

GW - 40

WORK PLANS

**SOIL AND
GROUND WATER INVESTIGATIONS
AND REMEDIAL ACTION PLAN**

**GIANT INDUSTRIES, INC.
BLOOMFIELD REFINERY
BLOOMFIELD, NEW MEXICO**

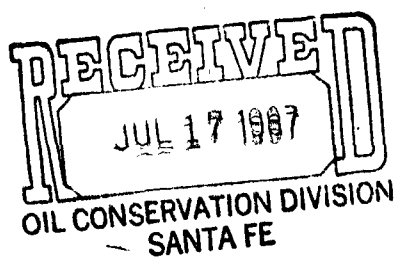
June 1987

Prepared for:

**MONTGOMERY & ANDREWS, P.A.
325 Paseo de Peralta
Santa Fe, New Mexico 87504-2307**

Prepared by:

**Geoscience Consultants, Ltd.
500 Copper Avenue, N.W., Suite 200
Albuquerque, New Mexico 87102**



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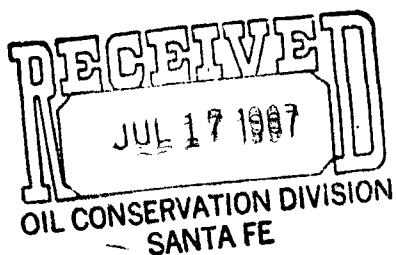
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500 Copper Avenue, N.W., Suite 200
Albuquerque, New Mexico 87102**



MONTGOMERY & ANDREWS

PROFESSIONAL ASSOCIATION
ATTORNEYS AND COUNSELORS AT LAWOF COUNSEL
A. K. Montgomery
William R. FedericiJ. O. Seth (1883-1963)
Frank Andrews (1914-1981)Seth D. Montgomery
Victor R. Ortega
Jeffrey R. Brannen
John B. Pound
Gary R. Kilpatrick
Thomas W. Olson
William C. Madison
Walter J. Melendres
Bruce Herr
Robert P. Worcester
James C. Compton
John B. Draper
Nancy M. Anderson
Alison K. Schuler
Janet McL. McKay
Jean-Nikole Wells
Mark F. Sheridan
Joseph E. Earnest
Stephen S. Hamilton
W. Perry Pearce
Stephen J. Rhoades
Brad V. Coryell
Michael H. Harbour
Robert J. Mroz
Sarah M. SingletonJay R. Hone
Charles W. N. Thompson, Jr.
John M. Hickey
Mack E. With
Galen M. Buller
Katherine W. Hall
Edmund H. Kendrick
Helen C. Sturm
Richard L. Puglisi
Arturo Rodriguez
Joan M. Waters
Terri A. Mazur
Stephen R. Kotz
James C. Murphy
James R. Jurgens
Ann M. Maloney
Deborah J. Van Vleck
Anne B. Hemenway
Roger L. Prucino
Kay E. Mares
Deborah S. Dungan
Helen L. Stirling
Rosaline Olson
William P. Slattery
Kenneth B. Baca

July 17, 1987

SANTA FE OFFICE
325 Paseo de Peralta
Post Office Box 2307
Santa Fe, New Mexico 87504-2307Telephone (505) 982-3873
Telecopy (505) 982-4289ALBUQUERQUE OFFICE
Suite 500
7 Broadway Place
707 Broadway, N.E.
Post Office Box 26927
Albuquerque, New Mexico 87125-8927

Telephone (505) 242-9677

LOS ALAMOS OFFICE
Suite 120
901 18th Street
Los Alamos, New Mexico 87544

Telephone (505) 662-0005

REPLY TO SANTA FE OFFICE

HAND DELIVEREDMr. William J. LeMay
Director
Oil Conservation Division
State Land Office
310 Old Santa Fe Trail
Santa Fe, New Mexico 87501

Re: Giant Industries, Inc./Bloomfield Refinery

Dear Mr. LeMay:

On behalf of our client, Giant Industries, Inc., I am enclosing a report on investigations of soil and ground water contamination at Giant's Bloomfield Refinery, prepared for us by Geoscience Consultants, Ltd. The latter part of the report outlines a remedial action plan for the containment and removal of such contamination. As you will see, our consultants believe that the implementation of this plan will be effective in preventing contamination originating within the refinery from migrating off the refinery site. However, our consultants also recognize that such actions cannot address the far more extensive contamination emanating from the Lee Acres landfill. After you

Mr. William J. LeMay
July 17, 1987
Page 2

have had an opportunity to review the report, we will be happy to discuss it with you and with members of your staff.

Sincerely,



Edmund H. Kendrick

EHK:jem:17
Enclosure
File #8361-85-09
Copy: Mr. David Boyer (w/o enclosure)

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1.0 EXECUTIVE SUMMARY

At the request of Montgomery and Andrews, P.A., Geoscience Consultants, Ltd. (GCL) performed site investigations at the Giant Bloomfield Refinery (GBR) to assess the environmental quality of the site. These investigations revealed several discrete areas of soil and ground water contamination. After evaluation, GCL began remedial action to remove or contain the contamination. Subsequent to initial remedial action, GCL performed additional studies and has developed a comprehensive remedial action plan. This report presents the results of all soil and ground water investigations performed to date by GCL at the Giant Bloomfield Refinery and describes the completed and proposed remedial actions.

GCL removed for treatment all known contaminated soil that feasibly could be excavated. Approximately 4500 cubic yards of contaminated soil have been spread within two bermed areas to prevent run-on and run-off while natural biodegradation takes place. Chemical analyses indicate that this process is effectively breaking down the oil and aromatic hydrocarbons in this soil.

The ground water contamination zones on the refinery site consist of three localized plumes as well as a regional plume resulting from past waste disposal practices at the Lee Acres Landfill. The on-site sources are identified in this report as the Diesel Spill Area, the Southern Refinery Area, and the Truck Fueling Area, each of which has exhibited floating product in some observation wells. For each of these ground water contamination areas, GCL has taken steps to identify the extent of the plume, contain the product on-site and remove the product contamination.

*What about
Spill in
NE Area*

The Lee Acres Landfill, which is located hydrologically upgradient from the refinery on land administered by the Bureau of Land Management (BLM), has generated a contaminant plume that GCL believes underlies much of the western portion of the refinery site in the course of moving in a southerly direction to the Lee Acres Subdivision. This plume geometry is supported by the analytical results of several ground water samples

which have been found to contain contaminants characteristic of contamination at the Lee Acres Landfill specifically several chlorinated solvents not generated by any known refinery source.

GCL supervised the drilling of 40 boreholes on refinery property in order to obtain information about the depth, lateral extent, and chemical quality of the contaminant plumes. Data from this drilling program were used to design the remedial action plan presented in this report. Eight recovery wells (3 in the Diesel Spill Area, 1 in the Truck Fueling Area, and 4 in the Southern Refinery Area) have been completed and fitted with product-recovery pumps.

There have been three studies assessing the role of Lee Acres Landfill as a potential contamination source: a terrain electromagnetic conductivity survey performed by the New Mexico Environmental Improvement Division (NMEID) (McQuillan and Longmire, 1986); an analysis of existing information for the BLM (AEPCO, Inc., 1986); and a soil gas survey for the BLM (Tracer Research Corporation, 1986). These studies identified the existence of a contaminant plume originating at the landfill and suggested that the landfill was the likely source of chlorinated hydrocarbons found in the well water of several domestic wells located in the Lee Acres Subdivision. GCL understands that the United States Geological Survey (U.S.G.S.) has installed ground water piezometers in the vicinity of the landfill and plans to conduct additional studies.

GCL is currently operating recovery pumps in the Diesel Spill Area, the Truck Fueling Area and the Southern Refinery Area to remove floating product and contaminated ground water. Data have shown that the current degree of pumping in the Diesel Spill Area is sufficient to contain and remove the floating product plume in that area. Data from the Southern Refinery Area indicate that continuous pumping from two previously existing wells and from the two additional recovery wells described in this remedial action plan will effectively contain the floating product

plume in this area. One recovery well installed in the Truck Fueling Area is expected to capture the plume resulting from the recent diesel leak in that area.

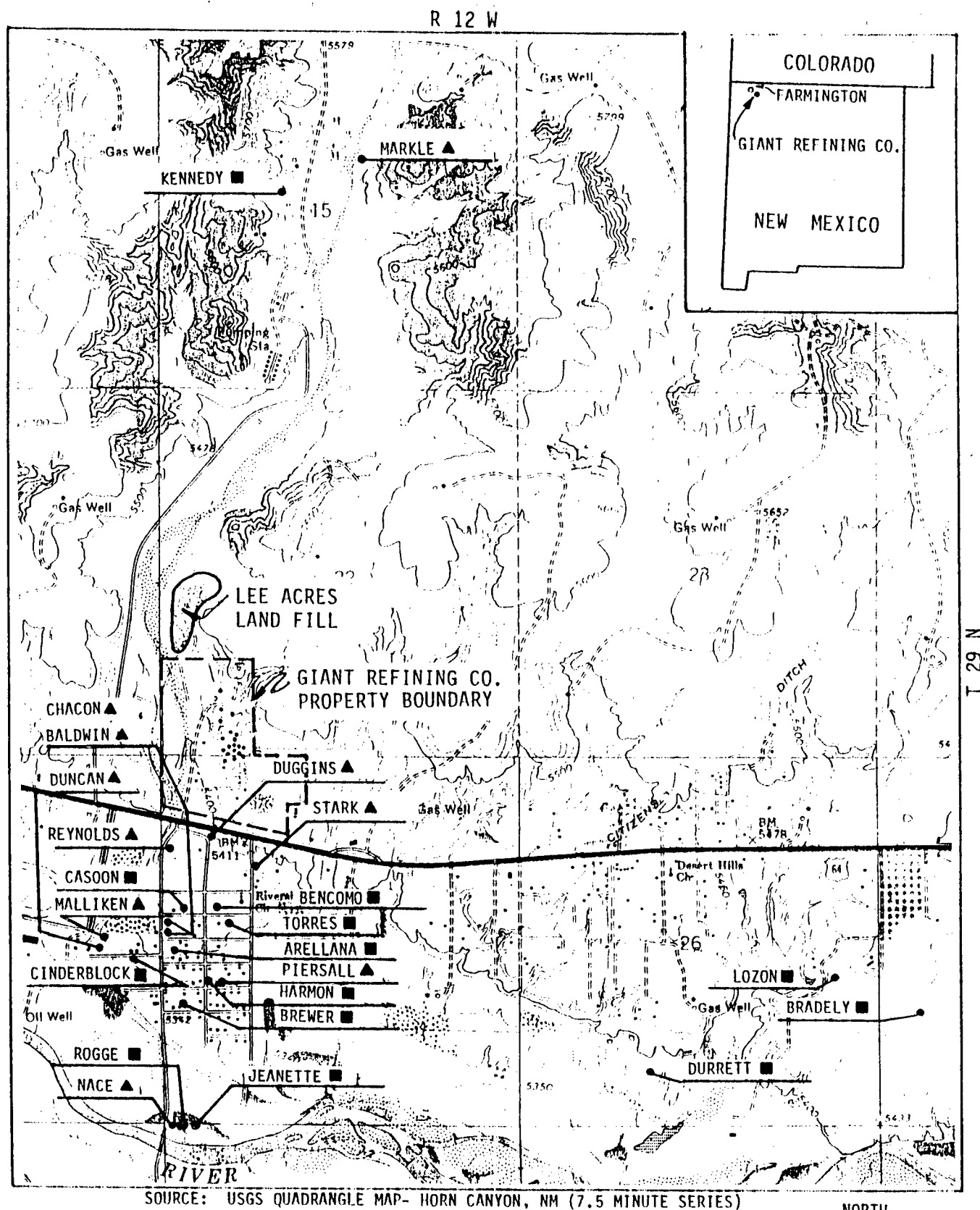
GCL believes that the remedial action plan presented in this report will be effective in preventing contamination -- both free-phase product and associated dissolved-phase product -- originating at the three on-site sources discussed above from migrating off the refinery site.

2.0 HISTORICAL BACKGROUND OF INVESTIGATIONS

The Giant Bloomfield Refinery (GBR) is located along hydrologic flow lines extending between the Lee Acres Landfill in the north and the Lee Acres Subdivision in the south. Detectable levels of chlorinated solvents have been found in at least two domestic water wells in the Lee Acres Subdivision. BLM consultants and the NMEID have identified the Lee Acres Landfill as the most likely source of this domestic well contamination. Because the refinery lies between the landfill and the subdivision, the contamination from the landfill has affected a large portion of the refinery property.

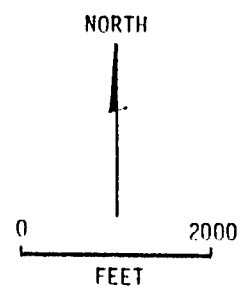
The precise location of the refinery is NW 1/4, Section 27 and SW 1/4, Section 22, T.29 N., R.12 W. in San Juan County, New Mexico, approximately 5 miles west of the town of Bloomfield. Figure 2-1 is a map of the area showing locations of the landfill, the refinery and known domestic water wells in the vicinity.

The Lee Acres Landfill was used from 1981 to 1986 as a modified sanitary landfill by San Juan County and was operated by the County Department of Public Works under a lease from the Bureau of Land Management-Farmington Resource Area (BLM). In addition to sanitary wastes, industrial liquid wastes were also dumped into liquid waste pits at the landfill. In April 1985, during a severe rain storm, one dike of the landfill liquid-waste pits failed and mixed industrial/domestic wastes entered an arroyo which extends in a southerly direction from the landfill, posing a possible threat to the San Juan River. During the same period, several releases of toxic H₂S gas from the liquid waste pits caused 15 people, including some on-site remedial workers, to experience difficulty in breathing, severe headaches, skin rashes, and other symptoms. Also during that time, the Governor called out the National Guard to secure the perimeter of the landfill. The NMEID ordered the landfill closed to liquid wastes, and a private contractor was hired by the NMEID to treat the pit contents with ferric chloride to control pH levels and prevent further releases of H₂S gas.



- WELL LOCATIONS FROM STATE ENGINEERS DRILL LOGS
LITHOLOGIC DESCRIPTIONS AVAILABLE
 - ▲ WELL LOCATIONS FROM NMEID
WATER CHEMISTRY DATA AVAILABLE
- WELL LOCATIONS ARE APPROXIMATE

FIGURE 2-1
LOCATION MAP



Analyses of solid-phase waste and sludge samples collected from the Lee Acres Landfill by NMEID personnel and others indicated that the wastes contained elevated concentrations of highly volatile and mobile organic compounds. Some of these are toxic and/or carcinogenic, including toluene, benzene, trichloromethane, 1,1,1-trichloroethane, trichloroethylene, dichloromethane, ethylbenzene, and all three isomers of xylene. High concentrations of sulfide and strontium and trace amounts of naphthalene, phenanthrene, and 2-methyl naphthalene were also detected in the solid medium of the wastes. Compounds detected in the aqueous phase of the wastes were quite similar to those in the solid phase. The aqueous phase also contained 2,4-dimethylphenol, phenol, and 2- and 4-methylphenol. These findings indicated that the wastes in the liquid waste pits were slightly corrosive, highly volatile, slightly flammable, and potentially toxic. The chemical analyses of lagoon water samples from the landfill are shown in Appendix A.

Complaints related to the odor and taste of drinking water from wells in the Lee Acres Subdivision were registered by local residents. Residential well water samples collected downgradient from the landfill contained low but detectable concentrations of benzene, tetrachloroethane, trichloroethylene, 1,1-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethene, 1,1,1-trichloroethylene, and dichlorobromomethane. These results are included in Appendix A. The investigations that followed have indicated that contamination of at least two private wells in the Lee Acres subdivision could be linked to leachate from the landfill (McQuillan and Longmire, 1986).

Giant's potential role in the observed ground water contamination was questioned by regulatory authorities. GCL conducted surface and subsurface investigations on the refinery property that revealed specific locations of soil and ground water contamination. Soil contamination was found near several product storage tanks, the fire fighting drill area and the stormwater catchment area. Three ground water contamination plumes were discovered in locations identified as the Diesel Spill Area, the Southern Refinery Area, and the Truck Fueling Area. GCL then

assessed the extent of this contamination and began remedial action. These on-site investigations have revealed that the Lee Acres Landfill contaminant plume is also present under the refinery property, complicating the delineation, containment and removal of any contaminants that may have originated from refinery sources.

3.0 SUMMARY OF INVESTIGATIONS

3.1 SOIL INVESTIGATIONS

Investigations have revealed several isolated locations of hydrocarbon contaminated soil (Section 5.0), and GCL has removed over 4500 cubic yards of this contaminated soil as part of a remedial action program (Section 7.0). The removed soil has been stored in bermed areas that are underlain by shale bedrock and do not contain shallow ground water.

3.2 GROUND WATER INVESTIGATIONS

GCL has drilled a total of 40 boreholes on the refinery site to characterize the general ground water regime and to investigate the nature and extent of the localized zones of ground water contamination. Of these 40 boreholes, 32 have been completed as wells. Table 3-1 lists all of the boreholes that have been drilled to date and their completion information; Table 3-2 lists their elevations and coordinates. Two entries are shown for GBR-21 and GBR-24 because each was completed with two casings in one borehole, screened at different depths to permit selective sampling of ground water from two separate zones. One zone is located below the floating product and the other intercepts the floating product.

GBR-1 through GBR-4 were boreholes advanced in the fire fighting drill area to define the nature and extent of the area. These borings did not encounter ground water and were not completed as wells. They were plugged with bentonite and abandoned. GBR-16, also in the fire fighting drill area, was completed as a 2-inch PVC piezometer, but was removed during the excavation of the area. GBR-12 was planned to be a monitor well but auger refusal above the water table precluded its completion. GBR-39 and GBR-40 were drilled in the Truck Fueling Area to determine the boundary of the plume, but were not completed as wells. GBR-14 (6-inch), GBR-27 (5-inch) and GBR-28 (6-inch) are PVC recovery wells in the Diesel Spill Area; GBR-6, GBR-29, GBR-37 and GBR-38 are 6-inch PVC recovery wells in the Southern Refinery Area. The remainder are 2-inch monitor wells or piezometers. Logs of all the borings are included in Appendix B, and the well locations are shown in Plate 1.

TABLE 3-1

DESCRIPTION OF WELLS AND BOREHOLES DRILLED AT THE
GIANT BLOOMFIELD REFINERY

GBR WELL NO.	COMPLETION DATE	LOCATION	MATERIAL	DIAM.	DEPTH	SCREEN
1	12/20/85	BURN PIT	-	-	20'	NOT COMPLETED
2	12/20/85	BURN PIT	-	-	25'	NOT COMPLETED
3	12/20/85	BURN PIT	-	-	11'	NOT COMPLETED
4	12/20/85	BURN PIT	-	-	25'	NOT COMPLETED
5	12/20/85	SOUTHERN	PVC	2"	55'	32' - 52'
6	09/09/86	SOUTHERN	PVC	6"	65'	20' - 60'
7	09/24/86	SOUTHERN	PVC,SS	2"	48'	31.6' - 41.6'
8	10/01/86	SOUTHERN	PVC,SS	2"	58'	38' - 53'
9	09/30/86	SOUTHERN	PVC,SS	2"	65'	50' - 60'
10	09/29/86	SOUTHERN	PVC,SS	2"	45'	29' - 39'
11	04/01/86	SOUTHERN	GALV.	2"	55'	40' - 50'
12	04/03/86	SOUTHERN	-	-	42'	NOT COMPLETED
13	04/01/86	SOUTHERN	PVC	2"	48'	32' - 42'
14	09/10/86	DIESEL SPILL	PVC	6"	65'	20' - 60'
15	09/28/86	DIESEL SPILL	PVC,SS	2"	60'	45' - 55'
16	05/28/86	BURN PIT	PVC	2"	25'	REMOVED
17	05/28/86	ARROYO	PVC,SS	2"	68'	31' - 51'
18	05/28/86	NORTHERN	GALV.	2"	50'	35' - 45'
19	10/01/86	SOUTHERN	PVC,SS	2"	51'	31' - 46'
20	04/18/86	SOUTHERN	PVC	2"	48'	27' - 37'
21S	04/16/86	DIESEL SPILL	PVC	2"	40'	17' - 32'
21D	04/16/86	DIESEL SPILL	PVC	2"	41'	33' - 38'
22	04/16/86	DIESEL SPILL	PVC	2"	48'	32' - 42'
23	04/16/86	DIESEL SPILL	PVC	2"	48'	24' - 34'
24S	04/17/86	DIESEL SPILL	PVC	2"	41'	23' - 33'
24D	04/18/86	DIESEL SPILL	PVC	2"	46'	33' - 43'
25	04/18/86	DIESEL SPILL	PVC	2"	48'	25' - 35'
26	04/18/86	DIESEL SPILL	PVC	2"	42'	22' - 62'
27	04/23/86	DIESEL SPILL	PVC	5"	67'	22' - 62'
28	05/27/86	DIESEL SPILL	PVC	6"	69'	24' - 64'
29	05/30/86	SOUTHERN	PVC	6"	72'	25' - 65'
30	09/24/86	DIESEL SPILL	PVC,SS	2"	49'	25' - 40'
31	09/15/86	DIESEL SPILL	PVC,SS	2"	45'	24.6' - 39.6
32	04/22/87	ARROYO	PVC,SS	2"	45'	24' - 39'
33	04/23/87	FUELING AREA	PVC	2"	48.5'	27' - 43'
34	04/24/87	FUELING AREA	PVC,SS	2"	48'	27' - 43'
35	04/24/87	FUELING AREA	PVC	2"	46'	25' - 41'
36	04/30/87	FUELING AREA	PVC	6"	70'	25' - 65'
37	04/28/87	SOUTHERN	PVC	6"	69'	26' - 66'
38	04/29/87	SOUTHERN	PVC	6"	72'	27' - 67'
39	04/23/87	FUELING AREA	---	---	43'	NOT COMPLETED
40	04/24/87	FUELING AREA	---	---	38'	NOT COMPLETED

GALV = Galvanized Steel
SS = Stainless Steel
PVC = Polyvinyl Chloride

TABLE 3-2

WELL ELEVATIONS AND COORDINATES

GBR WELL NO.	GROUND ELEVATION (IN FEET)	WELL COORDINATES (REFER TO PLATE 1)	
		NORTH	EAST
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	5392.70	10248	11696
6	5392.38	10235	11680
7	5392.53	10241	11688
8	5387.57	10150	11487
9	5387.64	10155	11468
10	5387.73	10158	11459
11	5387.80	10160	11448
12	-	-	-
13	5390.30	10355	11465
14	5393.53	10978	11382
15	5394.82	10944	11411
16	-	-	-
17	5401.30	11240	11142
18	5419.80	12022	11528
19	5391.74	10439	11322
20	5391.60	10255	11601
21S	5397.60	10946	11493
21D	5397.60	10946	11493
22	5393.88	10751	11459
23	5400.60	11014	11563
24S	5393.50	11084	11447
24D	5393.50	11084	11447
25	5395.00	10854	11476
26	5394.10	10950	11422
27	5396.90	10937	11484
28	5395.30	10869	11419
29	5387.90	10135	11550
30	5394.63	11015	11382
31	5391.47	10794	11351
32	5412.76	12062	11143
33	5393.35	10689	11383
34	5393.43	10694	11445
35	5393.35	10644	11447
36	5392.36	10589	11378
37	5387.80	10168	11420
38	5391.62	10114	11688
39	-	-	-
40	-	-	-

- Indicates that well was not completed

No map shows
any record to
be collected or paid.

There is no way to
supplemental

Ground water investigations have revealed two localized contamination areas caused by recent transportation activities (the Diesel Spill Area and the Truck Fueling Area), one localized area of ground water degradation due to past refinery activities (the Southern Refinery Area), and one aerially-extensive plume associated with the Lee Acres Landfill. The Diesel Spill Area is north of the truck dispatching office, the Truck Fueling Area is northwest of the truck dispatching office, and the Southern Refinery Area is in the southwest corner of the refinery site.

A pipeline leak in 1985 released an estimated 10,000 to 15,000 gallons of diesel fuel in the Diesel Spill Area. GCL originally detected free-floating product in four wells in the area but found only trace amounts of such product in other wells within 100 feet of the spill. Test pumping in the Diesel Spill Area demonstrated a very low hydraulic conductivity of the water-bearing zone in that area, which indicates that potentially degraded ground water is not migrating rapidly from its source, and can be removed by properly placed recovery wells.

In the Southern Refinery Area, GCL found free-floating product in 3 wells and discovered a water seep near the abandoned fire fighting drill area. Test pumping in this area and ground water modeling indicate that pumping from properly placed recovery wells will prevent off-site migration of floating product in this area.

The Truck Fueling Area is the site of localized ground water degradation caused by an underground pipeline leak at the fueling station in November 1986, that released approximately 15,000 gallons of diesel fuel. GCL investigated this area, identified the extent of the localized plume, and determined that it can be controlled by a recovery well placed at the leading edge of the plume.

3.3 PRODUCT RECOVERY INVESTIGATIONS

In order to assess the feasibility of product recovery, GCL has operated a pilot-scale recovery system in the Diesel Spill Area using GBR-27 as a recovery well. A traditional two-pump system, consisting of a water

level depression pump and a product recovery pump, was used in this pilot operation. In a two-pump system, the water level depression pump removes water from the well in order to create a cone of depression and induce the flow of floating product into the well; and the product recovery pump, which is located at the oil/water interface, skims floating product off the water as it accumulates in the well. However, GCL determined on the basis of test pumping, that the traditional two-pump system was not appropriate for this situation, because an excessive amount of water was removed in relation to the amount of floating product recovered. GCL then found that a single top-filling pump was sufficient both to remove floating product and maintain a cone of depression. This type of pump was installed and used for the remainder of the pilot operation.

GCL then installed a full-scale hydrocarbon recovery system in the Diesel Spill Area using GBR-14, GBR-27 and GBR-28. Pumping from the three wells has proven to be effective in controlling the plume. Giant will continue long-term pumping as further described in Section 8.1.2.

GCL installed similar pilot-scale pumps in GBR-6 and GBR-29 in the Southern Refinery Area to test the recovery of floating product prior to the installation of a full-scale recovery system for that portion of the refinery. These investigations indicated that additional recovery wells were required in this area in order to effectively contain the plume. Actions taken in this area, described in Section 8.2.2 include the installation of two additional recovery wells.

All hydrocarbons and water that have been recovered to date from the hydrocarbon recovery systems are being stored in above-ground storage tanks at the refinery until appropriate methods of disposal or treatment are approved by the New Mexico Oil Conservation Division (NMOCD). GCL has taken samples of this water and has investigated the feasibility of using impulse sprinklers for land application of the water. Further information on water treatment and disposal is presented in Section 8.5.

3.4 LEE ACRES LANDFILL INVESTIGATIONS

The NMEID has treated the liquid waste pits at the landfill with ferric chloride to reduce hydrogen sulfide generation, closed the landfill to liquid waste disposal, and has subsequently closed the landfill to disposal of any wastes.

The following three reconnaissance studies of the Lee Acres Landfill have been conducted to assess the effects of its contamination and to make recommendations for further action: a terrain electromagnetic conductivity survey by the NMEID (McQuillan and Longmire, 1986); an analysis of existing information for the BLM (AEPCO, Inc., 1986); and a soil gas survey for the BLM (Tracer Research Corporation, 1986).

From these investigations, the NMEID has determined that chlorinated solvents associated with the Lee Acres Landfill ground water contamination plume are widespread throughout the alluvial sediments of the nearby arroyo, and GCL has determined that these contaminants extend well under the refinery property. The plume is characterized by the presence of specific chlorinated solvents that were found in wastewater at the landfill site, in domestic wells located south of the refinery property, and in monitor wells located on the refinery property.

Additional investigations are being planned by the BLM to further evaluate the effects of the landfill contamination. The first of these began in January 1987, and includes the construction of a series of piezometers near the landfill to be used to establish the hydrologic conditions of the site. Seismic and electrical resistivity surveys were also conducted. To date these studies, which are being done by the U.S. Geological Survey (USGS) for the BLM, have only provided limited preliminary data.

4.0 HYDROGEOLOGY OF THE SITE

The refinery is located on weathered outcrops of the Nacimiento Formation which is comprised of shales, sandstones and siltstones of Cretaceous-Tertiary age. Immediately to the west of the refinery and on Giant's property is a large unnamed arroyo which is underlain by 30 to 60 feet of Quaternary alluvial sediments. Older Quaternary terrace deposits of cobbles and boulders are observed on the interfluvial ridges adjacent to the arroyo. These terrace deposits may have been utilized as fill on the refinery site. The San Juan River Valley is located south of the site and contains up to several hundred feet of alluvial fill.

The uppermost zone of ground water in the refinery area is an unconfined to partially confined water-table unit which is hosted by the weathered, locally porous sandstones and shales of the Nacimiento Formation and arroyo alluvium. These units merge hydrologically with the San Juan River alluvium to the south. Figure 4-1 is a generalized east-west cross section across the refinery site showing the relationship of the arroyo alluvium to bedrock. Major hydrogeologic features of the site are:

- o an interconnected water-table aquifer, hosted by both valley and arroyo fill and the upper parts of the Nacimiento sandstone;
- o ground water at a depth of 25 to 45 feet beneath the land surface;
- o an upper water-table surface generally conforming to topography, with ground water flow from north or northeast to south (towards the San Juan River) through the refinery area; and
- o minor, local zones of perched ground water, lying 5 to 30 feet above the water table.

Plate 1 shows an overall view of the site. Plates 2A and 2B present hydrogeologic cross sections of the refinery site, and the borings used to construct them. The specific locations of the cross sections on the refinery site are shown on Plate 3.

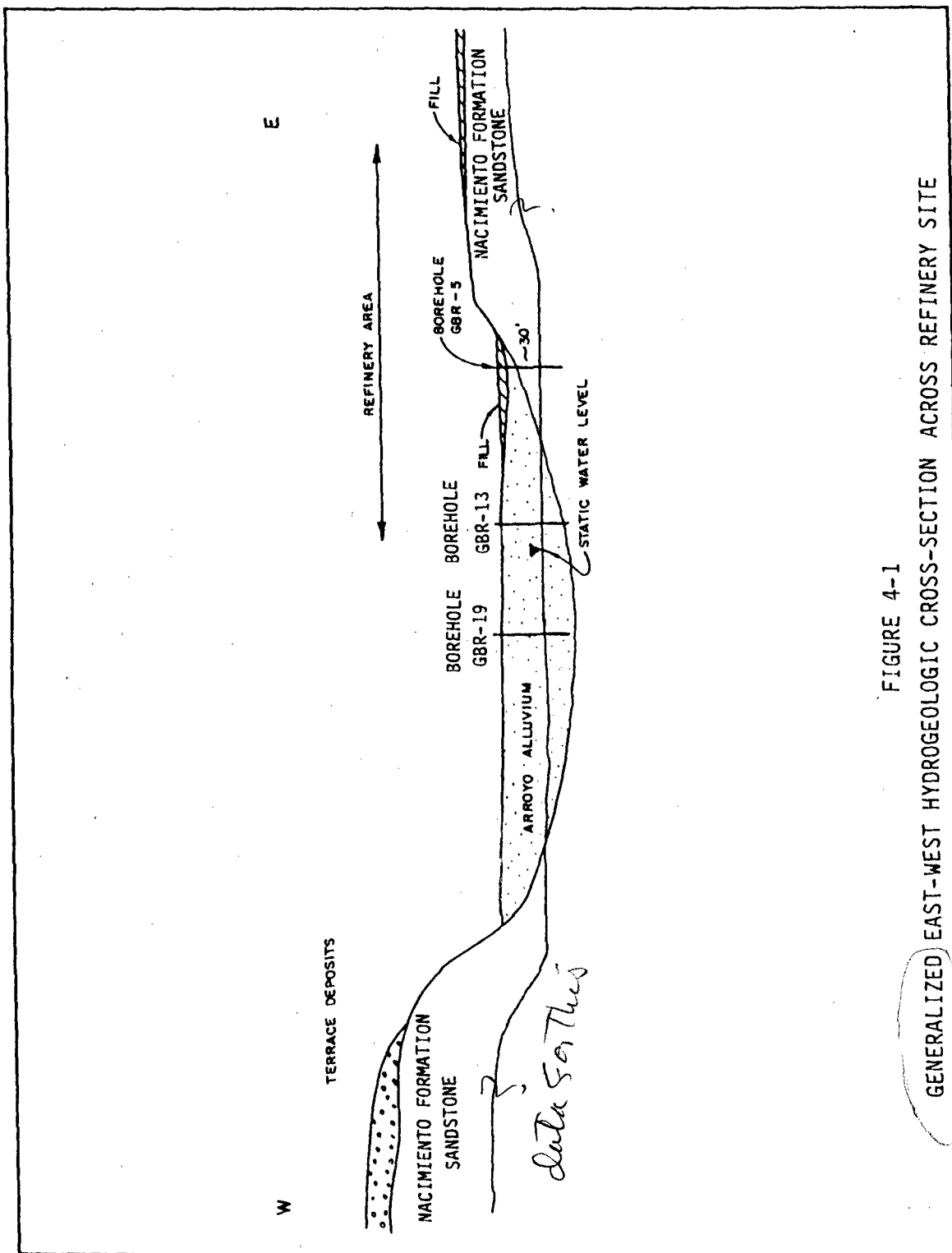


FIGURE 4-1
GENERALIZED EAST-WEST HYDROGEOLOGIC CROSS-SECTION ACROSS REFINERY SITE

GCL measured water levels and floating product thicknesses in all wells on the refinery property from April through November 1986. A record of these measurements is shown in Table 4-1. A water table contour map was prepared (Figure 4-2) based on the static water levels of all the wells at the refinery measured in November 1986. This map is representative of static conditions of the aquifer because pumping was not being done at that time. Where floating product was encountered, the product thickness (Table 4-1) has been multiplied by 0.8 and added to the measured water elevation. This calculation corrects for the difference in density between floating product and water by taking into account a product density of approximately 0.8 g/cc (Table 4-2). The result provides a value that would be the actual potentiometric surface.

The water table surface depicted in Figure 4-2 generally conforms to local topography. The ground water gradient slopes and flows from:

- o north to south in the arroyo toward the San Juan River;
- o northeast to southwest in the area east of the arroyo; and
- o east to west at the arroyo boundary near the Diesel Spill Area.

The water table contour maps presented in this report were generated by computer and represent the probable contour lines as interpreted from a significant number of data points.

Several pump tests were conducted in the Diesel Spill Area and in the Southern Refinery Area. Analysis of the pump tests in the Diesel Spill Area revealed small values of transmissivity and storativity near GBR-27 and moderate values near GBR-14. High values were found in the Southern Refinery Area near GBR-29. These findings imply that fine-grained sandstone, shale, and clay are more predominant in the northern part of the Diesel Spill Area and that coarse-grained sandstone dominates the geology in the southern part of the Diesel Spill Area and the Southern Refinery Area. Flow conditions appear to range from confined near GBR-27 where shale is present, to semi-confined near GBR-14 where clay is

TABLE 4-1

GIANT INDUSTRIES BLOOMFIELD REFINERY
CHRONOLOGY OF STATIC WATER LEVELS AND PETROLEUM PRODUCT THICKNESSES IN FEET
WELLS 5-16

year? 1986?

DATE	WELL NO.	GBR 5	GBR 5	GBR 5	GBR 5	GBR 6	GBR 6	GBR 7	GBR 7	GBR 8	GBR 8	GBR 9	GBR 9	GBR 10	GBR 10	GBR 11	GBR 11	GBR 12	GBR 12	GBR 13	GBR 13	GBR 14	GBR 14	GBR 15	GBR 15	GBR 16	GBR 16
		W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.	P.T.
4/3																											
4/15		5343.10																									
4/16																											
4/23		5341.20	0.00																								
4/30		5342.54	0.00																								
5/2			0.00																								
5/9																											
5/28			0.00																								
5/29		5358.21	1.38																								
5/30			0.08																								
7/1			6.75																								
7/15			14.00																								
7/31		5351.93	11.04																								
8/12		5351.53	11.49																								
10/7		5362.31	1.00	5359.50																							
10/8		5362.81	0.83	5359.54																							
10/8																											
(After Pumping GBR-7)		5362.39	0.75	5358.58																							
10/9																											
10/9																											
(After Pumping GBR-31)																											
10/16																											
10/17				5360.00																							
(after purging)																											
11/4		5363.10	0.71	5360.17	0.04	5362.50	0	5348.71	0	5348.46	0.04	5348.71	0	5348.17	2.04	5348.32	1.50	5351.79	0.38								
(after purging)																											
11/5 (after purge)																											
(After Pumping GBR-29)																											
11/19		5363.39	0.67	5360.33	0.08	5363.21	0	5349.12	0	5347.42	3.17	5349.08	1.04	5352.33	0.38												
11/21																											
(After pump test)																											

W.L. = WATER LEVEL IN FEET ABOVE SEA LEVEL
P.T. = PRODUCT THICKNESS IN FEET
- = NO MEASUREMENT
0 = ZERO MEASUREMENT

TABLE 4-1 CONTINUED
GIANT INDUSTRIES BLOOMFIELD REFINERY
CHRONOLOGY OF STATIC WATER LEVELS AND PETROLEUM PRODUCT THICKNESSES IN FEET CONT.
WELLS 17-25

DATE	WELL NO.	GBR 17	GBR 18	GBR 19	GBR 20	GBR 21(S)	GBR 21(O)	GBR 22	GBR 23	GBR 24(S)	GBR 24(O)	GBR 25
		W.L.	W.L.	W.L.	W.L.	W.L.	W.L.	W.L.	W.L.	W.L.	W.L.	W.L.
		P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.
4/3		-	-	-	-	-	-	-	-	-	-	-
4/15		-	-	-	-	-	-	-	-	-	-	-
4/16		-	-	-	-	-	-	-	-	-	-	-
4/23		-	-	-	-	-	-	-	-	-	-	-
4/30		-	-	-	-	-	-	-	-	-	-	-
5/2		-	-	-	-	-	-	-	-	-	-	-
5/9		-	-	-	-	-	-	-	-	-	-	-
5/28		-	-	-	-	-	-	-	-	-	-	-
5/29		-	-	-	-	-	-	-	-	-	-	-
5/30		-	-	-	-	-	-	-	-	-	-	-
7/1		-	-	-	-	-	-	-	-	-	-	-
7/15		-	-	-	-	-	-	-	-	-	-	-
7/31		-	-	-	-	-	-	-	-	-	-	-
8/12		-	-	-	-	-	-	-	-	-	-	-
10/7		-	-	-	-	-	-	-	-	-	-	-
10/8		-	-	-	-	-	-	-	-	-	-	-
10/9		-	-	-	-	-	-	-	-	-	-	-
10/9	(After Pumping GBR-31)	-	-	-	-	-	-	-	-	-	-	-
10/15		-	-	-	-	-	-	-	-	-	-	-
10/17		-	-	-	-	-	-	-	-	-	-	-
10/17	(After purging)	-	-	-	-	-	-	-	-	-	-	-
11/4		-	-	-	-	-	-	-	-	-	-	-
11/5		-	-	-	-	-	-	-	-	-	-	-
11/5	(After Pumping GBR-29)	-	-	-	-	-	-	-	-	-	-	-
11/19		-	-	-	-	-	-	-	-	-	-	-
11/21		-	-	-	-	-	-	-	-	-	-	-
11/21	(After pump test)	-	-	-	-	-	-	-	-	-	-	-

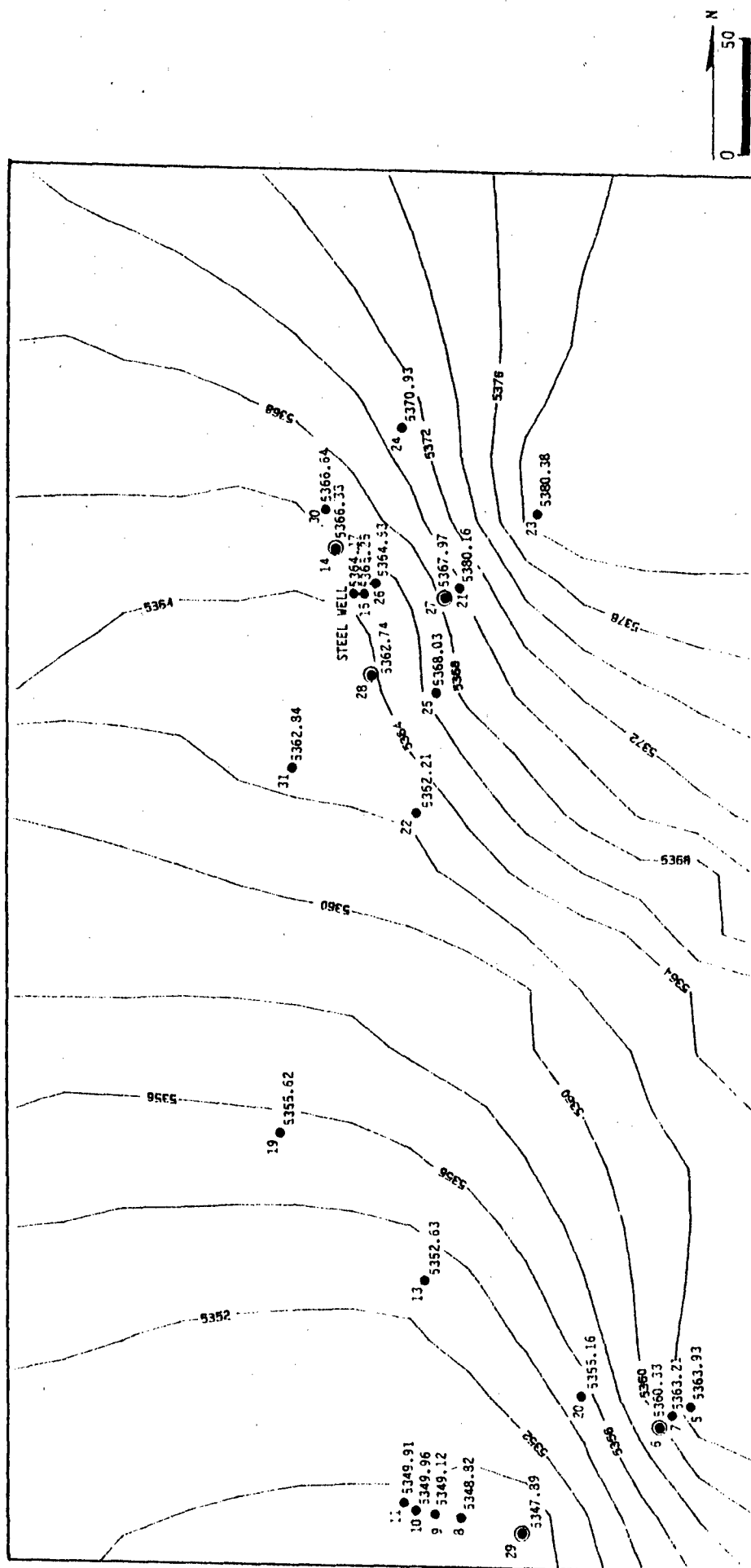
W.L. = WATER LEVEL IN FEET ABOVE SEA LEVEL
P.T. = PRODUCT THICKNESS IN FEET
0 = NO MEASUREMENT
0 = ZERO MEASUREMENT

BLOOMING

TABLE 4-1 CONTINUED
GIANT INDUSTRIES BLOOMFIELD REFINERY
CHRONOLOGY OF STATIC WATER LEVELS AND PETROLEUM PRODUCT THICKNESSES IN FEET CONT.
WELLS 26-31

DATE	WELL NO.-	GBR 26	GBR 27	GBR 28	GBR 29	GBR 30	GBR 31	STEEL WELL
		W.L.	P.T.	W.L.	P.T.	W.L.	P.T.	W.L.
4/3		-	-	-	-	-	-	-
4/15		-	-	-	-	-	-	5363.17
4/16		-	-	-	-	-	-	5363.08
4/23		5362.65	-	-	-	-	-	5362.80
4/30		5362.92	5357.04	-	-	-	-	-
5/2		5362.85	0	5360.16	7.17	-	-	5363.12
5/9		5362.75	-	-	-	-	-	5362.92
5/28		-	-	-	-	-	-	-
5/29		5361.29	0	5357.67	8.08	-	-	5363.04
5/30		-	0	-	8.98	0.17	5345.00	-
		-	-	-	-	0.13	0	0
7/1		-	0	-	9.00	-	-	-
7/15		5362.62	0	-	-	0.50	5342.85	5362.96
7/31		5362.93	0	5364.75	2.91	0.58	5341.02	-
		-	-	(after being pumped)	-	-	-	-
8/12		5362.31	0	-	-	1.22	5341.61	-
		-	-	5360.43	-	6.25	5366.00	5363.71
10/7		5363.72	0	5367.25	0.42	5362.18	0	0
10/8		-	-	-	-	-	-	-
10/9		-	-	-	-	-	-	-
10/9		-	-	-	-	-	-	-
(After Pumping GBR-31)		5363.56	0.04	5367.08	0.38	5361.47	0	5363.56
10/16		5363.35	0	-	-	5358.43	0	5362.79
10/17		5361.26	0	-	-	-	0	5363.04
(after purging)		-	-	-	-	-	-	-
11/4		-	-	-	-	5343.02	5.58	-
11/5		-	-	-	-	-	-	-
(After Pumping GBR-29)		5364.93	0.08	5368.08	0.29	5362.26	0	5364.21
11/19		5364.39	0.17	5367.91	0.08	5362.64	0.25	5364.17
11/21		-	-	-	-	-	0.17	5362.84
(After pump test)		5364.01	0.12	5357.16	0	5361.93	0	5363.79

W.L. = WATER LEVEL IN FEET ABOVE SEA LEVEL
P.T. = PRODUCT THICKNESS IN FEET
- = NO MEASUREMENT
0 = ZERO MEASUREMENT



Elevations in Feet above Sea Level, Measured in Monitor and Recovery Wells and Corrected for Floating Product, if Present.

FIGURE 4-2

GROUND WATER LEVEL CONTOUR MAP - GIANT BLOOMFIELD REFINERY, NOV. 1986

TABLE 4-2

GIANT BLOOMFIELD REFINERY
PRODUCT VISCOSITY DATA

<u>WELL NO.</u>	<u>SAMPLE NO.</u>	<u>API GRAVITY</u>	<u>SPECIFIC GRAVITY¹</u>
GBR 5	8610071647	45.3	0.800
GBR 10	8610071630	46.1	0.797
GBR 11 ²	-----	46.1	0.797
GBR 13	8610071605	43.8	0.807
GBR 21 ²	-----	43.8	0.807
GBR 28	8610071540	34.2	0.854
GBR 29	8610071619	44.2	0.805

Samples Collected By GCL, Analyzed by GBR

- 1= at 20°C, calculated from API gravity
2= determined by visual comparison with
analyzed samples

present, to unconfined near GBR-29, where clay and shale may be intermittently present but do not significantly affect flow. Descriptions of the pump tests and an analysis of results are presented below and summarized in Table 4-3. A detailed description of these tests, of data collected and of calculations performed is presented in Appendix C.

4.1 HYDROGEOLOGIC CHARACTERISTICS OF THE DIESEL SPILL AREA

4.1.1 GBR-27 Pump Test

GCL conducted the first pump test using GBR-27, which is located in the center of the Diesel Spill Area plume. The well was pumped for 16 hours at a rate of 0.88 gpm on April 30 and May 1, 1986. A 24 hour test was planned but the well was pumped dry and the test was terminated early. The pumped well had a drawdown of 21 feet at the end of the test, and an observation well 85 feet away (GBR-25) had a drawdown of 8 inches.

Drawdown and recovery data for this pump test along with plots of drawdown and recovery versus time and a thorough analysis of the data are shown in Appendix C. The aquifer parameters that were obtained using the data from both GBR-27 and GBR-25, correcting for the effects of floating product in GBR-27, are shown in Table 4-3.

GCL considers the calculated values for transmissivity and storativity for GBR-25 to be more representative of these aquifer characteristics in the Diesel Spill Area than those for GBR-27 because floating product was not present in GBR-25. Storativities estimated on the basis of data from observation well GBR-25 are well within the range of storativities generally associated with confined or partially confined units.

4.1.2 GBR-14 Pump Test

GCL conducted a pump test using GBR-14 on November 6, 1986, in order to better define the characteristics of the alluvial aquifer in the Diesel Spill Area. GBR-14 was step tested at 1 and 5 gpm and subsequently test-pumped at 2 gpm. Even at this low pumping rate, the well was pumped dry after 4 hours. Data obtained during the pump test, graphs of drawdown and recovery versus time, and a detailed analysis of the data are shown

TABLE 4-3

SUMMARY OF TRANSMISSIVITIES (T)
AND STORATIVITIES (S)
GIANT BLOOMFIELD REFINERY

<u>DIESEL SPILL AREA</u>	<u>I (gpd/ft)</u>	<u>S</u>
✓ GBR 14	792	NA
GBR 15	128	0.0045
GBR 25	387	0.00016
GBR 27	126	NA

ocb
T S
 ~100 -
 OK
 None
 14.7 none

SOUTHERN REFINERY AREA

GBR 8	2340	0.051
GBR 29	1040	NA

since drawdown
 only 0.76' after
 32 hrs,
 likely / pumping
 up cone SS
 9 sand perm.
 near Long P.
 higher Q
 step test than
 choose Q

NA = Not Applicable

(S cannot be estimated at pumped wells due to borehole storage effects)

in Appendix C. The analysis shows that the expanding cone of depression created by pumping GBR-14 encountered a less transmissive formation at the edge of the arroyo. The average transmissivity for GBR-14 was twice as large as the maximum transmissivity calculated for GBR-27 in the same area. Although transmissivity is only twice as large, the hydraulic conductivity of the alluvium could be an order of magnitude larger when differences in saturated thicknesses are considered. Thus, the sandstone acts as a low conductivity barrier when encountered by lateral stresses induced by pumpage of the adjacent alluvium.

What
was
the
GBR-14?

Characteristics of the alluvium near GBR-15, which was used to monitor the effects of this pump test, are also shown in Table 4-3. The estimated transmissivity of 128 gpd/ft. equals a hydraulic conductivity of 1.7 gpd/sq. ft., which is within the lower part of the range normally associated with silty sand. Storativity near GBR-15 was estimated as 0.0045, a value indicative of partially-confined conditions that may be encountered in the presence of extensive clay lenses.

Then
b = 75'?

4.1.3 Combined GBR-14, GBR-27 and GBR-28 Pump Test

GCL conducted a combined pump test utilizing GBR-14, GBR-27 and GBR-28 on November 19-21, 1986, for the purpose of identifying the combined effects of the three wells on the aquifer in the area of the floating product plume. The data from the test are presented in Appendix C along with plots of drawdown versus time for the three pumped wells and the six observation wells in the area. The closest observation wells were GBR-26, GBR-30 and the Steel Well.

See p. 53

No measurable drawdown response was observed in GBR-26, and only small drawdowns were observed in GBR-30 and the Steel Well even though they were each about 50 feet from the pumped well. These wells were screened within clayey sand or sandy clay located at the base of the alluvium in which GBR-14 was screened. Since there appears to be hydraulic communication between the coarser grained alluvium and the underlying clayey sand and sandy clay layers, as indicated by the response in well GBR-15, which was also screened in these layers, it is likely that silt has

steel well, GBR 26
had poor drawdown - not
(see sig 6.6, p. 53)

migrated through the gravel pack and may be lodged in the screens of the unresponsive wells. Alternatively, there could be a higher incidence of clay or shale between GBR-14 and the unresponsive observation wells than between GBR-14 and GBR-15, but given the closeness of the responsive and unresponsive observation wells this does not appear likely.

4.2 HYDROGEOLOGIC CHARACTERISTICS OF THE SOUTHERN REFINERY AREA

GCL conducted a pump test using GBR-29 in the Southern Refinery Area November 4-7, 1986. The data from this test and a thorough analysis are presented in Appendix C.

It was expected from observations during drilling of the well and from the experience of other wells on the site that GBR-29 would probably have a capacity of only about 1 gpm. Test pumping at 1 gpm, however, produced almost no drawdown and a rate of 2 gpm was subsequently used for the test. At 2 gpm, GBR-29 exhibited a drawdown of 9 inches after 31 hours and the nearest observation well, GBR-8, had a drawdown of 2 inches.

Transmissivity calculated on the basis of data from GBR-29 was estimated as 1040 gpd/ft., while transmissivity and storativity from the observation well (GBR-8) were determined to be 2340 gpd/ft. and 0.051, respectively. Transmissivities calculated from the test can be viewed as overall transmissivities for the unconfined system occurring throughout the alluvium and sandstone in the absence of containing shale units. An average transmissivity of 1690 gpd/ft. can therefore be used to characterize the unconfined alluvial system underlying the Southern Refinery Area.

? High

GCL concludes that the alluvium and sandstone underlying the Southern Refinery Area are hydraulically connected in the vicinity of GBR-29 and GBR-8. This system is generally unconfined, but confined conditions may exist locally beneath shale units of limited areal extent.

SURPRISE!

4.3 HYDROGEOLOGIC CHARACTERISTICS OF THE TRUCK FUELING AREA

GCL has drilled 5 exploratory boreholes in the Truck Fueling Area which are designated GBR-33, GBR-34, GBR-35, GBR-39 and GBR-40. Three of these were developed into 2-inch diameter observation wells (GBR-33, GBR-34 and GBR-35). GCL also installed a 6-inch diameter recovery well designated GBR-36. The lithologic logs of all the wells and boreholes are presented in Appendix B.

The hydrogeologic characteristics of the Truck Fueling Area area similar to those of the Diesel Spill Area which is nearby. Since an aquifer analysis was performed previously in the Diesel Spill Area, it was not necessary to perform such analysis in the Truck Fueling Area.

Do
Not
necessarily
argue!

5.0 SOIL CONTAMINATION

5.1 INVENTORY OF CONTAMINATED SOIL SITES

GCL investigated the Bloomfield Refinery site to identify potential sources of contamination. As a result, the following areas were identified.

- o Wastewater Retention Pond
- o Evaporation Pond
- o Fire Fighting Drill Area
- o Storage Tank Water Drain Areas
- o Storage Tank Bottom Containment Areas
- o Underground Catch Tank in Truck Loading Area
- o Stormwater Containment Areas
- o Amoco Produced Water Pits
- o Oil/Water Separator Area

The refinery operations relating to each of these areas is discussed below including, where possible, relevant dates of operation and waste disposal practices. The locations of each area can be found on the Site Location Map (Plate 1), except for the Storage Tank Bottom Containment Areas, which are not shown because they were located next to the tanks from which the waste material came.

5.1.1 Wastewater Retention Pond

Prior to construction of the oil/water separator and evaporation pond system, all oily refinery wastewaters were discharged to an unlined wastewater retention pond. Located approximately 25 feet south of the area where the oil/water separator eventually was constructed, the wastewater retention pond was in operation approximately from 1973 to 1978. The pond was about 30 x 30 feet in area with an estimated depth of 10-15 feet. The quantity of oily water discharged to this pond is unknown. However, during this period, the refinery was operated at a production capacity of approximately 2000 bbls/day, and the wastewater retention pond was of sufficient volume to contain all wastewater. When use of the wastewater retention pond was discontinued, the oily wastewater in the pond was recycled through the crude unit and the remaining sludges were left in place and covered.

5.1.2 Evaporation Pond

A synthetically-lined evaporation pond, designed for containment of oil/water separator effluent, was constructed in 1978. The pond was originally 50 feet square x 15 feet deep with a total capacity of 280,500 gallons. As refinery operations continued to expand during 1979-1980, the capacity of the pond was occasionally reached. When in 1980 the pond was expanded toward the south over an old storm-water catch basin, portions of the synthetic liner were removed. The pond was used to retain oil/water separator effluent until refinery operations ceased in June 1982.

5.1.3 Fire Fighting Drill Area

A pit was used as a fire fighting drill area to conduct fire fighting exercises in conjunction with neighboring fire departments until June 1979 when construction of the reformer unit began. The pit was approximately 20 feet long x 15 feet wide x 10 feet deep and exercises were scheduled on a weekly basis as weather permitted. Common practice was to partially fill the pit with water and float 1-2 barrels of crude oil on the surface. One or two gallons of gasoline were then added to help ignite the crude oil. As the oily material burned, fire fighters controlled or extinguished the fire. When the use of the pit for fire fighting exercises ceased, the pit, including any remaining residues of burned hydrocarbons, was covered with fill.

5.1.4 Storage Tank Water Drain Areas

Two unlined pits were used to dispose of water/paraffin wastes that were drained from crude Tanks 1 and 2. This practice may date from 1975 until the refinery closed in 1982. The pit next to Tank 1 was approximately 15 feet square x 7 feet deep. The pit next to Tank 2, which was covered over in 1984, was approximately 10 feet square x 7 feet deep.

5.1.5 Storage Tank Bottom Containment Areas

While the refinery was in operation, unknown quantities of unrecoverable tank bottoms were removed from six storage tanks (Tank Nos. 1, 4, 5, 13, 14 and 16) and buried within the respective containment berms. The

refinery followed the common industry procedure of recycling all recoverable tank bottoms and burying small quantities of unrecoverable bottoms in the containment area next to the tank.

5.1.6 Underground Catch Tank in Truck Loading Area

Between 1973 and 1975, an underground catch tank was installed to contain occasional product spills from the truck loading dock. The materials that accumulated in the tank were transferred to an above ground storage tank and were eventually fed back into the process stream. GCL supervised the removal of this tank from the ground so that contaminated soil in the area could be excavated.

5.1.7 Stormwater Containment Areas

Several stormwater containment areas (natural, closed depressions) have been identified from aerial photographs of the Bloomfield Refinery. One area was located approximately 25 feet south of the evaporation pond and measured 50 feet x 30 feet. A 1978 aerial photo shows what appears to be a berm in this area. This area, which apparently remained swampy throughout much of the year, received storm-water runoff from the refinery. This particular area was filled in when the evaporation pond was expanded in 1980 and is now partially covered by the southwestern corner of the unused evaporation pond. Two other stormwater containment areas were located at the base of the slope to the west of the fire fighting drill area. These were filled in when the parking lot area was leveled (see Plate 1).

5.1.8 Amoco Produced Water Pits

Amoco was operating a natural gas well at the northern end of the refinery property when Giant first purchased the refinery site and has continued to do so. Prior to 1985 all produced waters were discharged to unlined pits. These pits were replaced sometime in 1985 with fiberglass tanks. GCL has not been able to determine the quantities of produced waters that were discharged to these pits.

} O&L
Records

5.1.9 Oil/Water Separator

The abandoned oil/water separator was found to contain sludge that had accumulated from past operations. This sludge was completely contained in the concrete vessel. GCL has determined that this sludge should be removed from the refinery site.

5.2 SAMPLING OF CONTAMINATED SOIL SITES

GCL has taken soil samples from all of the excavated areas described in Section 5.1. The results of analysis of these samples are presented at the end of this section in Tables 5-1 and 5-2.

Prior to excavation, additional samples were taken from three areas: the Wastewater Retention Pond, the Fire Fighting Drill Area and the Storm-water Containment Area. A discussion of the sampling is summarized below.

5.2.1 Wastewater Retention Pond

GCL was unable to dig exploratory trenches or construct wells in the wastewater retention pond area because of uncertainties regarding the location of underground pipelines. Consequently, GCL dug one exploratory backhoe pit in what is believed to be the center of the area. Because underground lines in that area are within six feet of the surface, the backhoe pit was excavated to approximately 5.5 feet.

Oil-stained soil was observed from the surface to the bottom of the backhoe pit, with darker staining in the 2 to 4 foot depth interval. One laboratory analysis of samples collected in this area indicated that low levels of polynuclear aromatic hydrocarbons (PAH's) with some aromatic volatile hydrocarbons were present. However, the analysis of a composite sample by a second laboratory, showed detectable levels of naphthalene only, with no other PAH's present above detectable levels.

Needs
Further
investigation

5.2.2 Fire Fighting Drill Area

Previous investigation by GCL indicated that leachate from a septic tank to the east of the fire fighting drill area may have flowed through this

area toward the southwest and exited as a "seep" on the side of the topographic bench on which the fire fighting drill area was constructed. Additionally, some water may have originated from possible leaks in an underground fire line that runs north-south along the eastern edge of the fire fighting drill area. Giant discontinued its use of the fire line and the laundry facilities that discharge to the septic tank pending results of GCL's investigation of the fire fighting drill area.

A zone of ground water exists in sandstone and shale strata, approximately 5 feet below the base of the fill covering the fire fighting drill area. The ground water encountered under the fire fighting drill area had a hydrocarbon odor and a thin ($<1/8$ ") film of product. This water has an upper-surface elevation of approximately 5405 feet, in contrast to a water-level elevation of 5363 feet in well GBR-5, located 175 feet to the southwest. This difference of 42 feet in elevation over a lateral distance of 175 feet implies that the ground water under the fire fighting drill area is "perched" on an impermeable layer. Such a steep ground water gradient (1 foot in 4) could not be stable without substantial, continuous recharge, and no such recharge source was observed. The location of the "seep" relatively high on the sloped area west of the fire fighting drill area is consistent with the hypothesis of a perched ground water zone.

GCL drilled 4 boreholes (GBR-1 through GBR-4) in the fire fighting drill area for the purpose of collecting soil samples. In addition, GCL installed a 2.0" piezometer (GBR-16) in this ground water zone, located at the western edge of the fire fighting drill area. GBR-16 was removed during excavation of the fire fighting drill area.

Seven soil samples were taken from the fire fighting drill area. Excavation showed that the volume of contaminated soil in the immediate area of the fire fighting drill area was greater than previously anticipated, and large volumes appear to exist in the seep area and the area between the fire fighting drill area and the seep. The stained area observed in the aerial photograph represents a thin (1-4 inch) layer of oil-stained soil.

Thicker accumulations of stained soil (1-4 feet) were found in the central 250-300 square feet of the fire fighting drill area. Preliminary analyses of this soil material show that oil and grease and low levels of PAH's and aromatic volatile hydrocarbons were the primary contaminants.

5.2.3 Stormwater Containment Area

This area is located south and east of the office, immediately west of the fire fighting drain area seep. GCL excavated and collected 18 soil samples from 4 backhoe pits in this area, labeled "Pit #1" through "Pit #4" in the tables of soil analyses. This excavation indicated that visible soil contamination exists in an area of approximately 15,000 square feet, to a depth of at least 10 feet.

In December 1985, GCL selected a location in the parking lot below and southwest of the fire fighting drill area to advance a deeper borehole. The purpose of this borehole (GBR-5) was to allow the sampling of ground water in a location downgradient from the fire fighting drill area and the refinery. GCL encountered an unexpected zone of apparent hydrocarbon soil contamination up to 50 feet thick. Based upon auger cuttings, this zone extended from just below the surface of the ground to the water table at a depth of 33 feet, and another 15 to 20 feet below the water table. Continuous coring of similar areas indicates that "clean" sediments may exist between surface soil contamination and documented soil discoloration at the ground water/unsaturated zone interface. Analyses of soil samples show that benzene in concentrations up to 3.9 ppm existed at 55 feet below the surface of the ground, which is 25 feet beneath the water table.

GCL drilled another borehole near GBR-5 for the specific purpose of obtaining soil samples for moisture determination. The moisture profile of the soil is presented in Appendix E along with an analysis of the saturated and unsaturated hydraulic conductivity of the soil. The borehole used to collect these samples was developed into a monitor well (GBR-7).

The results of chemical analysis for all of the soil samples are presented in Tables 5-1 and 5-2.

TABLE 5-1
GIANT INDUSTRIES BLOOMFIELD REFINERY
CHEMICAL ANALYSES, SOIL SAMPLES

ORGANIC PARAMETERS:

BTEX
CONCENTRATIONS LISTED IN PARTS PER BILLION

SAMPLE #	LOCATION	BENZENE	TOLUENE	ETHYL BENZENE	META	XYLENES ORTHO & PARA	XYLENES TOTAL
8512191020	EVAPORATION POND	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191021	EVAPORATION POND	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191022	EVAPORATION POND	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191430	EVAPORATION POND	ND (0.01)	ND (0.01)	3.04 (0.01)	NA -	NA -	ND (0.01)
8512191440	EVAPORATION POND	ND (0.01)	ND (0.01)	3.80 (0.01)	NA -	NA -	ND (0.01)
8512191450	EVAPORATION POND	ND (0.01)	ND (0.01)	4.10 (0.01)	NA -	NA -	ND (0.01)
8512191157	STORAGE TANK BOTTOM CONTAINMENT AREAS	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191158	STORAGE TANK BOTTOM CONTAINMENT AREAS	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191159	STORAGE TANK BOTTOM CONTAINMENT AREAS	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191200	STORAGE TANK BOTTOM CONTAINMENT AREAS	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191201	STORAGE TANK BOTTOM CONTAINMENT AREAS	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191202	STORAGE TANK BOTTOM CONTAINMENT AREAS	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191459	AMOCO PRODUCED WATER PIT	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512191500	AMOCO PRODUCED WATER PIT	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512200850	GBR-1	ND (0.01)	ND (0.01)	9.37 (0.01)	NA -	NA -	ND (0.01)
8512200900	GBR-1	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512200916	GBR-1	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512201046	GBR-2	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512201240	GBR-5	ND (0.01)	ND (0.01)	ND (0.01)	NA -	NA -	ND (0.01)
8512201410	GBR-5	ND (0.01)	ND (0.01)	3.90 (0.01)	NA -	NA -	ND (0.01)
8605011412	GBR-11	ND (0.0001)	ND (0.0001)	ND (0.0001)	NA -	NA -	ND (0.001)
8605021516	GBR-13	(0.001 (0.0001)	35000 (0.0001)	32000 (0.0001)	NA -	NA -	279000 (0.001)

NA = not analyzed
ND = not detected

Detection limits in parentheses

Depths?

TABLE 5-1 (Cont.)
GIANT INDUSTRIES BLOOMFIELD REFINERY
CHEMICAL ANALYSES, SOIL SAMPLES

ORGANIC PARAMETERS:

BTEX
CONCENTRATIONS LISTED IN PARTS PER BILLION

SAMPLE #	LOCATION	BENZENE	TOLUENE	ETHYL BENZENE	META	XYLENES ORTHO & PARA	XYLENES TOTAL
8605021605	PIT #1 (a)	(0.001 (0.0001)	167000 (0.0001)	468000 (0.0001)	NA -	NA -	9950000 (0.001)
8605021550	PIT #2 (a)	ND (0.0001)	ND (0.0001)	ND (0.0001)	ND -	ND -	NA (0.001)
8605021618	PIT #3 (a)	ND (0.0001)	ND (0.0001)	ND (0.0001)	NA -	NA -	ND (0.001)
8605021635	PIT #4 (a)	9000 (900)	270 (4)	100 (2)	84000 (12000)	37000 (24000)	NA -
8605021635	PIT #4 (a)	(1000 (100)	4842000 (100)	3683000 (100)	NA -	NA -	32569000 (1000)
8512181220	STORAGE TANK	ND	ND	ND	NA	NA	ND
	WATER DRAIN	(0.01)	(0.01)	(0.01)	-	-	(0.01)
8605020230	STORAGE TANK,	2.4	1.4	ND	ND	2.0	NA
	WATER DRAIN, FLOOR	(1.0)	(1.0)	(0.5)	(1.0)	(2.0)	-
8605020225	STORAGE TANK, WATER	ND	ND	ND	ND	ND	NA
	DRAIN, SOUTH WALL	(1.0)	(1.0)	(0.5)	(1.0)	(2.0)	-
8605020305	UNDER STAIRWAY (b)	17000 (2000)	10000 (2000)	ND (1500)	92000 (2000)	66000 (4000)	NA -
8605020310	WEST WALL (b)	ND (1.0)	ND (1.0)	ND (0.5)	ND (1.0)	ND (2.0)	NA -
8605020320	SOUTH WALL (b)	ND (1.0)	ND (1.0)	ND (0.5)	ND (1.0)	ND (2.0)	NA -
8605020245	SOUTH WALL CENTER (c)	210 (10)	120 (10)	6.8 (5.0)	1400 (10)	1000 (20)	NA -
8605020250	NORTHWEST CORNER (c)	50000 (10000)	10000 (10000)	10000 (200)	230000 (10000)	210000 (20000)	NA -
8605020300	NORTH WALL CENTER (c)	ND (400)	ND (400)	ND (200)	2300 (400)	5000 (800)	NA -
8605091410	NEAR SEEP	ND (1.0)	ND (1.0)	ND (0.5)	ND (1.0)	ND (2.0)	NA -
8605091420	MIDDLE OF	ND	ND	ND	ND	ND	NA
	EXCAVATION (d)	(1.0)	(1.0)	(0.5)	(1.0)	(2.0)	-
8605091430	MIDDLE OF EAST	1.4	ND	ND	9.5	6.5	NA
	WALL (d)	(1.0)	(1.0)	(0.5)	(1.0)	(2.0)	-
8605091450	BLACK SLUDGE BELOW	2000	140	170	17000	9300	NA
	FIRE LINE (d)	(400)	(10)	(5)	(400)	(800)	-
8604031115	WASTEWATER RETENTION	ND	ND	ND	NA	NA	ND
	POND	(100)	(100)	(100)	-	-	(1000)
8604031115	WASTEWATER RETENTION	ND	ND	ND	670	880	NA
	(split) POND	(8)	(50)	(20)	(20)	(40)	-
8606051905	FIRE FIGHTING DRILL	15500 (100)	11900 (100)	NA (100)	NA -	NA -	1100 (100)
8604011445	FIRE FIGHTING DRILL	(1000 (100)	85000 (100)	42000 (100)	NA -	NA -	36000 (1000)
	AREA						

NA = not analyzed

ND = not detected

Detection limits in parentheses

(a) Stormwater Containment Area

(b) Storage Tank Bottom Containment Areas

(c) Underground Truck Loading Area Catch Tank Excavation

(d) Wastewater Retention Pond

TABLE 5-2
GIANT INDUSTRIES BLOOMFIELD REFINERY
CHEMICAL ANALYSES, SOIL SAMPLES

ORGANIC PARAMETERS:

POLYNUCLEAR AROMATIC HYDROCARBONS, pH
CONCENTRATIONS LISTED IN PARTS PER BILLION

SAMPLE NO.	LOCATION	NAPHTH	ANTHRA- CENE	PHENAN- THACENE	BENZO (b) FLUORANTHENE	BENZO (k) FLUORANTHENE	BENZO (a) PYRENE	FLUOR- ANTHENE	1-METHYL NAPHTHLENE	PYRENE	FLUORENE	2-NITRO PHENOL	PHENOL	CRESOL	2,4-DIMETHYL PHENOL	2,4-DINITRO- PHENOL	4-NITRO- PHENOL	4,6-DINITRO- O-CRESOL	AMMONIA AS N	ORTHO- PHOSPHATE AS P	pH
3605021516	GBR-13	2530	1920	1000	ND	ND	NA	ND	ND	ND	ND	29000	31000	ND	ND	ND	ND	ND	NA	NA	NA
3605021605	PIT #1 (a)	ND	3040	2040	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA
3605021550	PIT #2 (a)	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	3000	ND	ND	ND	ND	ND	NA	NA	NA
3605021618	PIT #3 (a)	ND	339	330	ND	ND	NA	1254	ND	ND	ND	ND	ND	ND	ND	ND	27000	ND	ND	NA	NA
3605021635	PIT #4 (a)	2520	1540	2000	ND	ND	NA	4630	ND	2220	ND	ND	50000	ND	ND	ND	ND	ND	NA	NA	NA
3605021635	PIT #4 (a) (split)	1500	ND	ND	ND	ND	ND	ND	NA	ND	150	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA
3604011443	FIRE FIGHTING DRILL AREA	15	44	43	ND	ND	ND	54	ND	ND	120	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(b)	FIRE FIGHTING DRILL AREA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	12250	500	23200000	6.3
3604031115	WASTEWATER RETENTION POND	ND	3700	ND	ND	ND	NA	6100	ND	2000	ND	3000	16000	ND	ND	ND	ND	ND	NA	NA	NA
3604031115	WASTEWATER RETENTION (split) POND	300	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA

ND = not detected
NA = not analyzed

(a) Storm Water Containment Area
(b) 3604011440, 3604011441, 3604011442
3604011443, 3604011444

6.0 GROUND WATER CONTAMINATION

6.1 INVENTORY OF CONTAMINATED GROUND WATER SITES

GCL determined existing ground water quality through a comprehensive sampling program utilizing all of the wells within refinery boundaries. Floating and/or dissolved hydrocarbons were found in several wells in the following areas:

- o Diesel Spill Area
- o Truck Fueling Area
- o Southern Refinery Area

Table 4-1 (in Section 4.0) is a chronological record from April through November 1986 of static water levels and floating product thicknesses, if any, in each of the wells on the site. Tables 6-1 through 6-6 summarize the results of physical and chemical analyses of water samples collected by GCL and the New Mexico Oil Conservation Division (NMOCD). When reviewing these tables, it should be noted that the date and time of day when a sample was taken is included in the sample number. For instance, the sample number listed in Table 6-1 for GBR-5 is 8606051745. Thus, this sample was taken on June 5, 1986 at 5:45 p.m. The results of these analyses indicate that the physical parameters (Table 6-1), and the inorganic ground water chemistry (Table 6-2 and Table 6-3) are typical of waters found in Cretaceous rocks of the San Juan Basin (Stone and others, 1983).

The organic analyses presented in Tables 6-4 through 6-6 indicate the extent of dissolved-phase ground water contamination by distinct chemical groups. One such group of contaminants, shown in Table 6-4, consists of aromatic organic compounds including benzene, toluene, ethylbenzene and xylene (BTEX). The presence of these contaminants is coincident with the floating product plumes in both the Diesel Spill Area (GBR-15, GBR-21, GBR-23, GBR-24, GBR-26, GBR-27, GBR-28, GBR-30 and the Steel Well), and the Southern Refinery Area (GBR-5, GBR-6, GBR-7, GBR-8, GBR-9, GBR-10, GBR-11, GBR-13 GBR-20 and GBR-29).

TABLE 6-1
GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
ORGANIC CHEMICAL ANALYSIS
PHYSICAL PARAMETERS

WELL NO.	SAMPLE NO.	ANALYTICAL LAB	pH	(uMHQS) CONDUCTIVITY	(CELSIUS) TEMP	TOTAL DISSOLVED SOLIDS (in parts per million)
GBR-05	8606051745	OCD	7.00	3700	25.0	2865
GBR-07	8610171550	GCL	6.92	3600	19.0	NA
GBR-08	8610171615	GCL	6.86	7500	16.8	NA
GBR-09	8610171630	GCL	7.20	3550	17.0	NA
GBR-11	8606051705	OCD	7.00	7200	25.0	7593
GBR-13	8606051900	OCD	7.00	7800	18.5	10553
GBR-14	8610171215	GCL	6.80	2850	17.5	NA
GBR-15	8610171215	GCL	7.25	3450	15.6	NA
GBR-17	8605290830	GCL	NA	NA	NA	3024
GBR-17	8606051230	OCD	7.00	5500	18.5	4355
GBR-17	8610171050	GCL	6.97	2650	15.6	NA
GBR-18	8606051435	OCD	7.00	4100	17.0	4934
GBR-18	8610170815	GCL	7.55	4300	14.2	NA
GBR-19	8610171510	GCL	6.84	4250	17.2	NA
GBR-20	8606051730	OCD	7.00	3400	21.0	3473
GBR-20	8610171525	GCL	7.04	2800	18.2	NA
GBR-21D	8610170900	GCL	6.97	6000	14.1	NA
GBR-22	8610170950	GCL	6.45	6000	14.5	NA
GBR-24	8606052040	OCD	7.00	NA	NA	NA
GBR-24D	8610171130	GCL	7.28	3250	18.3	NA
GBR-25	8605091210	GCL	NA	NA	NA	5096
GBR-25	8610170925	GCL	6.81	5000	15.3	NA
GBR-26	8610171230	GCL	6.91	2300	18.2	NA
GBR-27	8606052000	OCD	7.00	7200	21.0	9023
	* SPLIT	GCL	7.00	7200	21.0	9023
GBR-29	8606051525	OCD	7.00	NA	NA	1293
GBR-30	8610171155	GCL	6.84	4300	17.1	NA
GBR-31	8610171350	GCL	6.60	5000	17.5	NA
STEELWELL	8610171330	GCL	7.28	2500	17.5	NA
EAST SEEP	8606051905	OCD	7.00	1600	21.5	NA
WEST SEEP	8510291450	OCD	NA	1550	21.0	
SEEP	8510241435	GCL	7.50	NA	NA	1258

GCL = GEOSCIENCE CONSULTANTS, LTD.
OCD = OIL CONSERVATION DIVISION
NA = not analyzed for this parameter

TABLE 6-2
GIANT INDUSTRIES BLOOMFIELD REFINER
GROUND WATER SAMPLES
CHEMICAL ANALYSES

INORGANIC PARAMETERS

CHEMICAL CONCENTRATIONS IN MG/L

WELL NO.	SAMPLE NO.	ANALYTICAL LAB	HCO3	Ca	Cl-	CO3	K	Mg	Na	SO4
GBR-05	8608051745	OCD	837	320	464	0	6.79	97.6	588.8	491
GBR-11	8606051705	OCD	474	1030	2200	0	5.85	68	782	314
GBR-13	8606051900	OCD	470	1464	3070	0	2.73	70.8	377.2	1332
GBR-17	8606051230	OCD	376	712	1105	0	1.17	33.4	616.4	1202
GBR-18	8606051435	OCD	122	420	262	0	6.13	29.3	432	3141
GBR-20	8606051730	OCD	428	420	290	0	10.1	14.6	248.4	1776
GBR-24	8606052040	OCD	NA	NA	NA	NA	NA	NA	NA	NA
GBR-27	8606052000	OCD	350	1100	2816	0	1.17	141.1	526.7	1530
GBR-29	8606051525	OCD	106	800	1513	0	0	63	349	1113
SEEP	8606051525	OCD	100	100	134	0	0	14.6	4.6	70
SEEP	8510241435	GCL	NA	NA	98	NA	NA	NA	NA	9

GCL = GEOSCIENCE CONSULTANTS, LTD.
OCD = OIL CONSERVATION DIVISION
NA = not analyzed for this parameter

TABLE 6-3
GIANT INDUSTRIES BLOODFIELD REFINERY
GROUND WATER SAMPLES

CHEMICAL ANALYSIS

CHEMICAL CONCENTRATIONS IN MG/L

WELL NO.	SAMPLE NO.	ANALYTICAL LAB	Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg	Mg	Mn	Mo	Ni	Pb	Se	Si	Sn	Sr	V	Zn
GBR-05	8611201640	QCD	<0.1	<0.1	<0.005	0.6	0.2	<0.1	570	<0.1	<0.1	<0.1	<0.1	<0.1	NA	105	3.9	<0.1	<0.1	<0.1	NA	16	<0.1	<0.1	<0.1	<0.1
GBR-09	8611210820	QCD	<0.1	<0.1	<0.005	0.3	<0.1	<0.1	520	<0.1	<0.1	<0.1	<0.1	<0.1	NA	36	1.1	<0.1	<0.1	<0.1	NA	6.3	<0.1	10	<0.1	<0.1
GBR-11	8605291615	SCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.366	NA	NA	NA	NA	NA	NA
GBR-11	8606051705	QCD	<0.1	<0.1	0.014	0.3	0.5	<0.1	970	<0.1	<0.1	<0.1	<0.1	6.9	<0.0005	100	7.1	<0.1	0.2	<0.1	0	7.86	<0.1	19	<0.1	7.3
GBR-11	8606051705	SCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	8.5	<0.1	9.6	<0.1	8.0
GBR-11	8611201515	QCD	<0.1	<0.1	0.013	0.3	0.4	<0.1	530	<0.1	<0.1	<0.1	<0.1	2.3	NA	57	5.7	<0.1	<0.1	<0.1	NA	7.0	<0.1	30	<0.1	<0.1
GBR-13	8611201735	QCD	<0.1	<0.1	<0.005	0.5	0.3	<0.1	1610	<0.1	<0.1	<0.1	<0.1	5.5	NA	130	4.0	<0.1	0.6	0.076	NA	NA	NA	NA	NA	NA
GBR-17	8605290830	SCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	<0.0005	50	<0.05	<0.1	<0.1	<0.1	3	5.9	<0.1	12	<0.1	<0.1
GBR-17	8606051230	QCD	<0.1	<0.1	0.007	0.3	<0.1	<0.1	730	<0.1	<0.1	<0.1	<0.1	<0.1	NA	54	<0.05	<0.1	0.1	<0.1	NA	6.2	<0.1	11	<0.1	<0.1
GBR-17	8611211450	QCD	<0.1	<0.1	<0.005	0.2	<0.1	<0.1	660	<0.1	<0.1	<0.1	<0.1	<0.1	NA	32	5.2	<0.1	<0.1	<0.1	NA	8.3	<0.1	7.4	<0.1	<0.1
GBR-19	8611211510	QCD	<0.1	<0.1	<0.005	0.2	0.4	<0.1	390	<0.1	<0.1	<0.1	<0.1	0.7	NA	68	4.4	<0.1	<0.1	<0.1	NA	6.0	<0.1	12	<0.1	<0.1
GBR-24S	8611210945	QCD	<0.1	<0.1	<0.005	0.2	<0.1	<0.1	530	<0.1	<0.1	<0.1	<0.1	<0.1	NA	43	0.6	<0.1	<0.1	<0.1	NA	7.5	<0.1	7.1	<0.1	<0.1
GBR-24D	8611211105	QCD	<0.1	<0.1	<0.005	0.3	0.1	<0.1	330	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	ND	NA	NA	NA	NA	NA	NA
GBR-27	8606052000	SCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
GBR-27	8606052000	SCL	NA	NA	<0.005	0.5	<0.1	<0.1	650	<0.1	<0.1	<0.1	<0.1	<0.1	NA	55	4.3	<0.1	<0.1	<0.1	NA	5.6	<0.1	12	<0.1	<0.1
GBR-27	8611211270	QCD	<0.1	<0.1	<0.005	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.14	NA	NA	NA	NA	NA	NA
GBR-29	8605300945	SCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0005	83	5.8	<0.1	<0.1	<0.1	<0.1	9.0	<0.1	15	<0.1	<0.1
GBR-29	8606051525	QCD	<0.1	<0.1	0.008	0.4	<0.1	<0.1	814	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	<0.1	ND	NA	NA	NA	NA	NA	NA
GBR-29	8606051525	SCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	15	2.2	<0.1	<0.1	<0.1	NA	7.8	<0.1	3.4	<0.1	<0.1
GBR-30	8611210930	QCD	<0.1	<0.1	<0.005	0.3	<0.1	<0.1	190	<0.1	<0.1	<0.1	<0.1	<0.1	NA	105	2.3	<0.1	0.6	<0.1	NA	7.3	<0.1	26	<0.1	<0.1
GBR-31	8611211295	QCD	<0.1	<0.1	<0.005	0.5	<0.1	<0.1	1280	<0.1	0.3	<0.1	<0.1	0.2	NA	NA	7.2	<0.1	ND	ND	2.1	ND	4.6	ND	0.1	<0.1
SEEP	8510241430	QCD	NA	20	NA	5.4	9.8	ND	260	ND	ND	ND	ND	56	NA	36	3.5	<0.1	<0.1	<0.1	NA	30.0	<0.1	5.9	<0.1	0.2
SEEP	8606051905	QCD	<0.1	<0.1	0.024	5.4	0.4	<0.1	160	<0.1	<0.1	<0.1	<0.1	24	NA	22	NA	<0.1	<0.1	ND	NA	NA	NA	NA	NA	NA
SEEP	8606051905	SCL	<0.05	NA	<0.05	NA	<1.0	NA	NA	<0.01	<0.05	<0.05	<0.01	32	<0.002	NA	NA	NA	NA	<0.05	<0.01	NA	NA	NA	NA	NA
SEEP	3510241435	SCL																								

SCL = GEOSCIENCE CONSULTANTS, LTD.
QCD = OIL CONSERVATION DIVISION
NA = not analyzed for this parameter

TABLE 6-4

GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSIS

ORGANIC PARAMETERS

CONCENTRATIONS LISTED IN PARTS PER BILLION

WELL NO.	SAMPLE NO.	ANALYTICAL LAB	BENZENE	TOLUENE	ETHYL BENZENE	PARA	XYLENES META	ORTHO	XYLENES TOTAL
GBR-01	8606051115	GCL	ND	ND	NA	ND	ND	ND	ND
GBR-05	8601231410	GCL	830	638	229	-	-	-	2204
GBR-05	8606051745	DCD	530	200	1000	1000	2300	300	3600
GBR-05	8611201640	DCD	210	31	700	550	1400	81	2031
GBR-06	8611201545	DCD	70	ND	ND	1000	ND	240	1240
GBR-07	8610171550	GCL	8	10	11	-	-	-	33
GBR-07	8611201615	DCD	21	ND	ND	15	14	ND	29
GBR-08	8610171615	GCL	2670	1460	1870	-	-	-	6980
GBR-09	8610171630	GCL	41	66	54	-	-	-	138
GBR-09	8611210820	DCD	49	ND	ND	1	ND	1	2
GBR-10	8611210845	DCD	9500	1100	670	940	1600	590	3130
GBR-11	8604010845	GCL	9.7	14.1	2.7	-	-	-	14.2
GBR-11	8605291615	GCL	9025	3088	NA	-	-	-	6981
GBR-11	8606051705	DCD	4600	3100	960	1000	2100	1100	4200
GBR-11	8611201515	DCD	6500	2800	680	690	1400	690	2780
GBR-13	8604151545	GCL	42	25	11	-	-	-	99
GBR-13	8605091550	GCL	129	32	3	-	-	-	105
GBR-13	8606051900	DCD	1300	12	130	250	410	71	731
GBR-13	8611201735	DCD	2900	1800	520	740	1500	630	2870
GBR-14	8610171215	GCL	ND	ND	ND	ND	ND	ND	ND
GBR-14	8611211135	DCD	ND	ND	ND	ND	ND	ND	ND
GBR-15	8610171315	GCL	334	52	209	-	-	-	772
GBR-17	8605290830	GCL	ND	ND	NA	-	-	-	ND
GBR-17	8606051230	DCD	ND	ND	ND	ND	ND	ND	ND
GBR-17	8607150730	GCL	ND	ND	NA	-	-	-	ND
GBR-17	8611211450	DCD	ND	ND	ND	ND	ND	ND	ND
GBR-18	8605090925	GCL	ND	ND	ND	-	-	-	ND
GBR-18	8606051435	DCD	50	11	ND	ND	4	ND	4
GBR-18	8607081050	DCD	ND	1	ND	ND	ND	1	1
GBR-18	8607081100	DCD	ND	ND	ND	ND	ND	ND	ND
GBR-18	8611211425	DCD	ND	ND	ND	ND	ND	ND	ND
GBR-19	8610171515	GCL	112	105	111	-	-	-	306
GBR-19	8611211510	DCD	200	18	270	140	34	100	274
GBR-20	8605091040	GCL	ND	ND	ND	-	-	-	ND
GBR-20	8606051730	DCD	4	ND	<5	ND	ND	ND	ND
GBR-20	8611201711	DCD	41	ND	ND	28	22	ND	50
GBR-21	8605091700	GCL	ND	22	2	-	-	-	234
GBR-22	8605091350	GCL	ND	ND	ND	-	-	-	ND
GBR-23	8604181800	GCL	1513	823	NA	-	-	-	2092
GBR-24	8604181810	GCL	61160	58740	NA	-	-	-	120000
GBR-24	8605091625	GCL	1154	803	147	-	-	-	1020
GBR-24	8606052040	DCD	680	690	140	290	410	190	890
GBR-24S	8611210945	DCD	580	200	300	270	150	75	495
GBR-24D	8611211105	DCD	230	5	180	140	ND	7	147
GBR-25	8605091210	GCL	ND	ND	ND	-	-	-	ND
GBR-26	8605091515	GCL	ND	ND	ND	-	-	-	ND
GBR-26	8610171230	GCL	5280	119	54	-	-	-	1140
GBR-27	8605181400	GCL	ND	ND	ND	-	-	-	ND
GBR-27	8606052000A	DCD	410	120	ND	96	240	170	506
GBR-27	8606052000B	DCD	50	74	12	77	240	140	457
GBR-27	8510241435	GCL	5230	ND	3160	-	-	-	3250
GBR-27	8611211220	DCD	ND	ND	ND	ND	ND	ND	ND
GBR-28	8605291600	GCL	2419	819	NA	-	-	-	4019
GBR-28	8607151900	GCL	319	143	NA	-	-	-	224
GBR-29	8606051525	DCD	2600	3000	600	700	1500	670	2870
GBR-29	8606051525	GCL	3818	3338	NA	-	-	-	5210
GBR-29	8605300945	GCL	388	643	NA	-	-	-	2000
GBR-29	8611201440	DCD	240	72	98	340	710	350	1400
GBR-30	8610171155	GCL	ND	ND	ND	ND	ND	ND	ND
GBR-30	8611210930	DCD	ND	ND	ND	52	28	9	89
GBR-31	8610171350	GCL	4	6	ND	-	-	-	14
GBR-31	8611211205	DCD	ND	ND	ND	ND	ND	ND	ND

TABLE 6-4 (Cont.)

CONCENTRATIONS LISTED IN PARTS PER BILLION									
WELL NO.	SAMPLE NO.	ANALYTICAL LAB	BENZENE	TOLUENE	ETHYL BENZENE	PARA	XYLENES META	ORTHO	XYLENES TOTAL
STEEL WELL	8605091140	GCL	ND	ND	ND	-	-	-	ND
STEEL WELL	8610171330	GCL	144	148	179	-	-	-	356
SEEP	8606051905	OCD	28000	18000	1200	2200	5500	3000	10700
SEEP	8606051905	GCL	15500	11900	NA	-	-	-	ND
SEEP	8604011435	GCL	511000	103	48	-	-	-	1518
SEEP	8510241413	GCL	5230	ND	3160	-	-	-	3250
SEEP	8510241430	OCD	4100	ND	200	28	860	ND	888
SEEP	8510241450	OCD	2200	110	80	ND	80	ND	80

GCL = GEOSCIENCE CONSULTANTS, LTD.

OCD = OIL CONSERVATION DIVISION

NA = not analyzed for this parameter

ND = not detected

TABLE 6-5
GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSIS

POLYNUCLEAR AROMATIC HYDROCARBONS

CONCENTRATIONS LISTED IN PARTS PER BILLION

WELL NO.	SAMPLE NO.	ANALYTICAL LAB	NAPH	1-METHYL NAPH	2-METHYL NAPH	ACENAPHTH -ALENE	ACENAPHTHENE	ANTHRACENE	PHENAN-THRAcene	FLUOR-ANTHRENE	PYRENE	BENZ(A)ANTHRACENE	CHRYSENE	BENZ(B)FLUORANTHRENE	BENZ(K)FLUORANTHRENE	BENZ(A)PYRENE	DIBENZ(A,H)ANTHRACENE	INDENO(1,2,3-CD)PYRENE	BENZ(18-H,I)PERYLENE
58R-07	8610171550	SEL	ND	NA	NA	7	ND	ND	7	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
58R-08	8610171615	SEL	50	NA	NA	244	78	69	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
58R-09	8610171630	SEL	49	NA	NA	19	7	16	ND	ND	10	ND	ND	ND	ND	ND	ND	ND	ND
58R-15	8610171715	SEL	ND	NA	NA	9	ND	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
58R-19	8610171515	SEL	28	NA	NA	71	122	21	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND
58R-26	8610171230	SEL	9	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
58R-27	SPLIT	SEL	400	1100	2400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
58R-31	8610171350	SEL	3	NA	NA	19	ND	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
STEEL WELL	8610171330	SEL	ND	NA	NA	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SEL = GEOSCIENCE CONSULTANTS, LTD.

OCD = OIL CONSERVATION DIVISION

NA = not analyzed

ND = not detected

TABLE 5-5
SANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSIS

CHLORINATED HYDROCARBONS

WELL NO.	SAMPLE NO.	ANALYTICAL LAB	ACRYLONITRILE	BROMOFORM	CCl4	DIBROMOMETHANE	DICHLOROETHANE	CHLORODIBROMOMETHANE	CHLOROTHANE	2-CHLOROETHYL VINYL ETHER	CHC13	1,1-DCA	1,2-DCA	1,1-DCE	1,2-DCE
BR-05	8606051745	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-06	861201640	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-07	861201545	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-08	861201615	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-09	861210820	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-10	861210845	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-11	8606051705	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-12	861201315	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-13	8606051900	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-14	861201735	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-15	8610171215	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-16	8610171315	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-17	8606051230	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-18	8607150730	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-19	861211450	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-20	8606051435	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-21	861211425	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-22	8610171315	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-23	861211510	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-24	8606051730	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-25	861201711	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-26	8606052040	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-27	861210945	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-28	861211105	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-29	8610171230	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-30	8606052004	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-31	861211435	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-32	861211220	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-33	8607151900	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-34	8606051325	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-35	861201440	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-36	8610171135	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-37	861210930	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-38	8610171330	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-39	861211205	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-40	8610171330	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BR-41	861211330	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
STEEL WELL	8610171330	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SEEP	8606051905	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SEEP	861211535	ODD	NA	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

ODD = OIL CONSERVATION DIVISION
NA = not analyzed
NO = not detected

TABLE 5-6 (Cont.)
GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSIS

CHLORINATED HYDROCARBONS

CONCENTRATIONS LISTED IN PARTS PER BILLION

Sample compound

WELL NO.	SAMPLE NO.	ANALYTICAL LAB	1,2-DICHLORO-PROPANE	1,3-DICHLORO-PROPYLENE	METHYL BROMIDE	METHYL CHLORIDE	1,1,2,2-TETRA-CHLORO-ETHANE	TCR	TCE	VINYL CHLORIDE	TRICHLORO-ETHENE	METHYLENE CHLORIDE
GBR-05	8606051745	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-06	8611201640	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-07	8611201545	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-09	8611201615	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-10	8611210820	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-11	8606051705	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-12	8611201515	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-13	8606051900	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-14	8611201735	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-15	8610712115	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-16	8610712115	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-17	8607150730	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-18	8611211430	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-19	8611211425	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-20	8610711515	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-21	8611211510	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-22	8606051730	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-23	8611201711	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-24	8606052040	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-25	8611210945	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-26	8610711105	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-27	8606052008	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-28	8610711435	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-29	8611211220	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-30	8607151900	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-31	8606051325	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-32	8611201440	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-33	8610711155	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-34	8611210930	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-35	8610711350	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-36	8610711305	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-37	8611211205	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-38	8606051905	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
GBR-39	8611211335	CCD	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA

CCD = GEOSCIENCE CONSULTANTS, LTD.
OCD = OIL CONSERVATION DIVISION
NA = not analyzed
ND = not detected

The presence of these contaminants may also be associated with the Lee Acres Landfill plume as evidenced by BTEX contamination found in well GBR-18 upgradient to the refinery.

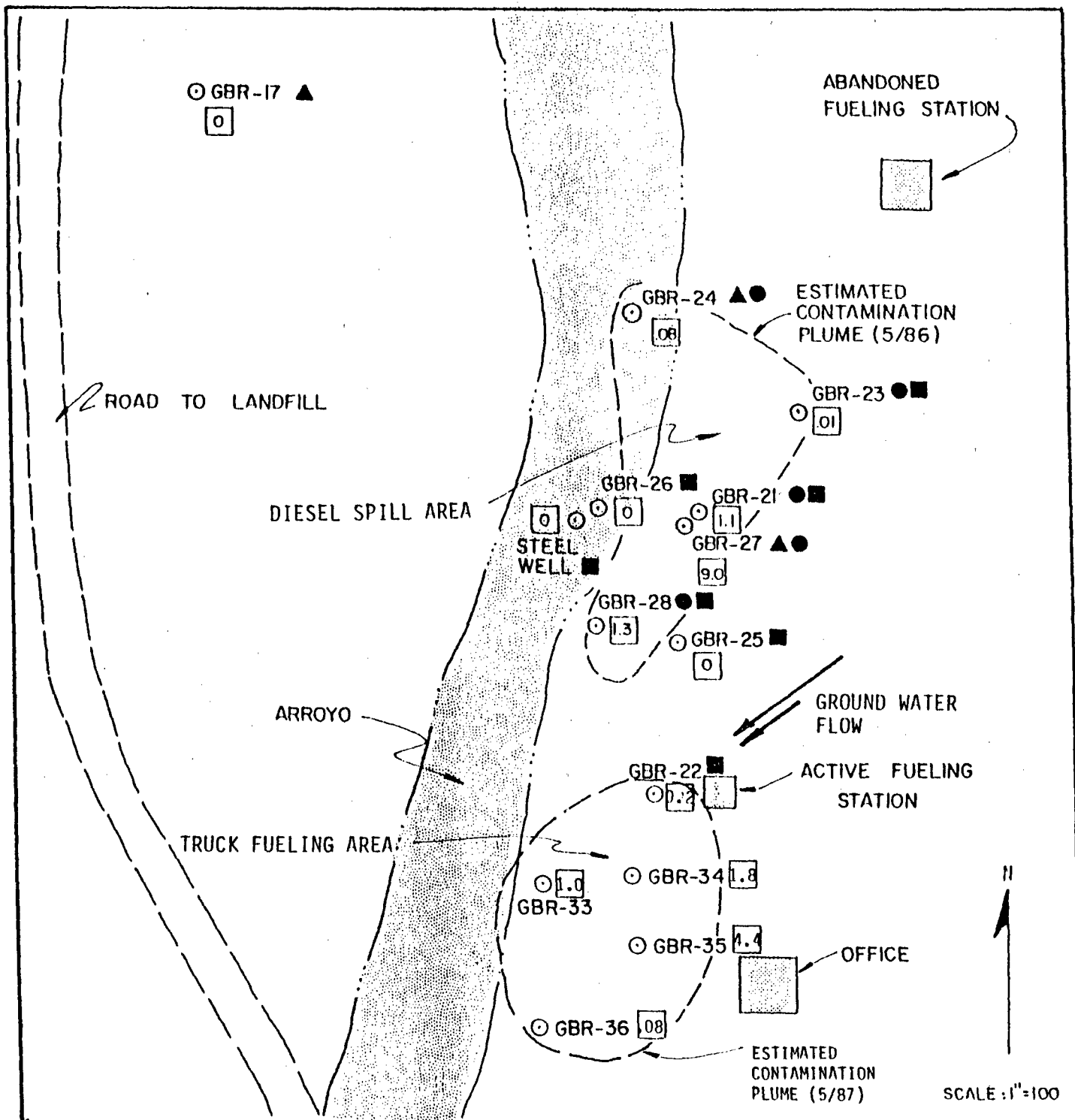
Another group of contaminants, shown in Table 6-6, consists of a number of chlorinated solvents that apparently were not utilized in refinery processes, with the exception of 1,1-DCA and 1,2-DCA, which were used as gasoline additives. The detection of these contaminants in GBR-13, GBR-17, GBR-19, GBR-29, and GBR-31 indicates the presence of a plume emanating from Lee Acres Landfill. This is so because these compounds were known to exist in wastewater at the landfill but were not in use nor discharged from refinery operations. This conclusion is further supported by the presence of chlorinated solvents in GBR-17, which is located upgradient from all refinery activities and directly downgradient from the Lee Acres Landfill.

6.2 DIESEL SPILL AREA

6.2.1 Plume Identification

GCL used the earliest available information from the monitor wells to estimate the extent of the product and dissolved-contamination plumes at the refinery site in order to provide a baseline for future evaluations. Analysis of the data resulted in the estimated product-plume boundary shown in Figure 6-1. This map is based on the measured floating-product thicknesses and ground water sample analyses from all existing wells (except GBR-22) in the area on May 30, 1986. Floating product was found in GBR-27 (9 feet), GBR-21 (1 foot), GBR-23 (1 inch) and GBR-28 (1 foot). These thicknesses have since been significantly reduced by pumping from the three recovery wells in the area, as discussed below. Another nearby down-gradient well (GBR-22) did not show any floating product, which indicates that the plume was localized. Since that time, floating product has appeared in GBR-22 as a result of a recent leak in the Truck Fueling Area.

GCL generally found dissolved-phase petroleum hydrocarbon products (benzene, toluene, xylenes and ethylbenzene) only in wells containing



LEGEND

- - - - - APPROXIMATE EXTENT OF PRODUCT PLUME
- - DISSOLVED BTEX DETECTED IN WELL
- - NOT ANALYZED FOR HALOGENATED HYDROCARBONS
- - UNCORRECTED BOREHOLE PRODUCT THICKNESS (FT.)
- ▲ - HALOGENATED HYDROCARBONS PRESENT IN WELL

**FLOATING PRODUCT THICKNESSES AND PRESENCE OF DISSOLVED PHASE PRODUCTS
IN WELLS BEFORE PRODUCT RECOVERY
DIESEL SPILL AND TRUCK FUELING AREAS
GIANT - BLOOMFIELD**

floating product. Initially none were found in nearby GBR-22 and the old "Steel Well". This association indicates that the dissolved-product plume closely coincides with the floating-product plume and the areal extent of both can be characterized by similar methods.

6.2.2 Plume Characteristics

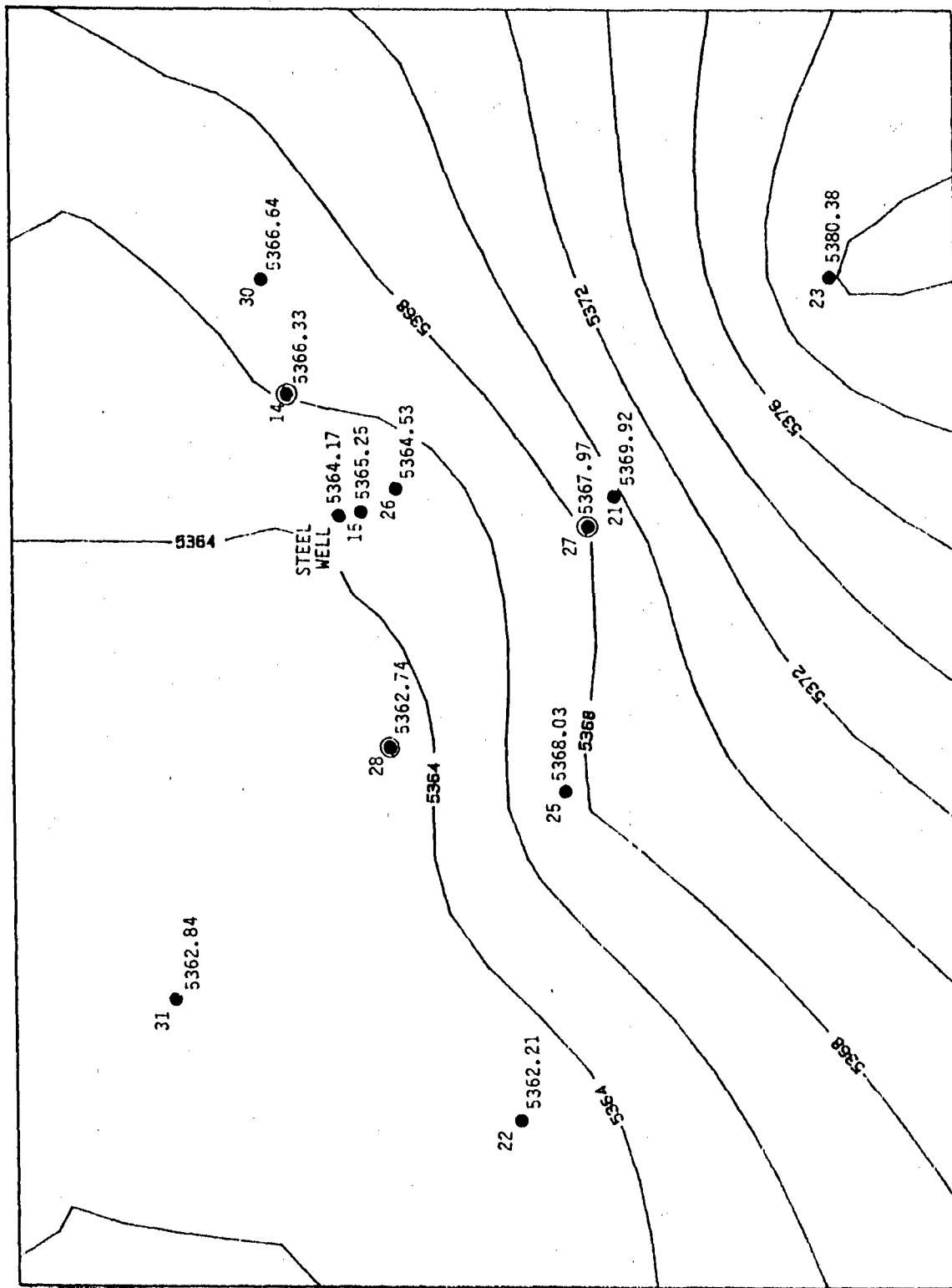
Based on the water level and floating product thickness measurements listed in Table 4-1 (in Section 4.0), GCL has prepared a series of contour maps showing water levels and product thickness for different conditions and different time periods. These are presented in Figures 6-2 through 6-7. These plots were generated by computer and represent existing conditions based on the observed values shown at each measuring point (well) from which the contours were generated.

Figure 6-2 was constructed by the same method as Figure 4-2 (discussed in Section 4.0) and displays water table relationships beneath the Diesel Spill Area in more detail. Again, it should be noted that ground water slopes and flows west and southwest toward the arroyo, then south down the arroyo. Southward deflection of flow lines in the arroyo suggest a high transmissivity of arroyo alluvium relative to units in the eastern part of the site.

Figure 6-3 is a contour map of the floating product according to measurements taken on May 30, 1986. It shows the plume to be centered around GBR-27 and restricted to a relatively small area. This is the baseline condition before any product pumping commenced.

Beginning in June 1986, GCL conducted experimental and pilot-scale pumping that reduced the floating product as demonstrated by subsequent measurements. Figure 6-4 is a contour map of the floating product as measured on October 7, 1986, after 4-1/2 months of intermittent pilot-scale pumping. It should be noted that the shape and distribution of the floating product plume is similar to what it was in May 1986 (compare with Figure 6-3), but the thickness of the plume is much less. The fact that the shape of the plume has been maintained indicates that the

yeh!
same
computer
drew both!



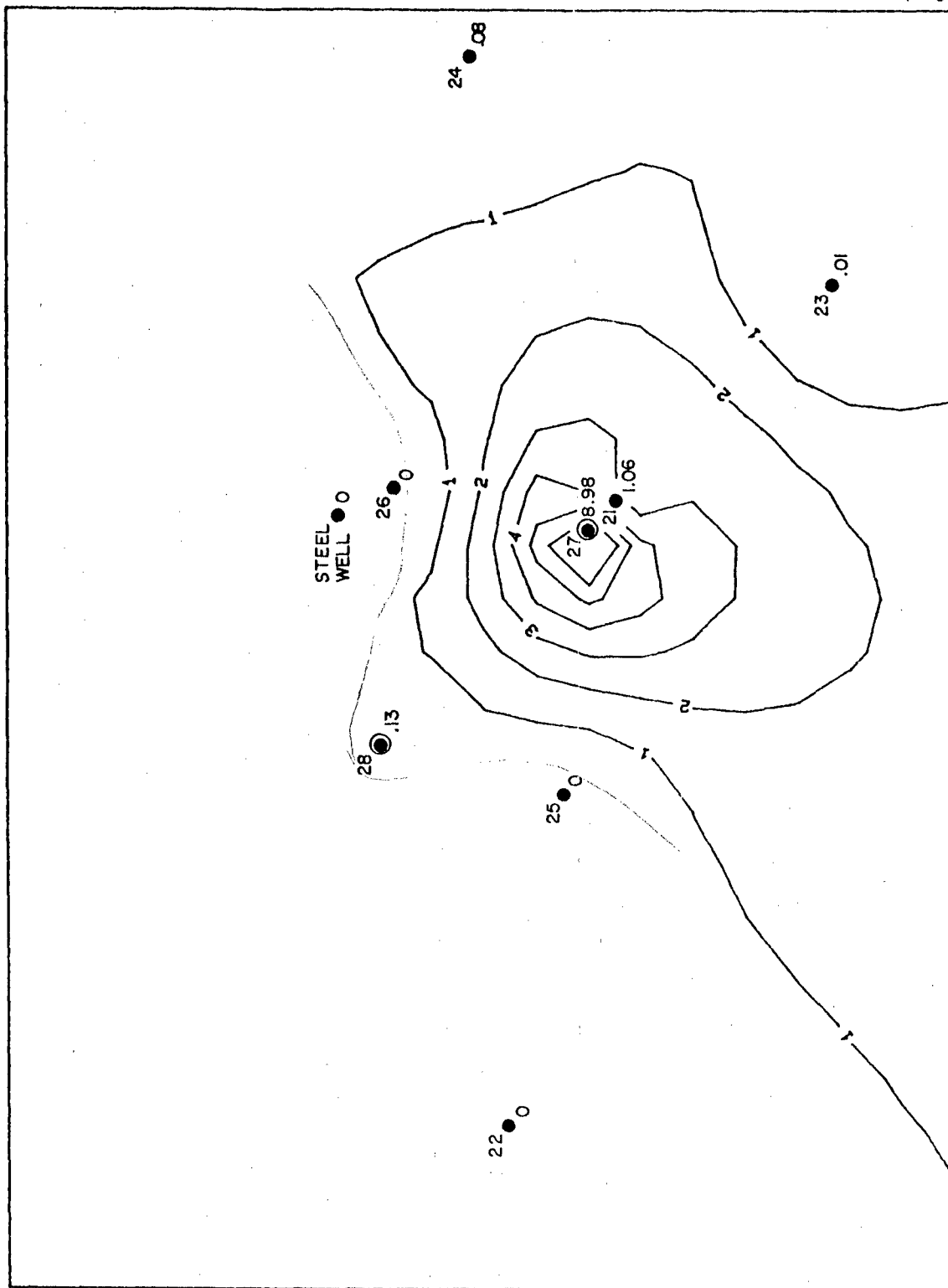
Elevations in Feet above Sea Level, Measured in Monitor and Recovery Wells and Corrected for Floating Product, if Present.

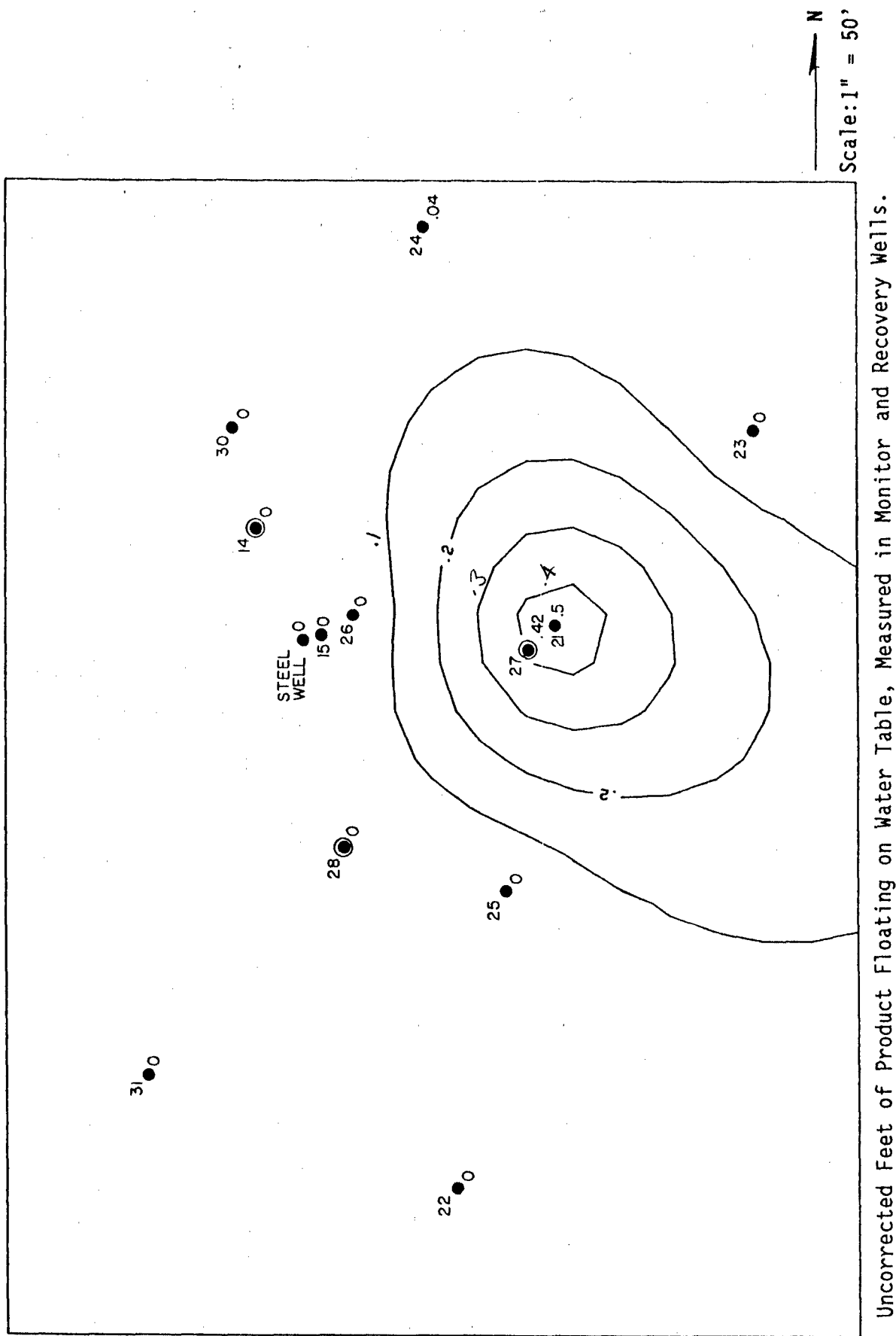
Scale: 1" = 50'

- RECOVERY WELL
- MONITOR WELL

FIGURE 6-2

GROUND WATER LEVEL CONTOUR MAP - DIESEL SPILL AREA
(BEFORE PUMPING BEGAN) Date? 5/30/86





- RECOVERY WELL
- MONITOR WELL

contour interval

FIGURE 6-4

FLOATING PRODUCT PLUME CONTOUR MAP - DIESEL SPILL AREA, OCT. 1986
(AFTER PILOT SCALE PUMPING FOR 4½ MONTHS) 10/17/86

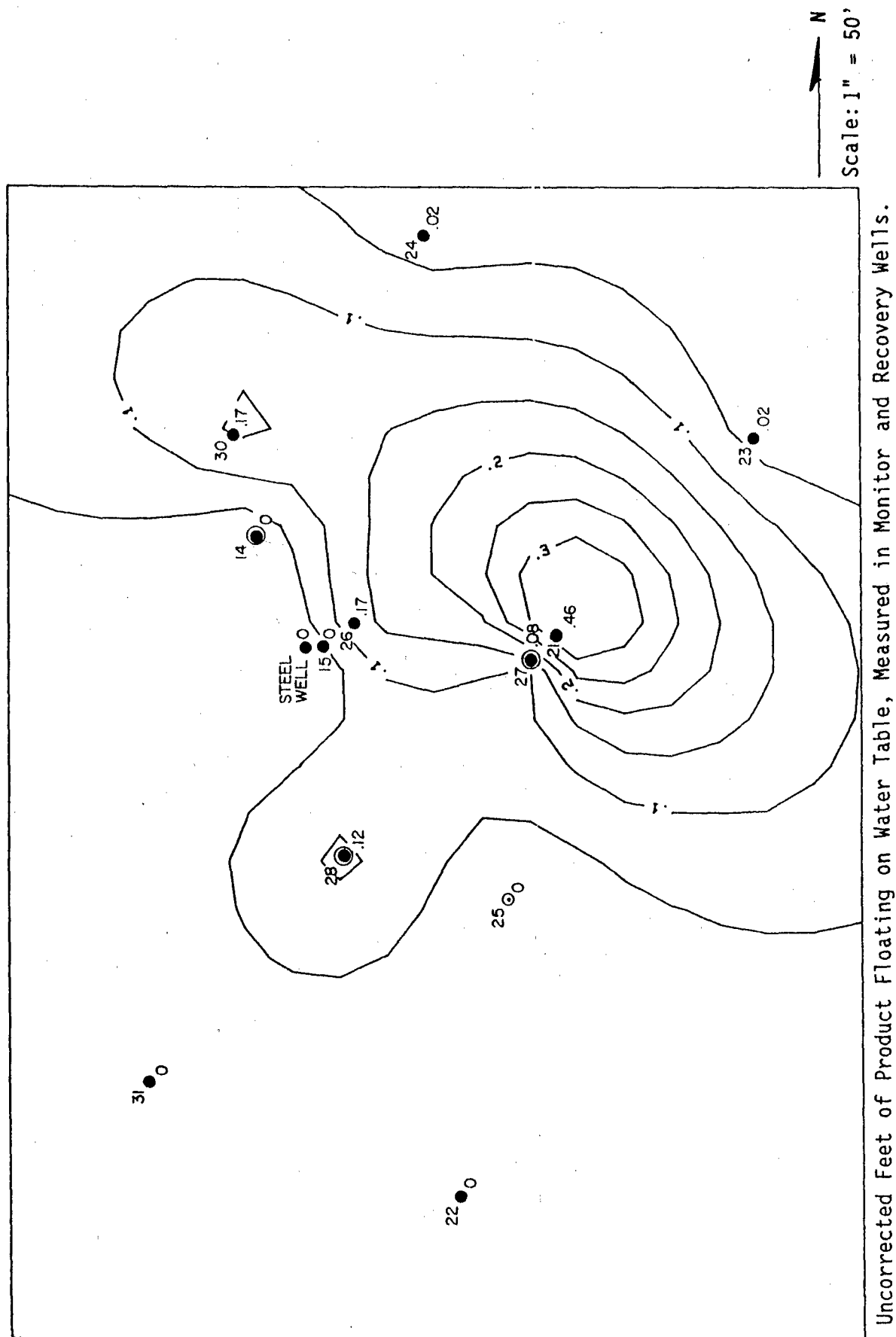


FIGURE 6-5

FLOATING PRODUCT PLUME CONTOUR MAP - DIESEL SPILL AREA, NOV. 1986

(AFTER PUMPING STOPPED FOR 2 WEEKS)

why increase
product in
wells not
previously contain?
eq. 26-30

11/13/86

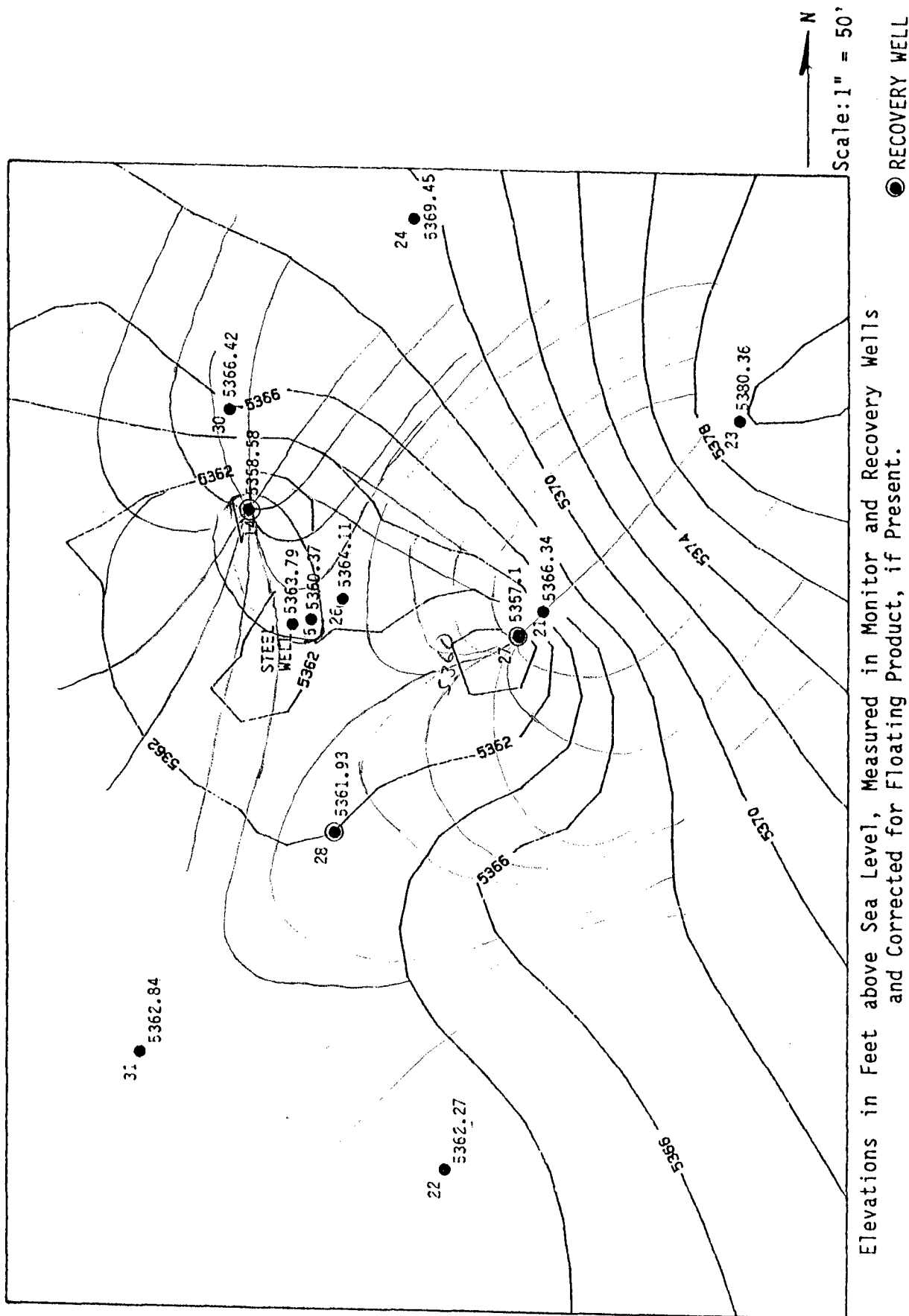
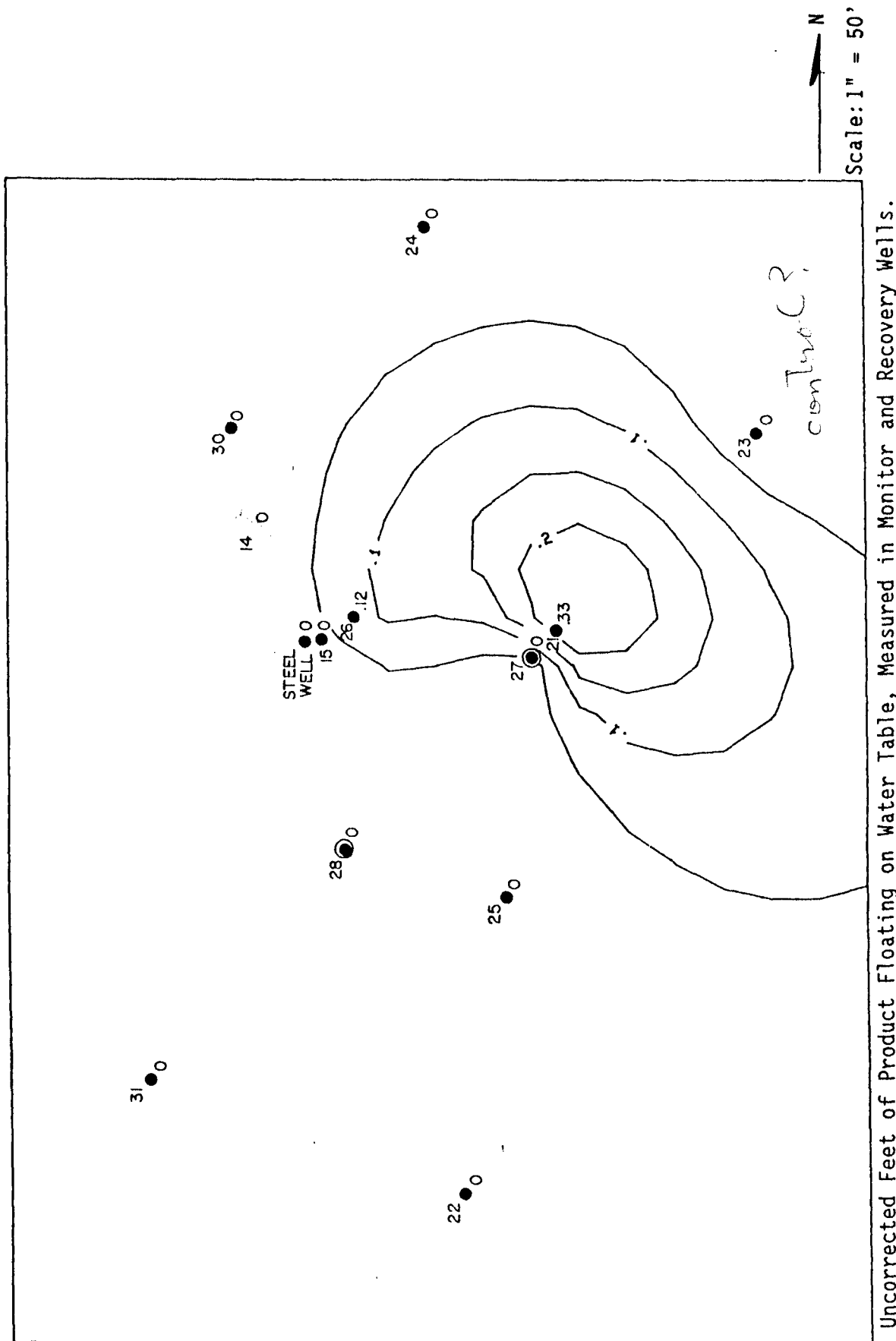


FIGURE 6-6

GROUND WATER LEVEL CONTOUR MAP - DIESEL SPILL AREA, NOV. 1986

(WELLS GBR 14, 27, AND 28 PUMPED FOR 2½ DAYS AT 1 GPM - COMPARE WITH FIGURE 6-2)



- RECOVERY WELL
- MONITOR WELL

FIGURE 6-7

Need tests to make clear sequence

FLOATING PRODUCT PLUME CONTOUR MAP - DIESEL SPILL AREA, NOV. 1986

(AFTER LONG TERM PUMP TEST - COMPARE WITH WATER LEVEL CONTOURS IN FIGURE 6-5)

recovery well is equally efficient in removing distant product as in removing product close to the well.

After beginning full-scale pumping in October 1986, GCL discontinued pumping for two weeks in November to prepare for an aquifer pump test in the area. Floating product measurements taken after this two week period of non-pumping are depicted in Figure 6-5, which represents the status of the floating product plume approximately one month after that of Figure 6-4. The plume is still centered around GBR-21 but now displays two pronounced lobes to the west and southwest. These lobes probably correspond to the major ground water and product flow directions, indicating that the floating product plume will tend to migrate slowly downgradient when the recovery pumps are not operating. The existence of these lobes suggests that product tends to migrate around an area of low conductivity on the west side of the Diesel Spill Area.

GCL performed a pump test of the recovery system in the Diesel Spill Area by continuously pumping all three recovery wells simultaneously at approximately 1 gpm each for 2-1/2 days. The influence of this pumping on the ground water elevations is shown in Figure 6-6. This pumping produced substantial local cones of depression centered on GBR-14 and GBR-27 and an overall cone of depression which is effective in controlling movement of the floating product plume as shown in Figure 6-7.

A comparison of the plume before pumping (in Figure 6-5) and after pumping (in Figure 6-7) demonstrates that the pumping has affected the plume in several ways:

- o the product plume is still centered on GBR-21 where it has thinned from .46 ft to .33 ft.;
- o floating product has disappeared from recovery wells GBR-27 and 28 and monitor wells GBR-23, 24 and 30; and
- o the areal extent of the plume has decreased and the prominent lobes to the west and southwest have disappeared.

Fig 6.5
indicates
product
GBR-21
More
Low
GBR-27
but not
30

GCL believes that the pumping of the three recovery wells is effective in containing the spreading of floating product in the Diesel Spill Area. As shown by Figures 6-2 through 6-7, the depression produced by pumping acts as a barrier to the movement of floating product and serves to change the direction of local ground water flow so as to allow this product to be retrieved.

6.3 SOUTHERN REFINERY AREA

6.3.1 Plume Identification

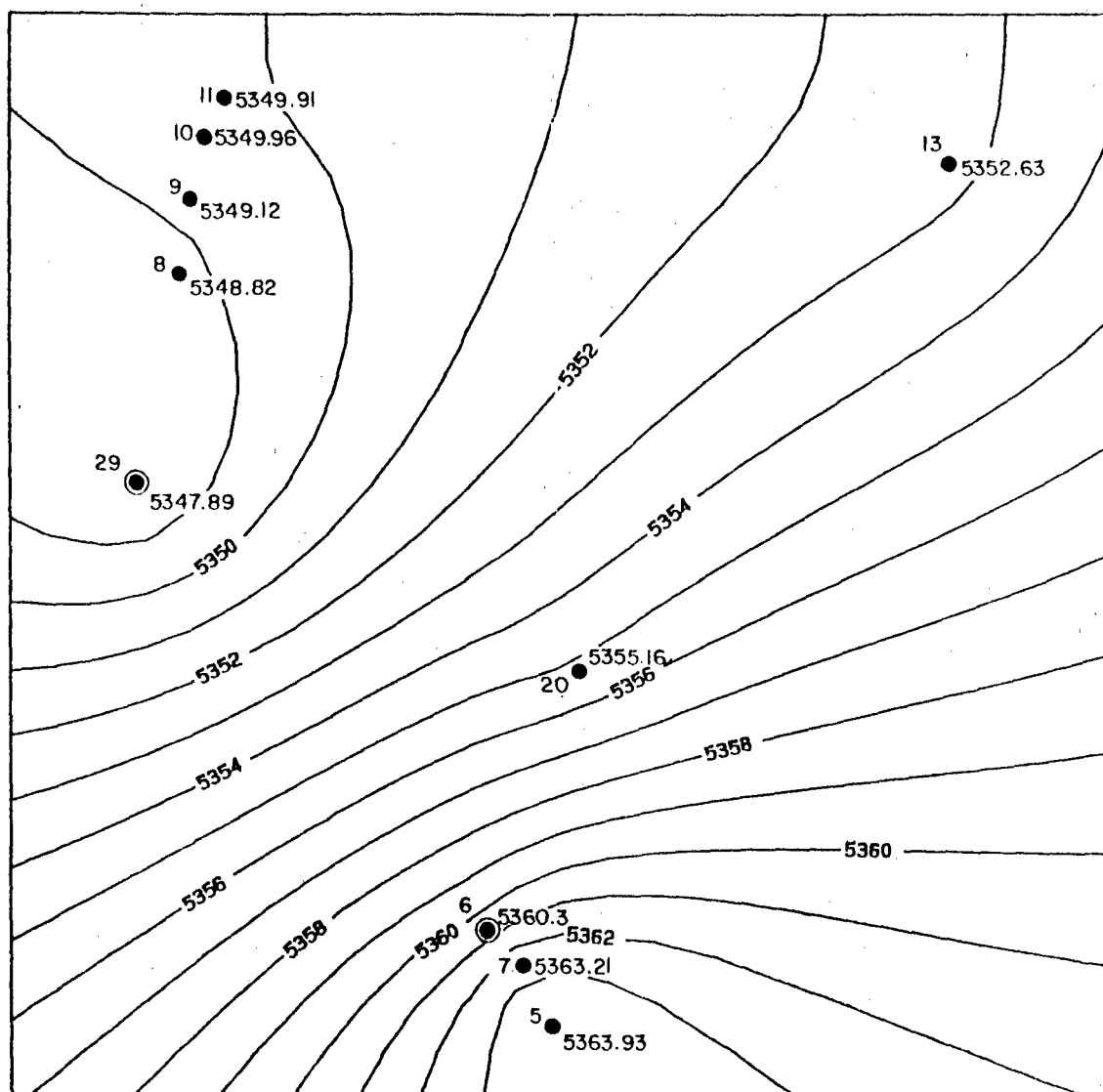
GCL has not yet fully defined the contamination plume in the Southern Refinery Area. In August 1986, GCL found floating product in GBR-5 (11 feet), GBR-29 (7 feet), GBR-11 (5 inches) and GBR-13 (1 foot), but none in nearby GBR-20. GCL has subsequently reduced these floating-product thicknesses in most of these wells by pumping from recovery wells in the area.

6.3.2 Plume Characteristics

Figures 6-8 through 6-11 are maps showing water levels and floating product thicknesses in the Southern Refinery Area at different points in time. Figure 6-8 displays the elevations of ground water beneath the area in more detail than Figure 4-2 (Section 4.0), which covered the entire refinery site. It should be noted that ground water flows southwest toward the arroyo and south within the arroyo.

Figure 6-9 presents the earliest complete data available for floating product levels in the Southern Refinery Area. These data were collected in August 1986 prior to any pumping of wells in the area. Floating product shown on this map is thickest at GBR-5 (greater than 11 feet) and underlies much of the Southern Refinery Area.

Figure 6-10 presents the levels of floating product measured in the Southern Refinery Area in October 1986. GCL had drilled several additional wells in the area since the data presented in Figure 6-9 had been collected in August 1986. Some recently-drilled wells are excluded from Figure 6-10, however, because they are deep-level piezometers



Elevations in Feet above Sea Level, Measured in Monitor and Recovery Wells and Corrected for Floating Product, if Present.

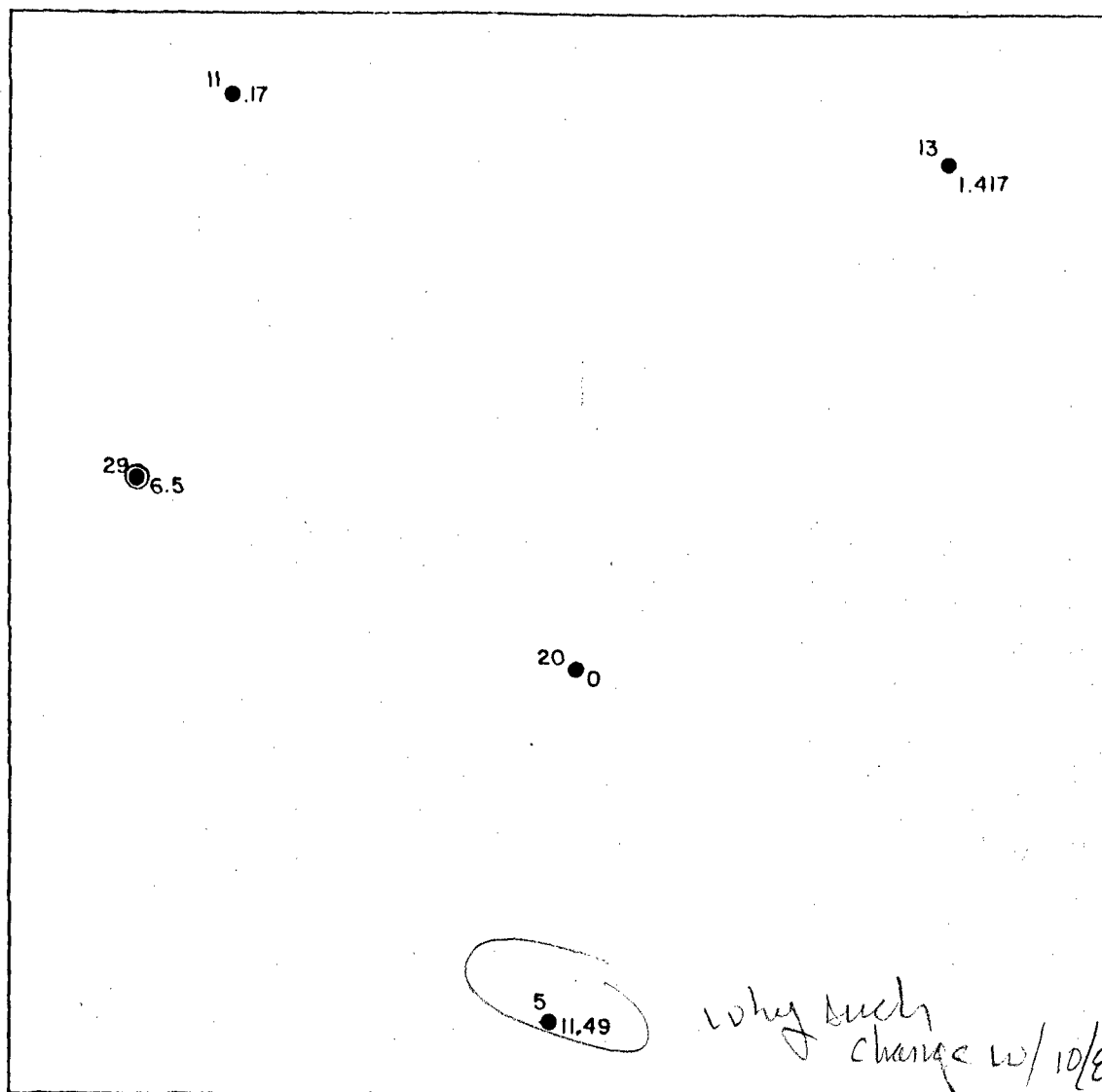
Scale: 1" = 50' N

● RECOVERY WELL

● MONITOR WELL

FIGURE 6-8

GROUND WATER LEVEL CONTOUR MAP - SOUTHERN REFINERY AREA, NOV. 1986

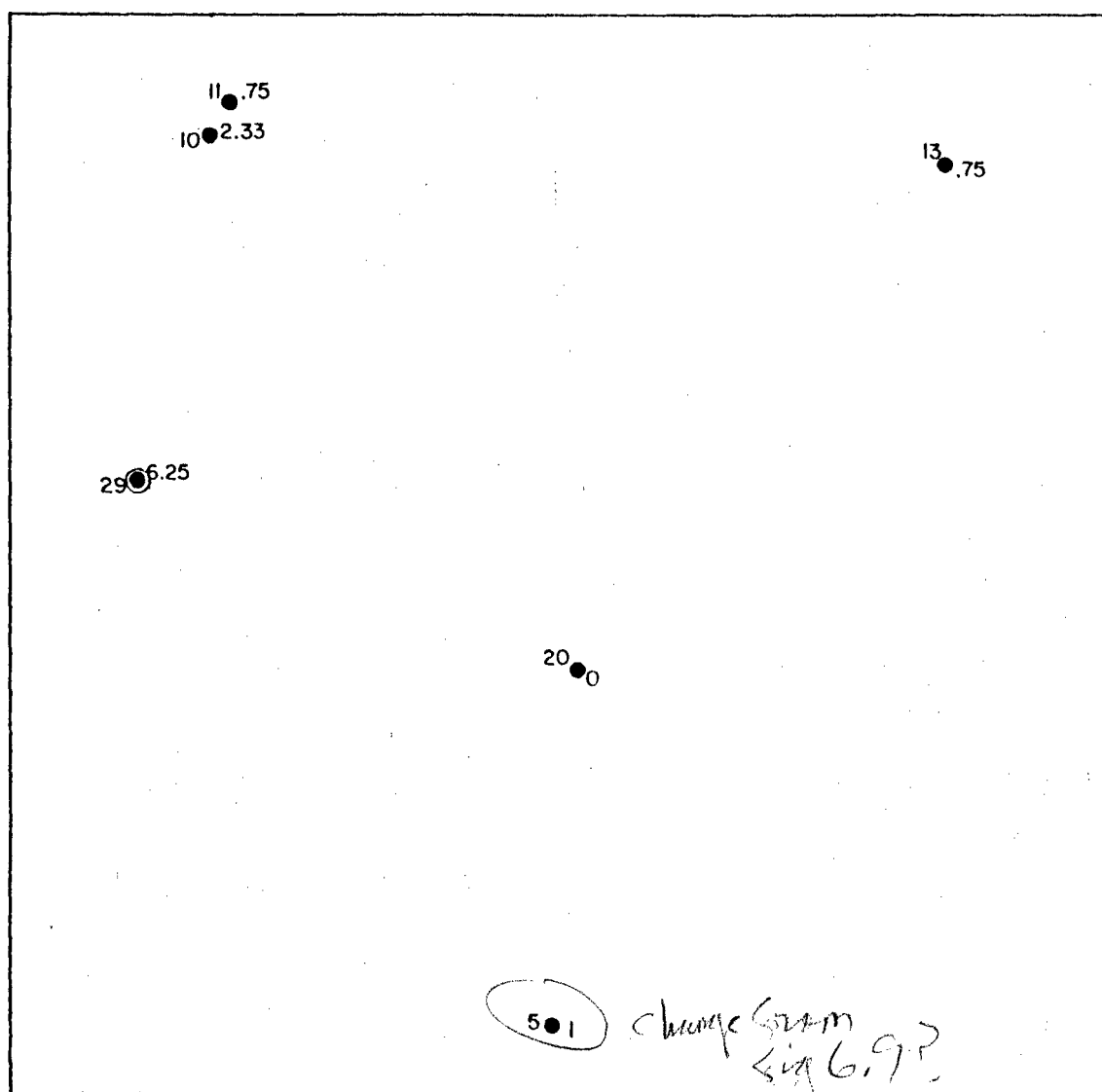


Uncorrected Feet of Product Floating on Water Table, Measured in Monitor and Recovery Wells.

FIGURE 6-9

FLOATING PRODUCT MEASUREMENTS - SOUTHERN REFINERY AREA, AUG. 1986

(INITIAL CONDITIONS - COMPARE WITH FIGURES 6-10 AND 6-11)



Uncorrected Feet of Product Floating on Water Table, Measured in Monitor and Recovery Wells.

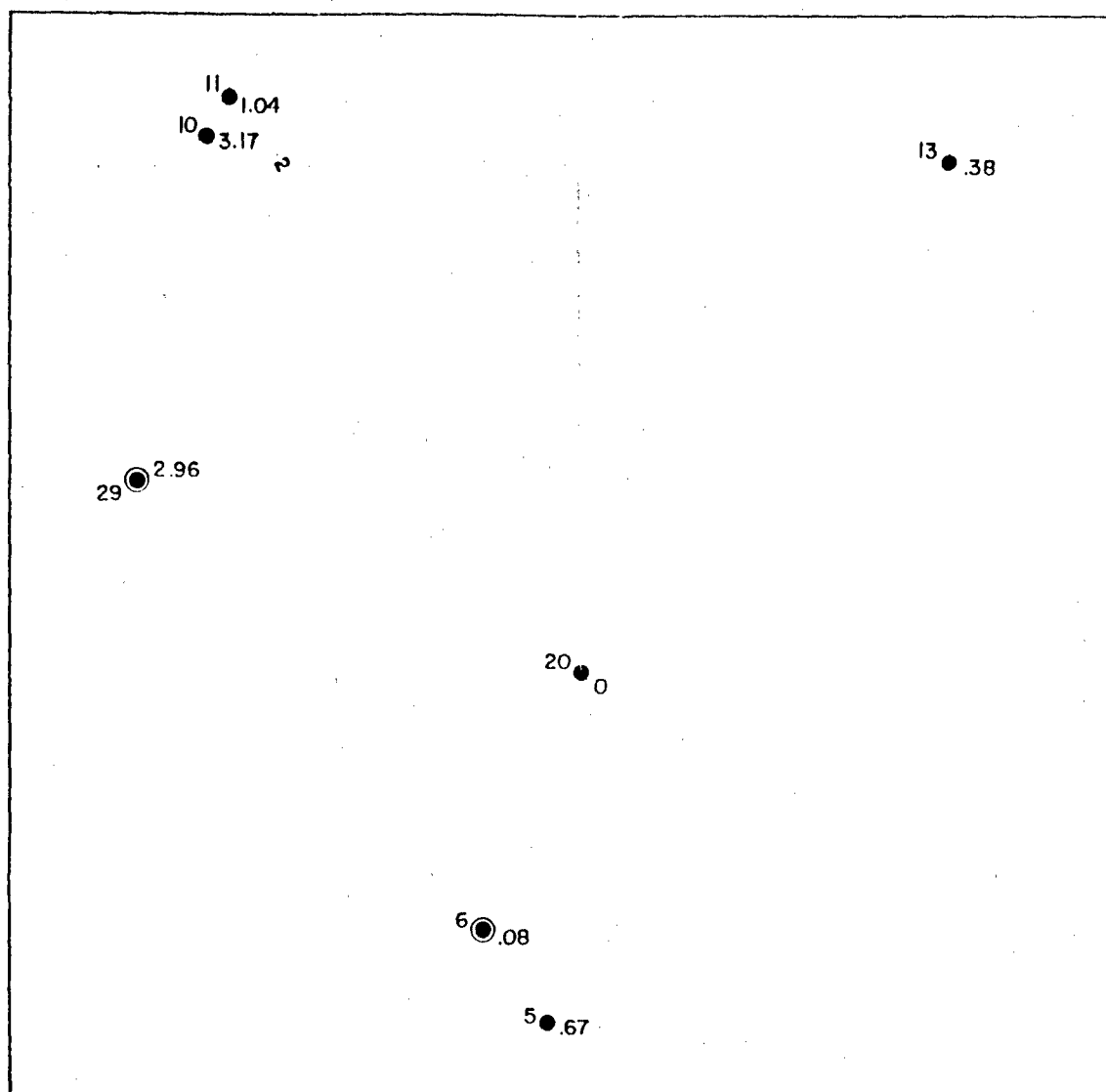
Scale: 1" = 50'

● RECOVERY WELL
● MONITOR WELL

FIGURE 6-10

FLOATING PRODUCT MEASUREMENTS - SOUTHERN REFINERY AREA, OCT. 1986

(BEFORE PILOT SCALE PUMPING IN GBR 29 - COMPARE WITH FIGURES 6-9 AND 6-11)



Uncorrected Feet of Product Floating on Water Table, Measured in Monitor and Recovery Wells.

Scale: 1" = 50'

● RECOVERY WELL
● MONITOR WELL

FIGURE 6-11

FLOATING PRODUCT MEASUREMENTS - SOUTHERN REFINERY AREA, NOV. 1986

(AFTER PILOT SCALE PUMPING IN GBR 29 - COMPARE WITH FIGURES 6-9 AND 6-10)

screened below the depth at which floating product occurs (GBR-9) or because they were drilled so recently that floating product, if present, had not yet been able to enter the boreholes (GBR-6, 7 and 8).

Figure 6-11 presents the levels of floating product beneath the Southern Refinery Area in November 1986, approximately one month later than those depicted in Figure 6-10. A recovery pump had been operating intermittently in GBR-29 for approximately 2 months. Deep-level piezometers GBR-7, 8 and 9 are excluded from this map because they are screened below depths at which floating product occurs.

Pilot scale pumping performed in GBR-29 was effective in removing some floating product and reducing its thickness in the vicinity of the well. GCL believes that continued pumping of GBR-29 and of the two additional recently installed recovery wells (GBR-37 and GBR-38) will be effective in controlling the movement of floating product offsite, as described further in Section 8.2. Such a conclusion is supported by the hydrogeologic analysis presented in Section 4.2 and Appendix C. Since the time of this pilot scale pumping, GBR-6 has been and continues to be pumped as a recovery well. Also recovery wells GBR-37 and GBR-38 have been drilled and pumps have been installed in them.

6.4 TRUCK FUELING AREA

In early November 1986, Giant discovered and repaired a leak in a diesel fuel delivery line near the currently used fueling station. Giant estimated that approximately 15,000 gallons of diesel fuel had been lost. On November 21, 1986, GCL measured a floating product thickness of 3 feet in GBR-22, which is within 15 feet of the fueling station. Floating product had not previously been found in this well.

The extent of the product plume in this area was recently defined through the installation of exploratory boreholes. GCL drilled 5 boreholes and developed three of them (GBR-33, GBR-34, and GBR-35) into observation wells (Figure 6-1). GCL also drilled a 6-inch recovery well (GBR-36) in the area.

10. 1888. 10. 1888.

GCL has estimated the thickness of the floating product in the aquifer to be 0.75 feet, which is 25% of the product thickness observed in the GBR-22 borehole on November 21, 1986 (see equation in Section 6.6). GBR-36 is currently being pumped and the water table is being depressed.

6.5 LEE ACRES LANDFILL PLUME

The NMEID (McQuillan and Longmire, 1986) has conducted an investigation of the ground water contamination caused by the Lee Acres Landfill. The NMEID found the soils in the area to be highly susceptible to contamination by the hazardous liquid and solid wastes that previously had been dumped in the liquid waste pits at the landfill. The study found that some of the soils or bottom materials in the arroyo near the site have been contaminated and that the probable source of such contamination was uncontrolled releases of wastes from the liquid waste pits. Contamination was documented in two domestic water wells in the Lee Acres Subdivision located downgradient from the landfill. The shallow ground water in the subdivision was found to contain low levels of benzene, tetrachloroethylene (PCE), trichloroethane (TCA), trichloroethylene (TCE), 1,1-dichloroethene, 1,2-dichloroethene, and 1,1,1-trichloroethane, most of which are also present at elevated concentrations in the surface water and liquid waste samples by the NMEID taken from the landfill.

The NMEID conducted and AEPCO analyzed a terrain electromagnetic conductivity survey (McQuillan and Longmire, 1986), that identified two ground water zones with high terrain conductivity anomalies. The survey indicates that the first zone is probably a leachate plume originating from the liquid waste pits at the landfill. The second zone appears to be near or in the Giant Refining Company's property and GCL believes it is associated with poor quality ground water due to naturally occurring minerals in the old arroyo channel which was buried during refinery construction. The on-site investigations by GCL did not reveal a corresponding contamination plume in this area. Both zones flow southward toward the Lee Acres Subdivision and appear to overlap in an area approximately 1500 feet north of the Bloomfield highway (Route 64) between the arroyo and Giant Refining Company. Terrain conductivity

→ Probably due to leaching⁶² of salts from surface sediments beneath fire water pond - Surface shows large areas of such salts

decreased away from these two areas and resumed normal background values near the Lee Acres Subdivision, immediately south of the Bloomfield highway.

Tracer Research Corporation conducted a soil gas survey in the area of the landfill and detected high concentrations of contaminants. A total of 46 soil gas samples were analyzed for TCA, TCE, PCE, chloroform and total hydrocarbons, all of which were found in significant concentrations near the landfill. The results of the investigation indicate that the Lee Acres Landfill is a source of both halocarbon and hydrocarbon contamination. These contaminants were shown to be migrating in a southerly direction toward wells in the subdivision that have been shown to be contaminated.

High concentrations of contaminants found in the source areas indicate that the soil underlying the landfill is contaminated. That is, the soil actually contains the contaminant, not just its vapors. Knowing this fact, it is possible that the contamination is still diffusing downward in those areas, actively contaminating the groundwater.

Based upon its investigations to date, GCL does not believe there were any sources of chlorinated solvents (with the exception of DCA) on the Bloomfield Refinery site. Consequently, GCL would not expect to find such contaminants in the soil or ground water at this site. However, GCL found chlorinated solvents similar to those found at the landfill both in ground water along the western edge of the refinery site and also in GBR-17 which is located completely outside of the influence of any potential contamination from the refinery and directly downgradient from the Lee Acres Landfill. Benzene, toluene and xylenes which were found at the landfill were also detected in GBR-18, which is located downgradient from the Lee Acres Landfill and upgradient from the Refinery area. It is apparent to GCL that the contamination found in both GBR-17 and GBR-18 must have come from the landfill and that this contamination is also present in the ground water underlying at the refinery site.

Maybe not
Maybe Amoco

Chlorinated solvents found in the ground water at the Lee Acres Subdivision can also reasonably be assumed to have emanated from the Lee Acres Landfill, because the solvents detected in the subdivision match the contaminant profile detected at the landfill. Benzene, toluene and xylenes were found in the subdivision in addition to chlorinated solvents; all of these compounds were also found at the landfill.

} Except
SCA

Until the USGS began their studies in January 1987, there had been no wells drilled in the Lee Acres Subdivision or Landfill to investigate the ground water situation, and data from the USGS studies are not yet available for this report. Therefore, the extent of the Lee Acres Landfill plume is presently not fully known. However, it is apparent that this plume is widespread and overshadows the localized contamination sources that GCL has identified on Giant's property. The corrective actions that Giant has initiated are complicated by the continuing influx of the Lee Acres Landfill leachate plume.

} No!

6.6 HYDROCARBON PLUME CHARACTERISTICS

Transport of spilled petroleum products in the ground occurs as a multi-phase flow involving volatile, soluble, and free-floating transport. Volatile components primarily migrate as vapor through pore spaces within the vadose zone; soluble components migrate as dissolved contaminants within ground water; and free-floating components migrate directly above the ground water. This free-floating product movement represents the primary means of transport for most of the components of a hydrocarbon spill.

The floating product in a hydrocarbon spill generally moves downward and downgradient until it reaches the top of the ground water. At this point the floating product spreads along the water surface until it reaches a critical thickness determined by density, viscosity and surface tension and typically becomes immobile. The lighter fractions, however, can still become dissolved in and be transported by the ground water.

The thickness of a hydrocarbon layer on ground water is usually greatly overestimated by measuring the amount of product which collects in a borehole. This results in an overestimation of the recoverable volume since free-product depth in a well can be typically four times greater than the hydrocarbon thickness in the surrounding ground water-soil matrix. This is expressed by the following equation:

$$\frac{H}{h} = \frac{P_{wo}}{P_{wa}} \times \frac{(d_o - d_a)}{(d_w - d_o)} \leq 4$$

Where: H = depth of oil in borehole
h = depth of oil in soil
P_{wa} & P_{wo} = capillary pressure difference between water and air
and between water and oil
d_o, d_a, d_w = respective densities of oil, air, and water

It should be noted that the floating product thicknesses presented in this report are not corrected by the above equation and may represent up to 4 times the actual expected thicknesses in the surrounding aquifer (Cooper and Sprague, 1986).

7.0 REMEDIAL ACTION ADDRESSING SOIL CONTAMINATION

Soil that has been contaminated with hydrocarbon product usually retains a significant amount of product suspended in the vadose zone. Because natural degradation is very slow, this product can be a continuous source of ground water contamination. Removal of the contamination is most effectively done by excavating the contaminated soil, spreading it on the surface, and adding water and nutrients to facilitate microbiological degradation. Treatment of soil in place is much more difficult and requires a much longer time.

7.1 REMEDIAL ACTIONS COMPLETED

GCL began a remedial action program soon after discovery of the contaminated soils. Approximately 4,500 cubic yards of soil were removed from four locations at the Bloomfield Refinery and transported to two vacant, bermed areas located in the northeast portion of the refinery property. The two areas have an approximate surface area of 3.1 acres and can effectively hold 5,000 cubic yards of material spread 1 foot thick. These sites were chosen as storage/biodegradation sites because:

- o usable ground water in this area is estimated to be greater than 75 feet below land surface; borehole and outcrop data demonstrate that this source of water is ~~protected from~~ any surface contamination by a layer of shale bedrock; *Which data?*
- o the berms will effectively prevent run-off and run-on of stormwater; and
- o the effectiveness of the proposed biodegradation can be monitored by obtaining shallow soil samples, since these areas have not been used in any refinery operation.

During the last week of April 1986, excavation and removal of hydrocarbon-stained soils began at four locations at the Bloomfield Refinery; the results of the soil samples taken from these areas were previously presented in Tables 5-1 and 5-2. These excavated sites include the storage tank water drain areas, the storage tank bottom containment areas, the underground catch tank excavation in the truck loading area located just to the east of the north loading rack, and the abandoned

fire fighting drill area. Giant, under GCL supervision, removed visibly and organoleptically-detectable hydrocarbon-stained soil with earth-moving equipment (backhoes, front-end loaders and bulldozers) and transported it by dump truck to the two bermed storage areas on the east side of the refinery property. After removal of as much stained material as possible, the excavations were inspected and sampled. The following is a more detailed discussion of the excavation, removal and sampling of contaminated soil from each site.

7.1.1 Storage Tank Water Drain Areas

Excavations by Giant at the storage tank water drain area to the west of Crude Tank 1 have completely removed all evidence of staining. Samples were collected from soil remaining at the base of the southern wall of the pit and in the bottom of the excavation. A sample of water that was encountered at a depth of about 15 feet was also collected. Analyses of these samples, presented in Tables 5-1 and 5-2, indicate that an insignificant amount of the contaminated soil remains in place.

what
about
another
version?

Excavations by Giant of the storage tank water drain area between Tanks 23 and 2 also have succeeded in removing significant volumes of stained soil. There are, however, stringers of stained material that could not be removed from the southern edge of the pit. These stringers extend under the foundation of Tank 2 on the eastern side of the pit. Samples were collected from the southern, eastern and western walls of the pit in areas of varying or no visible staining in order to determine the range of residual hydrocarbon concentration. Analyses of samples taken from the west and south walls indicate that all the contaminated soil has been removed. However, samples taken next to the foundation of Tank 2 indicate that contaminated soil extends under the foundation of the tank. The foundation will remain in place, preventing infiltration of precipitation and subsequent leaching of any contamination to ground water. Results of the chemical analyses of these samples are presented in Tables 5-1 and 5-2. GCL believes it is not practical, feasible or necessary to totally remove all evidence of contaminated soil in this area.

7.1.2 Underground Catch Tank in Truck Loading Area

Excavation by Giant of the underground tank in the truck loading area has resulted in the removal of the vast majority of hydrocarbon-stained soils. Some hydrocarbon-stained material was left in place because it extends underneath the concrete slab at the loading rack and beneath the piping networks that service the loading rack. Samples were collected along the northwest corner, the center of the northern pit wall and the center of the southern pit wall in an attempt to provide data on possible ranges of hydrocarbon concentration. Analyses of these samples, shown in Tables 5-1 and 5-2, indicate that soil contaminated with high concentrations of volatile compounds still remains in the northwest corner and along the south wall of the pit. This material does not pose a threat to ground water quality because the concrete slab prevents infiltration of precipitation and subsequent leaching of contaminants to ground water.

What
about
GW?

7.1.3 Fire Fighting Drill Area

Giant began to remove soil at the fire fighting drill area on May 1, 1986. Excavation started at the seep and removed hydrocarbon-stained soils, moving eastward toward the main pit area. The material had a noticeable hydrocarbon odor. Excavation of the fire fighting drill area was completed by May 9, 1986. Analyses of samples of remaining soils, shown in Tables 5-1 and 5-2, indicate that the vast majority of contaminated soil has been removed. Stained soil containing low levels of xylenes still remains in the east wall of the excavated area where pipelines prevented further excavation.

7.1.4 Oil/Water Separator

GCL did not consider the sludge from the abandoned oil/water separator to be a soil contaminant because it was contained in the concrete vessel. Nevertheless, Giant removed this sludge to prevent possibility of it becoming a source of contamination in the future. Approximately 700 gallons of sludge were transferred to 10 drums and temporarily stored at the soil treatment site pending the results of chemical analysis. The results of the analyses are shown in Tables 7-1 and 7-2. All of the

parameters evaluated were below detection or below EP Toxicity limits with the exception of mercury, which was found to exceed the limits in one sample. In order to be certain that waste that may be considered hazardous was not stored permanently on the site, Giant has shipped these 13 drums to an approved hazardous waste disposal site operated by USPCI, Inc. *where?*

7.2 PLANNED BIOLOGICAL TREATMENT OF REMOVED SOIL

In July 1986, GCL obtained samples from the soil that had been excavated from the areas described in Section 7.1 and moved to the bermed areas. One sample was taken of stained soil from each bermed area and a composite sample of unstained soil was taken from both areas. These samples, therefore, represent the range of concentrations that were present. GCL then analyzed the samples for the following constituents:

- o Total Metals
- o Halogenated and Aromatic Volatiles
- o Phenols
- o Polynuclear Aromatic Hydrocarbons (PAH's)

The analyses of these samples are presented in Tables 7-3 through 7-7. Detectable concentrations of arsenic, barium, chromium and lead were found in samples from the east and west bermed areas, as well as in the composite sample (Table 7-3). Of the halogenated volatile compounds, only methylene chloride and trichlorofluoromethane were detected (Table 7-4); however, these values are unreasonable and were probably caused by laboratory contamination. GCL found no evidence that these compounds were ever used at the refinery. The east bermed area did have detectable concentrations of some aromatic volatile compounds (Table 7-5). No phenolic or polynuclear aromatic hydrocarbon compounds were detected in any of the samples (Tables 7-6 and 7-7).

Although analysis of the soil stored in the bermed areas shows the material to be non-hazardous and non-threatening to ground water quality, visibly stained soil is present at the site. GCL believes that natural

Type

TABLE 7-1
GIANT BLOOMFIELD REFINERY
SLUDGE SAMPLES FROM ABANDONED OIL/WATER SEPARATOR
EP TOXICITY ANALYSIS

	<u>8610071100</u>	<u>8610071105</u>	<u>8610071110</u>	<u>8610071115</u>	<u>EP TOXICITY LIMITS</u>
Antimony	ND	ND	ND	ND	
Arsenic	ND	0.05	ND	ND	5.0
Barium	1.3	0.13	0.45	0.59	100.0
Beryllium	ND	ND	ND	ND	
Cadmium	ND	ND	ND	ND	1.0
Chromium	1.6	0.46	0.47	0.52	5.0
Cobalt	0.07	0.07	0.07	ND	
Lead	ND	ND	ND	ND	5.0
Mercury	0.004	0.02	0.004	0.34	0.2
Nickel	0.63	0.64	0.41	ND	
Selenium	ND	0.06	ND	ND	1.0
Silver	ND	ND	ND	ND	5.0
Vanadium	ND	ND	ND	ND	

DETECTION LIMITS
FOR ABOVE SAMPLES

	<u>8610071100</u>	<u>8610071105</u>	<u>8610071110</u>	<u>8610071115</u>
Antimony	(0.03)	(0.03)	(0.03)	(0.025)
Arsenic	(0.03)	(0.03)	(0.055)	(0.025)
Barium	(0.07)	(0.07)	(0.065)	(0.065)
Beryllium	(0.015)	(0.015)	(0.015)	(0.015)
Cadmium	(0.055)	(0.55)	(0.055)	(0.05)
Chromium	(0.07)	(0.07)	(0.065)	(0.065)
Cobalt	(0.055)	(0.055)	(0.055)	(0.05)
Lead	(0.35)	(0.35)	(0.35)	(0.35)
Mercury	(0.003)	(0.003)	(0.003)	(0.002)
Nickel	(0.15)	(0.15)	(0.15)	(0.15)
Selenium	(0.15)	(0.05)	(0.15)	(0.15)
Silver	(0.045)	(0.04)	(0.04)	(0.04)
Vanadium	(0.03)	(0.03)	(0.03)	(0.025)

units in mg/L
detection limits in parentheses
ND = not detected

TABLE 7-2

GIANT BLOOMFIELD REFINERY
SLUDGE SAMPLES FROM ABANDONED OIL/WATER SEPARATOR
INORGANIC PARAMETERS

	<u>Units</u>	<u>8610071100</u>	<u>8610071105</u>	<u>861007110</u>	<u>NEW SAMPLES 861007115</u>
Corrosivity	ph units	7.50 (0.01)	7.16 (0.01)	7.87 (0.01)	7.74 (0.01)
Reactive Sulfide	mg/kg	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Total Cyanide	mg/kg	ND (0.03)	0.01 (0.01)	ND (0.01)	ND (0.01)
Flash Point	°F	99 (200)	111 (200)	131 (200)	115 (200)
Oil	%	14.1 (0.1)	14.0 (0.1)	7.7 (0.1)	11.5 (0.1)
Solids	%	56.5 (0.1)	62.2 (0.1)	73.5 (0.1)	83.5 (0.1)

ND = not detected

limits of detection in parentheses

TABLE 7-3

GIANT BLOOMFIELD REFINERY
COMPOSITE SAMPLES OF REMOVED SOIL
TOTAL METALS

	8607151335 WEST BERMED AREA	8607151330 EAST & WEST BERMED AREAS	8607151315 WEST BERMED AREA	8607151230 EAST BERMED AREA
Arsenic	1.1 (0.2)	1.3 (0.2)	1.2 (0.2)	1.6 (0.2)
Barium	43 (0.5)	35 (0.5)	43 (0.5)	60 (0.5)
Cadmium	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.4)
Chromium	59 (0.5)	2.6 (0.5)	39 (0.5)	1.6 (0.5)
Lead	11 (2)	3.7 (2)	12 (2)	8.4 (2)
Mercury	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Selenium	ND (0.4)	ND (2)	ND (0.4)	ND (2)
Silver	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)

units in mg/kg

ND = not detected

detection limits in parentheses

TABLE 7-4

GIANT BLOOMFIELD REFINERY
COMPOSITE SAMPLES OF REMOVED SOIL
HALOGENATED VOLATILES

	8607151330 EAST & WEST BERMED AREA	8607151315 WEST BERMED AREA	8607151230 EAST BERMED AREA
Bromoform	ND (290)	ND (77)	ND (200)
Carbon tetrachloride	ND (9.8)	ND (2.6)	ND (6.6)
Chlorobenzene	ND (9.8)	ND (2.6)	ND (7)
Chloroethane	ND (98)	ND (26)	ND (66)
2-Chloroethylvinyl	ND (39)	ND (5.2)	ND (26)
Chloroform	ND (9.8)	ND (2.6)	ND (6.6)
Dibromochloromethane	ND (9.8)	ND (2.6)	ND (6.6)
1,2-Dichlorobenzene	ND (9.8)	ND (2.6)	ND (20)
1,3-Dichlorobenzene	ND (9.8)	ND (2.6)	ND (20)
1,4-Dichlorobenzene	ND (9.8)	ND (2.6)	ND (20)
Dichlorobromomethane	ND (9.8)	ND (2.6)	ND (6.6)
Dichlorodifluoromethane	ND (9.8)	ND (2.6)	ND (6.6)
1,1-Dichloroethane	ND (9.8)	ND (2.6)	ND (6.6)
1,2-Dichloroethane	ND (9.8)	ND (2.6)	ND (6.6)
1,1-Dichloroethylene	ND (9.8)	ND (2.6)	ND (6.6)
1,2-Dichloropropane	ND (9.8)	ND (2.6)	ND (6.6)
cis-1,3-Dichloropropylene	ND (9.8)	ND (2.6)	ND (6.6)
trans-1,3-Dichloropropylene	ND (9.8)	ND (2.6)	ND (6.6)
Methylbromide	ND (98)	ND (52)	ND (70)
Methylchloride	ND (200)	ND (52)	ND (130)
Methylene chloride	1300*# (820)	770*# (760)	830*# (57)
1,1,2,2-Tetrachloroethane	ND (9.8)	ND (2.6)	ND (6.6)
Tetrachloroethylene	ND (9.8)	ND (2.6)	ND (6.6)
1,2-trans-Dichloroethylene	ND (9.8)	ND (2.6)	ND (6.6)
1,1,1-Trichloroethane	ND (9.8)	ND (2.6)	ND (6.6)
1,1,2-Trichloroethane	ND (9.8)	ND (2.6)	ND (6.6)
Trichloroethylene	ND (20)	ND (2.6)	ND (13)
Trichlorofluoromethane	ND (98)	ND (2.6)	110* (66)
Vinyl Chloride	ND (9.8)	ND (2.6)	ND (6.6)

units in ug/kg except where noted

units in mg/kg

ND = not detected

detection limits in parentheses

*value suspect due to possible sample contamination at laboratory

TABLE 7-5

GIANT BLOOMFIELD REFINERY
COMPOSITE SAMPLES OF REMOVED SOIL
AROMATIC VOLATILES

	860715130 EAST & WEST BERMED AREA		8607151315 WEST BERMED AREA		8607151230 EAST BERMED AREA	
Benzene	ND	(4.9)	ND	(2.6)	ND	(20)
Ethylbenzene	ND	(9.8)	ND	(2.6)	18	(7)
Toluene	ND	(9.8)	ND	(2.6)	ND	(10)
Xylene, m	ND	(9.8)	ND	(2.6)	82	(7)
Xylenes, o & p	ND	(19)	ND	(5.2)	59	(15)

units in ug/kg
ND = not detected
detection limits in parentheses

TABLE 7-6

GIANT BLOOMFIELD REFINERY
COMPOSITE SAMPLES OF REMOVED SOIL
PHENOLS

	8607151330 EAST & WEST BERMED AREA		8607151315 WEST BERMED AREA		8607151230 EAST BERMED AREA	
4-Chloro-3-methylphenol	ND	(100)	ND	(500)	ND	(2000)
2-Chlorophenol	ND	(100)	ND	(500)	ND	(2000)
2,4-Dichlorophenol	ND	(100)	ND	(500)	ND	(2000)
2,4-Dimethylphenol	ND	(100)	ND	(500)	ND	(2000)
2,4-Dinitrophenol	ND	(500)	ND	(2000)	ND	(10000)
2-Methyl-4,6-dinitrophenol	ND	(250)	ND	(1000)	ND	(5000)
2-Nitrophenol	ND	(100)	ND	(500)	ND	(2000)
4-Nitrophenol	ND	(250)	ND	(1000)	ND	(5000)
Pentachlorophenol	ND	(250)	ND	(1000)	ND	(5000)
Phenol	ND	(100)	ND	(500)	ND	(2000)
2,4,6-Trichlorophenol	ND	(100)	ND	(500)	ND	(2000)

units in ug/kg

ND = not detected

detection limits in parentheses

TABLE 7-7

ANALYTICAL RESULTS OF
GIANT BLOOMFIELD REFINERY
COMPOSITE SAMPLES OF REMOVED SOIL
POLYNUCLEAR AROMATIC HYDROCARBONS

	8607151330 EAST & WEST BERMED AREA		8607151315 WEST BERMED AREA		8607151230 EAST BERMED AREA	
Acenaphthene	ND	(50)	ND	(1500)	ND	(1500)
Acenaphthylene	ND	(50)	ND	(1500)	ND	(1500)
Anthracene	ND	(1)	ND	(15)	ND	(15)
Benzo(a)anthracene	ND	(5)	ND	(150)	ND	(150)
Benzo(a)pyrene	ND	(1)	ND	(50)	ND	(50)
Benzo(b)fluoranthene	ND	(1)	ND	(30)	ND	(30)
Benzo(g,h,i)perylene	ND	(5)	ND	(50)	ND	(80)
Benzo(k)fluoranthene	ND	(1)	ND	(20)	ND	(30)
Chrysene	ND	(5)	ND	(150)	ND	(150)
Dibenzo(a,h)anthracene	ND	(10)	ND	(250)	ND	(300)
Fluoranthene	ND	(5)	ND	(150)	ND	(150)
Fluorene	ND	(10)	ND	(200)	ND	(250)
Indeno(1,2,3-cd)pyrene	ND	(5)	ND	(150)	ND	(150)
Naphthalene	ND	(50)	ND	(1500)	ND	(1500)
Phenanthrene	ND	(5)	ND	(150)	ND	(150)
Pyrene	ND	(5)	ND	(150)	ND	(150)

units in ug/kg

ND = not detected

detection limits in parentheses

Although analysis of the soil stored in the bermed areas shows the material to be non-hazardous and non-threatening to ground water quality, visibly stained soil is present at the site. GCL believes that natural biodegradation processes will be effective in abating any remaining organic contamination and that the metals will remain immobilized in the soil.

Biodegradation of oily wastes has had a long and successful history in the petroleum refinery industry. It has been well established by the American Petroleum Institute and others that naturally occurring soil-microbes have the capability of degrading oily waste fractions under a variety of mass loadings and climatological and site conditions (Hornick and others, 1983). Many of these studies have been conducted to examine the kinetics and pathways of biodegradation of specific organic constituents that are commonly encountered in petroleum wastes and have focused on compounds that are considered to be recalcitrant to biodegradation and extremely persistent in the environment. In all cases, the evidence has shown that even these resistant compounds can be degraded by naturally occurring organisms in relatively short periods, albeit, often with adjustment of soil moisture and nutrient content. These studies also show that biodegradation of oily wastes will occur without the addition of any nutrients or water, although at a slower rate.

It is apparent that natural biodegradation processes have been successful at the site. Samples of excavated soil at the time of removal ranged from grossly contaminated to marginally contaminated. Samples taken from the bermed storage area 2 1/2 months after removal showed little organic contamination. The actions of excavating and moving the soil exposed it to conditions favorable for natural biodegradation of organics, leaving only low levels of relatively immobile metals in the soil.

GCL believes that further treatment of this soil is not necessary. The soil will be kept in the bermed areas, isolated from any ground water

contact, and has been spread to depths of about 1 foot to promote complete aeration and microbiological degradation of any remaining organic constituents.

Because of the relatively clean condition of the soil in the bermed storage areas, it would be acceptable as a medium for treating contaminated ground water that will be produced from remedial actions at the refinery (Section 8.5). Contaminated water from ground water reclamation activities could be treated effectively by sprinkling it onto the soil where aeration and microbiological degradation would take place. Land treatment of wastewater in this manner is an accepted method which would be well suited to this application.

Which soil?

Which
constituents
treated?

7.3 TREATMENT OF SOIL IN-PLACE

GCL has removed all soil containing concentrated contamination that could feasibly be removed. In most areas, remaining contamination will be left to degrade naturally over time. These locations contain small volumes of contaminated soil and pose no threat to the underlying ground water.

However, the Southern Refinery Area, near the former stormwater containment areas, appears still to contain a significant amount of contaminated soil that is infeasible to remove (Figure 7-1). Because this soil contamination may be a continuing source of ground water contamination in the area, it is practical to approach the treatment of both media as a system. As described in detail in Section 8.2, floating product and contaminated water will be pumped from GBR-6, GBR-29, GBR-37 and GBR-38 in order to keep potential contamination from moving off the site. Any ground water contaminated by this soil will be intercepted as well.

Precipitation falling on the ground will provide occasional wetting of the soil and some downward migration of water through the contaminated zone. To provide for clean-up of the contaminated soil, it will be necessary to augment natural wetting of the soil with a controlled

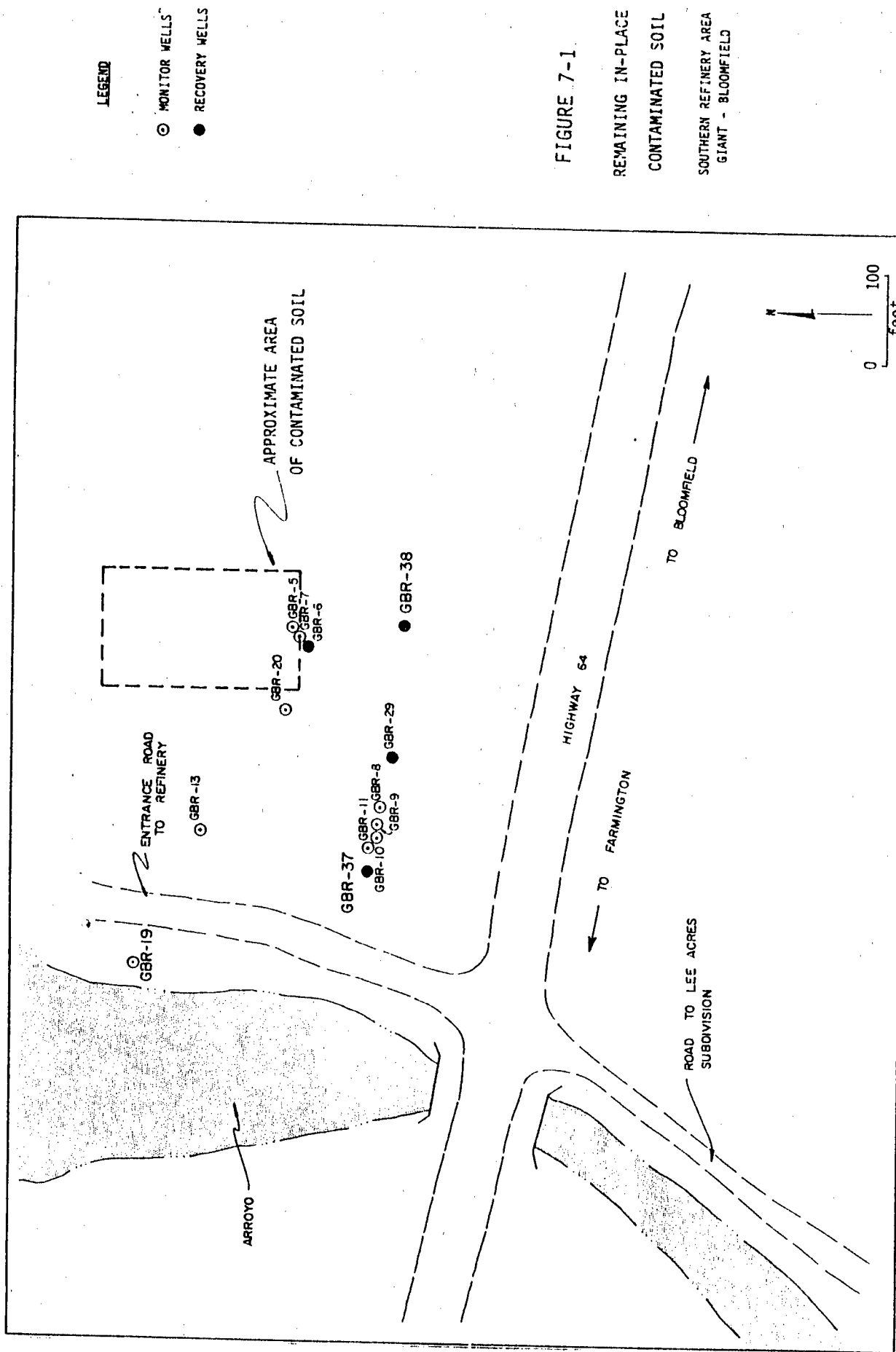


FIGURE 7-1

REMAINING IN-PLACE
CONTAMINATED SOIL
SOUTHERN REFINERY AREA
GIANT - BLOOMFIELD

How?
application of water. As the moisture in the soil is increased above naturally occurring levels, contamination in the soil will be flushed into the ground water and captured by the ground-water recovery system.

What about capture of salts?

During the frost-free period (April-October), reclaimed ground water will be applied to the contaminated soil in the Southern Refinery Area. Tests conducted on this soil (Appendix E) demonstrate that the unsaturated zone (upper 25 feet) exhibits an average moisture content of 6.5% by weight and an open pore space of 25%. If enough water was supplied to saturate the upper 25 feet of soil, a significant volume of soil contamination would be flushed out of the soil (as a wetted front of water and entrained hydrocarbons) and would enter ground water and be subsequently captured by the recovery pumps. Assuming open pore space of 25%, saturation of the upper 25 feet of soil in the area of concern will require the application of 6.25 feet of reclaimed water over a relatively short period of time.

GCL proposes to approach this upper limit of water application through a series of test applications. Eighteen inches of reclaimed ground water (about 25% of the maximum calculated open pore space) will be applied to the area of concern after a period of 2 weeks during which total precipitation was less than 0.1 inch and at a rate that does not result in ponding on the area. The area will be disked to facilitate infiltration of applied water. A 6-inch high berm will be constructed around the site to prevent any runoff. Water will be applied only during working hours when Giant personnel can monitor the application. It is anticipated that 5 days will be required to apply 18 inches of reclaimed water.

The recovery wells in the Southern Refinery Area will be pumped continuously and the effects of the application of water will be monitored by evaluation of the thickness of floating hydrocarbons observed in GBR-5, GBR-7, GBR-13, GBR-20 and GBR-25. Tests will be conducted at successively higher or, if required, lower application rates until the floating product in the observation wells reaches a maximum thickness. Results of the test applications will determine the application rates of

reclaimed water which will result in the desired flushing of contaminants. More detailed plans and specifications for this proposed in-situ treatment of soil will be developed prior to initiation of the program.

The tests described above will be performed only after all the required product recovery wells are in place and operational in the Southern Refinery Area. Since the transport of contaminants in the unsaturated zone cannot always be predicted with theoretical models, it is imperative that the recovery wells collect any contamination that may be dislodged by the flushing action of the water. The recovery wells are designed to capture any floating product and immediately underlying dissolved-phase product contamination that may appear before it can migrate off Giant's property in Southern Refinery Area.

8.0 REMEDIAL ACTION ADDRESSING GROUND WATER CONTAMINATION

Giant began remedial actions promptly upon GCL's discovery of the ground water contamination zones at the Bloomfield Refinery and has continued to assess the effects of all contamination sources on the site.

8.1 DIESEL SPILL AREA PLAN

8.1.1 Remedial Actions Completed

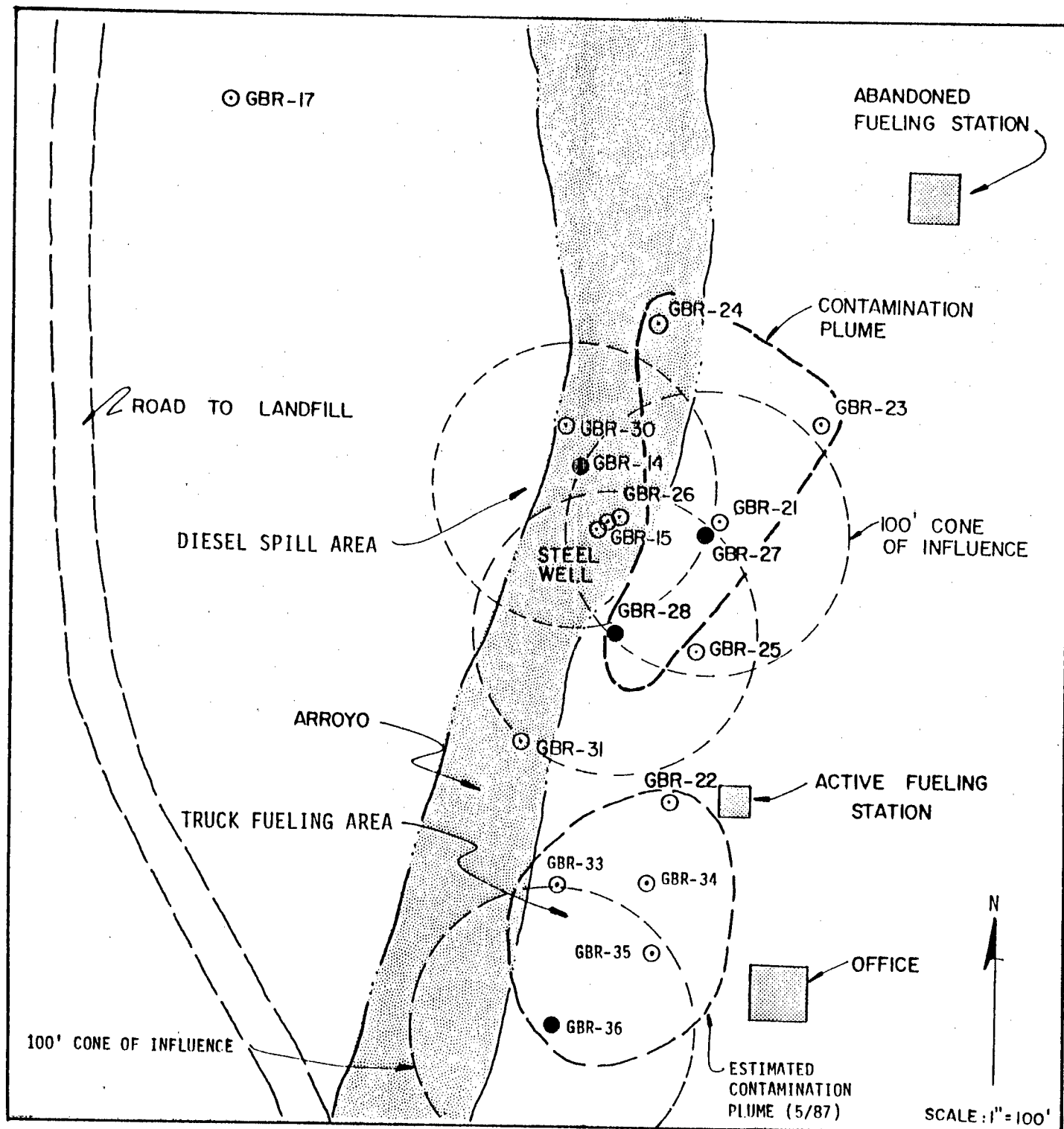
Based on the results of the pump test conducted in GBR-27 (Section 4.1.1) and data from existing wells, GCL drilled two additional exploratory wells, constructed an additional recovery well, and installed a piezometer cluster.

The exploratory wells were drilled in order to identify more accurately the extent of the plume. One exploratory well (GBR-30) was installed 100 feet southwest and downgradient of GBR-24; the other (GBR-31) was installed 100 feet southwest of GBR-28. The locations of both wells are shown in Figure 8-1. Although these 2-inch PVC wells did not encounter any floating product when drilled, a small amount appeared in GBR-30 after several weeks.

A 3-level well cluster was installed inside the contamination area, using two existing wells and one new well, to provide precise monitoring of ground water quality at specific depths and to monitor the effects of the remedial actions. The piezometer nest utilizes the Steel Well, GBR-15 and GBR-26. GBR-15 is constructed of stainless steel, as shown in Figure 8-2, and serves also as a monitor well. GBR-26 is screened at the top of the aquifer from 25 to 35 feet; the Steel Well has an open bottom at 40 feet in the middle of the aquifer, and GBR-15 is screened at the bottom of the aquifer from 45 to 55 feet.

But
GBR-26
and steel
well should
no draw-
down
GCL (C.P.A.)

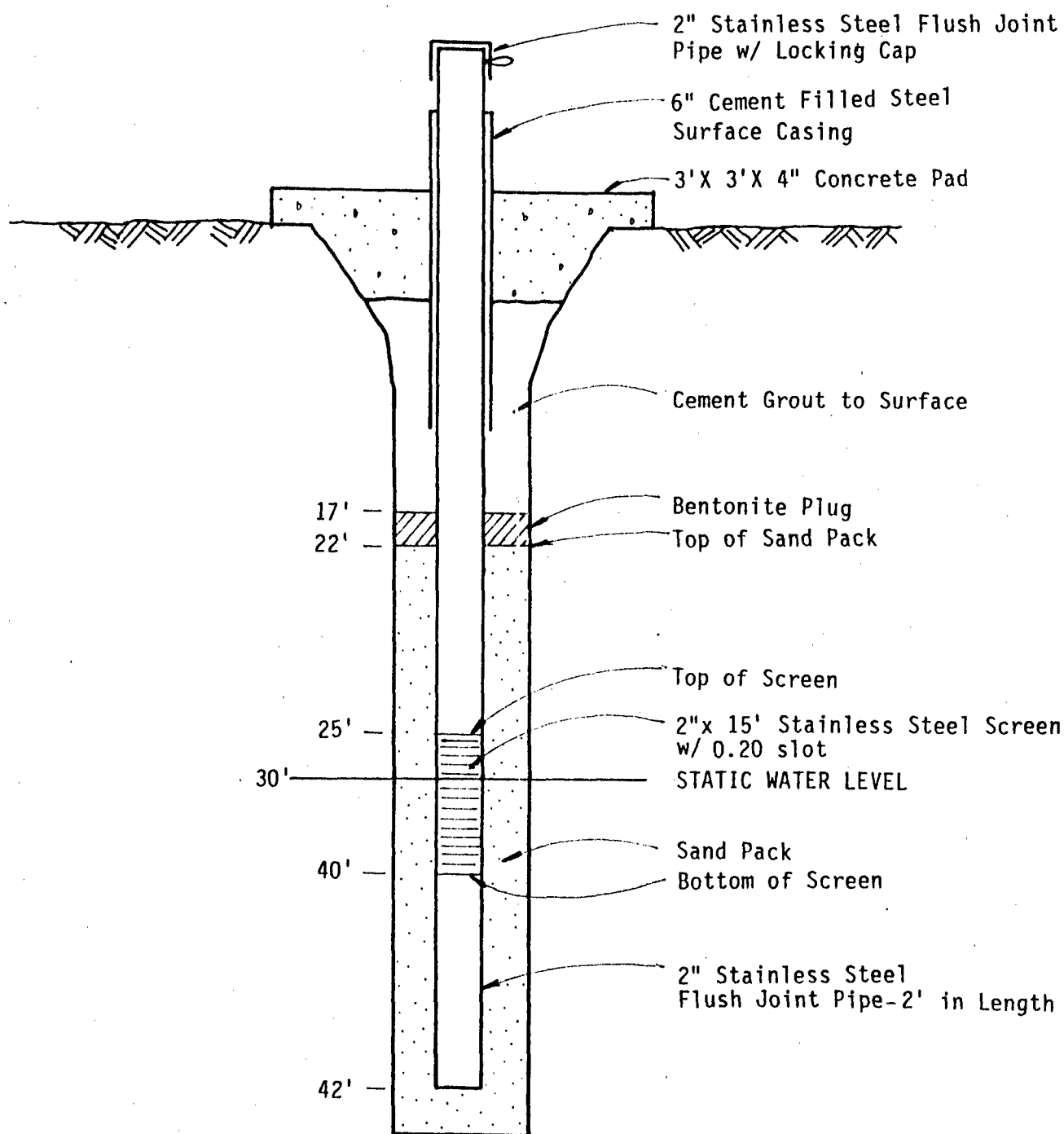
Three recovery wells are now in place: GBR-14 (6-inch diam.), GBR-27 (5-inch diam.), and GBR-28 (6-inch diam.). They have been spaced so that their cones of influence intersect each other and cover the entire estimated down-gradient edge of the plume (Figure 8-1). These wells were constructed of PVC casing as shown in Figure 8-3.



○ MONITOR WELLS
● RECOVERY WELLS

FIGURE 8-1

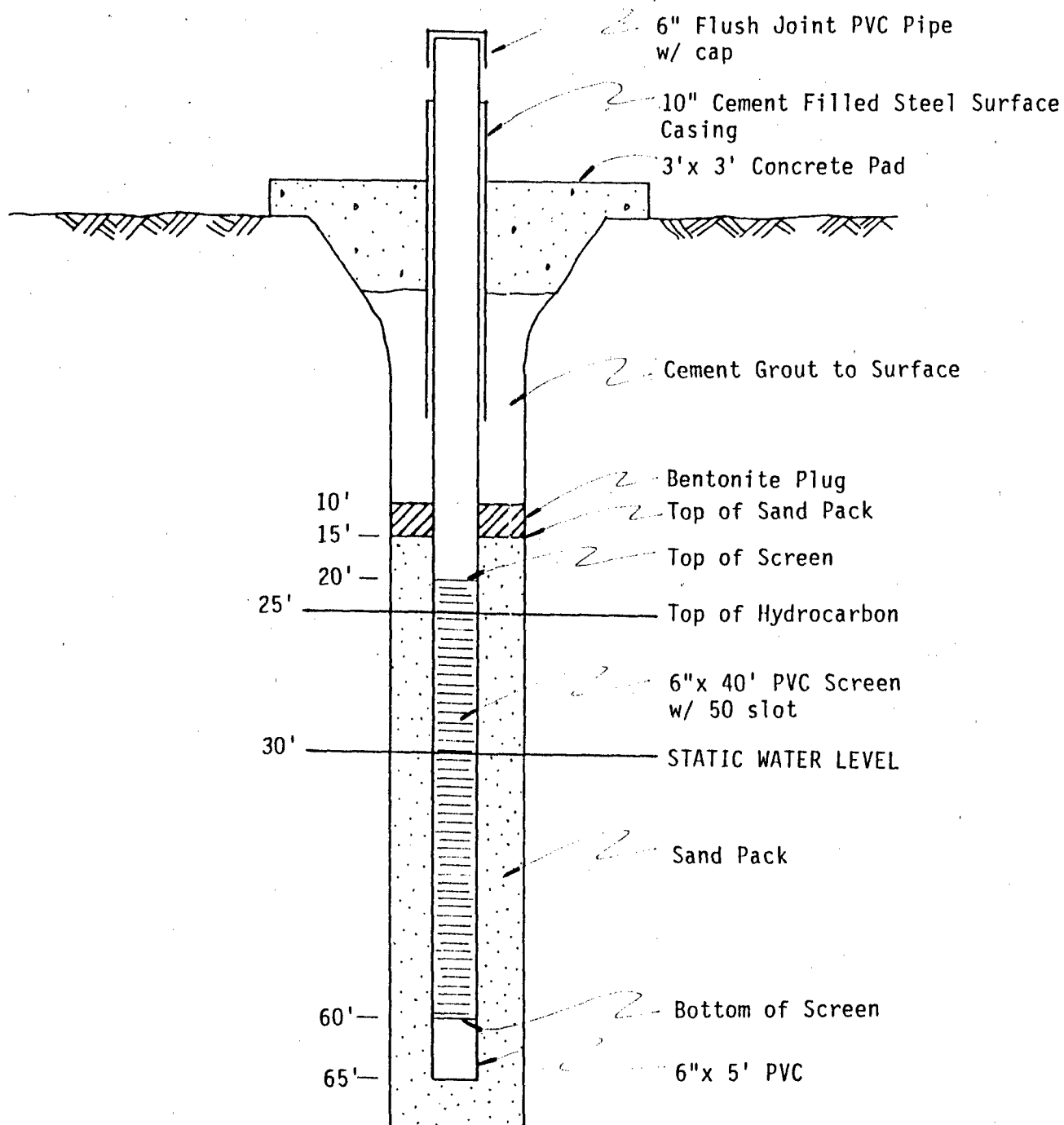
RECOVERY AND MONITOR WELLS
DIESEL SPILL AND TRUCK FUELING AREAS
GIANT - BLOOMFIELD



NOTE: The dimensions shown are typical. The actual values are shown on individual well logs.

TYPICAL MONITOR WELL

FIGURE 8-2



NOTE: The dimensions shown are typical. The actual values are shown on individual well logs.

TYPICAL RECOVERY WELL

FIGURE 8-3

Recovery pumps were installed in the three wells on October 7, 1986. With the exception of intermittent down time, the pumps have been pumping continuously since that time. The pumps currently discharge into a 500 barrel storage tank located near the wells, from which the water is periodically transferred to large storage tanks by truck. Because large quantities of water must be removed in order to also remove the floating product, most of the pumped liquid has consisted of water.

The recovery pump is a specially designed unit that operates by compressed air, as shown in Figure 8-4. It fills from the top of the pump so that, when the inlet is placed at the water level, any product floating on top of the water is skimmed off into the pump. When the pump becomes full it is automatically emptied and then is reset to fill again. This method of operation is well suited to the recovery wells in the Diesel Spill Area because of the low transmissivity of the underlying aquifer. When properly placed, the pumps remove not only floating product, but also enough water to depress the water level, which induces the flow of floating product into the well and effectively contains the plume.

Using the transmissivities and storativities obtained from pump test analyses, GCL designed a remedial action plan based upon a ground water model calibrated to the refinery site. The model is fully discussed in Appendix E of this report. Plate 4 is a representation of the predicted water table elevations during the planned remedial action. These elevations indicate that the floating hydrocarbon contamination present in the Diesel Spill Area is contained and removed through this plan. Field evidence also demonstrates that pumping of the three recovery wells does indeed result in containment and removal of both floating hydrocarbons and dissolved-phase hydrocarbons associated with the floating product.

Model may
not be
calibrated
right
1/4 are
incorrect

GCL has determined that optimal design, based on field testing, requires pumping rates of approximately 1 gpm from each well. Because the pumps fill from the top and discharge only when full, the distance of the pump

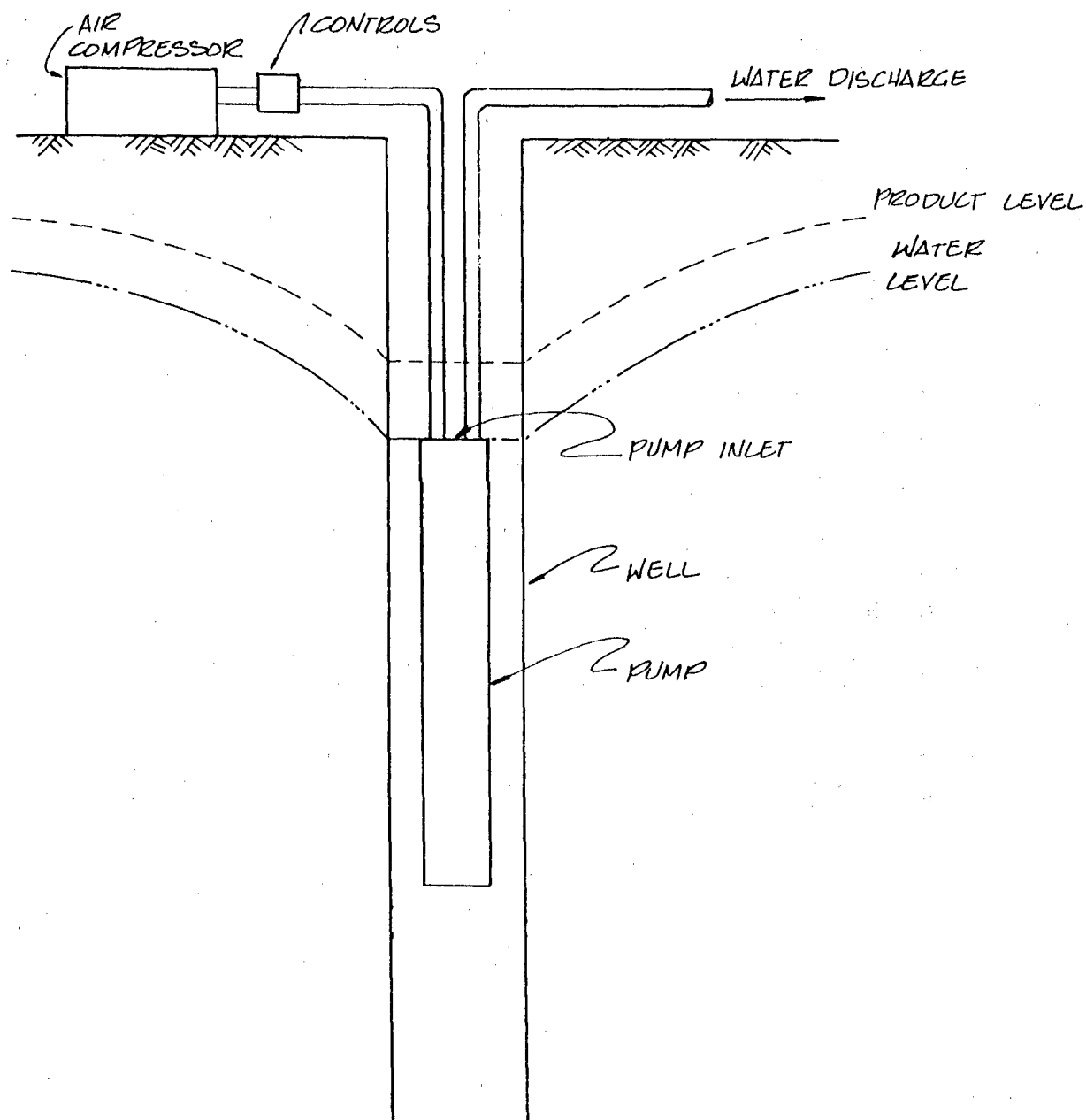


FIGURE 8-4

TYPICAL RECOVERY WELL AND PUMP INSTALLATION

below static water levels determines the rate of pumping. In the Diesel Spill Area the optimal pump distance below static water level is:

GBR-14	7.5 feet
GBR-27	8.0 feet
GBR-28	0.6 feet

8.1.2 Further Remedial Actions Planned

The remedial actions already taken in the Diesel Spill Area, as described in Section 8.1.1, have demonstrated that the existing recovery system will be effective in removing the floating product and associated dissolved phase plume in that area. To eliminate unexpected down time, GCL plans to make some improvements to the existing system. To assure long term, reliable operation, Giant will install a large capacity air compressor and direct piping from the 500-barrel storage tank to long-term storage tanks, eliminating the necessity of truck transfer.

Five large tanks will be employed to store produced water from the entire remedial action:

Tank 23	5,000 barrels capacity
Tank 24	20,000 barrel capacity
Tank 27	5,000 barrels capacity
Tank 32	5,000 barrels capacity
Tank 37	10,000 barrel capacity

where located? Need to be on plate 1

After one tank is filled, the stored water will be sampled and chemically analyzed (see Section 9.0) using EPA methods for purgeable organic compounds, acid-extractable compounds and base-neutral compounds. The results of the testing will determine the appropriate level of treatment required prior to discharge. Figure 8-5 shows the conceptual design of the ground water remedial action plan for the Diesel Spill and Southern Refinery Areas.

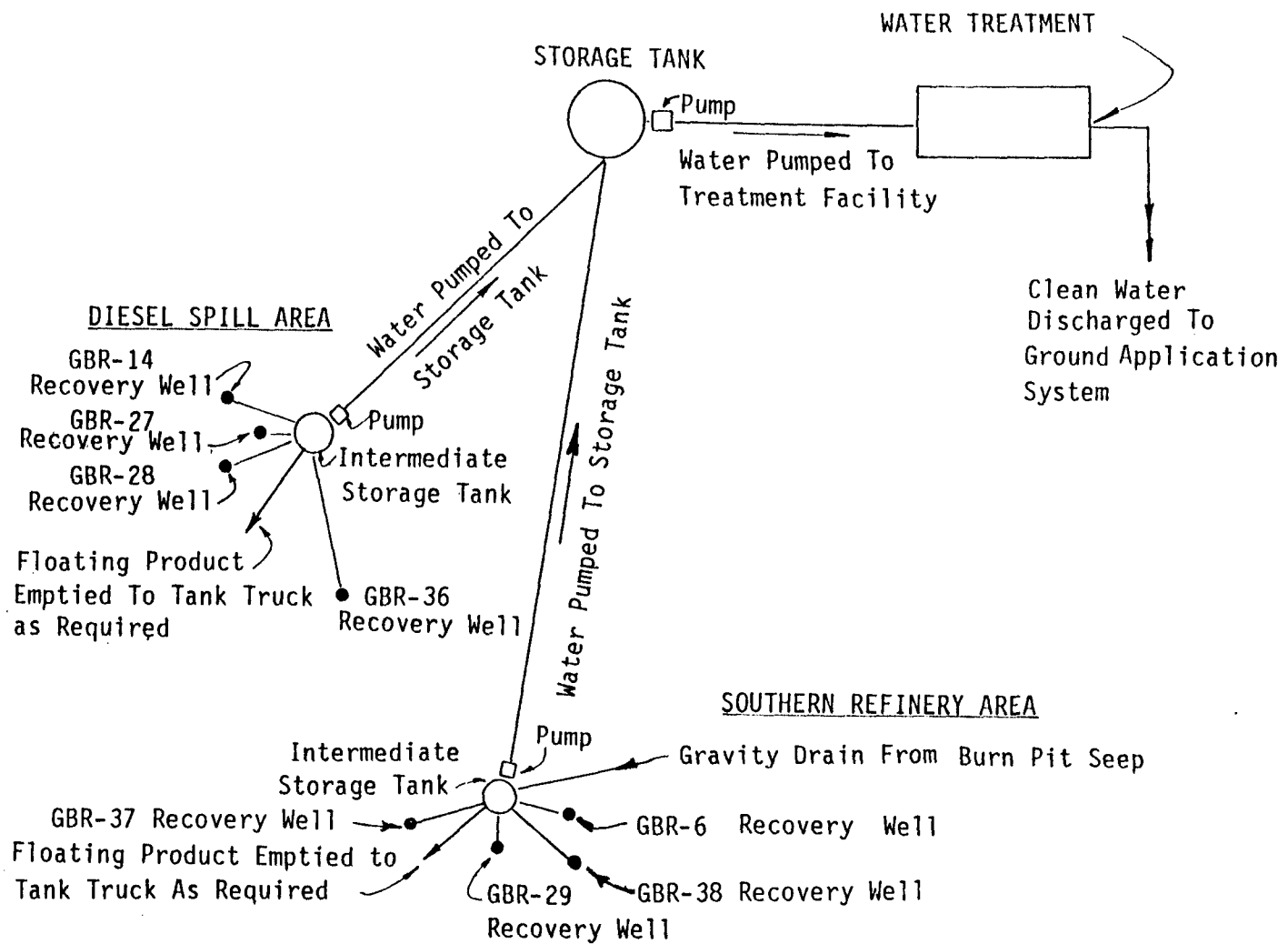


FIGURE 8-5

SCHEMATIC DIAGRAM OF GROUND WATER RECLAMATION SYSTEM

FOR THE GIANT BLOOMFIELD REFINERY

Pumping will be continued until floating product is no longer observable in any of the wells in the Diesel Spill Area. It is expected that at least a year of pumping will be required in order to achieve this result.

*Need to
add dis-
turbance,
also.*

8.2 SOUTHERN REFINERY AREA PLAN

8.2.1 Remedial Actions Completed

GCL installed a 3-level well cluster utilizing the existing GBR-11 as one level and two new adjacent 2-inch wells (GBR-9 and GBR-10) for the other levels. GBR-10 is screened at the top of the aquifer from 29 to 39 feet; GBR-11 is screened at the middle of the aquifer from 40 to 50 feet; and GBR-9 is screened at the bottom of the aquifer from 50 to 60 feet. Each well in the cluster is constructed similarly to the wells clustered in the Diesel Spill Area. The purpose of this cluster is to monitor the effects of remedial action in the Southern Refinery Area.

A recovery pump similar to those being used in the Diesel Spill Area was operated intermittently in GBR-29 since October 7, 1986; and a similar pump was operated in GBR-6 since November 21, 1986. Because GBR-6 is a low-yield well, the system proved suitable for it. However, because the aquifer adjacent to GBR-29 is more transmissive, wells in this area require a higher rate of pumping to achieve enough drawdown to fully contain the product plume. Therefore, a larger capacity pump (10 gpm) was installed in GBR-29. In the interim, the pilot scale pumping using a low capacity (1 gpm) pump has been successful in removing a considerable amount of floating product in GBR-29. A higher capacity pump was also installed in GBR-6 in order to provide a greater pumping capability during periods of water application to the soil in that area.

*Intermittent
pump
test yet?*

8.2.2 Further Remedial Actions Planned

Interception of contaminated ground water in the Southern Refinery Area will require a higher rate of ground water pumping than in the Diesel Spill Area because of higher-conductivity sediments characteristic of the Southern Refinery Area. Cones of depression that develop within these sediments in response to recovery pumping tend to be less steep than those produced in the silty low-conductivity arroyo alluvium of the

Diesel Spill Area. As a result, a greater discharge rate is required to control the migration of the plume and recover contaminated ground water. Figure 8-6 shows the optimal recovery-well network based upon the results of ground water modeling performed by GCL. The projected water table elevations resulting from pumping these wells are presented in Plate 4, and a complete discussion of the model utilized by GCL is presented in Appendix E. GCL concludes from this model that the documented floating product plume can be controlled and recovered by pumping from this proposed recovery-well network. This pumping, by removing large quantities of water underlying the floating product, will also remove virtually all of the associated dissolved phase contamination.

Check w/
new text
data

Unlike the Diesel Spill Area, long-term pumping data are not available for this area. Proper recovery-well placement depends on the quality of the data. Therefore, installation of the recovery system in the Southern Refinery Area will proceed incrementally on the basis of observed well yield. This phased approach is outlined below.

Wells X1 and X4, shown in Figure 8-6, have been drilled and completed as 6-inch PVC recovery wells. Well X1 was completed in the high-transmissivity valley sediment and Well X4 was completed in the same sandstone bedrock aquifer in which GBR-29 is located.

These wells will be pumped simultaneously with each well maintaining a pre-set pumping water level which will be determined by field testing. Water levels and product thickness will be monitored over a period of two months. The steady-state model used to design the well network will then be recalibrated with this long-term data. If field evidence and the recalibrated model determine that additional recovery wells are required, the wells will be installed at the optimum locations.

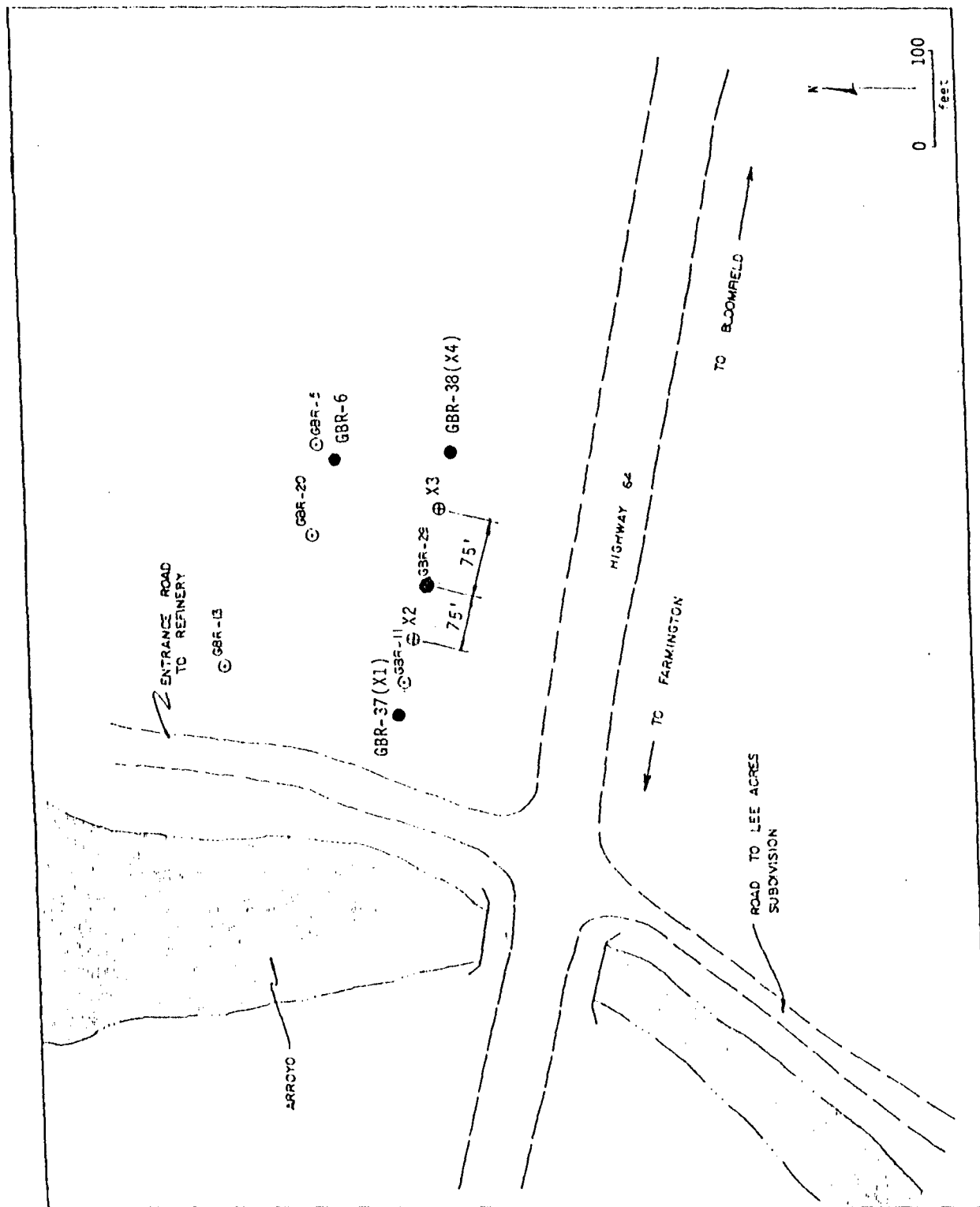
Because of the high yield of GBR-29 and the expected high yields of other planned recovery wells, the model has indicated that a pumping rate of 10-15 gpm will be necessary to achieve control over the plume. This rate

LEGEND

- ⊗ PROPOSED RECOVERY WELL
- EXISTING RECOVERY WELLS

FIGURE 8-6

LOCATIONS OF RECOVERY WELLS
SOUTHERN REFINERY AREA
GIANT - BLOOMFIELD



is beyond the capacity of the top-filling, air-driven pumps currently used in the Diesel Spill Area. Therefore, GCL installed higher capacity pumps in the Southern Refinery Area that will produce the necessary drawdown and remove floating product by pumping water from the upper portion of the aquifer.

As Figure 8-7 shows, a submersible pump is fitted with a 4-inch diameter sleeve, called a shroud, before being lowered down the 6-inch well. The bottom of the sleeve is sealed around the pump casing and the top of the sleeve is open to allow the entrance of floating product and water into the pump. The pump will maintain a drawdown in the well down to the top of the shroud by means of appropriate pump controls. This method of pumping will maintain the well water levels required to produce sufficient cones of depression and effectively remove the floating product plume.

constant
"A" pump

Produced water will be pumped to the intermediate storage tank located near GBR-29, where floating product will be removed and the remaining water subsequently pumped to long-term storage tanks on the site. Piping will be installed to permanently connect these tanks.

8.3 TRUCK FUELING AREA PLAN

8.3.1 Remedial Actions Completed

GCL installed a small-diameter recovery pump in GBR-22 on December 4, 1986, to begin immediate recovery action in that area. The pump fits in a 2-inch diameter well and is, therefore, smaller than the other recovery pumps in use at the refinery. This pump uses compressed air and operates on an adjustable, timed cycle. Because trial pumping of GBR-22 produced only a small volume of product and water, it became evident that a larger, thoroughly developed well will be required for effective recovery.

GCL drilled five exploratory boreholes in order to determine the extent of the plume in this area, three of which were cased with 2-inch PVC

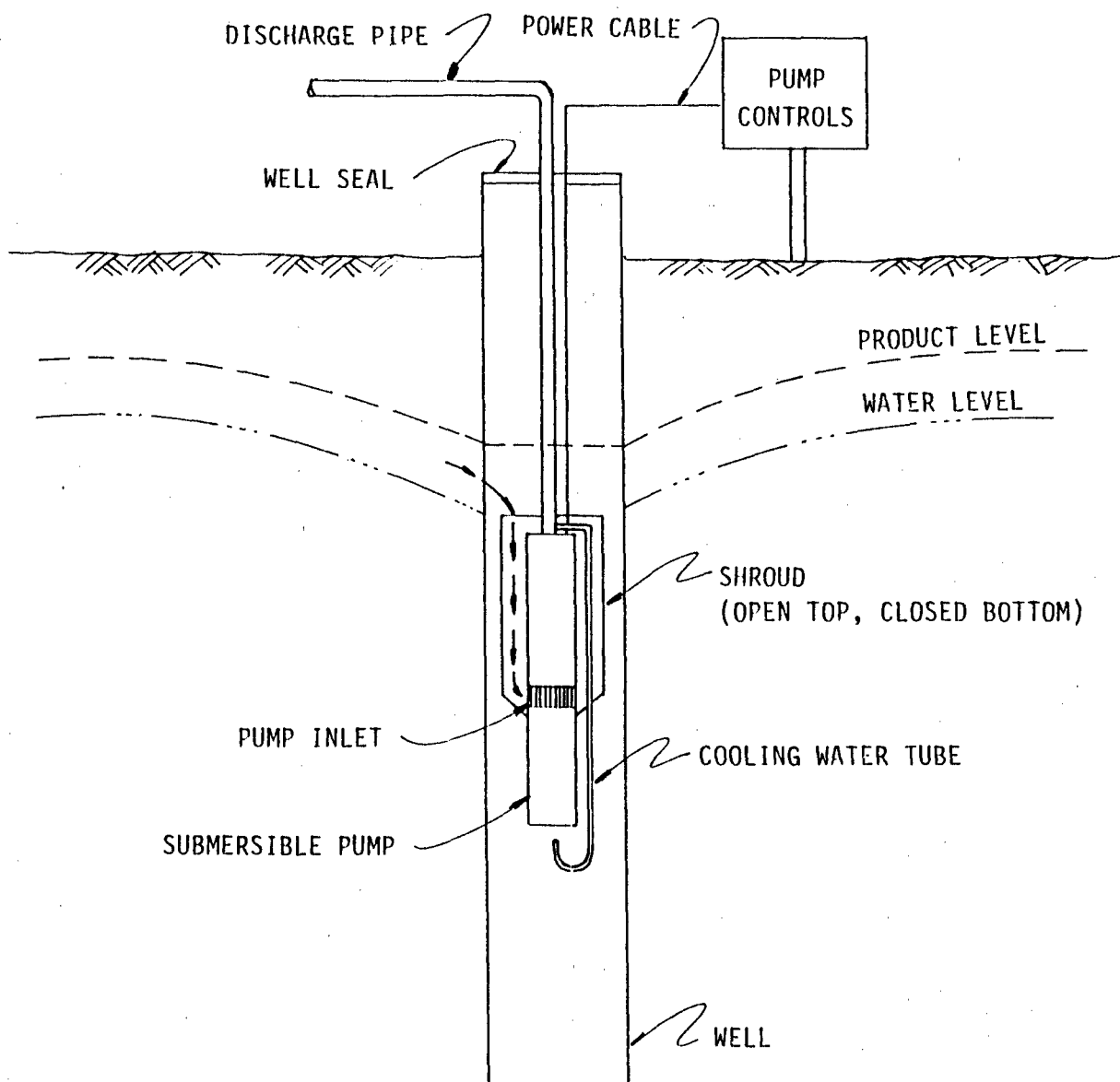


FIGURE 8-7

SUBMERSIBLE PUMP ADAPTED FOR FLOATING PRODUCT REMOVAL

pipe to be used as observation wells. These wells are identified as GBR-33, GBR-34 and GBR-35. GCL also installed one 6-inch recovery well (GBR-36) in the lower part of the identified plume at the location shown in Figure 8-1.

8.3.2 Further Remedial Actions Planned

GCL has temporarily installed an air operated recovery pump, similar to those used in the Diesel Spill Area, in recovery well GBR-36. This pump will discharge into the intermediate storage tank in the Diesel Spill Area at a rate of about 1 gpm. Also, a small-diameter, air-operated pump has been temporarily installed in GBR-35 and will produce about 1/2 gpm. These pumps will be permanently connected to the system in the Diesel Spill Area and be similarly pumped.

8.4 FIRE FIGHTING DRILL AREA SEEP

new The fire fighting drill area seep in the Southern Refinery Area does not present a hazard to the environment, *because 10/4/87 RTH* Water from the seep is currently being collected by a perforated PVC pipe laid in a gravel filled trench (Figure 8-8), and piped by gravity to an intermediate storage tank that is periodically emptied by tank truck. *Wrong*

8.5 WATER TREATMENT AND DISPOSAL

Most of the water pumped from the recovery systems will contain contaminant concentrations in the low ppm or ppb range. Samples taken from the Diesel Spill Area indicate that most dissolved organics are removed by the action of pumping and discharging into the intermediate storage tank. Samples of water from this tank have shown no detectable contamination in most cases and are below New Mexico ground water standards. GCL expects that water from the Southern Refinery Area will likewise be rendered acceptable after moderate exposure to the air. *referring only to organic standards?*

Floating product and contaminated water from the recovery wells and water from the fire fighting drill area seep will be collected in intermediate storage tanks, one in the Southern Refinery Area near GBR-29 and the other near GBR-28 in the Diesel Spill Area. Floating product

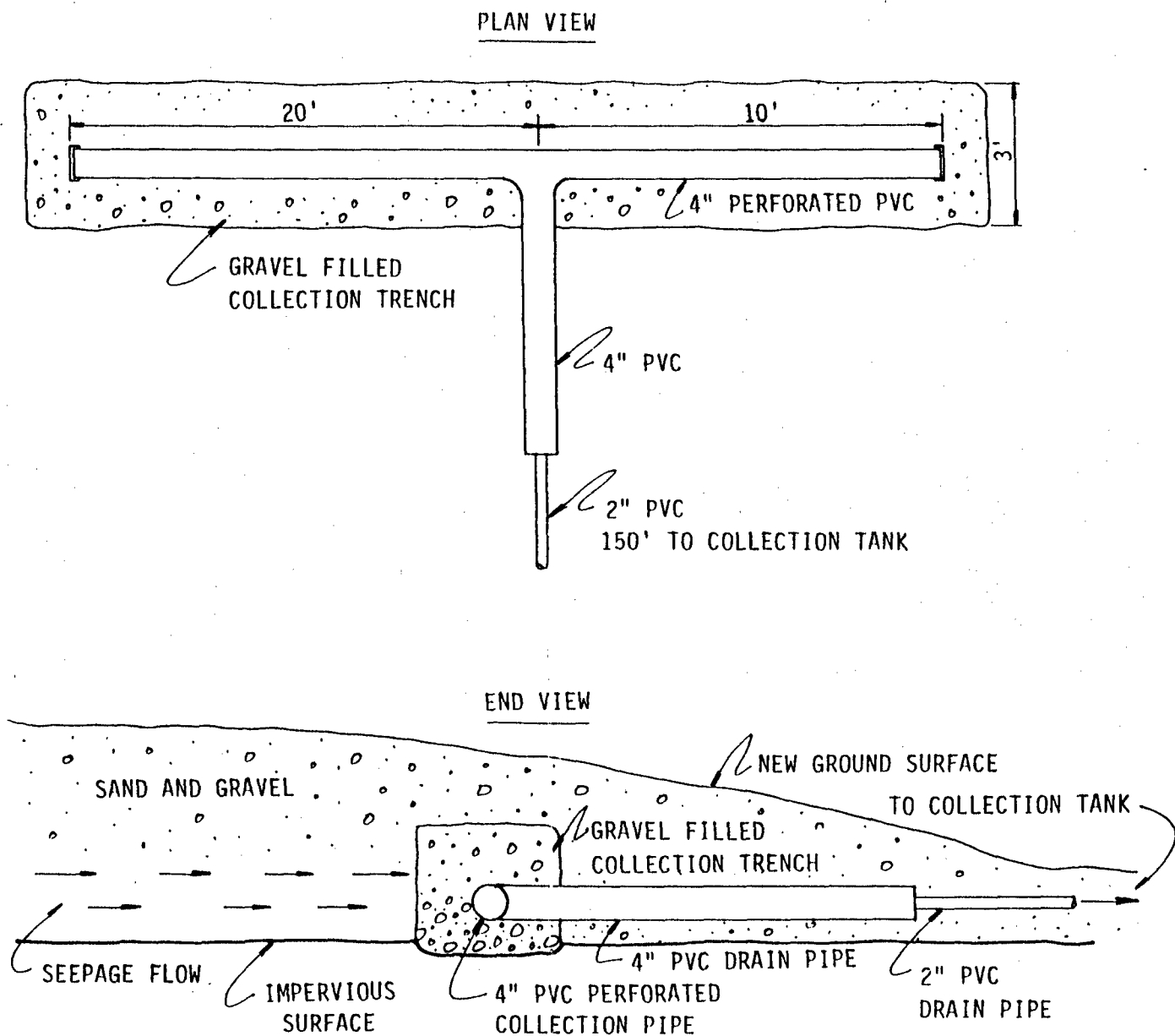


FIGURE 8-8

SEEPAGE COLLECTOR NEAR FIRE FIGHTING DRILL AREA
GIANT BLOOMFIELD REFINERY

will be removed from these intermediate storage tanks, as it accumulates. The remaining water will be transferred to long-term storage tanks for testing and treatment as required. Floating hydrocarbons will be removed from the long-term storage tanks as well. A schematic diagram of the planned collection system is shown in Figure 8-5.

It is likely that the agitation of pumping and exposure to air in the storage tanks will cause much of the dissolved hydrocarbons to volatilize. Limited storage is available at the refinery. With a total pumping rate of about 36 gpm, the residence time of produced water stored at the refinery site is approximately 25-30 days. Produced water may require air-stripping prior to discharge in order to meet state of New Mexico ground water standards. Air stripping, if required, will be achieved through the use of sprinklers as air stripping devices, while applying water to the ground.

GCL conducted a test on November 7, 1986 to determine the extent of hydrocarbon volatilization that would occur through application of contaminated water to soil using a standard impulse-type irrigation sprinkler. It has been reported that this procedure reduces volatile organics by at least 90% (Hazardous Waste Consultant, 1983). Water for the sprinkler test was taken from the intermediate storage tank in the Diesel Spill Area that had received contaminated water from GBR-14, GBR-27 and GBR-28. Water from these three wells continued to be pumped into the tank so that both stored water and freshly-pumped water were used, which would be representative of normal operation. A jet pump was used to pump the water to a Rainbird model 25 BPJ impulse sprinkler at a rate of 3.3 gpm at 50 psi. Twelve quart jars were placed on the ground to collect the water that accumulated over a 30-minute period of sprinkling. Water from all of the jars was combined to make up the sample. Other samples of water were taken from the tank and from the pipe just before it entered the sprinkler.

Table 8-1 presents the chemical analyses of these samples and of water previously taken directly from the three pumped wells. Although BTEX levels of well water samples from GBR-27 and GBR-28 ranged from 50 to 4019 ppb, most of these compounds were not detected in the sprinkler-test samples. As another example, levels of 1, 2-DCA were reported at 6.0 ppb in a GBR-27 well water sample, 7.1 and 6.3 ppb from the tank before sprinkling, and "not detected" after sprinkling.

The data shows an anomaly where benzene was reportedly increased after sprinkling from 2 to 7 ppb. Since an actual increase in benzene is not possible, and since there is a significant overall reduction of benzene in the water when passing through the system, this appears to be a spurious result caused by analytical variance or errors.

The most important result of the sprinkler test is the demonstration of significant reductions of contamination when well water samples are compared to tank discharge samples. Such a comparison indicates that the pumping of the water from the wells into the intermediate storage tank by air-driven pumps and the storage of the water in the tank are sufficient to reduce the levels of BTEX and other organic compounds to levels that may be acceptable for direct discharge to the ground or subsurface.

The sprinkler test did not show large reductions in contamination caused by sprinkling because most contaminants had already been reduced below the limits of detection during storage in the intermediate storage tank. If this contaminant reduction continues to be observed, sprinkling will not be necessary, and direct application to the soil will be used. *LA specified?*

Water will be applied to the ground only after it meets applicable ground water quality standards of the State of New Mexico (after storage or after air-stripping). Most of the water (except that which may be applied by sprinkling) will be applied to the ground through an infiltration trench to be located in the contaminated soil area of the Southern Refinery Area. Application in this manner will assist in flushing

*TDS
cl.*

*concentration
of cl, TDS?*

TABLE 8-1
GIANT INDUSTRIES BLOOMFIELD REFINERY
SPRINKLER TEST RESULTS
BTX AND CHLORINATED HYDROCARBONS

CONCENTRATIONS IN PARTS PER BILLION

	SPRINKLER TEST SAMPLES			SOURCE WELL SAMPLES				NOMINAL DETECTION LIMIT
	8611071410 PUMP HOSE IN STORAGE TANK	8611071400 BASE OF SPRINKLER	8611071420 SPRINKLER DISCHARGE	8606052000 GBR-27 OCD	8606052000 GBR-27 GCL	8605291600 GBR-28 GCL	8607151900 GBR-28 GCL	
BENZENE	2	ND	7	410	50	2419	319	1
CHLOROBENZENE	ND	ND	ND					1
1,2-DICHLOROBENZENE	ND	ND	ND					1
1,3-DICHLOROBENZENE	ND	ND	ND					1
1,4-DICHLOROBENZENE	ND	ND	ND					1
ETHYLBENZENE	ND	ND	ND					1
TOLUENE	ND	ND	ND	120	74	819	143	1
XYLENES	ND	ND	ND	506	457	4019	224	1
ACROLEIN	ND	ND	ND					25
ACRYLONITRILE	ND	ND	ND					25
BROMOFORM	ND	ND	ND					5
CCl4	ND	ND	ND					5
CHLORODIBROMOMETHANE	ND	ND	ND					5
CHLOROETHANE	ND	ND	ND					5
2-CHLOROETHYL VINYL ETHER	ND	ND	ND					5
CHCl3	ND	ND	ND					5
DICHLOROBROMOMETHANE	ND	ND	ND					5
1,1-DCA	ND	ND	ND					5
1,2-DCA	7.1	6.3	ND	6				5
1,3-DICHLOROPROPYLENE	ND	ND	ND					5
METHYL BROMIDE	ND	ND	ND					5
METHYL CHLORIDE	ND	ND	ND					5
METHYLENE CHLORIDE	ND	ND	ND					5
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND					5
TETRACHLOROETHENE	ND	ND	ND					5
TRANS-1,2-DICHLOROETHENE	ND	ND	ND					5
1,1,1-TCA	ND	ND	ND					5
1,1,2-TCA	ND	ND	ND					5
TRICHLOROETHENE	ND	ND	ND					5
VINYL CHLORIDE	ND	ND	ND					5

ND = not detected

weather conditions

- temperature = 0°C
- wind variable, 10-15 mph
- cloudy

sprinkler conditions

- discharge = 3.5 gpm
- spray length = 30 feet
- spray arc ht = 10 feet

contaminants from the soil, which will then be removed by the line of recovery wells along the southern edge of the site. The infiltration trench will be constructed according to New Mexico State requirements for septic tank effluent trenches. It will be 2-feet deep by 2-feet wide and filled with gravel. Perforated PVC pipe will be laid in the bottom of the trench through which water will be discharged. The length of the trench will be determined by percolation tests which will establish the absorption capacity of the soil. Plans and specifications for this discharge system will be submitted to NMOCD prior to construction of the trench.

9.0 MONITORING AND REPORTING

To ensure that the product recovery and containment system in each area is operating properly, it will be necessary to monitor the effects of pumping on ground water. For this purpose, ground water monitor wells are located within and outside of the product plume in each area.

On a bi-weekly basis, Giant will monitor and record the water level and product thickness in selected representative wells (GBR-7, 8, 10, 15, 19, 21, 22, 24, 25, 33, 35) in the Southern Refinery Area, the Diesel Spill Area and the Diesel Fueling Area. Giant will employ an electronic oil and water probe for such monitoring.

GCL will collect water quality data from the burn pit seep, all recovery wells (GBR-6, 14, 27, 28, 29, 36, 37, 38) and from 10 observation and monitor wells (GBR-7, 8, 9, 15, 17, 22, 24D, 25, 26, 33). Prior to discharging any water to the proposed infiltration trench, GCL will conduct a complete chemical analysis of such water for organic constituents. Prior to discharging from a specific storage tank, a sample from the tank will be obtained and analyzed for parameters subject to ground water standards at Section 3-103 of WQCC regulations. If the water to be discharged shows no contaminant level above the standards, it will be discharged directly to the infiltration trench. If contaminant levels exceed the standards, the water will be air-stripped and, if required, treated with granular activated charcoal to achieve the required reductions.

What about TBC, if SD?

GCL will oversee a program of continued surveillance to assure that the pumping systems operate properly. A daily log (kept on work days only) will be maintained by Giant personnel listing discharge meter readings, general observations and any repair actions taken. Water levels in all storage tanks will also be obtained and recorded in the log. Pipelines will be visually inspected for leaks.

GCL will conduct monthly inspections during the active pumping phases that will include measurement of water levels and product thicknesses. in all wells. Every quarter a report will be prepared listing:

- o ground water elevations;
- o product thicknesses on ground water;
- o quantities pumped;
- o quantities discharged;
- o analytical results of discharge water samples; and
- o all significant actions during the period.

By analyzing these data, GCL will continually evaluate the progress of the remedial action program and Giant will keep NMOCD informed of all significant developments.

MONT&AND\SOILGWAT.RPT

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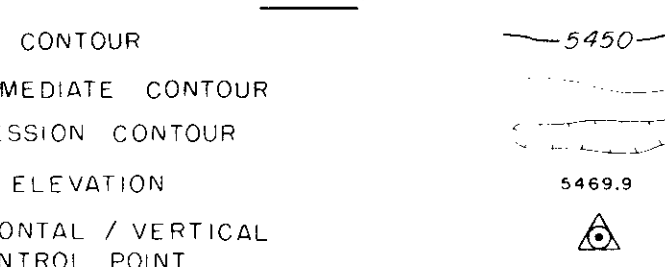
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NOTES:

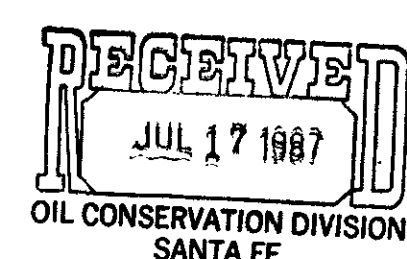
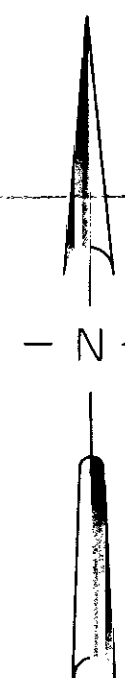
1. This map complies with the National Map Accuracy Standards.
2. Field surveys performed by San Juan Engineering, Farmington, New Mexico.
3. Vertical aerial photography exposed on July 22, 1978 with a Zeiss RMK A 15/23 precision aerial mapping camera, with a calibrated focal length of 152.58 mm.
4. Stereocompilation, final drafting, and photographic reproduction performed by Thomas R. Mann & Associates, Inc., Albuquerque, New Mexico.
5. 500 foot grid, based on a local coordinate system.

LEGEND

INDEX CONTOUR
INTERMEDIATE CONTOUR
DEPRESSION CONTOUR
SPOT ELEVATION
HORIZONTAL / VERTICAL CONTROL POINT



SCALE IN FEET
0 50 100 200
SCALE: 1" = 100' (1:1200)



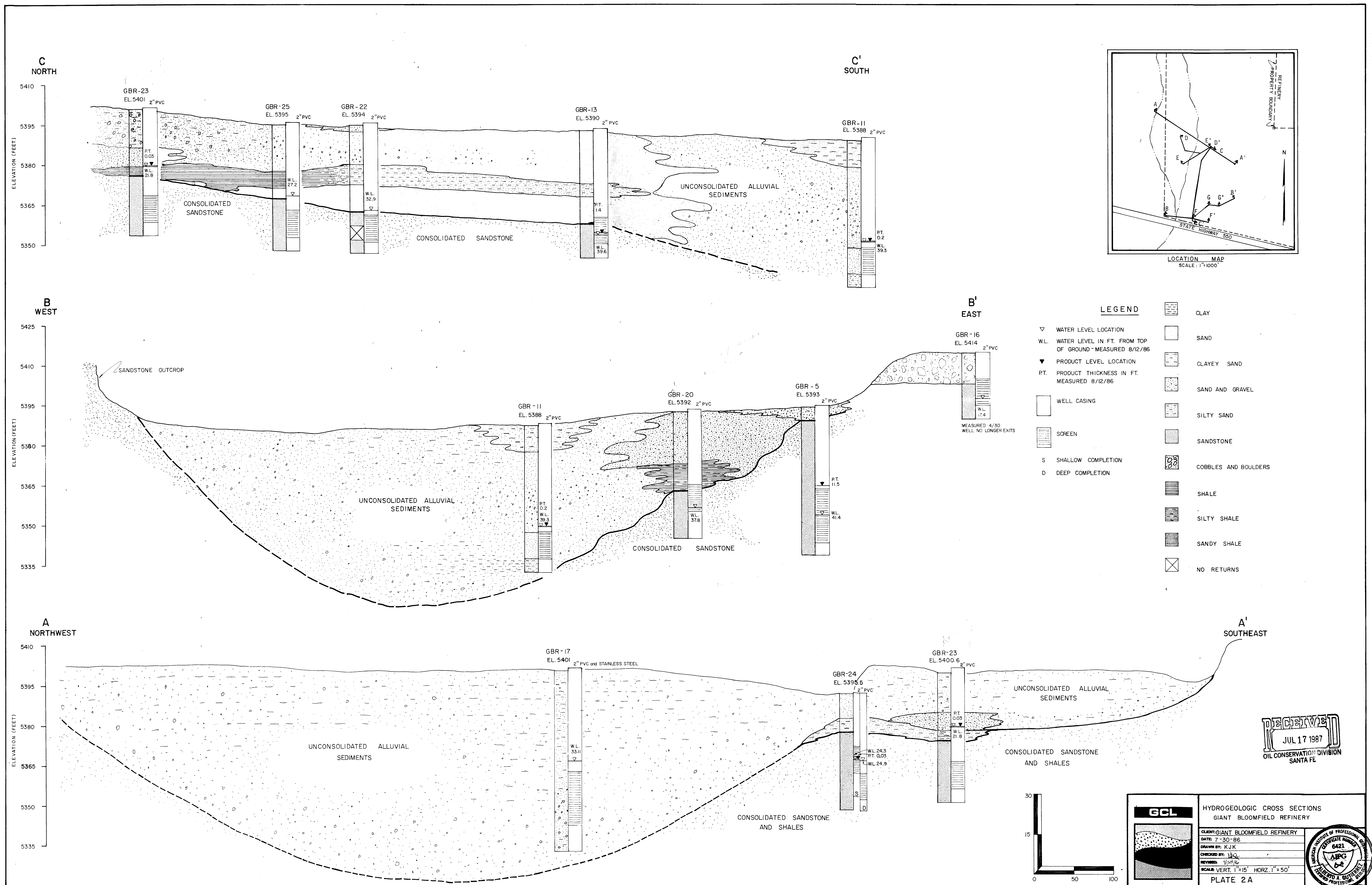
**TOPOGRAPHIC / PHOTOBASE MAP
OF THE
GIANT REFINERY
SAN JUAN COUNTY, NEW MEXICO**

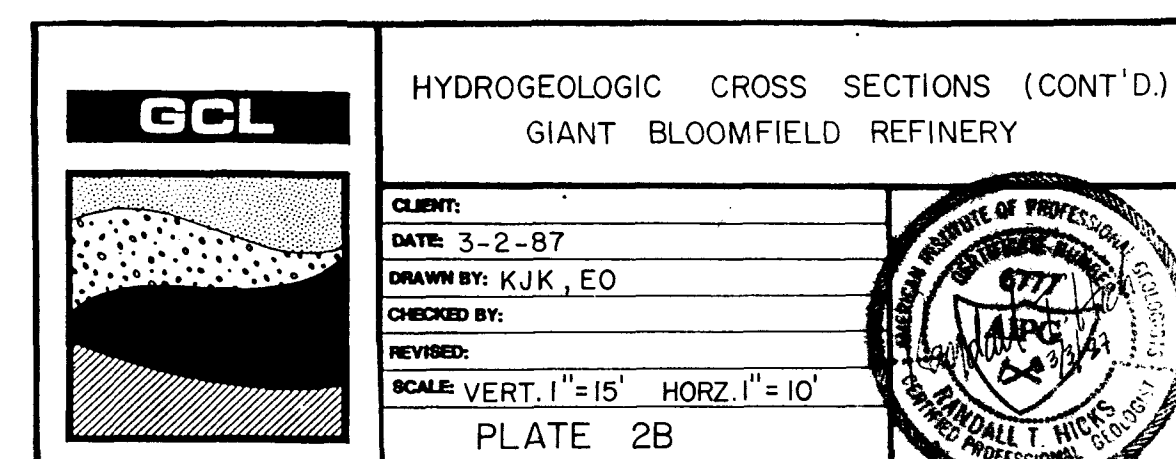
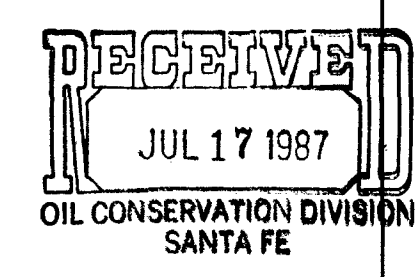
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VERTICAL DATUM: MEAN SEA LEVEL

1978

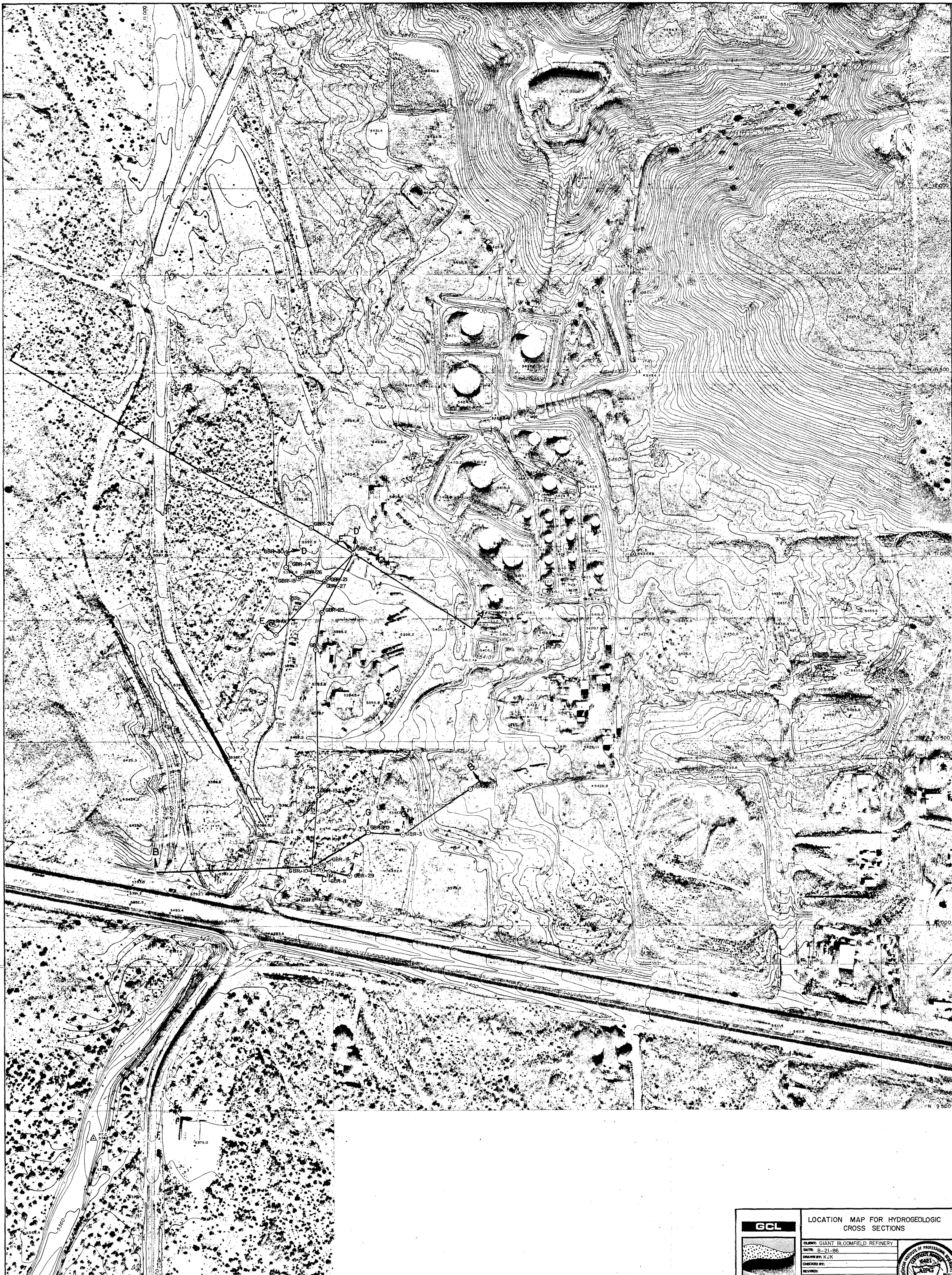
	SITE LOCATION MAP GIANT BLOOMFIELD REFINERY	
	CLIENT: GIANT BLOOMFIELD REFINERY	
	DATE: 8-21-86	
	DRAWN BY: KJK	
	CHECKED BY:	
REVISED:		
SCALE: 1" = 100'		
PLATE I		

1987 July 17 1987 copy





1987 only single copy

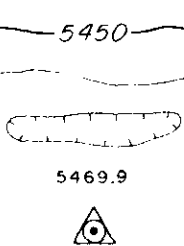


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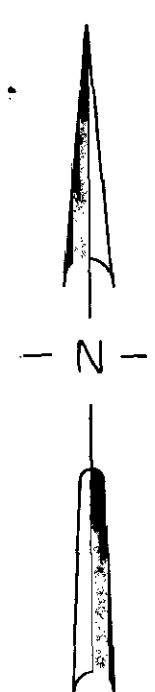
1. This map complies with the National Map Accuracy Standards.
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4. Stereocompilation, final drafting, and photographic reproduction performed by Thomas R. Mann & Associates, Inc., Albuquerque, New Mexico.
5. 500 foot grid, based on a local coordinate system.

LEGEND

INDEX CONTOUR
INTERMEDIATE CONTOUR
DEPRESSION CONTOUR
SPOT ELEVATION
HORIZONTAL / VERTICAL
CONTROL POINT



SCALE IN FEET
100 200
SCALE: 1" = 100' (1:1200)



RECEIVED
JUL 17 1987
OIL CONSERVATION DIVISION
SANTA FE

TOPOGRAPHIC / PHOTOBASE MAP
OF THE
GIANT REFINERY
SAN JUAN COUNTY, NEW MEXICO

SCALE: 1" = 100' (1:1200)
CONTOUR INTERVAL: 2'
VERTICAL DATUM: MEAN SEA LEVEL

1978

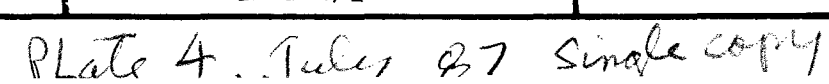


LOCATION MAP FOR HYDROGEOLOGIC
CROSS SECTIONS

CLIENT: GIANT BLOOMFIELD REFINERY
DATE: 8-21-86
DRAWN BY: KJK
CHECKED BY: _____
REVISED: _____
SCALE: 1" = 100'



M.T.S



**SOIL AND
GROUND WATER INVESTIGATIONS
AND REMEDIAL ACTION PLAN**

**GIANT INDUSTRIES, INC.
BLOOMFIELD REFINERY
BLOOMFIELD, NEW MEXICO**

APPENDICES A-C

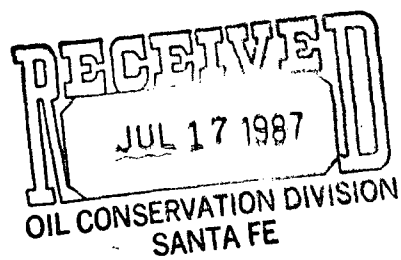
June 1987

Prepared for:

**MONTGOMERY & ANDREWS, P.A.
325 Paseo de Peralta
Santa Fe, New Mexico 87504-2307**

Prepared by:

**Geoscience Consultants, Ltd.
500 Copper Avenue, N.W., Suite 200
Albuquerque, New Mexico 87102**



APPENDIX A
RESULTS OF WATER SAMPLE ANALYSES FROM
LEE ACRES LANDFILL AND
LEE ACRES SUBDIVISION

APPENDIX A - Results of Chemical Analyses of

Water and Wastewater -

Lee Acres Landfill

All concentrations are mg/L except for pH units. If no entry is made for the trace elements (aluminum through zinc) then the element was not detected with the detection limit of 0.1 mg/L.

Abbreviations Used in Appendix A and in the text

CH ₂ Cl ₂	Methylene Chloride
1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethylene
1,2-DCE	1,2-Dichloroethylene
PCE	Tetrachloroethylene
R	Reported Well Depth
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
TD	Total (Well) Depth
TDS	Total Dissolved Solids (if filtered through 0.45 um membrane) or Total Solids (if not filtered through 0.45 um membrane)
Tr	Trace (<0.001 mg/L)
VOCs	Volatile Organic Compounds

Source of Appendix A: "Water Quality Investigations at the Lee Acres Landfill and Vicinity, San Juan County, NM", Environmental Improvement Division, State of New Mexico, Santa Fe, NM, 87504

Lagoon Water		W. Side	E. Side	S. Side*
Sampling Date	1/11/85	2/27/85	2/27/85	5/2/85
Calcium	204./170.	267/230.	234./200.	224./240.
Magnesium	26.8/19.	18.7/19.	18.5/16.	36.6/25.
Sodium	1,507.	1,833.	1,263.	1790.
Potassium	885.	848.	548.	390.
Bicarbonate	--	417.	625.	476.
Sulfate	430.	1,881.	1,086.	40.2
Chloride	2,759.	3,577.	2,251.	4,474.
Phosphate	--	--	--	0.92
Nitrate-N	--	--	--	< 0.01
Ammonia-N	--	--	--	6.8
TKN	--	--	--	11.1
Aluminum	2.3	1.8	1.5	0.30
Arsenic	0.022	--	--	0.009
Barium	0.74	0.60	0.37	0.5
Beryllium	<0.10	<0.10	<0.10	<0.1
Boron	0.61	0.58	0.48	1.6
Cadmium	<0.10	<0.10	<0.10	<0.10
Chromium	0.28	0.23	0.15	<0.10
Cobalt	<0.10	<0.10	<0.10	<0.10
Copper	<0.10	<0.10	<0.10	<0.10
Iron	6.9	7.8	6.8	75.
Lead	<0.10	0.21	0.10	<0.10
Manganese	1.5	0.83	0.80	2.1
Mercury	--	--	--	--
Molybdenum	<0.10	<0.10	<0.10	<0.10
Nickel	<0.10	<0.10	<0.10	<0.10
Selenium	0.026	--	--	0.025
Silicon	1.2	2.0	2.0	14.0
Silver	<0.10	<0.10	<0.10	<0.10
Strontium	4.4	6.0	4.5	7.3
Tin	<0.10	<0.10	<0.10	<0.10
Vanadium	<0.10	<0.10	<0.10	<0.10
Yttrium	<0.10	<0.10	<0.10	<0.10
Zinc	0.29	0.24	0.54	<0.10
TDS	6,308.	7,695.	5,268.	9018.
pH	7.14	8.08	7.64	6.14
Benzene	0.44	1.03	0.89	0.120
Toluene	0.95	1.98	1.94	0.330
Ethylbenzene	0.1	0.16	0.17	0.025
Xylenes	0.71	1.21	1.34	0.205
CH ₂ Cl ₂	2.0	0.18	0.21	--
1,1,1-TCA	0.4	0.19	0.23	0.010
TCE	0.004	--	--	--
PCE	--	0.016	0.007	--
Acetone	--	--	--	--
2-Propanol	--	--	--	--

* After the addition of FeCl₃

Baldwin Well TD = 50'-60'R

Sampling Date 5/2/85

Calcium	360./400.
Magnesium	46.4/47.
Sodium	311.
Potassium	55.4
Bicarbonate	148.8
Sulfate	1464.
Chloride	69.0

Nitrate-N	<0.01
Ammonia-N	0.02
TKN	0.19

Aluminum	
Arsenic	
Barium	
Beryllium	
Boron	0.24
Cadmium	
Chromium	
Cobalt	
Copper	
Iron	18.
Lead	
Manganese	0.77
Mercury	
Molybdenum	
Nickel	
Selenium	
Silicon	9.0
Silver	
Strontium	6.3
Tin	
Vanadium	
Yttrium	
Zinc	0.15

TDS	2345.
pH	7.11

Filtration (0.45 um)	No
-------------------------	----

VOCs	ND
------	----

Chacon Well TD = 55'R

Sampling Date 5/1/85

Calcium	352./410.
Magnesium	51.4/39.
Sodium	506.0
Potassium	3.9
Bicarbonate	127.6
Sulfate	2073.
Chloride	53.2

Nitrate-N	0.04
Ammonia-N	0.15
TKN	0.31

Aluminum	
Arsenic	
Barium	
Beryllium	
Boron	0.32
Cadmium	
Chromium	
Cobalt	
Copper	
Iron	26.
Lead	
Manganese	0.63
Mercury	
Molybdenum	
Nickel	
Selenium	
Silicon	6.6
Silver	
Strontium	7.1
Tin	
Vanadium	
Yttrium	
Zinc	0.80

TDS	3118.
pH	6.66

Filtration (0.45 um)	No
-------------------------	----

VOCs	
1,1,1-TCA	0.001
TCE	0.001

Duggins Well

Sampling Date 4/30/85

Calcium	448./430.
Magnesium	43.9/24.
Sodium	610.
Potassium	5.46
Bicarbonate	125.2
Sulfate	2452.
Chloride	40.2

Nitrate-N	1.39
Ammonia-N	0.32
TKN	0.39

Aluminum	
Arsenic	
Barium	
Beryllium	
Boron	0.30
Cadmium	
Chromium	
Cobalt	
Copper	
Iron	0.19
Lead	
Manganese	0.30
Mercury	
Molybdenum	
Nickel	
Selenium	
Silicon	7.4
Silver	
Strontium	8.8
Tin	
Vanadium	
Yttrium	
Zinc	0.40

TDS	3773.
pH	7.04

Filtration (0.45 um)	No
-------------------------	----

VOCs	ND
------	----

Duncan Well TD = 40'R

Sampling Date 4/22/85

Calcium	413./430.
Magnesium	69.3/51.
Sodium	508.
Potassium	5.46
Bicarbonate	119.0
Sulfate	2041.
Chloride	81.7

Nitrate-N <0.01

Ammonia-N

TKN

Aluminum

Arsenic

Barium

Beryllium

Boron 0.42

Cadmium

Chromium

Cobalt

Copper

Iron 15.

Lead

Manganese 0.45

Mercury

Molybdenum

Nickel

Selenium

Silicon 7.7

Silver

Strontium 7.7

Tin

Vanadium

Yttrium

Zinc

TDS 3250.

pH 7.59

Filtration
(0.45 um) No

VOCs ND

Haines "Cinderblock" Well

Sampling Date 4/30/85

Calcium	117./110.
Magnesium	22.0/24.
Sodium	273.7
Potassium	3.12
Bicarbonate	69.9
Sulfate	871.9
Chloride	20.2

Nitrate-N	0.00
Ammonia-N	0.12
TKN	0.36

Aluminum	
Arsenic	
Barium	
Beryllium	
Boron	0.17
Cadmium	
Chromium	
Cobalt	
Copper	
Iron	16.
Lead	
Manganese	0.15
Mercury	
Molybdenum	
Nickel	
Selenium	
Silicon	1.7
Silver	
Strontium	3.6
Tin	
Vanadium	
Yttrium	
Zinc	

TDS	1398.
pH	7.02

Filtration (0.45 um)	No
-------------------------	----

VOCs	ND
------	----

Mulliken Well

Sampling Date 4/30/85

Calcium	378./450.
Magnesium	42.5/48.
Sodium	345.
Potassium	3.12
Bicarbonate	155.7
Sulfate	1759.
Chloride	34.1

Nitrate-N	0.08
Ammonia-N	0.01
TKN	<0.1

Aluminum	
Arsenic	
Barium	
Beryllium	
Boron	0.26
Cadmium	
Chromium	
Cobalt	
Copper	
Iron	0.58
Lead	
Manganese	0.43
Mercury	
Molybdenum	
Nickel	
Selenium	
Silicon	12.
Silver	
Strontium	7.4
Tin	
Vanadium	
Yttrium	
Zinc	

TDS	2278.
pH	7.21

Filtration (0.45 um)	No
-------------------------	----

VOCs	ND
------	----

Nace Well TD = 13.5'R

Sampling Date 5/1/85

Calcium	148./130.
Magnesium	14.
Sodium	101.2
Potassium	2.73
Bicarbonate	151.4
Sulfate	471.9
Chloride	13.2

Nitrate-N	<0.01
Ammonia-N	0.07
TKN	<0.1

Aluminum	
Arsenic	
Barium	
Beryllium	
Boron	<0.1
Cadmium	
Chromium	
Cobalt	
Copper	
Iron	0.44
Lead	
Manganese	2.1
Mercury	
Molybdenum	
Nickel	
Selenium	
Silicon	6.7
Silver	
Strontium	2.0
Tin	
Vanadium	
Yttrium	
Zinc	0.13

TDS	855.
pH	6.60

Filtration (0.45 um)	No
-------------------------	----

VOCs	0.001 PCE
------	-----------

Piersall Well

Sampling Date	4/29/85
---------------	---------

Calcium	224./280.
Magnesium	46.4/32.
Sodium	145.
Potassium	2.73
Bicarbonate	169.
Sulfate	814.7
Chloride	37.7

Nitrate-N	<0.01
Ammonia-N	0.12
TKN	<0.1

Aluminum	
Arsenic	
Barium	
Beryllium	
Boron	0.18
Cadmium	
Chromium	
Cobalt	
Copper	
Iron	1.7
Lead	
Manganese	0.90
Mercury	
Molybdenum	
Nickel	
Selenium	
Silicon	10.
Silver	
Strontium	4.3
Tin	
Vanadium	
Yttrium	
Zinc	0.13

TDS	1428.
pH	6.93

Filtration (0.45 um)	No
-------------------------	----

VOCs	ND
------	----

Reynolds Well

TD = 50'R

Sampling Date	4/22/85	4/26/85	10/23/85	10/24/85	10/24/85
Calcium	677.	710.		816.8/810.	762.4/810.
Magnesium	73.0	53.		120.5/61.	86.4/61.
Sodium	393.			418.6	414.0
Potassium	2.34			1.17	1.56
Bicarbonate	171.6			228.9	218.7
Sulfate	1231.			1262.	1212.
Chloride	1002.9			1221.8	1320.8
Nitrate-N	3.06			2.31	2.38
Ammonia-N				<0.10	<0.10
TKN				0.62	<0.10
Aluminum	Not Analyzed		Not Analyzed		
Arsenic					
Barium					
Beryllium					
Boron		0.19		0.2	0.2
Cadmium					
Chromium					
Cobalt					
Copper					
Iron		<0.10		0.2	<0.10
Lead					
Manganese		<0.05		<0.05	<0.05
Mercury					
Molybdenum					
Nickel					
Selenium					
Silicon		6.6		6.3	6.2
Silver					
Strontium		13.		14.	14.
Tin					
Vanadium					
Yttrium					
Zinc		1.1		0.7	0.7
TDS	4313.			4343.	4308
pH	6.85			6.38	6.38
Filtration (0.45 um)	No	No	No	No	Yes
VOCs					
Benzene	0.008	Tr			
1,1-DCA	0.006	0.002			
1,1,1-TCA	0.022	0.02			
vinylchloride	--	--		?	
1,1-DCE	0.001	Tr	0.002		
1,2-DCE	0.001	Tr	0.011	0.01	
TCE	0.002	0.002	0.0015	Tr	
PCE	0.01	0.004	0.001	0.001	

Stark Well TD = 55'R

Sampling Date 4/30/85

Calcium	140./180.
Magnesium	24.4/26.
Sodium	80.5
Potassium	3.9
Bicarbonate	121.4
Sulfate	441.6
Chloride	19.2

Nitrate-N	0.05
Ammonia-N	0.03
TKN	<0.1

Aluminum	
Arsenic	
Barium	
Beryllium	
Boron	0.10
Cadmium	
Chromium	
Cobalt	
Copper	
Iron	4.2
Lead	
Manganese	4.9
Mercury	
Molybdenum	
Nickel	
Selenium	
Silicon	8.2
Silver	
Strontium	2.7
Tin	
Vanadium	
Yttrium	
Zinc	0.15

TDS	828.
pH	6.69

Filtration (0.45 um)	No
-------------------------	----

VOCs	ND
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APPENDIX B
LITHOLOGIC LOGS AND COMPLETION DIAGRAMS
OF WELLS INSTALLED BY GIANT INDUSTRIES

Geoscience
Consultants, Ltd.

WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR-1NE NW NW S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologySpud Date 12/20/85 Completion Date 12/20/85Logs Run lithology from cuttings Logged By J.C. HunterElevation 5414' topo Spud In (Fm.) Fill and/or Animas Fm.Remarks Drilled With Hollow-Stem Auger (CME-55)

Depth

Litho

Samples/Footage

Lithology/Remarks

0.0-10.0 (10.0') FILL: very coarse cobbles and small boulders
of quartzite w/sand and gravel; dark gray; dark hydrocarbon
stain and odor below 2.5'; damp.

8512200850/10.0' 10.0-20.0' (20.0') SANDSTONE: yellow-gray brown; silty and poorly
sorted; fine-med grained; damp' faint hydrocarbon odor 10.0-15.0'
8512200900/15.0' dryer with no odor 15.0'-20.0'.

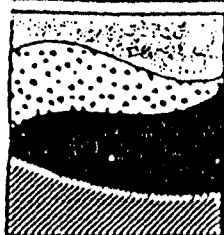
TD=20.0'

8512200916/20.0' Borehole located on N side of old burn pit; 90.0' 165° to south
fire hydrant' borehole backfilled w/cuttings and bentonite plug

85122000850 : 1 VOA, cuttings
8512200900 : 1 VOA, 1 Whirlpack, split spoon
8512200916 : 1 VOA, 1 Whirlpack, split spoon

Geoscience
Consultants, Ltd.

WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR-2NE NW NW S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologySpud Date 12/20/85 Completion Date 12/20/85Logs Run Lithology from cuttings Logged By J.C. HunterElevation 5414' topo Spud In (Fm.) Fill and/or Animas Fm.Remarks Drilled with Hollow-Stem Auger (CME 55)

Depth

Litho
Recor

Samples/Footage

Lithology/Remarks

0

0.0'-15.0' (15.0') FILL; very coarse cobbles and small boulders of quartzite w/sand and gravel; faint hydrocarbon odor 5.0'-10.0'; strong hydrocarbon odor 10.0'-15.0'; free water level encountered @ 10.0'; Hydrocarbon stains 5.0'-15.0'.

5

10

8512201046/12.5'

15

15.0'-25.0' (10.0') SANDSTONE : grades from medium gray (15.0-17.5') to yellow gray (17.5'-25.0'); strong hydrocarbon odor and some stains 15.0'-17.5'; faint odor and no stain 17.5'-25.0'; sand is fine-med grained, poorly sorted, silty; wet to 25.0'.

20

TD=25.0' 25

30

Borehole located in center of old burn pit; 73.0', 148° to south hydrant; borehole backfilled with cuttings and bentonite plug @ bottom and @ top of water.

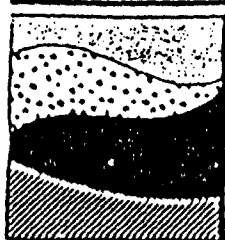
8512201046 : 1 VOA, 1 whirlpack, cuttings

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WELL LOGGING FORM

Page 1 of 1

Client Montgomery & Andrews Well Number GBR-3
1/4 NE 1/4 NW 1/4 NW 1/4 S 27 T 29 R 12 State New Mexico
 County San Juan Contractor Western Technology
 Spud Date 12/20/85 Completion Date 12/20/85
 Logs Run lithology from cuttings Logged By J.C. Hunter
 Elevation 5414' topo Spud In (Fm.) Fill and/or Animas Fm.
 Remarks Drilled with Hollow- Stem Auger (CME-55)



Depth

Litho
recor

Samples/footage

Lithology/remarks

0

0.0'-5.0' (5.0') FILL: very coarse cobbles and small boulder
 of quartzite; some sand and gravel; gray-gray brown; dry;
 faint hydrocarbon odor.

5

5.0'-7.5' (2.5') SANDY FILL: sand & gravel with some cobbles
 and boulders; brownish gray; damp; faint hydrocarbon odor.

10

7.5'-12.5' (5.0') SANDSTONE: yellow-brown; fine grained;
 poorly sorted and silty; damp; very faint hydrocarbon odor;
 no stain.

TD=12.5'

(Refused auger)

15

Borehole located 51.0', 136" to south hydrant; backfilled
 w/ cuttings and bentonite plug @ bottom. Probably at or
 near south edge of burn pit.

20

25

30

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR-41/4 NE 1/4 NW 1/4 NW 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologySpud Date 12/20/85 Completion Date 12/20/85Logs Run Lithology from cuttings Logged By J.C. HunterElevation 5414' topo Spud In (Fm.) Fill and/or Animas Fm.Remarks Drilled with Hollow-Stem Auger (CME-55)

Depth

Litho
recor

Samples/footage

Lithology/remarks

0

0.0'-5.0' (5.0') FILL: Very coarse cobbles and small boulder brown-gray; dry, faint hydrocarbon odor; no stain.

5

5.0'-25.0' (20.0') SAND and STONE: gray-brown; soft and loose 5.0'-13.0', becomes harder and consolidated 13.0'-25.0'; damp from 5.0'-10.0'; saturated 10.0'-25.0'; hydrocarbon odor and some stain 5.0' - 25.0'; water level poorly defined, about 10.0'.

10

15

20

TD=25.0' 25
refused auger

30

Located 97.0', 138° to south hydrant; backfilled with cuttings and bentonite plug @ bottom.

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR-51/2 1/2 1/2 1/2 S 1/2 T 1/2 R 1/2 State New MexicoCounty San Juan Contractor Western TechnologySpud Date 12/20/85 Completion Date 12/20/85Logs Run lithology from cuttings Logged By J.C. HunterElevation 5390' topo Spud In (Fm.) Fill and/or Animas Fm.Remarks Drilled with Hollow-Stem Auger (CME-55)

Depth

LITHO
LOG

Samples/footage

Lithology/remarks

0

0.0
0.0
0.0

0.0'-5.0' (5.0') FILL: Very coarse cobbles and small boulders of quartzite; minor sand and gravel; dark gray with strong oily hydrocarbon stain and odor, dry-moist.

10

20

8512201240/20.0'

5.0'-55.0' (50') SANDSTONE: dark gray-yellow gray; fine grained; poorly sorted; silty; strong hydrocarbon stain and odor 5.0'-25.0'; faint stain and some odor 25.5'- 55.0' ; water level at approximately 33.0', odor persists in saturated sand to total depth.

30

5/30/86

33'

40

50

8512201410/55.0'

Borehole covered and left open for later ground water sampling. Located below SW corner of south pad.

TD=55.0'
refused auger

60

8512201240 : 1VOA, 1 whirlpack, cuttings

8512201410 : 1VOA, 1 whirlpack, cuttings

TD 53'6" TOC, screened from 31'6" to 51'6"

gravel to 26'8", 50 lb. Bentonite @ 26'8"

Backfill to surface

WELL LOGGING FORM

Page of

Client Montgomery & Andrews **Well Number** GBR-6

1/4 1/4 1/4 1/4 S 27 T 29 R 12 State New Mexico

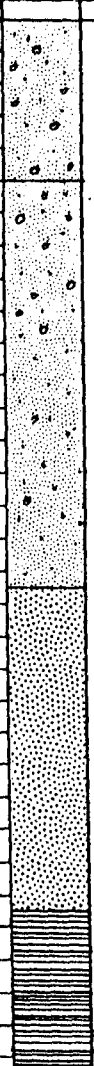
County San Juan Contractor Beeman Bros. Drilling Co.

Spud Date 9/9/86 Completion Date 9/9/86

Logs Run Lith from cuttings Logged By Martin

Elevation	Spud In (Fm.)
100	100
200	200
300	300
400	400
500	500
600	600
700	700
800	800
900	900
1000	1000
1100	1100
1200	1200
1300	1300
1400	1400
1500	1500
1600	1600
1700	1700
1800	1800
1900	1900
2000	2000
2100	2100
2200	2200
2300	2300
2400	2400
2500	2500
2600	2600
2700	2700
2800	2800
2900	2900
3000	3000
3100	3100
3200	3200
3300	3300
3400	3400
3500	3500
3600	3600
3700	3700
3800	3800
3900	3900
4000	4000
4100	4100
4200	4200
4300	4300
4400	4400
4500	4500
4600	4600
4700	4700
4800	4800
4900	4900
5000	5000
5100	5100
5200	5200
5300	5300
5400	5400
5500	5500
5600	5600
5700	5700
5800	5800
5900	5900
6000	6000
6100	6100
6200	6200
6300	6300
6400	6400
6500	6500
6600	6600
6700	6700
6800	6800
6900	6900
7000	7000
7100	7100
7200	7200
7300	7300
7400	7400
7500	7500
7600	7600
7700	7700
7800	7800
7900	7900
8000	8000
8100	8100
8200	8200
8300	8300
8400	8400
8500	8500
8600	8600
8700	8700
8800	8800
8900	8900
9000	9000
9100	9100
9200	9200
9300	9300
9400	9400
9500	9500
9600	9600
9700	9700
9800	9800
9900	9900
10000	10000

Remarks Drilled with Air Rotary

		Remarks Drilled with Air Rotary						
DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS	
0'							0'-very coarse-grained cobbles, sand and gravel; dark brown with hydrocarbon odor.	
10'							10'-coarse-grained sand and gravel with some cobbles; dark brown with hydrocarbon odor.	
20'							20'-fine-grained sand; well-sorted; medium brown with hydrocarbon odor.	
30'							30'-fine-grained sand; well-sorted; dark brown-black; strong hydrocarbon odor.	
35'							35'-sandstone; mixed gray-green/yellow-brown with hydrocarbon odor.	
40'							40'-sandstone; coarse-grained well-sorted; yellow-brown; faint hydrocarbon odor.	
45'							45'-sandstone; coarse-grained, poorly-sorted; yellow-brown with some clay.	
50'							50'-fine-grained, poorly-sorted; gray yellow/brown; water present.	
55'							55'-shale; gray.	
60'							60'-shale; minor medium-grained gravel, poorly-sorted; dark gray.	
65'							65'-shale; dark brown.	
70'							TD of 65'4" from surface, screened from 60'4" to 20'4" gravel to 12', bentonite to 6'5", cement grout w/5% bentonite to surface. Completed as 6" PVC recovery well with identical casing of 1" PVC attached to outside.	



WELL LOGGING FORM

Page 1 of 2Client Montgomery & Andrews Well Number GBR 71/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date _____ Completion Date 9-24-86Logs Run Lithology Logged By Martin

Elevation _____ Spud In (Fm.) _____

Remarks Drilled with Hollow Stem Auger

DEPTH

LITHO.

RECOV.

RUN

FROM

TO

SAMPLE
DEPTH

REMARKS

0				0-5'	COBBLES AND SAND, 1/8"-5" in diam w/minor sand; fn-co gr; mod ylsb brn 10YR5/4
5				5-7.5'	SAND AND GRAVEL, dusky hlsh brn 10YR2/2; med-co gr sand
				7.5-10'	SAND AND GRAVEL, as above; at 10' hit hydrocarbon-stained sand; brnsh blk 5YR2/5
10				10-12.5'	SAND, w/1-2% small gravel; 1/2"-1" in diam; olive gry 5Y4/1; fn-co gr; hydrocarbon odor and stain
				12.5-15'	SAND, w/some gravels; 2-3% gravel, 1/4"-1 1/2" diam; sand olive gry 5Y4/1 and fn-co gr
15				15-16'	SAND, lt olive gry 5Y5/2; v fn-fn gr; slight hydrocarbon odor
				16-17'	SILTY SAND, olive gry 5Y4/1; v fn gr; hydrocarbon odor
20				17-17.5'	SAND, olive gry 5Y4/1; v fn gr hydrocarbon odor
				17.5-18.0	SAND, lt olive gry 5Y5/2; v fn gr; slight hydrocarbon odor
				18-22.5'	SAND, v fn gr w/some silt; lt olive gry 5Y5/2; slight hydrocarbon odor
25				22.5-25.0'	SAND, as above, slight hydrocarbon odor
				25-27'	GRAVEL AND SAND, hydrocarbon-stained
				27-30'	SAND, hydrocarbon-stained; grades from olive blk 5Y2/1 to blk N1; 1/4"-1/2" diam cobbles; fn fr sand
30				33-35'	SANDSTONE, weathered lt olive brn 5Y5/6; fn-med gr w/some silt; no hydrocarbon odor, no moisture
35				35-36'	CLAY, olive gry 5Y3/2; hydrocarbon odor; moist; minor sand
				36-40'	SAND AND SOME SILT, fn gr dusky yel 5Y6/4
40				40-41'	SAND, w/some silt, fn gr dk yelsh orng 10YR6/6, some gravel and quartzite at 40'
				41-43.5'	SAND, w/some silt, fn gr minor gravels, quartzite
45				43.5-46'	SAND, grades from med-co gr sand to fn silty sand, dk yelsh orng

GCL

WELL LOGGING FORM

Page 2 of 2

Client Montgomery & Andrews Well Number GBR 7
1/4 1/4 1/4 1/4 S 27 T 29 R 12 State New Mexico
 County San Juan Contractor Western Technologies
 Spud Date _____ Completion Date 9-24-86
 Logs Run Lithology Logged By Martin
 Elevation _____ Spud In (Fm.) _____
 Remarks _____



DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
45							
							46-47.5' SILTY SANDSTONE, lt gry to lt olive gry N7 to 5Y6/1
50							TD to 48' from surface, screened from 41'7.5" to 31'7.5", 6' blank on bottom, gravel pack to 24'10", bentonite plug to 19'8", cement grout w/5% bentonite to surface. Completed well with 2" PVC.
55							
60							
65							
70							
75							
80							
85							
90							

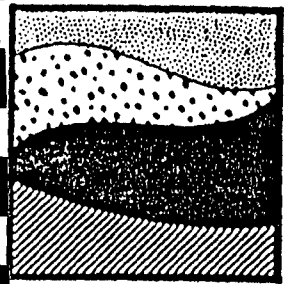
GCL

WELL LOGGING FORM

Page 1 of 2

Client Montgomery & Andrews Well Number (P-4) GBR 81/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date _____ Completion Date 10-1-86Logs Run Lithology Logged By Martin

Elevation _____ Spud In (Fm.) _____

Remarks Drilled with Hollow Stem Auger

LITHO.

RECOV.

DEPTH

RUN

FROM

TO

SAMPLE
DEPTH

REMARKS

0

0-5' SILTY SAND, w/some cobbles, fn-med gr dk
yelsh brn color 10YR4/2

5

5-10' SAND, med-co gr; dk yelsh brn color 10YR4/2

10

10-25' COARSE-GRAINED SAND, dk yelsh brn color
10YR4/2

15

20

25

25-30' CLAYEY SAND, fn-med gr; dk yelsh brn color
10YR4/2

30

30-35' SANDY CLAY, v fn-med gr, dk yelsh brn color
10YR4/2

35

35-38' SANDY CLAY, fn-med gr olive gry color
5Y4/1; strong hydrocarbon odor

40

38-38.33' SANDY CLAY, fn-med gr mixed color of mod
yelsh brn 10YR5/4 and olive gry 5Y4/1;
strong hydrocarbon odor38.33-39.17' SILTY SAND, fn-med gr olive gry color 5Y4/1
strong hydrocarbon odor

45

39.17-39.5' SAND, co gr olive gry color 5Y4/1, strong
hydrocarbon odor

GCL

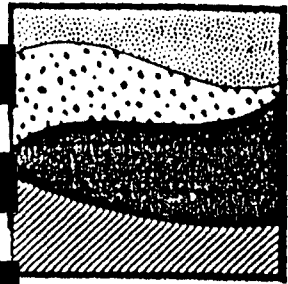
WELL LOGGING FORM

Page 2 of 2

Client Montgomery & Andrews Well Number (P-4) GBR 81/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date _____ Completion Date 10-1-86Logs Run Lithology Logged By Martin

Elevation _____ Spud In (Fm.) _____

Remarks



DEPTH

LITHO.

RECOV.

RUN

FROM

TO

SAMPLE
DEPTH

REMARKS

45

50

55

60

65

70

75

80

85

90

TD to 58' from surface. Screened from 53' to 38', 5' blank on bottom. Gravel pack to 30', bentonite plug to 25', cement grout to surface. Completed with 2" PVC.

GCL

WELL LOGGING FORM

Page 1 of 2

Client Montgomery & AndrewsWell Number GBR 91/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San JuanContractor Western TechnologiesSpud Date 9-29-86Completion Date 9-30-86Logs Run LithologyLogged By Martin/Kaszuba

Elevation _____

Spud In (Fm.) _____

Remarks

Drilled with Hollow Stem Auger

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
0							
						0-2.5'	SAND, med-fn gr w/rare pebbles; mod yelsh brn 10YR5/4
						2.5-5'	SAND, med-fn gr w/rare pebbles; mod yelsh brn 10YR5/4
5						5-7.5'	SAND, med-fn gr w/rare pebbles; mod yelsh brn 10YR5/4
						7.5-10'	CLAYEY SAND, med-fn gr; mod yelsh brn 10YR5/4
10						10-12.5'	CLAYEY SAND, co gr w/1-2% gravels; mod yelsh brn 10YR5/4
						12.5-15'	CLAYEY SAND, med-fn gr; mod yelsh brn 10YR5/4
15						15-17.5'	same as above
						17.5-20'	SAND, med gr; mod yelsh brn 10YR5/4
20						20-22.5'	SAND, med gr, w/occasional pebbles; mod yelsh brn 10YR5/4
						22.5-25'	same as above
25						25-27.5'	SAND, med gr, w/occasional pebbles; mod yelsh brn 10YR5/4
						27.5-30'	SANDY CLAY, med gr sand; dk yelsh brn 10YR4/2, faint HC odor
30						30-32.5'	CLAYEY SAND, fn-med gr; dk yelsh brn 10YR4/2, faint HC odor
						32.5-40'	SANDY CLAY, fn-med gr; olive gry 5Y4/1, strong HC odor
35							
						40-45'	CLAY AND SAND, fn gr sand, dk yelsh orng 10YR6/6; clay is lt olive gry 5Y5/2
40							
						45-47.5'	SANDY CLAY/CLAYEY SAND, dusky yel 5Y6/4
45							

GCL

WELL LOGGING FORM

Page 2 of 2

Client Montgomery & Andrews Well Number GBR 9
1/4 1/4 1/4 1/4 S 27 T 29 R 12 State New Mexico
 County San Juan Contractor Western Technologies
 Spud Date 9-29-86 Completion Date 9-30-86
 Logs Run Lithology Logged By Martin/Kaszuba
 Elevation _____ Spud In (Fm.) _____
 Remarks _____

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
45							47.5-52.5' <u>SANDY CLAY</u> , med gr sand; lt olive gry 5Y5/2
50							52.5-52.9' <u>SILT</u> , olive gry 5Y4/1
							52.9-57.5' <u>SHALE</u> , grnsh gry 5GY6/1
55							57.5-62.5' <u>SILT</u> , grnsh gry 5GY6/1
60							TD of 65' from TOC. Completed with 2" PVC/ss flush joint. Sand pack to 37', bentonite to 18 1/2' (1.5 bags) cement grout w/5% bentonite to surface. Screened from 50-60', ss up to 35', PVC from 35' to TOC.
65							
70							
75							
80							
85							
90							

Page 1 of 2

Client Montgomery & Andrews Well Number (P-2) GBR 101/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date _____ Completion Date 9-29-86Logs Run Lithology Logged By Martin

Elevation _____ Spud In (Fm.) _____

Remarks Drilled with Hollow Stem Auger

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
0							
						0-10'	SAND, med gr poorly sorted w/some cobbles; mod yelsh brn color 10YR5/4
5							
						10-15'	SAND, co-med gr mod yelsh brn color 10YR5/4 poorly sorted
10							
						15-20'	SAND, co-med gr poorly sorted; dk yelsh brn color 10YR4/2
15							
						20-30'	SAND, w/5% gravel co-med gr, poorly sorted; dk yelsh brn color 10YR4/2, faint HC smell
20							
						30-33'	SANDY CLAY, fn-med gr dk yelsh brn color 10YR4/2, faint HC odor
25							
						33-33.33'	SILTY SAND, fn-med gr; olive gry color 5Y4/1 well sorted, strong HC color
30						33.33-33.75'	SAND, fn-med gr well sorted; lt olive gry 5Y5/2, strong HC odor
35						33.75-34.67'	SILTY SAND, fn-med gr olive gry color 5Y4/1; well sorted; strong HC odor
						38-38.92'	CLAYEY SAND, fn-med gr olive gry color 5Y4/1; strong HC odor
40						38.92-39'	SAND, fn-med gr grysh blk color N2; strong HC odor
						39-39.67'	CLAYEY SAND, fn-med gr olive gry color 5Y4/1, strong HC odor
45						39.67-39.83'	CLAYEY SAND, co-med gr dusky yel color 5Y6/4; faint HC odor

GCL

WELL LOGGING FORM

Page 1 of 2Client Montgomery & Andrews Well Number GBR 91/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 9-29-86 Completion Date 9-30-86Logs Run Lithology Logged By Martin/Kaszuba

Elevation _____ Spud In (Fm.) _____

Remarks Drilled with Hollow Stem Auger

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
0							
						0-2.5'	SAND, med-fn gr w/rare pebbles; mod yelsh brn 10YR5/4
						2.5-5'	SAND, med-fn gr w/rare pebbles; mod yelsh brn 10YR5/4
5						5-7.5'	SAND, med-fn gr w/rare pebbles; mod yelsh brn 10YR5/4
						7.5-10'	CLAYEY SAND, med-fn gr; mod yelsh brn 10YR5/4
10						10-12.5'	CLAYEY SAND, co gr w/1-2% gravels; mod yelsh brn 10YR5/4
						12.5-15'	CLAYEY SAND, med-fn gr; mod yelsh brn 10YR5/4
15						15-17.5'	same as above
						17.5-20'	SAND, med gr; mod yelsh brn 10YR5/4
20						20-22.5'	SAND, med gr, w/occasional pebbles; mod yelsh brn 10YR5/4
						22.5-25'	same as above
25						25-27.5'	SAND, med gr, w/occasional pebbles; mod yelsh brn 10YR5/4
						27.5-30'	SANDY CLAY, med gr sand; dk yelsh brn 10YR4/2, faint HC odor
30						30-32.5'	CLAYEY SAND, fn-med gr; dk yelsh brn 10YR4/2, faint HC odor
						32.5-40'	SANDY CLAY, fn-med gr; olive gry 5Y4/1, strong HC odor
35							
						40-45'	CLAY AND SAND, fn gr sand, dk yelsh orng 10YR6/6; clay is lt olive gry 5Y5/2
40							
						45-47.5'	SANDY CLAY/CLAYEY SAND, dusky yel 5Y6/4
45							

GCL

WELL LOGGING FORM

Page 2 of 2Client Montgomery & Andrews Well Number (P-2) GBR 101/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date _____ Completion Date 9-29-86Logs Run Lithology Logged By Martin

Elevation _____ Spud In (Fm.) _____

Remarks _____

DEPTH	LITHO.	RECOV.					REMARKS
			RUN	FROM	TO	SAMPLE DEPTH	
45							TD to 45' from surface. Screened from 39' to 29' 5' blank on bottom. Gravel pack to 23' bentonite plug to 18.5'; cement grout to surface. Completed with 2" PVC.
50							
55							
60							
65							
70							
75							
80							
85							
90							

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR-111/4 SW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 4/1/86 Completion Date 4/1/86Logs Run Lithology from cuttings Logged By J.C. HunterElevation 5388' (topo) Spud In (Fm.) Nacimiento (Tertiary)Remarks Drilled w/HSA, completed as galv. steel piezometer (2.0")
80.7', 245' to N end of "GIANT" sign

Depth

Litho
Recor5'
10'
15'
20'
25'
30'
35'
40'
45'
50'
55'0'-10' (10') SILTY SAND: med. yellow-brown (10yr ⁵/₄); fine to med grained, poorly sorted,
rounded to subrounded, no stain or odor.10'-40' (30') SAND: med brown (5yr ⁴/₄); med to coarse grained, med. sorted, subround
to angular, no stain or odor.25'-35': Quartzite and granite pebbles, subrounded, ¹/_{8"} - 1".40'-50' (10') SAND: Light olive gray (5y ⁶/₁) to olive gray (5y ⁴/₁) med grained,
subangular, med sorted; distinct hydrocarbon stain and odor50'-55' (5') CLAYEY SAND: Dark yellow brown (10yr ⁴/₂); med grained sand with streaks
of blackish red (5r ²/₂) to med gray (NG) sticky wet clay; med hydrocarbon
odor.Completed as 2.0" galv steel piezometerTD=57.2 from top of pipe, stickup=2.7Screen from 40'-50', 5' blank on bottomScreen packed w/washed sand, bentonite plug (1/2 sack) @30-35'50.7"10' 1 1/2' H2O

W.L.

39.75

4/2/86

TD@ 55

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 121/4 1/4 1/4 1/4 S 1/4 T 1/4 R 1/4 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 4/2/86 Completion Date 4/3/86Logs Run Lithology from cuttings Logged By Nicholas

Elevation _____ Spud In (Fm.) _____

Remarks

Auger Refused @ 42"

Depth

Litho
Recor

0

0-5' GRAVEL: $\frac{1}{4}$ " - 12" cobbles predominately gaurtize. poorly sorted, subrounded to sub-angular.

5

10

15

5'-15' SILTY SAND: moderate yellowish brown, (10yr 5/4), fine to med grained, moderately well sorted.

20

25

15'-25' CLAYED SILTY SAND: light olive gray, (5y6/1), fine to med. grained, moderately well sorted.

30

35

25'-35' SILTY CLAY: dark yellowish brown, (10yr 4/2)

40

TD=42'

No cuttings would come up hole after 35'
Auger Refused at 42'

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WELL LOGGING FORM

Page _____ of _____

Client Montgomery & Andrews Well Number GBR 131/2 1/2 1/2 1/2 S 1/2 T 1/2 R 1/2 State New MexicoCounty San Juan Contractor Western Technologies

Spud Date _____ Completion Date _____

Logs Run Lith. from cuttings and cores Logged By J. HunterElevation 5392' topo Spud In (Fm.) NacimientoRemarks NW corner, South parking area

Depth

Litho
recor

0

5

10

15

20

25

30

35

37' 2"

40

45

TD=48'

50

0-20' sand: moderate yellowish brn, med to fine

grained

20-25' clayey sand: mod brown, very fine sand with stringers

of yellowish gray clay

25-30' sand: mod brown to yellowish brown, fine-med gr.

poorly sorted, locally clayey

30-35' oil-stained (?) sand: mod gray to yel gray, fine

gr., faint HC odor, stain increases w/depth

35-48' sand/sandstone: mod yel brn to yel brn, very fine gr;

poorly sorted, silty

Completed as 2.0" PVC piezometer, screen

32'-42'.

Page ____ of ____

Client Montgomery & AndrewsWell Number GBR-141/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San JuanContractor Beeman Bros. Drilling Co.Spud Date 9/10/86Completion Date 9/10/86Logs Run Lith from cuttingsLogged By MartinElevation 5398.58

Spud In (Fm.) _____

Remarks Drilled with Air Rotary

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
0'							0'-coarse-grained, poorly-sorted sandy; medium brown.
10'							10'-coarse-grained, well-sorted clayey sand; mixed medium brown/dark gray-black; stained; strong hydrocarbon odor
20'							20'-coarse-grained, poorly-sorted clayey sand; light gray brown, no hydrocarbon odor.
30'							30'-coarse-grained, well-sorted clayey sand; medium to dark gray; faint hydrocarbon odor.
							35'-poorly-sorted clayey sand and gravel; medium brown.
40'							40'-poorly-sorted sandy gravel; dark brown.
							45'-poorly-sorted clayey sand and gravel; gray-brown.
50'							50'-poorly-sorted gravel; light gray.
							55'-well-sorted clayey gravel; medium gray.
60'							60'-well-sorted coarse-grained gravel; medium gray-brown.
							65'-poorly-sorted sand and gravel; dark gray.
70'							TD to 65' from surface, screened from 60' to 20', gravel pack 10'10", bentonite plug to 4'4", cement grout w/5% bentonite to surface completed as 6" PVC recovery well with identical 1" PVC casing attached to side.
							<i>Set Thick ~ 28 - 60 = 35'</i>

Page 1 of 2

Client Montgomery & Andrews Well Number (P-1) GBR 15
1/4 1/4 1/4 1/4 S 27 T 29 R 12 State New Mexico
 County San Juan Contractor Western Technologies
 Spud Date _____ Completion Date 9-28-86
 Logs Run Lithology Logged By Martin
 Elevation _____ Spud In (Fm.) _____

Remarks Drilled with Hollow Stem Auger

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
0							
						0-5'	<u>SAND</u> , med gr; mod brn color 5YR4/4
						5-7'	<u>SAND</u> , med gr; mod brn color 5YR4/4, HC stain
5							
						7-10'	<u>SAND</u> , med gr; blk N1; strong HC odor and stain
						10-15'	<u>CLAYEY SAND</u> , med gr, olive gry color 5Y4/1; HC odor
10							
						15-20'	<u>CLAYEY SAND</u> , med gr w/2-5% gravels; olive gry color 5Y4/1, HC odor
15							
						20-25'	<u>SILTY SAND</u> , med gr olive gry color 5Y4/1 faint HC odor
20							
						25-30'	<u>CLAY</u> , fine to med gr, dark greenish-gray color 5GY4/1, HC odor
25							
						30-35'	<u>SANDY CLAY</u> , fn-med gr olive gry 5Y3/2; HC odor
30							
						35-40'	<u>CLAYEY, SILTY SAND</u> , fn gr lt olive gry color 5Y5/2; HC odor
35							
						40-45'	<u>CLAYEY SAND</u> , fn-med gr; grysh olive color 10Y4/2; faint HC odor
40							
						45-60'	<u>SANDY CLAY</u> , fn-med gr; grnsh gry color 5GY6/1; HC odor
45							

Block
 all water
 at 36.0'



WELL LOGGING FORM

Page 2 of 2Client Montgomery & Andrews Well Number GBR 151/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date _____ Completion Date 9-28-86Logs Run Lithology Logged By Martin

Elevation _____ Spud In (Fm.) _____

Remarks _____

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
45							TD to 60' from surface. Screened from 55' to 45', 5' blank on bottom. Gravel pack to 35', bentonite plug to 30', cement grout to surface. Completed with 2" PVC.
50							
55							
60							
65							
70							
75							
80							
85							
90							

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WELL LOGGING FORM

Page _____ of _____

Client Montgomery & Andrews Well Number GBR 16 S T R State New MexicoCounty San Juan Contractor Western Technologies

Spud Date _____ Completion Date _____

Logs Run Lith. from cuttings and cores Logged By _____Elevation 5414 topo Spud In (Fm.) FillRemarks w end of burn pit

Depth

Litho

Recor

0

0-12' Fill: Gray to brn gry, very coarse boulders, cobbles

5

and sand, local HC stain & odor

10

12.25'

15

12-25' Sandstone: mod yel brn, fine gr, very poor sorted,

20

subrounded, mod HC odor

25

Completed as 2.0" PVC piezometer,

screen 10-20'.

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 171 1 1 1 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Beeman Bros. Drilling Co.Spud Date 5/28/86 Completion Date 5/28/86Logs Run Lith from cuttings Logged By NICHOLAS

Elevation _____ Spud In (Fm.) _____

Remarks Drilled With Air Rotary, completed as a 2" flush joint
PVC and SS Well

Depth

Litho
Notes0-5' (5') sand, mod yellowish brn (10YR 5/4), very fine to coarse grained sand

5

5-10' (5') clayey sand, dk yellowish brn (10YR 4/2) fine to coarse grained sand

10

with clay stringers

15

10-20' (10') clayey sand, mod yellowish brn (10YR 5/4) fine to med grained sand

20

with clay stringers

25

20-45' (25') silty sand, mod yellowish brn, (10YR 5/4) fine to med grained sand

30

grades coarser at 45'

35

45-60' (15') sand, mod yellowish brn (10YR 5/4) to lt olive grey (5Y 5/2), fine to

40

coarse grained sand with some cobbles

45

60-68' (8') silty sand, greenish grey (5GY 6/1), fine to coarse grained sand

50

w/some cobbles (1/2"-3"), 10-15%.

55

TD 68' to TOC, screened from 31'-51' ss screen, ss blanks on bottom,

60

PVC risers. Gravel packed to 28', 100 lb bag Bentonite @ 28', Backfill

65

to surface

33'-6" 5-29-86

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WELL LOGGING FORM

Page ____ of ____

Client Montgomery & Andrews Well Number GBR 181/4 1/4 1/4 1/4 S 1/4 T 1/4 R 1/4 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date Completion Date Logs Run Lith from cuttings and cores Logged By Elevation Spud In (Fm.) Remarks drilled w/ HSA

Depth

Litho
Recor12'4" Y

0

5

10

15

20

25

30

35

40

45

50

0-10' (10') fill: very coarse cobbles, some sand and
gravel

10'-12.5' (2.5') sandy shale, yellowish brn

12.5-25' (12.5') sandstone: yellowish brn, med to fine grained
poorly sorted

25'-30' shale: brn gry to rd brn, fissile, clayey, damp

30-38' siltstone: gry brn to brn gry; clayey, same thin,

irregular sand stringers 1/4"-1/2"; moist

38-50' silty sandstone: yel brn to yel gry, very fine grained,
poorly sorted, locally clayey

Completed as 2.0" galv. steel piezometer.

screen 35'-45'.

GCL

WELL LOGGING FORM

Page 1 of 2

Client Montgomery & Andrews Well Number (Obs W2) GBR 19
1/4 1/4 1/4 1/4 S 27 T 29 R 12 State New Mexico
 County San Juan Contractor Western Technologies
 Spud Date _____ Completion Date 10-1-86
 Logs Run Lithology Logged By Martin
 Elevation _____ Spud In (Fm.) _____

Remarks Drilled with Hollow Stem Auger

LITHO.

RECOV.

DEPTH

RUN

FROM

TO

SAMPLE
DEPTH

REMARKS

0					0-5' SAND, fn-med gr, mod yelsh brn color 10YR5/4
5					5-10' SAND, med-co gr; mod yelsh brn color 10YR5/4
10					10-20' CLAYEY SAND, med-co gr; mod yelsh brn color 10YR5/4
15					
20					20-25' SAND, med gr; mod yelsh brn color 10YR5/4
25					25-30' SANDY CLAY, v med-co gr; dk yelsh brn color 10YR4/2
30					30-33' CLAY, fn gr; dk yelsh brn color 10YR4/2
					33-35' SILTY SAND, fn gr lt olive gry color 5Y5/2; HC odor
35					35-35.83' SILTY SAND, fn gr dk grnsh gry color 5GY4/1
					35.83-36.17' SAND, med gr blk N1; wet w/HC strong HC odor
40					36.17-36.5' SAND, med gr lt olive gry color 5Y5/2; faint HC odor
					36.83-38' SAND, co gr mod yelsh brn color 10YR5/4; no HC odor
					38-41.33' SANDY CLAY, fn gr dk yelsh brn color 10YR4/2
					41.33-41.67' SAND, fn-med gr; dk yelsh brn color 10YR4/2
45					41.67-42.33' CLAYEY SAND, v fn-med gr w/some cobbles and gravels; dk yelsh brn color 10YR4/2

WELL LOGGING FORM

Page 2 of 2

Client Montgomery & Andrews Well Number GBR 19
1/4 1/4 1/4 1/4 S 27 T 29 R 12 State New Mexico
 County San Juan Contractor Western Technologies
 Spud Date _____ Completion Date 10-1-86
 Logs Run Lithology Logged By Martin
 Elevation _____ Spud In (Fm.) _____

Remarks

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
45							
							42.92-43' SAND, co gr yelsh gry color 5Y7/2
							43-48' CLAY, fn gr; olive gry color 5Y4/1; faint HC odor
50							
							TD to 51' from surface. Screened from 46' to 31', 5' blank on bottom. Gravel pack to 25', bentonite plug to 20' cement grout to surface. Completed with 2" PVC.
55							
60							
65							
70							
75							
80							
85							
90							

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 20NW 1/4 SE 1/4 NW 1/4 S 27 T 29N R 12W State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 4/18/86 Completion Date 4/18/86Logs Run lithology from cuttings Logged By NicholasElevation 5394' (topo) Spud In (Fm.) NacimientoRemarks Drilled with HSA, no continuous sampler used.

Depth

Litho
Recor

0

5

10

15

20

25

30

35

40

45

0-20' (20') SAND & GRAVEL: Moderate yellowish brown (10yr 5/4), med to coarse grained sand with 5%-30% gravel (1/2"-2"), No HC Odor.

20-30' (10') SILTY CLAY: Med light gray (N6) to med dark grey (N4), fine to med grained with some silt, hard drilling at 34', no HC ODOR.

30-48.5' (18.5') SANDSTONE: Med lt grey (N6) to med dk grey (N4), fine to med grained with some silt, hard drilling at 34', No HC odor.

WL 5-1 38.0'

TD=48'

Completed as 2" PVC Piezometer

Stickup 1' 10" TD 43' 10" from top of casing

Screened interval 27'-37'

Sand to 25', Bentonite 2/3 Bag @ 25'

Backfill to 6', Bentonite 1/3 Bag @ 6'

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 21NE 1/4 NW 1/4 NW 1/4 NW 1/4 S27 T 29N R 12W State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 4/15/86 Completion Date 4/16/86Logs Run Lithology from cuttings Logged By B NicholasElevation 5398' (top) Spud In (Fm.) NacimientoRemarks Drille with HSA, completed as 2" PVC Piezometer

Depth

Litho
Recov

18'3"

0'-5' (5') SAND: Brown, fine to med grained

5'-20' (15') SILTY SAND: Brown, med to coarse grained with minor small cobbles.

20'-38' (18') SANDY SHALE: Brown, fine grained, grades to yellowish brown at 25'.
HC ODOR.38'-46' (8') SANDSTONE: Med. bluish gray (5B5/1), med to coarse grained with local
small cobbles (1/4"-1 1/2") HC ODOR and sheen in sampler.

Dual Completion as 2" PVC Piezometer

Stickup 3'3" ID 40'3" and 41'3" from top of casing

Screened intervals 17-32' and 33-38'

Caved in snad to 6', Bentonite (3/4 Bag) @ 6'

Bentonite (1/4 Bag) @ 2'

Geoscience
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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 22NE 1/4 NW 1/4 NW 1/4 S T R State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 4/15/86 Completion Date 4/16/86Logs Run Lithology from cuttings Logged By Hicks/NicholasElevation 5394.5'(topo) Spud In (Fm.) Naciminto

Remarks

Drilled with HSA, continuous sampler and spit spoon used
completed as 2' PVC Piezometer

Depth

Litho
Recor

0

5

10

15

20

25

4/16 32'8"

30

35

40

45

70=48'

50

0-2.5' (2.5') SAND & GRAVEL FILL: Brown, some HC odor from surface spills2.5'-15.0' (12.5') SAND: Mod yellowish brown (10yr5/4) (2.5'-12.5')
grades to Lt. brown at 12.5' (5yr5/6), med grained, well sorted
contains gravels (12/5'-15.0') HC Odor15.0-22.5' (7.5) CLAYEY SAND: Brown, grades to dark brown at 17.5', some clay balls
increasing with depth, HC odor.22.5'-32.5' (10') SAND: Brown, fine to med grained, well sorted, clean, some clay
from (22.5'-27.5'), black stained sand at 30', HC Odor.32.5'-38.0' (5.5') SANDSTONE: Green to yellow green, consolidated grades to yellow
brown at 36.5'.

38'-43' (5') No Returns.

43'-48' SANDSTONE: gray, med to coarse grained, no HC odor

Completed as 2' PVC Piezometer

Stickup 3'5" TD 49.5' from top of casing

Screen from 32'-42', 4' blank on bottom

Sand to 32', Backfill to 26', 3/4 Bag Bentonite @ 26'

Backfill to 2', 1/4 Bag Bentonite @ 2'

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 23SW 1/4 NE 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 4/16/86 Completion Date 4/16/86Logs Run Lithology from cuttings Logged By NicholasElevation 5401' (top) Spud In (Fm.) NacimientoRemarks Drilled With Hsa, continous sampler used 22'-48.5'

Depth

Litho
log0
5
10
15
20
25
30
35
40
45

4/16 WL24'4"

TD = 48.5'

0-15' (15') SILTY SAND: mod yellowish brown (10yr 5/4), very fine grained, with small amounts of cobbles (1/2"-1"), grades coarser at 10', HC Odor.

15'-22' (7') SAND & GRAVEL: Mod yellowish brown (10yr 5/4) to pale brown (5yr 5/2), med to coarse grained sand with cobbles (1/4"-3"), HC Odor

22'-26' (4') SHALE: Grayish Brown (5yr 3/2) to yellowish grey (5y 7/2), localized sand lenses, some weathering in shale, no HC Odor.

26'-48.5' (22.5) SANDSTONE: Weathered, light olive gray (5y 5/2) from 26-27', med lt gray (N6) to med gray (N5), fine to med grained, slight HC odor(?) from 26'-27'.

Completed as 2" PVC Piezometer

Stickup 3' TD 41'10" from top of casing

Screen from 23'10" to 33'10" 5' Blank on Bottom

Sand to 23', 2/3 Bag Bentonite @ 23', Backfill to 5', 1/3 Bag Bentonite at 5'

Geoscience
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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 24NW 1/4 NW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12 W State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 4/17/86 Completion Date 4/17/86Logs Run lithology from cuttings Logged By NicholasElevation 5395' (topo) Spud In (Fm.) NacimientoRemarks Drilled with HSA, continous sampler used from 9'-49'

Depth

Litho
Recov0
5
10
15
20
25
30
35
400'-9' (9') SAND: Moderate yellowish brown, (10yr 5/4), med to coarse grained, No HC Odor9'-14' (5') SILTY SANDSTONE: Moderate yellowish brown (10yr 5/4) to olive gray (5y 4/1)
weathered, very fine to fine grained, No HC Odor.14'-49' (35') SANDSTONE: lt olive grey (5y 6/1), fine grained, contains minor gravels.
28' (1"-1 1/2"), HC Odor at 29'

Dual Completion as 2' PVC Piezometer

Stickup 3'3" TD 41'3" and 46'3" from top of casing

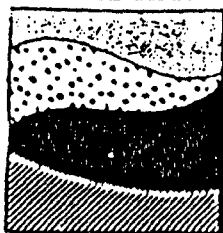
Screened intervals 23-33' and 33'-43'

Caved to 33', sand to 22', Bentonite 2/3 Bag

@ 22', Backfill to 6', Bentonite 1/3 Bag @ 6'.

WL 24'4"

TD = 49'

Geoscience
Consultants, Ltd.

WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 25NE 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12W State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date 4/17/86 Completion Date 4/18/86Logs Run lithology from cuttings Logged By NicholasElevation 5395' (topo) Spud In (Fm.) NacimientoRemarks Drilled with HSA, used continous sampler from 17'-48'

Depth

Litho
Recor

5	0'-17' (17') SAND: Mod yellowish brown (10yr5/4), med to coarse grained with some small cobbles from 5'-17', HC Odor
10	
15	
20	17'-24' (7') SHALE: Dark yellowish brown, (10yr4/2), with pale yellowish orange stringers (10yr8/6) from 23'-24', soft, slight HC Odor
25	
30	24'-28' SANDSTONE: Moderate yellowish brown (10yr5/4) with streaks of dark yellowish orange (10yr 6/6), fine to med grained, weathered, NO HC odor.
35	
40	28'-48' SANDSTONE: Ranges in color from lt gray (N7), to moderate yellowish brown (10yr5/4) from 28-33', greenish gray (5G6/1) to dark yellowish orange (10yr6/6) from 33'-43', med to coarse grained, grades coarser at 38', grades to lt gray (N7) at 43', contains small cobbles from 28-43', shale stringers from 43-48', no HC odor
45	
50	
55	
60	
65	
70	

WL 32'

70 = 46'

Completed as 2" PVC Piezometer

Stickup 2' 0" TD 50' to top of casing

Screened interval 33-43', caved to 35', sand to 23'

Bentonite 2/3 Bag @ 23', Backfill to 6'

Bentonite 1/3 Bag at 6'

Geoscience
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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 26NE 1/4 NW 1/4 NW 1/4 NW 1/4 S 27 T 29N R 12 W State New MexicoCounty San Juan Contractor PSI Western TechnologiesSpud Date 4/18/86 Completion Date 4/18/86Logs Run Lithology from cuttings Logged By NicholasElevation 5396' (topo) Spud In (Fm.) NacimientoRemarks Drilled with HSA, continuous sampler was not used.

Depth

Litho
Fm.

0

0-7' (7') SAND: moderate yellowish brown (10yr5/4), med to fine grained, well sorted,
no HC odor

5

10

15

7'-21' (14') SAND: HC stained, ranges from med dark gray (N4), grayish black (N2), to
med gray (N5), fine to med grained, contains cobbles at 15', clay lenses
from 12'-15' strong HC odor

20

25

4/23 WL 31'4"

30

21'-35' (14') CLAYEY SAND: HC stained, ranges in color from med gray (N5) to grayish
black (N2), very fine to fine grained, moist, HC odor.

35

40

35'-50' (15') SANDSTONE: med dark gray (N4), fine to med grained with some clay, wet HC
odor.

45

TD = 50'

50

Completed as 2" PVC Piezometer

Stickup 1'6" TD 41'6" from top of casing

Screened interval 25-35', caved to 26',

Sand to 23', Bentonite @23 2/3 Bag, Backfill to

5', Bentonite 1/3 Bag at 5'

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 27NE 1/4 NW 1/4 NW 1/4 S 27 T 29N R12W State New MexicoCounty San Juan Contractor Beeman BrothersSpud Date 4/23/86 Completion Date 4/23/86Logs Run Lithology from cuttings Logged By NicholasElevation 5397' (topo) Spud In (Fm.) NacimintoRemarks Drilled with Air Rotary, completed as 5" PVC Well

Depth

Litho
Recor

0	0-5' (5') SAND: Grayish orange (10yr7/4); fine to coarse grained, no HC odor
5	
10	
15	5-15' (10') SAND: Mod yellowish brown (10yr5/4); fine to med grained with some silt, contains some cobbles at 13', (2-3%)
20	
25	15-20' (5') SAND & GRAVEL: Mod yellowish brown (10yr5/4); fine to med grained with some silt, contains 30% gravels
30	
35	20-25' (5') SHALE: Dusky yellow (5y6/4)
40	
45	
50	
55	
60	
65	
68	25-62' (42') SANDSTONE: Lt gray (N2), very fine to med grained, grades to mod yellowish brown (10yr5/4) from 32'-34'
70	
75	
80	
85	
90	
95	
100	

Completed as 5" PVC well

Stickup 1'4" TD 68'4" from top of casing

Screen from 22-62', 5' Blank on Bottom

Sand to 18', Bentonite (Isack) 1 18'

WL 5/2 35'10"

TD=67'

Sat The 10-35-62 = 27'

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WELL LOGGING FORM

Page 1 of 1Client Montgomery & AndrewsWell Number GBR 281/2 1/2 1/2 1/2 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Beeman Bros. Drilling Co.Spud Date 5/27/86 Completion Date 5/27/86Logs Run Lith from cuttings Logged By NICHOLAS

Elevation _____ Spud In (Fm.) _____

Remarks Drilled With Air Rotary, completed as 6" PVC recovery well

Depth

Litho

0-10' (10')	sand, mod. yelish brn (10YR 5/4), med to coarse grained
5	w/some cobbles.
10-20' (10')	sand, mod. yelish brn (10YR 5/4), coarse to med grained
15	with some cobbles and lt brn clay stringers
20-29' (9')	sand, mod. yelish brn (10YR 5/4), fine to coarse grained,
25	grades coarser at 27'
29-30' (1')	silty clay, brown
30-32' (2')	sandy clay, brown, med. to fine grained sand.
35	Silty Sand, greyish black, HC ODOR, fine to med. grained sand w/brn
32-35' (3')	clay stringers.
35-38' (3')	sandstone, lt olive grey (5Y 5/2)
38-69' (31')	sandstone, med. lt grey (N8), graded to dk greenish grey
55	(5GY 4/1) at 58', grades to dk grey (N3) at 63', fine to coarse grained
60	sandstone with some cobbles, grading coarser from 55-57'
65	TD 68' 6" stickup 2', screened from 23'6" to 63'6", Bentonite @ 16'
	(100 lb bag), gravel packed to 16', TD from TOC 70'6"

Geoscience
Consultants, Ltd.

WELL LOGGING FORM

Page 1 of 1Client Montgomery & Andrews Well Number GBR 291 1 1 1 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Beeman Bros. Drilling Co.Spud Date 5/29/86 Completion Date 5/30/86Logs Run lith from cuttings Logged By NICHOLASElevation 5387.9 Spud In (Fm.) _____Remarks Drilled With Air Rotary, completed as a 6" PVC recovery well

Depth

Litho
Recov

0-5' (5') sand and gravel, pale yellowish brn (10YR 6/2), gravels (1/4"-1'),

5 sand; fine to coarse grained

10 5-15' (10') sand, greyish orange (10YR 7/4), med. to coarse grained

15 w/some cobbles

20 15-35' (20') clayey sand, dk yellowish brn (10YR 4/2), fine to coarse grained

25 sand with increasing clay content from 30-35'

30 35-40' (5') sandstone, greenish grey (5GY 6/1), H.C. ODOR, fine to coarse

35 grained with some silt.

40 40-50' (10') sandstone, mod. yellowish brn (10YR 5/4), fine to coarse grained sand,

5-30-86

45 grades med. to coarse at 45'

50 50-60' (10') silty clay, lt olive grey (5Y 6/1) from 50-55', brownish grey (5YR 4/1)

55 from 55-60, increasing clay content at 55'

60 60-70' (10') sandstone, greenish grey (5GY 6/1) to med. lt grey (N6), fine to med.

65 grained

70 TD 72' from TOC, screened interval from 25'-65', gravel packed to 15', 100 lb

bag Bentonite @ 15', backfill to the surface

Sat Thick ~43-65 = 22'

GCL

WELL LOGGING FORM

Page 1 of 2

Client Montgomery & Andrews Well Number (X-1) GBR 30
1/4 1/4 1/4 1/4 S 27 T 29 R 12 State New Mexico
 County San Juan Contractor Western Technologies
 Spud Date _____ Completion Date 9-24-86
 Logs Run Lithology Logged By Martin
 Elevation _____ Spud In (Fm.) _____

Remarks Drilled with Hollow Stem Auger

LITHO.

RECOV.

DEPTH

RUN

FROM

TO

SAMPLE
DEPTH

REMARKS

0

0-5'

SAND, med gr mod yelsh brn 10YR5/4

5

5-10'

SAND, med-co gr mod yelsh brn 10YR5/4

10

10-15'

SAND, w/1-2% gravels; med-co gr mod yelsh
brn 10YR5/4

15

15-20'

SILTY SAND, fn-med gr olive blk 5Y2/1;
strong HC odor and stain

20

20-25'

SILTY SAND, med gr, dk grnsh bry 5GY4/1;
strong HC odor and stain

25

25-30'

CLAYEY SAND, med-gr, olive blk 5Y2/1,
strong HC odor and stain

30

30-33'

SANDY CLAY, fn-med gr, olive gry 5Y4/1;
faint HC odor; wet

35

33-45'

SANDY CLAY, fn-med gr, lt olive gry 5Y5/2;
faint HC odor; wet

40

45

TD to 49'. Screened from 40' to 25', sand pack to 19'2"

GCL

WELL LOGGING FORM

Page 2 of 2Client Montgomery & Andrews Well Number (X-1) GBR 301/4 1/4 1/4 1/4 S 27 T 29 R 12 State New MexicoCounty San Juan Contractor Western TechnologiesSpud Date _____ Completion Date 9-24-86Logs Run Lithology Logged By Martin

Elevation _____ Spud In (Fm.) _____

Remarks

DEPTH

LITHO.

RECOV.

RUN

FROM

TO

SAMPLE
DEPTH

REMARKS

45

50

55

60

65

70

75

80

85

90

5' blank on bottom, bentonite plug to 13'11", cement grout
w/5% bentonite to surface. Completed with 2" PVC.

GCL

WELL LOGGING FORM

Page 1 of 1

Client Montgomery & Andrews Well Number (X-2) GBR 31
1/4 1/4 1/4 1/4 S 27 T 29 R 12 State New Mexico
 County San Juan Contractor Western Technologies
 Spud Date _____ Completion Date 9-25-86
 Logs Run Lithology Logged By Martin
 Elevation _____ Spud In (Fm.) _____

Remarks Drilled with Hollow Stem Auger

DEPTH	LITHO.	RECOV.	RUN	FROM	TO	SAMPLE DEPTH	REMARKS
0							
							0-5' SAND, med gr, mod yelsh brn 10YR5/4
5							
							5-10' CLAYEY SAND, med-co gr, dk yelsh brn 10YR4/2
10							
							10-20' SILTY SAND, med-co gr, dk yelsh brn 10YR4/2
15							
20							20-25' CLAYEY SAND, med-co gr, dk yelsh brn 10YR4/2 HC odor (?), v v faint
25							
							25-30' CLAY, fn gr, dk yelsh brn 10YR4/2
30							
							30-33' SANDY CLAY, fn-med gr, lt olive gry 5Y5/2
							33-37' GRAVEL LAYER
35							
							37-45' SANDY CLAY, fn-med gr lt olive gry 5Y5/2
40							
							TD to 45', screened from 39'7" to 24'7", 5' blank on bottom, sand pack to 19.33', bentonite plug to 13'4" cement grout w/5% bentonite to surface. Completed with 2" PVC.
45							

Water level
@ 33'Bedrock
37'

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 2SITE ID: MONT & AND LOCATION ID: (NW) GBR-32

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5412 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: HOLLOW STEM AUGER W/SPLIT SPOONS,DRILLING CONTR.: WESTERN TECH.DATE STARTED: 4/21/87 DATE COMPLETED: 4/22/87FIELD REP.: J.P. KASZUBA, S.J. COLARULLO, R.T. HICKSCOMMENTS: 7" BOREHOLE, SPOONS WET AT 33'-36'.BEDROCK @ 37.5' TD=45'

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0				1	4.5	6.0				4.5-4.7' <u>SAND</u> , fn- to cs-gr, poor sorting, tan color.
										4.7-5.2' <u>SAND</u> , fn- to med-gr, mod sorting, tan color.
5										5.2-6.0' <u>SAND</u> , med- to cs-gr, mod sorting, tan color.
10				2	9.5	11.0				9.5-11.0' <u>SAND</u> , as above.
15				3	14.5	16.0				14.5-16.0' <u>SAND</u> , as above.
20				4	19.5	21.0				19.5-21.0' <u>SAND</u> , as above.
25				5	24.5	26.0				24.5-25.2' <u>SILT</u> , lt brn, includes ~10% fn-gr sand and ~10% clay.
										25.2-26.0' <u>SAND</u> , med- to cs-gr, mod sorting, lt brn
30				6	29.5	31.0				29.5-31.0' <u>SAND</u> , as above, includes ~10% silt

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 2SITE ID: MONT & AND LOCATION ID: (NW) GBR-32

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5412 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: HOLLOW STEM AUGER W/SPLIT SPOONS,DRILLING CONTR.: WESTERN TECH.DATE STARTED: 4/21/87 DATE COMPLETED: 4/22/87FIELD REP.: J.P. KASZUBA, S.J. COLARULLO, R.T. HICKSCOMMENTS: 7" BOREHOLE, SPOONS WET AT 33'-36'.BEDROCK @ 37.5'. TD=45'

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30										
				7	34.5	36.0				34.5-34.9' <u>SLOUGH</u> , no returns. 34.9-36.0' <u>SAND</u> , cs- to v cs- gr, poor sorting, brn color. Minor granules (3-15 mm), little clay. Saturated, no odor.
35				8	37.5	38.0				37.5-38.0' <u>SANDSTONE</u> , fn- to med- gr, minor cs, mod sorting, friable, poorly cemented (weathered upper portion), mottled tan/white color.
				9	39.5	40.0				39.5-39.7' <u>SANDSTONE</u> , as above. 39.7-40.0' <u>SANDSTONE</u> , as above, but rust-colored w/limonite stain.
40										
				10	44.5	45.0				44.5-45.0' <u>SANDSTONE</u> , as above, but blue-grey color and significant clay (10-20%).
45										TD to 45' 2" SS blank 40'-45', SS 20 slot screen 25'-40', SS blank 20-25', 2" PVC to surface. Sandpack to 17.5', bentonite plug to 11.2', cement grout w/5% bentonite to surface.
50										
55										
60										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 2SITE ID: MONT & AND LOCATION ID: (EX-1) GBR-33

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: HSA W/CONTINUOUS SAMPLER, 7" BOREHOLEDRILLING CONTR.: WESTERN TECH.DATE STARTED: 4/22/87 DATE COMPLETED: 4/23/87FIELD REP.: J.P. KASZUBACOMMENTS: CUTTINGS FROM AUGER 0'-5'. BEGIN CONTINUOUSSAMPLING AT 8'.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0										0-2' <u>GRAVEL</u> , & sand fill
										~2-5' <u>SAND</u> , med-gr, minor fn and cs, mod sorting, tan brn color. No odor.
5										
				1	8	13				8.0-11.0' No Returns.
10										11.0-11.5' <u>SAND</u> , as above, minor 1 cm dia, rounded pebbles.
										11.5-12.3' <u>SAND</u> , fn- to med- gr, mod sorting, brn color. No odor.
				2	13	18				12.3-13.0' <u>SAND</u> , fn- gr, 10-20% silt, very minor clay, mod sorting, brn color. No odor.
15										13.0-15.5' No Returns.
										15.5-17.2' <u>SAND</u> , med-gr, minor fn and cs, mod sorting, tan brn color. No odor.
				3	18	23				17.2-18.0' <u>SAND</u> , fn- to med-gr, minor 1 cm dia pebbles, poor sorting, brn color. No odor.
20										18.0-20.3' No Returns.
										20.3-20.8' <u>SAND</u> , med-gr, minor fn- and cs, minor 1-5 cm dia pebbles, poor sorting, lt brn color. No odor.
										20.8-21.1' <u>SAND</u> , fn- to med- gr, mod sorting, brn color. No odor.
										21.1-21.4' <u>SAND</u> , as @ 20.3'-20.8'.
										21.4-22.0' <u>SANDY CLAY</u> , brn, sand is fn- gr, well sorted. No odor.
25				4	23	28				22.0-23.0' <u>SAND</u> , as @ 20.3'-20.8'.
										23.0-25.7' No Returns.
										25.7-26.1' <u>SAND</u> , as @ 20.3'-20.8', but pebbles common. No odor.
										26.1-26.2' <u>CLAY</u> , brn, no odor.
										26.2-26.8' <u>CLAYEY SAND</u> , lt olive brn color, sand is fn- to med- gr, well-sorted.
30				5	28	33				26.8-28.0' <u>CLAY</u> , brn, no odor.
										28.0-30.3' No Returns.

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 2

SITE ID: MONT & AND LOCATION ID: (EX-1) GBR-33

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: SAME

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: SAME DATE COMPLETED: SAME

FIELD REP.: SAME

COMMENTS: SATURATED @ ~36'. BEDROCK @ 41.2' (~40' BY DRILLER'S RECKONING). TD=49.5'. NO DIESEL NOTED DURING DRILLING.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30										30.3-32.2' <u>CLAY</u> , brn, no odor. Contains minor med- gr sand @ 31.9'-32.0'. No odor.
										32.2-32.7' <u>CLAYEY SAND</u> , olive brn, sand is fn- to med-gr, mod sorting. No odor. Sample placed in clean water yields no floating product.
										32.7-33.0' <u>CLAY</u> , olive color, contains minor fn- gr sand. Faint HC degradation odor.
35				6	33	38				33.0-36.2' No Returns.
										36.2-36.8' <u>SAND</u> , med- to cs- gr, well-sorted. Saturated. Black HC stain @ 36.2-36.3'. Dk grey HC stain @ 36.3'-36.5'. Grey HC stain @ 36.5'-36.8'. Strong HC odor. Sample placed in clean water yields floating HC.
40										36.8-37.2' <u>SAND</u> , as above, but brown color (no HC stain). Saturated. Faint HC odor. Sample placed in clean water yields no floating HC.
										37.2-37.6' <u>SAND</u> , brn, fn- to med- gr, well-sorted. Faint HC odor(?).
										37.6-38.0' <u>SAND</u> , brn, med- to cs- gr, well-sorted. Faint HC odor(?). Sample placed in clean water yields no floating HC.
45				7	38	43				38.0-39.6' No Returns.
										39.6-41.2' <u>SAND</u> , as above. Faint HC odor. Sample placed in clean water yields floating HC.
										41.2-43.0' <u>SANDSTONE</u> , bleached tan color, med- to cs-gr, mod well-sorted. Rare pebbles up to 1 cm in dia. Friable, poorly cemented. Limonite stain @ 42.0'-42.6'. No HC odor. Sample placed in clean water yields no floating HC.
50				8	43	48				43.0-43.2' No Returns.
										43.2-48.0' <u>SANDSTONE</u> , as above, but poorly sorted & brn color. Limonite stain @ 45.8-46.2'. No HC odor.
				9	48	49.5				48-49.5' No Returns.
55										TD=49.5'. 2" PVC blank 43-48.5'. PVC screen (20 slot) 27'-43'. PVC blank to surface. Sandpack to 22.5', bentonite plug to 17.5', cement grout w/5% bentonite to surface.
60										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 2SITE ID: MONT & AND LOCATION ID: (EX-2) GBR-34

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: HSA W/SPLIT SPOONS, 7" BOREHOLEDRILLING CONTR.: WESTERN TECH.DATE STARTED: 4/23/87 DATE COMPLETED: 4/24/87FIELD REP.: J.P. KASZUBACOMMENTS: CLAY @ 15.5-16.0'. SATURATED @ 30-31'. BEDROCK @ 37'. TD=48'.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0										
				1	3.0	4.5				3.0-4.5' <u>SAND</u> , tan, fn-to med- gr, mod sorting. Minor cs- gr sand & pebbles up to 0.5 cm. No HC odor.
5										
				2	8.0	9.5				8.0-8.5' No Returns.
										8.5-9.1' <u>SAND</u> , as above except pebbles more common & up to 3.0 cm dia.
10										9.1-9.5' <u>SAND</u> , brn, fn- gr, well-sorted. Minor silt & clay. Rare cs- gr. No HC odor.
				3	13.0	14.5				13.0-13.3' <u>SAND</u> , as above, but significant silt.
										13.3-13.8' <u>SAND</u> , lt brn, med- to fn- gr, minor cs- gr. Poor sorting.
										13.8-14.1' <u>SAND</u> , as @ 13.0'-13.3'.
15										14.1-14.5' <u>SAND</u> , lt brn, fn- gr, minor med- gr, minor silt, rare cs- gr, poorly sorted. No HC odor.
				4	18.0	19.5				18.0-18.3' <u>SAND</u> , as above, but cs- gr more abundant.
										18.3-18.7' <u>CLAY</u> , olive brn color, minor silt & fn- gr sand. No HC odor.
20										18.7-19.5' <u>SAND</u> , tan, fn- to med- gr, poorly sorted. No HC odor.
				5	23.0	24.5				23.0-23.3' <u>CLAYEY SAND</u> , brn, sand is med- to cs- gr, poorly sorted
										23.3-23.5' <u>SAND</u> , as @ 18.7'-19.5'.
25										23.5-24.5' <u>CLAY</u> , olive brn color, minor silt & fn- gr sand. No HC odor.
				6	28.0	29.5				28.0-28.3' <u>CLAY</u> , as above. No HC odor.
30										28.3-29.5' <u>SAND</u> , dk brn, fn- to med- gr, well-sorted. No HC odor.

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 2SITE ID: MONT & AND LOCATION ID: (EX-2) GBR-34

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: SAMEDRILLING CONTR.: WESTERN TECH.DATE STARTED: SAME DATE COMPLETED: SAMEFIELD REP.: SAMECOMMENTS: DIESEL ON SPLIT SPOONS IN SATURATED ZONE

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30				7	33.0	34.5				33.0-34.5' <u>SAND</u> , med- gr, minor fn- and cs- gr, well-sorted. Saturated. Black HC stain @ 34.2'-34.5'. Strong HC odor.
35										
40				8	38.0	38.3				38.0-38.3' <u>SANDSTONE</u> , mottled tan color, fn- to med-gr, mod sorting. Poorly cemented, friable. Strong HC odor.
45				9	43.0	43.3				43.0-43.3' <u>SANDSTONE</u> , as above, but abundant cs- gr. No HC odor. TD=48'. 2" PVC blank 43'-48', 20 slot screen 27'-43' (SS & PVC mix), PVC blank to surface. Sandpack to 22', bentonite plug to 17', cement grout w/5% bentonite to surface.
50										
55										
60										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 2SITE ID: MONT & AND LOCATION ID: (EX-4) GBR-35

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NW MEXICO COUNTY: SAN JUANDRILLING METHOD: HSA W/SPLIT SPOONS, 7" BOREHOLE.DRILLING CONTR.: WESTERN TECH.DATE STARTED: 4/24/87 DATE COMPLETED: 4/24/87FIELD REP.: J.P. KASZUBACOMMENTS: SATURATED @ ~ 33.8'. BEDROCK @ 38'. TD=50.DIESEL ON SPLIT SPOONS FROM SATURATED ZONE.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0				1	3.0	4.5				3.0-3.2' 3.2-4.5' Road Gravel. <u>SAND</u> , tan, med- gr, minor fn- and cs- gr, poor sorting. No HC odor.
5										
10				2	8.0	9.5				8.0-9.5' <u>SAND</u> , lt brn, med- to cs- gr, mod sorting. Pebbles up to 2 cm dia common. No HC odor.
15				3	13.0	14.5				13.0-13.2' 13.2-14.5' No Returns. <u>SAND</u> , lt brn, med- gr, minor cs- gr & pebbles up to 2 cm dia, well-sorted. No HC odor.
20				4	18.0	19.5				18.0-18.5' <u>SAND</u> , as above. 18.5-19.1' <u>SAND</u> , lt brn, fn- to med- gr, well-sorted. Minor clay. No HC odor. 19.1-19.6' <u>CLAYEY SAND</u> , lt brn, sand is fn- to med- gr, mod sorted. No HC odor.
25				5	23.0	24.5				23.0-23.4' <u>SAND</u> , brn, fn- gr, minor med- gr & clay, well-sorted. No HC odor. 23.4-23.9' <u>SAND</u> , tan, med- gr, minor fn-, cs- gr, & pebbles up to 2 cm dia, poorly sorted. No HC odor. 23.9-24.5' <u>CLAY</u> , olive brn, no HC odor. Sandy (fn- to med- gr) @ 24.1-24.2'.
30				6	28.0	29.5				28.0-28.5' <u>CLAY</u> , as above. 28.5-28.8' <u>SAND</u> , brn, fn- gr, well-sorted. Pebbles (up to 3 cm dia) @ 28.7-28.8'. No HC odor. 28.8-29.5' <u>CLAYEY SAND</u> , brn, sand is fn- gr, well-sorted. Minor silt. Faint HC odor(?).

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 2SITE ID: MONT & AND LOCATION ID: (EX-4) GBR-35

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: SAMEDRILLING CONTR.: WESTERN TECH.DATE STARTED: SAME DATE COMPLETED: SAMEFIELD REP.: SAME

COMMENTS: _____

1/4 1/4 1/4 1/4 S T R

LOCATION DESCRIPTION: _____

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30										
				7	33.0	34.5				33.0-33.8' No Returns
										33.8-34.5 <u>SAND</u> , olive brn, fn- to med- gr, well-sorted. Saturated. Black HC stain @ 33.9-34.5'. Strong HC odor.
35										
				8	38.0	38.3				38.0-38.3' <u>SANDSTONE</u> , mottled tan/brn, med- gr, minor fn- and cs- gr, minor pebbles up to 1 cm dia, poorly sorted. Friable, poorly cemented. Saturated. No HC odor (?).
40										TD=50'. 2" PVC bottom blank 41'-46', PVC 20 slot screen 25'-41', PVC blank to surface. Sand pack to 19.7', bentonite plug to 12.7', cement grout w/5% bentonite to surface.
45										
50										
55										
60										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 2SITE ID: MONT & AND LOCATION ID: (X5)GBR-36

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: AIR ROTARY, 10" BOREHOLE.DRILLING CONTR.: BEEMAN BROTHERSDATE STARTED: 4/29/87 DATE COMPLETED: 4/30/87FIELD REP.: J.P. KASZUBACOMMENTS: BEGIN USING WATER FOR LUBRICATION @ 25'.SATURATED @ ~33'. POOR RETURNS PAST 45'. TD=75'.

LOCATION DESCRIPTION: _____

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0				1	0	5				0-5' <u>SAND</u> , lt brn, fn- to cs- gr, poorly sorted. Rounded pebbles < 1 cm dia (<1%). No HC odor.
5				2	5	10				5-10' <u>SAND</u> , as above.
10				3	10	15				10-15' <u>SAND</u> , brn, fn- to med-gr, minor cs- gr, mod sorting. No HC odor.
15				4	15	20				15-20' <u>SAND</u> , as above.
20				5	20	25				20-25' <u>SAND</u> , brn, fn- to cs- gr, poor sorting. Rounded pebbles, ≤ 1 cm dia (<5%). No HC odor.
25				6	25	30				25-30' <u>SAND</u> , lt brn, med- to cs- gr, minor fn- gr, mod sorting. Olive brn clay nod (<1%).
30										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 2SITE ID: MONT & AND LOCATION ID: (X5)GBR-36

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: SAMEDRILLING CONTR.: SAMEDATE STARTED: SAME DATE COMPLETED: SAMEFIELD REP.: SAMECOMMENTS: SAME

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30				7	30	35				30-35' <u>SAND</u> , as above. Saturated (?). Faint HC odor (?). Olive brn clay nod (~15%).
35				8	35	40				35-40' <u>CLAY</u> , brn, black & grey HC stain, strong HC odor.
40				9	40	45				40-45' <u>CLAY</u> , as above.
45				10	45	50				45-50' <u>CLAY</u> , as above (50%), but slight grey HC stain in places, faint HC odor. Rounded pebbles (50%), ≤ 5 cm dia, various lith: qtzite, sandstone, granite.
50				11	50	55				50-55' <u>CLAY</u> , as above (30%), brn, no HC odor. Rounded pebbles (70%), as above.
55				12	55	60				55-60' <u>PEBBLES</u> , as above. TD=75'. 6" PVC blank 65'-70', 20 slot PVC screen 25-65', PVC blank to surface. 1" PVC screen 25-65', PVC blank 0-25'. Pea gravel (3/8") to 20', bentonite plug to 15, cement grout w/5% bentonite to surface.
60										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 3SITE ID: MONT & AND LOCATION ID: (X1)GBR-37

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5388 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: AIR ROTARY, 10" BOREHOLE.DRILLING CONTR.: BEEMAN BROTHERSDATE STARTED: 4/28/87 DATE COMPLETED: 4/28/87FIELD REP.: J.P. KASZUBA, S.J. COLARULLOCOMMENTS: BEGIN USING WATER FOR LUBRICATION @ 20'.CONTAMINATION @ ~34.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0				1	0	5'				0-5' <u>SAND</u> , brn, med- to cs- gr, minor fn- gr & angular pebbles (≤ 1 cm dia). Mod sorting. No HC odor.
5				2	5	10'				5-10' <u>SAND</u> , as above.
10				3	10	15'				10-15' <u>SAND</u> , lt brn, med-gr, minor cs- and fn- gr, mod sorting. Clay nodules (~1%). Sub-rounded, ≤ 5 cm dia pebbles (~1%). No HC odor.
15				4	15	20'				15-20' <u>SAND</u> , lt brn, med- to cs- gr, minor fn-, mod sorting. Angular pebbles, < 1 cm dia (~1%). No HC odor.
20				5	20	25'				20-25' <u>SAND</u> , tan, cs- gr, minor med- and fn- gr, mod sorting. Rounded pebbles, ≤ 1 cm dia (5%), ≤ 4 cm (1%). No HC odor.
25				6	25	30'				25-30' <u>SAND</u> , as above, except 10% rounded pebbles (1-4 cm dia). No HC odor.
30										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 3SITE ID: MONT & AND LOCATION ID: (X1)GBR-37

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5388 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: SAMEDRILLING CONTR.: SAMEDATE STARTED: SAME DATE COMPLETED: SAMEFIELD REP.: SAMECOMMENTS: SATURATION @ ~ 34'. BEDROCK @ 54'. TD=73'.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30				7	30	35				30-35' <u>SAND</u> , as above, but fn- gr more abundant. Pebbles (30%) now sub-rounded to sub-angular. Brn clay nod (<5%), some (<1%) w/HC odor & stain. Saturated (?).
35				8	35	40				35-40' <u>SAND</u> , as above, but grey HC stain & strong HC odor. Sub-rounded pebbles (~30%). ~0.5 cm dia, rare 3 cm dia. No clay.
40				9	40	45				40-45' <u>SAND</u> , as above, but lt grey HC stain, faint HC odor.
45				10	45	50				45-50' <u>SAND</u> , as above, but abundant fn- & med- gr, poorly sorted. Sub-rounded pebbles (20%), 0.5 cm dia. Lt brn color, no HC stain or odor.
50				11	50	55				50-54' <u>SANDY CLAY</u> , golden brn, sand is fn- gr, minor med- gr, mod sorting. No HC odor.
55				12	55	60				54-55' <u>SANDSTONE</u> , grey brn, med- to cs- gr, mod sorting. Poorly cemented, friable. No HC odor.
60										55-60' <u>CLAYSTONE</u> , blue grey, minor fn- gr sand. Poorly cemented, friable. No HC odor.

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 3 of 3

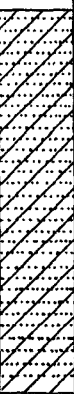
SITE ID: MONT & AND LOCATION ID: (X1)GBR-37

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5388 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: SAMEDRILLING CONTR.: SAMEDATE STARTED: SAME DATE COMPLETED: SAMEFIELD REP.: SAMECOMMENTS: SAME

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
60				13	60	65				60-65' <u>CLAYEY SANDSTONE</u> , blue grey, fn- gr, well sorted. Significant clay (up to 50%). Some fragments display brick red and blue grey color.
65				14	65	70				65-70' <u>CLAYEY SANDSTONE</u> , as above, but sand is fn- to cs- gr, poorly sorted; less clay (25%). Fragments lack red color.
70										TD=73'. 6" PVC blank 66'-69', 20 slot PVC screen 26'-66', PVC to surface. 1" PVC screen 28'-68', PVC blank 0'-28'. Pea gravel (3/8"), to 23', bentonite plug to 17', cement grout w/5% bentonite to surface.
75										
80										
85										
90										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 3SITE ID: MONT & AND LOCATION ID: (X4)GBR-38

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5393 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: AIR ROTARY, 10" BOREHOLE.DRILLING CONTR.: BEEMAN BROTHERSDATE STARTED: 4/28/87 DATE COMPLETED: 4/29/87FIELD REP.: J.P. KASZUBACOMMENTS: BEGIN USING WATER FOR LUBRICATION @ 15'.SATURATED @ ~37', BEDROCK @ 49'. TD=75'.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0				1	0	5				0-5' <u>SAND</u> , brn, fn- gr, minor med- gr, well sorted. No HC odor.
5				2	5	10				5-10' <u>SAND</u> , grey brn, fn- to med- gr, mod sorting. Brn clay nodules (<1%). Sub-rounded pebbles, 0.5 cm dia (<1%). No HC odor.
10				3	10	15				10-15' <u>SAND</u> , as above, but brn. Lacks clay. No HC odor.
15				4	15	20				15-20' <u>CLAY</u> , brn, minor fn- gr sand. No HC odor.
20				5	20	25				20-25' <u>CLAY</u> , as above, but no sand. No HC odor.
25				6	25	30				25-30' <u>SAND</u> , lt brn, fn- to cs- gr, poorly sorted. Saturated (?). No HC odor.
30										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 3

SITE ID: MONT & AND LOCATION ID: (X4)GBR-38

SITE COORDINATES (ft.):

N E

GROUND ELEVATION (ft. MSL): 5393 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: SAME

DRILLING CONTR.: SAME

DATE STARTED: SAME DATE COMPLETED: SAME

FIELD REP.: SAME

COMMENTS: SAME

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30				7	30	35				30-35' SAND, as above.
35				8	35	40				35-40' SAND, as above, but includes <1% sandstone. Sandstone is mottled tan/brn, med- to cs-gr, mod sorting. No HC odor.
40				9	40	45				40-45' SAND, as above, <10% of total. Angular, <5 cm dia qtzite chips (90%). No sandstone. No HC odor.
45				10	45	50				45-49' SAND, as above (90%). Large pebbles absent, small (<0.5 cm) pebbles present (~10%). No HC odor.
50				11	50	55				49-50' SANDSTONE, mottled lt brn, med- to cs-gr, poorly sorted. Poorly cemented, friable. No HC odor. 50-55' SANDSTONE, as above, but mottled blue-grey color (~5%). Blue-grey clay (<1%). Sand & pebbles as @ 45'-49' (~90%).
55				12	55	60				55-60' SANDSTONE, as above.
60										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 3 of 3

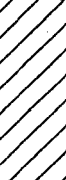
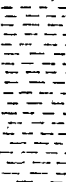
SITE ID: MONT & AND LOCATION ID: (X4)GBR-38

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5393 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: SAMEDRILLING CONTR.: SAMEDATE STARTED: SAME DATE COMPLETED: SAMEFIELD REP.: SAMECOMMENTS: SAME1/4 1/4 1/4 1/4 S T R

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
60				13	60	65				60-65' <u>CLAY</u> , blue-grey & brick red. Claystone (<1%) in same colors.
65				14	65	70				65-70' <u>CLAYSTONE</u> , as above (25%), contains minor fn-gr sand & silt. Sandy claystone (75%), blue-grey & brick red, sand is fn-gr.
70				15	70	75				70-75' <u>SANDY CLAYSTONE</u> , as above (70%). Clayey sandstone (25%), mottled white & blue-grey color, sand is med- to cs-gr, poorly sorted. Qtzite & sand (~5%) as @ 40-45'.
75										TD=75'. 6" PVC blank 67'-72', PVC 20 slot screen 27'-67', PVC blank to surface. 1" PVC screen, 27'-67', PVC blank 0'-27'. Pea gravel (3/8") to 20', bentonite plug to 15, cement grout w/5% bentonite to surface.
80										
85										
90										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 2SITE ID: MONT & AND LOCATION ID: (EX-3) GBR-39

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: HSA W/SPLIT SPOONS, 7" BOREHOLEDRILLING CONTR.: WESTERN TECH.DATE STARTED: 4/23/87 DATE COMPLETED: PLUGGED 4/24/87FIELD REP.: J.P. KASZUBACOMMENTS: BOREHOLE NOT COMPLETED AS A WELL. GRAVELS @ 32'.SATURATED @ ~ 33.5'. BEDROCK @ ~ 38'. TD=43'.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0				1	3.0	4.5				3.0-4.5' <u>SAND</u> , tan, fn- to med- gr, minor cs- gr, mod sorting. No HC odor.
5				2	8.0	9.5				8.0-9.1' <u>SAND</u> , lt brn, fn- gr, minor med- gr, well-sorted. No HC odor. 9.1-9.4' <u>SAND</u> , brn, fn- gr, well-sorted. Abundant silt & clay. No HC odor. 9.4-9.5' <u>SAND</u> , as @ 8.0-9.1'. 13.0-13.4' No Returns. 13.4-13.8' <u>SAND</u> , lt brn, med- gr, poor sorting. Minor cs- gr. No HC odor. 13.8-14.1' <u>SAND</u> , brn, fn- to cs- gr, poorly sorted. Abundant silt & clay. No HC odor. 14.1-14.2' <u>SAND</u> , lt brn, med- to cs- gr, poorly sorted. No HC odor. 14.2-14.5' <u>SAND</u> , brn, fn- gr, well-sorted. Abundant silt & clay. No HC odor.
10				3	13.0	14.5				
15				4	18.0	19.5				18.0-18.8' <u>CLAY</u> , brn, minor fn- gr sand. No HC odor. 18.8-19.5' <u>SAND</u> , lt brn, fn- gr, well-sorted. No HC odor.
20				5	23.0	24.5				23.0-23.2' <u>CLAY</u> , brn, minor cs- gr sand & <0.5 cm dia pebbles. No HC odor. 23.2-23.7' <u>SAND</u> , lt brn, med- to cs- gr, poor sorting. No HC odor. 23.7-24.5' <u>CLAY</u> , as @ 23.0-23.2'. Sandy @ 24.2-24.3'. No HC odor.
25										
30				6	28.0	29.5				28.0-29.5' <u>CLAY</u> , as @ 23.0-23.2', but lacks pebbles. No HC odor.

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 2SITE ID: MONT & AND LOCATION ID: (EX-3) GBR-39

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: SAMEDRILLING CONTR.: WESTERN TECH.DATE STARTED: SAME DATE COMPLETED: SAMEFIELD REP.: SAMECOMMENTS: NO DIESEL NOTED DURING DRILLING.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30				7	33.0	34.5				33.0-33.4' <u>CLAY</u> , as above. No HC odor. 33.4-33.5' <u>GRAVEL</u> , rounded, 2-5 cm dia. 33.5-34.5' <u>SAND</u> , lt brn, med- gr, well-sorted. Minor pebbles (up to 2 cm dia). Saturated. Strong HC odor. Black HC stain @ 33.5-34.0. Grey HC stain @ 34.0-34.2'. Lt grey stain @ 34.2-34.5'.
35				8	38.0	38.3				38.0-38.3' <u>SANDSTONE</u> , med- gr, minor fn-, cs- gr, pebbles (2-4 cm dia), mod sorting. Friable, poorly cemented. Limonite stain. Saturated. Faint HC odor (?).
40				9	43.0	43.3				43.0-43.3' <u>SANDSTONE</u> , as above, but lt brn color, cs-gr more abundant.
45										
50										
55										
60										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 1 of 2

SITE ID: MONT & AND LOCATION ID: (EX-5)GBR-40

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: HSA W/SPLIT SPOONS. 7" BOREHOLE.

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: 4/24/87 DATE COMPLETED: PLUGGED 4/24/87

FIELD REP.: J.P. KASZUBA

COMMENTS: BOREHOLE NOT COMPLETED AS A WELL. SATURATED @

33.0-34.5'. TD=38'.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
0										
				1	3.0	4.5				3.0-3.3' Road Gravel. 3.3-4.5' SAND, tan, med- to cs- gr, mod sorting. No HC odor.
5										
				2	8.0	9.5				8.0-9.5' No Returns.
10										
				3	13.0	14.5				13.0-13.6' SAND, lt brn, med- to cs- gr, mod sorting. No HC odor. 13.6-14.5' SAND, lt brn, fn- to med- gr, minor cs- gr, mod sorting. No HC odor.
15										
				4	18.0	19.5				18.0-18.9' SAND, brn, med- to cs- gr, mod sorting. Angular pebble fragments (up to 2 cm across) @ 18.7-18.9'. No HC odor. 18.9-19.5' SAND, lt brn, fn- to med- gr, mod sorting. No HC odor.
20										
				5	23.0	24.5				23.0-23.5 SAND, lt brn, fn- to cs- gr, minor silt & pebbles (up to 2 cm across), poorly sorted, no HC odor. 23.5-24.1' SAND, tan, fn- to med- gr, minor silt & cs- gr, mod sorting. No HC odor.
25										
										24.1-24.5' SAND, tan, med- to cs- gr, minor fn- gr, well-sorted. No HC odor.
30										
				6	28.0	29.5				28.0-29.5' CLAY, olive brn. No HC odor.

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:

Page 2 of 2SITE ID: MONT & AND LOCATION ID: (EX-5) GBR-40

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)STATE: NEW MEXICO COUNTY: SAN JUANDRILLING METHOD: SAMEDRILLING CONTR.: WESTERN TECH.DATE STARTED: SAME DATE COMPLETED: SAMEFIELD REP.: SAMECOMMENTS: MINOR DIESEL ON SPLIT SPOONS FROM SATURATED ZONE.BEDROCK @ 39'.

LOCATION DESCRIPTION:

DEPTH	LITH.	R E C	S A M	RUN			SAMPLE		USCS	VISUAL CLASSIFICATION
				#	FROM	TO	I.D.	TYPE		
30				7	33.0	34.5				33.0-33.8' <u>CLAYEY SAND</u> , dark olive brn, sand is fn-gr, well-sorted. Saturated. Faint HC odor.
										33.8-34.5' <u>CLAY</u> , as @ 28.0-29.5, but saturated & faint HC odor(?).
35				8	38.0	39.5				38.0-38.9' <u>CLAYEY SAND</u> , brn, sand is fn- to med-gr, mod sorting. Saturated. Faint HC odor(?).
										38.9-39.5' <u>SANDSTONE</u> , mottled tan/brn, med-gr, minor cs-gr, mod sorting. Poorly cemented, friable. Saturated.
40										
45										
50										
55										
60										

APPENDIX C
AQUIFER HYDROGEOLOGIC ANALYSIS AT THE
GIANT BLOOMFIELD REFINERY

PUMP TESTS - DIESEL SPILL AREA

GBR-27

GBR-14

GBR-14, GBR-27, AND GBR-28

PUMP TEST - SOUTHERN REFINERY AREA - GBR-29

PUMP TEST
DIESEL SPILL AREA
GBR-27

PUMP TEST - DIESEL SPILL AREA - GBR-27

Water level measurements obtained during the April/May pump test in the consolidated sandstone aquifer underlying the site were believed to be affected by the presence of floating product in the GBR-27 pump well, as well as in the GBR-25 and GBR-21 observation wells. Floating product was observed to increase from 9 feet to 16 feet in GBR-27 during pumping. Although product was not encountered at GBR-25, this could be attributed to the fact that the top of the screened interval was below the piezometric surface. Thus, any product floating above the water table could not be detected by in-hole probes. Floating product was especially considered to be a problem in well GBR-21, where water levels were observed to increase throughout the test, presumably in response to removal of product by the pump well.

Water levels in the pump well became progressively depressed both in response to lowering of the piezometric surface and to accumulation of product in the borehole. Analysis of drawdown data obtained at the pump well therefore requires consideration of the effect of increasing product pressure head during the test. The decrease in product pressure head at observation wells, where floating product was continually being removed, should also be considered when analyzing drawdown data obtained at the observation wells. Although it is difficult to account for complex dynamics attributed to two-phase flow between wells, it is possible to consider the effects of product thickness on water level measurements within any well at any given time during the pump test.

CORRECTION OF WATER LEVELS FOR FLOATING PRODUCT

If it is assumed that the total head of water at any well is the sum of both the measured elevation head and a pressure head ascribed to the occurrence of floating product, the total hydraulic head (h) of water can be expressed as:

$$h = z + \frac{p}{\rho_{\text{product}} \cdot g} \frac{\rho_{\text{product}}}{\rho_{\text{H}_2\text{O}}}$$

where z = observed elevation head [L]
 p = pressure of the product [M/LT²]
 d_{product} = density of the product [M/L³]
 $d_{\text{H}_2\text{O}}$ = density of water [M/L³]
 g = the gravitational constant [L/T²]

The expression $P/(d_{\text{product}} \cdot g)$ is equivalent to the pressure head of the product in units of length (eg. feet) of product, and must be converted to length of water through multiplication by the ratio $P_{\text{product}}/P_{\text{H}_2\text{O}}$.

The resulting expression

$$h = z + \frac{p}{d_{\text{H}_2\text{O}} \cdot g}$$

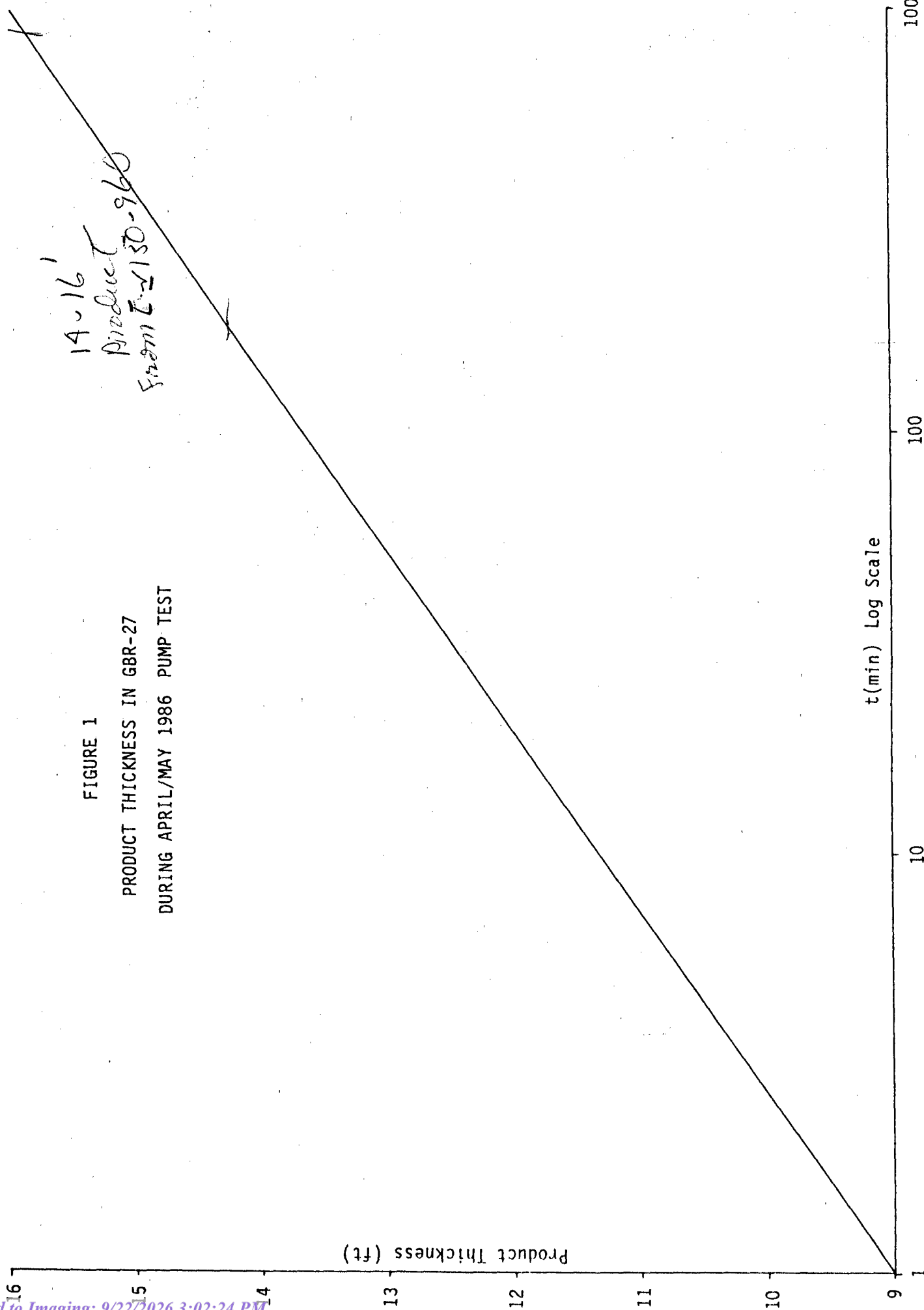
can easily be seen as the familiar Bernoulli equation for the hydraulic head of water, neglecting a velocity head term. The actual hydraulic head h of the water, in the absence of product, can therefore be determined by simply multiplying the observed product thickness ($P/P_{\text{product}} \cdot g$) by an estimate of $d_{\text{product}}/d_{\text{H}_2\text{O}}$ and adding it to the observed elevation head z .

If product thickness is known before and after pumping, it can be estimated during intermediate times by plotting a line between initial and final thickness versus $\log t$ (see Figure 1). Use of this plot for estimating product thickness at GBR-27 for intermediate times of the pump test implies a rapid increase in thickness during early time, with a progressively slower rate of increase at later times. Such behavior would be expected on the basis of initially steep hydraulic gradients at the onset of pumping and a large corresponding initial influx of product. The attached plot was constructed by assuming that product thickness at GBR-27 did not begin to increase until 1 minute after pumping began. This initial time was chosen purely on the basis of expediency; use of smaller times of initial accumulation resulted in fluctuating corrected water levels and negative corrected drawdowns during early times. Ideally, product thickness should be determined more accurately through periodic measurement during the pump test, but the logistical problems relating to such measurements would probably be difficult to overcome.

FIGURE 1

PRODUCT THICKNESS IN GBR-27
DURING APRIL/MAY 1986 PUMP TEST

t(min) Log Scale



14-16'
Product
From E-2130-960

It should be noted that there is no need to reduce product thickness by a factor of 4 before applying the correction, since in-hole water level elevations were observed during the test. Because it is these elevations that are being corrected, the actual in-hole product thickness should be used.

A major assumption implicit to the approach described above is that the dynamics of water flow in the aquifer remain unaltered by the occurrence of floating product. Specifically, it is assumed that the hydraulic gradients characteristic of the floating product, which may differ significantly from those of the underlying water, do not greatly affect the rate of water transmission to the pump well or the rate of water migration away from observation wells. In reality, within areas where the gradient of the product is large, the gradient of the piezometric surface will also tend to be large and would cause greater lateral flow of water than would otherwise occur in the absence of product (see Figure 2). In the event that the product gradient is directed opposite to the naturally-occurring piezometric gradient, the actual piezometric gradient would be reduced or even reversed by the presence of product. Depending upon the location of the pump or observation wells, transmissivities calculated on the basis of pump test data could be significantly over- or underestimated.

PUMP-TEST DATA ANALYSIS

Jacob Analysis of Data from GBR-27

Drawdown data observed at pump well GBR-27 was analyzed using a straight-line semi-log Jacob plot. The change in slope of the water level vs. log t plot at t=100 minutes (see Figure 3) could be due to a low-permeability lateral boundary encountered by the expanding cone of depression at GBR-27 or could be the result of partial-penetration effects. Both possibilities can theoretically be addressed using Stallman and Hantush modified Theis analyses with log-log plots of the drawdown data versus time (Kruseman and DeRidder, 1970).

causing
storage
or delayed
yield

As indicated in the attached plot of water level vs. log t/t' (Figure 4), the rate of recovery is much smaller during early recovery times (i.e.,

not much chance
at low Q

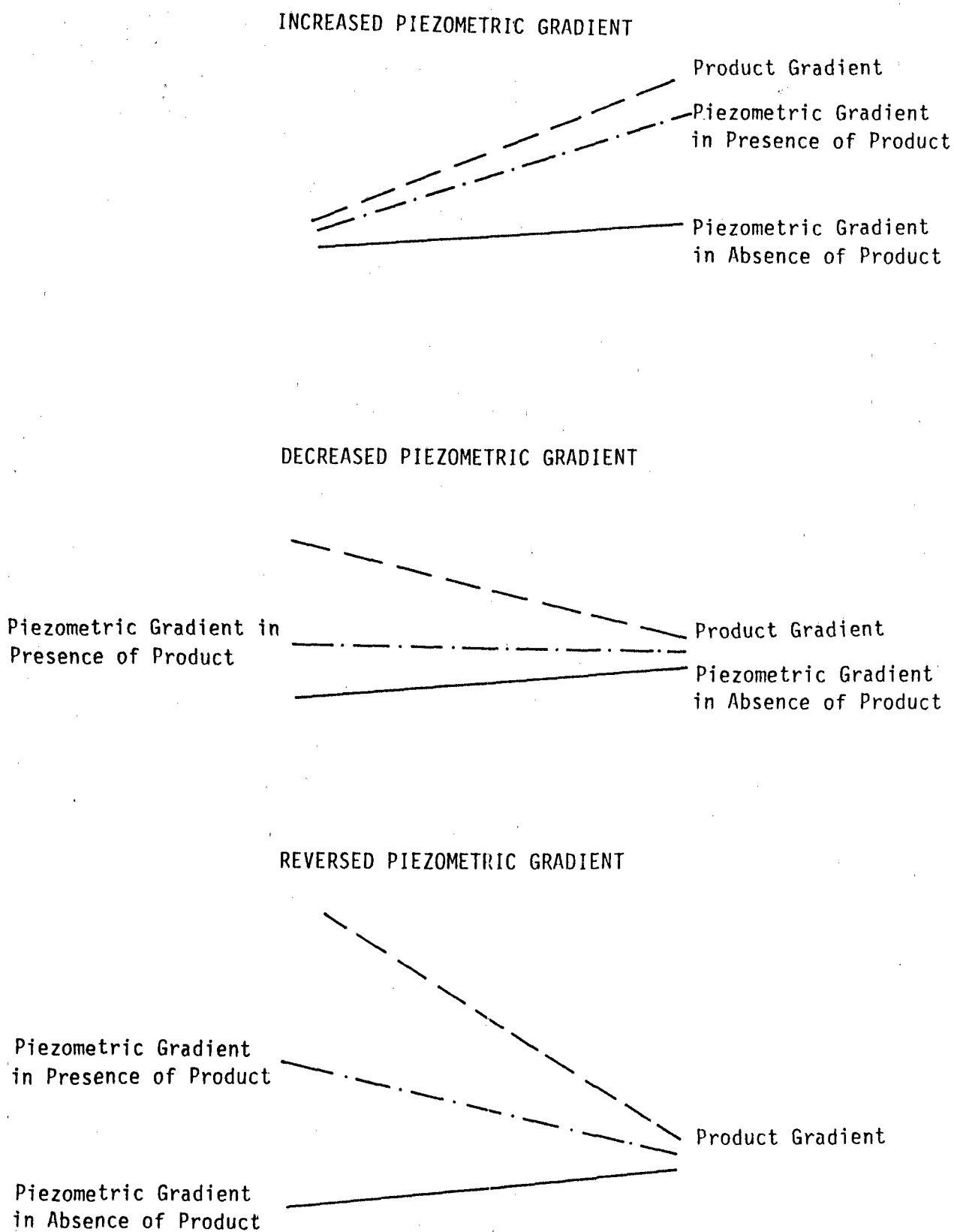
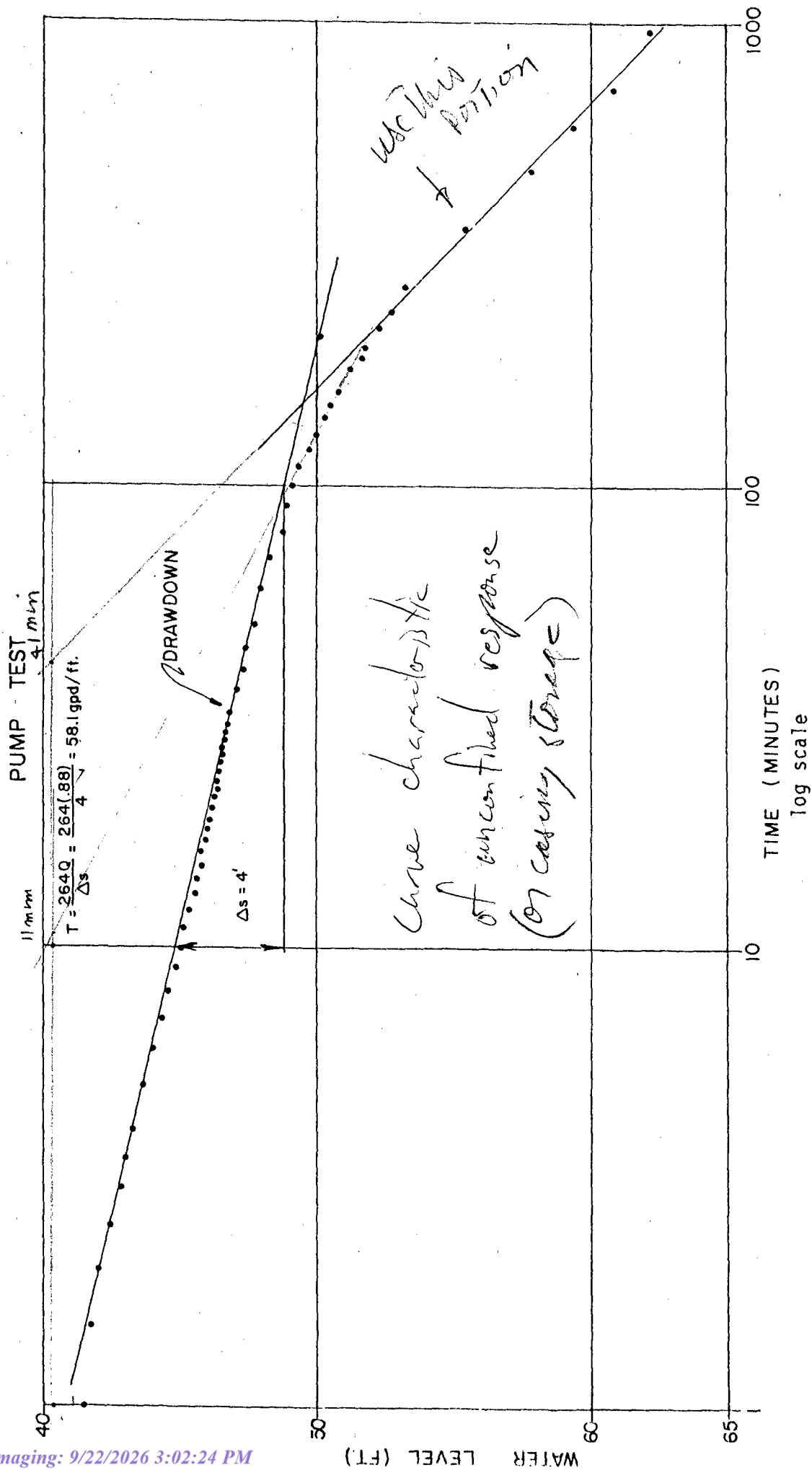


FIGURE 2

SCHEMATIC REPRESENTATION OF THE EFFECTS OF
PRODUCT GRADIENT ON THE PIEZOMETRIC GRADIENT

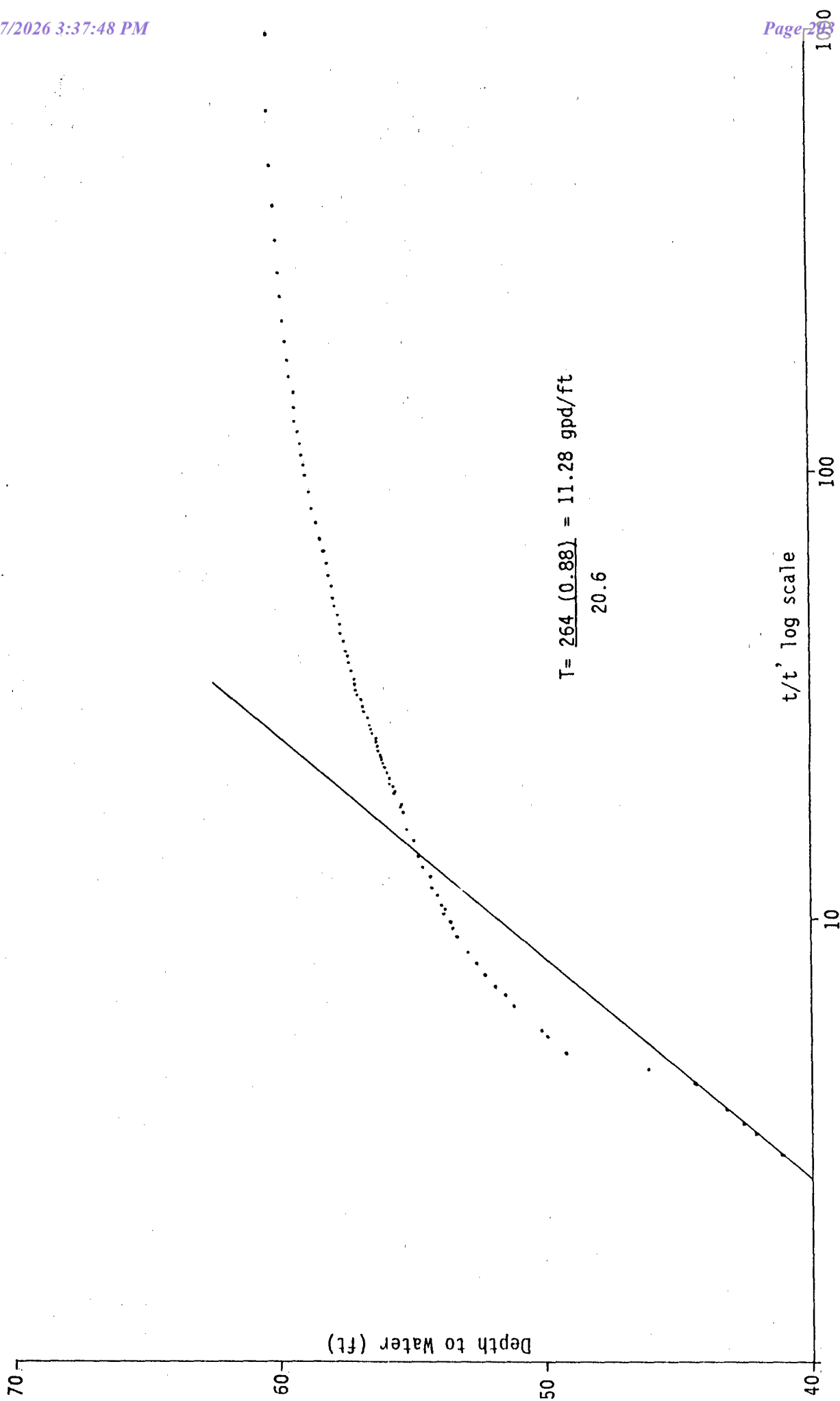


GIANT - BLOOMFIELD
PUMPED WELL
WELL NO. 27

FIGURE 3

4/30/86
C.S.

FIGURE 4
GBR-27
RECOVERY DATA 5/1/86

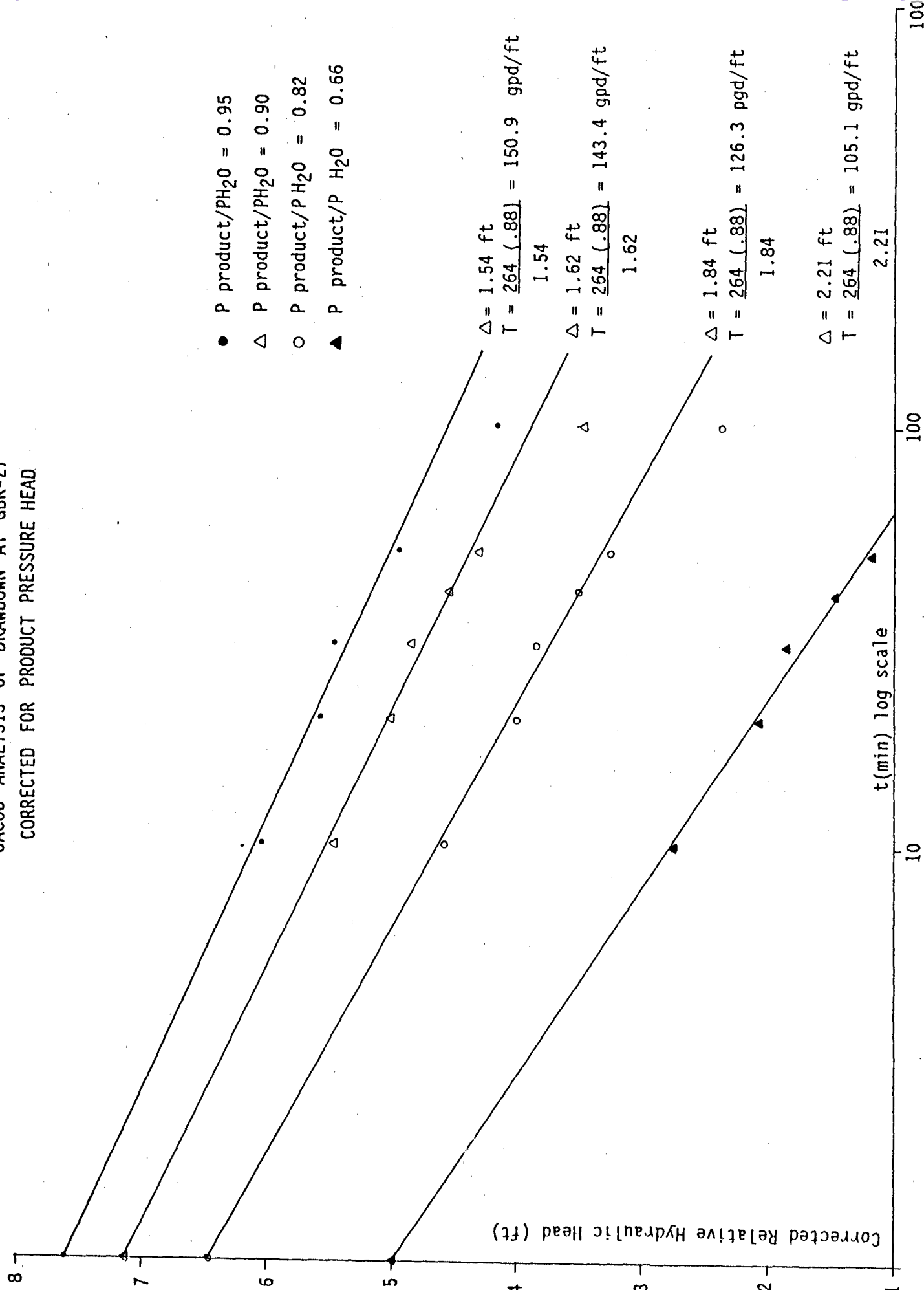


large values of t/t') than during later recovery times ($t/t' < 5$). This is the opposite of the usual case of recovery for which the water table rebounds rapidly during initial stages of recovery as water surges back to the well under the pump-induced gradient, with slower recovery as the gradient towards the well decreases at later times. It appears that the large amount of product that accumulated in GBR-27 during pumping was effectively dampening the rate of water level recovery during early stages. The rate of recovery increased somewhat during intermediate stages, but was still significantly smaller than the rate associated with late recovery stages. This behavior would seem typical of water overlain by an initially thick layer of accumulated product that migrates away from the well in response to a decrease in the piezometric gradient, allowing the water table to ultimately rebound to its initial level. The slow rate of rebound during early recovery stages can be attributed to the low conductivity of the aquifer with respect to the low-density, high-viscosity product and the resulting slow rate of product migration. As the water table slowly rebounded and the gradient decreased towards the well, product was gradually removed and the water table rebounded at progressively faster rates. Since no data were available to describe the change in product thickness during recovery stages, no attempt was made to evaluate the effects of product thickness on water recovery at GBR-27. When a straight line was fitted to the recovery data at large recovery time (t/t' small), the calculated transmissivity was equal to 11.3 gpd/ft. Clearly, abrupt recovery during late recovery stages when large quantities of product have migrated away from the vicinity of the well caused the small estimated transmissivity. More gradual late-stage recovery normally associated with recovery in the absence of product pressure head would have produced a higher estimate of transmissivity.

Jacob analysis of GBR-27 drawdown corrected for product pressure head using a density ratio of 0.82 typical of kerosene (CRC Handbook of Chemistry and Physics, p. F-3) yielded a transmissivity of 126.3 gpd/ft. (see Figure 5). This transmissivity estimate was significantly higher than the transmissivity obtained with uncorrected pump-well drawdown because 'removal' of the product pressure head effectively reduced the rate of drawdown during pumping.

} in the same ballpark as values.
I calculated
for the GBR-14 pump test

FIGURE 5
JACOB ANALYSIS OF DRAWDOWN AT GBR-27
CORRECTED FOR PRODUCT PRESSURE HEAD



THEIS ANALYSIS OF DATA FROM GBR-27

The Stallman modified Theis analysis was applied to the drawdown data from pump well GBR-27 in order to determine the position of a low-permeability lateral boundary which might give rise to the observed increase in drawdown at $t=100$ minutes. The occurrence of low-conductivity clay lenses in the adjacent arroyo alluvium may have been responsible for such boundary effects, causing increased drawdown at GBR-27 as the expanding cone of depression intercepted alluvial deposits. Data both corrected and uncorrected for product thickness were used in the analysis, as indicated in Figure 6. The analysis involved utilizing type curves equal to the sum of well functions associated with the pump well and discharging image wells that would produce the shape of the observed log s versus log t plot (see Figure 7).

} delayed yield

The match point for the uncorrected drawdown data occurred at $s=0.23$ ft. and $t=0.63$ minutes. Using these values, transmissivity was calculated to be 43.9 gpd/ft when the drawdown was corrected for product thickness. The transmissivity was estimated to equal 118.7 gpd/ft. Again, the larger transmissivity for corrected drawdown was expected on the basis of the reduced rate of drawdown that occurred when product was essentially removed during the analysis.

Use of the Stallman method of images to identify the location of a possible low-permeability barrier affecting drawdown at GBR-27 was not considered successful. For the case of GBR-27 acting as its own observation well, the analysis became indeterminate. The analysis yielded estimates of the boundary location at anywhere between 1.0 and 4.2 feet from GBR-27 for both corrected and uncorrected data. Given the moderate aquifer transmissivity estimated from Jacob and modified Theis analyses, any low-permeability barrier observed at $t=100$ minutes is more likely to be much further from the pump well than 1 to 4 feet. The match point, and thus the estimate of transmissivity obtained from the Stallman modified Theis method, were not affected by the indeterminate value of r_r .

True

FIGURE 6
THEIS PLOT OF DRAWDOWN VS. TIME AT GBR-27

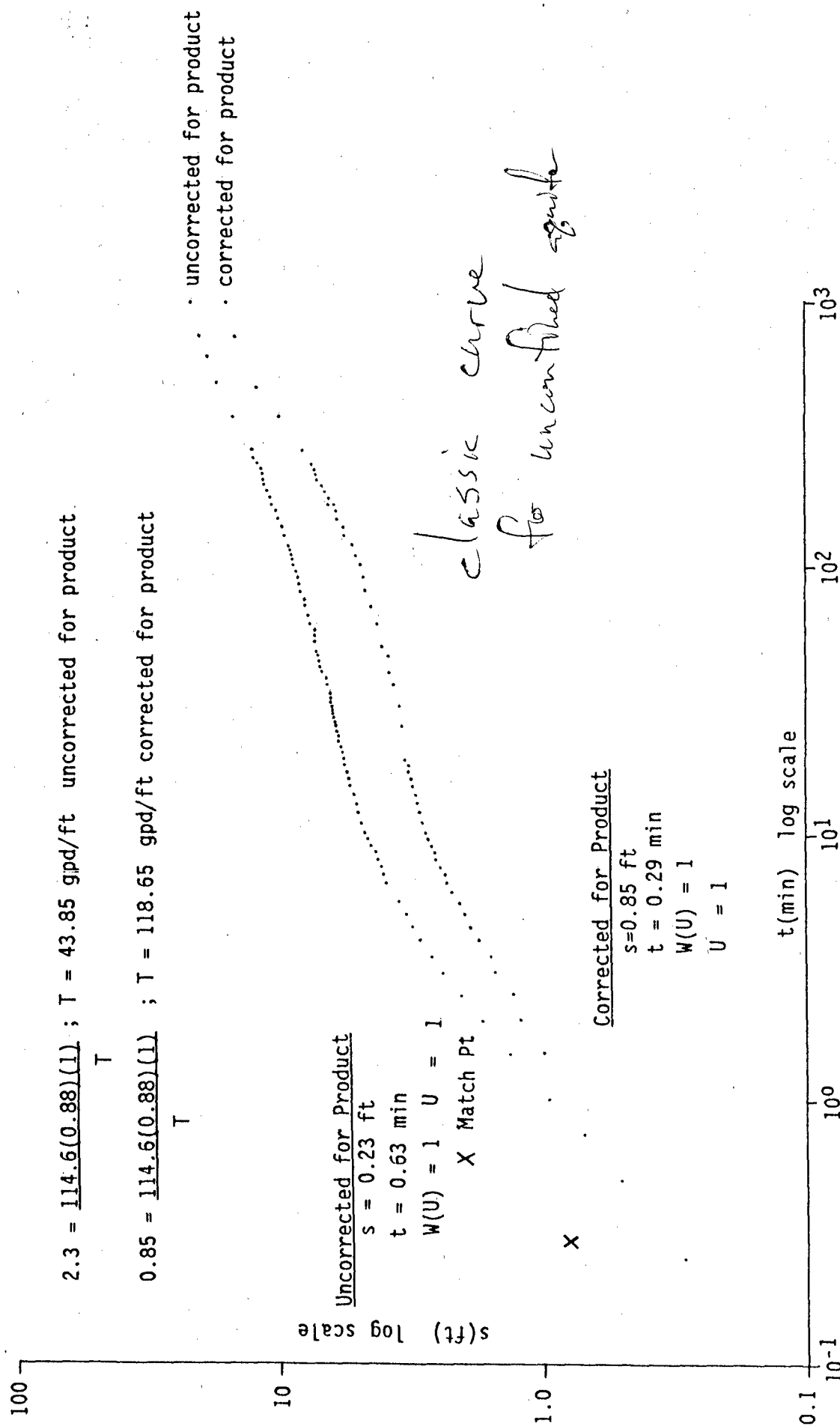
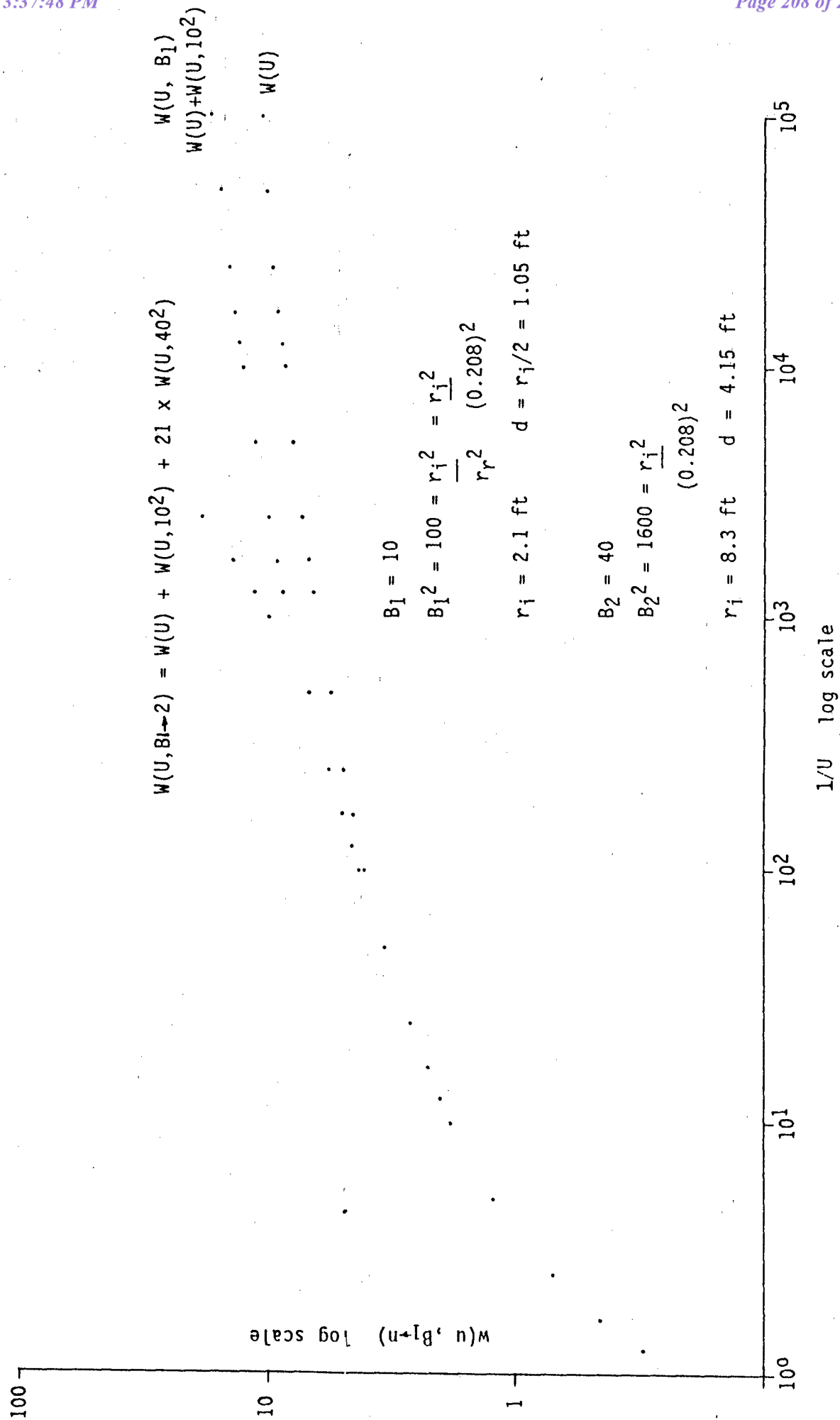


FIGURE 7
STALLMAN MODIFIED THIEIS CURVE $W(U, B_1 \rightarrow N)$ vs. $1/U$



The upward deviation of drawdown from the Theis curve may be attributed to the effects of a partially-penetrating pump well under conditions of dewatering rather than to low-permeability boundary effects. As the pump-well became dewatered, the effective screen area would have been reduced and the velocity of water entering the well would have greatly increased. This increased velocity would produce large head losses in the well and significantly increased drawdown. The likelihood that the observed drawdown behavior at GBR-27 reflects partial-penetration head losses is somewhat substantiated by the fact that, when drawdown data from GBR-25 are plotted on double-log paper, an upward deviation is not apparent; head losses due to vertical flow at a distance of 80 feet from a partially-penetrating pump well would tend to be minor. Analysis of drawdown data from GBR-27 for potential effects of partial-penetration could not be performed without information pertaining to the thickness of the consolidated sandstone aquifer.

JACOB ANALYSIS OF DATA FROM GBR-25

Strictly speaking, Jacob analysis of uncorrected drawdown data obtained from GBR-25 for early and moderate times was not possible. In order for the straight-line semi-log analysis to be valid, the value of $u = r^2 S / 4 T t$ must be smaller than 0.01 for all values of t involved in the straight-line fit. The value of u for GBR-25, assuming T , S , and r values of 422.4 gpd/ft (0.0392 ft²/min), 0.00017, and 80 feet was less than 0.01 only for $t > 694$ minutes. Ideally, analysis would be performed by using data for $t > 694$ min., obtaining new estimates of T , S , u and a new lower time limit. Iterative application of the method would eventually allow convergence to the actual values of T and S . Since there was little data for $t > 694$ minutes, recourse to the Theis method was believed to yield more reliable estimates of aquifer parameters.

It should be noted that a single straight line could conceivably be fit to drawdown data on the semi-log plot for GBR-25 (Figure 8). The increased drawdown observed at $t = 220$ minutes was sufficiently slight to substantiate use of a single straight-line fit. Using this single-line fit, transmissivity was estimated to equal 387.2 gpd/ft., with storativity remaining essentially unchanged at 0.00016. However, since the

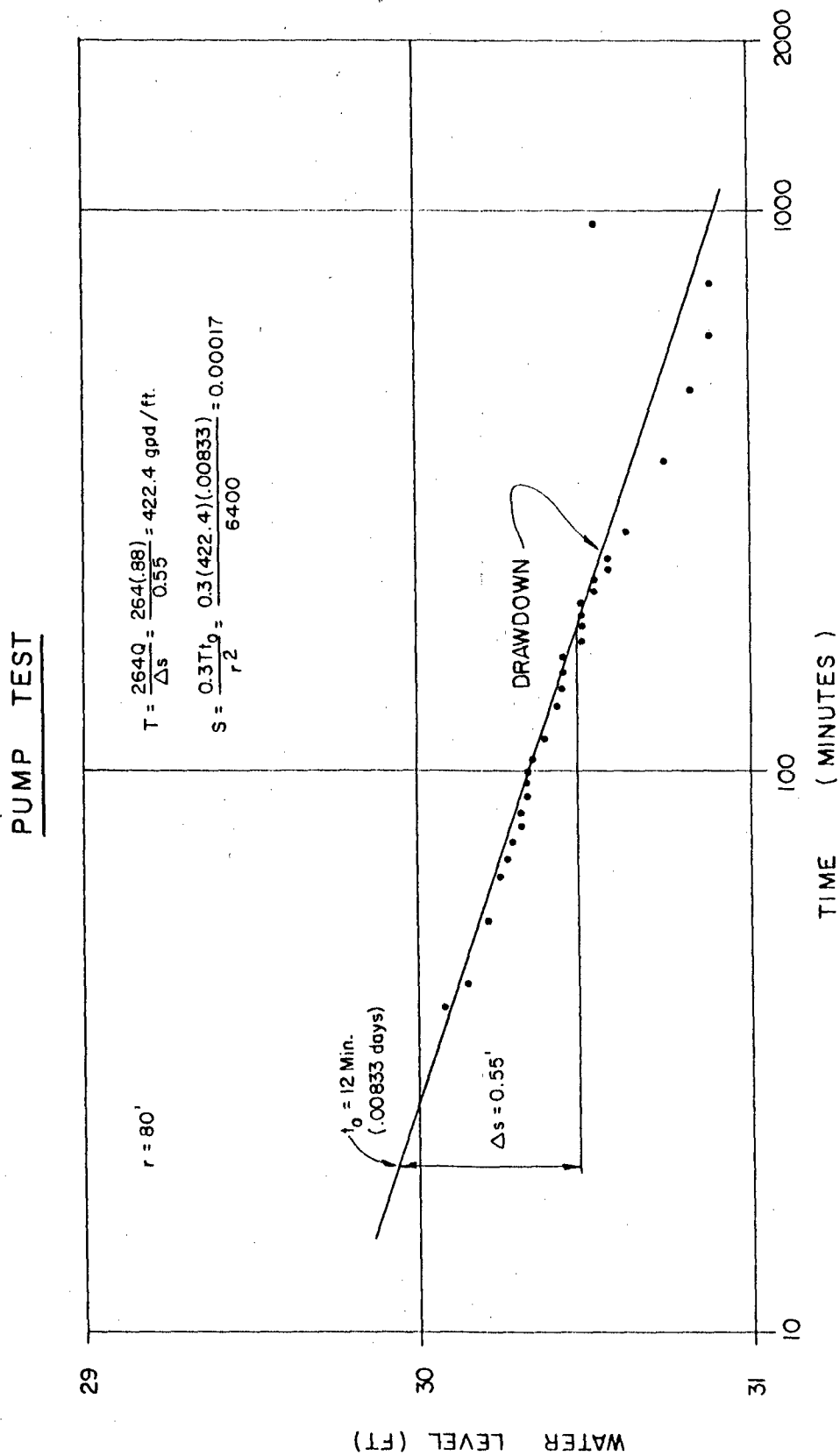


FIGURE 8

GIANT - BLOOMFIELD
OBSERVATION WELL
WELL NO. GBR 25

4/30/86

4/30/86
C.S.

value of u remains too large for valid Jacob analysis, these values should be considered less reliable than those obtained using Theis analysis. Correction for product pressure head at GBR-25 was not possible because no data related to changing product thickness at the well were available.

THEIS ANALYSIS OF DATA FROM GBR-25

Using a double logarithmic plot of drawdown vs. t for GBR-25, a match point of $W(u)=1$, $u=1$, $s=0.3$ feet, and $t=14.5$ minutes was obtained. These values yielded estimates of $T = 336.2$ gpd/ft. and $S = 0.00028$, which were both of the same order of magnitude as parameters estimated from Jacob analysis (see Figure 9). Due to the low values of S calculated from all analyses at GBR-25, the aquifer was assumed to be confined in the vicinity of the pump test and drawdowns were not corrected for unconfined conditions. The occurrence of confined conditions in the vicinity of GBR-25 was related to the existence of a shale layer along the eastern edge of the Diesel Spill Area.

Deviations of drawdown from the Theis curve at large times were not as pronounced at GBR-25 as they were for GBR-27. This lack of deviation brought into question whether a low-permeability lateral boundary did, in fact, exist in the area affected by the pump test. Deviation of data from Theis-predicted behavior at GBR-27, and the lack of deviation at GBR-25, imply that the source of non-ideal behavior is located in the vicinity of GBR-27. Partial-penetration effects would tend to be localized at the pump well, but would not be as evident at GBR-25 where vertical flow components induced by the partially-penetrating pump well would be negligible simply by virtue of the large distance from pumping.

Yes, and
therefore
could be
due to
delayed
yield

EVALUATION OF DATA FROM GBR-21

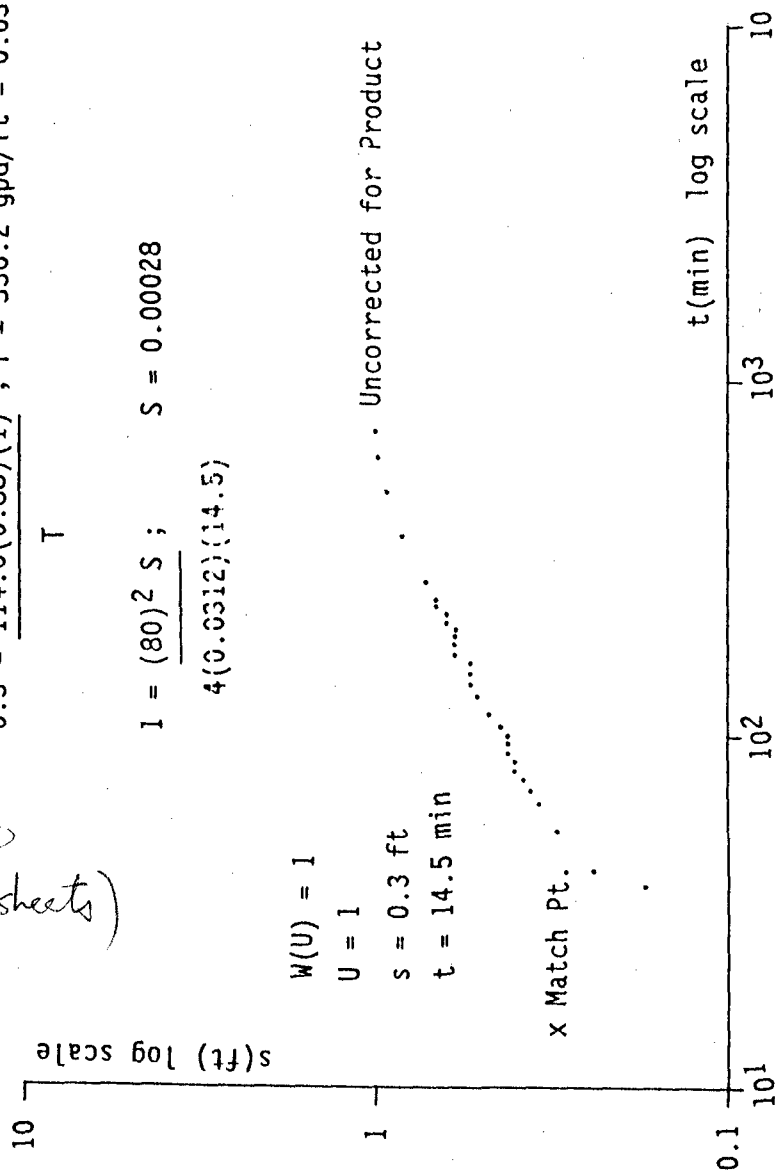
In the absence of changing barometric conditions, the observed 1.8-foot rise in water levels at GBR-21 can only be ascribed to the removal of floating product by the GBR-27 pump well. As product moved out of the observation borehole, the product pressure head decreased and caused a simultaneous rise in the piezometric level. Removal of 2.2 feet of product would be required to generate a 1.8-ft rise in the water table,

FIGURE 9
THEIS PLOT OF DRAWDOWN DATA FROM GBR-25

*n = 80, m = 150
(as on data sheets)*

$$0.3 = \frac{114.6(0.88)(1)}{T} ; T = 336.2 \text{ gpd/ft} = 0.0312 \text{ ft}^2/\text{min}$$

$$I = \frac{(80)^2 S}{4(0.0312)(14.5)} ; S = 0.00028$$



assuming a specific gravity of 0.82 for the product. Due to lack of data pertaining to the decrease in product thickness during pumping, it was not possible to correct drawdown data for product pressure head. No estimates of T or S could therefore be obtained using GBR-21 data.

SUMMARY OF AQUIFER PARAMETERS

Aquifer parameters obtained on the basis of drawdown data from wells GBR-27 and GBR-25 are summarized below. Storativity at the pump well could not be determined due to the high storage associated with the pump borehole and its distorting effects on storativity analysis.

WELL AND TYPE OF ANALYSIST(gpd/ft)Sy

GBR-27

Jacob w/uncorrected drawdown
w/corrected drawdown

58.1

NA

126.3

NA

Jacob recovery

ND

NA

Stallman modified Theis
(low-k barrier)

w/uncorrected drawdown

43.9

NA

w/corrected drawdown

118.7

NA

Hantush modified Theis
(partial penetration)

ND

NA

GBR-25

Jacob w/uncorrected drawdown
w/corrected drawdown

387.2

0.00016

ND

ND

Stallman modified Theis
(low-k barrier)

ND

ND

Theis w/uncorrected drawdown
w/corrected drawdown

336.2

0.00028

ND

ND

NA = not applicable

ND = no data available

Don't make sense for sand stone
 $K = \frac{T}{b} = \frac{336.2}{40'} = 8.4 \text{ gpd/ft}^2$
 u is not less than 0.01 invalid
 m at GBR-27

CONCLUSIONS

If drawdown data obtained at GBR-25 are not significantly affected by product pressure head, calculated transmissivities and storativities from analysis of uncorrected drawdown data can be assumed to be reliable estimates of consolidated aquifer parameters. The 336-387 gpd/ft range of transmissivities is somewhat higher than the range of 119-126 gpd/ft estimated using corrected drawdown at GBR-27, where the presence of floating product was considered to be much more of an influence on observed drawdown response. This discrepancy may be attributed to partial-penetration effects that are much more dominant at GBR-27. The continual dewatering of the pump well may have resulted in decreasing screen area, increased velocity of withdrawn water, greater vertical flow components, and significant head losses at the pump well. These head

losses would be manifested by drawdown in excess of that which would occur under fully-penetrating conditions, resulting in reduced transmissivity estimates. Although the presence of a low-permeability boundary within the expanding cone of depression could be responsible for the abrupt increase in drawdown at $t=100$ minutes, image-well analysis did not yield conclusive results due to insensitivity of the analysis to drawdown at the pump well. Since the presence of a low-permeability boundary was not indicated by drawdown data obtained at the GBR-25 observation well, the possibility of partial-penetration effects should not be discounted. Lack of data relating to consolidated aquifer thickness made it impossible to explicitly address the likelihood that partial-penetration of the pump well was responsible for the observed deviations from ideal behavior and the low transmissivities encountered at GBR-27.

Storativities estimated on the basis of uncorrected data from observation well GBR-25 ranged from 0.00016 to 0.00028. These estimates were well within the range of storativities generally associated with confined to partially-confined flow. If the pump test had been of longer duration, it is possible that leakage from localized shale units along the eastern edge of the Diesel Spill Area would have become evident. 

RECOMMENDATIONS

In order to account for all effects of non-ideal behavior during pump testing, it is essential that sufficient information related to the causes of such non-ideal behavior be acquired. Floating product thicknesses should be monitored throughout the duration of pump testing at all pump and observation wells. This will make it possible to correct for product pressure head without resorting to speculative semi-log plots of product thickness vs. $\log t$ (see Figure 1). In addition, test pumping should be conducted for at least 24 hours by ensuring that the pump well has been completed at a depth sufficient to avoid dewatering and consequent partial-penetration effects. Long-duration tests would make it possible to more thoroughly investigate the possibility of low-permeability lateral boundaries, vertical leakage, and other sources of non-ideal behavior. A longer duration test at GBR-27 would have made it possible to determine whether the effects of a proposed low-permeability



*exactly what we
were saying*

boundary would have eventually become evident at observation well GBR-25. If a significant increase in drawdown did not occur at GBR-25 after 2 to 3 days of pumping, the abrupt drawdown increase at GBR-27 at $t=100$ minutes would clearly be ascribed to partial-penetration influences. A final source of inadequate data was related to lack of a specified consolidated sandstone aquifer thickness. Geophysical studies may have the potential for yielding estimates of aquifer thickness for the deep consolidated aquifer. Alternatively, at least one borehole should be drilled to several hundred feet in order to ascertain the depth to contiguous shale and the minimum aquifer thickness. For large estimates of minimum aquifer thickness, many methods of analysis are insensitive to this parameter. For example, in correcting for partial penetration effects, it may make little difference whether aquifer thickness is 500 or 2000 feet when compared to the depth of the pump well. However, if aquifer thickness is only 100 feet, such an analysis would be sensitive to the estimated thickness.

or
delayed
yield

All ND (no data) entries in the aquifer parameter summary table can be ascribed to lack of data relating to product thickness and consolidated aquifer thickness and to testing of insufficient duration.

Given the constraints associated with pumping in contaminated areas affected by product pressure head, excessive costs of drilling to large depths for aquifer thickness determination, and general problems relating to non-ideal aquifer behavior, the use of slug or bailer tests and laboratory testing of core samples for purposes of defining hydraulic conductivity should be considered. When properly conducted, these methods can produce inexpensive and reliable estimates of aquifer transmissivity without the problems inherent to field testing methods.

TABLE C-1
AQUIFER TEST DATA

Page 1 of 4

Owner Giant Address Bloomfield, NM County San Juan State NM

Date 4/30/86 Company performing test Geoscience Measured by Nicholas

Well No. GBR-27 Distance from pumping well - Type of test Pump Test No. 1

Measuring equipment Soilinst WL Indicator *(corrected levels?)*

Time Data		Water Level Data		Discharge Data		Comments on factors affecting test data
Pump on: Date <u>4/30</u> Time <u>1530</u> (L)		Static water level <u>40' 4.5"</u>		How Q measured <u>Bucket</u>		
Pump off: Date <u>5/1</u> Time _____ (L)		Measuring point <u>Top of Casing</u>		Depth of pump/air line <u>62'</u>		
Duration of aquifer test: _____		Elevation of measuring point _____		Previous pumping? Yes _____ No _____		
Pumping <u>16 hrs.</u> Recovery _____				Duration _____ End _____		

Date	Clock time	Time since pump started h m	Time since pump stopped h m	t/t'	Water level measurement	Correction or Conversion	Water level s or s'	Water level change s or s'	Discharge measurement	Rate	
4/30/86	1530	0			40' 4.5"		40.38'	9'	33.00	= Static	
		:15			8"		40.67'				
		:30			10.5"		40.88'				
		:45			41' 1"		41.08'				
		1:00			4"		41.33'				
		1:30			8.5"		41.71'				
		2:00			42' 1"		42.08'				
		2:30			5"		42.42'				
		3:00			9.5"		42.79'				
		3:30			43' 0"		43.00'				
		4:00			3.5"		43.29'				
		4:30			6"		43.50'				
		5:00			8"		43.67'				
		5:30			10.25"		43.85'				
		6:00			44' 1"		44.08'				
		6:30			3"		44.25'				
		7:00			4"		44.33'				
		7:30			6"		44.50'				
		8:00			7.5"		44.63'				
		8:30			8.5"		44.71'				
		9:00			10"		44.83'				
		9:30			11.5"		44.96'				
		10:00			45' 1"		45.08'				
		11:00			2.5"		45.21'				
		12:00			4.5"		45.38'				
		13:00			6"		45.50'				
		14:00			7"		45.58'				

TABLE C-1 (Cont.)
AQUIFER TEST DATAPage 2 of 4

Owner Giant Address Bloomfield, NM County San Juan State NM
 Date 4/30/86 Company performing test Geoscience Measured by Nicholas
 Well No. GBR-27 Distance from pumping well - Type of test Pump Test No. 1

Measuring equipment SOILINST WL Indicator

Time Data

Pump on: Date 4/30 Time 1530 (L)
 Pump off: Date Time (L)
 Duration of aquifer test:
 Pumping 16 hrs. Recovery

Water Level Data

Static water level 40' 4.5"
 Measuring point Top of Casing
 Elevation of measuring point

Discharge Data

How Q measured Bucket
 Depth of pump/air line 62'
 Previous pumping? Yes No
 Duration End

Comments on factors
affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level Water level change s or s'	Discharge measurement	Rate	
4/30/86		15.0			45' 9"		45.75'			
		16.0			10"		45.83'			
		17.0			11.5"		45.96'			
		18.0			46' 0"		46.00'			
		19.0			1.5"		46.13'			
		20.0			2.5"		46.21'			
		21.0			3.5"		46.29'			
		22.0			4.5"		46.38'			
		23.0			4.5"		46.38'			
		24.0			5.25"		46.44'			
		25.0			6"		46.50'			
		26.0			7"		46.58'			
		27.0			7.5"		46.63'			
		28.0			8"		46.67'			
		29.0			8.5"		46.71'			
		30.0			9"		46.75'			
		31.0			10"		46.83'			
		32.0			10"		46.83'			
		33.0			-		-			
		34.0			-		-			
		36.0			47' 1"		47.08'			
		38.0			-		-			
		40.0			47' 4"		47.33'	6.95		
		42.0			5"		47.42'			
		44.0			5.5"		47.46'			
		46.0			6"		47.50'			
		48.0			8"		47.67'			
		50.0			9"		47.75'			

TABLE C-1 (Cont.)

Page 3 of 4

AQUIFER TEST DATA

Owner Giant Address Bloomfield County San Juan State NMDate 4/30/86 Company performing test Geoscience Measured by NicholasWell No. GBR-27 Distance from pumping well - Type of test Pump Test No. 1Measuring equipment Soilinst WL Indicator

Time Data		Water Level Data		Discharge Data		Comments on factors affecting test data
Pump on: Date <u>4/30</u> Time <u>1530</u> (L)		Static water level <u>40' 4.5"</u>		How Q measured <u>Bucket</u>		
Pump off: Date <u> </u> Time <u> </u> (L)		Measuring point <u>Top of Casing</u>		Depth of pump/air line <u>62'</u>		
Duration of aquifer test: <u> </u>		Elevation of measuring point <u> </u>		Previous pumping? Yes <u> </u> No <u> </u>		
Pumping <u>16 hrs.</u> Recovery <u> </u>				Duration <u> </u> End <u> </u>		

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
4/30/86		52.0			-		-				
		54.0			-		-				
		56.0			-		-				
		58.0			-		-				
	1630	60.0			48' .5"		48.04	13.18	37.23	4.23	
		65.0			2.75"		48.23				
		70.0			4.5"		48.38	13.32	37.46	4.46	
		75.0			6.25"		48.52				
		80.0			9"		48.75	13.45	37.72	4.72	
		85.0			10"		48.83				
		90.0			11.5"		48.96				
		95.0			49' 2"		49.17				
		100.0			2.5"		49.21	13.6	38.06	5.06	
		105.0			4.5"		49.38				
		110.0			5.5"		49.46				
		115.0			7"		49.58				
	1730	120.0			9"		49.75				
		130.0			50.5"		50.04				corrected WL =
		140.0			3.5"		50.29	4 PT	CWL	4c	WL - (PT)(.82)
		150.0			6.75"		50.56	10.18	14.1	39.00	6.00
		160.0			9"		50.75	10.37	14.18	39.12	6.12
		170.0			51' 3"		51.25	10.87	14.22	39.59	6.59
	1830	180.0			3.5"		51.29	10.91	14.3	39.56	6.56
		190.0			7"		51.58	11.2	14.35	39.81	6.81
		200.0			9.5"		51.79	11.41	14.4	39.98	6.98
		210.0			52.5"		52.08	11.7	14.45	40.23	7.23
		220.0			3"		52.25	11.87	14.5	40.36	7.36

TABLE C-1 (Cont.)
AQUIFER TEST DATA

Page 4 of 4

Owner Giant Address Bloomfield County San Juan State NM

Date 4/30 / 5/1 Company performing test Geoscience Measured by Nicholas

Well No. GBR-27 Distance from pumping well - Type of test Pumps Test No. 1

Measuring equipment Soilinst WL Indicator

Time Data	Water Level Data	Discharge Data	Comments on factors affecting test data
Pump on: Date <u>1530</u> Time <u>4:30</u> (h) Pump off: Date _____ Time _____ (h) Duration of aquifer test: _____ Pumping <u>16 hrs.</u> Recovery _____	Static water level <u>40' 4.5"</u> Measuring point <u>Top of Casing</u> Elevation of measuring point: _____	How Q measured <u>Bucket</u> Depth of pump/air line <u>62'</u> Previous pumping? Yes _____ No _____ Duration _____ End _____	

Date	Clock time	Time since pump started	Time since pump stopped	1/l'	Water level measurement	Correction or Conversion	Water level	Water level change	PT	CWL	Discharge measurement	δc Rate
		t	t'					s or s'				
4/30/86		230.0			52'4"		52.33	11.95	14.54	40.41	7.41	
	1930	240.0			7"		52.58	12.2	14.58	40.32	7.32	
	2000	270			53'2.5"		53.21	12.83	14.7	41.16	8.16	
		360			55'5.5"		55.46	15.08	14.98	43.18	10.18	
5/1/86	0000	480			57'11"		57.92	12.54	15.28	45.39	12.39	
	0200	600			59'4.5"		59.38	19.00	15.5	46.67	13.67	
	0400	720			60'10"		60.83	20.45	15.69	47.96	14.96	
	0800	960			62'1.5"		62.13	21.75	15.97	49.03	16.03	

TABLE C-2

Page 1 of 2

AQUIFER TEST DATA

Owner Giant Address Bloomfield, NM County San Juan State NMDate 4/30/86 Company performing test Geoscience Measured by ThomasWell No. GBR-21 Distance from pumping well 12.3' Type of test Pump Test No. 1Measuring equipment Powers WL Indicator

Time Data

Pump on: Date 4/30 Time 1530 (h)
Pump off: Date 5/1 Time 800 (h)
Duration of aquifer test:
Pumping 16 hrs. Recovery _____

Water Level Data

Static water level 25' 7"
Measuring point Top of Casing
Elevation of measuring point _____

Discharge Data

How Q measured Bucket
Depth of pump/air line 62'
Previous pumping? Yes _____ No _____
Duration _____ End _____Comments on factors
affecting test data

Date	t	Time since pump started t	Time since pump stopped t'	t/t'	Water level measure- ment	Correc- tion or Conversion	Water level s or s'	Water level change s or s'	Discharge measure- ment	Rate	
4/30/86	0				25' 7"		25.58'				
	11.0				25' ?						
	12.0				25' .75"		25.06'				
	13.0				24' 9"		24.75'				
	14.0				8"		24.67'				
	15.0				7.75"		24.65'				
	18.0				8.33"		24.69'				
	20.0				7.5"		24.63'				
	22.0				7.75"		24.65'				
	23.0				7.75"		24.65'				
	26.0				8.75"		24.73'				
	30.0				9"		24.75'				
	32.0				9.25"		24.77'				
	40.0				9.25"		24.77'				
	42.0				9.5"		24.79'				
	44.0				9.25"		24.77'				
	48.0				5.5"		24.46'				
	50.0				5.75"		24.48'				
	58.0				6"		24.50'				
	65.0				6.5"		24.54'				
	70.0				6.5"		24.54'				
	75.0				5.5"		24.46'				
	80.0				1"		24.08'				
	85.0				1"		24.08'				
	90.0				24' .5"		24.04'				
	95.0				24'		24.00'				

TABLE C-2 (Cont.)

Page 2 of 2

AQUIFER TEST DATA

Owner Giant Address Bloomfield, NM County San Juan State NMDate 4/30/86 Company performing test Geoscience Measured by ThomasWell No. GBR-21 Distance from pumping well 12.3' Type of test Pump Test No. 1Measuring equipment Powers WL Indicator

Time Data

Pump on: Date 4/30 Time 1530 (h)Pump off: Date Time (h)

Duration of aquifer test:

Pumping 16 hrs. Recovery

Water Level Data

Static water level 25' 7"Measuring point Top of CasingElevation of measuring point

Discharge Data

How Q measured BucketDepth of pump/air line 62'Previous pumping? Yes No Duration End Comments on factors
affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
4/30/86		100.0			24'0"		24.00'				
		105.0			.25"		24.04'				
		110.0			23'11.25"		23.94'				
		115.0			24'2.75"		24.23'				Sampled Well
	1730	120.0			2.75"		24.23'				
		130.0			1.5"		24.13'				
		140.0			1"		24.08'				
		150.0			24'0"		24.00'				
		160.0			23'11.5"		23.96'				
		170.0			11"		23.92'				
	1830	180.0			10.75"		23.90'				
		190.0			10.25"		23.85'				
		200.0			10"		23.83'				
		210.0			9.5"		23.79'				
		220.0			8.75"		23.73'				
		230.0			8.75"		23.73'				
	1930	240.0			8.25"		23.69'				
	2000	270.0			8.25"		23.69'				
		360.0			6.75"		23.56'				
5/1/86	0000	480.0			6.25"		23.52'				
	0200	600.0			5"		23.42'				
	0400	770.0			9"		23.75'				
	0800	960.0			4.25"		23.35'				

TABLE C-3

Page 1 of 2

AQUIFER TEST DATA

Owner Giant Address Bloomfield County San Juan State NMDate 4/30/86 Company performing test Geoscience Measured by NicholasWell No. GBR-25 Distance from pumping well 50 ft. Type of test Pump Test No. 1Measuring equipment Powers W.L. Indicator

Time Data

Pump on: Date 4/30 Time 1530 (h)Pump off: Date 5/1 Time 0800 (h)

Duration of aquifer test:

Pumping 16 hrs. Recovery

Water Level Data

Static water level 29' 11"Measuring point Top of Casing

Elevation of measuring point

Discharge Data

How measured BucketDepth of pump/air line 62'Previous pumping? Yes NoDuration EndComments on factors
affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
4/30/86		0			29' 11"	29.91		0			
		38			30' 1"	30.08		0.17			
		42			30' 1.75"	30.15		0.24			
		54			30' 2.5"	30.21		0.30			
		65			30' 3"	30.25		0.34			
		70			30' 3.25"	30.27		0.36			
		75			30' 3.5"	30.29		0.38			
		80			30' 3.75"	30.31		0.40			
		85			30' 3.75"	30.31		0.40			
		90			30' 4"	30.33		0.42			
		95			30' 4"	30.33		0.42			
		100			30' 4"	30.33		0.42			
		105			30' 4.25"	30.35		0.44			
		115			30' 4.5"	30.38		0.57			
		130			30' 5"	30.42		0.51			
		140			30' 5.25"	30.44		0.53			
		150			30' 5.25"	30.44		0.53			
		160			30' 5.25"	30.44		0.53			
		170			30' 6"	30.50		0.59			
		180			30' 6"	30.50		0.59			
		190			30' 6"	30.50		0.59			
		200			30' 6"	30.50		0.59			
		210			30' 6.5"	30.54		0.63			
		220			30' 6.5"	30.54		0.63			
		230			30' 7"	30.58		0.67			
		240			30' 7"	30.58		0.67			
		270			30' 7.5"	30.63		0.72			
		360			30' 9"	30.75		0.84			

TABLE C-3 (Cont.)

Page 2 of 2

AQUIFER TEST DATA

Owner Giant Address Bloomfield County San Juan State NM

Date 4/30/86 Company performing test Geoscience Measured by Nicholas

Well No. GBR-25 Distance from pumping well 50 Type of test Pump Test No. 1

Measuring equipment Powers W.L. Indicator

Time Data Pump on: Date <u>4/30</u> Time <u>1530</u> (h) Pump off: Date <u>5/1</u> Time <u>0800</u> (h) Duration of aquifer test: Pumping <u>16 hrs.</u> Recovery _____	Water Level Data Static water level <u>29' 11"</u> Measuring point <u>Top of Casing</u> Elevation of measuring point _____	Discharge Data How Q measured <u>Bucket</u> Depth of pump/air line <u>62'</u> Previous pumping? Yes _____ No _____ Duration _____ End _____	Comments on factors affecting test data

[illegible]

TABLE C-4
AQUIFER TEST DATAPage 1 of 4Owner Giant Address Bloomfield County San Juan State NMDate 5/1/86 Company performing test Geoscience Measured by NicholasWell No. GBR-27 Distance from pumping well - Type of test Recovery Test No. 1Measuring equipment Soilinst WL Indicator

Time Data

Pump on: Date 4/30 Time 1530 (h)
Pump off: Date 5/1 Time 0800 (h)
Duration of aquifer test:
Pumping 16 hrs., Recovery 8 hrs

Water Level Data

Static water level 40' 4.5"
Measuring point Top of Casing
Elevation of measuring point _____

Discharge Data

How Q measured Bucket
Depth of pump/air line 62'
Previous pumping? Yes No
Duration _____ End _____Comments on factors
affecting test data

Date	Clock time	Time since pump started h	Time since pump stopped m	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
5/1/86	0800		.15		-						
			.30		60' 6.5"		60.54				
			.45		-		-				
			.60		4.75"		60.40				
			1.30		3.5"		60.29				
			2.0		2"		60.17				
			2.30		1"		60.08				
			3.0		59' 11.75"		59.98				
			3.30		10.5"		59.88				
			4.0		10"		59.83				
			4.30		9"		59.75				
			5.0		8"		59.67				
			5.30		7"		59.58				
			6.0		6"		59.50				
			6.30		5"		59.42				
			7.0		4.25"		59.35				
			7.30		3.25"		59.27				
			8.0		2.25"		59.19				
			8.30		1.5"		59.13				
			9.0		.5"		59.04				
			9.30		59' 0"		59.00				
			10.0		58' 11.25"		58.94				
			11.0		9.5"		58.77				
			12.0		8"		58.67				
			13.0		7"		58.58				
			14.0		5.25"		58.44				
			15.0		4"		58.33				

TABLE C-4 (Cont.)

Page 2 of 4

AQUIFER TEST DATA

Owner Giant Address Bloomfield County San Juan State NM
 Date 5/1/86 Company performing test Geoscience Measured by Nicholas
 Well No. GBR-27 Distance from pumping well - Type of test Recovery Test No. 1

Measuring equipment Soilinst WL Indicator

Time Data

Pump on: Date 4/30 Time 1530 (t₁)
 Pump off: Date 5/1 Time 0800 (t₂)
 Duration of aquifer test:
 Pumping 16 hrs. Recovery 8 hrs.

Water Level Data

Static water level 40' 4.5"
 Measuring point Top of Casing
 Elevation of measuring point _____

Discharge Data

How Q measured Bucket
 Depth of pump/air line 62'
 Previous pumping? Yes No
 Duration End

Comments on factors
 affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
5/1/86		16.0			58' 2.5"		58.21'				
		17.0			1"		58.08'				
		18.0			58' 0"		58.00'				
		19.0			57' 11.5"		57.94'				
		20.0			10"		57.83'				
		21.0			9"		57.75'				
		22.0			8.25"		57.69'				
		23.0			7.5"		57.63'				
		24.0			6.25"		57.52'				
		25.0			5.5"		57.46'				
		26.0			4.5"		57.38'				
		27.0			3.75"		57.31'				
		28.0			2.75"		57.23'				
		29.0			2"		57.17'				
	0830	30.0			1"		57.08'				
		31.0			.5"		57.04'				
		32.0			56' 11.5"		56.96'				
		33.0			10.5"		56.88'				
		34.0			9.75"		56.81'				
		35.0			9.25"		56.77'				
		36.0			8.25"		56.69'				
		37.0			7.5"		56.63'				
		38.0			6.5"		56.54'				
		39.0			6"		56.50'				
		40.0			5"		56.42'				
		41.0			4.25"		56.35'				

TABLE C-4 (Cont.)

Page 3 of 4

AQUIFER TEST DATA

Owner Giant Address Bloomfield County San Juan State NMDate 5/1/86 Company performing test Geoscience Measured by NicholasWell No. GBR-27 Distance from pumping well - Type of test Recovery Test No. 1Measuring equipment Soilinst WL Indicator

Time Data

Pump on: Date 4/30 Time 1530 (L)Pump off: Date 5/1 Time 0800 (L)

Duration of aquifer test:

Pumping 16 hrs. Recovery 8 hrs

Water Level Data

Static water level 40' 4.5"Measuring point Top of Casing

Elevation of measuring point

Discharge Data

How Q measured Bucket

Depth of pump/air line

Previous pumping? Yes No Duration End Comments on factors
affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
5/1/86			42.0		-		-				
			43.0		56' 3"		56.25'				
			44.0		2.25"		56.19'				
			45.0		1.5"		56.13'				
			46.0		.75"		56.06'				
			47.0		56' 0"		56.00'				
			48.0		55' 11.5"		55.96'				
			49.0		10.75"		55.90'				
			50.0		9.5"		55.79'				
			51.0		9"		55.75'				
			52.0		8.5"		55.71'				
			53.0		8"		55.67'				
			54.0		7.5"		55.63'				
			55.0		-		-				
			56.0		-		-				
			57.0		-		-				
			58.0		5"		55.42'				
			59.0		5"		55.42'				
	0900		60.0		4.5"		55.38'				
			65.0		2"		55.17'				
			70.0		54' 11.5"		54.96'				
			75.0		9.5"		54.79'				
			80.0		7"		54.58'				
			85.0		4.5"		54.38'				
			90.0		3.25"		54.27'				
			95.0		1.25"		54.10'				

TABLE C-4 (Cont.)
AQUIFER TEST DATA

Page 4 of 4

Owner Giant Address Bloomfield County San Juan State NM

Date 5/1/86 Company performing test Geoscience Measured by Nicholas

Well No. GBR-27 Distance from pumping well - Type of test Recovery Test No. 1

Measuring equipment

Time Data					Water Level Data					Discharge Data			Comments on factors affecting test data	
Pump on: Date	Time	Time	Time	Time	Static water level	Measuring point	Elevation of measuring point	How Q measured	Depth of pump/air line	Previous pumping? Yes	No	Duration		End
4/30	1530	(%)	5/1	0800	(%)	40' 4.5"	Top of Casing		Bucket	62'				
Pumping 16 hrs. Recovery 8 hrs.														
Date	Clock time	Time since pump started	Time since pump stopped	t/t'	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate				
5/1/86		100			53' 11"		53.92'							
		105			9.5"		53.79'							
		110			7"		53.58'							
		115			6.5"		53.54'							
	1000	120			3.5"		53.29'							
		130			52' 11.5"		52.96'							
		140			7"		52.58'							
		150			3.5"		52.29'							
		160			51' 10.5"		51.88'							
		170			6.5"		51.54'							
	1100	180			2.5"		51.21'							
		210			50' 2.5"		50.21'							
	1200	240			49' 3"		49.25'							
		270			46' 4.5"		46.38'							
	1300	300			44' 1"		44.08'							
	1400	360			43'		43.00'							
	1500	420			42' 1"		42.08'							
	1600	480			41' 1"		41.08'							

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TABLE C-5
AQUIFER TEST DATAPage 1 of 2Owner Giant Address Bloomfield County San Juan State NMDate 5/1/86 Company performing test Geoscience Measured by NicholasWell No. GBR-21 Distance from pumping well 12.3 Type of test Recovery Test No. 1Measuring equipment Powers WL Indicator

Time Data

Pump on: Date 4/30 Time 1530 (h)
Pump off: Date 5/1 Time 0800 (h)
Duration of aquifer test:
Pumping 16 hrs. Recovery 8 hrs

Water Level Data

Static water level 25' 7"
Measuring point Top of Casing
Elevation of measuring point _____

Discharge Data

How () measured Bucket
Depth of pump/air line 62'
Previous pumping? Yes ☐ No ☐
Duration _____ End _____Comments on factors
affecting test data

Date	Clock time	Time since pump started h	Time since pump stopped m	h'	Water level measurement	Correction or Conversion	Water level	Water level change in or s'	Discharge measurement	Rate	
5/1/86	0800	.15			23' 4.25"		23.35'				
		.30			4.25"		23.35'				
		.45			4.25"		23.35'				
		.60			4.25"		23.35'				
		1.30			4.25"		23.35'				
		2.0			4.25"		23.35'				
		2.30			4.25"		23.35'				
		3.0			4.5"		23.38'				
		3.30			4.25"		23.35'				
		4.30			4.25"		23.35'				
		6.0			4.25"		23.35'				
		7.0			3.25"		23.27'				
		8.0			3.25"		23.27'				
		9.0			3.25"		23.27'				
		10.0			3.25"		23.27'				
		13.0			3.25"		23.27'				
		15.0			3.25"		23.27'				
		17.0			3.25"		23.27'				
		22.0			3.25"		23.27'				
		29.0			3.25"		23.27'				
		57.0			4.5"		23.38'				
		70.0			3.125"		23.26'				
		80.0			2.5"		23.21'				
		85.0			3"		23.25'				
	1000	120.0			2.75"		23.23'				
		150.0			2.75"		23.23'				

TABLE C-5 (Cont.)
AQUIFER TEST DATA

Page 2 of 2

Owner Giant Address Bloomfield County San Juan State NM

Date 5/1/86 Company performing test Geoscience Measured by Nicholas

Well No. GBR-21 Distance from pumping well 12.3 Type of test Recovery Test No. 1

Measuring equipment Powers WL Indicator

Time Data Pump on: Date <u>4/30</u> Time <u>1530</u> (h) Pump off: Date <u>5/1</u> Time <u>0800</u> (h) Duration of aquifer test: Pumping <u>16 hrs.</u> Recovery <u>8 hrs.</u>	Water Level Data Static water level <u>25' 7"</u> Measuring point <u>Top of Casing</u> Elevation of measuring point _____	Discharge Data How Q measured <u>Bucket</u> Depth of pump/air line <u>62'</u> Previous pumping? Yes _____ No _____ Duration _____ End _____	Comments on factors affecting test data

[illegible]

PUMP TEST
DIESEL SPILL AREA
GBR-14

Note: Because of the large number of figures and tables in this section, they are grouped together at the end of the text.

PUMP TEST - DIESEL SPILL AREA - GBR-14

ANALYSIS OF DRAWDOWN DATA AT GBR-14

When drawdown observations obtained at pump well GBR-14 were plotted on double-log paper, as many as 3 distinct inflection points were identified for each pump test. These distinct changes in slope were even more clearly indicated on semi-log plots of the data because changes in drawdown were more evident when plotted on an arithmetic scale rather than a log scale (see Figures 10, 13 and 16).

Initially, it was believed that the abrupt changes in slope on the semi-log plots and the corresponding deviations from the Theis curve on double-log plots resulted solely from interception of the expanding cone of depression at GBR-14, which was completed in the arroyo alluvium, with lower-conductivity sandstone occurring along the edges of the arroyo or low-conductivity clay lenses in the arroyo. However, the maximum semi-log slope change which would occur when a completely impermeable boundary was encountered would be 2. Slopes on the semilog plots changed by a factor of 4 and 3 for pump tests #1 and #3, respectively. Given that the adjacent sandstone or interlayered clay lenses are not completely impermeable relative to the alluvial fill, even slope changes of 2 would not be expected solely on the basis of boundary effects. The excessive slope changes were probably due to superposition of lower-conductivity sandstone or clay boundary effects and partial-penetration effects that become progressively more evident as pumping dewatered the alluvial aquifer. *change occurs at $t = 33$ min. I don't see these effects at such early times*

Unfortunately, analysis of pump test results on the basis of these non-ideal influences could not be performed using drawdown data observed at the pump well; the relevant equations become indeterminate at small radial distances from the pump well. Rather, drawdown data observed at observation well GBR-15, which was completed in the arroyo alluvium, was relied on to perform quantitative analysis relating to boundary and partial-penetration influences.

Since deviations from ideal behavior at the pump well were not evident

during early pumping times, presumably prior to the interception of sandstone or clay boundaries or the occurrence of significant dewatering, drawdown observed at GBR-14 during early stages of pumping was useful in defining the transmissivity which would occur at a fully-penetrating well in an infinite aquifer. Prior to analysis of the data, a correction was applied to all drawdown observations obtained in the unconfined alluvial aquifer to account for the effects of decreasing saturated thickness and consequent decreases in transmissivity during dewatering of the aquifer. Correction for unconfined conditions was performed according to the Jacob relation (Kruseman and DeRidder, 1970):

$$S' = S - \frac{S^2}{2D}$$

Where S' = drawdown which would occur in an equivalent confined aquifer under conditions of constant transmissivity [L]

S = observed drawdown in the unconfined alluvial aquifer under conditions of decreasing transmissivity [L]

D = the estimated average aquifer saturated thickness at the well at which drawdown is observed [L]

The correction did not substantially alter the plots when aquifer thicknesses of 70 and 100 feet were assumed, even during pump test #3 when large water level declines were observed in response to pumpage of 5 gpm (see Figure 14).

Transmissivities obtained on the basis of early drawdown data at pump well GBR-14 are shown calculated in Figures 10, 11, 13, 14, 16 and 17 and are summarized below:

ESTIMATED TRANSMISSIVITY OF THE ALLUVIAL AQUIFER NEAR GBR-14

	T (gpd/ft.)	
Pump Test	Theis Analysis	Jacob Analysis
1 (Q = 1 gpm)	902.4	754.3 } uses 1 st 10 min of data
3 (Q = 5 gpm)	855.2	1100.0 } uses 1 st 6 min of data
5 (Q = 2 gpm)	619.5	660.0 } →
average	792.4	838.1

Since the transmissivities obtained using Theis analysis varied over a smaller range than those calculated according to Jacob analysis, it was estimated that the transmissivity of the alluvial aquifer was roughly 790 gpd/ft. This average transmissivity was twice as large as the maximum transmissivity of 387 gpd/ft calculated for the adjacent sandstone aquifer using data from a pump test performed at GBR-27 in the same area.

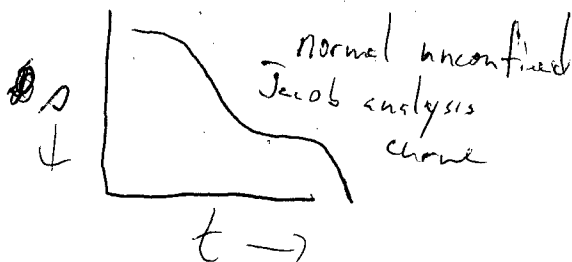
If it is assumed that the sandstone aquifer may be more than 10 times as thick as the alluvial aquifer, the hydraulic conductivity of the alluvial system could be as much as 20 times larger than the conductivity of the consolidated sandstone aquifer. Even this large a difference in conductivity would not be sufficient to cause semi-log slope changes of 2 or greater, further suggesting that abrupt changes in drawdown must be due to some combination of boundary and partial-penetration effects.

obviously conductivity of sand, much greater than sandstone

Although late-time data at GBR-14 could not be used to quantitatively characterize boundaries and partial-penetration effects due to limitations of the methods of analysis for data observed at the pump well, observation of the drawdown data clearly indicates the presence of at least two boundaries within the radius of influence at GBR-14. These boundaries become evident at various times during pumping, depending on the rate of withdrawal. The expanding cone of depression at GBR-14 apparently encounters a clay lens or the boundary at the edge of the arroyo closest to GBR-14, then reaches another clay lens or the sandstone at the side of the arroyo farthest from GBR-14.

cone of depression expands across arroyo in 6 to 7 min (max of 35 min)

The table below summarizes the time after pumping at which major deviations from the Theis type curve occurred during each pump test. With the exception of the first deviation noted for pump test #1, which occurred at a time of approximately 1 minute, the data indicate the presence of two sandstone boundaries. The first boundary was encountered most quickly when the aquifer was pumped at a rate of 5 gpm, at t approximately equal to 7 minutes.



breaks could be due to unconfined conditions such as density of aquifer

TIME AFTER PUMPING AT WHICH DEVIATION FROM THEIS CURVE OCCURRED (MIN)

TEST	DISCHARGE (GPM)	DELAYED YIELD	FIRST BOUNDARY	SECOND BOUNDARY
PT #1	1	1-3	12	34
PT #3	5		7	20
PT #5	2		10	40

This same boundary was subsequently encountered at times of approximately 10 minutes and 12 minutes for discharges of 2 and 1 gpm. The second boundary, which was clearly located at a greater distance from the pump well, was encountered at times of 20, 40, and 34 minutes for pumpages of 5, 2, and 1 gpm, respectively. The more rapid response to the smaller discharge rate of 1 gpm compared to the response to discharge of 2 gpm may be attributed to measurement error.

The possibility that delayed yield effects could have contributed to the initial deviation of drawdown between 1 and 3 minutes for $Q = 1$ gpm was somewhat discounted by the fact that "flattening" of the drawdown vs. time plot did not occur at larger discharges, when delayed yield effects in the unconfined aquifer would have become more dominant. It is much more likely that the small observed changes in drawdown for pump test #1 at early time were related to measurement error and not to any physically-based phenomenon.

Therefore no deviation of the aquifer?

what, flattening at early times?

As previously mentioned, it was not possible to evaluate the data observed at the GBR-14 pump well for boundary locations because of the mathematical limitations of the analytical methods. The first boundary appears to correspond to the western edge of the arroyo closest to GBR-14 and the second boundary corresponds to the eastern edge of the arroyo located further from the pump well. The fact that the time to respond to the second boundary is more than three times the time to respond to the first boundary suggests, according to the "law of times", that the second boundary is at least 1.7 times farther from GBR-14 than the first boundary (Todd, 1972).

how?

No attempt was made to incorporate the effects of partial-penetration into the analysis because there are no methods available to account for its effect on drawdown data observed at the pump well. Pump test data observed at GBR-14 are listed in Tables C6, C8 and C10.

ANALYSIS OF RECOVERY DATA AT GBR-14

Recovery data observed at GBR-14 consistently plotted as S-shaped or convex-downward curves on semi-log paper, typical of recovery under partially-penetrating conditions when a low-conductivity barrier is present upgradient of the recovery site (see Figures 12, 15 and 18).

also typical of unconfined conditions

During early recovery times (large t/t'), recovery is very slow because replenishment of the aquifer is occurring only from those directions where lateral flow is not inhibited by the presence of boundaries. The extent of distortion of the recovery rate depends on the location of the boundary relative to the natural hydraulic gradient. Moreover, upward vertical flow near the partially-penetrating recovery well produces smaller drawdown than would otherwise be observed under conditions of

flow won't be much vertical flow during recovery

full penetration. As the well becomes replenished at intermediate values of t/t' , vertical flow components diminish and drawdown approaches that which would occur in a fully-penetrating well in a finite aquifer. At

later recovery stages, the rate of replenishment is no longer distorted by vertical flow components, but is still dominated by the occurrence of inhibited flow from upgradient barriers. Lack of replenishment from the

possibly some late times

vicinity of sandstone boundaries along the edges of the arroyo is considered to be the cause of low transmissivities estimated from late-recovery (small t/t') straight-line fits to the recovery data from pump tests 2, 4, and 6. Transmissivities of 95.0, 17.1, and 34.7 gpd/ft estimated on the basis of late recovery data from these tests were not considered to be representative of the alluvial aquifer due to persistent boundary influences. Longer-duration recovery observations would presumably have yielded smaller slopes on the semi-log plots and large corresponding transmissivities. Recovery data observed at GBR-14 are listed in Tables C7, C9 and C11.

ANALYSIS OF DRAWDOWN DATA AT GBR-15

Five drawdown values were obtained at observation well GBR-15 during pump

test #5 when GBR-14 was pumped at a rate of 2 gpm. A double-log plot of the data exhibited an overall shape characteristic of drawdown in an aquifer stressed by a partially-penetrating well (see Figure 19). Using parameters related to the geometry of pump and observation well screened intervals, the Hantush modification of the Theis method was used to analyze the drawdown data observed at GBR-15.

Parameters used in defining the modified type curve are shown in Figure 21. Although values of b , b_0 , d , and z varied during the course of the test as water levels declined, the modified type curve remained essentially unchanged regardless of whether initial or final parameters were used.

Transmissivity estimated using the modified type curve was equal to 128.2 gpd/ft, which storativity was estimated as 0.0045. These small values of T and S relative to those observed at GBR-14 are presumably related to the greater predominance of clayey and silty sands and lower percentages of gravel in the vicinity of GBR-15 relative to those near GBR-14.

*Similar
to values
calculated
from recovery
data*

Upward deflection of drawdown data from the modified type curve at $t=100$ minutes (see Figure 19) was probably the result of the interception of a clay lens or sandstone at the edge of the arroyo by the expanding cone of depression at GBR-14. Judging from the rapid increase in drawdown at GBR-15 and the time associated with this increase, this boundary most likely corresponds to the second boundary encountered by the pump well. The distance to this boundary was estimated using the Stallman method to account for a discharging image well situated on the far side of the boundary. The image well was calculated to be located roughly 40 feet from GBR-15. These results agreed with the image-well location obtained using a semi-log plot of the data shown in Figure 20 and the "law of times", which was estimated to be 60 feet from GBR-15. Assuming that the edge of the sandstone was to the east of GBR-15, the boundary was estimated to be located up to 10 feet away from GBR-15. Geologic cross-sections appear, in fact, to indicate a rapid gradation of alluvium into sandstone to the east of this well. More accurate specification of the

edge of the alluvium would have been possible on the basis of data from an additional observation well.

Saturated aquifer thickness obtained using the Hantush modification of the Theis curve (Kruseman and DeRidder, 1970) was roughly 75 feet in the vicinity of the pump test site (see Figure 19). Assuming an average depth to water of 33 feet in this area, the alluvium was determined to be approximately 108 feet deep. }

CONCLUSIONS

Average transmissivity of the unconfined alluvial aquifer in the vicinity of GBR-14 was estimated to be 790 gpd/ft. Assuming an average saturated thickness of 75 feet, this translates into a hydraulic conductivity of 10.5 gpd/ft². This is within the range of conductivity representative of silty sand (Freeze and Cherry, 1978). *but logs show sand & gravel*

Although transmissivity of the alluvial aquifer was only twice as large as the maximum sandstone transmissivity of the 387 gpd/ft in the diesel spill area, the hydraulic conductivity of the alluvium could be an order of magnitude larger when differences in saturated thicknesses are considered. Thus, the sandstone acts as a low-conductivity barrier when encountered by lateral stresses induced by pumpage of the adjacent alluvium.

Transmissivity of the alluvium near GBR-15 was estimated to be 128 gpd/ft, which was equal to a hydraulic conductivity of 1.7 gpd/ft². This value of conductivity is within the lower part of the range normally associated with silty sand (Freeze and Cherry, 1978). Storativity near GBR-15 was estimated as 0.0045, a value indicative of partially-confined conditions which may be encountered in the presence of areally-extensive clay lenses.

Sandstone boundaries on both the eastern and western edges of the arroyo were evident from the drawdown data.

The saturated thickness of the alluvial aquifer near GBR-14 was estimated

to be roughly 75 feet, with the total thickness of the alluvium amounting to roughly 108 feet. } 1

ANALYSIS OF DRAWDOWN DATA AT GBR-26, GBR-30, AND THE STEEL WELL No measurable drawdown response was observed in wells GBR-26, GBR-30, and the steel well during pumping at GBR-14. These wells were screened within clayey sand or sandy clay located at the base of the alluvium in which GBR-14 was screened. Since there appears to be hydraulic communication between the alluvium and the underlying clayey sand and sandy clay layers, as indicated by the response in well GBR-15 which was also screened in these layers, it is likely that silt has migrated through the gravel pack and lodged in the screen of the unresponsive wells. Alternatively, there could be a higher incidence of clay or shale between GBR-14 and the unresponsive observation wells than between GBR-14 and GBR-15, but given the closeness of the responsive and unresponsive observation wells this does not appear likely.

RECOMMENDATIONS

Fully-penetrating wells, particularly those intended as pump wells for pump-test analysis, should be constructed whenever economically feasible. Methods do exist for analyzing pump-test data in the presence of a partially-penetrating pump well, but they are not as reliable as the more conventional Theis and Jacob methods of analysis.

As many observation wells as possible should be monitored during pump testing, for as long a duration as possible. Data recorded at the wells can be used to analyze for non-ideal influences relating to boundaries and partial penetration, while data observed at pump wells is usually worthless for characterizing non-ideal behavior because the effective well radius is unknown, well losses distort drawdown data, and many equations become indeterminate when applied to observations from the pump well.

Longer-duration recovery should be allowed in order to minimize problems associated with boundaries and partial-penetration effects.

Yes

FIGURES AND TABLES FOR
GBR-14 PUMP TEST

Summary of Pump Tests:

Pump Test 1 - GBR-14 pumped at 1 gpm
Pump Test 2 - Recovery from pump test 1
Pump Test 3 - GBR-14 pumped at 5 gpm
Pump Test 4 - Recovery from pump test 3
Pump Test 5 - GBR-14 pumped at 2 gpm
Pump Test 6 - Recovery from pump test 5

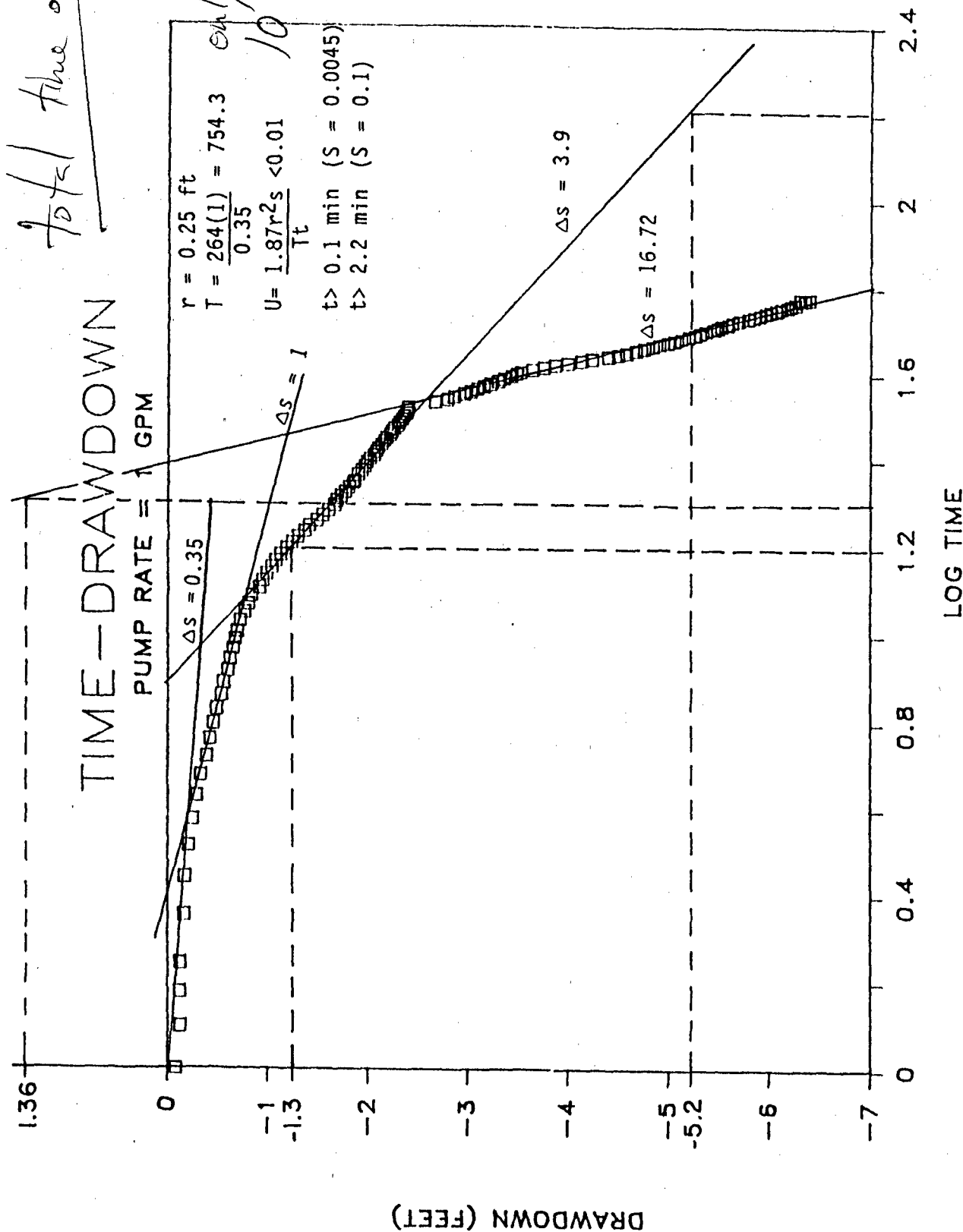
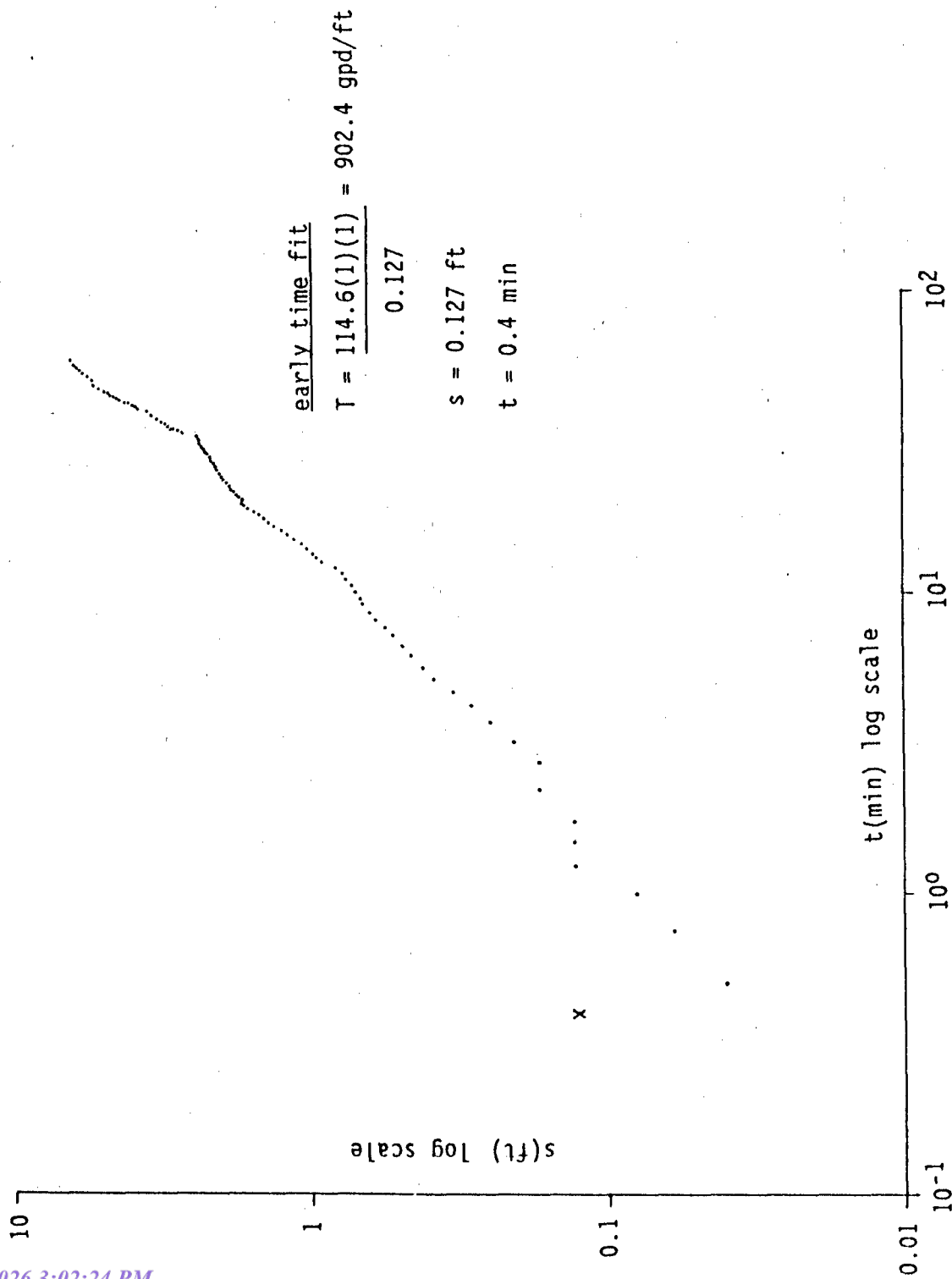


FIGURE 10

SEMILOG PLOT OF DRAWDOWN VS.

TIME FOR PUMP TEST 1 AT GBR - 14

FIGURE 11
DOUBLE LOG PLOT OF DRAWDOWN VS.
TIME FOR PUMP TEST 1 AT GBR - 14



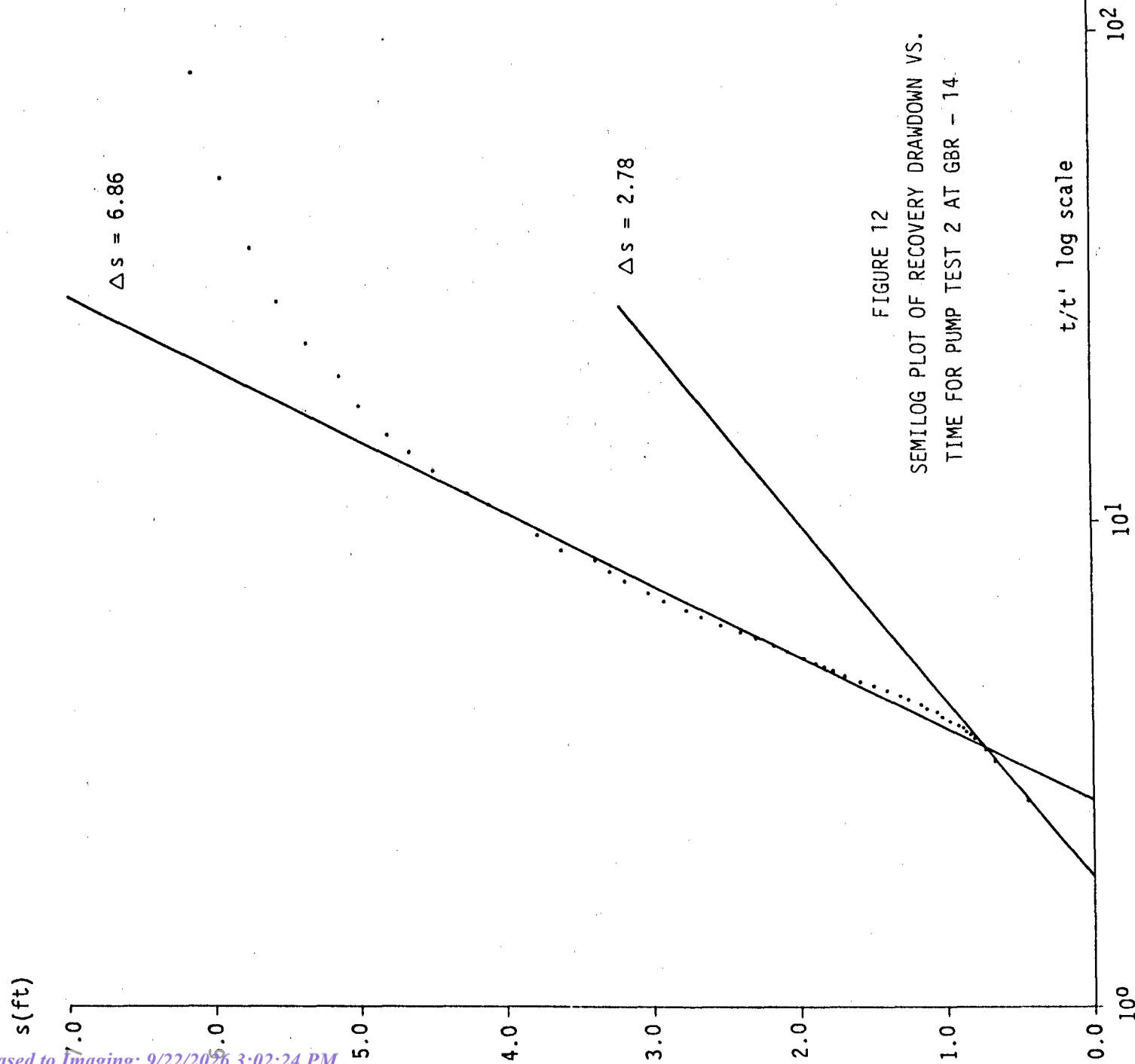


FIGURE 12
SEMILOG PLOT OF RECOVERY DRAWDOWN VS.
TIME FOR PUMP TEST 2 AT GBR - 14

$$T = \frac{264Q}{\Delta s} = \frac{264(1)}{2.78} = 95.0 \text{ gpd/ft}$$

012

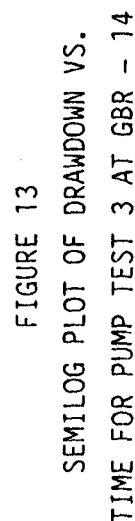
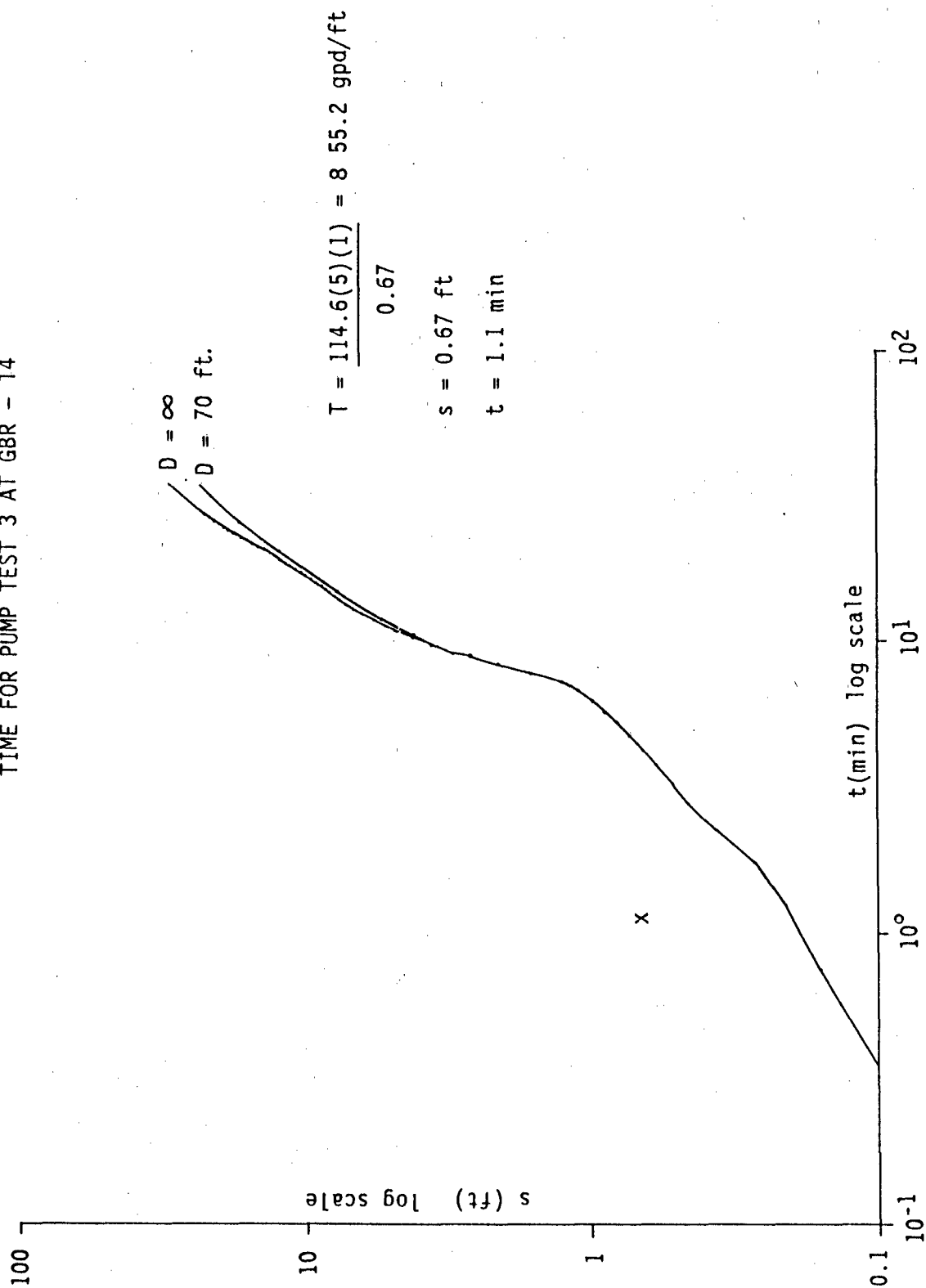
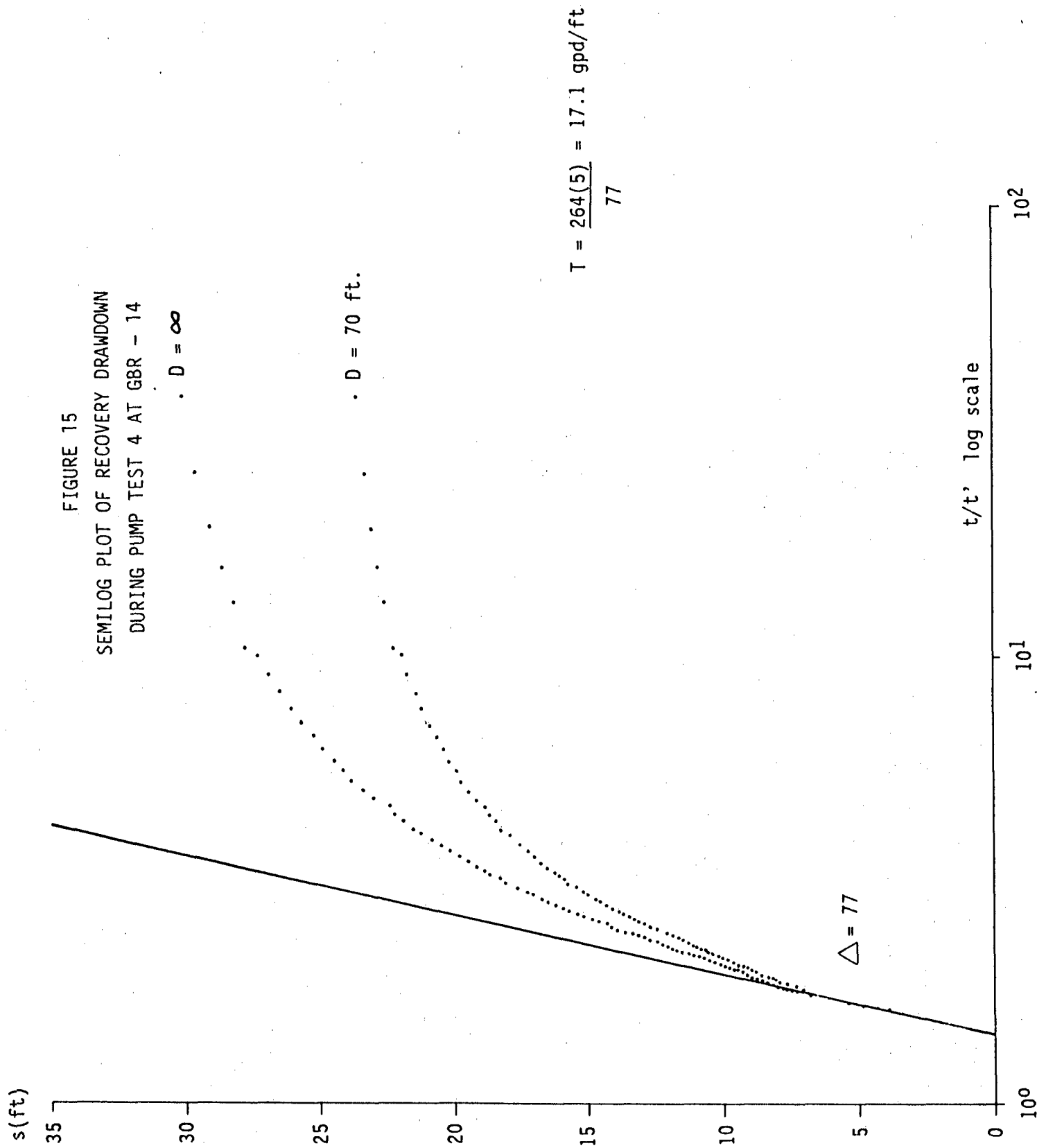


FIGURE 14
DOUBLE LOG PLOT OF DRAWDOWN VS.
TIME FOR PUMP TEST 3 AT GBR - 14





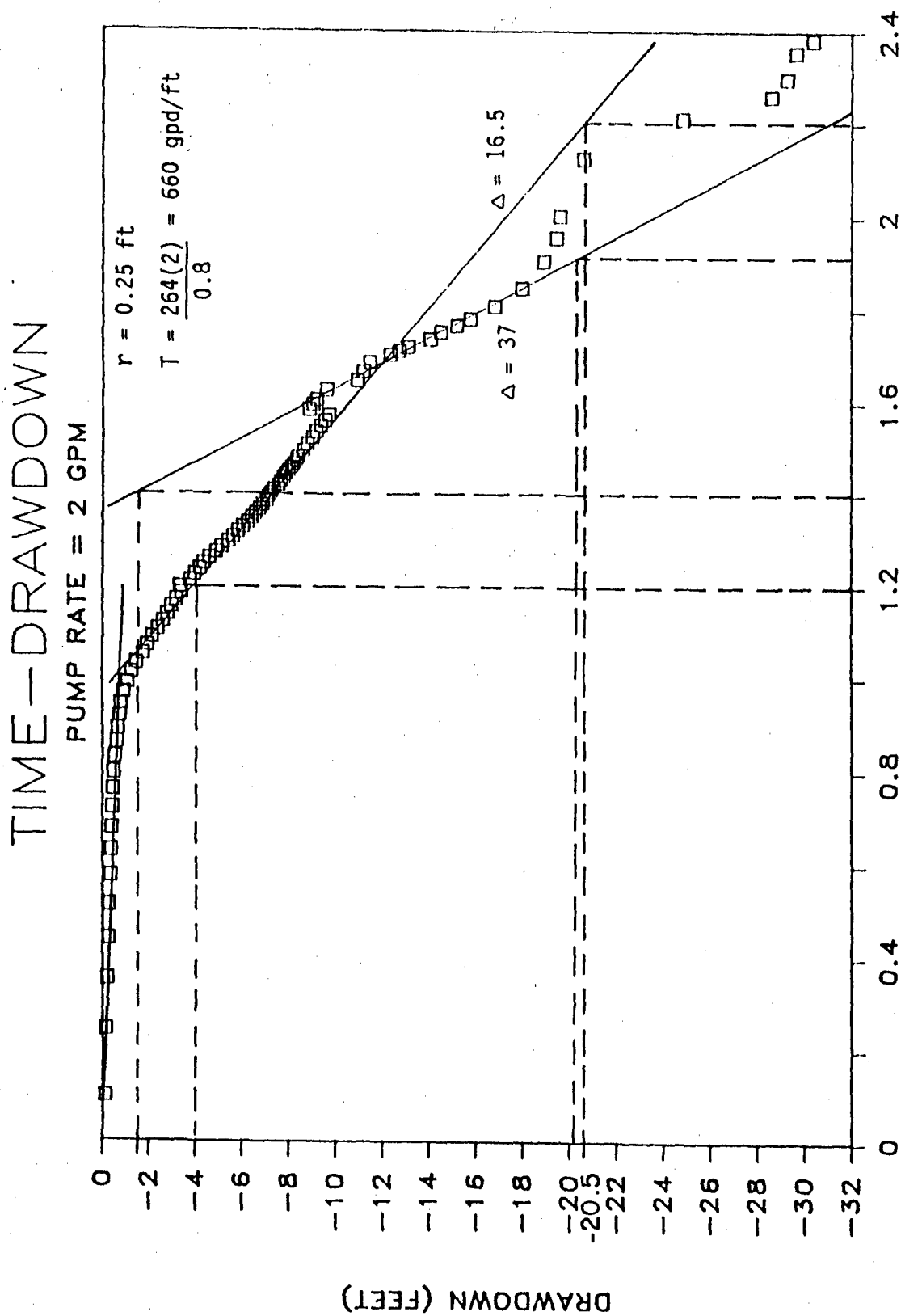
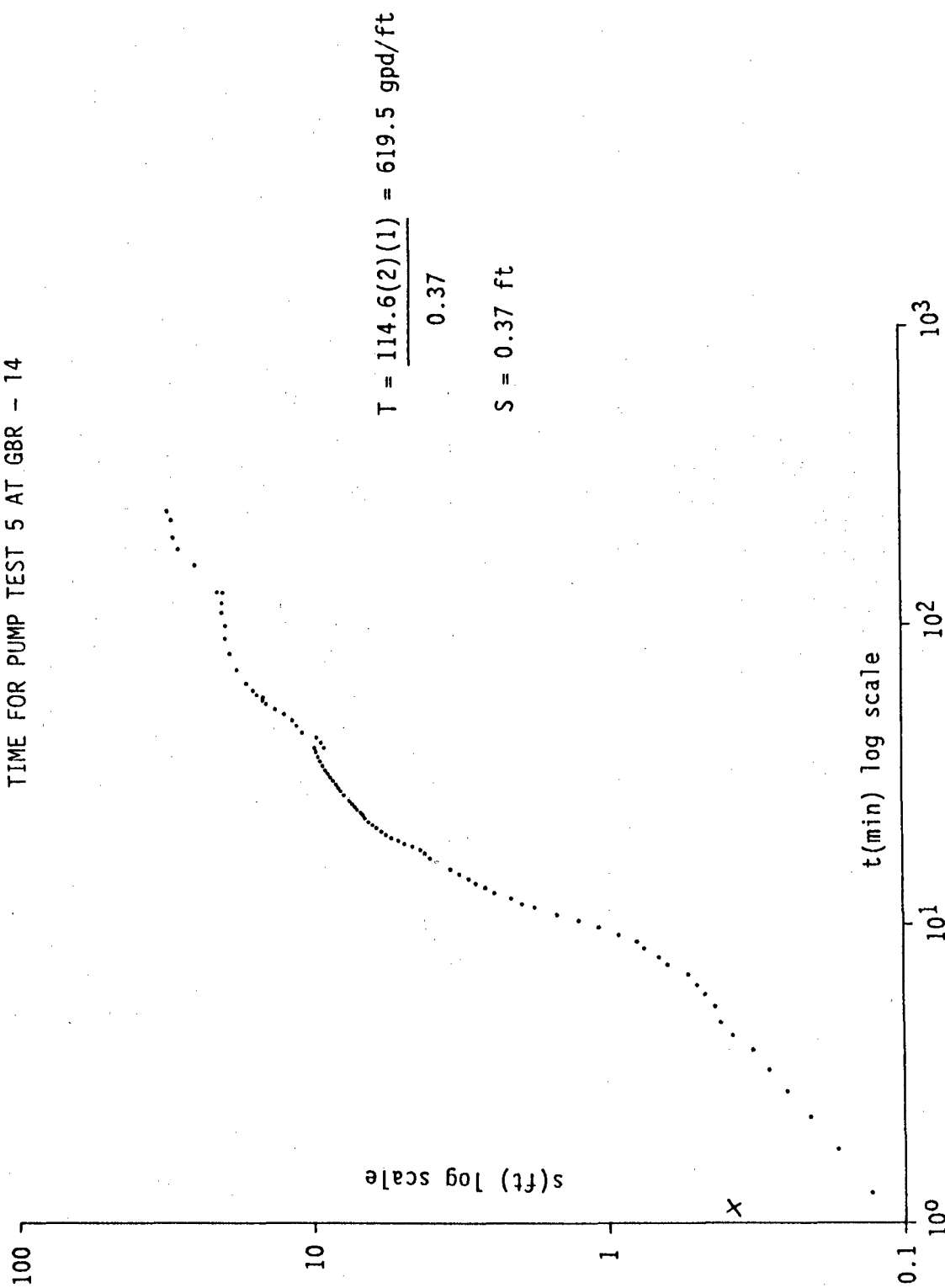


FIGURE 16

SEMILOG PLOT OF DRAWDOWN VS.
TIME FOR PUMP TEST 5 AT GBR - 14

FIGURE 17

DOUBLE LOG PLOT OF DRAWDOWN VS.
TIME FOR PUMP TEST 5 AT GBR - 14



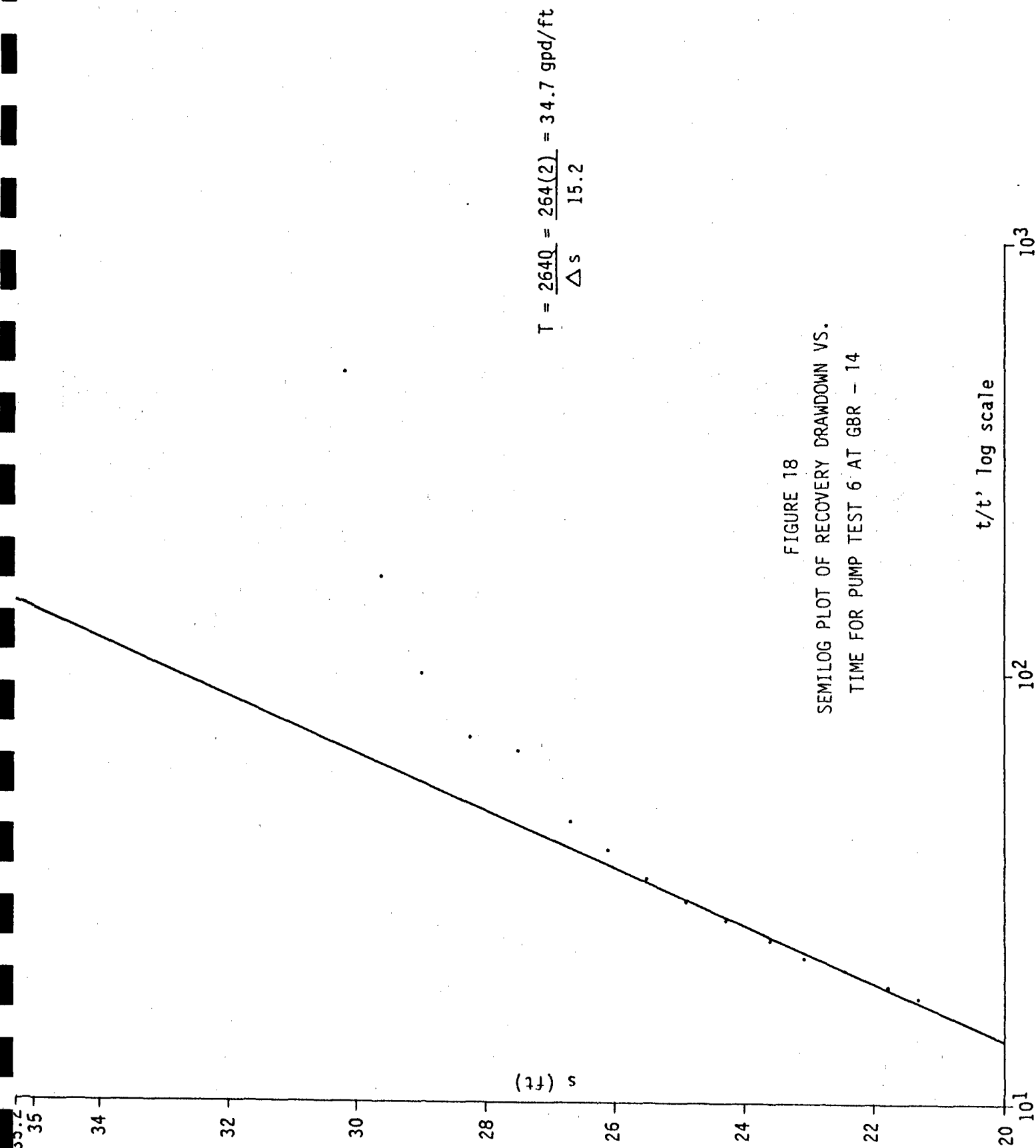


FIGURE 19

DOUBLE LOG PLOT OF DRAWDOWN VS.

TIME FOR PUMP TEST 5 AT GBR - 15

$$r = 40 \text{ ft} \quad Q = 2 \frac{\text{gal}}{\text{min}} \left(\frac{\text{ft}^3}{7.48 \text{ gal}} \right) = 0.2673 \text{ ft}^3/\text{min}$$

$$E(u) = 1$$

$$U = 1$$

$$s = 2.4 \text{ ft}$$

$$t = 150 \text{ min}$$

$$1/U \text{ dep} = 1.4$$

$$S = \frac{Q}{8\pi K(6-d)} E(u)$$

$$2.4 = \frac{0.2673}{8\pi K(28-0)} \quad (1)$$

$$\text{For MP } u = u(u) = 1$$

$$L = 2 \text{ min}$$

$$A = 3.6 \text{ ft}$$

$$T = \frac{114.6(A)}{3.6} = 63.67$$

$$K = 1.58 \times 10^{-4} \text{ ft/min} \times 7.48 \frac{\text{gal}}{\text{ft}^3} \times \frac{144 \text{ min}}{\text{day}} = 1.7 \text{ gal/day}$$

$$D = 0.5 \left[b + 2 + r \sqrt{\frac{5}{10 \text{ dep}}} \right] = 0.5 \left[28 + 16.75 + 40 \sqrt{5(1.4)} \right]$$

$$= 75.3 \text{ ft}$$

$$T = KD = 1.58 \times 10^{-4} (75.3) = 1.19 \times 10^{-2} \text{ ft}^2/\text{min},$$

$$= 1.19 \times 10^{-2} \frac{\text{ft}^2}{\text{min}} \left(\frac{1440 \text{ min}}{1 \text{ day}} \right) \left(\frac{7.48 \text{ gal}}{\text{ft}^3} \right),$$

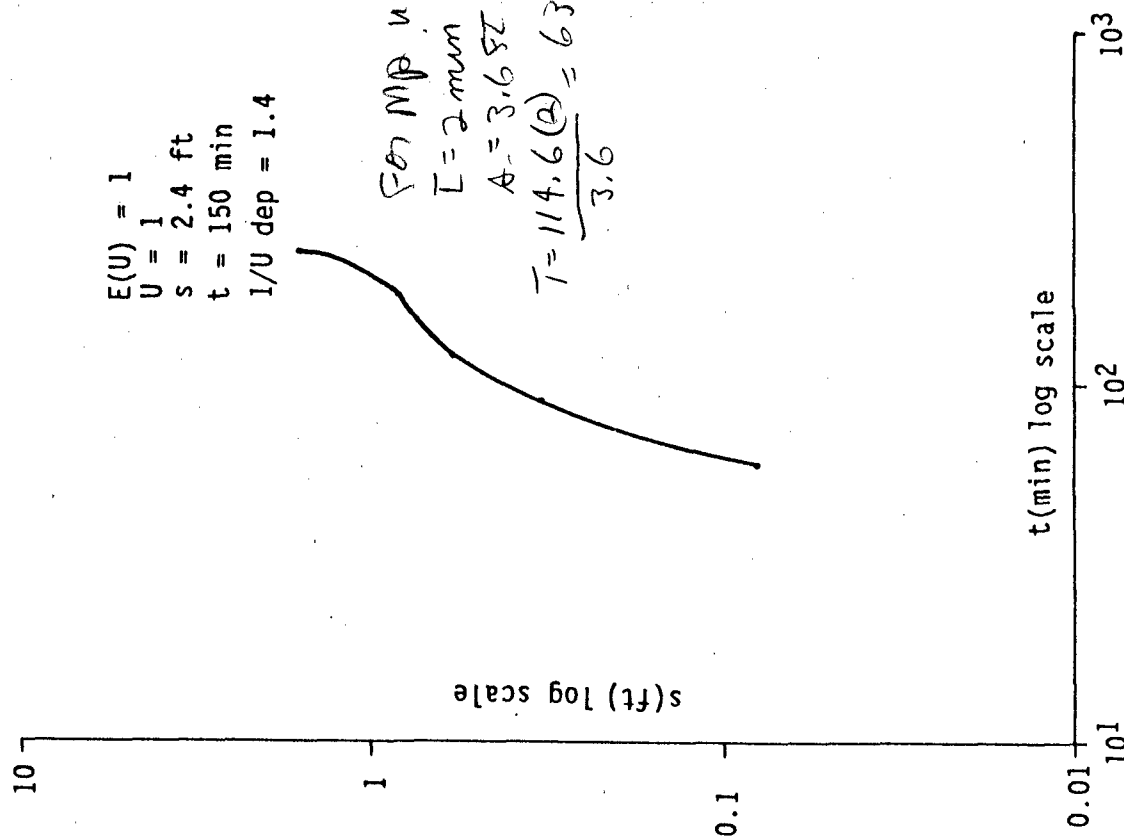
$$= 128.2 \text{ gpd/ft}$$

$$u = \frac{r^2 s}{4Tt}$$

$$1 = (40)^2 S$$

$$4 (1.19 \times 10^{-2}) (150)$$

$$S = 0.0045$$



SEMILOG PLOT OF DRAWDOWN VS.
TIME FOR PUMP TEST 5 AT GBR - 15

$$T = \frac{264(2)}{1.58} = 334.2 \text{ gpd/ft.}$$

$$S = 0.3 \frac{(334.2)}{(40)^2} (0.03736) = 0.0023$$

$$U = 1.87 \quad (40)^2(0.0023) < 0.01$$

334.2t

t>2.06 days

t>2966 min

not valid

$$S_a = 0.5 \text{ ft}$$

$$t_r = 110 \text{ min}$$

$$t_j = 235 \text{ min}$$

$$\frac{r_i}{r_r} = \sqrt{\frac{235}{110}} = 1.46$$

$$r_j = 1.46(40) = 58.5 \text{ ft}$$

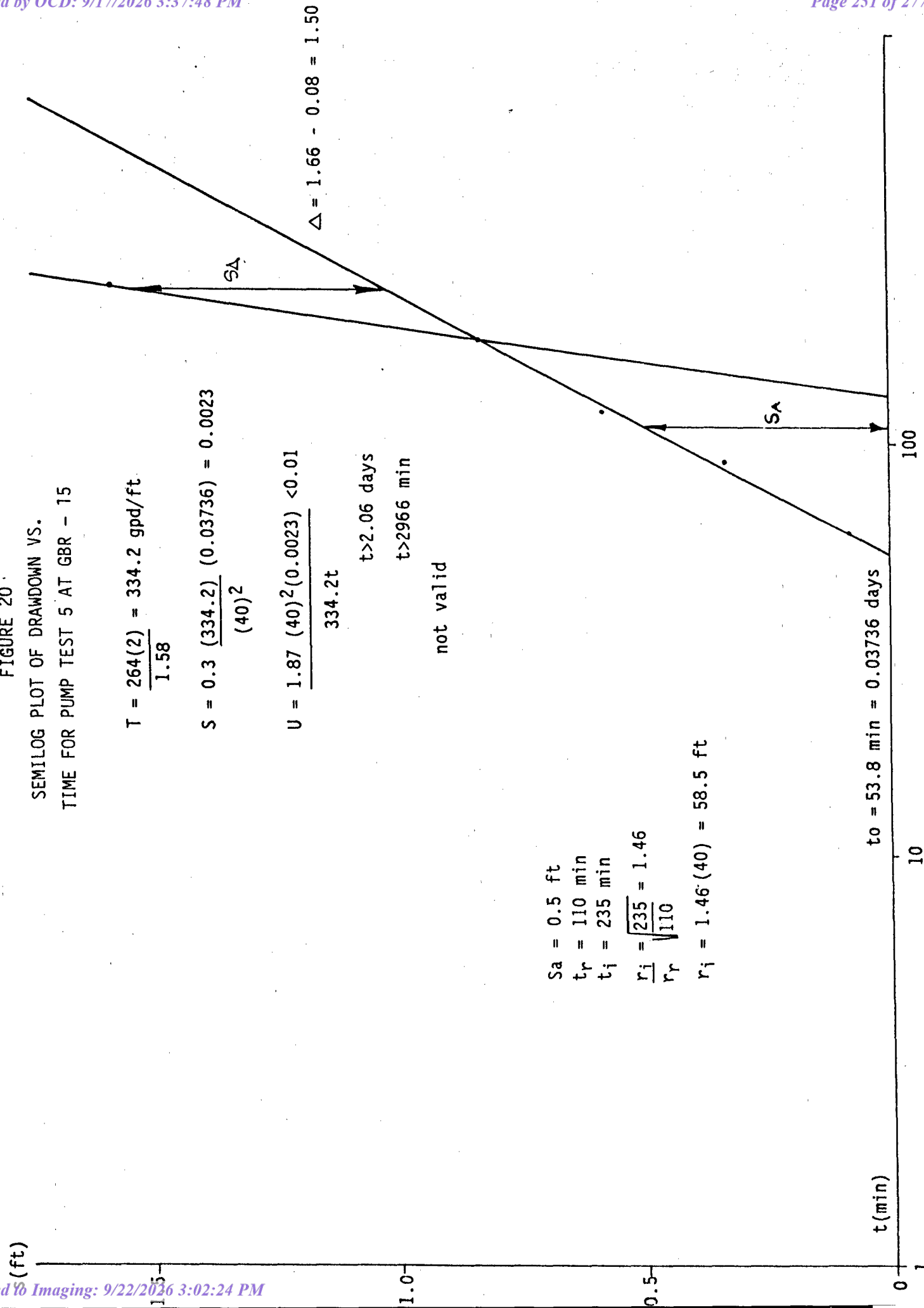


FIGURE 21
COMPLETION DIAGRAM
FOR GBR - 14 AND GBR - 15

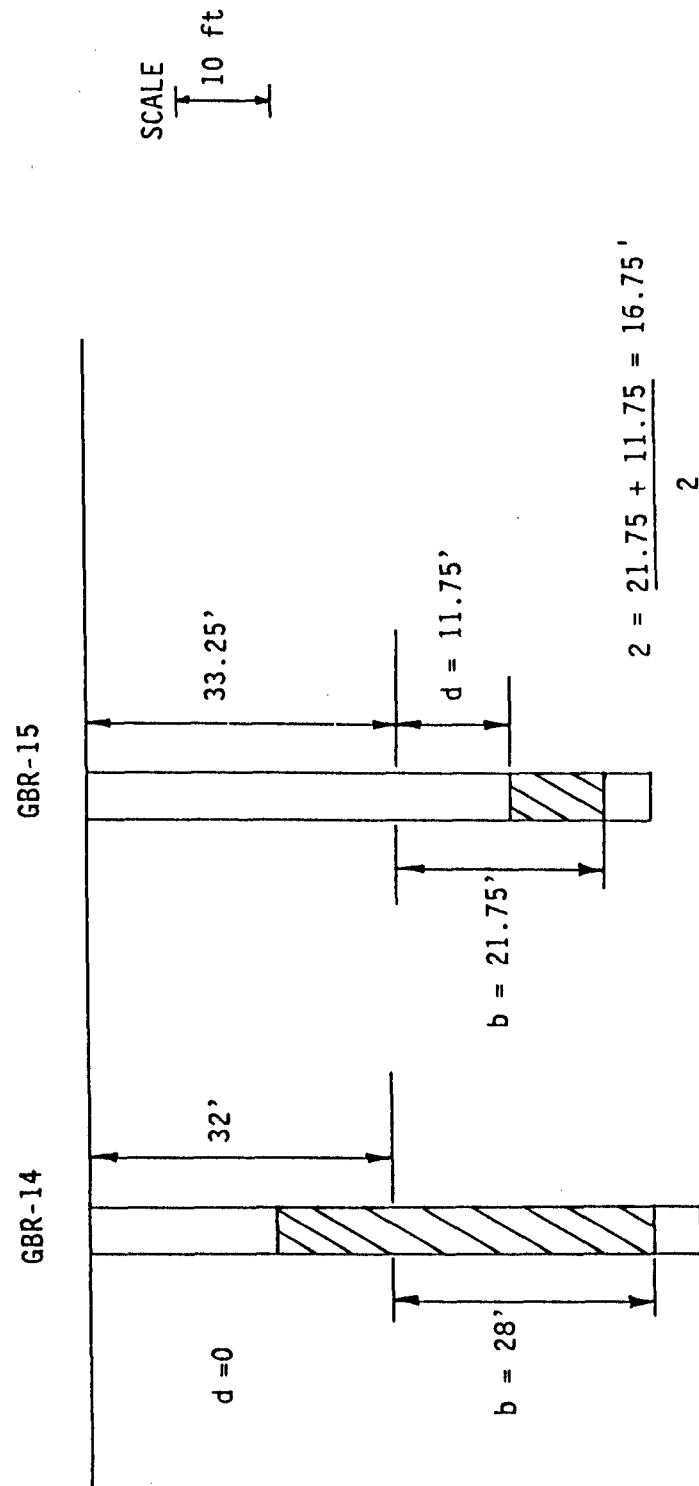


TABLE C6
DRAWDOWN MEASUREMENTS
GBR-14
Q = 1 gpm

PUMPTEST 1

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
0.00	32.00	1.00	32.08	0.00	0.00	ERR
0.25	32.00	1.00	32.08	0.00	0.25	-0.60
0.50	32.00	1.50	32.13	-0.04	0.50	-0.30
0.75	32.00	1.75	32.15	-0.06	0.75	-0.12
1.00	32.00	2.00	32.17	-0.08	1.00	0.00
1.25	32.00	2.50	32.21	-0.13	1.25	0.10
1.50	32.00	2.50	32.21	-0.13	1.50	0.18
1.75	32.00	2.50	32.21	-0.13	1.75	0.24
2.25	32.00	3.00	32.25	-0.17	2.25	0.35
2.75	32.00	3.10	32.26	-0.17	2.75	0.44
3.25	32.00	3.50	32.29	-0.21	3.25	0.51
3.75	32.00	4.00	32.33	-0.25	3.75	0.57
4.25	32.00	4.50	32.38	-0.29	4.25	0.63
4.75	32.00	5.00	32.42	-0.33	4.75	0.68
5.25	32.00	5.70	32.48	-0.39	5.25	0.72
5.75	32.00	6.10	32.51	-0.42	5.75	0.76
6.25	32.00	6.50	32.54	-0.46	6.25	0.80
6.75	32.00	6.90	32.58	-0.49	6.75	0.83
7.25	32.00	7.40	32.62	-0.53	7.25	0.86
7.75	32.00	7.70	32.64	-0.56	7.75	0.89
8.25	32.00	8.20	32.68	-0.60	8.25	0.92
8.75	32.00	8.50	32.71	-0.63	8.75	0.94
9.25	32.00	8.90	32.74	-0.66	9.25	0.97
9.75	32.00	9.10	32.76	-0.67	9.75	0.99
10.15	32.00	9.40	32.78	-0.70	10.15	1.01
10.75	32.00	9.80	32.82	-0.73	10.75	1.03
11.25	32.00	10.30	32.86	-0.77	11.25	1.05
11.75	32.00	10.70	32.89	-0.81	11.75	1.07
12.25	32.00	11.10	32.93	-0.84	12.25	1.09
12.75	33.00	0.00	33.00	-0.92	12.75	1.11
13.25	33.00	0.40	33.03	-0.95	13.25	1.12
13.75	33.00	0.90	33.08	-0.99	13.75	1.14
14.25	33.00	1.50	33.13	-1.04	14.25	1.15
14.75	33.00	2.00	33.17	-1.08	14.75	1.17
15.25	33.00	2.60	33.22	-1.13	15.25	1.18
15.75	33.00	3.30	33.28	-1.19	15.75	1.20
16.25	33.00	3.90	33.33	-1.24	16.25	1.21
16.75	33.00	4.60	33.38	-1.30	16.75	1.22
17.25	33.00	5.40	33.45	-1.37	17.25	1.24
17.75	33.00	6.00	33.50	-1.42	17.75	1.25
18.25	33.00	6.90	33.58	-1.49	18.25	1.26
18.75	33.00	7.60	33.63	-1.55	18.75	1.27
19.25	33.00	8.30	33.69	-1.61	19.25	1.28

TABLE C6 (CONT.)
DRAWDOWN MEASUREMENTS

PUMPTEST 1

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
19.75	33.00	9.00	33.75	-1.67	19.75	1.30
20.25	33.00	9.30	33.78	-1.69	20.25	1.31
20.75	33.00	9.80	33.82	-1.73	20.75	1.32
21.25	33.00	10.30	33.86	-1.77	21.25	1.33
21.75	33.00	10.70	33.89	-1.81	21.75	1.34
22.25	33.00	11.20	33.93	-1.85	22.25	1.35
22.45	33.00	11.40	33.95	-1.87	22.45	1.35
23.25	33.00	11.80	33.98	-1.90	23.25	1.37
23.75	34.00	0.20	34.02	-1.93	23.75	1.38
24.25	34.00	0.60	34.05	-1.97	24.25	1.38
24.75	34.00	0.90	34.08	-1.99	24.75	1.39
25.25	34.00	1.20	34.10	-2.02	25.25	1.40
25.75	34.00	1.70	34.14	-2.06	25.75	1.41
26.25	34.00	2.00	34.17	-2.08	26.25	1.42
26.75	34.00	2.20	34.18	-2.10	26.75	1.43
27.25	34.00	2.60	34.22	-2.13	27.25	1.44
27.75	34.00	2.90	34.24	-2.16	27.75	1.44
28.25	34.00	3.20	34.27	-2.18	28.25	1.45
28.75	34.00	3.60	34.30	-2.22	28.75	1.46
29.25	34.00	3.80	34.32	-2.23	29.25	1.47
29.75	34.00	4.10	34.34	-2.26	29.75	1.47
30.25	34.00	4.50	34.38	-2.29	30.25	1.48
30.75	34.00	4.70	34.39	-2.31	30.75	1.49
31.25	34.00	5.00	34.42	-2.33	31.25	1.49
31.75	34.00	5.20	34.43	-2.35	31.75	1.50
32.25	34.00	5.50	34.46	-2.38	32.25	1.51
32.75	34.00	5.70	34.48	-2.39	32.75	1.52
33.25	34.00	5.80	34.48	-2.40	33.25	1.52
34.25	34.00	9.00	34.75	-2.67	34.25	1.53
34.75	34.00	10.50	34.88	-2.79	34.75	1.54
35.25	34.00	11.30	34.94	-2.86	35.25	1.55
35.75	35.00	0.50	35.04	-2.96	35.75	1.55
36.25	35.00	1.30	35.11	-3.02	36.25	1.56
36.75	35.00	2.10	35.18	-3.09	36.75	1.57
37.25	35.00	2.90	35.24	-3.16	37.25	1.57
37.75	35.00	3.70	35.31	-3.22	37.75	1.58
38.25	35.00	4.60	35.38	-3.30	38.25	1.58
38.75	35.00	5.30	35.44	-3.36	38.75	1.59
39.25	35.00	6.20	35.52	-3.43	39.25	1.59
39.75	35.00	6.80	35.57	-3.48	39.75	1.60
40.25	35.00	7.30	35.61	-3.52	40.25	1.60
40.75	35.00	8.70	35.73	-3.64	40.75	1.61
41.25	35.00	10.00	35.83	-3.75	41.25	1.62
41.75	35.00	11.40	35.95	-3.87	41.75	1.62
42.25	36.00	0.90	36.08	-3.99	42.25	1.63

TABLE C6. (CONT.)
DRAWDOWN MEASUREMENTS

PUMPTEST 1

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
42.75	36.00	2.50	36.21	-4.13	42.75	1.63
43.25	36.00	3.80	36.32	-4.23	43.25	1.64
43.75	36.00	5.70	36.48	-4.39	43.75	1.64
44.25	36.00	6.90	36.58	-4.49	44.25	1.65
44.75	36.00	7.90	36.66	-4.57	44.75	1.65
45.25	36.00	9.00	36.75	-4.67	45.25	1.66
45.75	36.00	10.00	36.83	-4.75	45.75	1.66
46.25	36.00	11.00	36.92	-4.83	46.25	1.67
46.75	36.00	11.80	36.98	-4.90	46.75	1.67
47.25	37.00	0.80	37.07	-4.98	47.25	1.67
47.75	37.00	1.60	37.13	-5.05	47.75	1.68
48.25	37.00	2.40	37.20	-5.12	48.25	1.68
48.75	37.00	3.30	37.28	-5.19	48.75	1.69
49.25	37.00	4.10	37.34	-5.26	49.25	1.69
49.75	37.00	4.60	37.38	-5.30	49.75	1.70
50.25	37.00	5.30	37.44	-5.36	50.25	1.70
50.75	37.00	6.30	37.53	-5.44	50.75	1.71
51.25	37.00	6.80	37.57	-5.48	51.25	1.71
51.75	37.00	7.20	37.60	-5.52	51.75	1.71
52.25	37.00	8.00	37.67	-5.58	52.25	1.72
52.75	37.00	8.50	37.71	-5.63	52.75	1.72
53.25	37.00	9.30	37.78	-5.69	53.25	1.73
53.75	37.00	10.40	37.87	-5.78	53.75	1.73
54.25	37.00	11.10	37.93	-5.84	54.25	1.73
54.75	37.00	11.80	37.98	-5.90	54.75	1.74
55.25	38.00	0.50	38.04	-5.96	55.25	1.74
55.75	38.00	1.00	38.08	-6.00	55.75	1.75
56.25	38.00	1.70	38.14	-6.06	56.25	1.75
56.75	38.00	2.30	38.19	-6.11	56.75	1.75
57.25	38.00	3.00	38.25	-6.17	57.25	1.76
57.75	38.00	3.40	38.28	-6.20	57.75	1.76
58.25	38.00	4.00	38.33	-6.25	58.25	1.77
59.75	38.00	4.60	38.38	-6.30	59.75	1.78
59.25	38.00	5.10	38.43	-6.34	59.25	1.77
59.75	38.00	5.70	38.48	-6.39	59.75	1.78

TABLE C7
RECOVERY MEASUREMENTS
GBR-14

PUMPTEST 2

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
0.00	38.00	4.50	38.38	-6.29	0.00	ERR
0.25	38.00	4.50	38.38	-6.29	0.25	-0.60
0.75	38.00	2.60	38.22	-6.13	0.75	-0.12
1.25	38.00	0.20	38.02	-5.93	1.25	0.10
1.75	37.00	9.90	37.83	-5.74	1.75	0.24
2.25	37.00	7.70	37.64	-5.56	2.25	0.35
2.75	37.00	5.30	37.44	-5.36	2.75	0.44
3.25	37.00	2.40	37.20	-5.12	3.25	0.51
3.75	37.00	0.80	37.07	-4.98	3.75	0.57
4.25	36.00	10.80	36.90	-4.82	4.25	0.63
4.75	36.00	8.80	36.73	-4.65	4.75	0.68
5.25	36.00	6.80	36.57	-4.48	5.25	0.72
5.75	36.00	4.40	36.37	-4.28	5.75	0.76
6.25	36.00	2.30	36.19	-4.11	6.25	0.80
6.75	36.00	0.20	36.02	-3.93	6.75	0.83
7.25	35.00	10.30	35.86	-3.77	7.25	0.86
7.75	35.00	8.30	35.69	-3.61	7.75	0.89
8.25	35.00	5.70	35.48	-3.39	8.25	0.92
8.75	35.00	4.50	35.38	-3.29	8.75	0.94
9.25	35.00	3.00	35.25	-3.17	9.25	0.97
9.75	35.00	1.30	35.11	-3.02	9.75	0.99
10.25	34.00	11.90	34.99	-2.91	10.25	1.01
10.75	34.00	10.30	34.86	-2.77	10.75	1.03
11.25	34.00	9.10	34.76	-2.67	11.25	1.05
11.75	34.00	7.40	34.62	-2.53	11.75	1.07
12.25	34.00	5.80	34.48	-2.40	12.25	1.09
12.75	34.00	4.60	34.38	-2.30	12.75	1.11
13.25	34.00	3.20	34.27	-2.18	13.25	1.12
13.75	34.00	1.80	34.15	-2.07	13.75	1.14
14.25	34.00	0.50	34.04	-1.96	14.25	1.15
14.75	33.00	11.50	33.96	-1.88	14.75	1.17
15.25	33.00	10.40	33.87	-1.78	15.25	1.18
15.75	33.00	9.30	33.78	-1.69	15.75	1.20
16.25	33.00	8.00	33.67	-1.58	16.25	1.21
16.75	33.00	6.90	33.58	-1.49	16.75	1.22
17.25	33.00	5.80	33.48	-1.40	17.25	1.24
17.75	33.00	4.70	33.39	-1.31	17.75	1.25
18.25	33.00	4.00	33.33	-1.25	18.25	1.26
18.75	33.00	3.20	33.27	-1.18	18.75	1.27
19.25	33.00	2.50	33.21	-1.13	19.25	1.28
19.75	33.00	1.70	33.14	-1.06	19.75	1.30
20.25	33.00	1.20	33.10	-1.02	20.25	1.31
20.75	33.00	0.60	33.05	-0.97	20.75	1.32
21.25	33.00	0.00	33.00	-0.92	21.25	1.33

TABLE C7 (CONT.)
RECOVERY MEASUREMENTS

PUMPTEST 2

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
21.75	32.00	11.70	32.98	-0.89	21.75	1.34
22.25	32.00	11.30	32.94	-0.86	22.25	1.35
22.75	32.00	11.00	32.92	-0.83	22.75	1.36
23.25	32.00	10.60	32.88	-0.80	23.25	1.37
23.75	32.00	10.40	32.87	-0.78	23.75	1.38
24.25	32.00	10.10	32.84	-0.76	24.25	1.38
25.25	32.00	9.60	32.80	-0.72	25.25	1.40
26.25	32.00	9.20	32.77	-0.68	26.25	1.42
27.25	32.00	8.70	32.73	-0.64	27.25	1.44
28.25	32.00	8.40	32.70	-0.62	28.25	1.45
29.25	32.00	8.10	32.68	-0.59	29.25	1.47
30.25	32.00	7.80	32.65	-0.57	30.25	1.48
31.25	32.00	7.30	32.61	-0.52	31.25	1.49
33.25	32.00	6.90	32.58	-0.49	33.25	1.52
36.25	32.00	6.30	32.53	-0.44	36.25	1.56

TABLE C8
DRAWDOWN MEASUREMENTS
GBR-14
Q = 5 gpm

PUMPTEST 3

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
0.00	31.00	9.00	31.75	-0.08	0.00	ERR
0.25	31.00	10.00	31.83	-0.16	0.25	-0.60
0.75	31.00	10.90	31.91	-0.21	0.50	-0.30
1.25	31.00	11.50	31.96	-0.27	1.00	0.00
1.75	32.00	0.20	32.02	-0.37	1.50	0.18
2.25	32.00	1.40	32.12	-0.46	2.00	0.30
2.75	32.00	2.50	32.21	-0.52	2.50	0.40
3.25	32.00	3.30	32.28	-0.59	3.00	0.48
3.75	32.00	4.10	32.34	-0.67	3.50	0.54
4.25	32.00	5.00	32.42	-0.73	4.00	0.60
4.75	32.00	5.70	32.48	-0.81	4.50	0.65
5.25	32.00	6.70	32.56	-0.88	5.00	0.70
5.75	32.00	7.50	32.63	-0.98	5.50	0.74
6.25	32.00	8.70	32.73	-1.10	6.00	0.78
6.75	32.00	10.20	32.85	-1.29	6.50	0.81
7.25	33.00	0.50	33.04	-1.63	7.00	0.85
7.75	33.00	4.50	33.38	-2.13	7.50	0.88
8.25	33.00	10.50	33.88	-2.58	8.00	0.90
8.75	34.00	4.00	34.33	-3.08	8.50	0.93
9.25	34.00	10.00	34.83	-3.63	9.00	0.95
9.75	35.00	4.50	35.38	-4.21	9.50	0.98
10.25	35.00	11.50	35.96	-4.75	10.00	1.00
10.75	36.00	6.00	36.50	-5.21	10.50	1.02
11.25	36.00	11.50	36.96	-5.75	11.00	1.04
11.75	37.00	6.00	37.50	-6.29	11.50	1.06
12.25	38.00	0.50	38.04	-6.71	12.00	1.08
12.75	38.00	5.50	38.46	-7.17	12.50	1.10
13.25	38.00	11.00	38.92	-7.52	13.00	1.11
13.75	39.00	3.30	39.28	-7.89	13.50	1.13
14.25	39.00	7.70	39.64	-7.28	14.00	1.15
14.75	39.00	0.40	39.03	-8.54	14.50	1.16
15.25	40.00	3.50	40.29	-8.82	15.00	1.18
15.75	40.00	6.80	40.57	-9.42	15.50	1.19
16.25	41.00	2.00	41.17	-9.84	16.00	1.20
16.75	41.00	7.10	41.59	-10.35	16.50	1.22
17.25	42.00	1.20	42.10	-10.83	17.00	1.23
17.75	42.00	7.00	42.58	-11.33	17.50	1.24
18.25	43.00	1.00	43.08	-11.79	18.00	1.26
18.75	43.00	6.50	43.54	-12.29	18.50	1.27
19.25	44.00	0.50	44.04	-12.83	19.00	1.28
19.75	44.00	7.00	44.58	-13.33	19.50	1.29
20.25	45.00	1.00	45.08	-13.79	20.00	1.30
20.75	45.00	6.50	45.54	-14.54	20.50	1.31

TABLE C8 (CONT.)
DRAWDOWN MEASUREMENTS

PUMPTEST 3

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
21.25	46.00	3.50	46.29	-15.29	21.00	1.32
21.75	47.00	0.50	47.04	-16.00	21.50	1.33
22.25	47.00	9.00	47.75	-16.63	22.00	1.34
22.75	48.00	4.50	48.38	-17.25	22.50	1.35
23.25	49.00	0.00	49.00	-17.92	23.00	1.36
23.75	49.00	8.00	49.67	-18.54	23.50	1.37
24.25	50.00	3.50	50.29	-19.08	24.00	1.38
24.75	50.00	10.00	50.83	-19.75	24.50	1.39
25.25	51.00	6.00	51.50	-20.33	25.00	1.40
25.75	52.00	1.00	52.08	-20.88	25.50	1.41
26.25	52.00	7.50	52.63	-21.46	26.00	1.41
26.75	53.00	2.50	53.21	-22.04	26.50	1.42
27.25	53.00	9.50	53.79	-22.63	27.00	1.43
27.75	54.00	4.50	54.38	-23.17	27.50	1.44
28.25	54.00	11.00	54.92	-23.71	28.00	1.45
28.75	55.00	5.50	55.46	-24.25	28.50	1.45
29.25	56.00	0.00	56.00	-24.79	29.00	1.46
29.75	56.00	6.50	56.54	-25.25	29.50	1.47
30.25	57.00	0.00	57.00	-25.75	30.00	1.48
30.75	57.00	6.00	57.50	-26.25	30.50	1.48
31.25	58.00	0.00	58.00	-26.71	31.00	1.49
31.75	58.00	5.50	58.46	-27.21	31.50	1.50
32.25	58.00	11.50	58.96	-27.67	32.00	1.51
32.75	59.00	5.00	59.42	-28.17	32.50	1.51
33.25	59.00	11.00	59.92	-28.58	33.00	1.52
33.75	60.00	4.00	60.33	-29.13	33.50	1.53
34.25	60.00	10.50	60.88	-29.50	34.00	1.53
34.75	61.00	3.00	61.25	-29.96	34.50	1.54
35.25	61.00	8.50	61.71	-30.50	35.00	1.54
35.75	62.00	3.00	62.25	31.75	35.50	1.55

TABLE C9
RECOVERY MEASUREMENTS
GBR-14

PUMPTEST 4

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
0.00	61.00	10.00	61.83	-30.08	0.00	ERR
1.00	61.00	10.00	61.83	-30.08	1.00	0.00
1.50	61.00	4.00	61.33	-29.58	1.50	0.18
2.00	60.00	10.00	60.83	-29.08	2.00	0.30
2.50	60.00	5.00	60.42	-28.67	2.50	0.40
3.00	59.00	11.50	59.96	-28.21	3.00	0.48
3.50	59.00	6.00	59.50	-27.75	3.50	0.54
4.00	59.00	0.50	59.04	-27.29	4.00	0.60
4.50	58.00	7.50	58.63	-26.88	4.50	0.65
5.00	58.00	2.50	58.21	-26.46	5.00	0.70
5.50	57.00	10.00	57.83	-26.08	5.50	0.74
6.00	57.00	5.00	57.42	-25.67	6.00	0.78
6.50	56.00	11.50	56.96	-25.21	6.50	0.81
7.00	56.00	7.50	56.63	-24.88	7.00	0.85
7.50	56.00	2.50	56.21	-24.46	7.50	0.88
8.00	55.00	10.00	55.83	-24.08	8.00	0.90
8.50	55.00	7.50	55.63	-23.88	8.50	0.93
9.00	55.00	2.00	55.17	-23.42	9.00	0.95
9.50	54.00	9.00	54.75	-23.00	9.50	0.98
10.00	54.00	1.50	54.13	-22.38	10.00	1.00
10.50	54.00	0.00	54.00	-22.25	10.50	1.02
11.00	53.00	8.00	53.67	-21.92	11.00	1.04
11.50	53.00	3.50	53.29	-21.54	11.50	1.06
12.00	52.00	11.00	52.92	-21.17	12.00	1.08
12.50	52.00	7.00	52.58	-20.83	12.50	1.10
13.00	52.00	3.00	52.25	-20.50	13.00	1.11
13.50	51.00	10.50	51.88	-20.13	13.50	1.13
14.00	51.00	7.00	51.58	-19.83	14.00	1.15
14.50	51.00	3.00	51.25	-19.50	14.50	1.16
15.00	50.00	11.50	50.96	-19.21	15.00	1.18
15.50	50.00	7.50	50.63	-18.88	15.50	1.19
16.00	50.00	5.00	50.42	-18.67	16.00	1.20
16.50	50.00	1.00	50.08	-18.33	16.50	1.22
17.00	49.00	9.50	49.79	-18.04	17.00	1.23
17.50	49.00	5.50	49.46	-17.71	17.50	1.24
18.00	49.00	1.00	49.08	-17.33	18.00	1.26
18.50	48.00	10.50	48.88	-17.13	18.50	1.27
19.00	48.00	6.50	48.54	-16.79	19.00	1.28
19.50	48.00	3.50	48.29	-16.54	19.50	1.29
20.00	48.00	0.00	48.00	-16.25	20.00	1.30
20.50	47.00	8.50	47.71	-15.96	20.50	1.31
21.00	47.00	5.00	47.42	-15.67	21.00	1.32
21.50	47.00	2.00	47.17	-15.42	21.50	1.33
22.00	46.00	11.00	46.92	-15.17	22.00	1.34

TABLE C9 (CONT.)
RECOVERY MEASUREMENTS

PUMPTEST 4

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
22.50	46.00	8.00	46.67	-14.92	22.50	1.35
23.00	46.00	5.00	46.42	-14.67	23.00	1.36
23.50	46.00	2.00	46.17	-14.42	23.50	1.37
24.00	45.00	11.00	45.92	-14.17	24.00	1.38
24.50	45.00	8.00	45.67	-13.92	24.50	1.39
25.00	45.00	5.00	45.42	-13.67	25.00	1.40
25.50	45.00	2.00	45.17	-13.42	25.50	1.41
26.00	44.00	11.00	44.92	-13.17	26.00	1.41
26.50	44.00	8.00	44.67	-12.92	26.50	1.42
27.00	44.00	6.00	44.50	-12.75	27.00	1.43
27.50	44.00	2.50	44.21	-12.46	27.50	1.44
28.00	44.00	0.00	44.00	-12.25	28.00	1.45
28.50	43.00	9.50	43.79	-12.04	28.50	1.45
29.00	43.00	7.50	43.63	-11.88	29.00	1.46
29.50	43.00	5.00	43.42	-11.67	29.50	1.47
30.00	43.00	3.00	43.25	-11.50	30.00	1.48
30.50	43.00	1.00	43.08	-11.33	30.50	1.48
31.00	42.00	10.50	42.88	-11.13	31.00	1.49
31.50	42.00	8.50	42.71	-10.96	31.50	1.50
32.00	42.00	6.50	42.54	-10.79	32.00	1.51
32.50	42.00	4.00	42.33	-10.58	32.50	1.51
33.00	42.00	2.50	42.21	-10.46	33.00	1.52
33.50	42.00	1.00	42.08	-10.33	33.50	1.53
34.00	41.00	11.00	41.92	-10.17	34.00	1.53
34.50	41.00	9.50	41.79	-10.04	34.50	1.54
35.00	41.00	8.00	41.67	-9.92	35.00	1.54
35.50	41.00	6.50	41.54	-9.79	35.50	1.55
36.00	41.00	5.00	41.42	-9.67	36.00	1.56
36.50	41.00	3.00	41.25	-9.50	36.50	1.56
37.00	41.00	1.50	41.13	-9.38	37.00	1.57
37.50	41.00	0.00	41.00	-9.25	37.50	1.57
38.00	40.00	10.50	40.88	-9.13	38.00	1.58
38.50	40.00	9.00	40.75	-9.00	38.50	1.59
39.00	40.00	7.50	40.63	-8.88	39.00	1.59
39.50	40.00	6.00	40.50	-8.75	39.50	1.60
40.00	40.00	4.50	40.38	-8.63	40.00	1.60
40.50	40.00	3.00	40.25	-8.50	40.50	1.61
41.00	40.00	1.50	40.13	-8.38	41.00	1.61
41.50	40.00	0.00	40.00	-8.25	41.50	1.62
42.00	39.00	10.50	39.88	-8.13	42.00	1.62
42.50	39.00	9.50	39.79	-8.04	42.50	1.63
43.00	39.00	7.50	39.63	-7.88	43.00	1.63
43.50	39.00	6.50	39.54	-7.79	43.50	1.64
44.00	39.00	5.00	39.42	-7.67	44.00	1.64
44.50	39.00	3.00	39.25	-7.50	44.50	1.65

TABLE C9 (CONT.)
RECOVERY MEASUREMENTS

PUMPTEST 4

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
45.00	39.00	1.50	39.13	-7.38	45.00	1.65
45.50	39.00	0.00	39.00	-7.25	45.50	1.66
46.00	38.00	10.50	38.88	-7.13	46.00	1.66
47.00	38.00	7.00	38.58	-6.83	47.00	1.67
48.00	38.00	3.50	38.29	-6.54	48.00	1.68
50.00	37.00	8.00	37.67	-5.92	50.00	1.70
52.00	37.00	1.50	37.13	-5.38	52.00	1.72
54.00	36.00	6.50	36.54	-4.79	54.00	1.73
56.00	36.00	0.50	36.04	-4.29	56.00	1.75
58.00	35.00	6.50	35.54	-3.79	58.00	1.76
60.00	35.00	1.50	35.13	-3.38	60.00	1.78

TABLE C10
DRAWDOWN MEASUREMENTS
GBR-14
Q = 2 gpm

PUMPTEST 5

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
0.00	32.00	1.50	32.13	0.00	0.00	ERR
0.25	32.00	1.50	32.13	0.00	0.25	-0.60
0.75	32.00	2.00	32.17	-0.04	0.75	-0.12
1.25	32.00	3.00	32.25	-0.13	1.25	0.10
1.75	32.00	3.50	32.29	-0.17	1.75	0.24
2.25	32.00	4.00	32.33	-0.21	2.25	0.35
2.75	32.00	4.50	32.38	-0.25	2.75	0.44
3.25	32.00	5.00	32.42	-0.29	3.25	0.51
3.75	32.00	5.50	32.46	-0.33	3.75	0.57
4.25	32.00	6.00	32.50	-0.38	4.25	0.63
4.75	32.00	6.50	32.54	-0.42	4.75	0.68
5.25	32.00	6.70	32.56	-0.43	5.25	0.72
5.75	32.00	7.10	32.59	-0.47	5.75	0.76
6.25	32.00	7.50	32.63	-0.50	6.25	0.80
6.75	32.00	8.00	32.67	-0.54	6.75	0.83
7.25	32.00	9.00	32.75	-0.63	7.25	0.86
7.75	32.00	9.50	32.79	-0.67	7.75	0.89
8.25	32.00	10.50	32.88	-0.75	8.25	0.92
8.75	32.00	11.00	32.92	-0.79	8.75	0.94
9.25	33.00	0.50	33.04	-0.92	9.25	0.97
9.75	33.00	2.50	33.21	-1.08	9.75	0.99
10.25	33.00	4.50	33.38	-1.25	10.25	1.01
10.75	33.00	7.00	33.58	-1.46	10.75	1.03
11.25	33.00	10.50	33.88	-1.75	11.25	1.05
11.75	34.00	0.50	34.04	-1.92	11.75	1.07
12.25	34.00	3.00	34.25	-2.13	12.25	1.09
12.75	34.00	6.00	34.50	-2.38	12.75	1.11
13.25	34.00	8.50	34.71	-2.58	13.25	1.12
13.75	34.00	11.00	34.92	-2.79	13.75	1.14
14.25	35.00	1.00	35.08	-2.96	14.25	1.15
14.75	35.00	3.50	35.29	-3.17	14.75	1.17
15.25	35.00	6.00	35.50	-3.38	15.25	1.18
15.75	35.00	5.50	35.46	-3.33	15.75	1.20
16.25	35.00	10.50	35.88	-3.75	16.25	1.21
16.75	36.00	1.00	36.08	-3.96	16.75	1.22
17.25	36.00	3.50	36.29	-4.17	17.25	1.24
17.75	36.00	5.50	36.46	-4.33	17.75	1.25
18.25	36.00	8.50	36.71	-4.58	18.25	1.26
18.75	37.00	0.00	37.00	-4.88	18.75	1.27
19.25	37.00	3.00	37.25	-5.13	19.25	1.28
19.75	37.00	6.50	37.54	-5.42	19.75	1.30
20.25	37.00	9.00	37.75	-5.63	20.25	1.31
20.75	37.00	11.50	37.96	-5.83	20.75	1.32

TABLE C10 (CONT.)
DRAWDOWN MEASUREMENTS

PUMPTEST 5

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
21.25	38.00	2.00	38.17	-6.04	21.25	1.33
21.75	38.00	4.50	38.38	-6.25	21.75	1.34
22.25	38.00	6.50	38.54	-6.42	22.25	1.35
22.75	38.00	8.50	38.71	-6.58	22.75	1.36
23.25	38.00	10.50	38.88	-6.75	23.25	1.37
23.75	39.00	0.00	39.00	-6.88	23.75	1.38
24.25	39.00	2.00	39.17	-7.04	24.25	1.38
24.75	39.00	3.00	39.25	-7.13	24.75	1.39
25.25	39.00	4.50	39.38	-7.25	25.25	1.40
25.75	39.00	6.00	39.50	-7.38	25.75	1.41
26.25	39.00	8.00	39.67	-7.54	26.25	1.42
26.75	39.00	9.50	39.79	-7.67	26.75	1.43
27.25	39.00	11.00	39.92	-7.79	27.25	1.44
27.75	40.00	0.00	40.00	-7.88	27.75	1.44
28.25	40.00	1.50	40.13	-8.00	28.25	1.45
28.75	40.00	3.00	40.25	-8.13	28.75	1.46
29.25	40.00	4.00	40.33	-8.21	29.25	1.47
29.75	40.00	5.50	40.46	-8.33	29.75	1.47
30.25	40.00	6.50	40.54	-8.42	30.25	1.48
31.25	40.00	9.00	40.75	-8.63	31.25	1.49
32.25	40.00	11.00	40.92	-8.79	32.25	1.51
33.25	41.00	1.50	41.13	-9.00	33.25	1.52
34.25	41.00	3.50	41.29	-9.17	34.25	1.53
35.25	41.00	6.00	41.50	-9.38	35.25	1.55
36.25	41.00	8.00	41.67	-9.54	36.25	1.56
37.25	41.00	10.00	41.83	-9.71	37.25	1.57
38.25	41.00	0.00	41.00	-8.88	38.25	1.58
39.25	41.00	2.00	41.17	-9.04	39.25	1.59
40.25	41.00	4.00	41.33	-9.21	40.25	1.60
42.25	41.00	9.00	41.75	-9.63	42.25	1.63
44.25	43.00	0.50	43.04	-10.92	44.25	1.65
46.25	43.00	3.50	43.29	-11.17	46.25	1.67
48.25	43.00	7.00	43.58	-11.46	48.25	1.68
50.25	44.00	5.50	44.46	-12.33	50.25	1.70
51.25	44.00	10.00	44.83	-12.71	51.25	1.71
52.25	45.00	2.50	45.21	-13.08	52.25	1.72
54.25	46.00	2.00	46.17	-14.04	54.25	1.73
56.25	46.00	7.50	46.63	-14.50	56.25	1.75
58.25	47.00	3.50	47.29	-15.17	58.25	1.77
60.25	47.00	10.50	47.88	-15.75	60.25	1.78
64.25	48.00	11.00	48.92	-16.79	64.25	1.81
70.25	50.00	1.00	50.08	-17.96	70.25	1.85
80.25	51.00	0.00	51.00	-18.88	80.25	1.90
90.00	51.00	6.50	51.54	-19.42	90.00	1.95
100.00	51.00	8.50	51.71	-19.58	100.00	2.00

TABLE C10 (CONT.)
DRAWDOWN MEASUREMENTS

PUMPTEST 5

TIME (minutes)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
133.00	52.00	8.50	52.71	-20.58	133.00	2.12
162.00	56.00	11.00	56.92	-24.79	162.00	2.21
182.00	60.00	8.00	60.67	-28.54	182.00	2.26
199.00	61.00	4.00	61.33	-29.21	199.00	2.30
227.00	61.00	8.50	61.71	-29.58	227.00	2.36
241.00	62.00	5.50	62.46	-30.33	241.00	2.38

TABLE C11
RECOVERY MEASUREMENTS
GBR-14

PUMPTEST 6

TIME (minutes)	DEPTH FEET	TO WATER INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
0.00	62.00	4.00	62.33	-30.21	0.00	ERR
0.50	62.00	4.00	62.33	-30.21	0.50	-0.30
1.50	61.00	9.00	61.75	-29.63	1.50	0.18
2.50	61.00	1.50	61.13	-29.00	2.50	0.40
3.50	60.00	4.50	60.38	-28.25	3.50	0.54
4.50	59.00	7.50	59.63	-27.50	4.50	0.65
5.50	58.00	10.00	58.83	-26.71	5.50	0.74
6.50	58.00	3.00	58.25	-26.13	6.50	0.81
7.50	57.00	8.00	57.67	-25.54	7.50	0.88
8.50	57.00	0.00	57.00	-24.88	8.50	0.93
9.50	56.00	5.00	56.42	-24.29	9.50	0.98
10.50	55.00	9.00	55.75	-23.63	10.50	1.02
11.50	55.00	2.00	55.17	-23.04	11.50	1.06
12.50	54.00	7.00	54.58	-22.46	12.50	1.10
13.50	54.00	0.00	54.00	-21.88	13.50	1.13
14.50	53.00	5.00	53.42	-21.29	14.50	1.16

PUMP TEST
DIESEL SPILL AREA
GBR-14, GBR-27 AND GBR-28

- Note:
1. The 3 wells were pumped simultaneously
 2. All figures and tables are grouped together following the text

PUMP TEST - DIESEL SPILL AREA - GBR-14, GBR-27, AND GBR-28

Recent pumping performed simultaneously at wells GBR-14, GBR-27, and GBR-28 resulted in three separate cones of depression in the diesel spill area. Analysis of the drawdown data shown in Figures 22-34 and Tables C12-C30 at each of the pump and observation wells involved separation of the effects of each pump well on total drawdown. Assuming that drawdown at all wells was sufficiently small to maintain constant transmissivity during the pump test and that flow could therefore be described using the Theis equation, drawdown due to simultaneous operation of several pump wells was additive. Therefore, separation of drawdown effects could be performed using the principle of superposition.

Two pump tests had previously been performed in the diesel spill area. Drawdown at GBR-14 and GBR-27 had been observed at GBR-15 and GBR-25, respectively. Extension of drawdown at late times associated with the multiple-well pump test could not be performed for these wells using fitted Theis curves because of the non-ideal boundary effects at these wells. Moreover, drawdown data at all other observation wells due to separate pumpage at the three discharging wells was not available. Due to these limitations, recourse was made to predicting the drawdown at all observation wells using a simple computer program developed in-house and based on the Theis equation. Output from this program was considered to be a first approximation of drawdown generated by discharge at the three pump wells.

Drawdown at each observation well due to separate pumping at each discharging well was calculated by the program using the equations.

$$u = \frac{1.87 r^2 S}{T t}$$

$$s = \frac{114.6 Q W(u)}{T}$$

where T = transmissivity between any pair of pump and observation wells (gpd/ft)
 S = storativity between any pair of pump and observation wells

Q = discharge at the pump well (gpm)

r = distance between the pump and observation well (ft)

t = time since pumping began (days)

s = drawdown at the observation well (ft)

W(u) = the well function

The well function was approximated using the series

$$W(u) = -0.5772 - \ln u + u - \frac{u^2}{2 \times 2!} + \frac{u^3}{3 \times 3!} - \frac{u^4}{4 \times 4!} + \frac{u^5}{5 \times 5!}$$

Use of a greater number of terms resulted in computer storage overflow during program execution for certain values of T and S.

Average transmissivity and storativity values obtained as a result of pump tests performed at wells GBR-14 and GBR-27 were used to characterize the semi-confined part of the aquifer in the diesel spill area. Average T and S estimated in the vicinity of GBR-14 were equal to 790 gpd/ft and 0.0045, while average T and S near GBR-27 were equal to 361.7 gpd/ft and 0.00022. Although GBR-14 was completed in the alluvium and most of the other wells were completed in the underlying consolidated sandstone, these two units were considered to be in hydraulic connection over much of the test area, as evidenced by the response of GBR-8 to pumping in GBR-29. Drawdown was predicted at all wells in response to each pumping well regardless of the unit of completion.

T and S for well GBR-28, for which no previous pump test had been performed, were initially adjusted until calculated drawdown responses at GBR-28 due to discharge at all 3 wells summed up to the observed response during times sufficiently early to approximate their behavior but sufficiently late to allow well interference to develop. Based on this approach, very large values of T and S equal to 7000 gpd/ft and 0.03 were required to match drawdown at GBR-28.

Use of lower values of T and S for GBR-28 produced excessively large predicted drawdowns at the well when the effects of pumping at all wells were summed. There was geologic evidence that clayey sands south of GBR-14 and shale near GBR-27 could be inhibiting flow from GBR-28 to these wells, producing smaller drawdown at GBR-28 than predicted. When it was assumed that drawdown at GBR-28 was primarily influenced by pumping at GBR-28, a transmissivity of 2100 gpd/ft and a storativity of 0.02 were determined iteratively by adjusting T and S until predicted drawdown at this well due to its own pumping matched total observed drawdown. These large values of T and S relative to those obtained at the other pump wells may be related to the predominance of coarse-grained sandstone and cobbles encountered at this well (see Appendix B).

Total observed drawdown at pump wells GBR-14 and GBR-27 is as much as three times the predicted drawdown when the drawdown influences of all pump wells are summed. These discrepancies are presumably the result of the interception of expanding cones of depression with low-permeability fine-grained sandstone, shale, or clay, which would tend to cause larger drawdowns than those predicted on the basis of the Theis equation.

The small values of T and S observed near GBR-27, the moderate values encountered near GBR-14, and the high values obtained near GBR-28 and near GBR-29 in the southern refinery area imply that fine-grained sandstone, shale, and clay are more predominant in the northern part of the diesel spill area and that coarse-grained sandstone dominate the geology in the southern part of the spill area and in the southern refinery area (see Appendix B). Flow conditions appear to range from confined near GBR-27 where shale is present, to semi-confined near GBR-14 where clay is present, to unconfined near GBR-28 and to the south, where discontinuous clay and shale layers do not significantly affect flow on a regional scale.

Using the transmissivities and storativities obtained from all pump test analyses, it was possible to estimate the radius of influence at each pump well in the diesel spill area after 1 year of pumping at a rate of 1 gpm. Assuming that the cone of depression effectively extends out to all

points at which a drawdown of 0.1 feet would occur, the radius of influence was determined using the Theis equation with a drawdown of 0.1 feet. Results of the calculations, assuming a horizontal water table, are listed below:

Well	T (gpd/ft)	S	Effective Radius of Influence (ft)
GBR-14	790.0	0.0045	3610
GBR-27	361.7	0.00022	16600
GBR-28	2100.0	0.02	1150

> NOT REASONABLE

The actual radius of influence would tend to be smaller than the predicted radius in the upgradient direction and larger in the downgradient direction, depending on the natural hydraulic gradient. The collective area within these three cones of depression extends well over the area of contamination, indicating that the recovery operation would be successful in intercepting floating product. In fact, pumpage at only GBR-14 and GBR-27 for a period of 15 hours would be sufficient to create an effective cone of depression of 150 feet that would be adequate to intercept the entire plume of floating product as it is currently defined. Steady-state conditions would not be attained at any of the wells after 1 year of recovery; the effective radius of influence would continue to expand for years in the moderately transmissive aquifer. In order to account for a sloping water table, recourse was made to utilizing a finite-difference flow model for defining the actual zone of capture induced by pumping in the diesel spill area.

where the capture zone comes

FIGURES AND TABLES FOR
PUMP TEST OF GBR-14, 27 AND 28

- Note:
1. Pumped wells - GBR-14, 27 and 28
 2. Observation wells - GBR 15, 21S, 21D, 23, 24S, 24D, 25, 26, 30, Steel Well
 3. Time-Drawdown Plots are presented followed by the corresponding tables of drawdown measurements

TIME-DRAWDOWN

GBR-14, PUMPING WELL

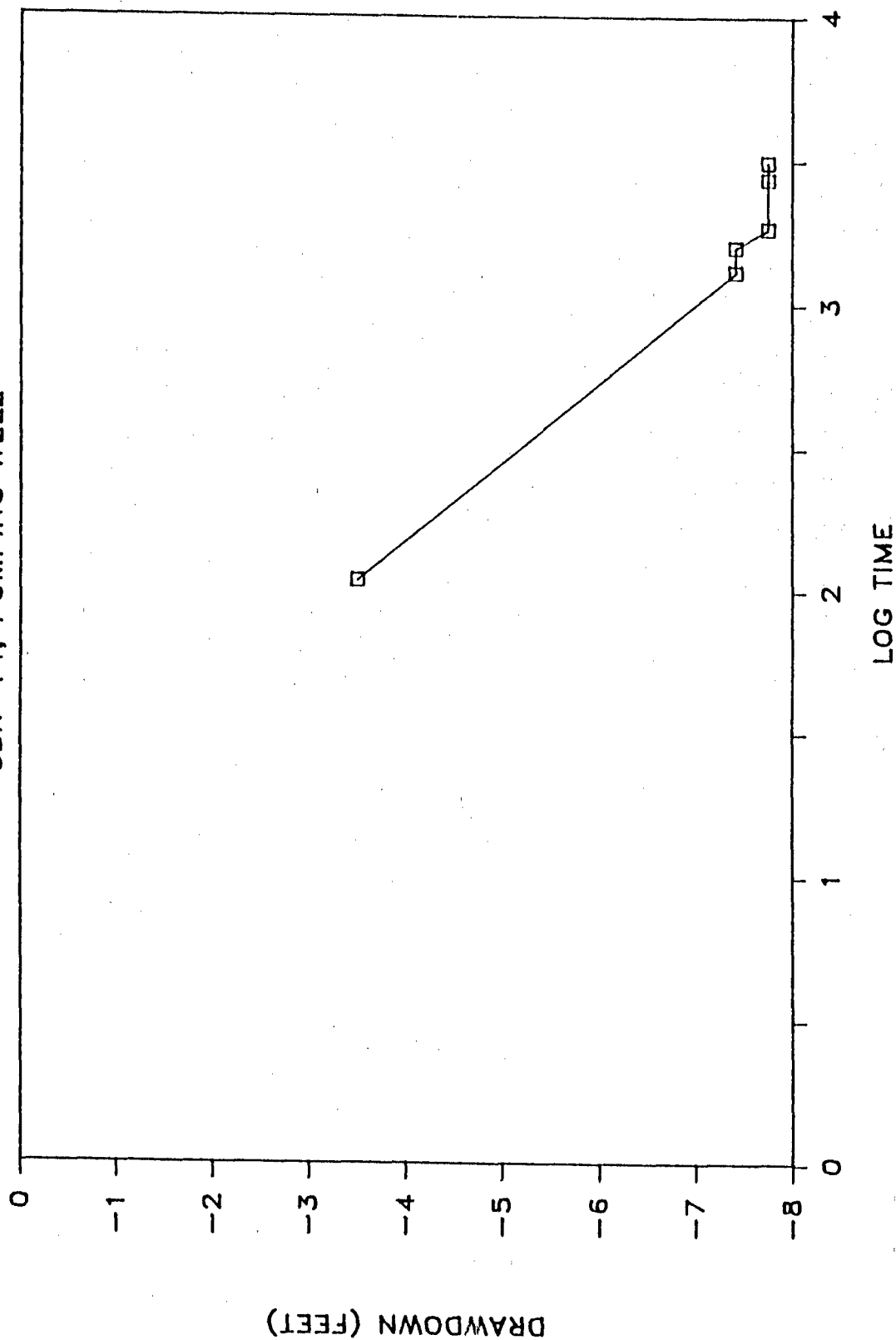


FIGURE 22

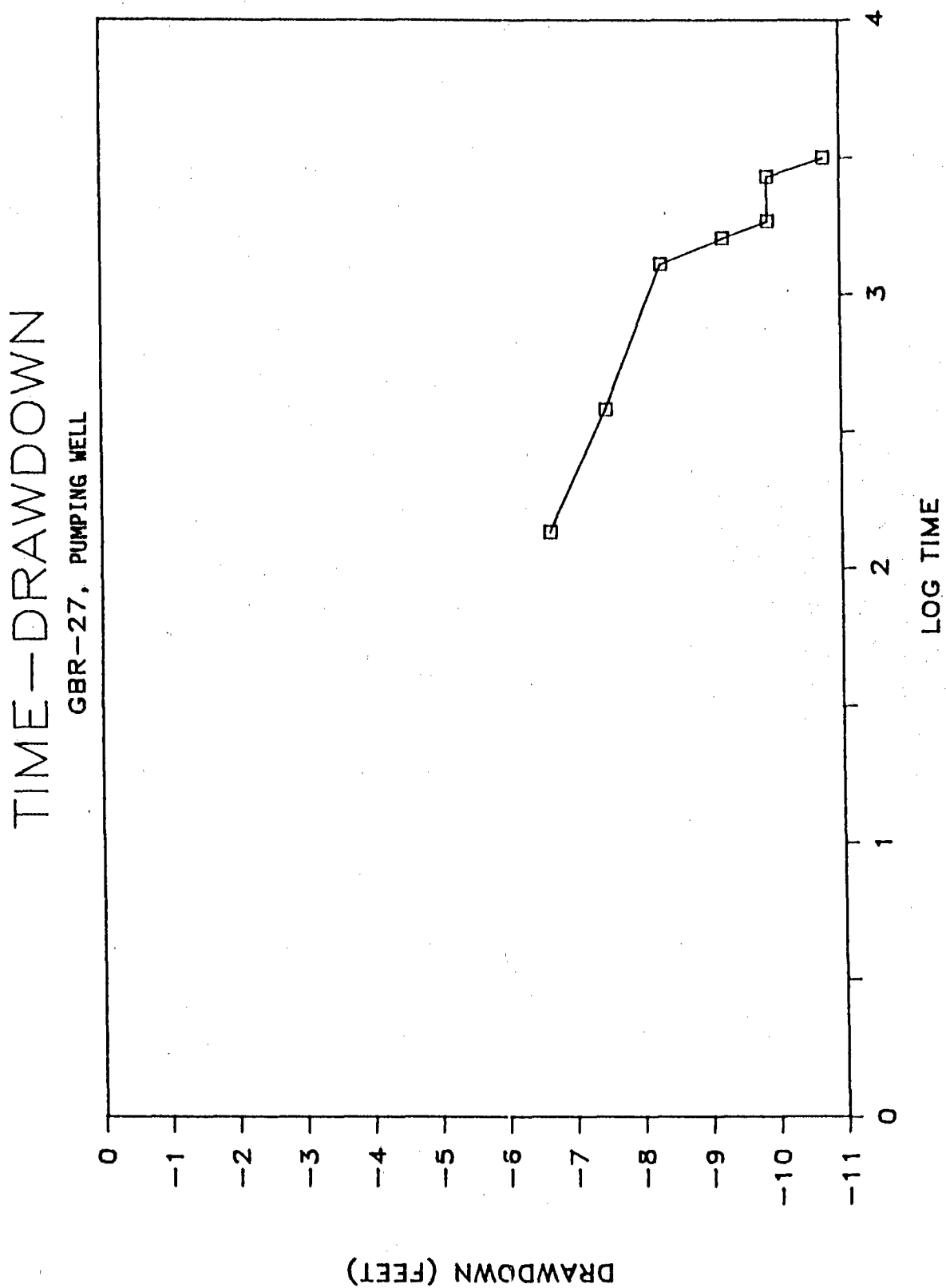
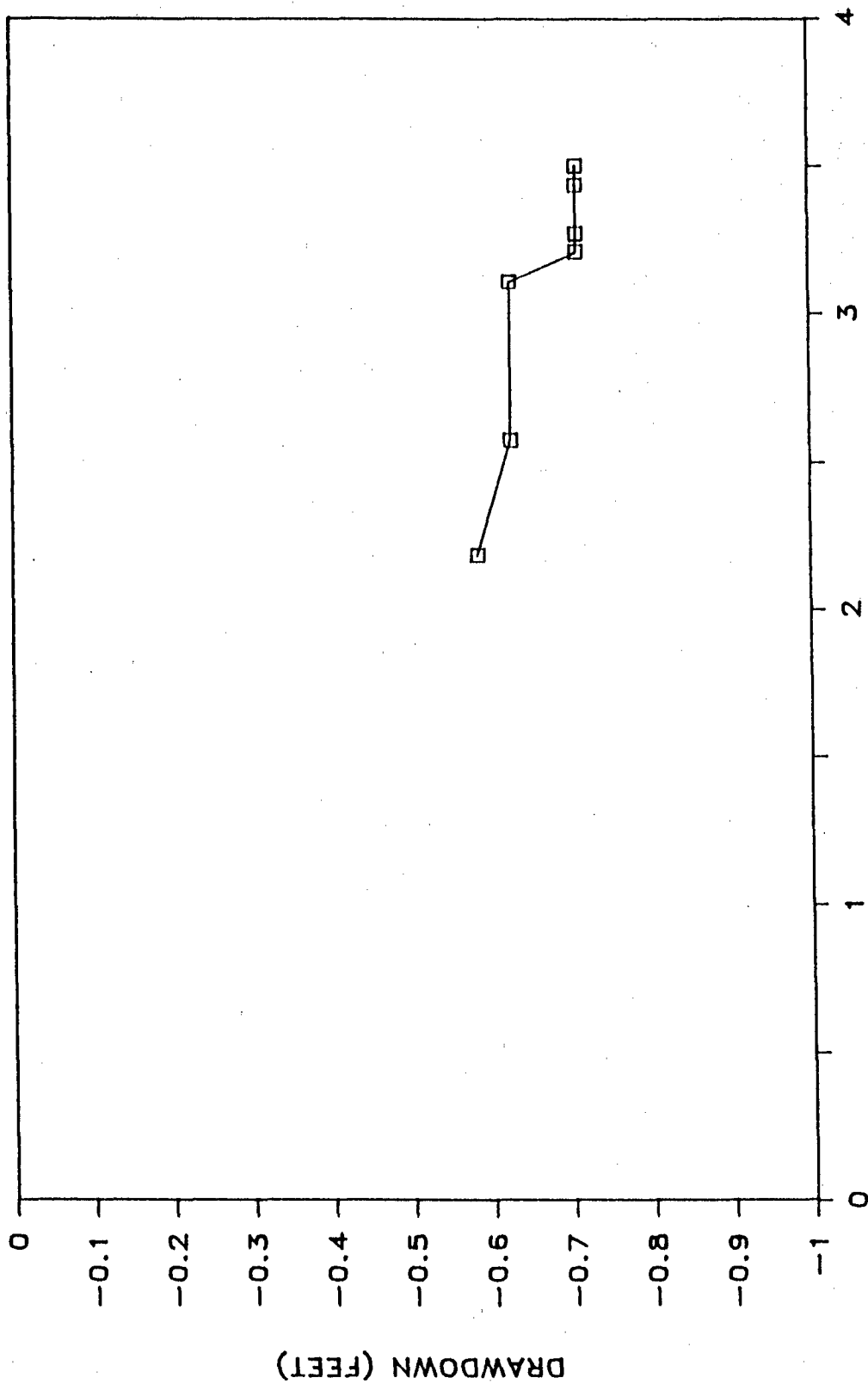


FIGURE 23

TIME--DRAWDOWN

GBR-28, PUMPING WELL

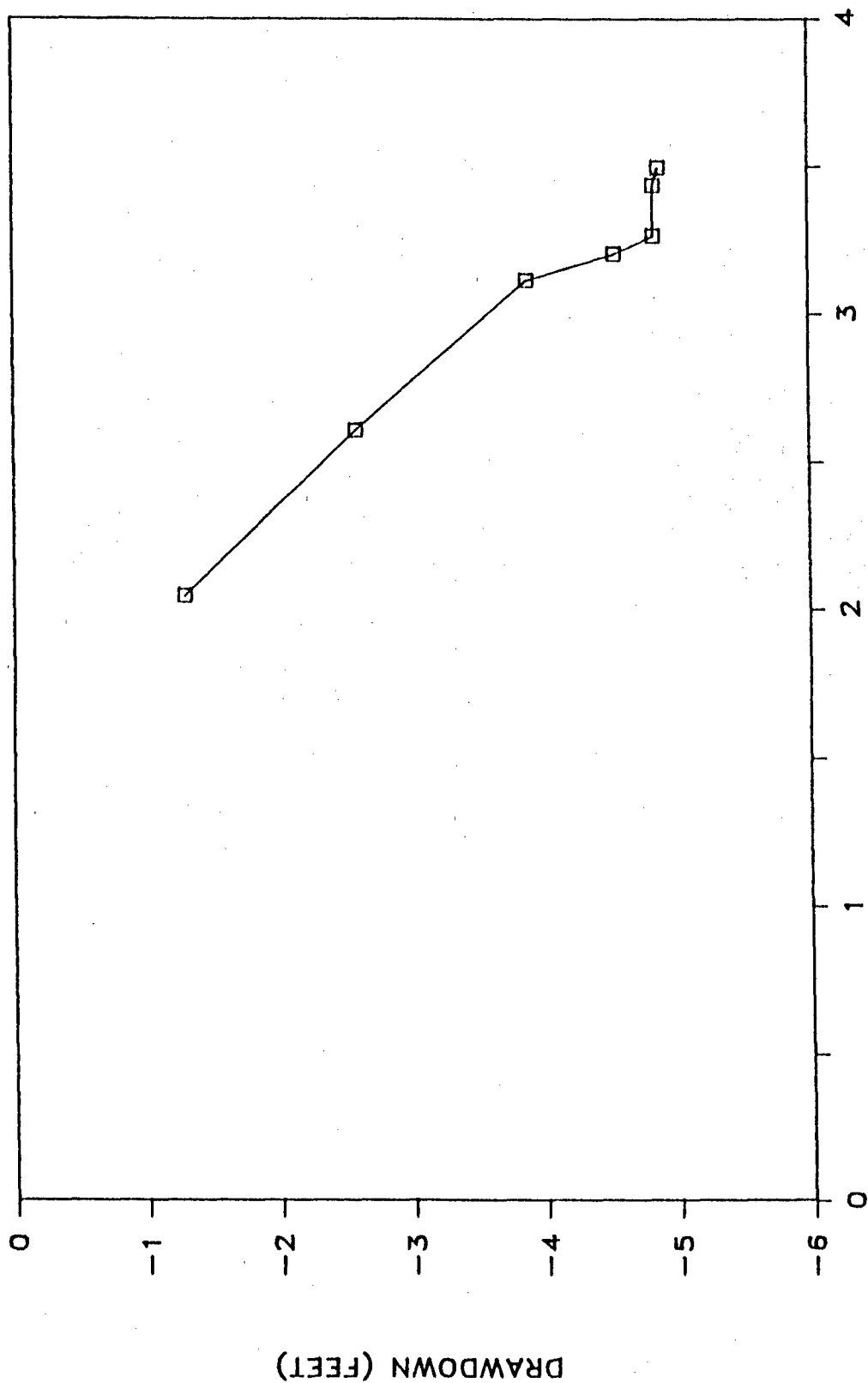


LOG TIME

FIGURE 24

TIME--DRAWDOWN

GBR-15, OBS WELL



LOG TIME

FIGURE 25

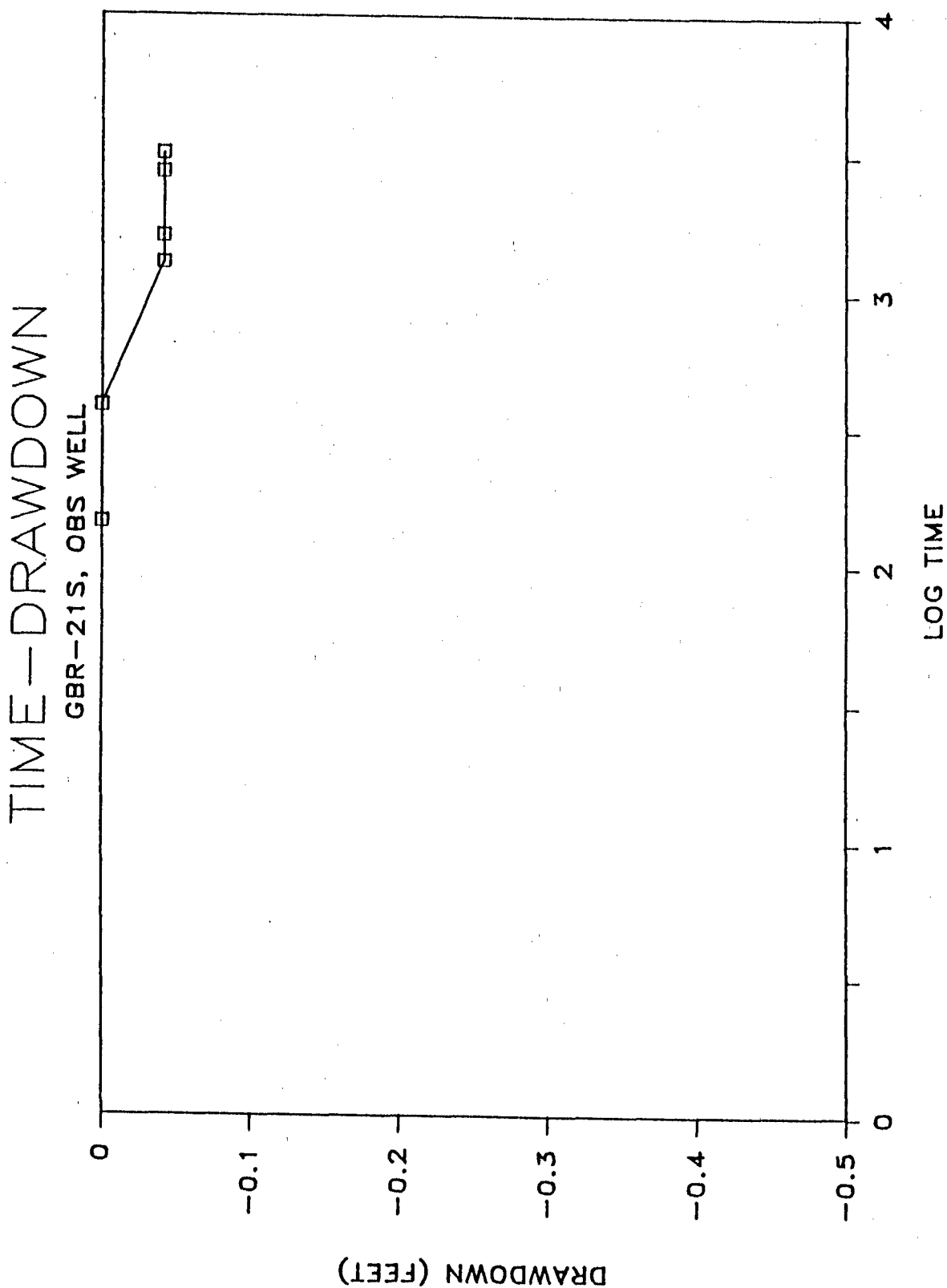
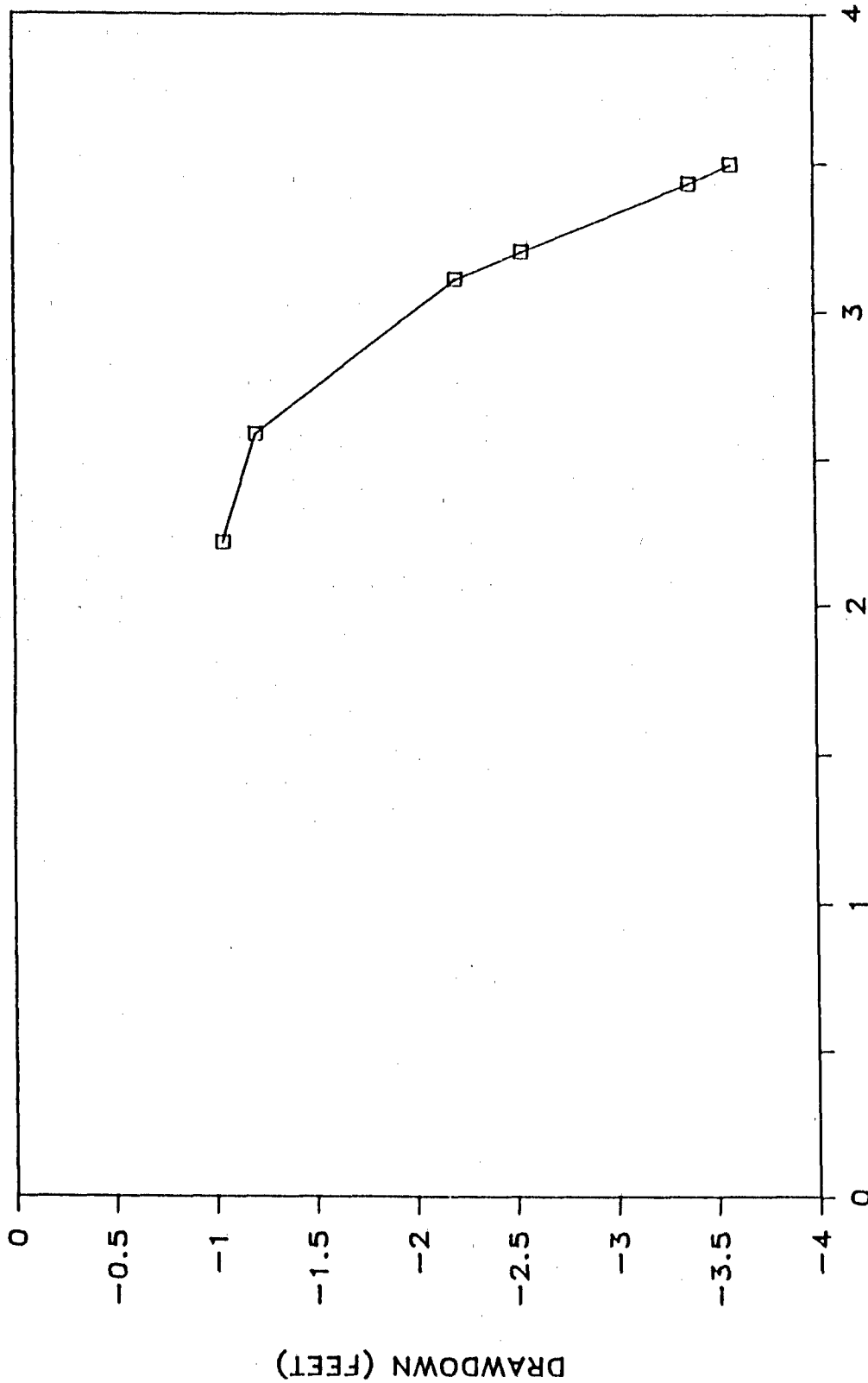


FIGURE 26

TIME—DRAWDOWN

GBR-21D, OBS WELL



LOG TIME

FIGURE 27

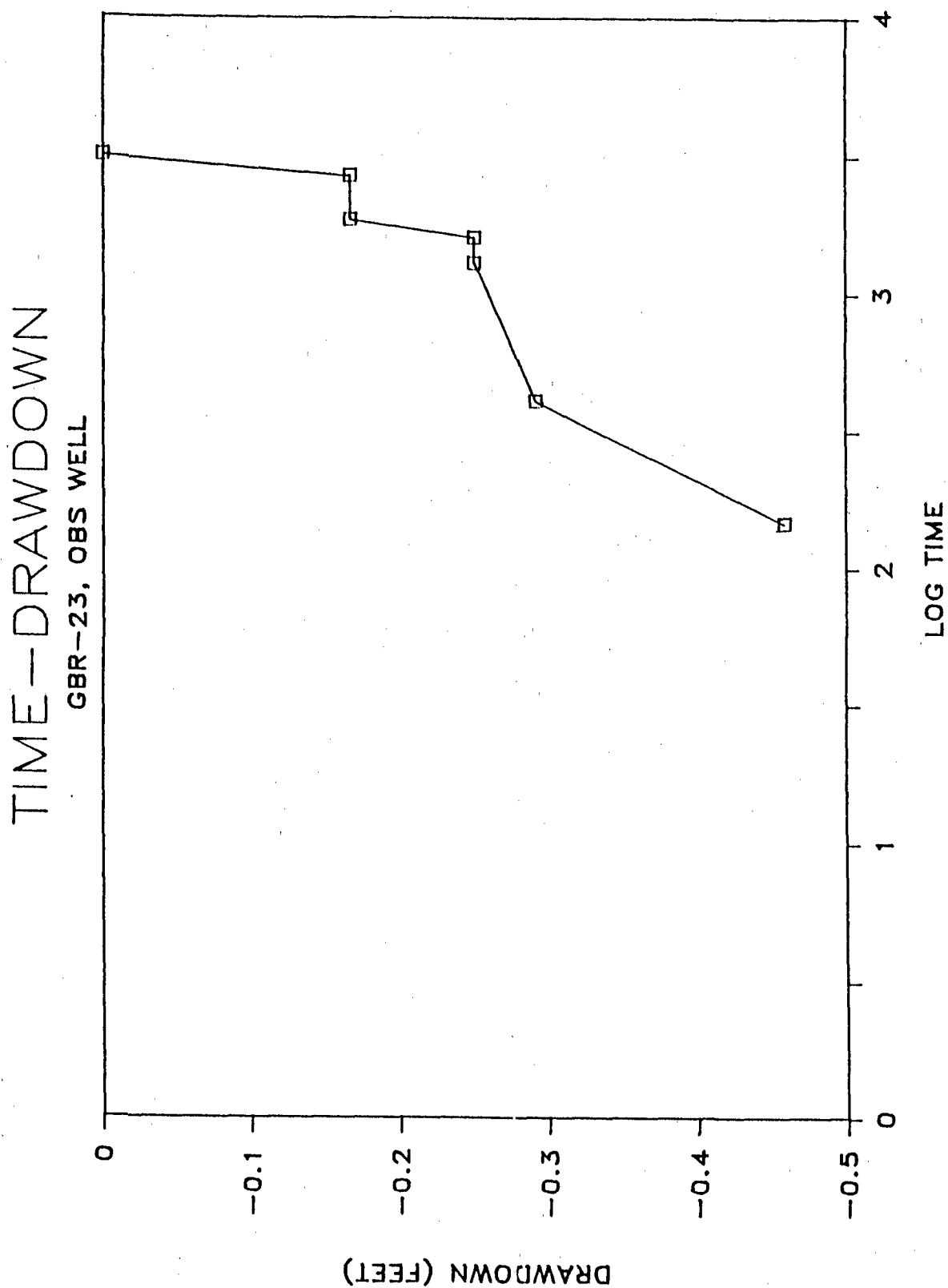
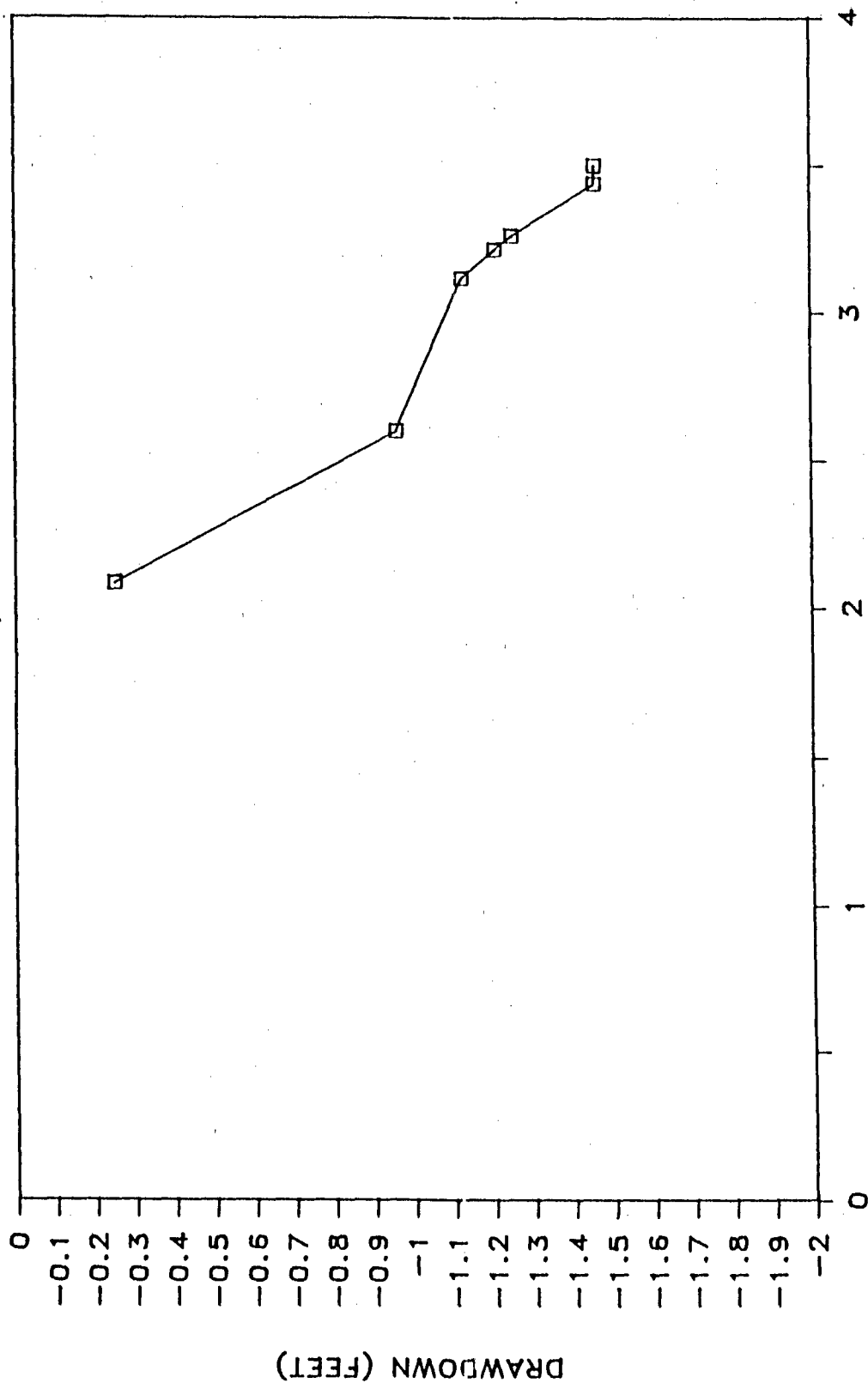


FIGURE 28

TIME-DRAWDOWN

GBR-24S, OBS WELL



LOG TIME

FIGURE 29

TIME-DRAWDOWN

GBR-24D, OBS WELL

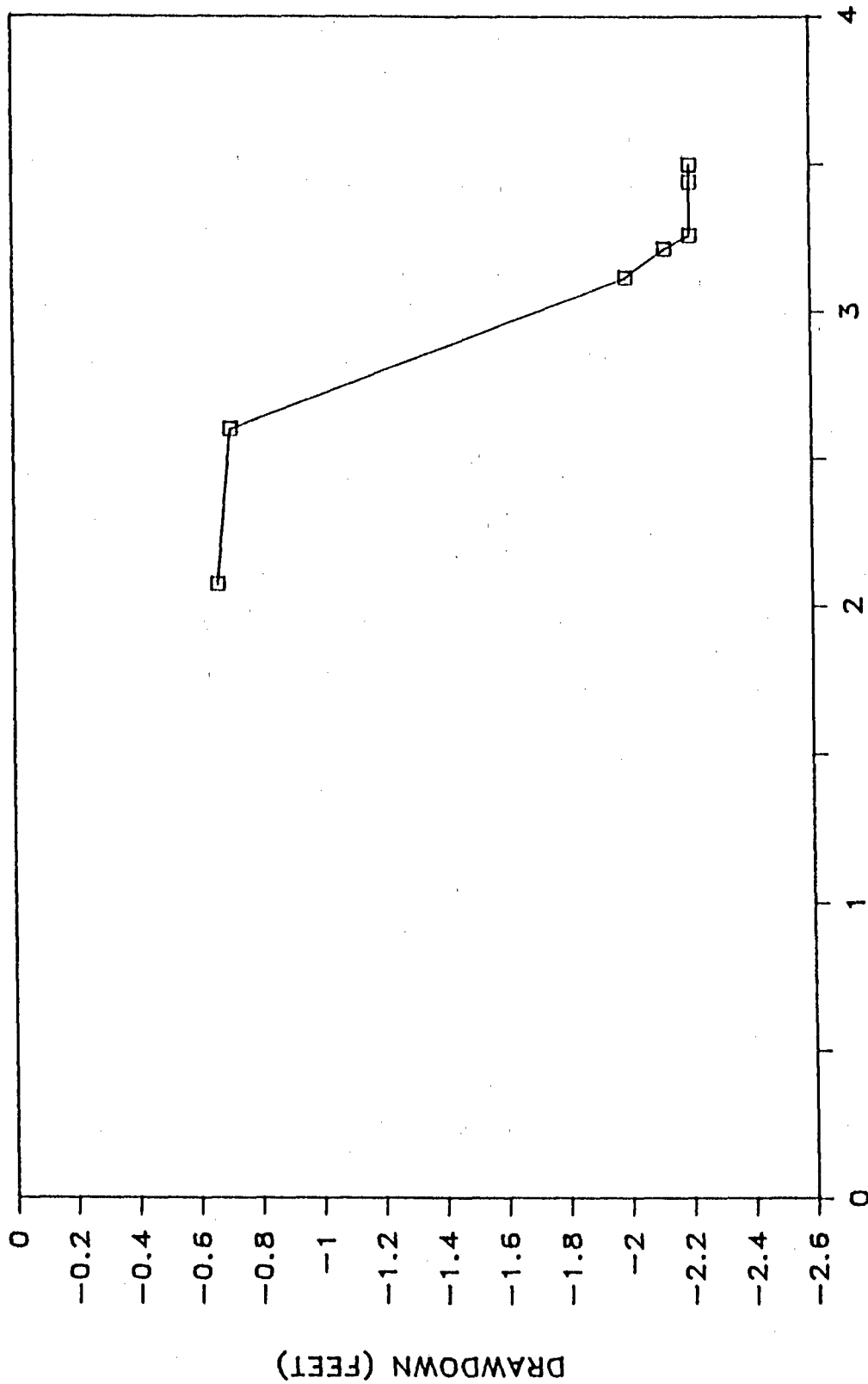
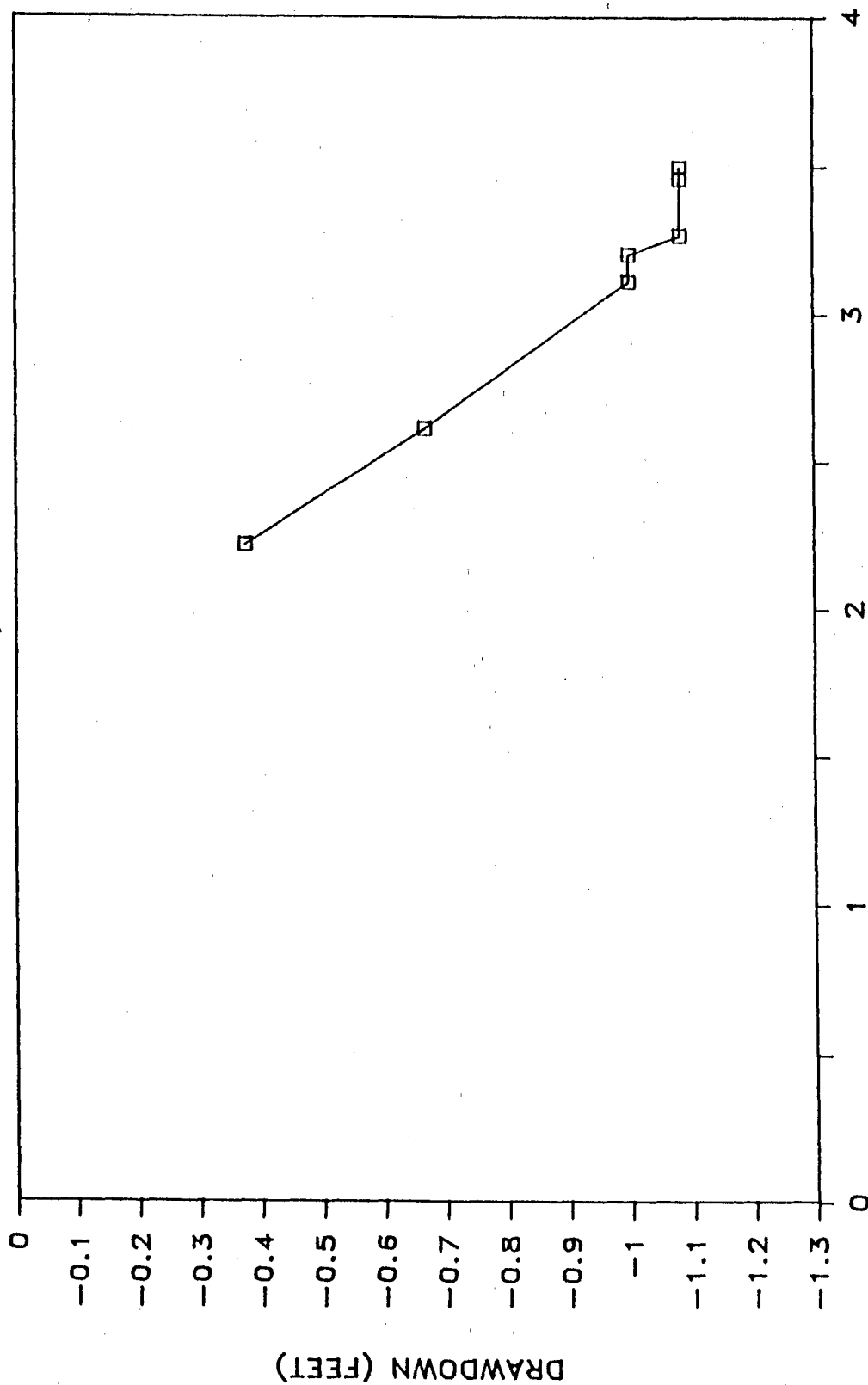


FIGURE 30

TIME-DRAWDOWN

GBR-25, OBS WELL



LOG TIME

FIGURE 31

TIME—DRAWDOWN

GBR-26, OBS WELL

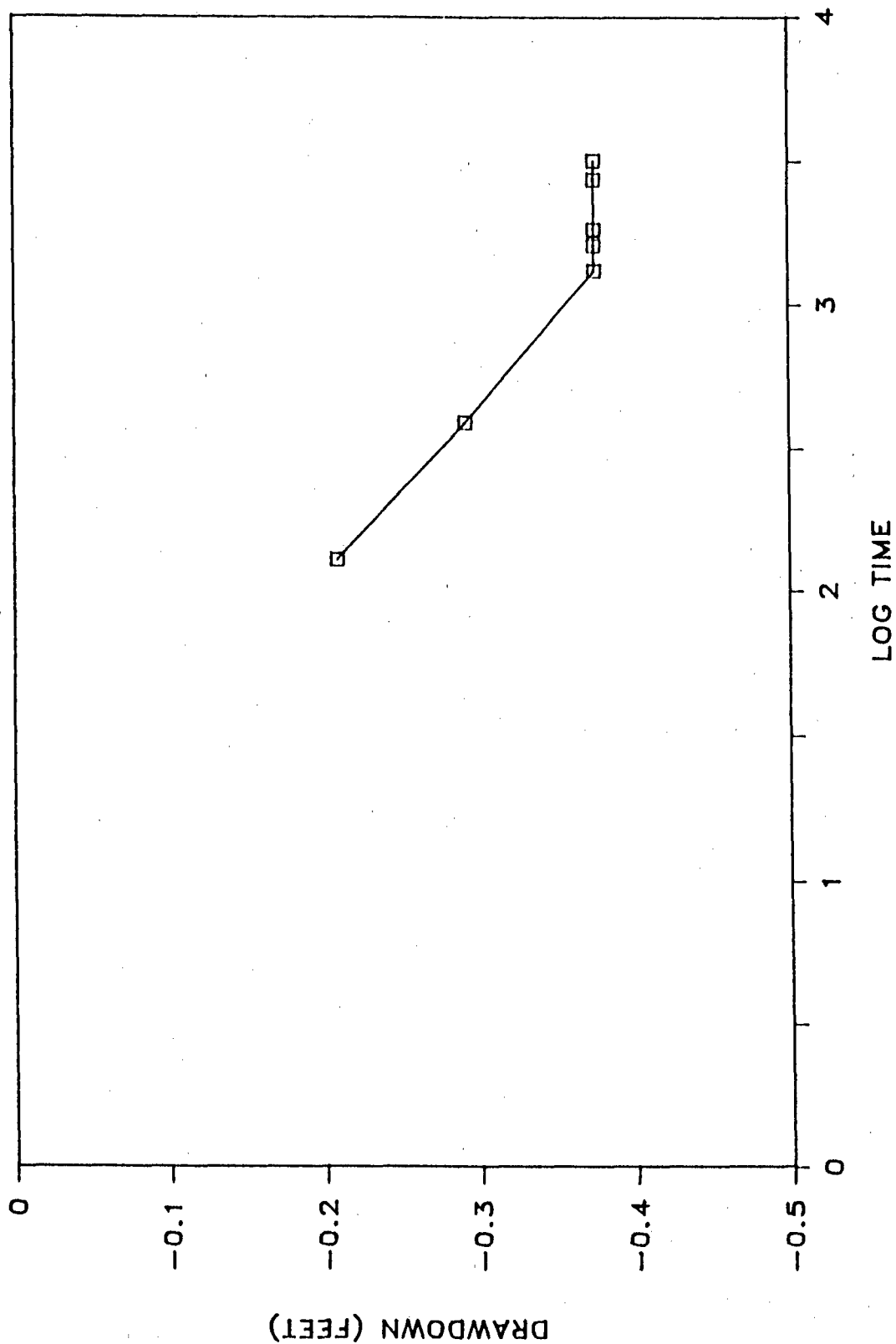


FIGURE 32

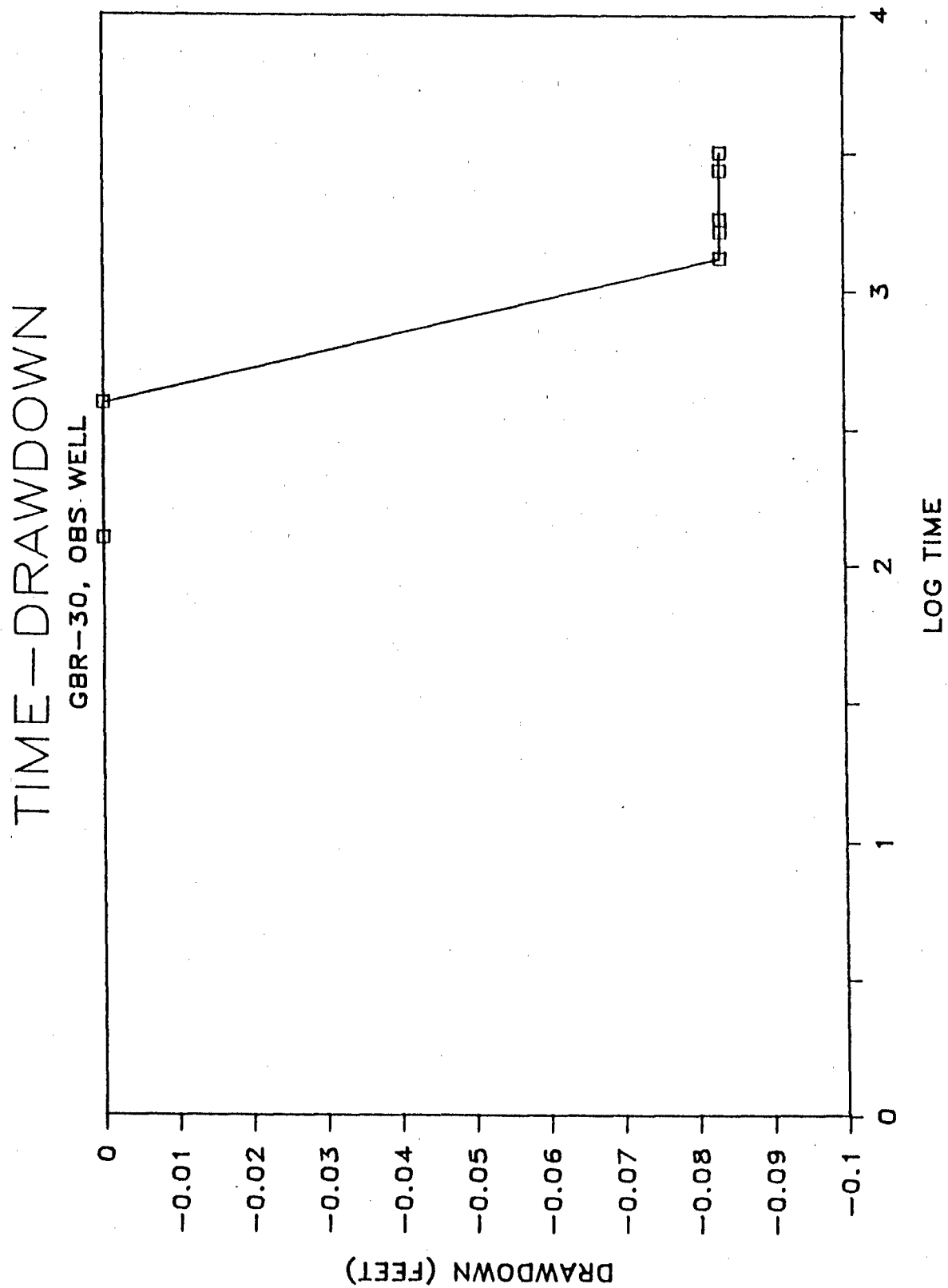


FIGURE 33

TIME-DRAWDOWN

STEEL WELL, OBS WELL

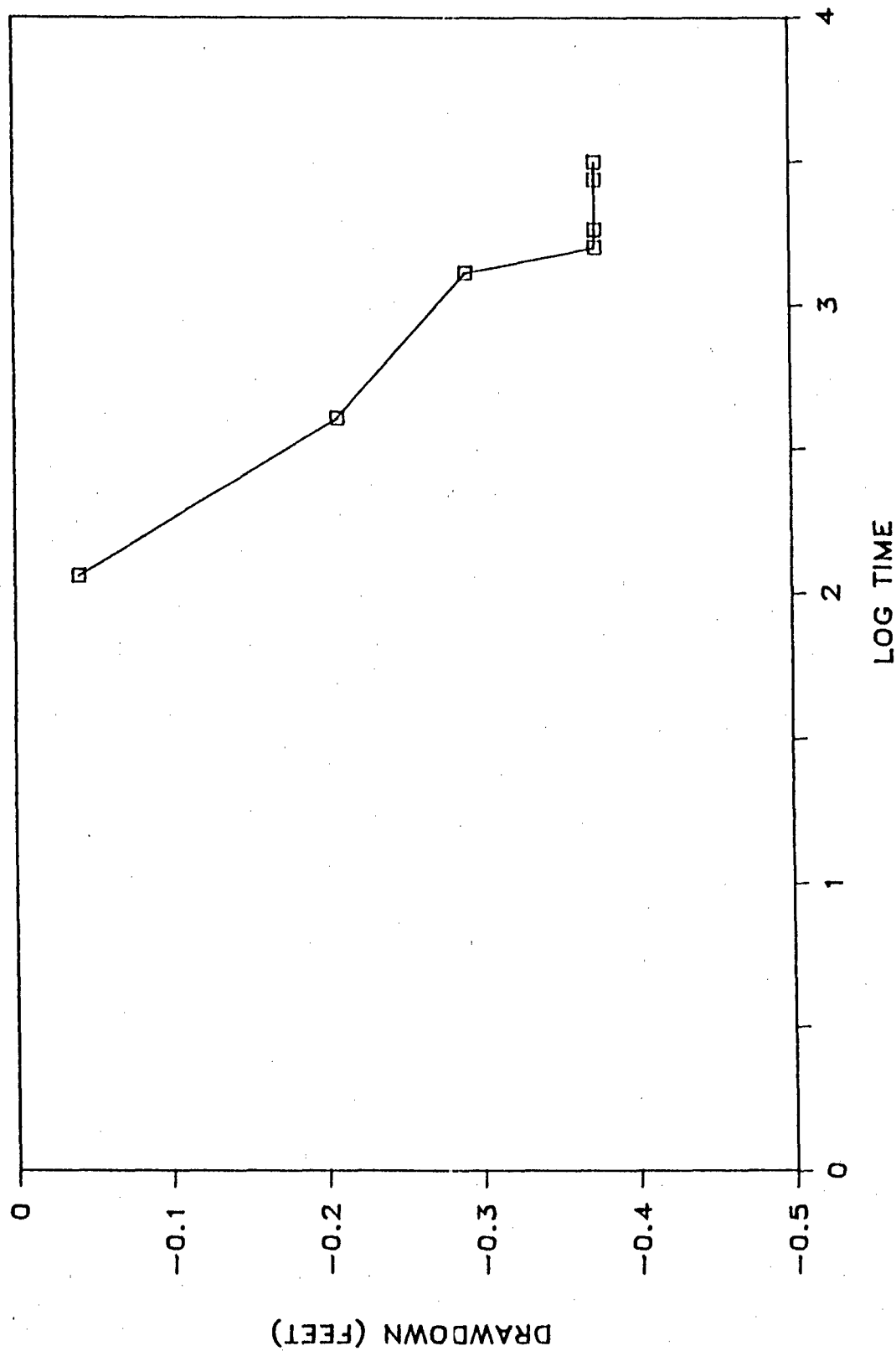


FIGURE 34

PUMP TEST DATA
TABLE C12

WPR 17 COLUMBIA WELLS

CLOCK	TIME (min)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	31.00	8.00	31.57	0.00	0.00	ERR
1348.00	108.00	38.00	2.00	36.17	5.50	108.00	2.03
945.00	1305.00	39.00	1.00	37.08	-7.42	1197.00	3.12
1430.00	1590.00	39.00	1.00	39.08	-7.42	285.00	3.20
1845.00	1845.00	39.00	5.00	39.42	-7.75	255.00	3.27
939.00	2739.00	39.00	5.00	39.42	-7.75	874.00	3.44
1609.00	3129.00	39.00	5.00	39.42	-7.75	380.00	3.50

PUMP TEST DATA
TABLE C13

GRR 117 (a) (PUMPING WELL)

CLOCK	TIME (min)	DEPTH TO PRODUCT FEET	DEPTH TO PRODUCT INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME LOG TIME MINUTES	
1200.00	0.00	29.00	7.00	29.50	0.00	0.00	FRR
1415.00	135.00	NONE	NONE	----	----	135.00	2.13
1820.00	380.00	NONE	NONE	----	----	245.00	2.58
926.00	1286.00	NONE	NONE	----	----	906.00	3.11
1444.00	1604.00	NONE	NONE	----	----	218.00	3.21
1849.00	1849.00	NONE	NONE	----	----	243.00	3.27
849.00	2689.00	NONE	NONE	----	----	840.00	3.43
1629.00	3149.00	NONE	NONE	----	----	460.00	3.50

PUMP TEST DATA
TABLE C14

GBR 27 (PUMPING WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	29.00	9.00	29.87	0.00	0.00	FRR
1415.00	135.00	36.00	4.00	36.33	6.67	135.00	2.13
1820.00	380.00	37.00	2.00	37.17	-7.50	245.00	2.58
926.00	1286.00	38.00	0.00	38.00	-8.33	201.00	3.11
1444.00	1604.00	38.00	11.00	38.32	-9.29	318.00	3.21
1849.00	1849.00	39.00	7.00	39.58	-9.92	245.00	3.27
849.00	2689.00	39.00	7.00	39.58	-5.92	240.00	3.43
1629.00	3149.00	40.00	5.00	40.42	-10.75	460.00	3.50

PUMP TEST DATA TABLE C15

GR 28(a) (PUMPING WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	WATER INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	33.00	9.00	33.75	0.00	0.00	SLR
1443.00	153.00	TRACE	TRACE	----	----	153.00	2.18
1815.00	375.00	TRACE	TRACE	----	----	222.00	2.67
921.00	1281.00	TRACE	TRACE	----	----	506.00	3.11
1452.00	1612.00	TRACE	TRACE	----	----	331.00	3.21
1852.00	1852.00	NONE	NONE	----	----	240.00	3.27
908.00	2708.00	NONE	NONE	----	----	856.00	3.43
1635.00	3155.00	NONE	NONE	----	----	447.00	3.50

PUMP TEST DATA
TABLE C16

GER 28 (PUMPING WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	WATER INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	33.00	10.50	33.98	0.00	0.00	ERR
1443.00	153.00	34.00	5.50	34.46	-0.58	153.00	2.18
1815.00	375.00	34.00	6.00	34.59	-0.63	222.00	2.57
921.00	1281.00	34.00	6.00	34.50	0.63	906.00	3.11
1452.00	1612.00	34.00	7.00	34.58	-0.71	331.00	3.21
1852.00	1852.00	34.00	7.00	34.58	-0.71	240.00	3.27
908.00	2700.00	34.00	7.00	34.58	-0.71	858.00	3.43
1635.00	3155.00	34.00	7.00	34.58	0.71	447.00	3.50

PUMP TEST DATA
TABLE C17

BWR IS FORM DELLY

CLOCK	TIME (min)	DEPTH TO WATER FEET	WATER INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	30.00	9.00	30.75	0.00	0.00	ERR
1351.00	111.00	32.00	0.50	32.04	-1.29	111.00	2.05
1842.00	402.00	33.00	0.00	33.33	-2.50	291.00	2.60
941.00	1301.00	34.00	7.50	34.43	-3.88	589.00	3.11
1434.00	1594.00	35.00	0.50	35.22	-4.54	293.00	3.20
1834.00	1834.00	34.00	7.00	35.58	-1.83	140.00	3.26
924.00	2724.00	35.00	7.00	35.58	-4.80	390.00	3.44
1612.00	3132.00	35.00	7.50	35.63	-4.80	400.00	3.50

PUMP TEST DATA
TABLE C18

GWR 215 (b) (OBS. WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	DEPTH TO WATER INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	21.00	4.00	21.50	0.00	0.00	ERR
1423.00	143.00	21.00	6.00	21.50	0.00	143.00	2.16
1822.00	382.00	21.00	6.00	21.50	0.00	239.00	2.38
928.00	1288.00	21.00	6.50	21.54	-0.04	806.00	3.11
1447.00	1607.00	21.00	6.50	21.54	-0.04	339.00	3.21
916.00	2716.00	21.00	6.50	21.54	-0.04	1105.00	3.43
1639.00	3157.00	21.00	6.50	21.54	-0.04	743.00	3.50

PUMP TEST DATA
TABLE C19

DWR 210 (003 WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	31.00	4.50	31.38	0.00	0.00	ERR
1443.00	163.00	32.00	5.00	32.42	-1.04	163.00	2.21
1824.00	384.00	32.00	7.00	32.58	-1.21	221.00	2.58
931.00	1291.00	33.00	7.00	33.58	-2.51	907.00	3.11
1439.00	1595.00	34.00	11.00	34.92	-2.51	208.00	3.20
918.00	2710.00	34.00	9.00	34.75	-3.38	1179.00	3.43
1620.00	3140.00	34.00	11.50	34.96	-3.58	422.00	3.50

PUMP TEST DATA
TABLE C20

GUR 23a (GUS WELL)

CLOCK	TIME (min)	DEPTH TO PRODUCT FEET	PRODUCT INCHES	TOTAL DEPTH FEET	TOTAL DEADEND FEET	DELTA TIME MINUTES	TIME LOG TIME
1200.00	0.00	23.00	11.75	23.00	0.00	0.00	ERR
1426.00	146.00	TRACE	TRACE	---	---	146.00	2.16
1847.00	407.00	TRACE	TRACE	---	---	261.00	2.61
936.00	1236.00	TRACE	TRACE	---	---	339.00	3.11
1449.00	1609.00	TRACE	TRACE	---	---	313.00	3.21
1858.00	1858.00	NONE	NONE	---	---	245.00	3.27
846.00	2686.00	NONE	NONE	---	---	528.00	3.43
1633.00	3153.00	NONE	NONE	---	---	467.00	3.50

PUMP TEST DATA
TABLE C21

OBS 23 (OBS WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	DEPTH TO WATER INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	24.00	0.00	24.00	0.00	0.00	ERR
1426.00	146.00	24.00	5.50	24.46	-0.46	146.00	2.16
1847.00	407.00	24.00	3.50	24.29	-0.29	261.00	2.61
936.00	1296.00	24.00	3.00	24.25	-0.25	589.00	3.11
1449.00	1609.00	24.00	3.00	24.25	-0.25	513.00	3.21
1858.00	1858.00	24.00	2.00	24.17	-0.17	249.00	3.27
846.00	2686.00	24.00	2.00	24.17	-0.17	528.00	3.43
1633.00	3153.00	24.00	0.00	24.00	0.00	467.00	3.50

PUMP TEST DATA TABLE C22

BSR 248(g) (OBS WELL)

CLOCK	TIME (min)	DEPTH TO PRODUCT FEET	PRODUCT INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	26.00	4.25	26.52	0.00	0.00	ERR
1401.00	121.00	26.00	9.25	26.77	-0.25	121.00	2.00
1835.00	395.00	27.00	5.50	27.46	-0.94	274.00	2.60
949.00	1309.00	27.00	7.50	27.63	-1.10	914.00	3.12
1524.00	1644.00	27.00	8.50	27.73	-1.19	735.00	3.22
1824.00	1824.00	27.00	9.25	27.77	-1.05	100.00	3.23
946.00	2746.00	TRACE	TRACE	---	---	922.00	3.44
1644.00	3164.00	NONE	NONE	---	---	412.00	3.50

PUMP TEST DATA TABLE C23

BSR 243 (URS HELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	WATER INCHES	TOTAL DEPTH FEET	TOTAL DEMAND FEET	REL. TIME MINUTES	LOS TIME
1200.00	0.00	26.00	6.50	26.54	0.00	0.00	ERR
1401.00	121.00	26.00	9.50	26.79	-0.25	121.00	2.08
1835.00	395.00	27.00	6.00	27.50	-0.94	274.00	2.60
949.00	1309.00	27.00	9.00	27.67	-1.17	514.00	3.12
1524.00	1644.00	27.00	9.00	27.75	-1.21	535.00	3.22
1824.00	1824.00	27.00	7.50	27.79	-1.25	130.00	3.26
946.00	2746.00	28.00	0.00	28.00	-1.66	722.00	3.44
1644.00	3164.00	28.00	0.00	28.00	-1.46	418.00	3.50

PUMP TEST DATA
TABLE C24

ERR 24D (OBS WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	WATER INCHES	TOTAL DEPTH FEET	TOTAL DROWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	27.00	5.00	27.42	0.00	0.00	ERR
1358.00	118.00	28.00	1.00	28.08	-0.67	118.00	2.07
1837.00	397.00	28.00	1.50	28.13	-0.71	279.00	2.60
947.00	1307.00	29.00	5.00	29.42	-2.00	910.00	3.12
1521.00	1641.00	29.00	6.50	29.54	-2.13	334.00	3.22
1822.00	1822.00	29.00	7.50	29.63	-2.21	181.00	3.26
948.00	2748.00	29.00	7.50	29.63	-2.21	276.00	3.44
1617.00	3137.00	29.00	7.50	29.63	-2.21	389.00	3.50

PUMP TEST DATA
TABLE C25

GUR 25 (085 WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	DEPTH TO WATER INCHES	TOTAL DEPTH FEET	TOTAL DEMANDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	29.00	0.00	29.00	0.00	0.00	ERR
1445.00	165.00	29.00	4.50	29.38	-0.38	165.00	2.22
1849.00	409.00	29.00	8.00	29.67	-0.67	244.00	2.61
934.00	1294.00	30.00	0.00	30.00	-1.00	1385.00	3.11
1441.00	1601.00	30.00	0.00	30.00	-1.00	307.00	3.20
1856.00	1856.00	30.00	1.00	30.08	-1.08	235.00	3.27
844.00	2884.00	30.00	1.00	30.08	-1.08	1028.00	3.46
1623.00	3143.00	30.00	1.00	30.08	-1.08	759.00	3.50

**PUMP TEST DATA
TABLE C26**

GBR 26(a) (OBS WELL)

CLOCK	TIME (min)	DEPTH TO PRODUCT FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	31.00	1.50	31.13	0.00	0.00	ERR
1408.00	128.00	31.00	2.00	31.17	-0.04	128.00	2.11
1828.00	388.00	31.00	3.00	31.25	-0.13	260.00	2.59
959.00	1319.00	31.00	4.00	31.33	-0.21	931.00	3.12
1455.00	1615.00	31.00	4.00	31.33	-0.21	296.00	3.21
1832.00	1832.00	31.00	4.00	31.33	-0.21	217.00	3.26
921.00	2721.00	31.00	4.50	31.38	-0.25	889.00	3.43
1652.00	3172.00	31.00	4.50	31.38	-0.25	451.00	3.50

GBR 26(a) (OBS WELL)

CLOCK	TIME (min)	DEPTH TO PRODUCT FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	31.00	1.50	31.13	0.00	0.00	ERR
1408.00	128.00	31.00	2.00	31.17	-0.04	128.00	2.11
1828.00	388.00	31.00	3.00	31.25	-0.13	260.00	2.59
959.00	1319.00	31.00	4.00	31.33	-0.21	931.00	3.12
1455.00	1615.00	31.00	4.00	31.33	-0.21	296.00	3.21
1832.00	1832.00	31.00	4.00	31.33	-0.21	217.00	3.26
921.00	2721.00	31.00	4.50	31.38	-0.25	889.00	3.43
1652.00	3172.00	31.00	4.50	31.38	-0.25	451.00	3.50

PUMP TEST DATA
TABLE C27

GBR 26(b) (OBS WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	WATER INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	31.00	1.50	31.13	0.00	0.00	ERR
1408.00	128.00	31.00	4.00	31.33	-0.21	128.00	2.11
1828.00	308.00	31.00	5.00	31.42	-0.27	260.00	2.59
959.00	1319.00	31.00	6.00	31.50	-0.38	931.00	3.12
1455.00	1615.00	31.00	6.00	31.50	-0.38	296.00	3.21
1832.00	1832.00	31.00	6.00	31.50	-0.32	217.00	3.26
921.00	2721.00	31.00	6.00	31.50	-0.38	889.00	3.43
1652.00	3172.00	31.00	6.00	31.50	-0.38	451.00	3.50

PUMP TEST DATA
TABLE C28

GER 30(a) (Q88 WELLY)

CLOCK	TIME (min)	DEPTH TO FEET	PRODUCT INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	31.00	4.00	31.33	0.00	0.00	ERR
1405.00	125.00	31.00	5.00	31.42	-0.08	125.00	2.10
1832.00	392.00	31.00	5.50	31.46	-0.13	267.00	2.57
957.00	1317.00	31.00	6.00	31.50	-0.17	925.00	3.12
1527.00	1647.00	31.00	6.00	31.50	-0.17	330.00	3.22
1829.00	1829.00	31.00	6.00	31.50	-0.17	182.00	3.26
930.00	2730.00	31.00	6.00	31.50	-0.17	901.00	3.44
1649.00	3169.00	NONE	NONE	---	---	439.00	3.50

PUMP TEST DATA
TABLE C29

GDR 30 (UES WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	DEPTH TO WATER INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	31.00	6.00	31.50	0.00	0.00	ERR
1405.00	125.00	31.00	6.00	31.50	0.00	125.00	2.10
1832.00	392.00	31.00	6.00	31.50	0.00	267.00	2.59
957.00	1317.00	31.00	7.00	31.58	-0.08	925.00	3.12
1527.00	1647.00	31.00	7.00	31.58	-0.08	330.00	3.22
1829.00	1829.00	31.00	7.00	31.58	-0.08	182.00	3.26
930.00	2730.00	31.00	7.00	31.58	-0.08	501.00	3.44
1649.00	3169.00	31.00	7.00	31.58	-0.08	439.00	3.50

PUMP TEST DATA
TABLE C30

STEEL WELL (OBS WELL)

CLOCK	TIME (min)	DEPTH TO WATER FEET	INCHES	TOTAL DEPTH FEET	TOTAL DRAWDOWN FEET	DELTA TIME MINUTES	LOG TIME
1200.00	0.00	29.00	9.50	29.79	0.00	0.00	ERR
1354.00	114.00	29.00	10.00	29.83	-0.04	114.00	2.06
1844.00	404.00	30.00	0.00	30.00	-0.21	290.00	2.61
942.00	1302.00	30.00	1.00	30.08	-0.29	378.00	3.11
1436.00	1596.00	30.00	2.00	30.17	-0.38	294.00	3.20
1836.00	1836.00	30.00	2.00	30.17	0.38	240.00	3.26
926.00	2726.00	30.00	2.00	30.17	-0.38	890.00	3.44
1615.00	3135.00	30.00	2.00	30.17	-0.38	409.00	3.50

PUMP TEST
SOUTHERN REFINERY AREA
GBR-29

PUMP TEST - SOUTHERN REFINERY AREA - GBR-29

The pump test performed in the southern refinery area involved withdrawal of water from GBR-29, which had a screened interval extending throughout the alluvium and the underlying consolidated sandstone. However, since the piezometric surface occurred well below the alluvium, only the sandstone was stressed at the pump well (see logs, Appendix C). Observation well GBR-8, which was completed entirely within the alluvium to the northwest of GBR-29, exhibited a measurable response to pumping, indicating that the alluvium and sandstone are hydraulically-connected at the pump test site. Some response was evident at GBR-9, which was completed in sandy clay, silt, and shale at the base of the alluvium, but analysis of the data obtained at this well was hindered by the small resolution of drawdown measurements, which were obtained with an automatic measuring device and were accurate only to the nearest 0.5 inch. Changes in drawdown observed at GBR-9 were not sufficiently large to permit identification of aquifer behavior within the limits of measurement error.

for some reason should not use data from GBR-8

?
On what basis

Upward leakage of ground water from the locally-confined system underlying the shale near GBR-9 did not appear to measurably influence drawdown at either GBR-29 or 8, as indicated by the absence of a flattened portion of Theis plots of the data recorded at GBR-29 or 8 within the bounds of measurement error. The shale was probably limited in areal extent to the vicinity of GBR-9 and did not contribute significantly to the overlying unconfined system.

no definite curve for this data

Since there was no evidence of deviation from ideal Theis behavior for drawdown observed at GBR-29 or GBR-8 within measurement error, straight-forward Theis fits were used to analyze the data. Transmissivity calculated on the basis of data from GBR-29 was estimated as 1041.8 $\frac{\text{gpd}}{\text{ft}}$, while T and S from data observed at GBR-8 were determined to equal 2338.8 $\frac{\text{gpd}}{\text{ft}}$ and 0.051 (see Figures 35 & 36). The moderately-high value of the storage coefficient suggested that shale was absent in the vicinity of the pump test site. Transmissivities calculated from the test can be viewed as overall transmissivities for the unconfined system occurring throughout the alluvium and sandstone in the absence of continuing shale units. An average transmissivity of 1690.3 $\frac{\text{gpd}}{\text{ft}}$ can therefore be used to characterize the unconfined system underlying the

I had $T = 928.5 \frac{\text{gpd}}{\text{ft}}$ using Jacob analysis

this value should not be used due to low confidence in calculations for GBR-8 which should not be averaged in

southern refinery area. The estimated value of storativity was well within the range normally encountered in unconfined aquifers.

CONCLUSIONS

The alluvium and sandstone underlying the southern refinery area are hydraulically connected in the vicinity of GBR-29 and GBR-8. This system is generally unconfined, but confined conditions may exist locally beneath areally-limited shale units.

No Overall transmissivity of the regionally unconfined system averages 1645.3 gpd/ft. Storativity is approximately equal to 0.05 in unconfined areas of the system.

Why use 0.05 calculated from GBR-8 instead of value from GBR-29 29 is pumped well

DISCHARGE AT GBR-29 REQUIRED TO INTERCEPT PRODUCT AT GIANT BLOOMFIELD REFINERY - SOUTHERN REFINERY AREA

The rate of discharge that would be required at well GBR-29 in order to completely offset the natural southwestward-trending hydraulic gradient toward the subdivision can be estimated using general Theis analysis. The natural hydraulic gradient in the unconfined system was estimated using a map of water levels obtained during November and corrected for product thicknesses observed at that time. A flow line extending through GBR-29 perpendicular to the observed equipotential lines is shown in Figure 37. On the basis of the 5351-ft and 5350-ft potential lines, which were the last lines generated by the plot routine along the southern edge of the map, the hydraulic gradient oriented perpendicular to the lines was defined as:

$$\left(\frac{dh}{dx}\right)_{\max} = \frac{(5350-5351) \text{ ft}}{12.5 \text{ ft}} = -0.08$$

and was equal to the maximum hydraulic gradient near well GBR-29.

Since interest was focused on the southern component of the gradient, which was the principle control on contaminant transport into the subdivision, this gradient was projected in the southern direction as follows:

$$\begin{aligned}
 \left(\frac{dh}{dx}\right)_{\text{south}} &= \left(\frac{dh}{dx}\right)_{\text{max}} \cos A \\
 &= -0.08 \cos (60) \\
 &= -0.04
 \end{aligned}$$

At a point located 300 feet south of GBR-29, the difference in head was determined as

$$h = \left(\frac{dh}{dx}\right)_{\text{south}} \times (300 \text{ ft}) = (-0.04)(300 \text{ ft}) = 12 \text{ ft}$$

yes it's the same as the pumped area

Thus, pumping at GBR-29 can offset the natural southern component of the gradient only by generating at least 12 feet of drawdown at the well.

Using a transmissivity of 1690.3 gpd/ft and a storage coefficient of 0.05 *should not use (use 1041 gpd/ft)* ?
 from a previous pump-test analysis performed in the sandstone unit at GBR-29, a first approximation of the rate of discharge required to maintain a horizontal water table after 1 year of pumping can be estimated.

$$\begin{aligned}
 u &= \frac{1.87 (0.25)^2 (0.05)}{1690.3 (365)} = 9.5 \times 10^{-9} \\
 w(u) &= 17.8948 \\
 Q &= \frac{12(1690.3)}{114.6 (17.8948)} = 9.9 \text{ gpm}
 \end{aligned}$$

However, this discharge creates drawdown at a point 300 feet south of the well, requiring even greater discharge to offset the resulting slight southward hydraulic gradient.

Using the discharge of 9.9 gpm, additional drawdown induced at a point 300 feet from the pump well was determined.

$$\begin{aligned}
 u &= \frac{1.87 (300)^2 (0.05)}{1690.3 (365)} = 1.4 \times 10^{-2} \\
 w &= 3.7054 \\
 s &= \frac{114.6 (9.9) (3.705)}{1690.3} = 2.5 \text{ ft}
 \end{aligned}$$

Pumpage at GBR-29 which would overcome the new estimate of $12 + 2.5 = 14.5$ feet of head differential was estimated:

$$Q = \frac{14.5 (1690.3)}{114.6 (17.8948)} = 11.95 \text{ gpm}$$

Using this iterative method, the minimum rate of discharge required at GBR-29 was calculated until the change in discharge between iterations was negligible:

<u>iteration</u>	<u>Q min (gpm)</u>
1	9.9
2	11.95
3	12.37
4	12.45
5	12.47

*This value will be diff.
using $T = 1041 \text{ sp/ft}$*

The minimum rate of pumping required at GBR-29, assuming that T, S, and dh/dx observed near GBR-29 are representative of the unconfined system 300 feet south of the pump well, was 12.5 gpm. Larger discharge would be required to actually induce northward-oriented hydraulic gradients which would draw contamination away from the subdivision.

Although larger values of T and S are probably representative of the alluvial valley fill south of the highway, flow to the GBR-29 recovery well will be limited by the transmissivity and storativity of the consolidated sandstone. Therefore, consideration of the effects of higher T and S south of the highway would have little effect on the analysis.

FIGURE-35
DOUBLE LOG PLOT OF
DRAWDOWN AT GBR-29

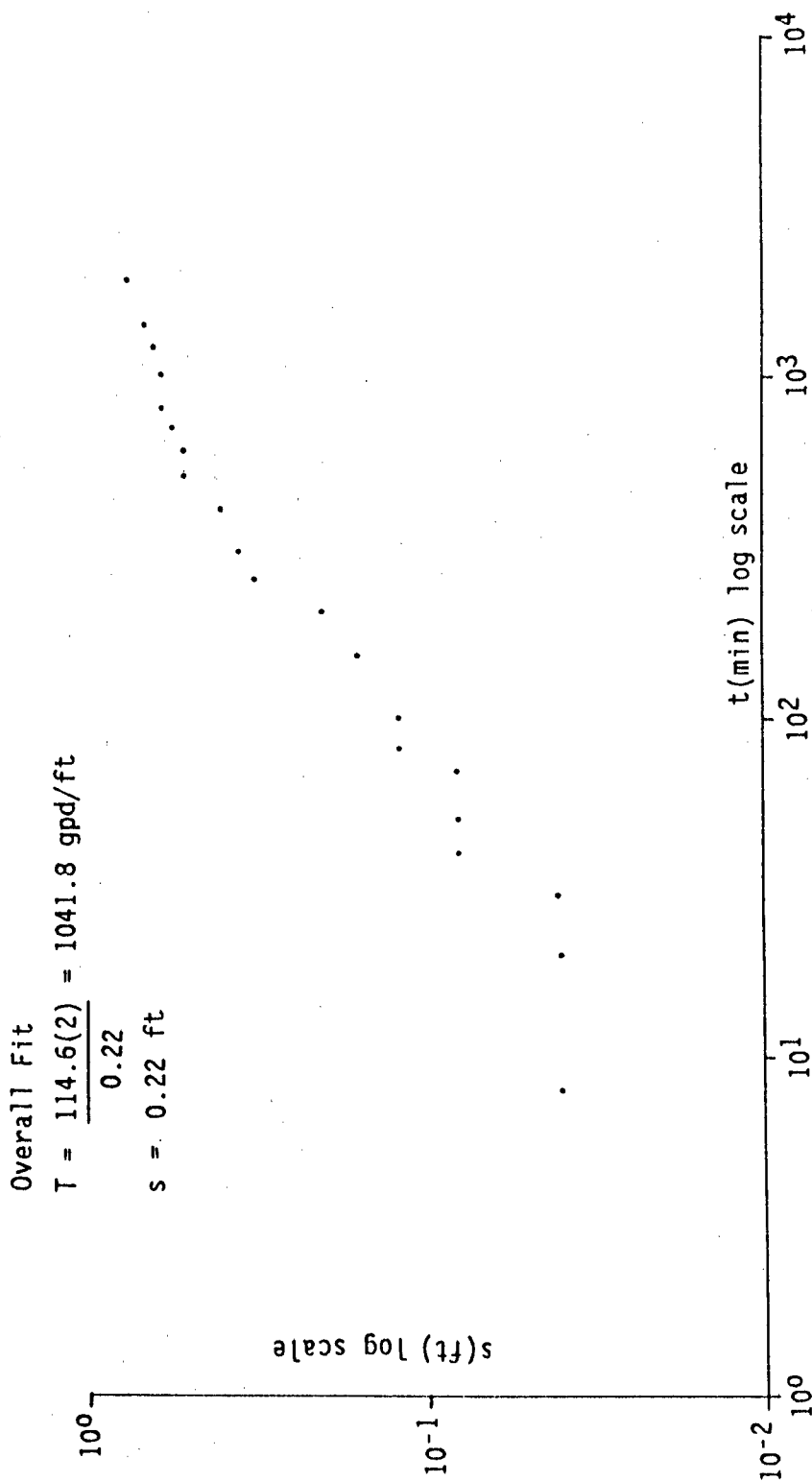
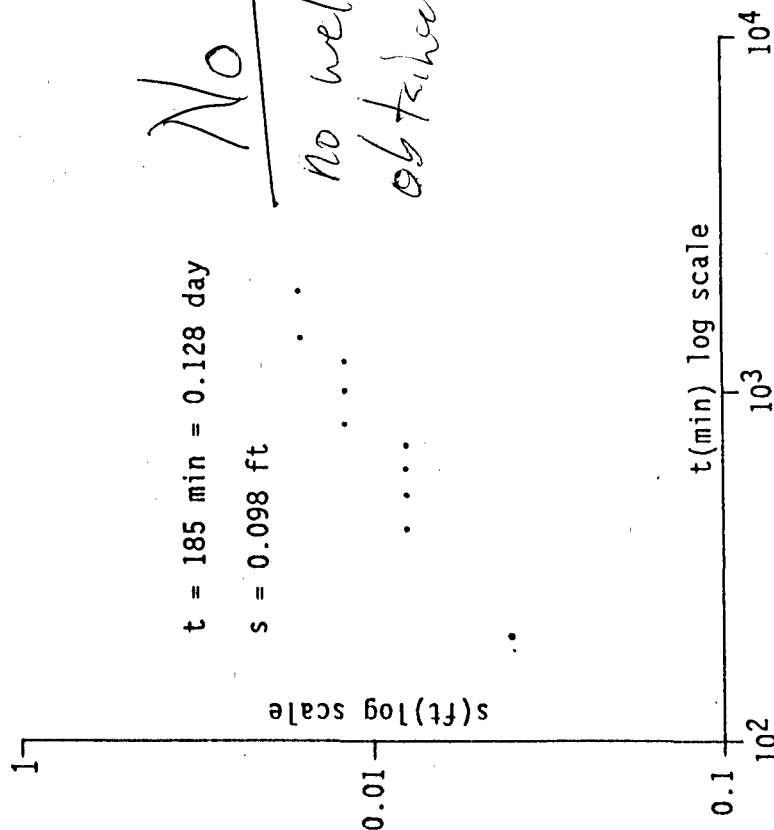


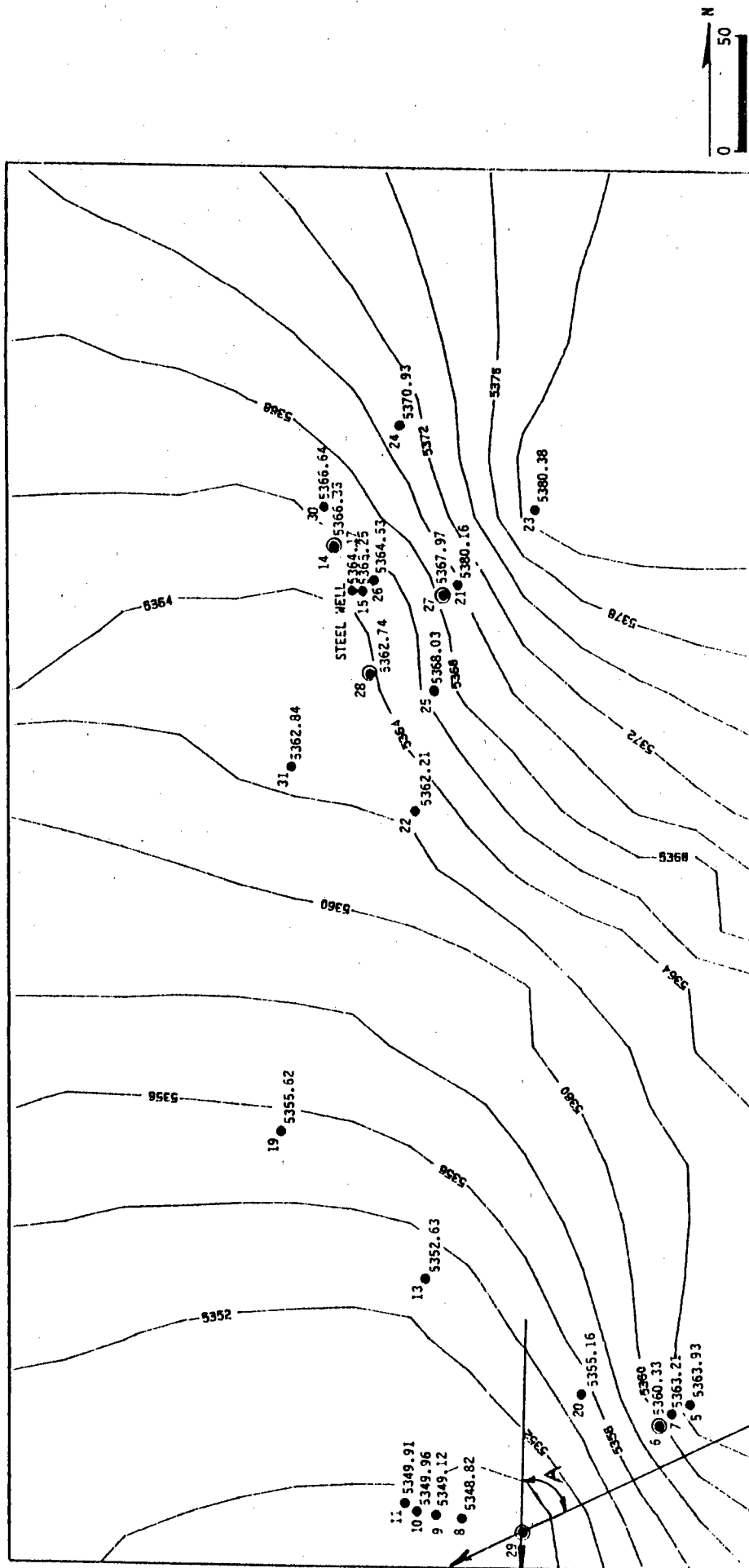
FIGURE - 36

DOUBLE LOG PLOT OF DRAWDOWN AT
GBR-8 DUE TO PUMPING AT GBR-29

$$T = \frac{114.6(2)}{0.098} = 2338.8 \text{ gpd/ft}$$

$$s = \frac{2338.8(0.128)}{1.87(56.3)^2} = 0.051$$





Elevations in Feet above Sea Level, Measured in Monitor and Recovery Wells and Corrected for Floating Product, if Present.

- RECOVERY WELL
- MONITOR WELL

GROUND WATER LEVEL CONTOUR MAP - GIANT BLOOMFIELD REFINERY, NOV. 1986

FIGURE 37

TABLE C31 GBR-29 PUMP TEST DRAWDOWN IN FEET (Q=2 gpm)			
MINUTES OF PUMPING	PUMPED WELL GBR-29	OBSERVATION WELLS	
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	.04	0	0
9	.04	0	0
10	.04	0	0
20	.04	0	0
30	.04	0	0
40	.08	0	0
50	.08	0	0
70	.08	0	0
80	.12	0	0
100	.12	0	0
150	.16	0	0
200	.20	.04	0
250	.32	.04	0
300	.36	.04	0
400	.40	.08	.04
500	.52	.08	.04
600	.52	.08	.04
700	.56	.08	.04
800	.60	.12	.04
1000	.60	.12	.04
1200	.64	.12	.04
1400	.68	.16	.08
1900	.76	.16	.08

Note: Resolution of readings = .04 ft. by computer hardware

REFERENCES

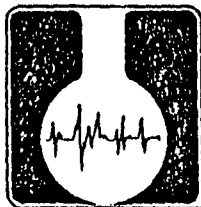
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Freeze, R.A. and J.A. Cherry, 1979, Ground Water: Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Todd, D.K., 1959, Ground Water Hydrology: John Wiley and Sons, New York.

MONT&AND\APPENDIX.C

APPENDIX D
SOIL HYDRAULIC ANALYSIS

ASSAIGAI
ANALYTICAL
LABORATORIES

TO: Geoscience/M & A
Attn: Nicholas
Alvarado Square
Albuquerque, NM 87158

DATE: 29 October 1986
1834

*% Moistures
for GBR-6*

ANALYTE: % Water Moisture

SAMPLE ID.	ANALYTICAL RESULTS
8609231130 2.5'	5.7 %
8609231200 11.0'	6.9 %
8609231300 15.0'	8.0 %
8609231330 17.5'	6.0 %
8609231400 20.0'	5.3 %
8609231415 22.5'	6.0 %
8609231430 25.0'	10.9 %
8609231500 30.0'	15.7 %
8609231520 32.5'	9.5 %
8609231530 33.0'	7.7 %
8609231545 36.0'	8.7 %
8609231600 37.5'	12.0 %
8609231615 40'	6.0 %
8609231620 43'	8.5 %
8609231630 48'	10.7 %

REFERENCE: " Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", USEPA, SW 846, EMSL-Cincinnati, 1982.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Jennifer V. Smith
Jennifer V. Smith, Ph.D.
Laboratory Director

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DANIEL B. STEPHENS & ASSOCIATES, INC.

CONSULTANTS IN GROUND-WATER HYDROLOGY

SOCORRO, NEW MEXICO

FINAL DATA REPORT
ON
LABORATORY ANALYSES
OF
SOIL HYDRAULIC PROPERTIES

PREPARED FOR
GEOSCIENCE CONSULTANTS, LTD.
ALBUQUERQUE, NEW MEXICO

DECEMBER, 1986

• GROUND-WATER CONTAMINATION • UNSATURATED ZONE INVESTIGATIONS • WATER SUPPLY DEVELOPMENT •



DANIEL B. STEPHENS & ASSOCIATES, INC.
CONSULTANTS IN GROUND-WATER HYDROLOGY

• GROUND-WATER CONTAMINATION • UNSATURATED ZONE INVESTIGATIONS • WATER SUPPLY DEVELOPMENT •

December 9, 1986

Mr. Randall T. Hicks
Vice President
GEOSCIENCE CONSULTANTS, LTD.
500 Cooper Avenue N.W., Suite 325
Albuquerque, New Mexico 87102

Dear Mr. Hicks:

Please find enclosed the final data report on the five soil analyses. This report constitutes completion of the analyses requested in your written communication of October 27, 1986.

We have reviewed the data available for each sample, and we believe the parameters are generally reasonable and representative for the soil samples. However, Daniel B. Stephens & Associates, Inc. cannot verify that samples are representative of the soils from which they were collected, and we do not assume any responsibility for interpretations or analyses based on this data.

We are very grateful to provide this service to GEOSCIENCE CONSULTANTS, LTD. Please do not hesitate to call us if you have any questions.

Sincerely Yours,

Warren B. Cox
Laboratory Manager

WBC:bdf
Enclosure

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Page 1

INTRODUCTION

INTRODUCTION

Daniel B. Stephens & Associates, Inc. was requested to perform the following tasks as outlined in written communication from GEOSCIENCE CONSULTANTS, LTD. on October 27, 1986 and personal communication from Mr. Randall Hicks on November 17, 1986.

Task #1. Conduct laboratory analyses of five (5) soil samples, to include analyses as outlined below for each sample:

<u>DEPTH</u>	<u>SAMPLE NUMBER</u>	<u>ANALYSIS TO BE PERFORMED</u>
12.5'	GC1	Initial moisture content, unsaturated hydraulic conductivity.
29.5'	GC2	Initial moisture content.
37'	GC3	Initial moisture content.
39'	GC4 (Sandstone)	Initial moisture content, unsaturated hydraulic conductivity.
39'	GC5 (Mudstone)	Initial moisture content, unsaturated hydraulic conductivity.

Task # 2. Determine, if possible, the horizontal saturated hydraulic conductivity of the sandstone sample, from 39 feet.

In execution of the foregoing request, Daniel B. Stephens & Associates, Inc. has performed the following work as summarized below and in Table 1.

Task #1. Laboratory analyses of the five (5) soil samples were completed. The method of Mualem (1978) was chosen for determin-



DANIEL B. STEPHENS & ASSOCIATES, INC.

ing unsaturated hydraulic conductivity, as agreed upon by Mr. Randall Hicks (Personal communication, November 17, 1986). The three parameter fit of the Mualem model was applied to moisture retention-pressure head characteristics of samples GC1, GC4, and GC5 which were obtained by the hanging column and pressure plate methods. The parameters of fit α , n and residual moisture content, were used by the model to calculate relative unsaturated hydraulic conductivity, as described in Appendix B, Principles and Methods. Saturated hydraulic conductivity was determined for samples GC1, GC4 and GC5, as part of the determination of unsaturated hydraulic conductivity. Graphical representation of the data generated by the model is presented for unsaturated hydraulic conductivity.

Task #2. Horizontal saturated hydraulic conductivity of sample GC4 (Sandstone) could not be measured because there was insufficient soil core for analysis.

Included in this data report are summary tables, graphs, and raw laboratory data. The Appendices describe basic principles of the analyses, methods of calculation, sample preparation, and a chemical analysis of the water used in the laboratory. All calculation results are expressed in metric units according to Table 2, except for sample depths which were reported to us in length units of feet.



Table 1. Summary of Tests

Sample No. Test	GC1	GC2	GC3	GC4	GC5
Saturated Hydraulic Conductivity	X			X	X
Unsaturated Hydraulic Conductivity	X			X	X
Moisture Retention	X			X	X
Initial Moisture Content	X	X	X	X	X

Note: GC4 represents the sandstone sample, GC5 represents the mudstone sample.



Table 2. Unit Conventions

Hydraulic Conductivity: cm/sec

Moisture Content: % volume

Bulk Density: g/cc

Porosity: Dimensionless

Note: Unless otherwise stated, lengths are in units of centimeters, and masses are in units of grams.



DANIEL B. STEPHENS & ASSOCIATES, INC.

SATURATED HYDRAULIC CONDUCTIVITY

Table 3. Summary of Saturated Hydraulic Conductivity Test Results

<u>Sample No.</u>	<u>K (cm/sec)</u>	
GC1	1.1×10^{-4}	
GC4	3.1×10^{-5}	(Sandstone)
GC5	9.3×10^{-6}	(Mudstone)



FALLING HEAD TEST DATA

JOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GCI RING NO: H21 DEPTH: 12.5'TYPE OF WATER USED: TapLENGTH OF SAMPLE: 1.9 (cm) RADIUS OF SAMPLE: 2.5 (cm)CROSS SECTIONAL AREA OF SAMPLE: 19.63 (cm²)CROSS SECTIONAL AREA OF STANDPIPE: 20.428 (cm²)BEGINNING: Stand Pipe #5

DATE	TIME	TEMP (°C)	RESERVOIR HEAD (cm)	SAMPLE HEAD (cm)	ΔH_1 (cm)
11/13	0900	18.5	-41	-17.8	-23.2
11/13	1845	18.5	-41	-14.2	-26.8

ENDING:

DATE	TIME	TEMP (°C)	RESERVOIR HEAD (cm)	SAMPLE HEAD (cm)	ΔH_2 (cm)
11/13	1837	18.5	-41	-27.9	-13.1
11/14	0818	18.5	-41	-32.5	-8.5

ELAPSED TIME = 1st run = 34.620 (sec) 2nd run = 48,780 (sec)VISCOSITY CORRECTION = 1.038 (both runs)RUN NO. OF RUNS

CALCULATIONS: 1st run, $K_{sat} = 8.7 \times 10^{-5}$ cm/sec
 2nd run, $K_{sat} = 12.5 \times 10^{-5}$ cm/sec

K (SAT) = 1.1×10^{-4} cm/sec = arithmetic average

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: W. CoxCALCULATIONS MADE BY: W. CoxCHECKED BY: L. Williamson

DANIEL B. STEPHENS & ASSOCIATES, INC.

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FALLING HEAD TEST DATA

JOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC4 (Sandstone) RING NO: 21C DEPTH: 39'TYPE OF WATER USED: TapLENGTH OF SAMPLE: 5.1 (cm) RADIUS OF SAMPLE: 2.5 (cm)CROSS SECTIONAL AREA OF SAMPLE: 19.63 (cm²)CROSS SECTIONAL AREA OF STANDPIPE: 20.428 (cm²)

BEGINNING: Standpipe #4

DATE	TIME	TEMP (°C)	RESERVOIR HEAD (cm)	SAMPLE HEAD (cm)	ΔH_1 (cm)
11/13	0900	17.0	-41.5	-10.2	-31.3
11/13	1839	19.0	-41.5	-14.9	-26.6

ENDING:

DATE	TIME	TEMP (°C)	RESERVOIR HEAD (cm)	SAMPLE HEAD (cm)	ΔH_2 (cm)
11/13	1839	19.0	-41.5	-14.9	-26.6
11/14	0828	19.0	-41.5	-22.1	-19.4

ELAPSED TIME = 1st run = 34.740 (sec) 2nd run = 49,740 (sec)VISCOSITY CORRECTION = 1st run = 1.051 2nd run = 1.025RUN NO. OF RUNS

CALCULATIONS: 1st run, K sat = 2.6×10^{-5} cm/sec
 2nd run, K sat = 3.5×10^{-5} cm/sec

K (SAT) = 3.1×10^{-5} cm/sec = arithmetic average

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: W. CoxCALCULATIONS MADE BY: W. CoxCHECKED BY: L. Williamson

DANIEL B. STEPHENS & ASSOCIATES, INC.

FALLING HEAD TEST DATA

JOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC5 (Mudstone) RING NO: H14 DEPTH: 39'TYPE OF WATER USED: TapLENGTH OF SAMPLE: 5.1 (cm) RADIUS OF SAMPLE: 2.5 (cm)CROSS SECTIONAL AREA OF SAMPLE: 19.63 (cm²)CROSS SECTIONAL AREA OF STANDPIPE: 20.428 (cm²)

BEGINNING: Standpipe #3

DATE	TIME	TEMP (°C)	RESERVOIR HEAD (cm)	SAMPLE HEAD (cm)	ΔH_1 (cm)
11/13	0900	18.5	-39.0	-16.3	-22.7
11/13	1841	19.0	-39.0	-17.5	-21.5

ENDING:

DATE	TIME	TEMP (°C)	RESERVOIR HEAD (cm)	SAMPLE HEAD (cm)	ΔH_2 (cm)
11/13	1841	19.0	-39.0	-17.5	-21.5
11/14	0829	19.0	-39.0	-19.4	-19.6

ELAPSED TIME = 1st run = 34,860 (sec) 2nd run = 49,680 (sec)

VISCOSITY CORRECTION = 1st run = 1.031 2nd run = 1.025

RUN NO. OF RUNS

CALCULATIONS: 1st run, $K_{sat} = 8.5 \times 10^{-6}$ cm/sec
 2nd run, $K_{sat} = 10.1 \times 10^{-6}$ cm/sec

 $K_{(SAT)} = 9.3 \times 10^{-6}$ cm/sec = arithmetic average

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: W. CoxCALCULATIONS MADE BY: L. WilliamsonCHECKED BY: W. Cox

DANIEL B. STEPHENS & ASSOCIATES, INC.

MOISTURE RETENTION

Table 4. Summary of Moisture Retention-Pressure Head Test Results

<u>Sample No.</u>	<u>Pressure Head (cm of water)</u>	<u>Moisture Content (% volume)</u>
GC1	0.0	39.2
	- 15.8	37.7
	- 37.3	33.2
	- 74.6	29.2
	-105.0	28.1
	-125.0	27.4
	-176.7	26.3
GC4 (Sandstone)	0.0	36.6
	- 24.7	33.4
	- 73.4	30.0
	-102.8	29.8
	-130.4	29.1
	-173.8	28.7
	-202.5	28.7
GC5 (Mudstone)	-1020.0	19.3
	0.0	43.8
	- 28.8	43.2
	-101.0	40.8
	-128.7	40.7
	-156.4	39.7
	-200.8	39.2
	-1020.0	29.4



MOISTURE RETENTION DATA - HANGING COLUMN (PORE SIZE DISTRIBUTION)

JOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC1 RING NO.: H21DEPTH: 12.5' SAMPLE VOLUME: 96.19 (cc)WEIGHT AT 0 CM TENSION W/CAP AND RING (SATURATED): 287.1 (g)TARE WEIGHT, RING: 89.6 (g) TARE WEIGHT, CAP: 8.2 (g)DRY WEIGHT OF SAMPLE: 151.6 (g)SATURATED MOISTURE CONTENT: 39.2 (% vol)INITIAL VOLUME OF WATER IN SAMPLE: 37.7 (cc)

	SUCTION (cm)	BURET VOLUME (cc)	VOLUME CHANGE (cc)	VOLUME CHANGES (cc)	MOISTURE CONTENT (%VOL)
DRYING	0.0	45.2	0.0	0.0	39.2
	15.8	43.8	1.4	1.4	37.7
	37.3	39.4	4.4	5.8	33.2
	74.6	35.6	3.8	9.6	29.2
	105.0	34.5	1.1	10.7	28.1
	125.0	33.9	0.6	11.3	27.4
	176.7	32.8	1.1	12.4	26.3
WETTING					

* NOTE: Tension is measured from center of sample to bottom
of meniscus

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: L. WilliamsonCALCULATIONS MADE BY: W. CoxCHECKED BY: L. Williamson

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**MOISTURE RETENTION DATA - HANGING COLUMN
(PORE SIZE DISTRIBUTION)**

JOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC4 (Sandstone) RING NO.: 21CDEPTH: 39' SAMPLE VOLUME: 100.0 (cc)WEIGHT AT 0 CM TENSION W/CAP AND RING (SATURATED): 311.5 (g)TARE WEIGHT, RING: 100.3 (g) TARE WEIGHT, CAP: 7.7 (g)DRY WEIGHT OF SAMPLE: 166.9 (g)SATURATED MOISTURE CONTENT: 36.6 (% vol)INITIAL VOLUME OF WATER IN SAMPLE: 36.6 (cc)

	SUCTION (cm)	BURET VOLUME (cc)	VOLUME CHANGE (cc)	Σ VOLUME CHANGES (cc)	MOISTURE CONTENT (%VOL)
DRYING	0.0	49.4	0.0	0.0	36.6
	24.7	46.2	3.2	3.2	33.4
	73.4	42.8	3.4	6.6	30.0
	102.8	42.6	0.2	6.8	29.8
	130.4	41.9	0.7	7.5	29.1
	173.8	41.5	0.4	7.9	28.7
	202.5	41.5	0.0	7.9	28.7
WETTING					

* NOTE: Tension is measured from center of sample to bottom
of meniscus

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: L. WilliamsonCALCULATIONS MADE BY: W. CoxCHECKED BY: L. Williamson

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**MOISTURE RETENTION DATA - PRESSURE PLATE
(PORE SIZE DISTRIBUTION)**

JOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC4 (Sandstone) RING NO.: 21CDEPTH = 39' SAMPLE VOLUME: 100.0 (cc)WEIGHT AT 0 CM TENSION W/CAP AND RING (SATURATED) = 311.5 (g)TARE WEIGHT, RING = 100.3 (g) TARE WEIGHT, CAP = 7.7 (g)DRY WEIGHT OF SAMPLE = 166.9 (g)SATURATED MOISTURE CONTENT = 36.6 (% vol)INITIAL VOLUME OF WATER IN SAMPLE = 36.6 (cc)WEIGHT FROM HANGING COLUMN, W/O CAP = 301.0 (g)FINAL TENSION ON HANGING COLUMN = 202.5 (cm)

DATE	TIME	PRESSURE (BAR)	WEIGHT WITH Ring(g) + Rubber Ring	CHANGE IN WEIGHT(g)	± WEIGHT CHANGES (g)	MOISTURE CONTENT %VOL
11/24	1330	0		Into P.P.		
11/25	2220	1	291.6	9.4	17.3	19.3

COMMENTS: Rubber Ring Mass = 5.19 g

LABORATORY ANALYSES PERFORMED BY: L. WilliamsonCALCULATION MADE BY: W. CoxCHECKED BY: L. Williamson

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MOISTURE RETENTION DATA - HANGING COLUMN (PORE SIZE DISTRIBUTION)

JOB NAME: Geoscience Consultants

JOB NUMBER: 86-L-020

SAMPLE NUMBER: GC5 (Mudstone) RING NO.: H14

DEPTH: 39' SAMPLE VOLUME: 100.0 (cc)

WEIGHT AT 0 CM TENSION W/CAP AND RING (SATURATED): 309.7 (g)

TARE WEIGHT, RING: 93.0 (g) TARE WEIGHT, CAP: 7.5 (g)

DRY WEIGHT OF SAMPLE: 165.4 (g)

SATURATED MOISTURE CONTENT: 43.8 (% vol)

INITIAL VOLUME OF WATER IN SAMPLE: 43.8 (cc)

	SUCTION (cm)	BURET VOLUME (cc)	VOLUME CHANGE (cc)	VOLUME CHANGES (cc)	MOISTURE CONTENT (%VOL)
DRYING	0.0	47.6	0.0	0.0	43.8
	28.8	47.0	0.6	0.6	43.2
	101.0	44.6	2.4	3.0	40.8
	128.7	44.5	0.1	3.1	40.7
	156.4	43.5	1.0	4.1	39.7
	200.8	43.0	0.5	4.6	39.2
WETTING					

* NOTE: Tension is measured from center of sample to bottom of meniscus

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: L. Williamson

CALCULATIONS MADE BY: L. Williamson

CHECKED BY: W. Cox



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**MOISTURE RETENTION DATA - PRESSURE PLATE
(PORE SIZE DISTRIBUTION)**

JOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC5 RING NO.: H14DEPTH = 39' SAMPLE VOLUME: 100.0 (cc)WEIGHT AT 0 CM TENSION W/CAP AND RING (SATURATED) = 309.7 (g)TARE WEIGHT, RING = 93.0 (g) TARE WEIGHT, CAP = 7.5 (g)DRY WEIGHT OF SAMPLE = 165.4 (g)SATURATED MOISTURE CONTENT = 43.8 (% vol)INITIAL VOLUME OF WATER IN SAMPLE = 43.8 (cc)WEIGHT FROM HANGING COLUMN, W/O CAP = 297.7 (g)FINAL TENSION ON HANGING COLUMN = 200.8 (cm)

DATE	TIME	PRESSURE (BAR)	WEIGHT, WITH RING (g)	CHANGE IN WEIGHT(g)	Σ WEIGHT CHANGES (g)	MOISTURE CONTENT %VOL
11/23	1340	0		Into P.P.		
11/24	2215	1	292.9	9.9	14.4	29.4

COMMENTS: Weights Include Rubber Ring = 5.1 gramLABORATORY ANALYSES PERFORMED BY: W. CoxCALCULATION MADE BY: L. WilliamsonCHECKED BY: W. Cox

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INITIAL MOISTURE CONTENT



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Table 5. Summary of Initial Moisture Content Test Results

<u>Sample No.</u>	<u>Initial Moisture Content (% volume)</u>	<u>Comments</u>
GC1	11.2	
GC2	29.4	The sample, upon arrival at the laboratory, gave off strong smell of hydrocarbons. The sample was air dried in a well ventilated area for 3 days before oven drying. In evaluating the initial moisture content result, the density of the pore fluid initially present in the sample should be taken into account. For the laboratory result presented here, pore fluid density is taken to be 1 gram per cubic centimeter
GC3	28.0	
GC4 (Sandstone)	16.5	
GC5 (Mudstone)	24.1	



DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY AND POROSITYJOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC1RING NO.: H21 DEPTH: 12.5' (cm,m)TARE WEIGHT, RING = 89.6 (g) PAN NUMBER: 41TARE WEIGHT, CAP = 8.2 (g) TARE WEIGHT, PAN= Tared Off (g)FIELD WEIGHT OF SAMPLE W/CAP AND RING = 260.2 (g)VOLUME OF SAMPLE = 96.19 (cc)DATE AND TIME INTO/~~XXXX~~ OF OVEN: 11/23/86 1930DATE AND TIME ~~XXXX~~/OUT OF OVEN: 11/25/86 2220
(MILITARY TIME)DRY WEIGHT OF SAMPLE = 151.6 (g)DRY BULK DENSITY = 1.58 (g/cc)PARTICLE DENSITY = 2.65 (g/cc)METHOD: X ASSUME $\rho_s = 2.65$ g/cm PYCNOMETER (SEE SEPARATE DATA SHEET)CALCULATED POROSITY = 40.4 (% VOL)INITIAL MOISTURE CONTENT = 11.2 (% VOL)

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: L. WilliamsonCALCULATIONS MADE BY: W. CoxCHECKED BY : L. Williamson

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DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY AND POROSITYJOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC2RING NO.: N/A DEPTH: 29.5'TARE WEIGHT, RING = N/A (g) PAN NUMBER: 40TARE WEIGHT, CAP = N/A (g) TARE WEIGHT, PAN = Tared Off (g)FIELD WEIGHT OF SAMPLE (Soil Only) = 209.0 (g)VOLUME OF SAMPLE = 100 (cc)DATE AND TIME INTO/~~XXXX~~ Air Dry: 11/10/86 1840DATE AND TIME INTO/~~XXXX~~ OF OVEN: 11/13/86 1920DATE AND TIME INTO/OUT OF OVEN: 11/16/86 1810DRY WEIGHT OF SAMPLE = 179.6 (g)DRY BULK DENSITY = 1.80 (g/cc)PARTICLE DENSITY = 2.65 (g/cc)METHOD: X ASSUME $\rho_s = 2.65$ g/cm PYCNOMETER (SEE SEPARATE DATA SHEET)CALCULATED POROSITY = 32.1 (% VOL)INITIAL MOISTURE CONTENT = 29.4 (% VOL)

COMMENTS: Sample had to be air dried for 3 days before oven drying due to high hydrocarbon content.

LABORATORY ANALYSES PERFORMED BY: W. CoxCALCULATIONS MADE BY: L. WilliamsonCHECKED BY : W. Cox

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DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY AND POROSITYJOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC3RING NO.: N/ADEPTH: 37'TARE WEIGHT, RING = N/A (g) PAN NUMBER: 18TARE WEIGHT, CAP = N/A (g) TARE WEIGHT, PAN = Tared Off (g)FIELD WEIGHT OF SAMPLE (Soil Only) = 215.6 (g)VOLUME OF SAMPLE = 100.0 (cc)DATE AND TIME INTO/~~XXXX~~OUT OF OVEN: 11/10/86 1830DATE AND TIME ~~INTX~~OUT OF OVEN: 11/13/86 1935
(MILITARY TIME)DRY WEIGHT OF SAMPLE = 187.6 (g)DRY BULK DENSITY = 1.88 (g/cc)PARTICLE DENSITY = 2.65 (g/cc)METHOD: X ASSUME $\rho_s = 2.65$ g/cm PYCNOMETER (SEE SEPARATE DATA SHEET)CALCULATED POROSITY = 29.1 (% VOL)INITIAL MOISTURE CONTENT = 28.0 (% VOL)

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: W. CoxCALCULATIONS MADE BY: W. CoxCHECKED BY : L. Williamson

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DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY AND POROSITYJOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC4 (Sandstone)RING NO.: 21C DEPTH: 39'TARE WEIGHT, RING = 100.3 (g) PAN NUMBER: 16TARE WEIGHT, CAP = 7.7 (g) TARE WEIGHT, PAN= Tared Off (g)FIELD WEIGHT OF SAMPLE W/CAP AND RING = 291.4 (g)VOLUME OF SAMPLE = 100.0 (cc)DATE AND TIME INTO/~~XXXXXX~~ OF OVEN: 11/25/86 2240DATE AND TIME INTO/OUT OF OVEN: 11/28/86 2115
(MILITARY TIME)DRY WEIGHT OF SAMPLE = 166.9 (g)DRY BULK DENSITY = 1.67 (g/cc)PARTICLE DENSITY = 2.65 (g/cc)METHOD: X ASSUME $\rho_s = 2.65$ g/cm PYCNOMETER (SEE SEPARATE DATA SHEET)CALCULATED POROSITY = 37.0 (% VOL)INITIAL MOISTURE CONTENT = 16.5 (% VOL)

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: W. CoxCALCULATIONS MADE BY: W. CoxCHECKED BY : L. Williamson

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DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY AND POROSITYJOB NAME: Geoscience ConsultantsJOB NUMBER: 86-L-020SAMPLE NUMBER: GC5 (Mudstone)RING NO.: H14DEPTH: 39'TARE WEIGHT, RING = 93.0 (g) PAN NUMBER: 30TARE WEIGHT, CAP = 7.5 (g) TARE WEIGHT, PAN= Tared Off (g)FIELD WEIGHT OF SAMPLE W/CAP AND RING = 290.0 (g)VOLUME OF SAMPLE = 100.0 (cc)DATE AND TIME INTO/~~XXXX~~ OF OVEN: 11/25/86 2245DATE AND TIME ~~XXXX~~ INTO/OUT OF OVEN: 11/28/86 2110
(MILITARY TIME)DRY WEIGHT OF SAMPLE = 165.4 (g)DRY BULK DENSITY = 1.65 (g/cc)PARTICLE DENSITY = 2.65 (g/cc)METHOD: X ASSUME $\rho_s = 2.65$ g/cm PYCNOMETER (SEE SEPARATE DATA SHEET)CALCULATED POROSITY = 37.7 (% VOL)INITIAL MOISTURE CONTENT = 24.1 (% VOL)

COMMENTS:

LABORATORY ANALYSES PERFORMED BY: W. CoxCALCULATIONS MADE BY: W. CoxCHECKED BY : L. Williamson

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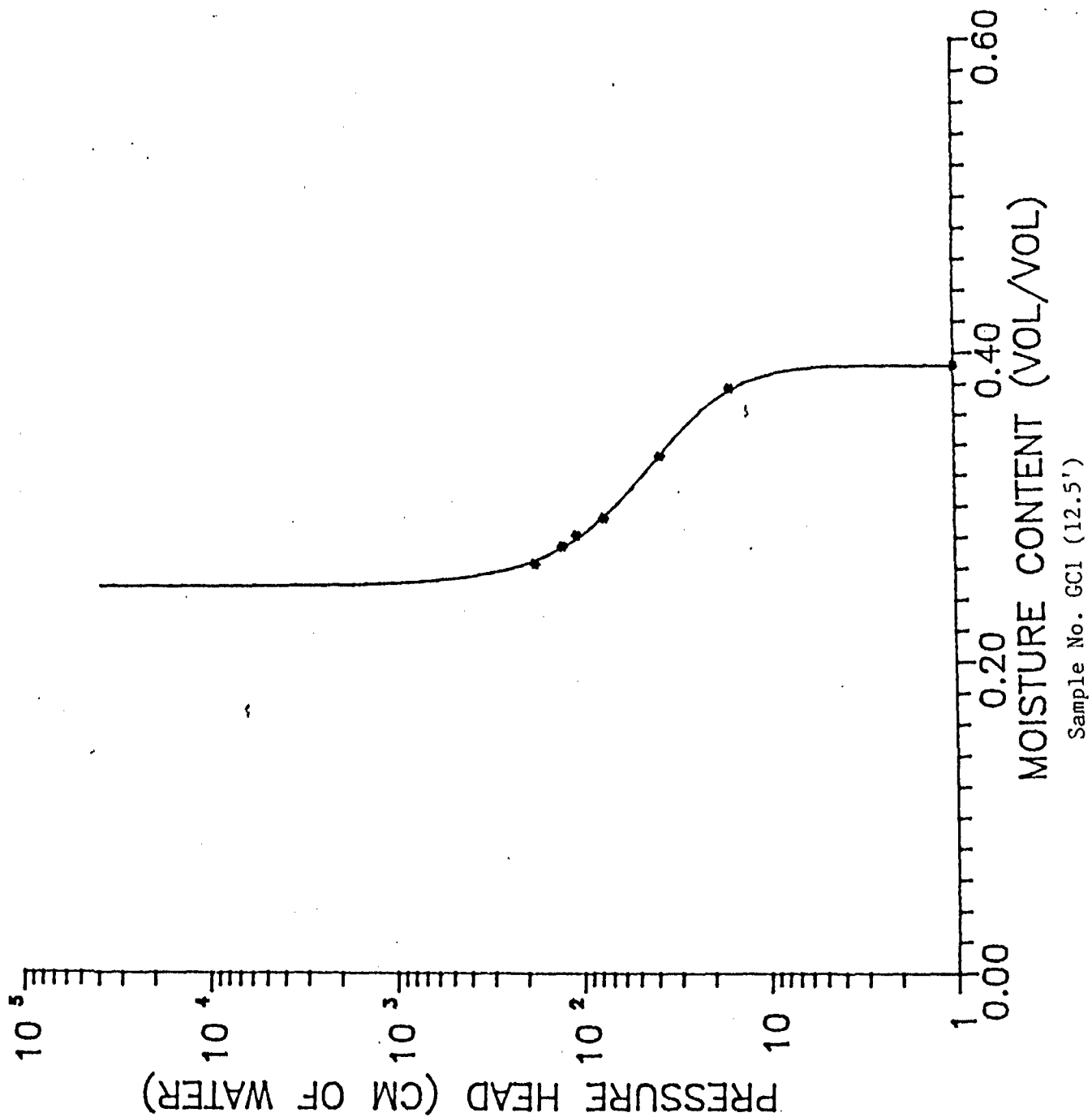
UNSATURATED HYDRAULIC CONDUCTIVITY

Table 6. Summary of Parameters in Mualem Model for Unsaturated Hydraulic Conductivity

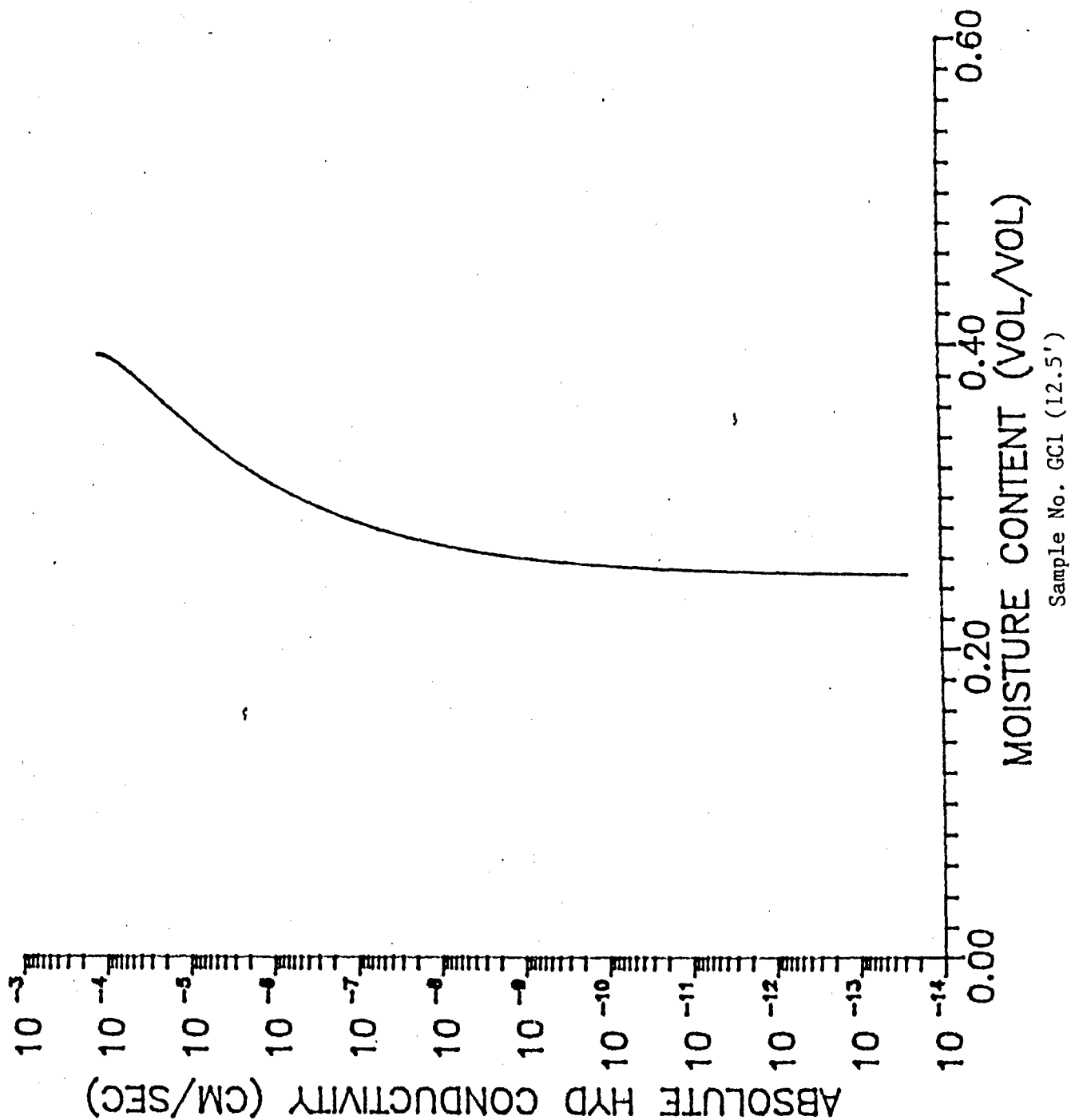
<u>Sample No.</u>	<u>Alpha</u>	<u>N</u>	<u>Saturated Moisture Content (fixed)</u>	<u>Residual Moisture Content (fitted)*</u>
GC1	0.03341	2.19880	0.392	0.24776
GC4 (Sandstone)	0.02080	1.19595	0.366	0.00008
GC5 (Mudstone)	0.00426	1.25027	0.438	0.00001

* Note: Residual moisture content is a parameter obtained by a regression analysis, rather than by measurement. Moisture content at -15 bars is approximately 12 and 15% for samples GC4 (Sandstone) and GC5 (Mudstone), respectively.

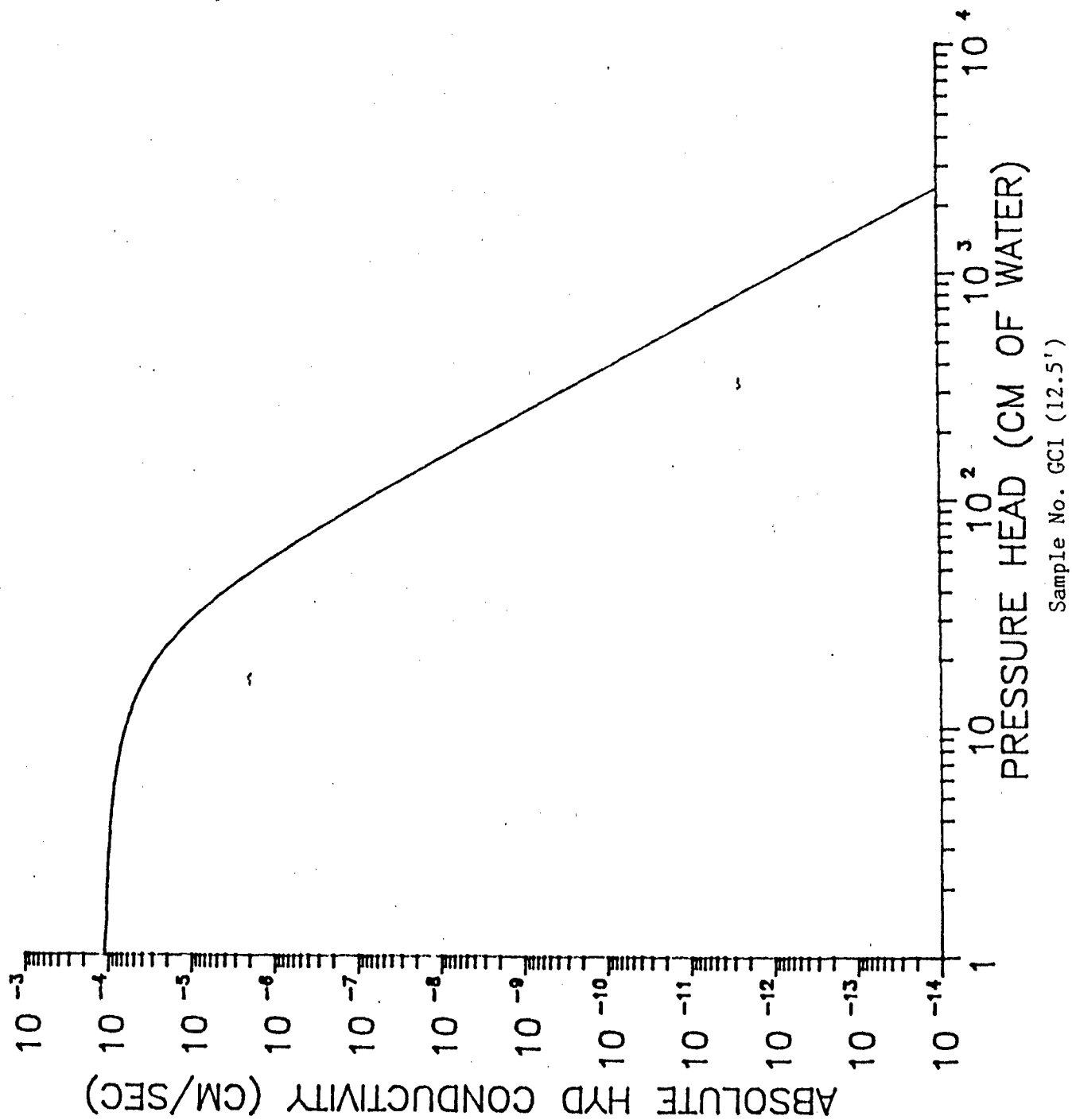




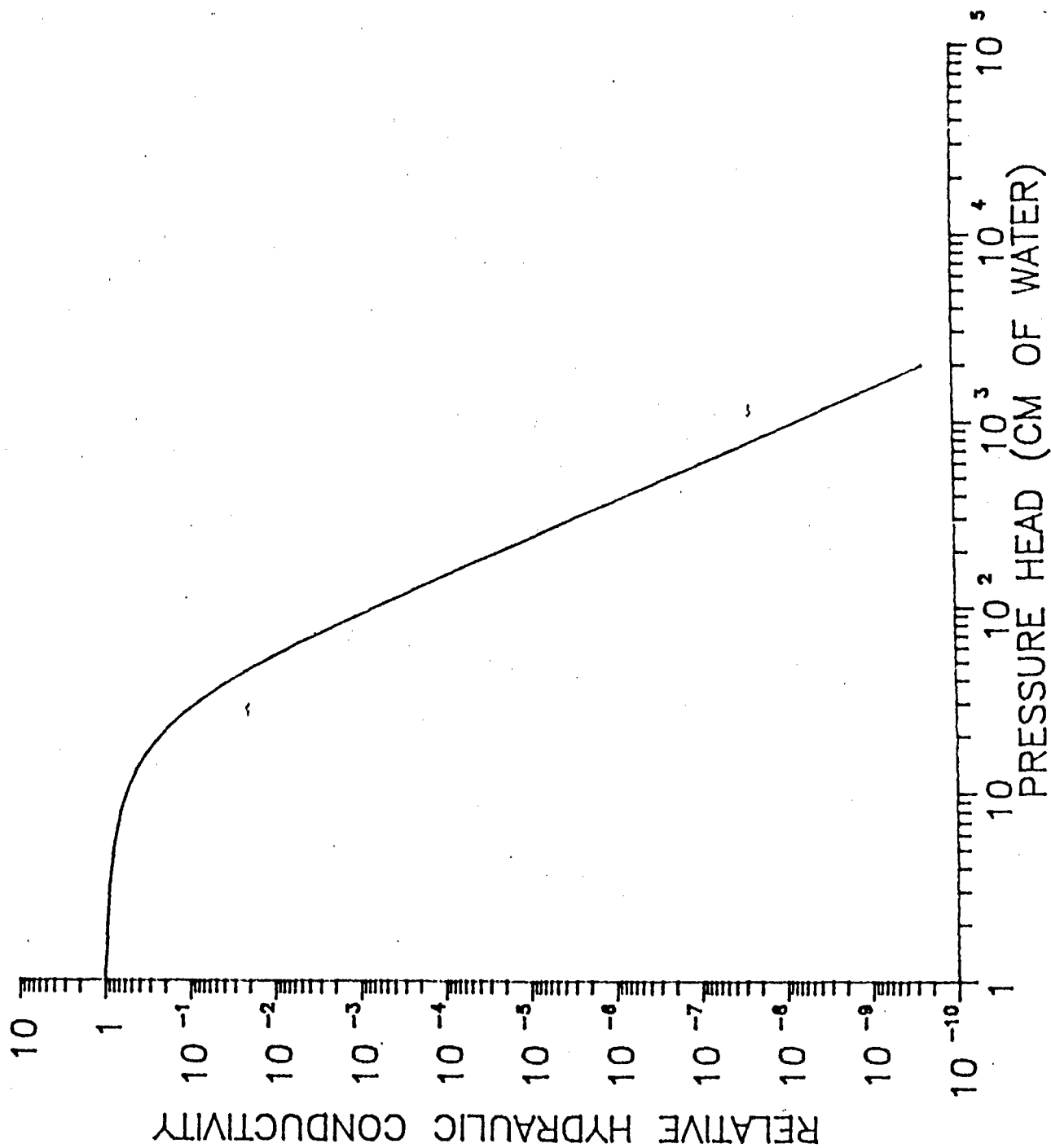
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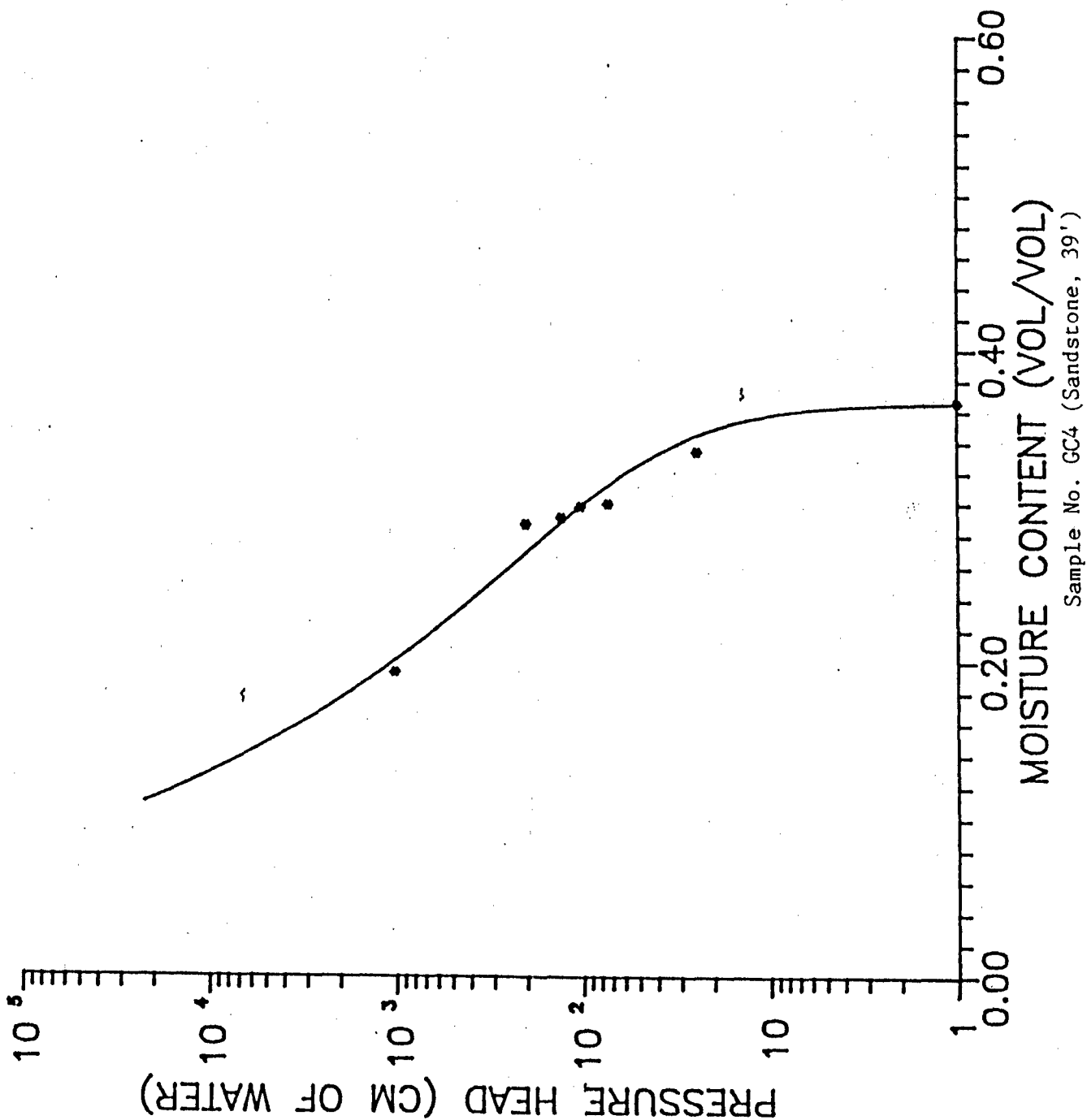
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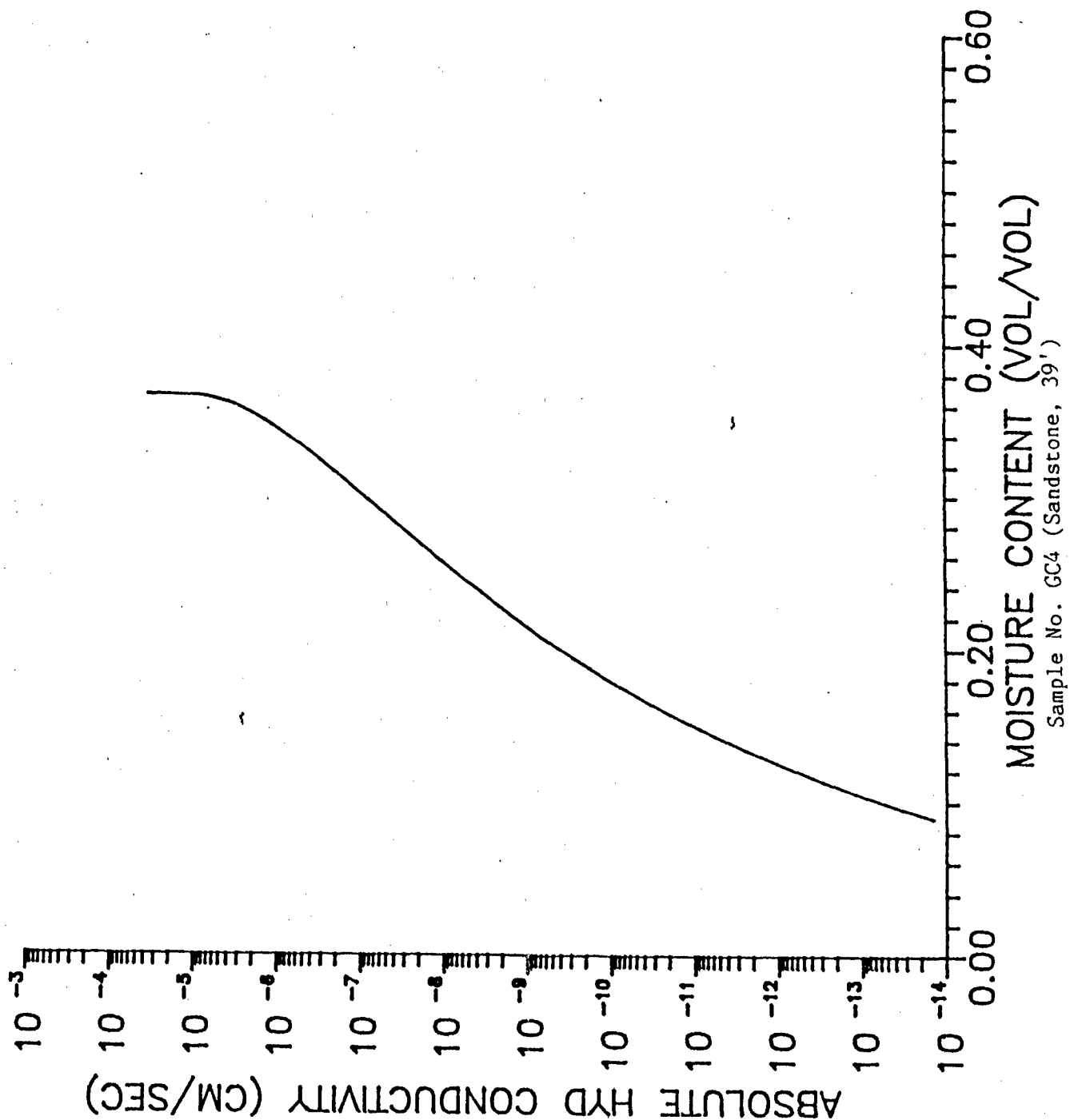
Sample No. GCI (12.5')



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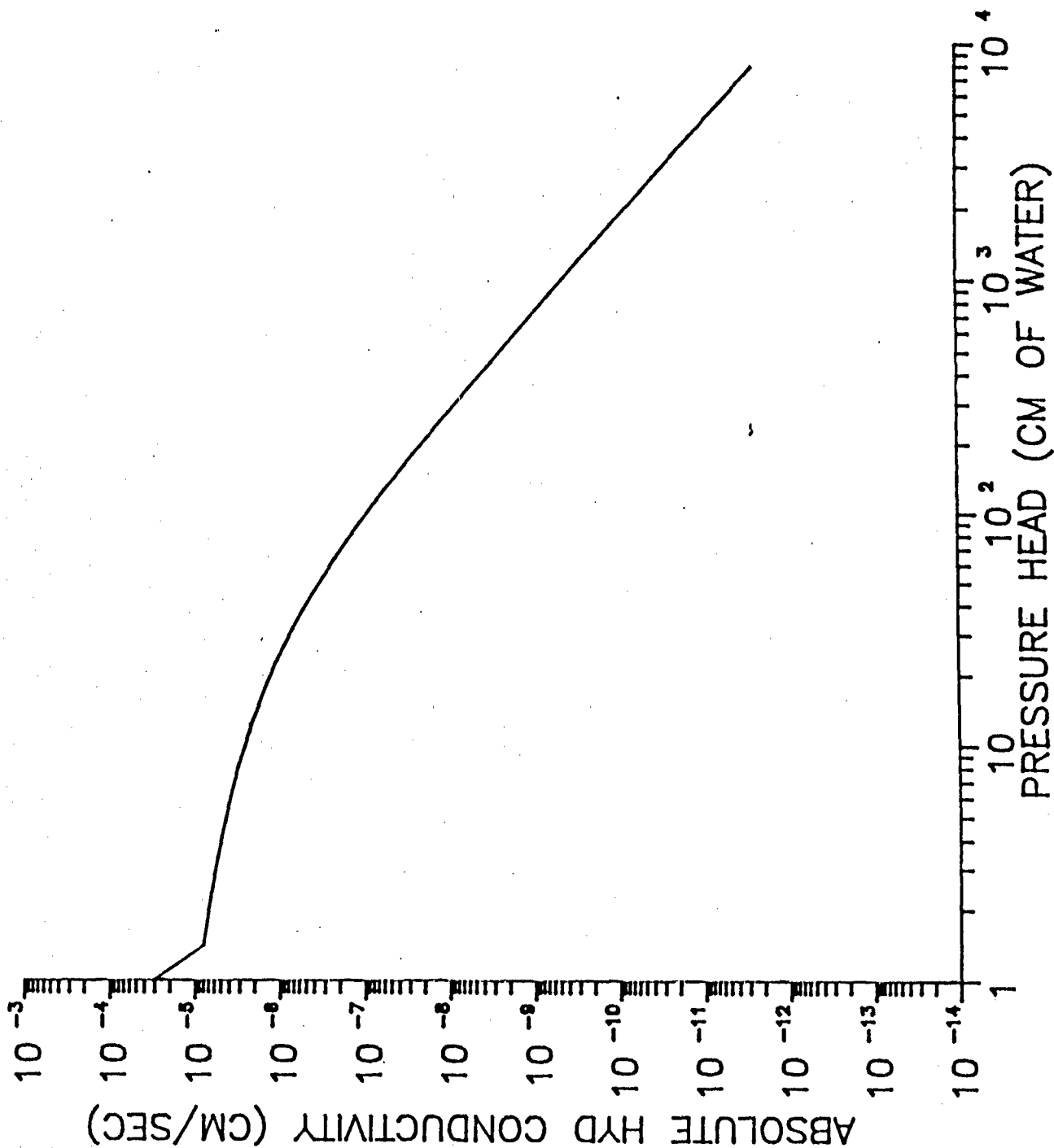


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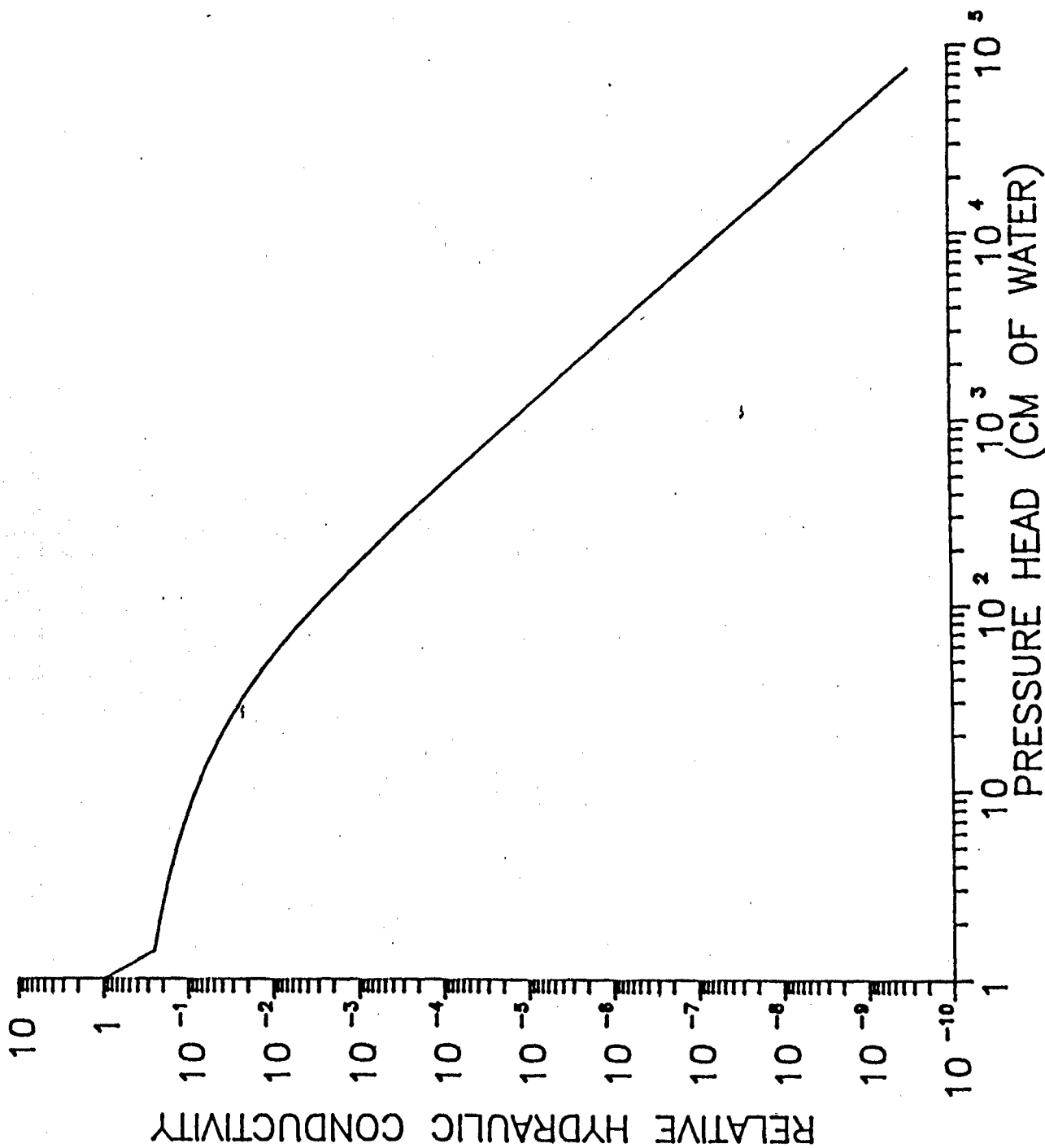
Page 33



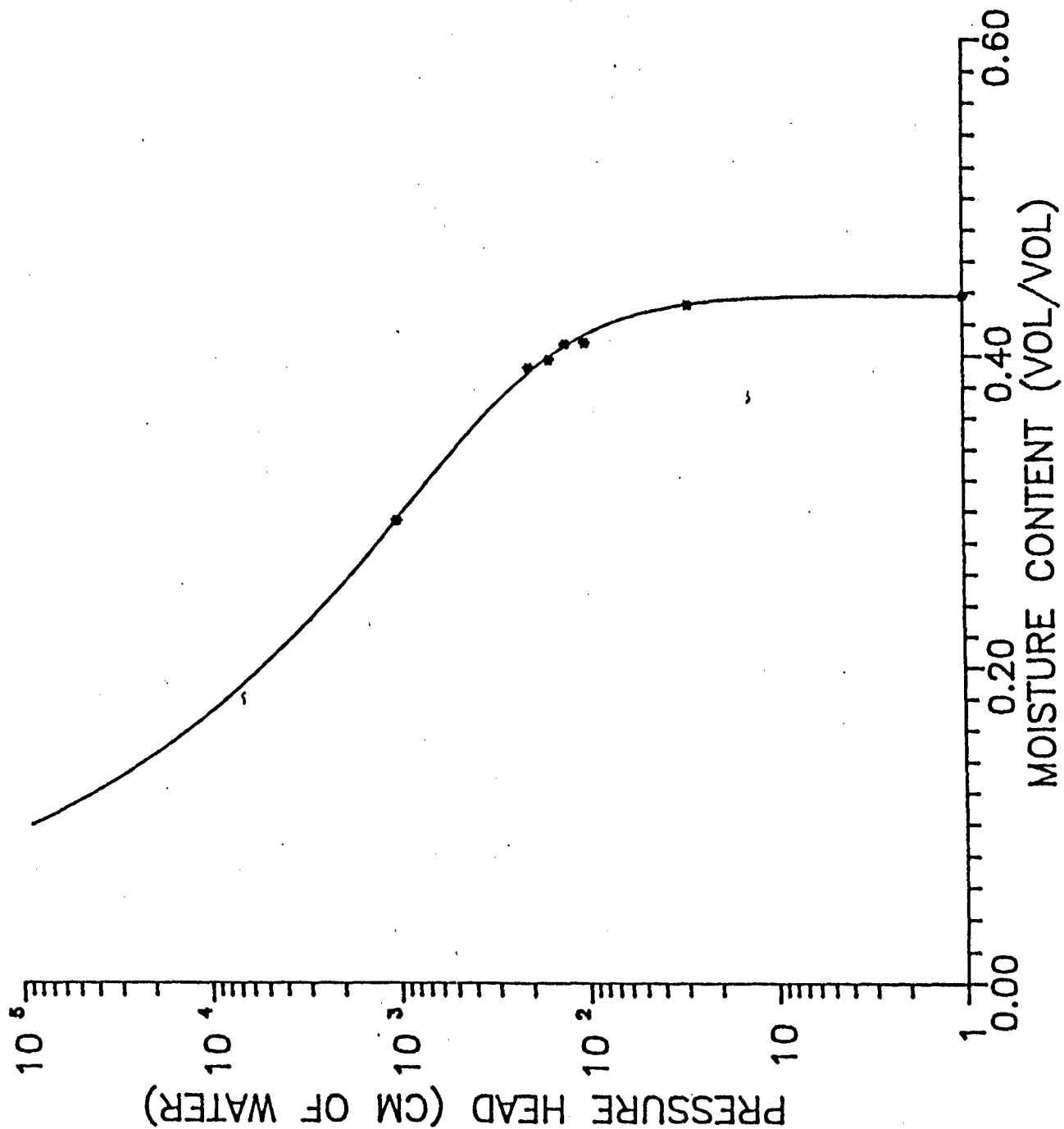
Sample No. GC4 (Sandstone, 39')



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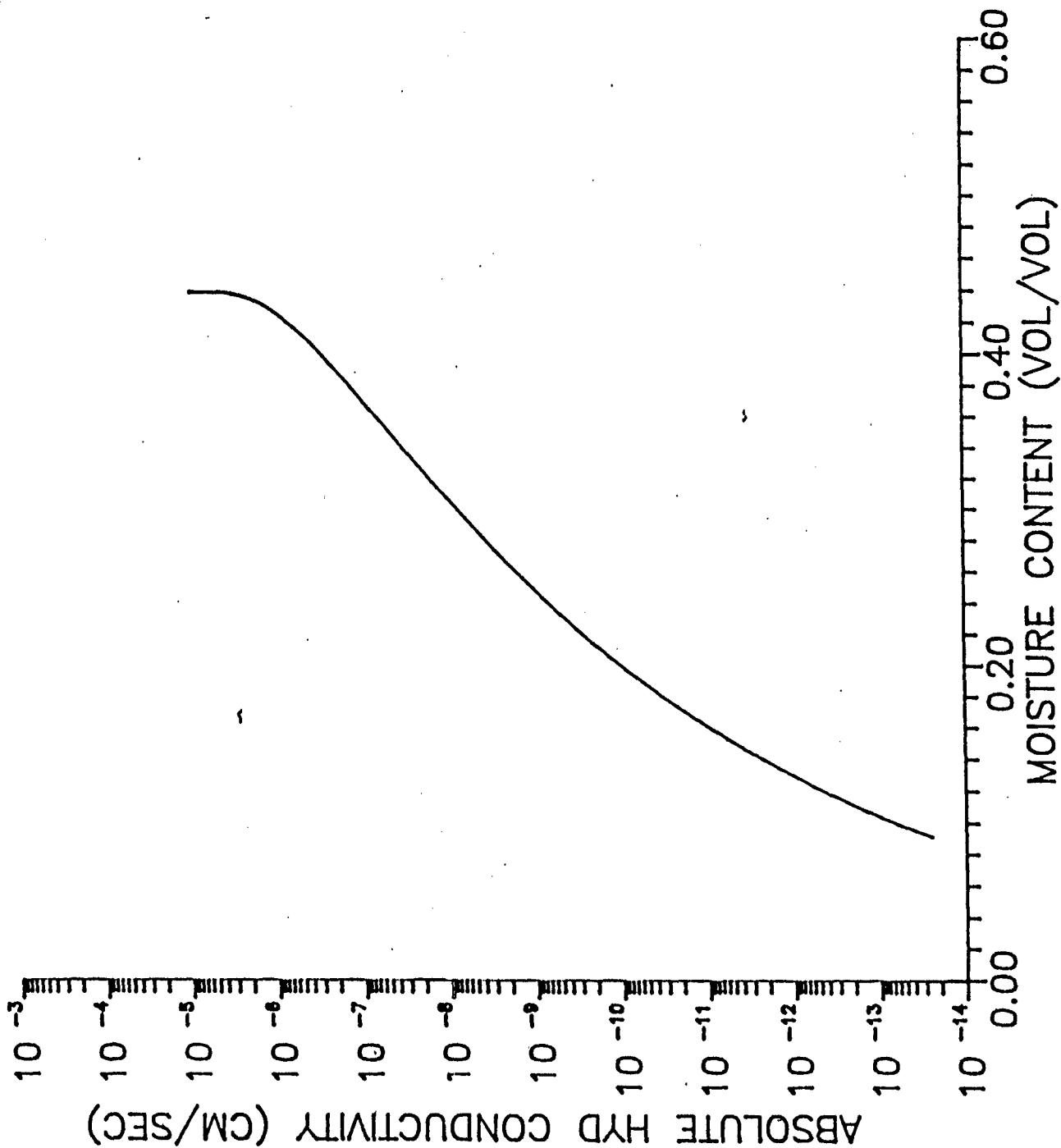
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Sample No. GC5 (Mudstone, 39')



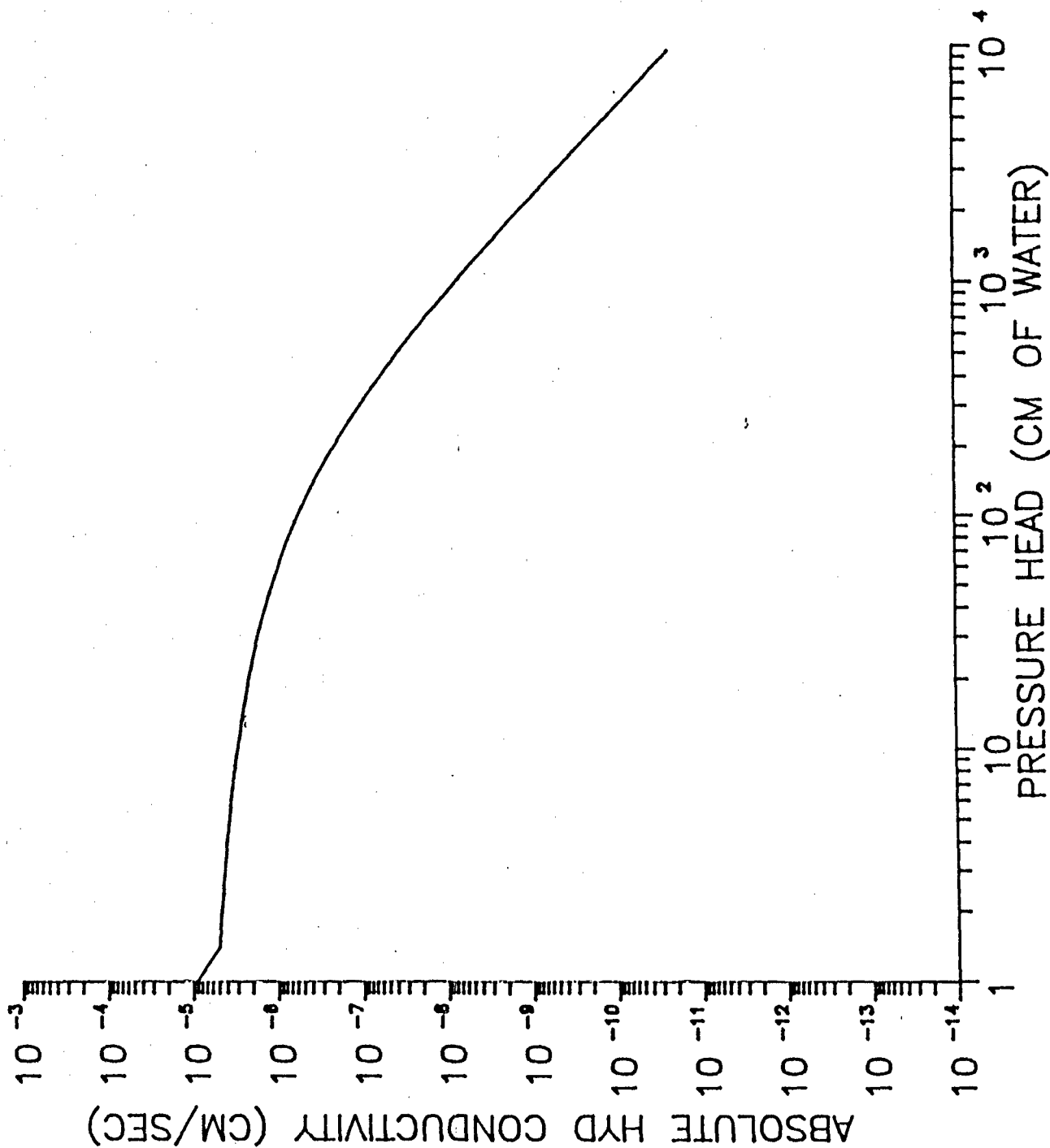
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Sample No. GC5 (Mudstone, 39')



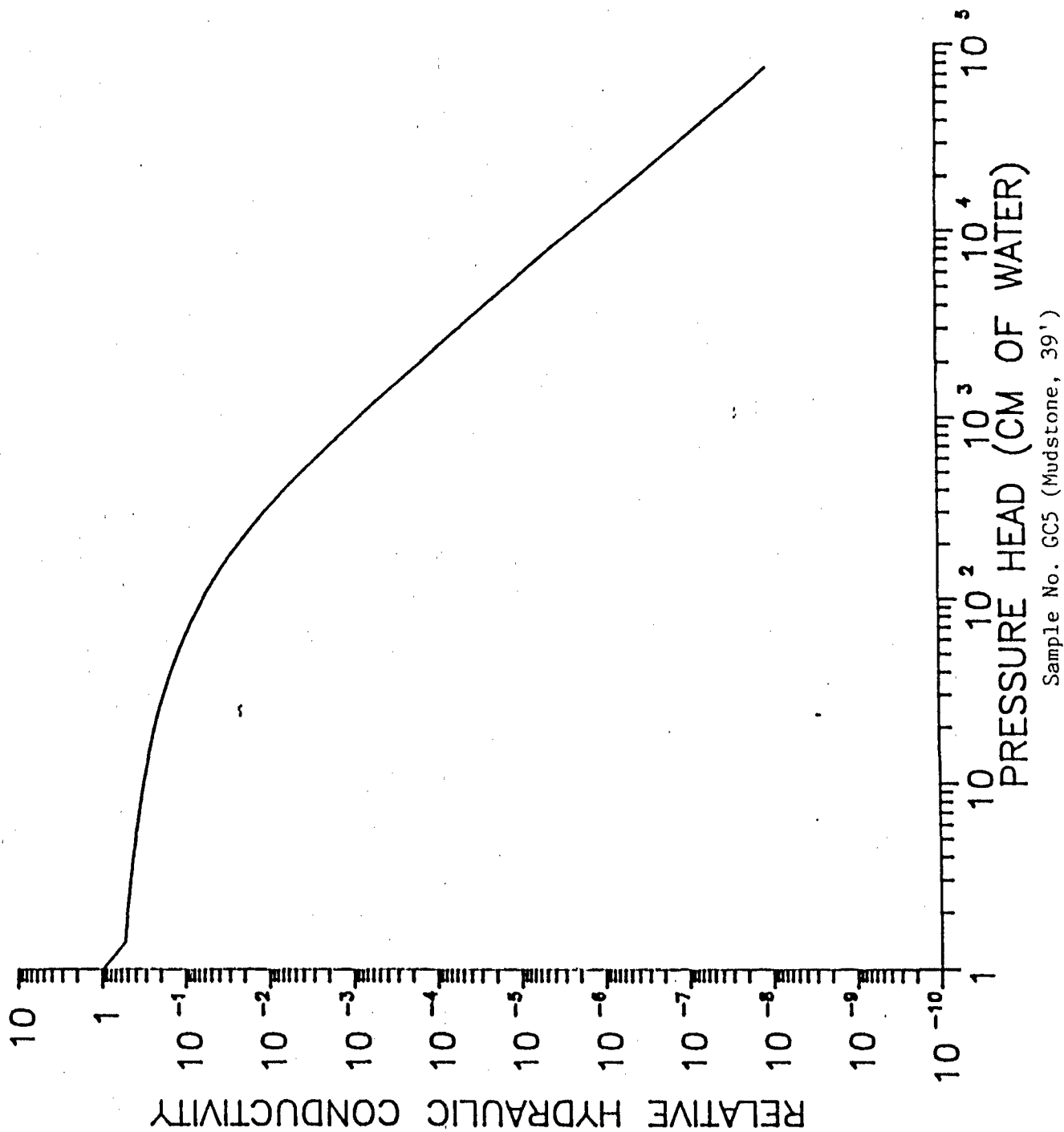
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Sample No. GC5 (Mudstone, 39')



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APPENDIX A
SAMPLE PREPARATION

LABORATORY ANALYSES REPORT - GEOSCIENCE CONSULTANTS Page A-2

SAMPLE PREPARATION

Sample No.Preparation Performed

GC1

Soil arrived at the laboratory loose in a plastic bag. To achieve a bulk density representative of the field bulk density of the soil, the one piece of the sample that was not broken was carved into a cubic shape 2cm x 2cm x 1.66cm. The mass of this soil cube was determined as well as the volume calculated. A 100cc sample ring was then hand packed to this density (g/cc).

GC2

Soil arrived at the laboratory loose in a plastic bag. The sample had a strong odor of hydrocarbons, and appeared to be close to saturation with the pore fluid present. Only a small portion of the sample was still intact. To achieve a bulk density of the soil, the procedure outlined for sample GC1 was employed. After preparation, the soil sample was removed from the 100cc sample ring and placed in an aluminum pan to air dry.



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LABORATORY ANALYSES REPORT - GEOSCIENCE CONSULTANTS Page A-3Sample No.Preparation Performed (Continued)

GC3

Soil arrived at the laboratory in a plastic-bag. The soil was in the form of a cylindrical core, and appeared to be intact. A 100 cc sample ring was slowly pushed over the end of the soil core until the sample ring had been filled. The soil core was then trimmed at both ends flush with the sample ring. The sample was then removed from the ring and placed in an aluminum pan for oven drying.

GC4 (Sandstone)

Soil arrived at the laboratory in a plastic bag. The soil was in the form of a cylindrical core. Some vertical fractures were present in the clay portion of the core which comprised one end of the core. The other end of the soil core consisted of what appeared to be a well cemented sandstone. There appeared to be a thin layer of organics separating the two portions of the core. The sandstone portion of the core was separated from the clay portion. A 100cc sample ring



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LABORATORY ANALYSES REPORT - GEOSCIENCE CONSULTANTS Page A-4

SAMPLE PREPARATION

<u>Sample No.</u>	<u>Preparation Performed (Continued)</u>
GC4	was slowly pushed over the soil core as the core was carved to a diameter just greater than the sample ring using an exacto knife.
GC5 (Mudstone)	Sample preparation was performed as outlined for sample GC4.



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APPENDIX B
PRINCIPLES AND METHODS

LABORATORY ANALYSES REPORT - GEOSCIENCE CONSULTANTS Page B-2

SATURATED HYDRAULIC CONDUCTIVITY

Method

The saturated hydraulic conductivity of a soil sample can be measured in two types of laboratory apparatus: a constant head permeameter or a falling head permeameter.

Constant head. The hydraulic conductivity K is defined here as the ratio of q , the volume flux of water passing through a unit cross sectional area of soil per unit time, and $(\Delta h/L)$ gradient of hydraulic head in the direction of flow, corrected to 20°C:

$$K = (q/[\Delta h/L])(V_T/V_{20}) \quad (1)$$

where $V_{20,T}$ is the kinematic viscosity at 20 °C and observed temperature, T .

A soil sample of length, L , and cross-sectional area, A , is placed in a sample holder which prevents any loss of soil or change in volume and establishes laminar unidirectional flow through the sample. A constant head differential, Δh , is then set up across the sample and maintained. Periodic readings of volumetric outflow are taken until stable values for conductivity, K are obtained. Temperature of the fluid is measured with a thermometer. Figure B-1 is a diagram of the apparatus used. A constant head system is best suited to samples with conductivities greater than 10^{-4} cm/sec.



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LABORATORY ANALYSES REPORT - GEOSCIENCE CONSULTANTS

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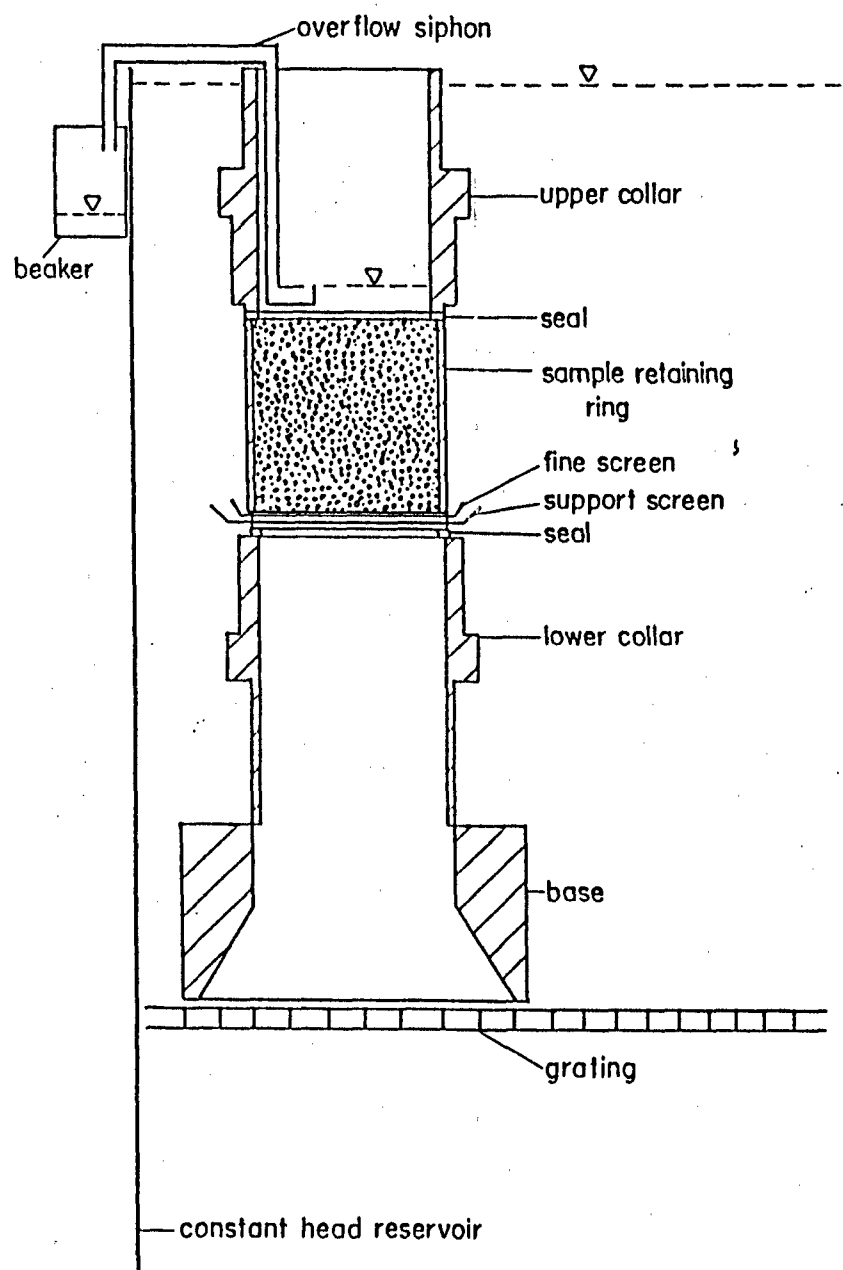


Figure B-1. Constant Head Permeameter



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Falling head. A soil sample of length L and cross sectional area, A , is placed in a sample holder which has a standpipe with cross-sectional area, a . A head of H_1 , is established in the standpipe above the sample, then the water level is allowed to fall to H_2 in time t . Figure B-2 is a diagram of the apparatus used. A falling head system is best suited to samples with conductivities less than 10^{-4} cm/sec. The hydraulic conductivity, is then defined as:

$$K = (a \times L / A \times t) \ln (H_1 / H_2) (V_T / V_{20}) \quad (2)$$

Procedures:

Constant head. Cylinders containing the soil sample are covered on both ends with loose fitting caps and placed in a shallow pan containing de-aired water. The samples are allowed to wet slowly from below for 24 hours. The samples are removed from the pan, and two screens are placed over one end; a very stiff one of coarse mesh for support and a fine one of either 80 to 100 mesh to prevent any sample from being washed out. The cylinder, with screens attached, is then clamped into the sample retainer and placed in the permeameter. The level of the water in the permeameter reservoir is then slowly raised over a period of hours. When the level in the reservoir reaches to within a few centimeters above the top of the sample, a siphon is placed in the sample retainer assembly to remove water from above



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LABORATORY ANALYSES REPORT - GEOSCIENCE CONSULTANTS

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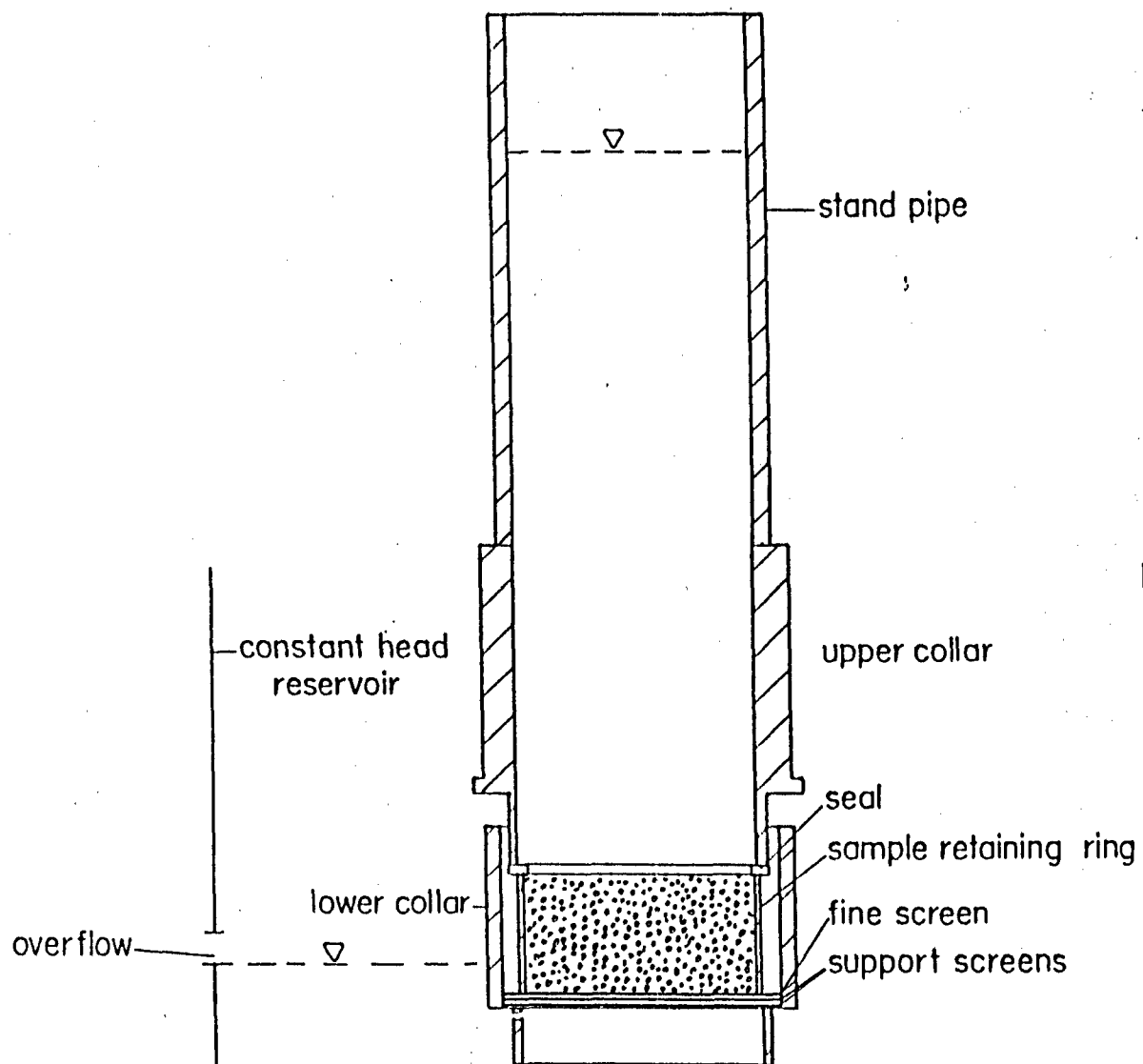


Figure B-2. Falling Head Permeameter



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the sample. Water flows upward through the sample due to the hydraulic head difference across the sample. Periodic measurements of discharge and the head difference across the sample are made, and the hydraulic conductivity is calculated. A correction to 20 C is then applied for differences in kinematic viscosity. Measurement continues until the calculated hydraulic conductivity value stabilizes.

Falling head. Saturation of the sample is obtained by the same procedures described under constant head test. Screens are also attached as outlined under constant head test. The ring with screens is then placed in the falling head sample retainer and set in a constant head reservoir. Water is added to the standpipe and the difference between the water level in the standpipe and that in the constant head reservoir are recorded over time. The water level in the standpipe is allowed to fall, while the fluid level in the lower level is constant. After a period of time the difference in water levels between that in the standpipe and that in the constant head reservoir are measured and the elapsed time noted. Correction is applied for kinematic viscosity.

Calculations:

Experimental values are substituted into the appropriate equation as outlined under methods.



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LABORATORY ANALYSES REPORT - GEOSCIENCE CONSULTANTS Page B-7

MOISTURE RETENTION - HANGING COLUMN

(PORE SIZE DISTRIBUTION)

Principle

Use of pore size distribution as a soil characteristic is based upon acceptance of the capillary model. This model is described by:

$$h' = 2 \cos \gamma / \rho g \quad (3)$$

where h' is the height to which a liquid will rise in a clean capillary tube of radius r , γ is the surface tension of the liquid, ρ is its density, and g is acceleration due to gravity. If water is extracted from an initially saturated sample of soil by a tension equal to h' , the volume of water extracted is equal to the volume of pores having an effective radius greater than the radius, r . As the tension applied to the sample increases, additional water drains from progressively smaller pores.

Method

The key component of the apparatus for measuring the retention of moisture at different pressure heads or pore size distribution is a fritted glass porous plate that conducts water, but when wet the plate is impermeable to air. The fritted glass



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LABORATORY ANALYSES REPORT - GEOSCIENCE CONSULTANTS Page B-8

plates have an air-entry pressure of about 300 to 400 cm of water. These plates are affixed in a glass funnel which is connected to a buret with stopcock by means of flexible tubing. A diagram of the apparatus is shown in Figure 3. A soil sample is placed on the plate and tension, h' is applied to the sample by positioning the fluid level in the buret at different levels below the center of the sample. Water flows out of the sample into the buret until equilibrium is achieved. The tension is again increased or decreased to obtain another state of equilibrium between moisture held by capillary forces in the sample and the applied tension.

Laboratory Procedure

Air is first removed from the porous plate by allowing de-aired water to pass continuously through it for 24 hours. The funnel with porous plate and the buret are supported on vertical rods by means of clamps. A saturated sample within its sample ring is then placed on the porous plate, making certain that good hydraulic contact is established between the soil particles and the plate. With the stopcock of the buret closed, the initial level of the water in the buret is recorded.

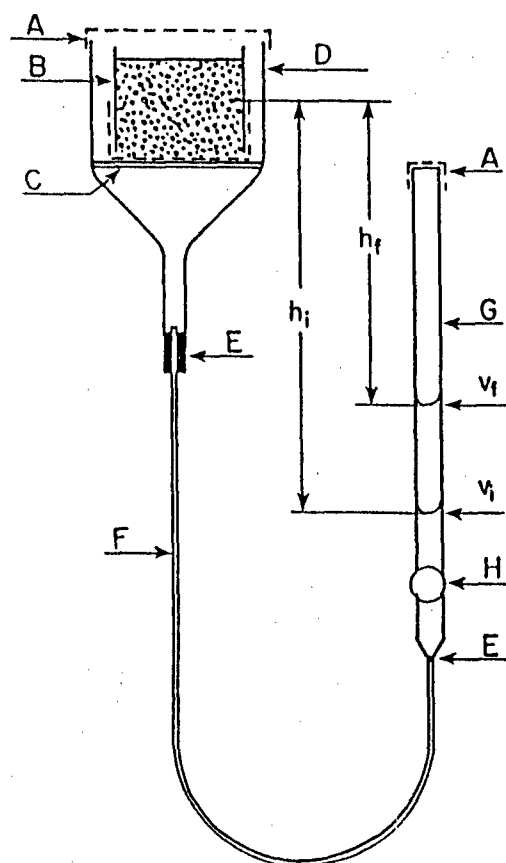
The buret is then lowered a small increment to about 10 to 15 cm below the center of the soil sample. When the stopcock is opened, the soil may begin to desaturate, and the drainage will flow into the buret. When drainage has ceased, the stopcock is



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- | | |
|--|--|
| A Aluminum foil covers | F Flexible tubing |
| B Sample in cylinder | G Burette, least division not more than 0.1% sample volume |
| C Fritted glass porous plate (part of D) | H Stopcock of burette |
| D Büchner funnel with porous plate | h_i cm of water suction, initial |
| E Joints must be secure | h_f cm of water suction, final |
| | v_i Burette reading, initial |
| | v_f Burette reading, final |

Figure B-3. Hanging Column Apparatus



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closed and we record the water level in the buret and the vertical distance from the bottom of the meniscus of the water in the buret to the middle of the soil sample. The procedure is repeated in a stepwise manner until the maximum tension desired is reached. A reversal of the process is used to gather data on the wetting behavior of the sample.

Calculation

Saturated moisture content , θ_{sat} , (volume percent) is determined as follows:

$$\theta_{\text{sat}} = [M_{\text{sat}} - M_{\text{dry}}] / [V_T \times \rho_w] \times 100 \quad (\% \text{ vol}) \quad (4)$$

where M_{sat} = mass of sample saturated, M_{dry} = mass of sample, oven dried to a constant weight, V_T = volume of the sample, ρ_w = density of the water at temp when saturated mass was determined. The quantity $[M_{\text{sat}} - M_{\text{dry}}] / \rho_w$ is the volume, in cubic centimeters, of water initially contained in the sample volume. The drainage is subtracted from the initial volume of water and then divided by the sample volume to arrive at the moisture content in percent volume at the given value of tension.

$$[V_i - V_D] / V_T \times 100 = \theta_{h'} \quad (\% \text{ vol}) \quad (5)$$

where V_i = volume of water initial, V_D = cumulative volume drained from sample, V_T = volume of sample, $\theta_{h'}$ = moisture content at the tension value h' . This gives then a paired set of values of tension, or pressure head, versus volumetric moisture content.



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MOISTURE RETENTION - PRESSURE PLATE

Principle

The operation of the pressure plate moisture extractor requires maintaining a pressure difference between the liquid phase of the water in the soil and water on the opposite side of a porous plate which supports the soil sample. The sample and porous plate are sealed in a rigid container so that positive gas pressure applied above the plate causes flow to occur across the plate (Figure B-4). The porous ceramic plate is supported by a fine mesh screen which also provides a passage way for the extracted solution. The water beneath the plate is open to the atmosphere through the outflow tube. The illustration in Figure B-5 shows a magnified view of soil particles in contact with the plate inside the pressure plate extractor during an extraction run.

As soon as air pressure inside the chamber is raised above atmospheric pressure, the higher pressure inside the chamber forces excess water through the microscopic pores in the plate. Air, however, will not flow through the pores of the plate, because the plate remains saturated due to its high air-entry pressure. When the pressure in the chamber increases, water leaves the sample until the tension of the water



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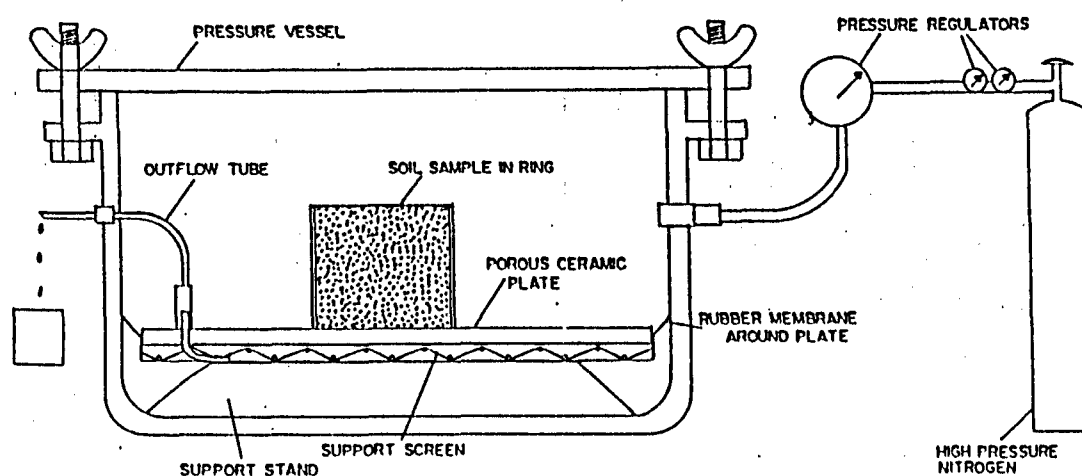


Figure B-4. Pressure Plate Extractor



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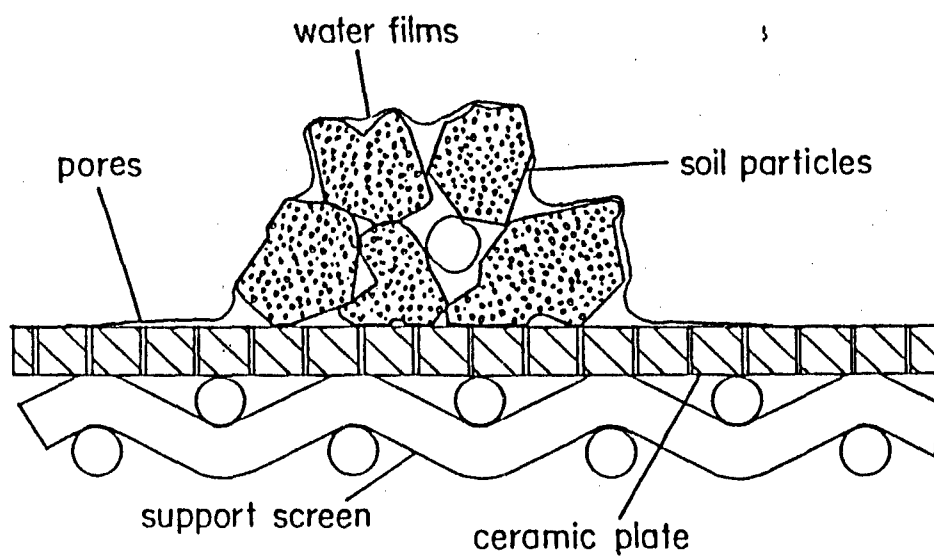


Figure B-5. Magnified View of Soil Particles



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due to capillary and adsorptive forces is in equilibrium with the applied pressure.

Method

Moisture retention is obtained using a pressure plate extractor (Soil Moisture Inc., Santa Barbara, CA, Model 1500), with 1, 3 and 15 bar ceramic plates. Pressure is provided by high pressure nitrogen from cylinders.

Laboratory Procedure

The porous ceramic plate is placed in a shallow pan with deaired distilled water and allowed to stand overnight. The plate is then removed from the pan and placed in the extractor. De-aired distilled water is poured over the plate to the limit allowed by the rubber skirt, which generally just submerges the plate. The pressure plate is sealed and pressure brought to 50% of the plates maximum rated pressure. This pressure is maintained until outflow ceases. The extractor is opened and any excess water around the plate is removed.

The soil samples in their sample rings are then placed on the plate, making certain good hydraulic contact is established. The extractor is then sealed and the pressure brought to the level desired. The pressure is maintained until outflow ceases. The extractor is then opened and the samples weighed quickly on an electronic top-loading balance. Subsequently, the samples are



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returned to the extractor, and the pressure is increased to the next increment.

Calculations

The decrease in mass of water in the sample during a period of applied pressure is converted to an equivalent decrease in volume of water according to:

$$V_w = \Delta m / \rho_T \quad (\text{cc}) \quad (6)$$

where Δm = change in mass of soil sample (g), ρ_T = density of water at temperature of experiment (g/cc), V_w = equivalent volume of water (cc).

Volumes of water calculated from equation 6 are then used to determine the moisture content at that pressure:

$$\theta_p = (V_i - \Sigma \Delta V_w) / V_T \times 100 \quad (\% \text{ vol}) \quad (7)$$

where θ_p = moisture content at pressure p (% vol), V_i = initial volume of water in sample (cc), $\Sigma \Delta V_w$ = cumulative water volume change (cc), V_T = total volume of the sample (cc).



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INITIAL MOISTURE CONTENT

Method

Core method, with oven drying.

Laboratory Procedure

The field weight of the soil sample is determined as soon as possible after the sample is removed from the packing container. The tare of the ring which holds the sample, as well as the mass of the caps for the ends of the ring, are determined. The volume of soil in the sample ring is also calculated. After all specified analyses have been performed on the sample, the sample is removed from its ring and spread in an aluminum pan. When necessary, soil aggregates are broken up by mortar and pestal. Care is taken not to change the natural particle size distribution. The sample is placed in a convection oven at 110° C for at least 24 hours until dried to a constant weight.

Calculations

The initial moisture content is determined on a percent volume basis according to:

$$\theta_i = [M_i - M_f] / [V_T \times \rho] \times 100 \quad (\% \text{vol}) \quad (8)$$

where θ_i = initial moisture content (% vol), M_i = initial mass of soil only (g), M_f = final mass of soil only (g), V_T = total



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volume of sample (cc), ρ = density of pore fluid in the soil when initial mass was determined (g/cc). The density of the pore fluid initially present in the sample is assumed to be 1.0 g/cc.



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BULK DENSITY

Method

Core method, with oven drying.

Laboratory Procedure

The volume of the soil sample is determined from sample geometry measurements, and the sample is dried in the oven at 110 C until no additional mass loss occurs.

Calculations

$$\rho_b = M_D / V_T \quad (\text{g/cc}) \quad (9)$$

where ρ_b = dry bulk density (g/cc), M_D = mass of oven dried soil sample (g), V_T = total volume of soil sample (cc).



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POROSITY

Method

Calculated from bulk density and measured or assumed values of particle density.

Laboratory Procedure

Bulk density, ρ_b , is determined by oven drying, as described in the section outlining the bulk density determination. For this series of analyses particle density, ρ_s , is assumed to be 2.65 g/cc.

Calculation

$$n = [1 - (\rho_b / \rho_s)] \times 100 \quad (\text{percent}) \quad (10)$$



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UNSATURATED HYDRAULIC CONDUCTIVITY

Method

Mualem (1976) described the theoretical basis for a procedure used to estimate unsaturated hydraulic conductivity from the soil-water release curve according to the following equations;

$$K_r = S_e^{\frac{1}{2}} \left[\int_0^{S_e} 1/h(x) dx / \int_0^1 1/h(x) dx \right]^2, \quad (11)$$

where K_r = relative hydraulic conductivity, $h = h(S_e)$ is the negative pressure head, given here as a function of dimensionless moisture content:

$$S_e = \theta - \theta_r / \theta_s - \theta_r \quad (12)$$

where subscripts s and r indicate saturated and residual values of the soil moisture (θ). The expression relating dimensionless moisture content to the pressure head, and thus the soil moisture release curve is given by:

$$S_e = [1/1 + (\alpha h)^n]^m \quad m = 1 + 1/n \quad (13)$$

where α , and n are obtained by a non-linear least squares numerical procedure applied to measured moisture retention data using the technique developed by Van Genuchten (1978).

Laboratory procedure

The data input to the computer model of Van Genuchten (1978)



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consists of the saturated moisture content, residual moisture content and values of observed pressure head versus moisture content. The residual moisture content is taken to be the moisture content at -15 bars. The paired values of observed pressure head and moisture content are obtained as described under the procedures for determining moisture retention by the hanging column and pressure plate methods. Saturated moisture content is determined through gravimetric measurements and sample geometry.

References

Mualem, Y., 1976, A New Model for Predicating the Hydraulic Conductivity of Unsaturated Porous Media, Water Resources Research, vol. 12, no. 3, p. 513-522.

Van Genuchten, R., 1978, Calculating the Unsaturated Hydraulic Conductivity With a New Closed-Form Analytical Model, Research Report No. 78-WR-08, Princeton University, Department of Civil Engineering, September 1978, 65pp.



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APPENDIX C
CHEMICAL ANALYSIS OF WATER

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TAP WATER CHEMICAL ANALYSIS

<u>ANIONS:</u>	<u>PPM</u>
CARBONATE, CO_3^-	0
BICARBONATE, HCO_3^-	202
CHLORIDE, Cl^-	40
SULFATE, $\text{SO}_4^{=}$	109
NITRATE, NO_3^-	2.44
FLUORIDE, F^-	0.69

CATIONS:

SODIUM, Na^+	62.0
POTASSIUM, K^+	1.5
MAGNESIUM, Mg^{++}	10
CALCIUM, Ca^{++}	61

TOTAL EPM ANIONS = 6.784

TOTAL EPM CATIONS = 6.602

% ERROR = 2.72

pH = 7.6

HARDNESS = 194 ppm, CaCO_3

APPROXIMATE TDS = 455 ppm

CONDUCTIVITY = 650 mmhos



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APPENDIX E
FINITE-DIFFERENCE GROUND WATER FLOW MODEL

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1.0 EXECUTIVE SUMMARY

The Prickett Lonquist Aquifer Simulation Model (PLASM) (Prickett, T.A. and C.G. Lonquist, 1971, Selected Digital Computer Techniques for Ground Water Resource Evaluation, Illinois State Water Survey, Urbana, Bulletin 55) finite-difference ground water flow model was used to predict the hydraulic impacts of pumping from existing and proposed recovery wells at the Giant Bloomfield Refinery Site. The model was first calibrated for steady-state conditions using drawdown responses observed during pump testing at the recovery wells, as well as estimated long-term drawdown. Impacts of recovery pumping were then predicted by imposing anticipated recovery discharges on the steady-state model. Results of the modeling study indicate that pumping at rates of 1 gpm at the three existing recovery wells in the Diesel Spill Area will be sufficient to capture the plume of product and dissolved contamination that extends over this area. The results also suggest that the installation and operation of four additional recovery wells near the existing recovery well in the Southern Refinery Area should be adequate to intercept all potentially contaminated ground water known or believed to be present north of the four proposed recovery wells.

Approximately 20 trial-and-error calibration runs were used to define the final model. Four transmissivity zones were used to characterize the flow domain. Artificial constant-head boundary conditions were imposed along three edges of the model, while a no-flow boundary was used to characterize flow along the remaining edge. A 41-column by 49-row rectangular grid was used to represent an area of 2200 feet by 2975 feet. The recovery model included eight pumping wells withdrawing at rates of from 1 to 15 gpm. At steady-state, approximately 91,000 gallons per day of water would be produced for treatment, storage, and eventual disposal.

2.0 JUSTIFICATION FOR THE MODELING STUDY

Use of a finite-difference model to predict the hydraulic response of the unconfined to partially-confined aquifer underlying the site provides a systematic framework for understanding the natural flow dynamics of the aquifer. While analytical methods for analyzing aquifer hydraulics can be useful for gaining insight into the general characteristics of an aquifer, they cannot be used to evaluate a heterogeneous, unconfined or partially-confined aquifer of finite extent under conditions of a sloping water table. At the Bloomfield site, two distinct but hydraulically-connected units of sandstone and alluvium comprise the aquifer. This is further complicated by the existence of discontinuous shale and clay layers distributed throughout the aquifer. These conditions preclude the use of simple Theis analysis for predicting the impacts of recovery.

This non-Theis behavior became evident during previous pump testing at the site. Results of this testing suggest that cones of depression which develop around recovery wells completed in alluvial and sandstone units encounter lower-permeability sandstone, shale, or clay. The large range of values for transmissivity and storage coefficient obtained from analyses of several pump tests clearly illustrates the extent of heterogeneity in the aquifer. The existence of a sloping water table introduces additional non-ideal behavior to the analysis.

In addition to permitting evaluation of aquifer response in the presence of heterogeneities and a sloping water table, the use of a numerical model also allows for accurate description of flow dynamics in an unconfined or partially-confined aquifer. The nonlinear nature of the flow equation under unconfined and partially-unconfined conditions requires iterative solution of the groundwater flow equation. During early, transient stages of calibration, changes in transmissivity and in the storage coefficient resulting from aquifer dewatering can easily be accounted for using a numerical model.

A final justification for application of numerical modeling is the fact that a well-calibrated model offers a means of systematically defining

areas of the site that require more intensive data collection. These areas can easily be identified through sensitivity analysis, during which the response of the calibrated model to small changes in parameters can be determined. Large changes in response indicate that a more refined model may be developed if additional data is acquired in the area where the large response occurs.

3.0 CALIBRATION OF THE FINITE-DIFFERENCE GROUND WATER FLOW MODEL

3.1 OVERVIEW OF THE CALIBRATION METHODOLOGY

Development of a realistic predictive model requires that the parameters of the model be systematically adjusted until the historical behavior of the aquifer is duplicated. Such calibration, or history-matching, generally involves simultaneous adjustment of aquifer parameters until the model reproduces observed aquifer behavior. Using the known steady-state behavior and transient response of the aquifer, calibration of the model for the aquifer underlying the Giant Bloomfield Refinery proceeded as follows:

Phase I: An initial steady-state calibration was performed by executing the flow model using various hydraulic conductivity distributions. Since the steady-state model response did not appear to be sensitive to changes in hydraulic conductivity within a reasonable range of variation, a more refined steady-state calibration was performed in Phase II using long-term steady-state drawdowns estimated from previous pump test results.

Phase II: This phase of calibration involved variation of hydraulic conductivity until estimated long-term drawdown was reproduced at recovery-well nodes. Single-well pump test results performed at GBR-14, GBR-27 and GBR-29 were used to estimate long-term drawdown. During this phase, as well as during Phase I, the storage coefficient was set to zero in order to force instantaneous convergence to steady-state head. The steady-state head distribution generated using the final conductivity estimates closely matched the observed November water-table map shown in Figure 4-4.)

Phase III: The final calibration phase will involve variation of the storage coefficient until short-term aquifer responses are duplicated. The hydraulic conductivity will be held fixed at the values obtained during Phase II steady-state calibration.

Division of the calibration procedure into steady-state and transient phases minimized the number of degrees of freedom associated with each calibration phase. During Phase I and II, only the hydraulic conductivity distribution had an effect on the simulated steady-state head distribution and the storage coefficient was not explicitly considered during these phases. Calibration during the final, transient phase will involve only adjustment of the storage coefficient, with hydraulic conductivity fixed at the final values obtained during Phase II. Use of this phased calibration approach eliminates the problems generally associated with simultaneously varying two parameters to match the observed aquifer response.

3.2 MODIFICATIONS OF PLASM

Certain modifications were made in the BASIC code for the 2-dimensional finite-difference PLASM algorithm in order to facilitate calibration. The modified code allows recalculation of adjusted hydraulic conductivity and rewrites the recalculated transmissivity onto the input file for subsequent model execution. In addition, the modified code adjusts the xy coordinates used to generate a hydraulic head plot file in order to account for an irregular grid. Finally, the modified code prints steady-state hydraulic head values to an external file rather than directly to a printer so that the simulated steady-state head distribution can be used to initialize the model for subsequent transient model execution.

3.3 MODEL SPECIFICATIONS

3.3.1 The Finite-Difference Grid

A finite-difference grid was constructed over the entire refinery site so that the effects of recovery in both the Diesel Spill Area and the Southern Refinery Area could be predicted simultaneously. Interaction between the two recovery sites was of some interest, since pumping at GBR-29 and at proposed wells in the southern refinery area could conceivably pull some of the product from the Diesel Spill Area downgradient into the Southern Refinery Area. Moreover, pumping in the Diesel spill Area at the three existing recovery wells could potentially reduce the

natural southwestward hydraulic gradient in the Southern Refinery Area, minimizing the rate of pumping required to prevent additional off-site migration of potentially contaminated ground water.

Some initial consideration was given to orienting the grid such that rows and columns would be parallel and perpendicular to the overall southwestward hydraulic gradient over the site, as shown in the observed water table map shown in Figure 4-4. This would have made it possible to input longitudinal and lateral dispersivity values directly during subsequent solute-transport simulation, with longitudinal dispersivity specified along columns corresponding to the direction of flow and lateral dispersivity specified along rows perpendicular to the flow direction. Instead, orientation of the grid columns in a north-south direction was chosen because this orientation permitted no-flow conditions to be assigned to nodes located along the western boundary where water-table contours appeared to be perpendicular to the edges of the grid (see Figure 4-4). This orientation greatly facilitated the modeling study. Subsequent definition of longitudinal and lateral dispersivities, relative to the direction of ground water flow, can be redefined with respect to the orientation of the grid by simply resolving the dispersivity vectors into grid-oriented vectors.

The finite-difference grid was constructed to be very fine at the pumping sites, where large hydraulic gradients were expected to occur. Close spacing of rows and columns permitted more accurate definition of drawdown at the recovery wells, since the model generated average drawdown over a given nodal element. Drawdown averaged over a small element thus approached the drawdown that would occur at a point. Distances between columns and rows were expanded at increasing distances from recovery sites where hydraulic gradients were expected to gradually decline and where average drawdown in a given nodal element approached drawdown at any point in the element. The change in column or row spacing did not exceed a factor of two between adjacent cells anywhere in the grid. This minimized spatial-truncation errors during model execution.

A total of 49 rows and 41 columns comprised the grid, resulting in 2009 nodal points. The entire grid extended 2200 feet in the east-west or x-direction and 2975 feet in the north-south or y-direction. The dimensions of the grid were defined to be sufficiently large to avoid propagation of recovery well drawdown to the edges of the grid during calibration. Table 1 lists values of DELX (I) and DELY (J) describing the spacing between columns and rows. These spacings are shown plotted on Plate F1. The northwesternmost corner of the grid was located at a northing of 2500 feet and an easting of 10400 feet.

Despite anticipation of radial flow during steady-state and transient pumping, a regular grid rather than a radial-segment grid was used throughout the flow domain. The loss of accuracy associated with using a regular grid near pumping wells was more than offset by the convenience of using a grid with regularly-spaced nodes.

3.3.2 Boundary Conditions

Since natural physical boundaries were not observed at the site, artificial boundary conditions were established around the flow domain. A no-flow boundary was specified along the western edge of the flow domain because observed equipotential lines appeared to be perpendicular to the edges of the grid (see Figure 4-4). It was not clear whether this orientation of equipotential lines was due to the contouring process or whether it was due to southward channeling of water through the arroyo, which happened to be parallel to the boundary. Southward deflection of flowlines as water enters the arroyo from the east implies that the hydraulic conductivity of the arroyo is significantly larger than the conductivity of the adjacent sandstone.

Unlike water-table contours along the western edge of the grid, contours along the northern, eastern and southern edges of the flow domain are oblique to the edges of the grid. This suggests that water laterally enters or exits the system through these areas. Since the rates of influx and outflux of water were not known, constant-head conditions were assigned to these parts of the flow domain. This permitted the model to

TABLE 1A
FINITE-DIFFERENCE GRID COLUMN
SPACING ARRAY DELX(I) (FT)

I	DELX(I)	I	DELX(I)
1	250	23	12.5
2	200	24	12.5
3	150	25	12.5
4	100	26	12.5
5	75	27	12.5
6	50	28	12.5
7	25	29	25
8	25	30	25
9	25	31	25
10	25	32	50
11	12.5	33	50
12	12.5	34	50
13	12.5	35	50
14	12.5	36	75
15	12.5	37	100
16	12.5	38	150
17	12.5	39	200
18	12.5	40	250
19	12.5		
20	12.5		
21	12.5		
22	12.5		

TABLE 1B
FINITE-DIFFERENCE GRID ROW
SPACING ARRAY DELY(J) (FT)

J	DELY(J)	J	DELY(J)
1	300	26	50
2	250	27	50
3	200	28	100
4	150	29	100
5	100	30	100
6	100	31	50
7	100	32	50
8	75	33	25
9	75	34	25
10	50	35	25
11	50	36	12.5
12	25	37	12.5
13	25	38	12.5
14	25	39	12.5
15	12.5	40	25
16	12.5	41	25
17	12.5	42	50
18	12.5	43	50
19	12.5	44	50
20	12.5	45	100
21	25	46	100
22	25	47	100
23	25	48	100
24	25		
25	50		

calculate the rate of influx, equal to the rate of outflux under steady-state conditions, for any given distribution of hydraulic conductivity. As long as steady-state conditions are maintained at these boundary nodes, there is no difference between assigning constant-head and constant-flux conditions. This is because the saturated thickness and gradient at a boundary remains constant under steady-state conditions. Use of constant-head boundaries along the northern, eastern, and southern edges of the grid was valid during calibration phases involving pumpage as long as the pumping stresses did not propagate to the boundaries. Specification of constant-head conditions along these boundaries was easier to implement than assignment of constant-flux conditions, which would have to be adjusted during calibration whenever hydraulic conductivity was changed.

With lower heads assigned along the southern constant-head boundary, and higher heads specified along the eastern and northern constant-head boundaries, the steady-state throughflow Q of water was uniquely defined for any distribution of hydraulic conductivity. The distribution of hydraulic conductivity was then modified until the observed distribution of hydraulic gradients was obtained. Essentially, the steady-state calibration procedure focused on modifying hydraulic conductivity $K(x,y)$ at each node until the observed gradient $\Delta h/\Delta l$ across the nodal element was reproduced according to Darcy's Law:

$$Q = K(x,y) A \quad h/l$$

Where A equals the cross-sectional flow area of the element.

Constant-head values along the northern, eastern, and southern boundaries were specified on the basis of observed water levels shown in Figure 4-4. Since data related to the observed hydraulic head distribution did not extend to the grid edges, constant heads were instead assigned along the edges of a rectangle constructed along the edges of the water-table contoured area (see Plate F1). When constant-head conditions were assigned along the top, bottom and right edges of this rectangle, the

resulting head values between the rectangle and the grid edges automatically conformed to principles of ground water flow. It should be noted, however, that the grid edges act as no-flow boundaries by default during model execution. Therefore, simulated head between the constant-head inner boundaries and the grid edges became less reliable close to the grid edges.

November water levels corrected for floating product were used to define constant-head values along the inner rectangular boundary (see Plate F1). Table 2 lists the constant heads assigned to row 5 along the northern edge of the rectangle, row 48 along its southern edge and column 39 along its eastern edge. 5000 feet were subtracted from all head levels in order to minimize accumulation of round-off error during model execution. Constant head levels were maintained by setting the storage coefficient along these rows and columns at an effectively infinite value of 1×10^{22} to represent infinite sources and sinks. Any storage coefficient of 5 equal to 1.0 or greater could actually have been used.

3.4 STEADY-STATE CALIBRATION

After the grid was defined and boundary conditions were established, the model was initially calibrated by attempting to match the simulated steady-state hydraulic head distribution to the observed November water table. Since the steady-state head distribution is completely insensitive to the storage coefficient, this initial stage of calibration focused on adjustment of hydraulic conductivity values until the observed head distribution was duplicated. Subsequent transient calibration for storativity will involve duplication of pump-test drawdown to the extent possible, given the non-ideal behavior of the aquifer under pumping stresses.

3.4.1 Convergence to Steady-State

Steady-state calibration for hydraulic conductivity involved solution of the general flow equation:

TABLE 2A
CONSTANT HEADS ALONG THE
NORTHERN INNER BOUNDARY (FT)

ROW 5:	COLUMN 2	371.0	21	375.1
	COLUMN 3	371.5	22	375.35
	COLUMN 4	371.9	23	375.35
	COLUMN 5	372.3	24	375.45
	COLUMN 6	372.6	25	375.55
	COLUMN 7	373	26	375.75
	COLUMN 8	373.15	27	375.85
	COLUMN 9	373.4	28	376.0
	COLUMN 10	373.6	29	376.15
	COLUMN 11	373.8	30	376.35
	COLUMN 12	373.9	31	376.6
	COLUMN 13	374.1	32	376.8
	COLUMN 14	374.2	33	377.25
	COLUMN 15	374.3	34	377.65
	COLUMN 16	374.4	35	378.0
	COLUMN 17	374.5	36	378.1
	COLUMN 18	374.65	37	378.2
	COLUMN 19	374.8	38	378.3
	COLUMN 20	374.9	39	378.6

TABLE 2B
CONSTANT HEADS ALONG THE
SOUTHERN INNER BOUNDARY (FT)

ROW 48:	COLUMN 2	350	22	350
	COLUMN 3	350	23	350
	COLUMN 4	350	24	350
	COLUMN 5	350	25	350
	COLUMN 6	350	26	350
	COLUMN 7	350	27	350
	COLUMN 8	350	28	350
	COLUMN 9	350	29	350
	COLUMN 10	350	30	350
	COLUMN 11	350	31	350
	COLUMN 12	350	32	350
	COLUMN 13	350	33	350.7
	COLUMN 14	350	34	352.0
	COLUMN 15	350	35	353.0
	COLUMN 16	350	36	354.0
	COLUMN 17	350	37	354.75
	COLUMN 18	350	38	356.3
	COLUMN 19	350	39	357.4
	COLUMN 20	350		
	COLUMN 21	350		

TABLE 2C
CONSTANT HEADS ALONG THE
EASTERN INNER BOUNDARY

COLUMN 39:	ROW 3	378.25	27	375.0
	ROW 4	378.5	28	373.4
	ROW 5	378.65	29	371.5
	ROW 6	378.75	30	370.0
	ROW 7	379.0	31	367.2
	ROW 8	379.0	32	366.0
	ROW 9	379.0	33	364.9
	ROW 10	378.9	34	364.2
	ROW 11	378.7	35	363.5
	ROW 12	378.5	36	362.95
	ROW 13	378.35	37	362.85
	ROW 14	378.25	38	362.75
	ROW 15	378.1	39	362.65
	ROW 16	378.0	40	362.55
	ROW 17	377.9	41	363.35
	ROW 18	377.75	42	362.2
	ROW 19	377.5	43	361.9
	ROW 20	377.35	44	361.15
	ROW 21	377.25	45	360.3
	ROW 22	377.0	46	359.5
	ROW 23	376.5	47	359.05
	ROW 24	376.2	48	357.4
	ROW 25	376.0		
	ROW 26	375.5		

$$K_{xx} \, h_x + K_{yy} \, h_y = S \frac{dh}{dt}$$

where K_{xx} = the hydraulic conductivity in the x-direction (along rows) [L/T]
 K_{yy} = the conductivity in the y-direction (along columns) [L/T]
 h_x = the hydraulic gradient in the x-direction (along rows)
 h_y = the hydraulic gradient in the y-direction (along columns)
 h = the hydraulic head at any point [L]
 S = the specific yield or storage coefficient at any node

In order to obtain instantaneous convergence to steady-state, the value of S was effectively set to zero at 10^{-22} . Since this removed the time derivative term from the right-hand side of the flow equation, the resulting equation was essentially equivalent to the Laplace equation describing steady-state flow:

$$K_{xx} \, h_x + K_{yy} \, h_y = 0$$

Alternatively, steady-state conditions could have been attained by using a non-zero value of S and by allowing the model to converge to steady-state over a finite period of time. The length of real time required for dh/dt to approach zero would depend on how close the specified initial conditions were to steady-state conditions and on the overall flow dynamics of the aquifer. This procedure would have required far more computer time than the procedure used to generate instantaneous convergence.

For the case of instantaneous convergence, the time derivative term does not explicitly appear in the flow equation. Under these circumstances, initial conditions become irrelevant and arbitrary initial heads of 362.5 feet can be assigned to all variable-head nodes in the flow domain. When

a uniform bedrock elevation of 300 feet is specified for all nodes, an initial saturated thickness of 62.5 feet is defined by the model prior to convergence to steady-state.

3.4.2 Average saturated Thickness

Although saturated thickness for the model was initially set to 62.5 feet to reflect the average depth to the lower edge of recovery-well screens, saturated thickness generated by the model varied from 50 to 78 feet after convergence to steady-state. A uniform steady-state saturated thickness of 62.5 feet could have been generated only through iterative adjustment of depth to bedrock. However, the effort required to iteratively define a uniform saturated thickness of 62.5 feet over the flow domain was not considered warranted at this time.

*Set Thick
22-32'*

Use of an average saturated thickness of 62.5 feet made it possible to identify recovery-well nodes that would be incapable of sustaining targeted recovery rates. These nodes would go dry as soon as water levels dropped below the average screened interval bottom depth of 62.5 feet.

3.4.3 Hydraulic Conductivity Zoning

Hydraulic conductivity zones were defined over the flow domain according to observed geologic conditions. Hydraulic conductivity, rather than transmissivity, was used as the calibration parameter because the actual saturated thickness of the unconfined/partially-confined aquifer was unknown. Initial conductivities were assigned on the basis of pump-test transmissivities normalized to the average saturated thickness of 62.5 feet. In areas located outside of the regions of pump test influence, hydraulic conductivity was estimated on the basis of lithologic descriptions obtained from well logs.

Due to boundary influences, a sloping water table, and other non-ideal conditions affecting pump test results, hydraulic conductivities obtained from the pump tests required some adjustment until the behavior of the

aquifer was reproduced. The pump-test conductivities represented an initial input to the iterative, trial-and-error calibration.

In order to permit hydraulic conductivity to conform to observed geologic conditions, the flow domain was subdivided into several zones within which conductivity was assumed to be uniform (see Plate F1). Pump testing at GBR-14 and observation of drawdown at GBR-15, both of which were completed in the arroyo alluvium, yielded transmissivity estimates of 790 and 128 gpd/ft at the pump well and at GBR-15, respectively. These transmissivities translated into conductivities of 12.6 and 2.1 gpd/ft² when normalized by the average saturated thickness of the alluvial-sandstone aquifer. The average conductivity of 7.4 gpd/ft² was well within the range of the silty sand of 1-1000 gpd/ft² which appears to characterize the arroyo sediments (Freeze and Cherry, 1979). Since lithologic descriptions of the fine-to-medium grained clayey sand obtained at GBR-17 appear to closely correspond to descriptions of the alluvium at GBR-14 and GBR-15, this value of hydraulic conductivity was applied everywhere in the zone of arroyo alluvium.

In the zones immediately east and west of the arroyo zone, which were characterized by a fine-to-medium-grained sandstone overlain by unsaturated alluvial fill, results from a pump test performed at GBR-27 were used to identify initial hydraulic conductivity. Transmissivities obtained from this test ranged from 118.7 to 387.2 gpd/ft, the equivalent of 1.9 and 6.2 gpd/ft² hydraulic conductivity. The average conductivity of 4.1 gpd./ft² was well within the accepted range for sandstone of 0.001 to 50 gpd/ft² (Freeze and Cherry, 1979).

A pump test performed at GBR-29, which was completed within the sandstone unit in the southeastern portion of the grid, yielded a transmissivity of 1041.8 gpd/ft, or an equivalent conductivity of 16.7 gpd/ft². This conductivity was somewhat higher than that observed in the sandstone near GBR-27, possibly as a result of replenishment from adjacent valley sediments near GBR-8, 9, 10, and 11 during the pump test, but was well within the range normally encountered in sandstone. Values of 4.1 and

16.7 gpd/ft² were used to initialize the hydraulic conductivities in the northern sandstone zone and in the southeastern sandstone zone, respectively.

Pump test data obtained at well GBR-8 during pumping at GBR-29 indicated a transmissivity of 2338.8 gpd/ft. The associated conductivity of 37.4 gpd/ft² obtained from drawdown data observed at GBR-8, which was completed in San Juan River valley sediments, probably represents a minimum conductivity, because it was the adjacent sandstone actually being stressed. These valley sediments were believed to be somewhat coarser-grained than the arroyo sediments, which were deposited by fluvial processes. River valley sediments appear to have been generated by higher-energy erosional processes caused by incision of the San Juan River and by the resulting increase in the topographic gradient to the south. The conductivity of 37.4 gpd/ft² was within the 10 to 10,000 gpd/ft² range typical of clean sand (Freeze and Cherry, 1979).

Table 3 lists the hydraulic conductivity estimates used to initialize the calibration in each zone. The conductivity zones were extended out to the edges of the model grid where geologic data were lacking. Further refinement of conductivity zones was limited by the number and location of actual transmissivity measurements and well logs.

There are no known leaking rivers and lakes near the site and the properties of discontinuous confining shale and clay beds are unknown. Therefore, no attempt was made to incorporate leakance into the model calibration.

3.4.4 Iterative Trial-and-Error Calibration

Initial attempts at steady-state calibration focused on variation of hydraulic conductivity until the overall configuration of the observed water table was reproduced. This Phase I calibration was directed at generating the overall characteristics of the potentiometric surface. Phase II calibration involved adjustment of hydraulic conductivity until the anticipated steady-state response to pumping stresses was duplicated.

TABLE 3
INITIAL, MINIMUM, MAXIMUM, AND FINAL MODEL
HYDRAULIC CONDUCTIVITIES (GPD/FT²)

ZONE	INITIAL CONDUCTIVITY	RANGE OF VARIATION ^a		FINAL CONDUCTIVITY
		MINIMUM	MAXIMUM	
Arroyo Alluvium	7.4	2.1	12.6	1.8
Sandstone (N)	4.1	1.9	6.2	35.
(SE)	16.7	8.	25.	35.
Low-K Sandstone	5.	-	-	1.3
Valley Sediments	37.4	19.	56.	50.

^a range defined by minimum and maximum transmissivities from pump test analysis or as $\pm 50\%$ of lithologically estimated conductivity when pump test data not available

The second phase was intended to "fine-tune" the model to facilitate subsequent transient calibration when small errors in conductivity may produce large errors in the estimate of storage coefficient. An error closure of 196 ft. was used during both phases, allowing an average error of 0.1 feet at each of the 1960 active nodes.

3.4.4.1 Phase 1 Calibration

It became clear early in the calibration procedure that the closely spaced contours in the vicinity of the recovery wells in the Diesel Spill Area and near recovery-well GBR-29 in the Southern Refinery Area could not be duplicated by the previously-described zoning (see Figure 4-4). In an effort to reproduce these closely-spaced contours, two low-permeability zones were constructed beneath these areas. Conductivities of these low-permeability zones were initially assigned as 5 gpd/ft² and were gradually reduced to 1.3 gpd/ft² in order to accurately duplicate the observed steep gradients in the rezoned areas.

Hydraulic head simulated in the northeastern part of the flow domain with the initial conductivities was well below the observed head. This suggested that a groundwater source should be included in that area. If such a source did exist, it might also explain why closely-spaced contours in the diesel spill area could not be duplicated. However, steady-state injection of up to 1 gpm at a node in the 14th row and 28th column of the grid had no observable effect on the hydraulic gradients in the areas of interest. This injection rate was considered to be the maximum rate at which water could be migrating into the system through preferred pathways such as along buried pipelines from the northeast. Given the unlikelihood that such a source could be contributing at a rate of even 1 gpm, the calibration was continued without specifying an external source anywhere in the northeast part of the grid.

Steady-state response of the model was remarkably insensitive to variation in hydraulic conductivity within the ranges defined by pump-test analyses. Although this insensitivity could, to some extent, be attributed to the use of constant-head boundaries along three sides of the

flow domain and the resulting pre-definition of the overall head drop across the system, it could also be related to the small range of pump-test conductivity used to perform the calibration (see Table 3).

3.4.4.2 Phase II Calibration

To compensate for this apparent model insensitivity, use was made of the three single-well pump tests performed in the Diesel Spill Area and Southern Refinery Areas. Based on the drawdown versus time plots generated at each pump-test well, a long-term steady-state drawdown was extrapolated from double-log plots of the data. Hydraulic conductivities were then adjusted until the model-simulated drawdown at the pump node, discharging at the pump-test rate, matched the estimated long-term drawdown at the pump well. The extrapolated long-term drawdown was intentionally underestimated so that adjusted model conductivities would be somewhat overestimated. This represented a worst-case scenario for the case of recovery operations, because high transmissivities would result in smaller induced gradients. Thus, using these somewhat overestimated conductivities, it was possible to predict overestimated (i.e., maximum) discharges required to intercept all contaminated ground water. If the aquifer zone containing the recovery well could support this maximum required discharge, then recovery could be expected to be successful. Use of underestimated long-term drawdown at pump wells is a means of building a margin-of-error into the recovery-prediction stage of the modeling study.

Drawdown obtained at the pump nodes had to be adjusted for the finite-area cell associated with the node before it could be compared to the drawdown at a point sink such as a pump well. The adjustment was made according to the relation (Prickett and Lonquist, 1971):

$$s = 0.3665 (Q/T) \log (a/4.81 r_w)$$

where s = additional drawdown at the pump
well beyond that predicted
by the model (ft)

Q = pump-test discharge (gpd)

T = aquifer transmissivity (gpd/ft)

a = square root of the cell area
associated with the pumping
node (ft)

r_w = well radius (ft)

The procedure used to 'fine-tune' the steady-state model for long-term pumpage was as follows:

- 1) Using the estimated transmissivity of the zone containing the well and pump-test discharge, calculate s
- 2) Add s to the drawdown predicted by the model, s , to obtain simulated drawdown at a point $s' = s + s$
- 3) If the value of s' is approximately equal to the extrapolated observed steady-state drawdown at the pump well, the model has been calibrated for transmissivity (and conductivity) of the zone containing the pump node. If s' does not match the observed drawdown, adjust transmissivity accordingly and repeat steps 1-3.

Table 4 lists the pump-test discharges and extrapolated steady-state drawdown at GBR-14, GBR-27, and GBR-29 obtained from Figures C-11, C-6 and C-35, respectively.

TABLE 4 EXTRAPOLATED STEADY-STATE DRAWDOWN AT RECOVERY WELLS

Well	Conductivity Zone	Q (gpd)	Extrapolated Steady-State Drawdown (ft)
14	Arroyo alluvium	1440	15
27	Low-K Sandstone	1440	20
29	Sandstone (SE)	2880	1

The conductivity in these zones was varied until the generated drawdown, adjusted for the finite-area pumping node, was equal to the extrapolated steady-state drawdown. Assuming that drawdown at any pump well was not significantly affected by pumping from the other wells, all recovery wells could be pumped simultaneously during this stage of the calibration procedure.

Use of extrapolated drawdown at the GBR-14, 27, and 29 pump-test wells permitted estimation of hydraulic conductivities in the arroyo alluvial zone, the low-conductivity sandstone zone, and the southeastern sandstone zone. Due to lack of pump-test data in the high-conductivity sandstone located in the northern part of the grid, conductivity in this zone was assumed to be equal to conductivity identified in the southeastern sandstone zone. Conductivity for the valley sediments in the southern part of the grid was estimated by matching the model drawdown and the observed drawdown at GBR-8 due to pump-testing at GBR-29. Since radial flow was not occurring at GBR-8 during the pump test, no drawdown correction was necessary when matching drawdown at GBR-8.

Table 3 lists the final estimates of conductivity obtained on the basis of the two-phase steady-state calibration. With the exception of final conductivity for the sandstone, all final conductivities were within the specified ranges.

The similarity of conductivities obtained in the arroyo alluvium zone and in the adjacent low-conductivity sandstone zone suggests that the low-conductivity sandstone zone may actually be underlain by silty saturated overbank sediments associated with the arroyo. Although southward deflection of flowlines occurring in the arroyo would appear to suggest that the overall arroyo conductivity is larger than the conductivity of the sandstone, a lower conductivity was evident from pump test results. These results indicated larger drawdown in GBR-14 than in GBR-27 under an equivalent pumping stress.

Comparison of the final simulated steady-state head distribution (Plate F4) with the observed water table (Figure 4-4) shows that while the closely-spaced contours in specific portions of the flow domain were not exactly duplicated, the overall regional characteristics of the steady-state water table were adequately reproduced using the zone conductivities listed in Table 5. The far-spaced equipotential lines evident immediately southwest of the Diesel Spill Area appeared to result from the flow geometry around the low-conductivity area. The stagnation point at which streamlines converged on each other produced a loss of hydraulic potential and a reduced hydraulic gradient. The same phenomenon occurs in the observed water table, although to a lesser extent.

No attempt was made to contour the simulated water table outside of the constant-head boundaries. Contouring of data over the entire flow domain would have implied a greater reliability of head data outside of the constant-head boundaries than was actually realized.

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

2	20	2245.25	2245.25	1E-22	364.15	0	0	0	0	300	35	35
2	21	2240	2240	1E-22	364	0	0	0	0	300	35	35
2	22	2226	2226	1E-22	363.6	0	0	0	0	300	35	35
2	23	2215.5	2215.5	1E-22	363.3	0	0	0	0	300	35	35
2	24	2205	2205	1E-22	363	0	0	0	0	300	35	35
2	25	2192.75	2192.75	1E-22	362.65	0	0	0	0	300	35	35
2	26	2170	2170	1E-22	362	0	0	0	0	300	35	35
2	27	2117.5	2117.5	1E-22	360.5	0	0	0	0	300	35	35
2	28	2065	2065	1E-22	359	0	0	0	0	300	35	35
2	29	1995	1995	1E-22	357	0	0	0	0	300	35	35
2	30	1911	1911	1E-22	354.6	0	0	0	0	300	35	35
2	31	1890	1890	1E-22	354	0	0	0	0	300	35	35
2	32	1855	1855	1E-22	353	0	0	0	0	300	35	35
2	33	1837.5	1837.5	1E-22	352.5	0	0	0	0	300	35	35
2	34	1828.75	1828.75	1E-22	352.25	0	0	0	0	300	35	35
2	35	1820	1820	1E-22	352	0	0	0	0	300	35	35
2	36	1814.75	1814.75	1E-22	351.85	0	0	0	0	300	35	35
2	37	1813	1813	1E-22	351.8	0	0	0	0	300	35	35
2	38	1811.25	1811.25	1E-22	351.75	0	0	0	0	300	35	35
2	39	1807.75	1807.75	1E-22	351.65	0	0	0	0	300	35	35
2	40	1806	1806	1E-22	351.6	0	0	0	0	300	35	35
2	41	1800.75	1800.75	1E-22	351.45	0	0	0	0	300	35	35
2	42	1795.5	1795.5	1E-22	351.3	0	0	0	0	300	35	35
2	43	1785	1785	1E-22	351	0	0	0	0	300	35	35
2	44	1779.75	1779.75	1E-22	350.85	0	0	0	0	300	35	35
2	45	1776.25	1776.25	1E-22	350.75	0	0	0	0	300	35	35
2	46	1767.5	1767.5	1E-22	350.5	0	0	0	0	300	35	35
2	47	1758.75	1758.75	1E-22	350.25	0	0	0	0	300	35	35
2	48	1750	1750	1E-22	350	0	0	0	0	300	35	35
2	49	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	5	128.7	128.7	1E+22	371.5	0	0	0	0	300	1.8	1.8
3	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	32	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	33	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	34	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	35	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	36	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	45	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	46	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
3	47	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
3	48	90	90	1E+22	350	0	0	0	0	300	1.8	1.8
3	49	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	5	129.42	129.42	1E+22	371.9	0	0	0	0	300	1.8	1.8
4	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8

TABLE 5
PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

4	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	32	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	33	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	34	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	35	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	36	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
4	45	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	46	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	47	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
4	48	90	90	1E+22	350	0	0	0	0	300	1.8	1.8
4	49	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
5	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
5	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
5	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	5	130.14	130.14	1E+22	372.3	0	0	0	0	300	1.8	1.8
5	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	41	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	42	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	43	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	44	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	45	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	46	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	47	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
5	48	90	90	1E+22	350	0	0	0	0	300	1.8	1.8

TABLE 5
PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CON'D)

5	49	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
6	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
6	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
6	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	5	130.68	130.68	1E+22	372.6	0	0	0	0	300	1.8	1.8
6	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	41	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	42	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	43	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	44	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	45	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	46	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	47	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
6	48	90	90	1E+22	350	0	0	0	0	300	1.8	1.8
6	49	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
7	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
7	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
7	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	5	131.4	131.4	1E+22	373	0	0	0	0	300	1.8	1.8
7	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

7	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	41	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	42	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	43	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	44	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	45	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	46	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	47	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
7	48	90	90	1E+22	350	0	0	0	0	300	1.8	1.8
7	49	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
8	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
8	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
8	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	5	131.67	131.67	1E+22	373.15	0	0	0	0	300	1.8	1.8
8	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	41	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	42	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	43	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	44	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	45	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	46	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	47	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
8	48	90	90	1E+22	350	0	0	0	0	300	1.8	1.8
8	49	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
9	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
9	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
9	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	5	132.12	132.12	1E+22	373.4	0	0	0	0	300	1.8	1.8
9	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

9	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	41	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	42	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	43	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	44	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	45	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	46	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
9	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
9	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
9	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
10	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
10	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
10	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
10	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	5	132.48	132.48	1E+22	373.6	0	0	0	0	300	1.8	1.8
10	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	41	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	42	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	43	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	44	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	45	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
10	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
10	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
10	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
10	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
11	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
11	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
11	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
11	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	5	132.84	132.84	1E+22	373.8	0	0	0	0	300	1.8	1.8
11	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

11	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	41	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	42	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	43	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	44	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	45	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
11	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
11	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
11	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
11	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
12	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
12	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
12	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
12	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	5	133.02	133.02	1E+22	373.9	0	0	0	0	300	1.8	1.8
12	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
12	41	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
12	42	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
12	43	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
12	44	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
12	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
12	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
12	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
12	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
12	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
13	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
13	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
13	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
13	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
13	5	133.38	133.38	1E+22	374.1	0	0	0	0	300	1.8	1.8
13	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
13	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
13	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8

TABLE 5

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

[illegible]

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

14	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
14	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
15	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
15	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
15	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
15	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	5	133.74	133.74	1E+22	374.3	0	0	0	0	300	1.8	1.8
15	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	12	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	13	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	14	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	15	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	16	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	17	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	18	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	19	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	20	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	21	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	22	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	23	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	31	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	32	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	33	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	34	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	35	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	36	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	37	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	38	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	39	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	40	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
15	41	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
15	42	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
15	43	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
15	44	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
15	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
15	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
15	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
15	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
15	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
16	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
16	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
16	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	5	133.92	133.92	1E+22	374.4	0	0	0	0	300	1.8	1.8
16	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
16	24	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	25	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	26	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	27	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	28	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	29	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	30	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
16	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
16	32	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	33	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	34	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	35	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	36	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	37	3125	3125	1E-22	362.5	0	0	0	0	300	50	50

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

16	38	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	39	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	40	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	41	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	42	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	43	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	44	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
16	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
16	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	4	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
17	5	134.1	134.1	1E+22	374.5	0	0	0	0	300	1.8	1.8
17	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
17	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
17	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
17	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
17	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
17	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
17	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
17	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
17	32	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	33	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	34	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	35	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	36	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	37	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	38	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	39	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	40	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	41	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	42	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	43	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	44	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
17	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
17	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	5	134.37	134.37	1E+22	374.65	0	0	0	0	300	1.8	1.8
18	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
18	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
18	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
18	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
18	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
18	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
18	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
18	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

18	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
18	32	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	33	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	34	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	35	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	36	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	37	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	38	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	39	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	40	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	41	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	42	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	43	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	44	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
18	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
18	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	5	134.64	134.64	1E+22	374.8	0	0	0	0	300	1.8	1.8
19	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
19	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
19	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
19	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
19	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
19	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
19	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
19	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
19	32	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	33	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	34	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	35	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	36	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	37	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	38	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	39	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	40	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	41	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	42	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	43	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	44	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
19	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
19	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	5	134.82	134.82	1E+22	374.9	0	0	0	0	300	1.8	1.8
20	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
20	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
20	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
20	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
20	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
20	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
20	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

20	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
20	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	32	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	33	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	34	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	35	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	36	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	37	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	38	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	39	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	40	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	41	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	42	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	43	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	44	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
20	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
20	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	5	2628.5	2628.5	1E+22	375.1	0	0	0	0	300	35	35
21	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
21	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
21	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
21	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
21	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
21	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
21	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
21	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
21	32	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	33	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	34	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	35	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	36	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	37	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	38	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	39	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	40	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	41	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	42	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	43	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	44	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
21	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
21	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
22	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
22	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
22	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
22	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
22	5	2637.25	2637.25	1E+22	375.35	0	0	0	0	300	35	35
22	6	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
22	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8

STEADY-STATE HEAD (CONT'D)

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PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

23	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
23	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
23	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
24	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	5	2640.751	2640.751	1E+22	375.45	0	0	0	0	300	35	35
24	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	7	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
24	8	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
24	9	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
24	10	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
24	11	112.5	112.5	1E-22	362.5	0	0	0	0	300	1.8	1.8
24	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
24	32	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
24	36	81.25	81.25	1								

TABLE 5
PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

25	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
25	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
25	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
25	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
25	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
25	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
25	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
25	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
25	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
25	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
25	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
25	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
25	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
26	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	5	2651.25	2651.25	1E+22	375.75	0	0	0	0	300	35	35
26	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	32	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	36	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
26	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
26	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
26	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
26	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
26	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
26	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
27	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	5	2654.75	2654.75	1E+22	375.85	0	0	0	0	300	35	35
27	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

27	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	32	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	36	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
27	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
27	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
27	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
27	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
27	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
27	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
28	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	5	2660	2660	1E+22	376	0	0	0	0	300	35	35
28	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	12	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	13	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	14	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	15	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	16	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	17	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	18	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	19	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	20	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	21	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	22	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	23	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	32	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	36	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
28	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
28	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
28	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
28	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
28	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
28	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
29	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	5	2665.25	2665.25	1E+22	376.15	0	0	0	0	300	35	35
29	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

29	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	32	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
29	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
29	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
29	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
29	36	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
29	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
29	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
29	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
29	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
29	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
29	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
30	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	5	2672.25	2672.25	1E+22	376.35	0	0	0	0	300	35	35
30	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	32	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
30	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
30	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
30	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
30	36	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
30	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
30	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
30	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
30	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
30	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
30	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
31	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	5	2681	2681	1E+22	376.6	0	0	0	0	300	35	35
31	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

31	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	32	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
31	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
31	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
31	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
31	36	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
31	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
31	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
31	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
31	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
31	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
31	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
32	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	5	2688	2688	1E+22	376.8	0	0	0	0	300	35	35
32	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	32	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
32	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
32	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
32	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
32	36	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
32	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
32	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
20	36	350	2187.5	1E-22	362.5	0	0	0	0	300	50	50

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

32	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
32	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
32	48	2500	2500	1E+22	350	0	0	0	0	300	50	50
32	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
33	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	5	2703.75	2703.75	1E+22	377.25	0	0	0	0	300	35	35
33	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	32	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
33	33	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
33	34	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
33	35	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
33	36	81.25	81.25	1E-22	362.5	0	0	0	0	300	1.3	1.3
33	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
33	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
33	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
33	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
33	48	2535.001	2535.001	1E+22	350.7	0	0	0	0	300	50	50
33	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
34	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	5	2717.75	2717.75	1E+22	377.65	0	0	0	0	300	35	35
34	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	32	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	33	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	34	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	35	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35

TABLE 5
PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

34	36	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
34	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
34	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
34	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
34	48	2600	2600	1E+22	352	0	0	0	0	300	50	50
34	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
35	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	5	2730	2730	1E+22	378	0	0	0	0	300	35	35
35	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	32	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	33	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	34	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	35	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	36	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
35	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
35	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
35	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
35	48	2650	2650	1E+22	353	0	0	0	0	300	50	50
35	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
36	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	5	2733.5	2733.5	1E+22	378.1	0	0	0	0	300	35	35
36	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

36	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	32	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	33	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	34	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	35	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	36	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
36	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
36	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
36	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
36	48	2700	2700	1E+22	354	0	0	0	0	300	50	50
36	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
37	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	5	2737.001	2737.001	1E+22	378.2	0	0	0	0	300	35	35
37	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	32	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	33	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	34	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	35	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	36	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
37	45	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
37	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
37	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
37	48	2737.5	2737.5	1E+22	354.75	0	0	0	0	300	50	50
37	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
38	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	5	2740.5	2740.5	1E+22	378.3	0	0	0	0	300	35	35
38	6	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	7	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	8	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	9	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	10	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	11	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	12	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	13	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	14	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	15	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35

PLASM INPUT PARAMETERERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

38	16	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	17	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	18	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	19	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	20	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	21	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	22	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	23	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	24	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	25	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	26	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	27	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	28	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	29	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	30	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	31	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	32	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	33	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	34	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	35	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	36	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	37	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	38	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	39	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	40	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	41	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	42	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	43	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	44	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	45	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
38	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
38	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
38	48	2815	2815	1E+22	356.3	0	0	0	0	300	50	50
38	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
39	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
39	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
39	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
39	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
39	5	2751	2751	1E+22	378.6	0	0	0	0	300	35	35
39	6	2756.25	2756.25	1E+22	378.75	0	0	0	0	300	35	35
39	7	2765	2765	1E+22	379	0	0	0	0	300	35	35
39	8	2765	2765	1E+22	379	0	0	0	0	300	35	35
39	9	2765	2765	1E+22	379	0	0	0	0	300	35	35
39	10	2761.5	2761.5	1E+22	378.9	0	0	0	0	300	35	35
39	11	2754.501	2754.501	1E+22	378.7	0	0	0	0	300	35	35
39	12	2747.5	2747.5	1E+22	378.5	0	0	0	0	300	35	35
39	13	2742.25	2742.25	1E+22	378.35	0	0	0	0	300	35	35
39	14	2738.75	2738.75	1E+22	378.25	0	0	0	0	300	35	35
39	15	2733.5	2733.5	1E+22	378.1	0	0	0	0	300	35	35
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39	27	2625	2625	1E+22	375	0	0	0	0	300	35	35
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39	34	2247.001	2247.001	1E+22	364.2	0	0	0	0	300	35	35
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39	39	2192.75	2192.75	1E+22	362.65	0	0	0	0	300	35	35
39	40	2189.25	2189.25	1E+22	362.55	0	0	0	0	300	35	35
39	41	2182.25	2182.25	1E+22	362.35	0	0	0	0	300	35	35
39	42	2177.001	2177.001	1E+22	362.2	0	0	0	0	300	35	35
39	43	2166.5	2166.5	1E+22	361.9	0	0	0	0	300	35	35
39	44	2140.25	2140.25	1E+22	361.15	0	0	0	0	300	35	35
39	45	2110.5	2110.5	1E+22	360.3	0	0	0	0	300	35	35
39	46	2975	2975	1E+22	359.5	0	0	0	0	300	50	50
39	47	2952.5	2952.5	1E+22	359.05	0	0	0	0	300	50	50
39	48	2870	2870	1E+22	357.4	0	0	0	0	300	50	50
39	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
40	1	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
40	2	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
40	3	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
40	4	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
40	5	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

[illegible]

PLASM INPUT PARAMETERS FOR GENERATION OF
STEADY-STATE HEAD (CONT'D)

41	45	2187.5	2187.5	1E-22	362.5	0	0	0	0	300	35	35
41	46	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
41	47	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
41	48	3125	3125	1E-22	362.5	0	0	0	0	300	50	50
41	49	3125	3125	1E-22	362.5	0	0	0	0	300	50	50

DESCRIPTION OF PLASM INPUT OPTIONS AND VARIABLES
IN TABLE 5

<u>Line</u>	<u>Option</u>
1	U = unconfined flow
2	Y = predictor option in effect
3	N = mass-balance option not in effect
4	O = % mass-balance error
5	English units used
6	C = constant pumping rate

<u>Line</u>	<u>Variable</u>
7	NSTEPS, DELTA, ERROR, CON
8	NC, NR, NP, NSP, NRT
9-2017	I, J, Tx, Ty, S, H, Q, R, RH, RD, BUT, Kx, Ky

NSTEPS = number of time steps
 DELTA = time increment (days)
 ERROR = total global error closure (ft)
 CON = conversion factor
 NC = number of columns
 NR = number of rows
 NP = number of pumping nodes
 NSP = number of time increments per pumping change
 NRT = number of rates in pumping schedule
 I = nodal column number
 J = nodal row number
 Tx = transmissivity in the x-direction (gpd/ft)
 Ty = transmissivity in the y-direction (gpd/ft)
 S = Storage coefficient
 H = initial hydraulic head (ft)
 Q = withdrawal rate per unit area (gpd/ft²)
 R = leakance coefficient (gpd/ft³)
 RH = source bed head (ft)
 RD = confining layer bottom elevation (ft)
 BOT = elevation of aquifer bottom (ft)
 Kx = hydraulic conductivity in x-direction (gpd/ft²)
 Ky = hydraulic conductivity in y-direction (gpd/ft²)

Table 5 is a listing of the final input parameters and variables used to generate the steady-state hydraulic head distribution using the PLASM finite-difference flow model.

3.5 PREDICTION OF RECOVERY-WELL IMPACTS

Plate F3 depicts the potentiometric surface in the Southern Refinery Area due to the recovery-well pumpages listed in Table 6. A total of 91,000 gallons per day of water would be pumped under the suggested strategy. A successful recovery strategy was difficult to maintain in the Southern Refinery Area due to the moderately-high conductivity associated with the sandstone and valley sediments in the contaminated area. Targeted recovery discharges were chosen on the basis of the discharge that could be expected to be maintained for the indicated zonal transmissivities.

The steady-state potentiometric surface shown in Plate F3 would evolve over a long period of time. Clearly, this pumping strategy would result in interception of all upgradient contamination in both the Southern Refinery Area and the Diesel Spill Area. In the case of the Diesel Spill Area, even downgradient portions of the estimated plume could easily be captured by the proposed level of pumping.

Based on prediction of recovery-well impacts, the estimated plume in the Diesel Spill Area can be intercepted by three existing recovery wells operating at a discharge rate of 1 gpm. Given that these wells have been tested previously at rates of 1 gpm and appear to be capable of maintaining this discharge rate over long periods of time, proposed recovery operations in the Diesel Spill Area are likely to be successful.

Interception of contaminated ground water in the Southern Refinery Area is expected to be somewhat more difficult than in the Diesel Spill Area because of higher-conductivity sediments characteristic of the Southern Refinery Area; cones of depression that develop within these sediments in response to recovery pumping tend to be less steep than those produced in the silty low-conductivity arroyo alluvium. As a result, greater discharge and a larger number of wells will be required to recover a

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TABLE 6
PROPOSED LONG-TERM
RECOVERY-WELL PUMPING

Well	Column Location	Row Location	Hydraulic Conductivity (GPD/FT ²)	Q(GPM)
14	14	14	1.8	1
27	21	16	1.3	1
28	17	22	1.3	1
X1	17	36	50	15
X2	22	37	50	15
29	27	38	35	10
X3	31	39	35	10
X4	33	41	35	10

specific volume of contaminated ground water in the Southern Refinery Area compared to the Diesel Spill Area.

Plate F3 shows only one of several possible recovery-well networks that would be capable of capturing the potential plume in the Southern Refinery Area. Installation of more than the four additional recovery wells would, in general, require less pumping from each well to effect the same recovery drawdown. For example, total required discharge from wells X1 and X2, completed in the high-conductivity valley sediments, could be reduced by installing several more wells in the sediments. The total required discharge would tend to be reduced with a greater number of recovery wells because the amount of stress required to intercept water would diminish when it is distributed over a wider area. The actual number of wells required for recovery of all potentially contaminated ground water will be dictated by long-term well yields and by the capacity of the treatment system.

3.6 RECOMMENDATIONS

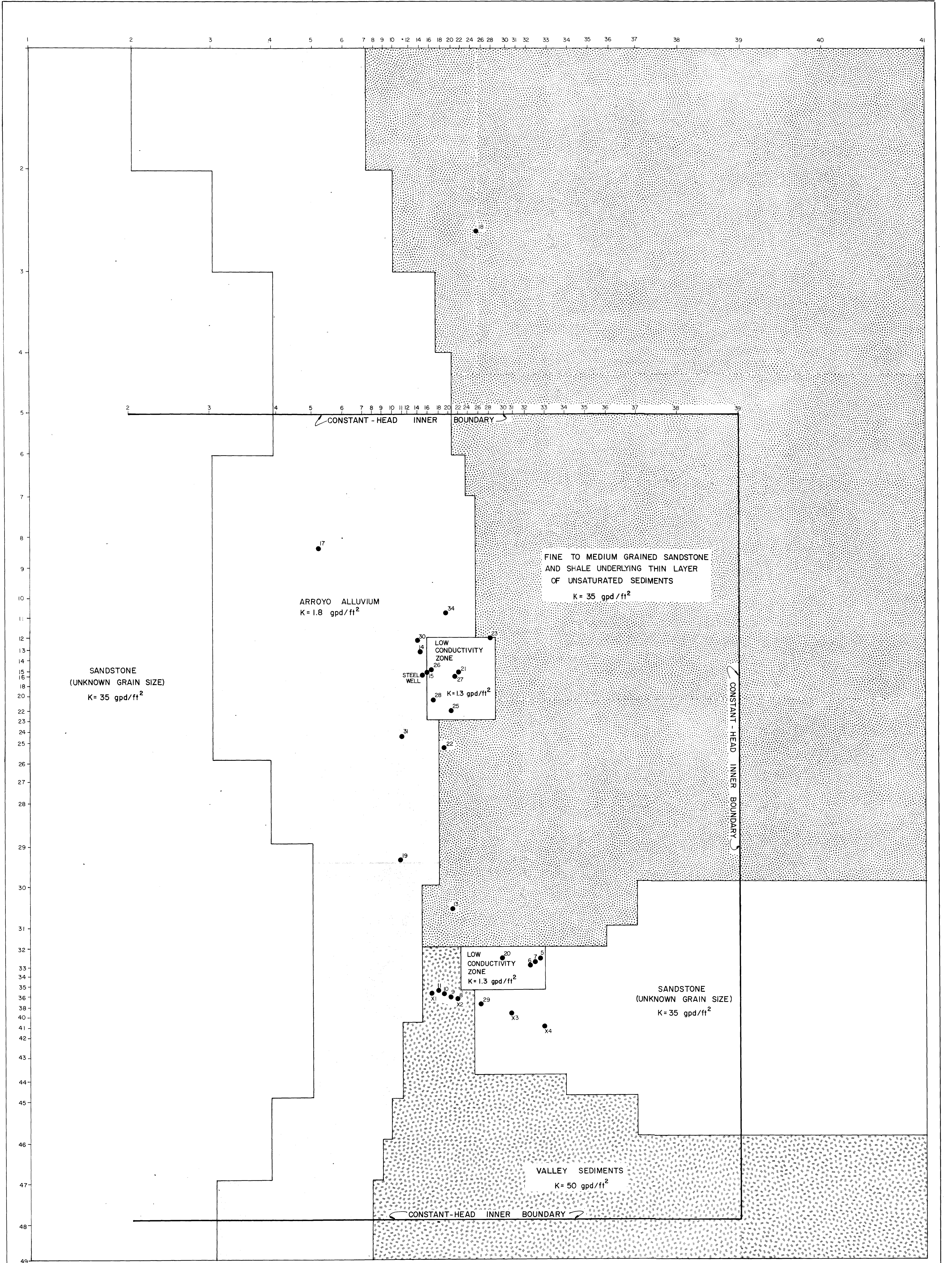
Since recovery-well placement and number will partly depend on the yield of the aquifer, installation of the recovery system should proceed on the basis of observed well yield. The suggested procedure for recovery-well installation is as follows:

- 1) Install wells X2 and X3, shown in Plate F3. Optimal placement of these wells are more dominated by the edges of the inferred plume than by aquifer yield.
- 2) Test the two new wells over a period of one or two months to determine their long-term yields. Assume that all new wells completed in the same materials will have these yields. Estimate potential yields in untested aquifer materials.
- 3) Run the calibrated steady-state model using observed and estimated long-term yields to determine the precise locations of additional wells needed to prevent contamination from migrating off the site.

The approximate capture zones that would develop under the proposed remedial action pumping strategy are shown in Plate F4. Clearly, much of the anticipated product and dissolved contamination would be intercepted

by the recovery wells, given the assumption upon which the numerical models are based.

M&A\APPENDIX.E

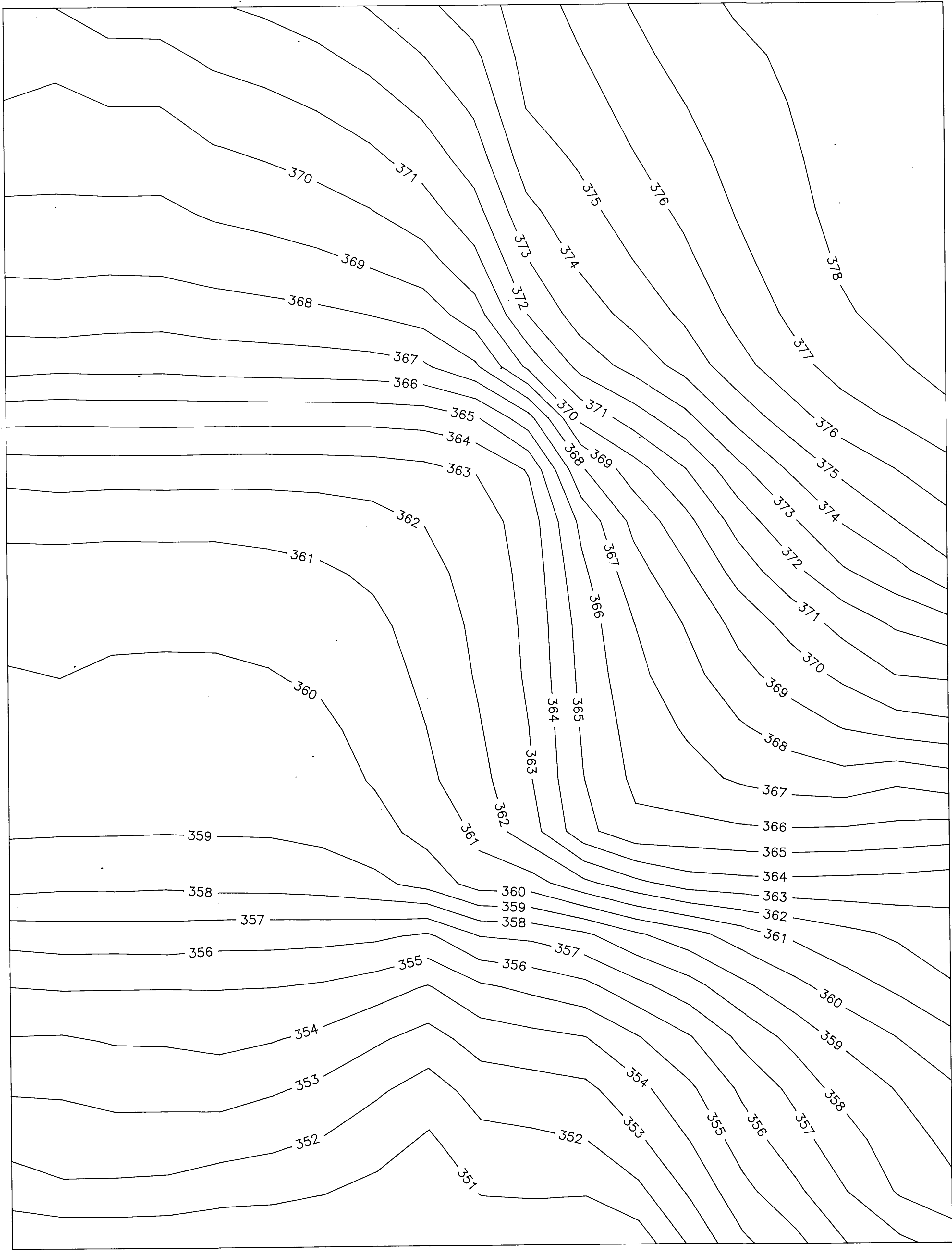


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JUL 17 1987
OIL CONSERVATION DIVISION
SANTA FE

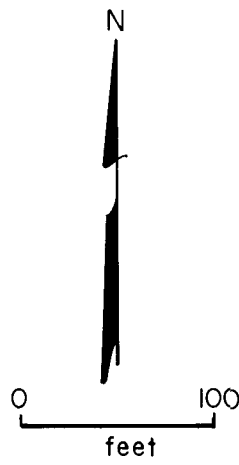
LEGEND
● WELL LOCATIONS



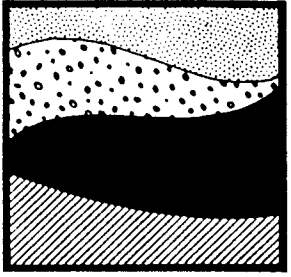
	HYDRAULIC CONDUCTIVITY ZONES	
	CLIENT:	
	DATE: 3/20/87	
	DRAWN BY: KJ K	
	CHECKED BY:	
	REVISION:	
	SCALE: 1" = 100'	
PLATE EI		

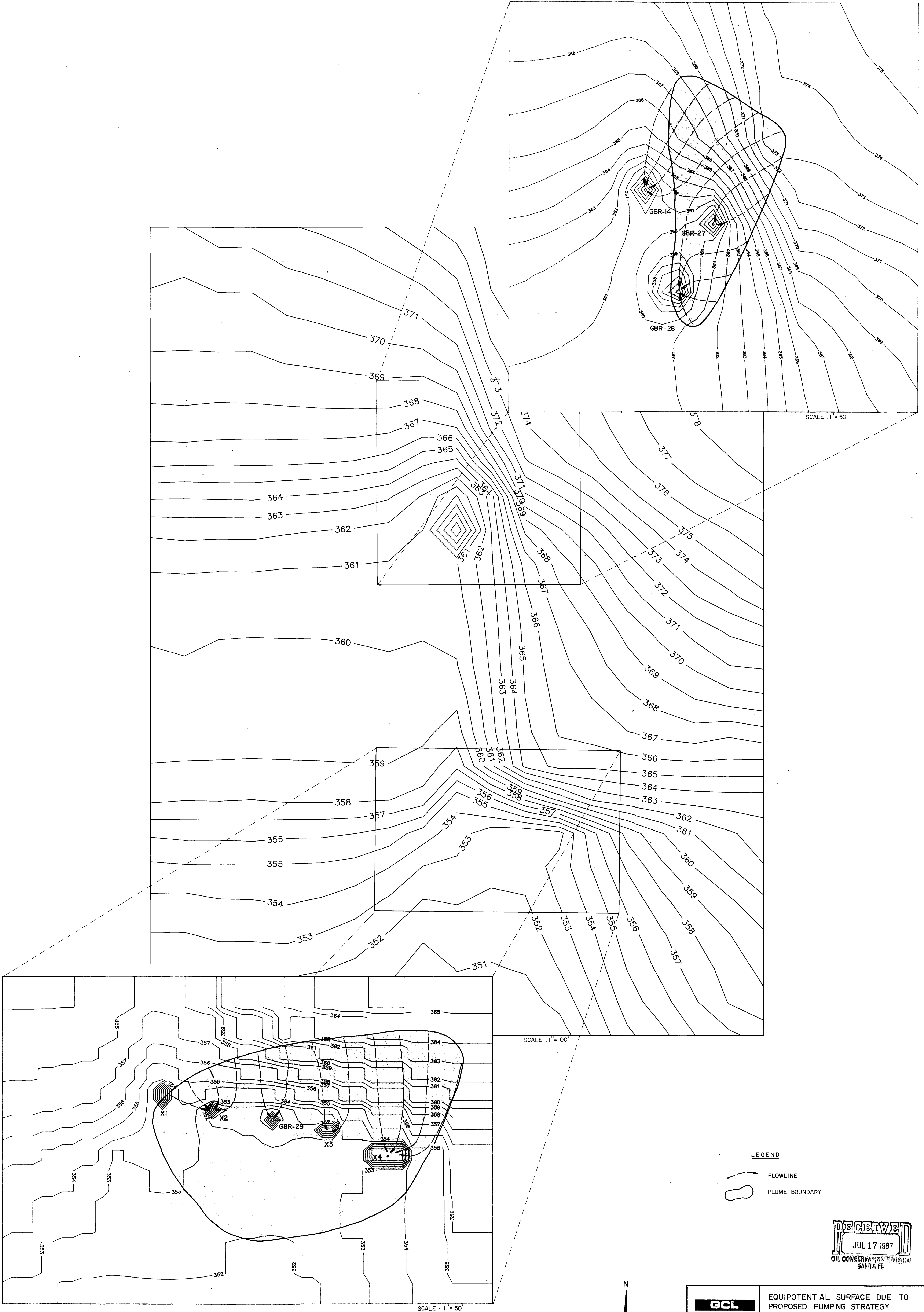


LEGEND
— 356 — EQUIPOTENTIAL LINE
(HEAD = 5000 ft.)



RECEIVED
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OIL CONSERVATION DIVISION
SANTA FE

	SIMULATED EQUIPOTENTIAL SURFACE UNDER STEADY-STATE CONDITIONS	
	CLIENT:	
	DATE: 3-24-87	
	DRAWN BY:	
	CHECKED BY:	
REVISION:		
SCALE: 1"=100'		
PLATE E2		

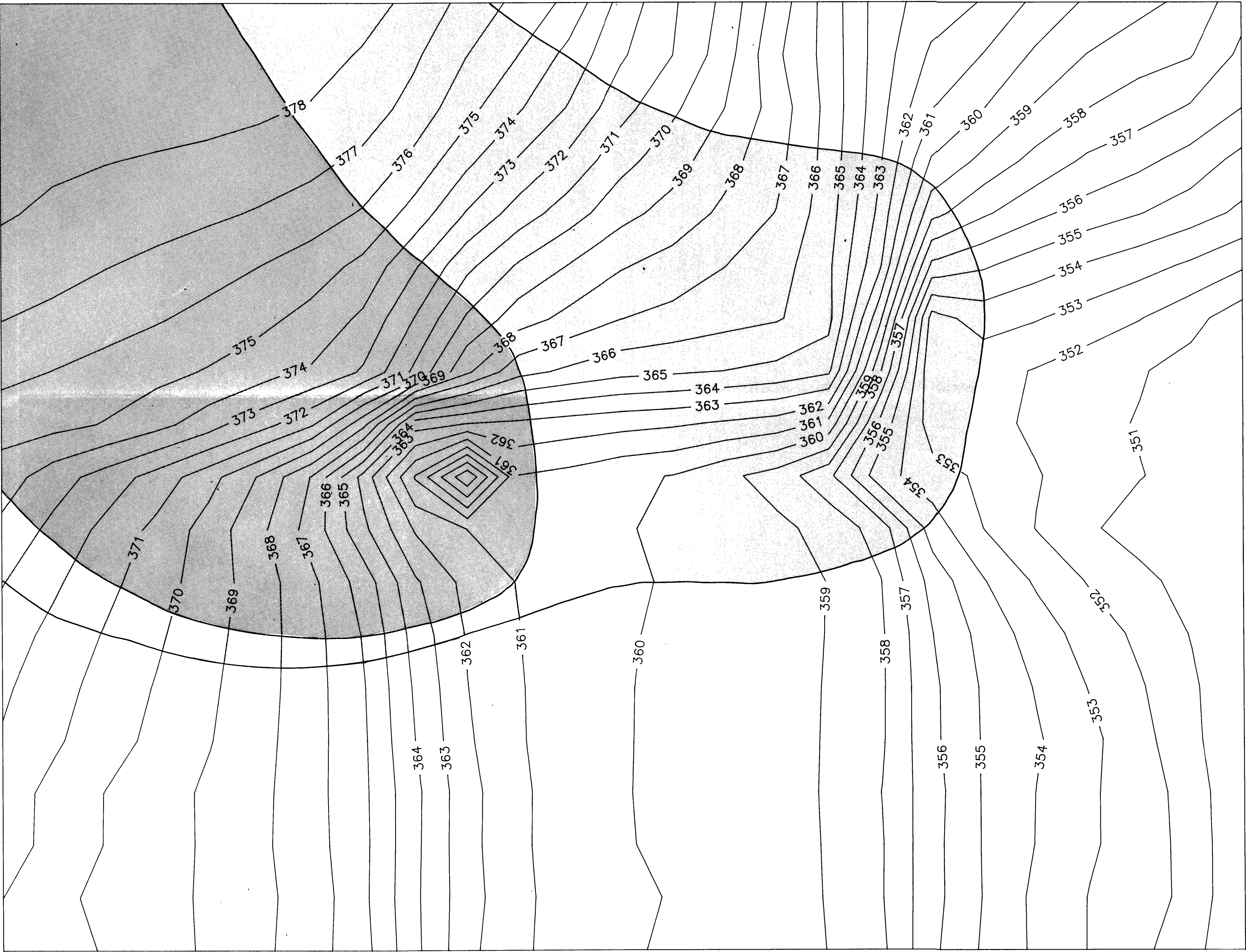


LEGEND

- FLOWLINE
- PLUME BOUNDARY

RECEIVED
JUL 17 1987
OIL CONSERVATION DIVISION
SANTA FE

	EQUIPOTENTIAL SURFACE DUE TO PROPOSED PUMPING STRATEGY	
	CLIENT:	
	DATE:	3-23-87
	DRAWN BY:	KJK
	CHECKED BY:	
	REVISED:	
	SCALE AS NOTED	
	PLATE 4/E3	



LEGEND

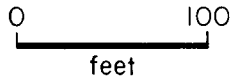
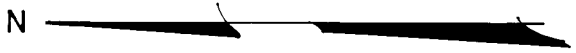


ZONE OF CAPTURE ASSOCIATED WITH RECOVERY
PUMPING IN DIESEL SPILL AREA



ZONE OF CAPTURE ASSOCIATED WITH RECOVERY
PUMPING IN SOUTHERN REFINERY AREA

CONTOUR INTERVAL : 1 FT.



DISCLOSURE
JUL 17 1987
OIL CONSERVATION DIVISION
SANTA FE



APPROXIMATE CAPTURE ZONES UNDER
PROPOSED RECOVERY STRATEGY

CLIENT:
DATE: 3/19/87
DRAWN BY:
CHECKED BY:
REVIEWED:
SCALE 1" = 100'

PLATE E4

ANNUAL REPORT

FORMER GIANT BLOOMFIELD REFINERY
BLOOMFIELD, NEW MEXICO
DISCHARGE PERMIT GW-040

APRIL 2011



WESTERN REFINING SOUTHWEST, INC.
111 CR 4990
Bloomfield, New Mexico 87413

ANNUAL REPORT
FORMER GIANT BLOOMFIELD REFINERY
BLOOMFIELD, NEW MEXICO
DISCHARGE PERMIT GW-040

APRIL 2011

Prepared for:

WESTERN REFINING SOUTHWEST, INC.
111 CR 4990
Bloomfield, New Mexico 87413

Prepared by:

LT ENVIRONMENTAL, INC.
2243 Main Avenue, Suite 3
Durango, Colorado 81301
(970) 385-1096



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EXECUTIVE SUMMARY

LT Environmental, Inc. (LTE) on behalf of Western Refining Southwest, Inc. (Western) has prepared this report detailing work completed from January through December 2010 at the former Giant Bloomfield Refinery (Site) in Bloomfield, New Mexico. The scope of work for this project was continued mitigation and monitoring of petroleum hydrocarbon impacts to groundwater, which were identified upon cessation of refinery operations. During the time period covered in this report, Western utilized a groundwater recovery and remediation system consisting of groundwater recovery wells, a carbon filtration unit, and a treated water infiltration trench.

LTE conducted weekly operations and maintenance on the remediation system and monitored groundwater quality throughout 2010. Quarterly activities in 2010 included sampling the remediation system influent and effluent for laboratory analysis of volatile organic compounds (VOCs), measuring depth to groundwater in groundwater monitoring and recovery wells, and recovering phase separated hydrocarbons (PSH) in groundwater monitoring wells. When PSH was detected in monitoring wells, oil absorbent socks were placed in the wells for product recovery. Annual activities in January 2010 included collecting groundwater samples from 17 monitoring wells and two recovery wells for laboratory analysis of VOCs. One collected groundwater sample was analyzed for polynuclear aromatic hydrocarbons (PAH).

Laboratory analysis results indicated no VOCs were detected in influent and effluent groundwater samples. Minor concentrations of VOC constituents were detected in the annual groundwater samples from monitoring wells GBR-24D, GBR-32, GBR-48, GBR-49, and GBR-50, and minor concentrations of PAH constituents were detected in monitoring well GBR-24D. However, concentrations of these constituents were below New Mexico Water Quality Control Commission standards. Thin accumulations of PSH exist in source areas identified during previous subsurface investigations. A total of 93.6 ounces of PSH were recovered from the Site in 2010.

A total of 1,121,363 gallons of groundwater was recovered and treated by the remediation system in 2010, representing a decrease from the 9,455,408 gallons treated during 2009. However, the lower recovery volume was sufficient to maintain a hydraulic barrier preventing migration of PSH offsite. Smaller thicknesses of PSH were observed in groundwater monitoring wells compared to 2009 and there was a decreased total number of groundwater monitoring wells containing measurable volumes of PSH in 2010. This suggests PSH recovery with oil absorbent socks was effective.

Based on the results presented in this report, Western should continue PSH recovery and operation of the remediation system. LTE recommends continued quarterly monitoring of groundwater flow behavior and presence of PSH, as well as influent and effluent sampling and laboratory analysis. Annual sampling of monitoring and recovery wells should continue.

1.0 INTRODUCTION

LT Environmental, Inc. (LTE) prepared this report for Western Refining Southwest, Inc. (Western) to summarize work completed from January through December 2010 at the former Giant Bloomfield Refinery (Site) in Bloomfield, New Mexico.

1.1 SITE DESCRIPTION

The Site is on the northeast corner of United States (U.S.) Highway 64 and County Road 350, approximately five miles west of Bloomfield, New Mexico, in the northwest quarter of Section 27 and the southwest quarter of Section 22, Township 29 North, Range 12 West in San Juan County (Figure 1). Facilities include a control building, aboveground storage tanks, a carbon filtration tank, groundwater monitoring wells, and groundwater recovery wells (Figure 2).

1.2 SITE HISTORY

The former refinery, under ownership of Giant Industries, Arizona (Giant), produced leaded and unleaded gasoline, diesel, kerosene, and other refined petroleum products from 1974 to 1982 but is presently inactive. The refining operations and subsequent truck loading and unloading activities impacted groundwater, which were identified and investigated as part of the site closure requirements prescribed by the New Mexico Oil Conservation Division (NMOCD) in 1986. Details of a subsurface investigation and initial remediation efforts are contained in a 1987 report entitled *Soil and Groundwater Investigations and Remedial Action Plan, Giant Industries, Inc. Bloomfield Refinery, Bloomfield, New Mexico*. The investigation identified three source areas (Figure 2):

- Northern Area (Diesel Spill Area): 10,000 to 15,000 gallons of diesel were released from a pipeline in 1985;
- Central Area (Truck Fueling Area): 15,000 gallons of diesel were released from a pipeline in 1986; and
- Southern Area: Historic releases from a former fire fighting drill area east and upgradient of the Site may have collected in a former seep and a stormwater catchment area.

Concurrent with refinery operations, the Lee Acres Landfill, formerly located up-gradient of the Site, operated as a San Juan County landfill from 1962 to 1986 (Figure 1). Solid wastes were disposed of in trenches, and a series of lagoons were used for disposal of a variety of liquid wastes. The NMOCD sampled the lagoons in 1985 and demonstrated that the liquids in the impoundments contained a variety of chlorinated solvents, petroleum hydrocarbon constituents, heavy metals, and salts. In April 1985, a breach in the dike retaining the lagoons released liquid wastes into an arroyo west of the Site. The arroyo drains south toward the Lee Acres Subdivision, where the NMOCD and the New Mexico Environment Department (NMED) identified contaminated water in domestic water wells in 1988. In response, the NMOCD required Giant to investigate petroleum hydrocarbon impacts to groundwater downgradient of the refinery in the Lee Acres Subdivision, and the NMED conducted a separate investigation to identify potential landfill impacts. The results of the subsurface investigation south of the refinery by Giant are contained in three volumes of the 1992 report, *Remedial Investigation*

Report for Lee Acres Landfill. The NMED, in conjunction with the Bureau of Land Management and the United States Geological Survey, published their results in three reports referenced in Section 6.0 of this report.

The investigations identified two separate plumes of impacted groundwater that commingled across the refinery and flowed downgradient into the Lee Acres Subdivision. Groundwater contaminants detected in the refinery plume included phase-separated hydrocarbons (PSH) and dissolved phase petroleum hydrocarbons. The dissolved-phase constituents included benzene, toluene, ethylbenzene and total xylenes (BTEX), naphthalene, and 1,2 dichloroethane (EDC). The landfill contaminant plume contained total dissolved solids, chloride, sulfate, manganese, BTEX, naphthalene, 1,1 dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene.

Beginning in 1988, Giant installed a groundwater recovery, treatment, and disposal system in stages at the Site to restrict migration of contaminants and to remediate groundwater impacts caused by their operations. A total of 45 monitoring wells were initially installed and designated GBR wells (Figure 2). Of these 45 monitoring wells, 11 were converted to recovery wells and renamed with GRW designations. An additional 17 monitoring wells were completed in the Lee Acres Subdivision and designated as SHS wells. Four SHS wells initially operated as recovery wells. Giant pumped groundwater from the recovery wells into storage tanks, then treated the groundwater with carbon filtration, and re-injected treated groundwater into the subsurface through two infiltration galleries.

As groundwater quality improved over time, the remediation system was gradually simplified. It currently consists of 10 active groundwater recovery wells that pump groundwater into a single storage tank (Tank 102). Groundwater from the tank is transferred to a carbon filtration tank, and then passes through a treated water infiltration gallery (Figure 2). Following initial contaminant reduction, the groundwater remediation system operated in an operation and maintenance mode. Concentrations of contaminants within the remediation system's influent and effluent were below laboratory detection limits for 18 years. In 2008, Western began a supplemental evaluation of the remedial operations, which included shutting down the remediation system and sampling groundwater wells under static conditions in an effort to redefine the area of impact and assess effectiveness of the remediation system. Existing equipment was inspected and repaired to optimize performance. Results from the sampling event were included in the 2008 annual report submitted to the NMOCD. Pumping and treating operations were resumed in February 2009 and have continued through 2010.

1.3 SITE HYDROLOGY

The Site is located on weathered outcrops of the Nacimiento Formation, which is comprised of shales, sandstones, and siltstones of Cretaceous-Tertiary age. The San Juan River is approximately 2,000 feet south of the Site. Immediately west is a large unnamed arroyo, which is underlain by 30 feet to 60 feet of Quaternary alluvial sediments. Older Quaternary terrace deposits of cobbles and boulders were observed on the interfluvial ridges adjacent to the arroyo. These terrace deposits may have been utilized as fill on the Site. The outcropping surfaces of the Nacimiento Formation have been eroded to form a paleo-channel that appears to be similar in

morphology to the existing surface arroyo located to the west. The bedrock is overlain by recent alluvial deposits (gravel, sand, silt, and clay), which thicken toward the southwest.

The subsurface geology is a controlling feature for groundwater flow direction and contaminant migration. Shallow groundwater is generally unconfined with some local areas potentially under semi-confined conditions. There are two aquifers of concern that are in direct hydraulic communication: 1) a shallow aquifer composed of recent alluvial materials and 2) a bedrock aquifer that exists in the underlying Nacimiento Formation. The alluvial aquifer generally has the higher permeability of the two aquifers, and recovery wells completed within this aquifer have higher yields with larger radii of influence.

1.4 SCOPE OF WORK

The scope of work for this project included operating and maintaining the groundwater remediation system, monitoring groundwater quality and presence of PSH, and recovering PSH. A summary of field activities, results, conclusions, and recommendations are presented in the subsequent sections of this report.



2.0 METHODOLOGY

2.1 GROUNDWATER REMEDIATION SYSTEM

The groundwater remediation system at the Site was designed to pump impacted groundwater from local aquifers through a series of recovery wells, which prevent migration of impacted water beyond the influence of the wells as illustrated on Figure 3. The recovered groundwater is collected in a storage tank (Tank 102) and pumped to a second tank with a carbon matrix lining where it is treated by carbon adsorption. The treated water is then returned to the aquifer through an infiltration trench. The infiltration trench consists of a subsurface system of perforated polyvinyl chloride (PVC) pipes placed within gravel packs. Water infiltrates the surrounding strata and eventually makes its way back to the aquifer. The return of recovered water to the aquifer acts as a recharge mechanism. Figure 4 is a simplified diagram representation of groundwater recovery, treatment, and disposal system at the Site.

2.2 OPERATIONS AND MAINTENANCE

LTE conducted weekly inspections to ensure normal operation of the remediation system. A panel located in the control building controls operation of the remediation system and incorporates shutdown functions to safeguard against tank overflows and other undesirable events. The control panel was monitored weekly, as were water flow meters at each storage tank and recovery well. Weekly observations were recorded in a bound field logbook with the date, time and person recording the information noted. Water meter readings were entered into a spreadsheet to calculate flow volumes and monitor cumulative flow rates. All equipment at the Site was inspected for leaks and malfunctions. The inspector was familiar with the location of underground lines and noted any surface indication of underground leaks.

Maintenance included repair and replacement of well pumps, pump controllers, and flow meters. LTE also replaced filters in well houses on a regular basis, inspected the carbon pre-filter, and repaired any other hardware as necessary.

2.3 GROUNDWATER MONITORING

Quarterly groundwater monitoring included measurements of depth to groundwater at all monitoring wells with a Keck oil-water interface probe, and investigation for the presence of PSH. The interface probe was decontaminated with AlconoxTM soap and rinsed with de-ionized water before each measurement. Depth to groundwater measurements were used to calculate quarterly groundwater elevations at the Site to determine direction of groundwater flow and hydraulic control achieved by the recovery wells. The recovery pumps were not turned off during quarterly monitoring events nor were the pumps removed from the recovery wells; therefore, calculated groundwater elevations do not represent static conditions.

Oil absorbent socks were used to passively recover PSH detected in groundwater monitoring wells at the Site. The socks were checked quarterly and replaced as necessary. Volumes of recovered PSH were estimated based on percent saturation observed in the socks and were recorded in a field log book.

Influent and effluent groundwater samples were collected quarterly and analyzed for volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8260B. Influent groundwater was collected from a system valve before it entered Tank 102. Effluent groundwater was collected through a sample valve as treated water exited the carbon adsorption tank. Groundwater samples were collected in appropriate pre-cleaned and/or pre-preserved sample bottles or glass vials. Samples were labeled with the date and time of collection, sample designation, project name, collector's name, and parameters to be analyzed and immediately sealed and packed on ice. The samples were shipped to Hall Environmental Analysis Laboratory (HEAL) in Albuquerque, New Mexico before designated holding times expired following strict chain-of-custody procedures.

LTE collected annual groundwater samples from groundwater monitoring wells within and south of the Site. The sampling schedule in Table 1 represents the revised groundwater sampling schedule instituted in March 2009 following submittal of the April 2008 annual report. The volume of groundwater in the wells was calculated, and a minimum of three well casing volumes of groundwater was purged from each well using a disposable bailer. As groundwater was extracted, pH, electric conductivity and temperature were monitored. Wells were purged until these properties stabilized or the well bailed dry, indicating the purge water was representative of aquifer conditions. Stabilization was defined as three consecutive stable readings for each water property (± 0.4 units for pH, ± 10 percent for electric conductivity and $\pm 2^\circ$ Celsius for temperature). Once each monitoring well was properly purged, groundwater samples were collected in bottles or vials and shipped to HEAL. Groundwater sampling from recovery wells followed the same procedures as monitoring wells, except pumps installed in recovery wells were used to purge the appropriate volume of groundwater from each recovery well. The groundwater samples were analyzed for VOCs according to EPA method 8260B, and groundwater sample GBR-24D was also analyzed for polynuclear aromatic hydrocarbons (PAH) according to EPA Method 8310.



3.0 RESULTS

3.1 OPERATIONS AND MAINTENANCE

LTE addressed several maintenance problems at the Site. The groundwater pump in GRW-4 failed twice and had to be replaced, and groundwater pumps in GRW-3 and GRW-9 were repaired. The flow meters at four recovery wells were replaced, heaters in two well boxes were replaced, and frozen pipes were repaired during the winter.

The recovery pump in GRW-1 ceased working in 2009 and was not returned to service, making this well inactive during 2010. Recovery wells GRW-3, GRW-9, and GRW-10 pumped considerably lower volumes of groundwater as compared to 2009. Table 2 presents the total volume of groundwater pumped from each recovery well during 2010 and 2009. A total of 1,121,363 gallons of groundwater were recovered and treated by carbon filtration in 2010, representing a decrease from the 9,455,408 gallons treated during the 2009.

3.2 QUARTERLY GROUNDWATER MONITORING

Measured groundwater elevations and thickness of PSH in groundwater monitoring and recovery wells are presented in Table 3 and quarterly potentiometric surface maps are depicted in Figures 5 through 8. Groundwater flow direction was consistently toward the southwest throughout the year. Drawdown around recovery wells is evident each quarter.

Thin accumulations of PSH were measured in groundwater monitoring wells near each of the source areas identified in the preliminary subsurface investigation conducted by Giant. Near the Northern Area, 0.01 feet of PSH was measured in GBR-26 during October 2010. Near the Central Area, 0.31 feet of PSH were detected in GBR-22 in January 2010, and 0.35 feet were measured in GBR-34 in October 2010. Monitoring well GBR-22 was dry during the rest of the quarterly monitoring events. Near the Southern Area, 0.04 feet of PSH were measured in GBR-20 in July 2010, but at no other time during the year. No other wells in the Southern Area contained detectable PSH in 2010. The number of wells containing measureable PSH decreased and the overall thicknesses measured decreased in 2010 compared to 2009. The total volume of PSH recovered from monitoring wells during 2010 was 0.73 gallons (Table 4). The volume of PSH recovered during 2010 was less than the volume of PSH recovered during 2009.

3.3 GROUNDWATER SAMPLING

Laboratory analytical results from groundwater sampling are in Table 5 and the complete laboratory analytical reports are in Appendix A. Isopach maps and geologic cross sections illustrating the distribution of analytes are not included, because the sampling events do not include wells from all of the current source areas. Such a presentation of results would not be indicative of true conditions at the Site. Laboratory analytical results from 2010 are summarized below.

- No VOCs were detected exceeding laboratory detection limits in influent or effluent samples.

- VOCs were detected in the annual groundwater samples, but only in minor concentrations that do not exceed NMWQCC standards:
 - o 1,2,4-trimethylbenzene, 1-methylnaphthalene, and 2-methylnaphthalene were detected in monitoring well GBR-24D.
 - o Tetrachloroethene was detected in upgradient monitoring wells GBR-32, GBR-48, and GBR-49.
 - o Acetone was detected in upgradient monitoring well GBR-50.
- Concentrations of the PAH constituents phenanthrene, fluorine, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were detected in GBR-24D, but did not exceed NMWQCC standards.

4.0 CONCLUSIONS

Western successfully prevented migration of contaminants in groundwater during 2010 and reduced the total volume of PSH present at the Site. The influent and effluent groundwater associated with the remediation system at the Site did not contain detectable concentrations of VOCs during 2010 and groundwater samples collected from monitoring and recovery wells did not contain VOCs or PAHs exceeding NMWQCC standards. Groundwater observed and sampled in the Lee Acres Subdivision exhibited no PSH and contained no concentrations of VOCs. Thin accumulations of PSH were present near the previously identified sources near the Northern and Central Areas and occasionally present near the Southern Area; however, the remediation system created a sufficient hydraulic barrier to restrict migration of PSH offsite, even though the volume of groundwater pumped by the recovery wells decreased during 2010. Smaller thicknesses of PSH were observed in groundwater monitoring wells compared to 2009 and there was a decreased total number of groundwater monitoring wells containing measurable volumes of PSH in 2010. This suggests PSH recovery with oil absorbent socks was effective.



5.0 RECOMMENDATIONS

LTE presents the following recommendations at the Site:

1. Continue to operate and maintain the remediation system to prevent migration of PSH.
2. Continue passive PSH recovery using oil absorbent socks.
3. Continue quarterly monitoring of groundwater flow behavior and presence of PSH by measuring depth to groundwater.
4. Continue quarterly sampling and laboratory analysis of the remediation system influent and effluent.
5. Continue annual sampling and laboratory analysis of groundwater monitoring and recovery wells, including monitoring well SHS-8 on the south side of the Site.



6.0 REFERENCES

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FIGURES



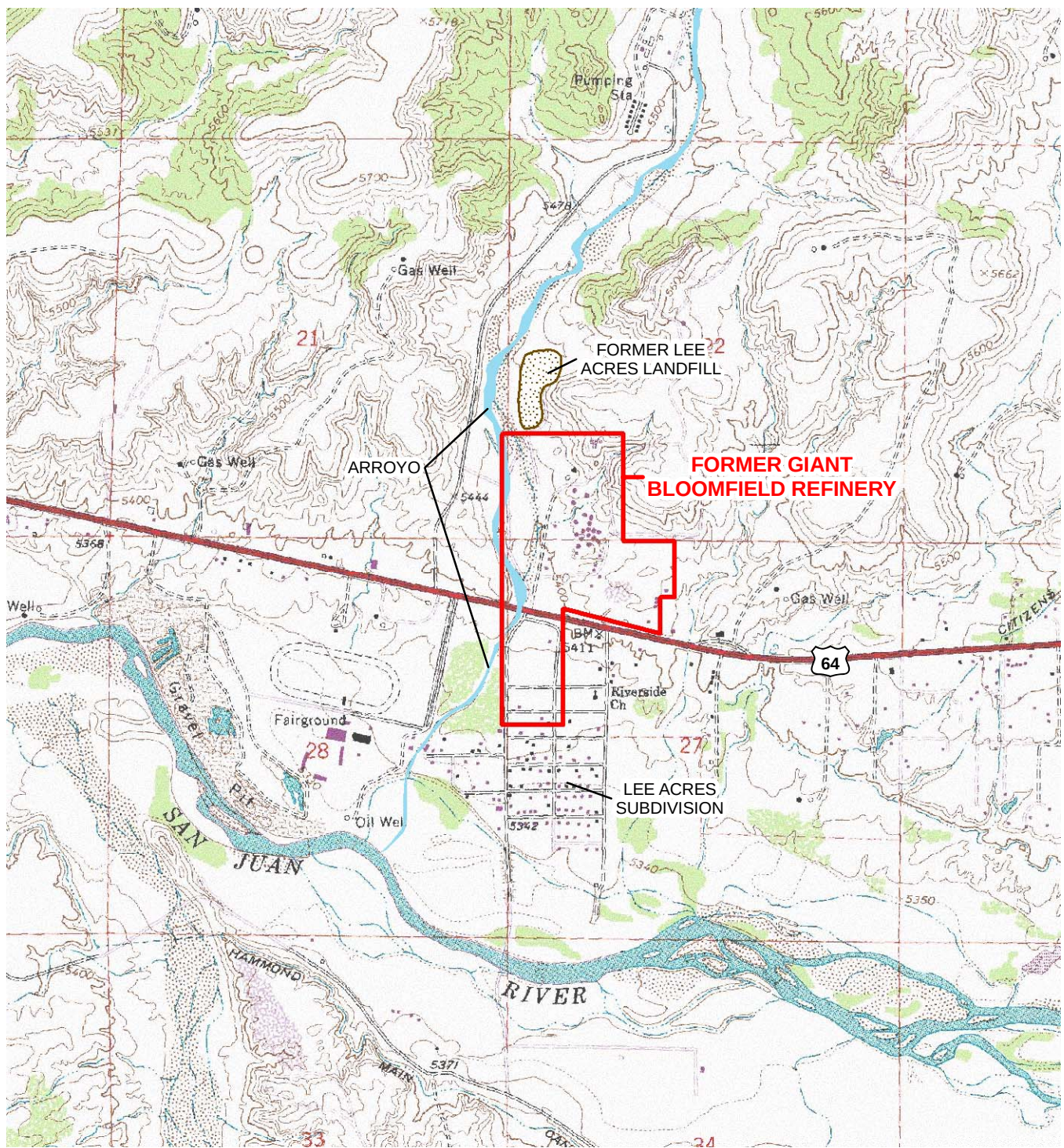


IMAGE COURTESY OF USDA/NRCS, VARIOUS DATES

LEGEND

- SITE LOCATION
- ARROYO
- FORMER LEE ACRES LANDFILL

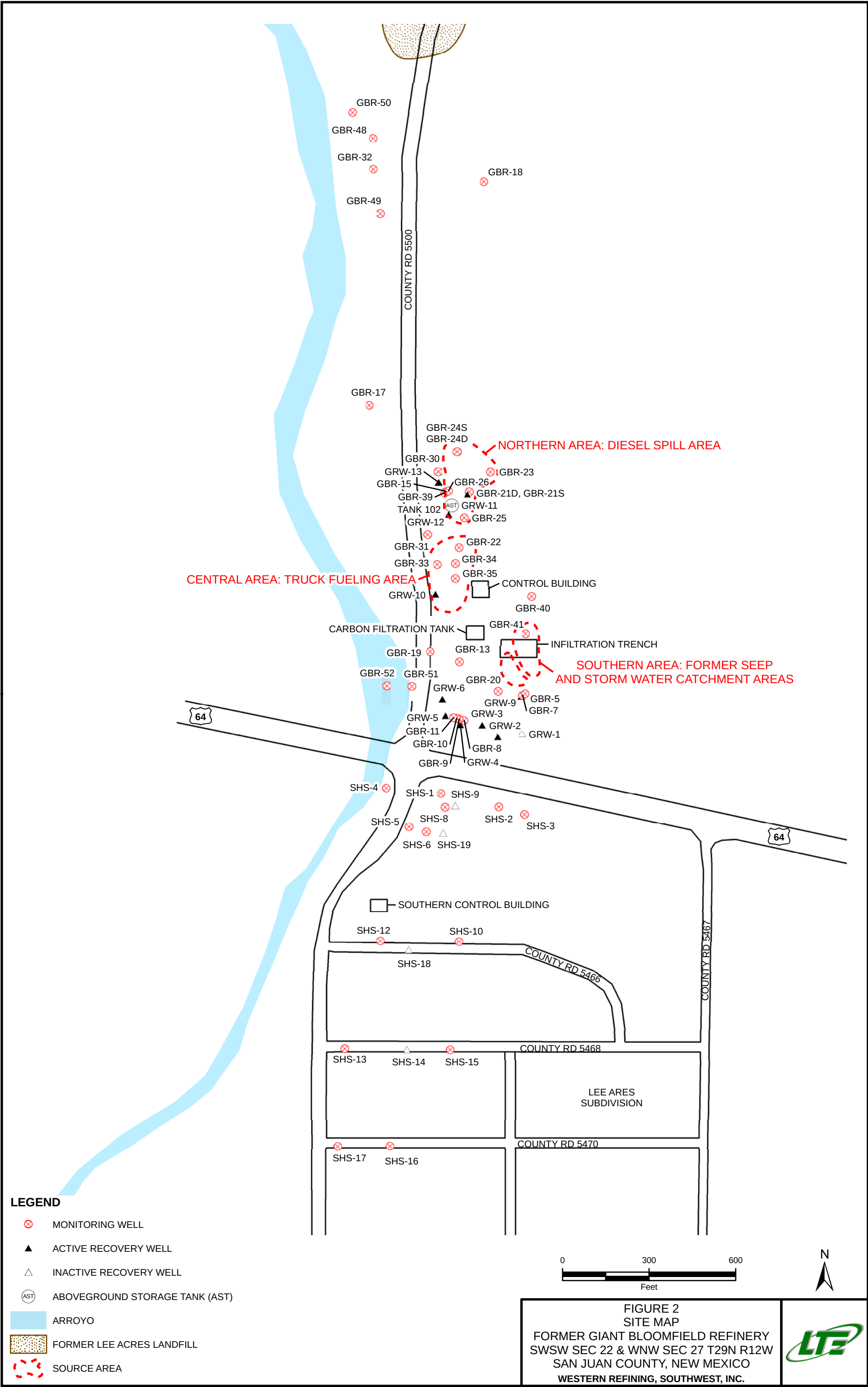
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Feet



FIGURE 1
REGIONAL MAP
 FORMER GIANT BLOOMFIELD REFINERY
 SWSW SEC 22 & WNW SEC 27 T29N R12W
 SAN JUAN COUNTY, NEW MEXICO
 WESTERN REFINING SOUTHWEST, INC.



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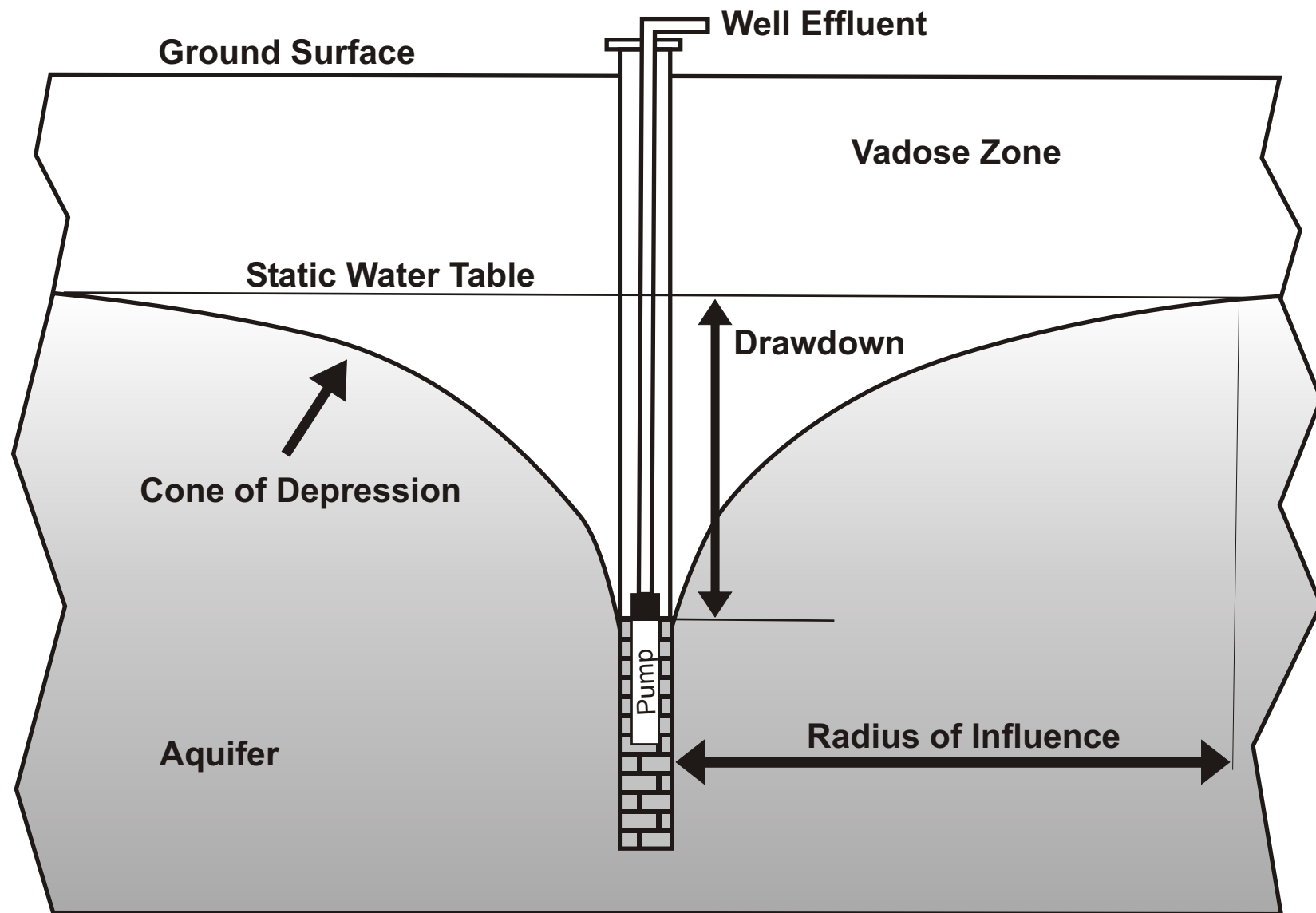


FIGURE 3
HYDRAULIC BARRIER
FORMER GIANT BLOOMFIELD REFINERY
SWSW SEC 22 & WNW SEC 27 T29N R12W
WESTERN REFINING SOUTHWEST, INC.



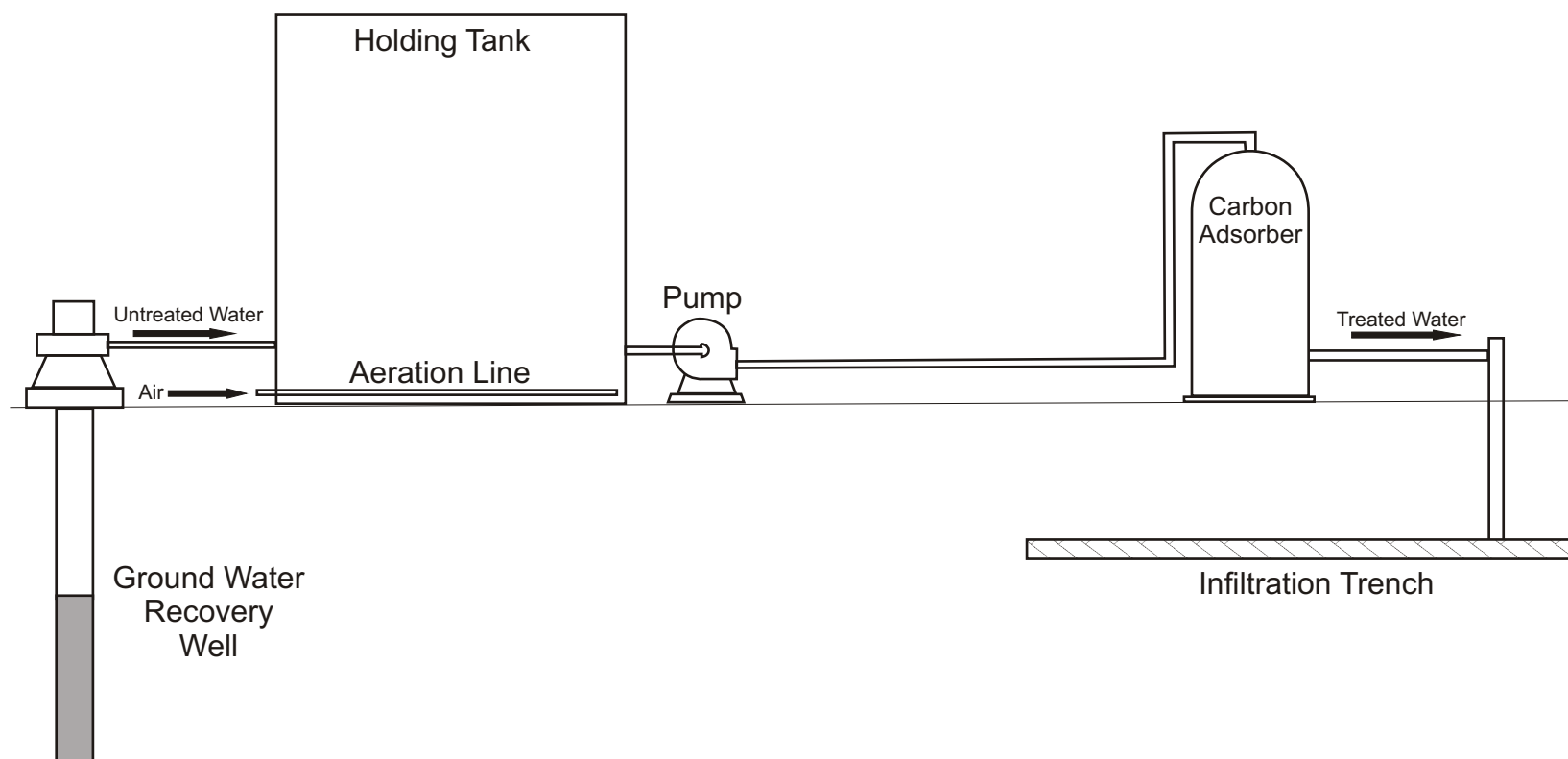
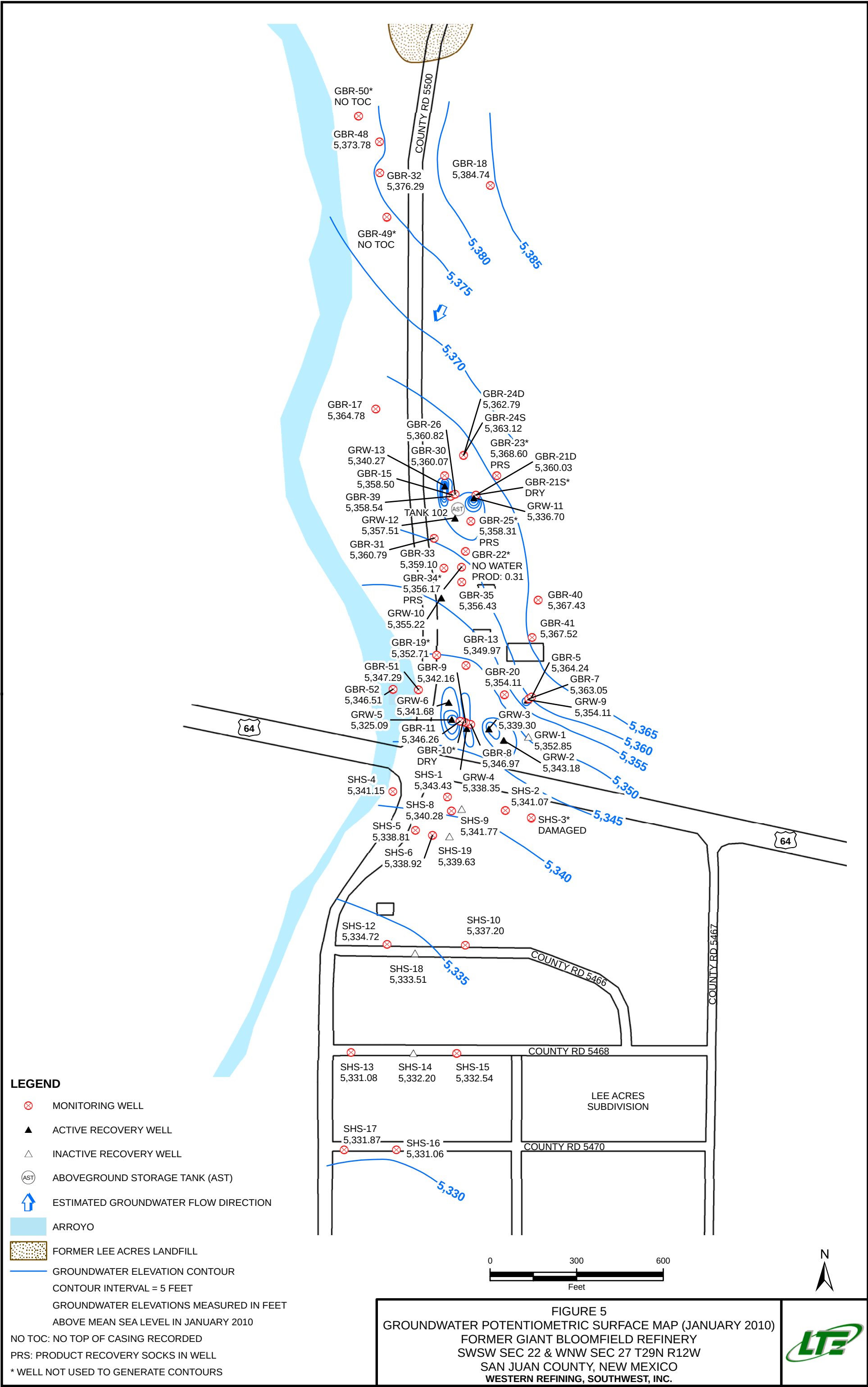
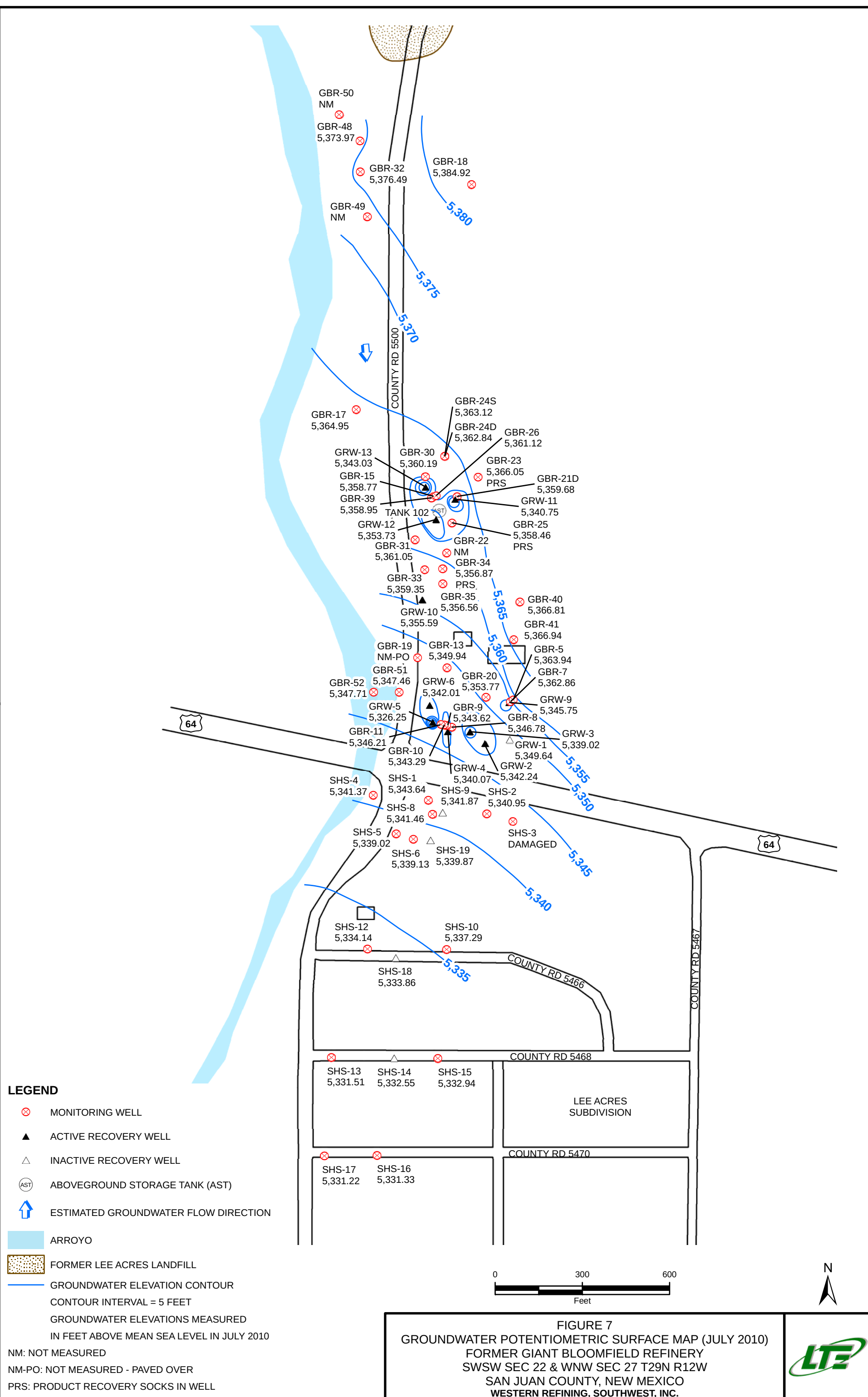


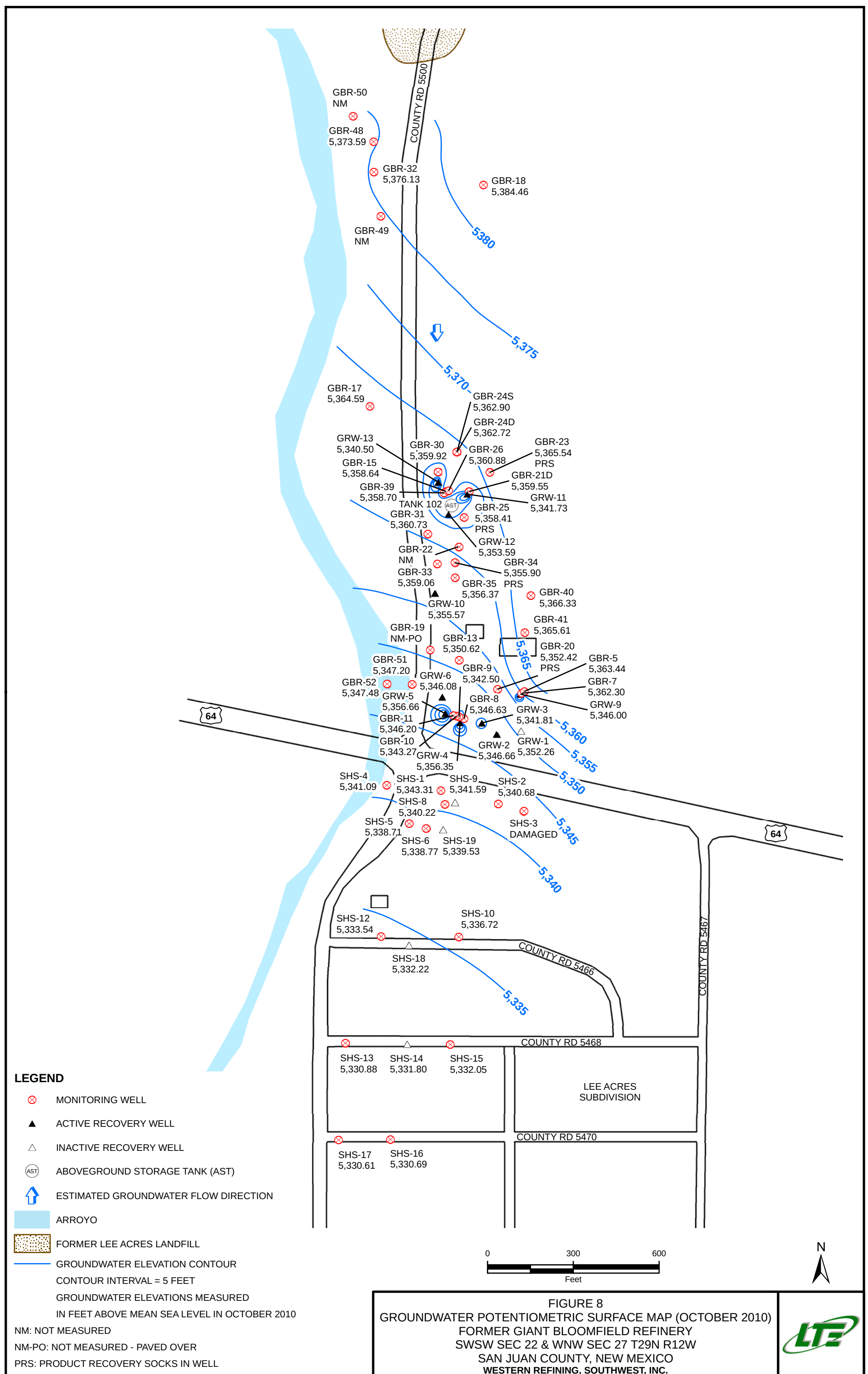
FIGURE 4
SIMPLIFIED REPRESENTATION OF THE GROUNDWATER RECOVERY,
TREATMENT AND DISPOSAL SYSTEM
FORMER GIANT BLOOMFIELD REFINERY
SWSW SEC 22 & WNW SEC 27 T29N R12W
WESTERN REFINING SOUTHWEST, INC.











TABLES



TABLE 1

**2010 SAMPLING SCHEDULE
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING SOUTHWEST, INC.**

	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-10
System Influent			VOCs			VOCs			VOCs			VOCs
System Effluent			VOCs			VOCs			VOCs			VOCs
GRW-3												VOCs
GRW-6												VOCs
GBR-17												VOCs
GBR-24D												VOCs PAH
GBR-30												VOCs
GBR-31												VOCs
GBR-32												VOCs
GBR-48												VOCs
GBR-49												VOCs
GBR-50												VOCs
GBR-51												VOCs
GBR-52												VOCs
SHS-8												VOCs

Notes:

VOCs - volatile organic compounds

PAH - polynuclear aromatic hydrocarbons



TABLE 2

**GROUNDWATER RECOVERY WELL VOLUME TABULATION
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING SOUTHWEST, INC.**

Well Number	Total Volume Pumped in 2009 (Gallons)	Total Volume Pumped in 2010 (Gallons)	Difference (Gallons)
GRW-1	208,668	0	-208,668
GRW-2	98,597	91,479	-7,118
GRW-3	130,001	85,084	-44,917
GRW-4	157,837	179,535	21,698
GRW-5	134,819	118,414	-16,405
GRW-6	127,499	136,921	9,422
GRW-9	64,779	36,723	-28,056
GRW-10	8,295,461	119,371	-8,176,090
GRW-11	191,523	292,763	101,240
GRW-12	6,329	16,722	10,393
GRW-13	39,895	44,351	4,456
Total Volume Pumped (Gallons)	9,455,408	1,121,363	-8,334,045

Notes:

GRW-1 Pump broke in August 2009 and was not returned to service.

TABLE 3

GROUNDWATER ELEVATIONS AND THICKNESS OF PHASE SEPARATED HYDROCARBONS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING SOUTHWEST, INC.

Well Number	Wellhead Elevation (feet)	Total Depth (feet)	January 2010				April 2010				July 2010				October 2010			
			Depth to Water (feet BTOC)	Depth to Product (feet)	PSH Thickness (feet)	Adjusted GWEL (feet)	Depth to Water (feet BTOC)	Depth to Product (feet)	PSH Thickness (feet)	Adjusted GWEL (feet)	Depth to Water (feet BTOC)	Depth to Product (feet)	PSH Thickness (feet)	Adjusted GWEL (feet)	Depth to Water (feet BTOC)	Depth to Product (feet)	PSH Thickness (feet)	Adjusted GWEL (feet)
GRW-1	5,394.30	73.35	41.45	-	-	5,352.85	41.63	-	-	5,352.67	44.66	-	-	5,349.64	42.04	-	-	5,352.26
GRW-2	5,391.28	61.00	48.10	-	-	5,343.18	48.86	-	-	5,342.42	49.04	-	-	5,342.24	44.62	-	-	5,346.66
GRW-3	5,388.77	58.30	49.47	-	-	5,339.30	48.91	-	-	5,339.86	49.75	-	-	5,339.02	46.96	-	-	5,341.81
GRW-4	5,390.02	60.00	51.67	-	-	5,338.35	57.53	-	-	5,332.49	49.95	-	-	5,340.07	33.67	-	-	5,356.35
GRW-5	5,390.56	68.30	65.47	-	-	5,325.09	63.35	-	-	5,327.21	64.31	-	-	5,326.25	33.90	-	-	5,356.66
GRW-6	5,390.81	53.80	49.13	-	-	5,341.68	48.95	-	-	5,341.86	48.80	-	-	5,342.01	44.73	-	-	5,346.08
GRW-9	5,395.70	54.40	41.59	-	-	5,354.11	46.81	-	-	5,348.89	49.95	-	-	5,345.75	49.70	-	-	5,346.00
GRW-10	5,395.02	66.02	39.80	-	-	5,355.22	39.57	-	-	5,355.45	39.43	-	-	5,355.59	39.45	-	-	5,355.57
GRW-11	5,397.85	64.00	61.15	-	-	5,336.70	53.22	-	-	5,344.63	57.10	-	-	5,340.75	56.12	-	-	5,341.73
GRW-12	5,397.24	48.00	39.73	-	-	5,357.51	44.02	-	-	5,353.22	43.51	-	-	5,353.73	43.65	-	-	5,353.59
GRW-13	5,396.90	61.30	56.63	-	-	5,340.27	50.80	-	-	5,346.10	53.87	-	-	5,343.03	56.40	-	-	5,340.50
GBR-5	5,395.07	47.08	30.83	-	-	5,364.24	30.85	-	-	5,364.22	31.13	-	-	5,363.94	31.63	-	-	5,363.44
GBR-7	5,395.85	51.65	32.80	-	-	5,363.05	32.73	-	-	5,363.12	32.99	-	-	5,362.86	33.55	-	-	5,362.30
GBR-8	5,390.50	50.90	43.53	-	-	5,346.97	43.75	-	-	5,346.75	43.72	-	-	5,346.78	43.87	-	-	5,346.63
GBR-9	5,389.92	67.22	47.76	-	-	5,342.16	47.57	-	-	5,342.35	46.30	-	-	5,343.62	47.42	-	-	5,342.50
GBR-10	5,390.57	47.56	Dry	-	-	-	Dry	-	-	-	47.28	-	-	5,343.29	47.30	-	-	5,343.27
GBR-11	5,389.43	51.87	43.17	-	-	5,346.26	43.24	-	-	5,346.19	43.22	-	-	5,346.21	43.23	-	-	5,346.20
GBR-13	5,393.04	45.47	43.07	-	-	5,349.97	43.12	-	-	5,349.92	43.10	-	-	5,349.94	42.42	-	-	5,350.62
GBR-15	5,397.99	58.42	39.49	-	-	5,358.50	39.22	-	-	5,358.77	39.22	-	-	5,358.77	39.35	-	-	5,358.64
GBR-17	5,402.69	43.20	37.91	-	-	5,364.78	37.67	-	-	5,365.02	37.74	-	-	5,364.95	38.10	-	-	5,364.59
GBR-18	5,421.68	47.85	36.94	-	-	5,384.74	36.33	-	-	5,385.35	36.76	-	-	5,384.92	37.22	-	-	5,384.46
GBR-19**	5,393.83	46.23	41.12	-	-	5,352.71	39.91	-	-	5,353.92	-	-	-	-	-	-	-	-
GBR-20	5,393.47	54.57	39.36	-	-	5,354.11	39.37	-	-	5,354.10	39.73	39.69	0.04	5,353.77	41.05	-	-	5,352.42 †
GBR-21D	5,400.19	49.77	40.16	-	-	5,360.03	40.49	-	-	5,359.70	40.51	-	-	5,359.68	40.64	-	-	5,359.55
GBR-21S	5,400.65	49.77	Dry	-	-	-	Dry	-	-	-	Dry	-	-	-	Dry	-	-	-
GBR-22	5,395.91	38.73	No Water	38.42	0.31	-	Dry	-	-	-	Dry	-	-	-	Dry	-	-	-
GBR-23	5,403.72	39.45	35.12	-	-	5,368.60 †	36.72	-	-	5,367.00 †	37.67	-	-	5,366.05 †	38.18	-	-	5,365.54 †
GBR-24D	5,396.77	51.40	33.98	-	-	5,362.79	33.80	-	-	5,362.97	33.93	-	-	5,362.84	34.05	-	-	5,362.72
GBR-24S	5,396.08	37.05	32.96	-	-	5,363.12	32.79	-	-	5,363.29	32.96	-	-	5,363.12	33.18	-	-	5,362.90
GBR-25	5,397.03	37.12	38.72	-	-	5,358.31 †	38.42	-	-	5,358.61 †	38.57	-	-	5,358.46 †	38.62	-	-	5,358.41 †
GBR-26	5,396.72	41.29	35.90	-	-	5,360.82	35.64	-	-	5,361.08	35.60	-	-	5,361.12	35.84	35.83	0.01	5,360.88
GBR-30	5,395.59	41.66	35.52	-	-	5,360.07	35.37	-	-	5,360.22	35.40	-	-	5,360.19	35.67	-	-	5,359.92
GBR-31	5,396.58	43.50	35.79	-	-	5,360.79	35.58	-	-	5,361.00	35.53	-	-	5,361.05	35.85	-	-	5,360.73
GBR-32	5,414.86	47.83	38.57	-	-	5,376.29	38.27	-	-	5,376.59	38.37	-	-	5,376.49	38.73	-	-	5,376.13
GBR-33	5,396.28	45.72	37.18	-	-	5,359.10	37.03	-	-	5,359.25	36.93	-	-	5,359.35	37.22	-	-	5,359.06
GBR-34	5,394.00	42.20	37.83	-	-	5,356.17 †	37.53	-	-	5,356.47 †	37.13	-	-	5,356.87 †	38.10	37.75	0.35	5,355.90 †
GBR-35	5,393.66	42.35	37.23	-	-	5,356.43	37.07	-	-	5,356.59	37.10	-	-	5,356.56	37.29	-	-	5,356.37
GBR-39	5,397.55	41.42	39.01	-	-	5,358.54	38.74	-	-	5,358.81	38.60	-	-	5,358.95	38.85	-	-	5,358.70
GBR-40	5,400.76	39.38	33.33	-	-	5,367.43	33.61	-	-	5,367.15	33.95	-	-	5,366.81	34.43	-	-	5,366.33
GBR-41	5,396.35	34.28	28.83	-	-	5,367.52	29.12	-	-	5,367.23	29.41	-	-	5,366.94	30.74	-	-	5,365.61
GBR-48	5,413.90	43.54	40.12	-	-	5,373.78	39.81	-	-	5,374.09	39.93	-	-	5,373.97	40.31	-	-	5,373.59
GBR-49	*	40.30	36.50	-	-	-	36.19	-	-	-	36.29	-	-	-	36.68	-	-	-
GBR-50	*	44.37	35.82	-	-	-	35.67	-	-	-	35.70	-	-	-	36.03	-	-	-
GBR-51	5,389.68	57.07	42.39	-	-	5,347.29	42.14	-	-	5,347.54	42.22	-	-	5,347.46	42.48	-	-	5,347.20
GBR-52	5,387.74	52.73	41.23	-	-	5,346.51	40.07	-	-	5,347.67	40.03	-	-	5,347.71	40.26	-	-	5,347.48



TABLE 3

GROUNDWATER ELEVATIONS AND THICKNESS OF PHASE SEPARATED HYDROCARBONS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING SOUTHWEST, INC.

Well Number	Wellhead Elevation (feet)	Total Depth (feet)	January 2010				April 2010				July 2010				October 2010			
			Depth to Water (feet BTOC)	Depth to Product (feet)	PSH Thickness (feet)	Adjusted GWEL (feet)	Depth to Water (feet BTOC)	Depth to Product (feet)	PSH Thickness (feet)	Adjusted GWEL (feet)	Depth to Water (feet BTOC)	Depth to Product (feet)	PSH Thickness (feet)	Adjusted GWEL (feet)	Depth to Water (feet BTOC)	Depth to Product (feet)	PSH Thickness (feet)	Adjusted GWEL (feet)
SHS-1	5,383.54	50.40	40.11	-	-	5,343.43	39.91	-	-	5,333.14	39.90	-	-	5,343.64	40.23	-	-	5,343.31
SHS-2	5,381.66	44.56	40.59	-	-	5,341.07	40.82	-	-	5,337.10	40.71	-	-	5,340.95	40.98	-	-	5,340.68
SHS-3***	5,383.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SHS-4	5,383.62	52.16	42.47	-	-	5,341.15	42.30	-	-	5,331.46	42.25	-	-	5,341.37	42.53	-	-	5,341.09
SHS-5	5,378.36	47.85	39.55	-	-	5,338.81	39.33	-	-	5,330.51	39.34	-	-	5,339.02	39.65	-	-	5,338.71
SHS-6	5,378.17	52.78	39.25	-	-	5,338.92	39.02	-	-	5,325.39	39.04	-	-	5,339.13	39.40	-	-	5,338.77
SHS-8	5,380.25	50.92	39.97	-	-	5,340.28	39.77	-	-	5,329.33	38.79	-	-	5,341.46	40.03	-	-	5,340.22
SHS-9	5,380.79	46.25	39.02	-	-	5,341.77	38.93	-	-	5,334.54	38.92	-	-	5,341.87	39.20	-	-	5,341.59
SHS-10	5,373.80	45.80	36.60	-	-	5,337.20	36.23	-	-	5,328.00	36.51	-	-	5,337.29	37.08	-	-	5,336.72
SHS-12	5,373.94	52.41	39.22	-	-	5,334.72	39.71	-	-	5,321.53	39.80	-	-	5,334.14	40.40	-	-	5,333.54
SHS-13	5,367.81	47.51	36.73	-	-	5,331.08	36.18	-	-	5,320.30	36.30	-	-	5,331.51	36.93	-	-	5,330.88
SHS-14	5,367.07	52.71	34.87	-	-	5,332.20	34.28	-	-	5,314.36	34.52	-	-	5,332.55	35.27	-	-	5,331.80
SHS-15	5,366.21	47.78	33.67	-	-	5,332.54	33.05	-	-	5,318.43	33.27	-	-	5,332.94	34.16	-	-	5,332.05
SHS-16	5,362.58	42.20	31.52	-	-	5,331.06	30.97	-	-	5,320.38	31.25	-	-	5,331.33	31.89	-	-	5,330.69
SHS-17	5,364.35	46.21	32.48	-	-	5,331.87	33.89	-	-	5,318.14	33.13	-	-	5,331.22	33.74	-	-	5,330.61
SHS-18	5,373.64	47.36	40.13	-	-	5,333.51	39.65	-	-	5,326.28	39.78	-	-	5,333.86	41.42	-	-	5,332.22
SHS-19	5,378.89	52.40	39.26	-	-	5,339.63	39.00	-	-	5,326.49	39.02	-	-	5,339.87	39.36	-	-	5,339.53

Notes:
BTOC - below top of casing
D - designates the well is deep
GWEL - groundwater elevation
PSH - phase separated hydrocarbon
S - designates the well is shallow
* Top-of-casing elevation is unknown
** Well is damaged by a tree root
*** Well was paved over in June 2010
† Product Recovery socks in well, groundwater and product levels are not static
- indicates no GWEL or PSH measured



TABLE 4

**ESTIMATED VOLUMES OF PHASE SEPARATED HYDROCARBONS
RECOVERED FROM GROUNDWATER MONITORING WELLS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING SOUTHWEST, INC.**

Well Number	2009 Volume Removed (ounces)					Well Number	2010 Volume Removed (ounces)				
	Jan-09	Apr-09	Jul-09	Oct-09	Total		Jan-10	Apr-10	Jul-10	Oct-10	Total
GBR-7	0.0	9.0	0.0	0.0	0.1	GBR-7	0.0	0.0	0.0	0.0	0.0
GBR-22	16.6	6.4	0.0	0.0	0.2	GBR-22	0.0	0.0	0.0	0.0	0.0
GBR-23	12.8	6.4	12.8	6.4	38.4	GBR-23	18.0	14.4	0.0	0.0	32.4
GBR-25	0.0	0.0	0.0	9.0	9.0	GBR-25	18.0	7.2	0.0	0.0	25.2
GBR-26	9.0	0.0	9.0	0.0	17.9	GBR-26	0.0	0.0	0.0	0.0	0.0
GBR-34	0.0	0.0	6.4	6.4	12.8	GBR-34	18.0	18.0	0.0	0.0	36.0
Total Volume Removed (ounces)					110.1	Total Volume Removed (ounces)					93.6
Total Volume Removed (gallons)					0.9	Total Volume Removed (gallons)					0.7

**GROUNDWATER LABORATORY ANALYTICAL RESULTS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING SOUTHWEST, INC.**

Table 1_Former Giant Bloomfield Refinery Analytical Results.xls

TABLE 5

GROUNDWATER LABORATORY ANALYTICAL RESULTS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING SOUTHWEST, INC.

Analyte	NMWQCC Standard	Unit	INFLUENT				EFFLUENT				GRW-3	GRW-6	GBR-17	GBR-24D	GBR-30	GBR-31	GBR-32	GBR-48	GBR-49	GBR-50	GBR-51	GBR-52	SHS-8
			Jan 2010	Apr 2010	Jul 2010	Oct 2010	Jan 2010	Apr 2010	Jul 2010	Oct 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010	Jan 2010
PAH - Method 8310																							
naphthalene	30	ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	5.8	NT	NT	NT	NT	NT	NT	NT	NT	NT
1-methylnaphthalene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	7.7	NT	NT	NT	NT	NT	NT	NT	NT	NT
2-methylnaphthalene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	4.9	NT	NT	NT	NT	NT	NT	NT	NT	NT
acenaphthylene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<2.5	NT	NT	NT	NT	NT	NT	NT	NT	NT
acenaphthene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT
fluorene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1.0	NT	NT	NT	NT	NT	NT	NT	NT	NT
phenanthrene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.62	NT	NT	NT	NT	NT	NT	NT	NT	NT
anthracene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.60	NT	NT	NT	NT	NT	NT	NT	NT	NT
fluoranthene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.30	NT	NT	NT	NT	NT	NT	NT	NT	NT
pyrene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.30	NT	NT	NT	NT	NT	NT	NT	NT	NT
benz(a)anthracene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.070	NT	NT	NT	NT	NT	NT	NT	NT	NT
chrysene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.20	NT	NT	NT	NT	NT	NT	NT	NT	NT
benzo(b)fluoranthene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.10	NT	NT	NT	NT	NT	NT	NT	NT	NT
benzo(k)fluoranthene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.070	NT	NT	NT	NT	NT	NT	NT	NT	NT
benzo(a)pyrene	0.7	ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.070	NT	NT	NT	NT	NT	NT	NT	NT	NT
dibenz(a,h)anthracene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.070	NT	NT	NT	NT	NT	NT	NT	NT	NT
benzo(g,h,l)perylene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.080	NT	NT	NT	NT	NT	NT	NT	NT	NT
indeno(1,2,3-cd)pyrene		ug/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.080	NT	NT	NT	NT	NT	NT	NT	NT	NT

Notes:
NT - not tested
NMWQCC - New Mexico Water Quality Control Commission
ug/l - micrograms per liter



APPENDIX A
LABORATORY ANALYTICAL REPORTS





COVER LETTER

Tuesday, January 26, 2010

Ashley Ager
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (970) 946-1093
FAX (505) 632-3911

RE: GBR

Order No.: 1001201

Dear Ashley Ager:

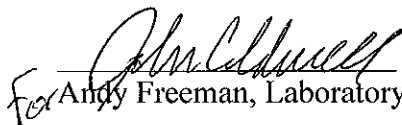
Hall Environmental Analysis Laboratory, Inc. received 16 sample(s) on 1/15/2010 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,


For Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

www.hallenvironmental.com

Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** Trip Blank**Lab Order:** 1001201**Collection Date:****Project:** GBR**Date Received:** 1/15/2010**Lab ID:** 1001201-01**Matrix:** TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 3:35:37 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 3:35:37 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 3:35:37 AM
Acetone	ND	10		µg/L	1	1/16/2010 3:35:37 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 3:35:37 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 3:35:37 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 3:35:37 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 3:35:37 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 3:35:37 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 3:35:37 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-01

Client Sample ID: Trip Blank
Collection Date:
Date Received: 1/15/2010
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 3:35:37 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 3:35:37 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 3:35:37 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 3:35:37 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 3:35:37 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 3:35:37 AM
Surr: 1,2-Dichloroethane-d4	95.6	54.6-141		%REC	1	1/16/2010 3:35:37 AM
Surr: 4-Bromofluorobenzene	108	60.1-133		%REC	1	1/16/2010 3:35:37 AM
Surr: Dibromofluoromethane	98.4	78.5-130		%REC	1	1/16/2010 3:35:37 AM
Surr: Toluene-d8	97.5	79.5-126		%REC	1	1/16/2010 3:35:37 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-52**Lab Order:** 1001201**Collection Date:** 1/12/2010 1:42:00 PM**Project:** GBR**Date Received:** 1/15/2010**Lab ID:** 1001201-02**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 4:03:04 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 4:03:04 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 4:03:04 AM
Acetone	ND	10		µg/L	1	1/16/2010 4:03:04 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 4:03:04 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 4:03:04 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 4:03:04 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 4:03:04 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 4:03:04 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 4:03:04 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-52**Lab Order:** 1001201**Collection Date:** 1/12/2010 1:42:00 PM**Project:** GBR**Date Received:** 1/15/2010**Lab ID:** 1001201-02**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 4:03:04 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 4:03:04 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 4:03:04 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 4:03:04 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 4:03:04 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 4:03:04 AM
Surr: 1,2-Dichloroethane-d4	96.9	54.6-141		%REC	1	1/16/2010 4:03:04 AM
Surr: 4-Bromofluorobenzene	103	60.1-133		%REC	1	1/16/2010 4:03:04 AM
Surr: Dibromofluoromethane	95.9	78.5-130		%REC	1	1/16/2010 4:03:04 AM
Surr: Toluene-d8	96.1	79.5-126		%REC	1	1/16/2010 4:03:04 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-03

Client Sample ID: GBR-51
Collection Date: 1/12/2010 3:33:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 4:30:40 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 4:30:40 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 4:30:40 AM
Acetone	ND	10		µg/L	1	1/16/2010 4:30:40 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 4:30:40 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 4:30:40 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 4:30:40 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 4:30:40 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 4:30:40 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 4:30:40 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-03

Client Sample ID: GBR-51
Collection Date: 1/12/2010 3:33:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 4:30:40 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 4:30:40 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 4:30:40 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 4:30:40 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 4:30:40 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 4:30:40 AM
Surr: 1,2-Dichloroethane-d4	95.6	54.6-141		%REC	1	1/16/2010 4:30:40 AM
Surr: 4-Bromofluorobenzene	107	60.1-133		%REC	1	1/16/2010 4:30:40 AM
Surr: Dibromofluoromethane	97.0	78.5-130		%REC	1	1/16/2010 4:30:40 AM
Surr: Toluene-d8	94.7	79.5-126		%REC	1	1/16/2010 4:30:40 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-04

Client Sample ID: SHS-8
Collection Date: 1/12/2010 4:12:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 5:53:42 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 5:53:42 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 5:53:42 AM
Acetone	ND	10		µg/L	1	1/16/2010 5:53:42 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 5:53:42 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 5:53:42 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 5:53:42 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 5:53:42 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 5:53:42 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 5:53:42 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-04

Client Sample ID: SHS-8
Collection Date: 1/12/2010 4:12:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 5:53:42 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 5:53:42 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 5:53:42 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 5:53:42 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 5:53:42 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 5:53:42 AM
Surr: 1,2-Dichloroethane-d4	94.6	54.6-141		%REC	1	1/16/2010 5:53:42 AM
Surr: 4-Bromofluorobenzene	111	60.1-133		%REC	1	1/16/2010 5:53:42 AM
Surr: Dibromofluoromethane	97.0	78.5-130		%REC	1	1/16/2010 5:53:42 AM
Surr: Toluene-d8	95.8	79.5-126		%REC	1	1/16/2010 5:53:42 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-05

Client Sample ID: GBR-50
Collection Date: 1/13/2010 9:31:00 AM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 6:21:14 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 6:21:14 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 6:21:14 AM
Acetone	11	10		µg/L	1	1/16/2010 6:21:14 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 6:21:14 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 6:21:14 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 6:21:14 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 6:21:14 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 6:21:14 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 6:21:14 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-05

Client Sample ID: GBR-50
Collection Date: 1/13/2010 9:31:00 AM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 6:21:14 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 6:21:14 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 6:21:14 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 6:21:14 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 6:21:14 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 6:21:14 AM
Surr: 1,2-Dichloroethane-d4	95.6	54.6-141		%REC	1	1/16/2010 6:21:14 AM
Surr: 4-Bromofluorobenzene	111	60.1-133		%REC	1	1/16/2010 6:21:14 AM
Surr: Dibromofluoromethane	95.4	78.5-130		%REC	1	1/16/2010 6:21:14 AM
Surr: Toluene-d8	94.4	79.5-126		%REC	1	1/16/2010 6:21:14 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-06

Client Sample ID: GBR-48
Collection Date: 1/13/2010 10:12:00 AM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 6:48:46 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 6:48:46 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 6:48:46 AM
Acetone	ND	10		µg/L	1	1/16/2010 6:48:46 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 6:48:46 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 6:48:46 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 6:48:46 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 6:48:46 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 6:48:46 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 6:48:46 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-06

Client Sample ID: GBR-48
Collection Date: 1/13/2010 10:12:00 AM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 6:48:46 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 6:48:46 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 6:48:46 AM
Tetrachloroethene (PCE)	1.3	1.0		µg/L	1	1/16/2010 6:48:46 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 6:48:46 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 6:48:46 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 6:48:46 AM
Surr: 1,2-Dichloroethane-d4	96.3	54.6-141		%REC	1	1/16/2010 6:48:46 AM
Surr: 4-Bromofluorobenzene	108	60.1-133		%REC	1	1/16/2010 6:48:46 AM
Surr: Dibromofluoromethane	98.6	78.5-130		%REC	1	1/16/2010 6:48:46 AM
Surr: Toluene-d8	94.9	79.5-126		%REC	1	1/16/2010 6:48:46 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-07

Client Sample ID: GBR-32
Collection Date: 1/13/2010 10:54:00 AM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 7:16:13 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 7:16:13 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 7:16:13 AM
Acetone	ND	10		µg/L	1	1/16/2010 7:16:13 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 7:16:13 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 7:16:13 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 7:16:13 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 7:16:13 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 7:16:13 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 7:16:13 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-07

Client Sample ID: GBR-32
Collection Date: 1/13/2010 10:54:00 AM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 7:16:13 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 7:16:13 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 7:16:13 AM
Tetrachloroethene (PCE)	1.0	1.0		µg/L	1	1/16/2010 7:16:13 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 7:16:13 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 7:16:13 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 7:16:13 AM
Surr: 1,2-Dichloroethane-d4	98.1	54.6-141		%REC	1	1/16/2010 7:16:13 AM
Surr: 4-Bromofluorobenzene	104	60.1-133		%REC	1	1/16/2010 7:16:13 AM
Surr: Dibromofluoromethane	98.9	78.5-130		%REC	1	1/16/2010 7:16:13 AM
Surr: Toluene-d8	96.4	79.5-126		%REC	1	1/16/2010 7:16:13 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-08

Client Sample ID: GBR-49
Collection Date: 1/13/2010 11:22:00 AM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 7:43:44 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 7:43:44 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 7:43:44 AM
Acetone	ND	10		µg/L	1	1/16/2010 7:43:44 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 7:43:44 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 7:43:44 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 7:43:44 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 7:43:44 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 7:43:44 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 7:43:44 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-08

Client Sample ID: GBR-49
Collection Date: 1/13/2010 11:22:00 AM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 7:43:44 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 7:43:44 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 7:43:44 AM
Tetrachloroethene (PCE)	1.6	1.0		µg/L	1	1/16/2010 7:43:44 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 7:43:44 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 7:43:44 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 7:43:44 AM
Surr: 1,2-Dichloroethane-d4	97.5	54.6-141		%REC	1	1/16/2010 7:43:44 AM
Surr: 4-Bromofluorobenzene	108	60.1-133		%REC	1	1/16/2010 7:43:44 AM
Surr: Dibromofluoromethane	99.9	78.5-130		%REC	1	1/16/2010 7:43:44 AM
Surr: Toluene-d8	97.1	79.5-126		%REC	1	1/16/2010 7:43:44 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-09

Client Sample ID: GBR-17
Collection Date: 1/13/2010 12:12:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 8:11:16 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 8:11:16 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 8:11:16 AM
Acetone	ND	10		µg/L	1	1/16/2010 8:11:16 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 8:11:16 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 8:11:16 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 8:11:16 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 8:11:16 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 8:11:16 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 8:11:16 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-09

Client Sample ID: GBR-17
Collection Date: 1/13/2010 12:12:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 8:11:16 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 8:11:16 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 8:11:16 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 8:11:16 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 8:11:16 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 8:11:16 AM
Surr: 1,2-Dichloroethane-d4	96.7	54.6-141		%REC	1	1/16/2010 8:11:16 AM
Surr: 4-Bromofluorobenzene	106	60.1-133		%REC	1	1/16/2010 8:11:16 AM
Surr: Dibromofluoromethane	95.8	78.5-130		%REC	1	1/16/2010 8:11:16 AM
Surr: Toluene-d8	96.6	79.5-126		%REC	1	1/16/2010 8:11:16 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-10

Client Sample ID: GRW-3
Collection Date: 1/13/2010 12:52:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Toluene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Naphthalene	ND	2.0		µg/L	1	1/16/2010 8:38:52 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 8:38:52 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2010 8:38:52 AM
Acetone	ND	10		µg/L	1	1/16/2010 8:38:52 AM
Bromobenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Bromoform	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Bromomethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
2-Butanone	ND	10		µg/L	1	1/16/2010 8:38:52 AM
Carbon disulfide	ND	10		µg/L	1	1/16/2010 8:38:52 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Chloroethane	ND	2.0		µg/L	1	1/16/2010 8:38:52 AM
Chloroform	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Chloromethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2010 8:38:52 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Dibromomethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2010 8:38:52 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
2-Hexanone	ND	10		µg/L	1	1/16/2010 8:38:52 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-10

Client Sample ID: GRW-3
Collection Date: 1/13/2010 12:52:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2010 8:38:52 AM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2010 8:38:52 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Styrene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2010 8:38:52 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2010 8:38:52 AM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2010 8:38:52 AM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2010 8:38:52 AM
Surr: 1,2-Dichloroethane-d4	95.9	54.6-141		%REC	1	1/16/2010 8:38:52 AM
Surr: 4-Bromofluorobenzene	104	60.1-133		%REC	1	1/16/2010 8:38:52 AM
Surr: Dibromofluoromethane	95.7	78.5-130		%REC	1	1/16/2010 8:38:52 AM
Surr: Toluene-d8	94.7	79.5-126		%REC	1	1/16/2010 8:38:52 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-11

Client Sample ID: GRW-6
Collection Date: 1/13/2010 1:04:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Toluene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Ethylbenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Naphthalene	ND	2.0		µg/L	1	1/18/2010 1:40:10 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 1:40:10 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 1:40:10 PM
Acetone	ND	10		µg/L	1	1/18/2010 1:40:10 PM
Bromobenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Bromoform	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Bromomethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
2-Butanone	ND	10		µg/L	1	1/18/2010 1:40:10 PM
Carbon disulfide	ND	10		µg/L	1	1/18/2010 1:40:10 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Chlorobenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Chloroethane	ND	2.0		µg/L	1	1/18/2010 1:40:10 PM
Chloroform	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Chloromethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/18/2010 1:40:10 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Dibromomethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/18/2010 1:40:10 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
2-Hexanone	ND	10		µg/L	1	1/18/2010 1:40:10 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-11

Client Sample ID: GRW-6
Collection Date: 1/13/2010 1:04:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/18/2010 1:40:10 PM
Methylene Chloride	ND	3.0		µg/L	1	1/18/2010 1:40:10 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Styrene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/18/2010 1:40:10 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/18/2010 1:40:10 PM
Vinyl chloride	ND	1.0		µg/L	1	1/18/2010 1:40:10 PM
Xylenes, Total	ND	1.5		µg/L	1	1/18/2010 1:40:10 PM
Surr: 1,2-Dichloroethane-d4	97.0	54.6-141		%REC	1	1/18/2010 1:40:10 PM
Surr: 4-Bromofluorobenzene	110	60.1-133		%REC	1	1/18/2010 1:40:10 PM
Surr: Dibromofluoromethane	97.9	78.5-130		%REC	1	1/18/2010 1:40:10 PM
Surr: Toluene-d8	93.6	79.5-126		%REC	1	1/18/2010 1:40:10 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-12

Client Sample ID: GBR-31
Collection Date: 1/13/2010 1:48:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Toluene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Ethylbenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Naphthalene	ND	2.0		µg/L	1	1/18/2010 2:07:55 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 2:07:55 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 2:07:55 PM
Acetone	ND	10		µg/L	1	1/18/2010 2:07:55 PM
Bromobenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Bromoform	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Bromomethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
2-Butanone	ND	10		µg/L	1	1/18/2010 2:07:55 PM
Carbon disulfide	ND	10		µg/L	1	1/18/2010 2:07:55 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Chlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Chloroethane	ND	2.0		µg/L	1	1/18/2010 2:07:55 PM
Chloroform	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Chloromethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/18/2010 2:07:55 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Dibromomethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/18/2010 2:07:55 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
2-Hexanone	ND	10		µg/L	1	1/18/2010 2:07:55 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-12

Client Sample ID: GBR-31
Collection Date: 1/13/2010 1:48:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/18/2010 2:07:55 PM
Methylene Chloride	ND	3.0		µg/L	1	1/18/2010 2:07:55 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Styrene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/18/2010 2:07:55 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/18/2010 2:07:55 PM
Vinyl chloride	ND	1.0		µg/L	1	1/18/2010 2:07:55 PM
Xylenes, Total	ND	1.5		µg/L	1	1/18/2010 2:07:55 PM
Surr: 1,2-Dichloroethane-d4	97.4	54.6-141		%REC	1	1/18/2010 2:07:55 PM
Surr: 4-Bromofluorobenzene	109	60.1-133		%REC	1	1/18/2010 2:07:55 PM
Surr: Dibromofluoromethane	93.6	78.5-130		%REC	1	1/18/2010 2:07:55 PM
Surr: Toluene-d8	91.9	79.5-126		%REC	1	1/18/2010 2:07:55 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-24D**Lab Order:** 1001201**Collection Date:** 1/13/2010 2:30:00 PM**Project:** GBR**Date Received:** 1/15/2010**Lab ID:** 1001201-13**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: JAT
Naphthalene	5.8	2.0		µg/L	1	1/24/2010 11:38:57 AM
1-Methylnaphthalene	7.7	2.0		µg/L	1	1/24/2010 11:38:57 AM
2-Methylnaphthalene	4.9	2.0		µg/L	1	1/24/2010 11:38:57 AM
Acenaphthylene	ND	2.5		µg/L	1	1/24/2010 11:38:57 AM
Acenaphthene	ND	5.0		µg/L	1	1/24/2010 11:38:57 AM
Fluorene	1.0	0.80		µg/L	1	1/24/2010 11:38:57 AM
Phenanthrene	0.62	0.60		µg/L	1	1/24/2010 11:38:57 AM
Anthracene	ND	0.60		µg/L	1	1/24/2010 11:38:57 AM
Fluoranthene	ND	0.30		µg/L	1	1/24/2010 11:38:57 AM
Pyrene	ND	0.30		µg/L	1	1/24/2010 11:38:57 AM
Benz(a)anthracene	ND	0.070		µg/L	1	1/24/2010 11:38:57 AM
Chrysene	ND	0.20		µg/L	1	1/24/2010 11:38:57 AM
Benzo(b)fluoranthene	ND	0.10		µg/L	1	1/24/2010 11:38:57 AM
Benzo(k)fluoranthene	ND	0.070		µg/L	1	1/24/2010 11:38:57 AM
Benzo(a)pyrene	ND	0.070		µg/L	1	1/24/2010 11:38:57 AM
Dibenz(a,h)anthracene	ND	0.070		µg/L	1	1/24/2010 11:38:57 AM
Benzo(g,h,i)perylene	ND	0.080		µg/L	1	1/24/2010 11:38:57 AM
Indeno(1,2,3-cd)pyrene	ND	0.080		µg/L	1	1/24/2010 11:38:57 AM
Surr: Benzo(e)pyrene	63.0	28.3-111		%REC	1	1/24/2010 11:38:57 AM

EPA METHOD 8260B: VOLATILES

Analyst: HL

Benzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Toluene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Ethylbenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2,4-Trimethylbenzene	3.5	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Naphthalene	ND	2.0		µg/L	1	1/18/2010 2:35:46 PM
1-Methylnaphthalene	8.0	4.0		µg/L	1	1/18/2010 2:35:46 PM
2-Methylnaphthalene	7.4	4.0		µg/L	1	1/18/2010 2:35:46 PM
Acetone	ND	10		µg/L	1	1/18/2010 2:35:46 PM
Bromobenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Bromoform	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Bromomethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
2-Butanone	ND	10		µg/L	1	1/18/2010 2:35:46 PM
Carbon disulfide	ND	10		µg/L	1	1/18/2010 2:35:46 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Chlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Chloroethane	ND	2.0		µg/L	1	1/18/2010 2:35:46 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-13

Client Sample ID: GBR-24D
Collection Date: 1/13/2010 2:30:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Chloroform	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Chloromethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/18/2010 2:35:46 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Dibromomethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/18/2010 2:35:46 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
2-Hexanone	ND	10		µg/L	1	1/18/2010 2:35:46 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/18/2010 2:35:46 PM
Methylene Chloride	ND	3.0		µg/L	1	1/18/2010 2:35:46 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Styrene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/18/2010 2:35:46 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/18/2010 2:35:46 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-13

Client Sample ID: GBR-24D
Collection Date: 1/13/2010 2:30:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Vinyl chloride	ND	1.0		µg/L	1	1/18/2010 2:35:46 PM
Xylenes, Total	ND	1.5		µg/L	1	1/18/2010 2:35:46 PM
Surr: 1,2-Dichloroethane-d4	95.9	54.6-141		%REC	1	1/18/2010 2:35:46 PM
Surr: 4-Bromofluorobenzene	109	60.1-133		%REC	1	1/18/2010 2:35:46 PM
Surr: Dibromofluoromethane	95.9	78.5-130		%REC	1	1/18/2010 2:35:46 PM
Surr: Toluene-d8	94.5	79.5-126		%REC	1	1/18/2010 2:35:46 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-14

Client Sample ID: GBR-30
Collection Date: 1/13/2010 3:08:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Toluene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Ethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Naphthalene	ND	2.0		µg/L	1	1/18/2010 3:03:27 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 3:03:27 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 3:03:27 PM
Acetone	ND	10		µg/L	1	1/18/2010 3:03:27 PM
Bromobenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Bromoform	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Bromomethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
2-Butanone	ND	10		µg/L	1	1/18/2010 3:03:27 PM
Carbon disulfide	ND	10		µg/L	1	1/18/2010 3:03:27 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Chlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Chloroethane	ND	2.0		µg/L	1	1/18/2010 3:03:27 PM
Chloroform	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Chloromethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/18/2010 3:03:27 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Dibromomethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/18/2010 3:03:27 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
2-Hexanone	ND	10		µg/L	1	1/18/2010 3:03:27 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-14

Client Sample ID: GBR-30
Collection Date: 1/13/2010 3:08:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/18/2010 3:03:27 PM
Methylene Chloride	ND	3.0		µg/L	1	1/18/2010 3:03:27 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Styrene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/18/2010 3:03:27 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/18/2010 3:03:27 PM
Vinyl chloride	ND	1.0		µg/L	1	1/18/2010 3:03:27 PM
Xylenes, Total	ND	1.5		µg/L	1	1/18/2010 3:03:27 PM
Surr: 1,2-Dichloroethane-d4	97.4	54.6-141		%REC	1	1/18/2010 3:03:27 PM
Surr: 4-Bromofluorobenzene	109	60.1-133		%REC	1	1/18/2010 3:03:27 PM
Surr: Dibromofluoromethane	95.6	78.5-130		%REC	1	1/18/2010 3:03:27 PM
Surr: Toluene-d8	95.1	79.5-126		%REC	1	1/18/2010 3:03:27 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-15

Client Sample ID: Influent
Collection Date: 1/13/2010 3:23:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Toluene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Ethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Naphthalene	ND	2.0		µg/L	1	1/18/2010 3:31:06 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 3:31:06 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 3:31:06 PM
Acetone	ND	10		µg/L	1	1/18/2010 3:31:06 PM
Bromobenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Bromoform	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Bromomethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
2-Butanone	ND	10		µg/L	1	1/18/2010 3:31:06 PM
Carbon disulfide	ND	10		µg/L	1	1/18/2010 3:31:06 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Chlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Chloroethane	ND	2.0		µg/L	1	1/18/2010 3:31:06 PM
Chloroform	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Chloromethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/18/2010 3:31:06 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Dibromomethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/18/2010 3:31:06 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
2-Hexanone	ND	10		µg/L	1	1/18/2010 3:31:06 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-15

Client Sample ID: Influent
Collection Date: 1/13/2010 3:23:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/18/2010 3:31:06 PM
Methylene Chloride	ND	3.0		µg/L	1	1/18/2010 3:31:06 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Styrene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/18/2010 3:31:06 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/18/2010 3:31:06 PM
Vinyl chloride	ND	1.0		µg/L	1	1/18/2010 3:31:06 PM
Xylenes, Total	ND	1.5		µg/L	1	1/18/2010 3:31:06 PM
Surr: 1,2-Dichloroethane-d4	97.4	54.6-141		%REC	1	1/18/2010 3:31:06 PM
Surr: 4-Bromofluorobenzene	105	60.1-133		%REC	1	1/18/2010 3:31:06 PM
Surr: Dibromofluoromethane	95.7	78.5-130		%REC	1	1/18/2010 3:31:06 PM
Surr: Toluene-d8	96.9	79.5-126		%REC	1	1/18/2010 3:31:06 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-16

Client Sample ID: Effluent
Collection Date: 1/13/2010 3:53:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Toluene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Ethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Naphthalene	ND	2.0		µg/L	1	1/18/2010 3:58:40 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 3:58:40 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/18/2010 3:58:40 PM
Acetone	ND	10		µg/L	1	1/18/2010 3:58:40 PM
Bromobenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Bromoform	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Bromomethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
2-Butanone	ND	10		µg/L	1	1/18/2010 3:58:40 PM
Carbon disulfide	ND	10		µg/L	1	1/18/2010 3:58:40 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Chlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Chloroethane	ND	2.0		µg/L	1	1/18/2010 3:58:40 PM
Chloroform	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Chloromethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/18/2010 3:58:40 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Dibromomethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/18/2010 3:58:40 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
2-Hexanone	ND	10		µg/L	1	1/18/2010 3:58:40 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 26-Jan-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1001201
Project: GBR
Lab ID: 1001201-16

Client Sample ID: Effluent
Collection Date: 1/13/2010 3:53:00 PM
Date Received: 1/15/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/18/2010 3:58:40 PM
Methylene Chloride	ND	3.0		µg/L	1	1/18/2010 3:58:40 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Styrene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/18/2010 3:58:40 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/18/2010 3:58:40 PM
Vinyl chloride	ND	1.0		µg/L	1	1/18/2010 3:58:40 PM
Xylenes, Total	ND	1.5		µg/L	1	1/18/2010 3:58:40 PM
Surr: 1,2-Dichloroethane-d4	95.3	54.6-141		%REC	1	1/18/2010 3:58:40 PM
Surr: 4-Bromofluorobenzene	108	60.1-133		%REC	1	1/18/2010 3:58:40 PM
Surr: Dibromofluoromethane	95.3	78.5-130		%REC	1	1/18/2010 3:58:40 PM
Surr: Toluene-d8	96.0	79.5-126		%REC	1	1/18/2010 3:58:40 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 1001201

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R36991 Analysis Date: 1/15/2010 8:32:16 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 1001201

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R36991 Analysis Date: 1/15/2010 8:32:16 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b6

MBLK

Batch ID: R36991 Analysis Date: 1/15/2010 9:08:41 PM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

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QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 1001201

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b6

MBLK

Batch ID: R36991 Analysis Date: 1/15/2010 9:08:41 PM

Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b3

MBLK

Batch ID: R36999 Analysis Date: 1/18/2010 10:53:57 AM

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

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QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 1001201

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b3 MBLK

Batch ID: R36999 Analysis Date: 1/18/2010 10:53:57 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

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QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 1001201

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b3

MBLK

Batch ID: R36999 Analysis Date: 1/18/2010 10:53:57 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng ics

LCS

Batch ID: R36991 Analysis Date: 1/15/2010 9:35:54 AM

Benzene	21.38	µg/L	1.0	20	0	107	76.7	114
Toluene	20.12	µg/L	1.0	20	0	101	78.4	117
Chlorobenzene	20.20	µg/L	1.0	20	0	101	80.7	127
1,1-Dichloroethene	24.60	µg/L	1.0	20	0	123	80.2	128
Trichloroethene (TCE)	18.81	µg/L	1.0	20	0	94.0	77.4	115

Sample ID: 100ng ics-b

LCS

Batch ID: R36991 Analysis Date: 1/15/2010 10:04:03 PM

Benzene	19.49	µg/L	1.0	20	0	97.5	76.7	114
Toluene	19.98	µg/L	1.0	20	0	99.9	78.4	117
Chlorobenzene	20.33	µg/L	1.0	20	0	102	80.7	127
1,1-Dichloroethene	22.21	µg/L	1.0	20	0	111	80.2	128
Trichloroethene (TCE)	17.05	µg/L	1.0	20	0	85.3	77.4	115

Sample ID: 100ng ics

LCS

Batch ID: R36999 Analysis Date: 1/18/2010 11:49:21 AM

Benzene	19.91	µg/L	1.0	20	0	99.6	76.7	114
Toluene	20.31	µg/L	1.0	20	0	102	78.4	117
Chlorobenzene	20.14	µg/L	1.0	20	0	101	80.7	127
1,1-Dichloroethene	23.38	µg/L	1.0	20	0	117	80.2	128
Trichloroethene (TCE)	18.48	µg/L	1.0	20	0	92.4	77.4	115

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 1001201

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8310: PAHs

Sample ID: MB-21184

MBLK

Batch ID: 21184 Analysis Date: 1/24/2010 10:34:47 AM

Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	2.0
2-Methylnaphthalene	ND	µg/L	2.0
Acenaphthylene	ND	µg/L	2.5
Acenaphthene	ND	µg/L	5.0
Fluorene	ND	µg/L	0.80
Phenanthrene	ND	µg/L	0.60
Anthracene	ND	µg/L	0.60
Fluoranthene	ND	µg/L	0.30
Pyrene	ND	µg/L	0.30
Benz(a)anthracene	ND	µg/L	0.070
Chrysene	ND	µg/L	0.20
Benzo(b)fluoranthene	ND	µg/L	0.10
Benzo(k)fluoranthene	ND	µg/L	0.070
Benzo(a)pyrene	ND	µg/L	0.070
Dibenz(a,h)anthracene	ND	µg/L	0.070
Benzo(g,h,i)perylene	ND	µg/L	0.080
Indeno(1,2,3-cd)pyrene	ND	µg/L	0.080

Sample ID: LCS-21184

LCS

Batch ID: 21184 Analysis Date: 1/24/2010 10:56:12 AM

Naphthalene	62.34	µg/L	2.0	80	0	77.9	20.5	109
1-Methylnaphthalene	69.51	µg/L	2.0	80.2	0	86.7	23.1	116
2-Methylnaphthalene	62.69	µg/L	2.0	80	0	78.4	19.5	112
Acenaphthylene	61.25	µg/L	2.5	80.2	0	76.4	27.5	119
Acenaphthene	63.27	µg/L	5.0	80	0	79.1	31	117
Fluorene	4.320	µg/L	0.80	8.02	0	53.9	17.1	109
Phenanthrene	1.500	µg/L	0.60	4.02	0	37.3	25.5	112
Anthracene	2.210	µg/L	0.60	4.02	0	55.0	25.8	119
Fluoranthene	5.330	µg/L	0.30	8.02	0	66.5	27.2	122
Pyrene	4.550	µg/L	0.30	8.02	0	56.7	24.1	118
Benz(a)anthracene	0.5200	µg/L	0.070	0.802	0	64.8	31.1	125
Chrysene	2.760	µg/L	0.20	4.02	0	68.7	32.8	119
Benzo(b)fluoranthene	0.5000	µg/L	0.10	1.002	0	49.9	24.4	117
Benzo(k)fluoranthene	0.4000	µg/L	0.070	0.5	0	80.0	28.4	132
Benzo(a)pyrene	0.4000	µg/L	0.070	0.502	0	79.7	32.4	119
Dibenz(a,h)anthracene	0.8000	µg/L	0.070	1.002	0	79.8	33.9	120
Benzo(g,h,i)perylene	0.7700	µg/L	0.080	1	0.04	73.0	35.2	113
Indeno(1,2,3-cd)pyrene	1.620	µg/L	0.080	2.004	0	80.8	33.6	115

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name WESTERN REFINING SOUT

Date Received:

1/15/2010

Work Order Number 1001201

Received by: ARS

Checklist completed by:

Signature

Date

Sample ID labels checked by:

Initials

Matrix:

Carrier name: Greyhound

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐	
Custody seals intact on shipping container/cooler?	Yes ☒	No ☐	Not Present ☐	Not Shipped ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	N/A ☒	
Chain of custody present?	Yes ☒	No ☐		
Chain of custody signed when relinquished and received?	Yes ☒	No ☐		
Chain of custody agrees with sample labels?	Yes ☒	No ☐		
Samples in proper container/bottle?	Yes ☒	No ☐		
Sample containers intact?	Yes ☒	No ☐		
Sufficient sample volume for indicated test?	Yes ☒	No ☐		
All samples received within holding time?	Yes ☒	No ☐		
Water - VOA vials have zero headspace?	No VOA vials submitted ☐	Yes ☒	No ☐	
Water - Preservation labels on bottle and cap match?	Yes ☐	No ☐	N/A ☒	
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☒	

Number of preserved bottles checked for pH:

<2 >12 unless noted below.

Container/Temp Blank temperature?

1.9°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: _____

Corrective Action _____

Chain-of-Custody Record

Client: Western RefiningMailing Address: 111CR 4990loomfield NM 87413

Phone #:

Email or Fax#:

QC Package:

☒ Standard

☐ Level 4 (Full Validation)

☒ Accreditation

☐ NELAP

☐ Other

☐ EDD (Type)

Date	Time	Matrix	Sample Request ID
01/12/10	0700	GW	trip blank
01/12/10	1342	GW	G-BR-52
01/12/10	1533	GW	G-BR-51
01/12/10	1612	GW	SHS-8
01/13/10	0931	GW	G-BR-50
01/13/10	1012	GW	G-BR-48
01/13/10	1054	GW	G-BR-32
01/13/10	1122	GW	G-BR-49
01/13/10	1212	GW	G-BR-17
01/13/10	1252	GW	G-BR-GRW-3
01/13/10	1304	GW	G-RW-6
01/13/10	1348	GW	G-BR-31

Date: 1/14/10Time: 1455Relinquished by: TracyDate: 1/14/10Time: 1455Relinquished by: Tracy

Turn-Around Time:

☒ Standard

☐ Rush

Project Name:

G-BR

Project #:

Project Manager: Ashley AgerSampler: TROY URBANOn Site: YES P. No. 19Sample Temperature: 19

Container Type and #

Preservative Type

☒ HCL

☒ HCL

☒ HCL

☒ HCL

☒ HCL

☒ HCL

☒ HCL

☒ HCL

☒ HCL

☒ HCL

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☒ HCL

☒ HCL

☒ HCL
Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10Time: 9:45Date: 1/15/10Time: 9:45Received by: [Signature]Date: 1/15/10

Chain-of-Custody Record

Client: Western RefiningMailing Address: 111CR 4990Bloomfield NM 87413

Phone #:

Email or Fax#:

QA/QC Package:

☒ Standard
☐ Level 4 (Full Validation)

 Accreditation
☐ NELAP

☐ Other

☐ EDD (Type)

☐ Standard
☐ Level 4 (Full Validation)

 Accreditation
☐ NELAP

☐ Other

☐ EDD (Type)

☐ Standard
☐ Level 4 (Full Validation)

 Accreditation
☐ NELAP

☐ Other

☐ EDD (Type)

☐ Standard
☐ Level 4 (Full Validation)

 Accreditation
☐ NELAP

☐ Other

☐ EDD (Type)

☐ Standard
☐ Level 4 (Full Validation)

 Accreditation
☐ NELAP

☐ Other

☐ EDD (Type)

☐ Standard
☐ Level 4 (Full Validation)

 Accreditation
☐ NELAP

☐ Other

☐ EDD (Type)

Turn-Around Time:

☒ Standard
☐ Rush

Project Name:

G-BR

Project #:

Project Manager:

Ashley Ager

Sampler:

Troy UrbanOn Ice ☐ Yes ☐ No

Sample Temperature

Container Type and #

Preservative Type

HEAL No.

1001901

4

HCl/none

3009

HCl

3009

HCl

3009

HCl

3009

HCl

3009

HCl

3009

HCl

3009

HCl

Turn-Around Time:

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☐ Rush

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Sample Temperature

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Troy UrbanOn Ice ☐ Yes ☐ No

Sample Temperature

Container Type and #

Preservative Type

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Turn-Around Time:

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☐ Rush

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Project #:

Project Manager:

Ashley Ager

Sampler:

Troy UrbanOn Ice ☐ Yes ☐ No

Sample Temperature

Container Type and #

Preservative Type

HEAL No.

1001901

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3009

HCl

Turn-Around Time:

☒ Standard
☐ Rush

Project Name:

G-BR

Project #:

Project Manager:

Ashley Ager

Sampler:

Troy UrbanOn Ice ☐ Yes ☐ No

Sample Temperature

Container Type and #

Preservative Type

HEAL No.

1001901

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HCl/none

3009

HCl

3009

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3009

HCl

Turn-Around Time:

☒ Standard
☐ Rush

Project Name:

G-BR

Project #:

Project Manager:

Ashley Ager

Sampler:

Troy UrbanOn Ice ☐ Yes ☐ No

Sample Temperature

Container Type and #

Preservative Type

HEAL No.

1001901

4

HCl/none

3009

HCl

3009

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HCl

3009

HCl

Turn-Around Time:

☒ Standard
☐ Rush

Project Name:

G-BR

Project #:

Project Manager:

Ashley Ager

Sampler:

Troy UrbanOn Ice ☐ Yes ☐ No

Sample Temperature

Container Type and #

Preservative Type

HEAL No.

1001901

4

HCl/none

3009

HCl

3009</



COVER LETTER

Tuesday, April 13, 2010

Bill Robertson
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4161
FAX (505) 632-3911

RE: GBR

Order No.: 1004184

Dear Bill Robertson:

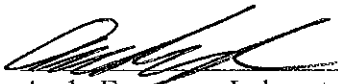
Hall Environmental Analysis Laboratory, Inc. received 3 sample(s) on 4/9/2010 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,



Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

www.hallenvironmental.com

Hall Environmental Analysis Laboratory, Inc.

Date: 13-Apr-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1004184
Project: GBR
Lab ID: 1004184-01

Client Sample ID: Influent
Collection Date: 4/8/2010 11:38:00 AM
Date Received: 4/9/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: DAM
Benzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Toluene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Ethylbenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Naphthalene	ND	2.0		µg/L	1	4/13/2010 12:45:42 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	4/13/2010 12:45:42 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	4/13/2010 12:45:42 AM
Acetone	ND	10		µg/L	1	4/13/2010 12:45:42 AM
Bromobenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Bromodichloromethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Bromoform	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Bromomethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
2-Butanone	ND	10		µg/L	1	4/13/2010 12:45:42 AM
Carbon disulfide	ND	10		µg/L	1	4/13/2010 12:45:42 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Chlorobenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Chloroethane	ND	2.0		µg/L	1	4/13/2010 12:45:42 AM
Chloroform	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Chloromethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
2-Chlorotoluene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
4-Chlorotoluene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
cis-1,2-DCE	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	4/13/2010 12:45:42 AM
Dibromochloromethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Dibromomethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	4/13/2010 12:45:42 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 1 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 13-Apr-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1004184
Project: GBR
Lab ID: 1004184-01

Client Sample ID: Influent
Collection Date: 4/8/2010 11:38:00 AM
Date Received: 4/9/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: DAM
2-Hexanone	ND	10		µg/L	1	4/13/2010 12:45:42 AM
Isopropylbenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	4/13/2010 12:45:42 AM
Methylene Chloride	ND	3.0		µg/L	1	4/13/2010 12:45:42 AM
n-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
n-Propylbenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
sec-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Styrene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
tert-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	4/13/2010 12:45:42 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
trans-1,2-DCE	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	4/13/2010 12:45:42 AM
Vinyl chloride	ND	1.0		µg/L	1	4/13/2010 12:45:42 AM
Xylenes, Total	ND	1.5		µg/L	1	4/13/2010 12:45:42 AM
Surr: 1,2-Dichloroethane-d4	78.2	54.6-141		%REC	1	4/13/2010 12:45:42 AM
Surr: 4-Bromofluorobenzene	106	60.1-133		%REC	1	4/13/2010 12:45:42 AM
Surr: Dibromofluoromethane	109	78.5-130		%REC	1	4/13/2010 12:45:42 AM
Surr: Toluene-d8	101	79.5-126		%REC	1	4/13/2010 12:45:42 AM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 2 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 13-Apr-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1004184
Project: GBR
Lab ID: 1004184-02

Client Sample ID: Effluent
Collection Date: 4/8/2010 12:00:00 PM
Date Received: 4/9/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
						Analyst: DAM
EPA METHOD 8260B: VOLATILES						
Benzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Toluene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Ethylbenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Naphthalene	ND	2.0		µg/L	1	4/13/2010 1:13:46 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	4/13/2010 1:13:46 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	4/13/2010 1:13:46 AM
Acetone	ND	10		µg/L	1	4/13/2010 1:13:46 AM
Bromobenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Bromodichloromethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Bromoform	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Bromomethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
2-Butanone	ND	10		µg/L	1	4/13/2010 1:13:46 AM
Carbon disulfide	ND	10		µg/L	1	4/13/2010 1:13:46 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Chlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Chloroethane	ND	2.0		µg/L	1	4/13/2010 1:13:46 AM
Chloroform	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Chloromethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
2-Chlorotoluene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
4-Chlorotoluene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
cis-1,2-DCE	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	4/13/2010 1:13:46 AM
Dibromochloromethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Dibromomethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	4/13/2010 1:13:46 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

Date: 13-Apr-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1004184
Project: GBR
Lab ID: 1004184-02

Client Sample ID: Effluent
Collection Date: 4/8/2010 12:00:00 PM
Date Received: 4/9/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
						Analyst: DAM
EPA METHOD 8260B: VOLATILES						
2-Hexanone	ND	10		µg/L	1	4/13/2010 1:13:46 AM
Isopropylbenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	4/13/2010 1:13:46 AM
Methylene Chloride	ND	3.0		µg/L	1	4/13/2010 1:13:46 AM
n-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
n-Propylbenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
sec-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Styrene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
tert-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	4/13/2010 1:13:46 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
trans-1,2-DCE	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	4/13/2010 1:13:46 AM
Vinyl chloride	ND	1.0		µg/L	1	4/13/2010 1:13:46 AM
Xylenes, Total	ND	1.5		µg/L	1	4/13/2010 1:13:46 AM
Surr: 1,2-Dichloroethane-d4	89.6	54.6-141		%REC	1	4/13/2010 1:13:46 AM
Surr: 4-Bromofluorobenzene	103	60.1-133		%REC	1	4/13/2010 1:13:46 AM
Surr: Dibromofluoromethane	115	78.5-130		%REC	1	4/13/2010 1:13:46 AM
Surr: Toluene-d8	104	79.5-126		%REC	1	4/13/2010 1:13:46 AM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

Date: 13-Apr-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1004184
Project: GBR
Lab ID: 1004184-03

Client Sample ID: TRIP BLANK
Collection Date:
Date Received: 4/9/2010
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: DAM
Benzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Toluene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Ethylbenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Naphthalene	ND	2.0		µg/L	1	4/13/2010 1:41:50 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	4/13/2010 1:41:50 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	4/13/2010 1:41:50 AM
Acetone	ND	10		µg/L	1	4/13/2010 1:41:50 AM
Bromobenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Bromodichloromethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Bromoform	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Bromomethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
2-Butanone	ND	10		µg/L	1	4/13/2010 1:41:50 AM
Carbon disulfide	ND	10		µg/L	1	4/13/2010 1:41:50 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Chlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Chloroethane	ND	2.0		µg/L	1	4/13/2010 1:41:50 AM
Chloroform	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Chloromethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
2-Chlorotoluene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
4-Chlorotoluene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
cis-1,2-DCE	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	4/13/2010 1:41:50 AM
Dibromochloromethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Dibromomethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	4/13/2010 1:41:50 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

Date: 13-Apr-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1004184
Project: GBR
Lab ID: 1004184-03

Client Sample ID: TRIP BLANK
Collection Date:
Date Received: 4/9/2010
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
Analyst: DAM						
EPA METHOD 8260B: VOLATILES						
2-Hexanone	ND	10		µg/L	1	4/13/2010 1:41:50 AM
Isopropylbenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	4/13/2010 1:41:50 AM
Methylene Chloride	ND	3.0		µg/L	1	4/13/2010 1:41:50 AM
n-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
n-Propylbenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
sec-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Styrene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
tert-Butylbenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	4/13/2010 1:41:50 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
trans-1,2-DCE	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	4/13/2010 1:41:50 AM
Vinyl chloride	ND	1.0		µg/L	1	4/13/2010 1:41:50 AM
Xylenes, Total	ND	1.5		µg/L	1	4/13/2010 1:41:50 AM
Surr: 1,2-Dichloroethane-d4	90.3	54.6-141		%REC	1	4/13/2010 1:41:50 AM
Surr: 4-Bromofluorobenzene	95.7	60.1-133		%REC	1	4/13/2010 1:41:50 AM
Surr: Dibromofluoromethane	111	78.5-130		%REC	1	4/13/2010 1:41:50 AM
Surr: Toluene-d8	102	79.5-126		%REC	1	4/13/2010 1:41:50 AM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

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QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 1004184

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b1 MBLK

Batch ID: R38161 Analysis Date: 4/12/2010 8:42:54 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E Estimated value
J Analyte detected below quantitation limits
ND Not Detected at the Reporting LimitH Holding times for preparation or analysis exceeded
NC Non-Chlorinated
R RPD outside accepted recovery limits

Page 1

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: GBR

Work Order: 1004184

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b1 MBLK

Batch ID: R38161 Analysis Date: 4/12/2010 8:42:54 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng lcs LCS

Batch ID: R38161 Analysis Date: 4/12/2010 11:09:19 AM

Benzene	19.10	µg/L	1.0	20	0	95.5	82.4	116
Toluene	20.21	µg/L	1.0	20	0	101	89.5	123
Chlorobenzene	18.99	µg/L	1.0	20	0	94.9	87.8	120
1,1-Dichloroethene	20.22	µg/L	1.0	20	0	101	90.3	138
Trichloroethene (TCE)	20.11	µg/L	1.0	20	0	101	64	129

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name **WESTERN REFINING SOUT**

Date Received:

4/9/2010

Work Order Number **1004184**Received by: **TLS**Sample ID labels checked by: **AS**

Initials

Checklist completed by: 

Signature

Date

4/9/10

Matrix:

Carrier name: Greyhound

Shipping container/cooler in good condition?

Yes ☒No ☐Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☒No ☐Not Present ☐Not Shipped ☐

Custody seals intact on sample bottles?

Yes ☐No ☐N/A ☒

Chain of custody present?

Yes ☒No ☐

Chain of custody signed when relinquished and received?

Yes ☒No ☐

Chain of custody agrees with sample labels?

Yes ☒No ☐

Samples in proper container/bottle?

Yes ☒No ☐

Sample containers intact?

Yes ☒No ☐

Sufficient sample volume for indicated test?

Yes ☒No ☐

All samples received within holding time?

Yes ☒No ☐

Water - VOA vials have zero headspace?

No VOA vials submitted ☐Yes ☒No ☐

Water - Preservation labels on bottle and cap match?

Yes ☐No ☐N/A ☒

Water - pH acceptable upon receipt?

Yes ☐No ☐N/A ☒Number of preserved
bottles checked for
pH:<2 >12 unless noted
below.

Container/Temp Blank temperature?

4.6°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: _____

Corrective Action _____



COVER LETTER

Thursday, July 22, 2010

Bill Robertson
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4161
FAX (505) 632-3911

RE: GBR

Order No.: 1007591

Dear Bill Robertson:

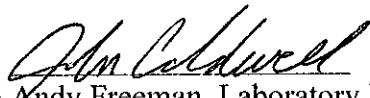
Hall Environmental Analysis Laboratory, Inc. received 3 sample(s) on 7/16/2010 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,


For Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

www.hallenvironmental.com

Hall Environmental Analysis Laboratory, Inc.

Date: 22-Jul-10

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** Influent**Lab Order:** 1007591**Collection Date:** 7/15/2010 1:09:00 PM**Project:** GBR**Date Received:** 7/16/2010**Lab ID:** 1007591-01**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Toluene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Ethylbenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Naphthalene	ND	2.0		µg/L	1	7/17/2010 1:14:25 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	7/17/2010 1:14:25 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	7/17/2010 1:14:25 PM
Acetone	ND	10		µg/L	1	7/17/2010 1:14:25 PM
Bromobenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Bromodichloromethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Bromoform	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Bromomethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
2-Butanone	ND	10		µg/L	1	7/17/2010 1:14:25 PM
Carbon disulfide	ND	10		µg/L	1	7/17/2010 1:14:25 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Chlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Chloroethane	ND	2.0		µg/L	1	7/17/2010 1:14:25 PM
Chloroform	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Chloromethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
2-Chlorotoluene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
4-Chlorotoluene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
cis-1,2-DCE	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/17/2010 1:14:25 PM
Dibromochloromethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Dibromomethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	7/17/2010 1:14:25 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 1 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 22-Jul-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1007591
Project: GBR
Lab ID: 1007591-01

Client Sample ID: Influent
Collection Date: 7/15/2010 1:09:00 PM
Date Received: 7/16/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
2-Hexanone	ND	10		µg/L	1	7/17/2010 1:14:25 PM
Isopropylbenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	7/17/2010 1:14:25 PM
Methylene Chloride	ND	3.0		µg/L	1	7/17/2010 1:14:25 PM
n-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
n-Propylbenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
sec-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Styrene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
tert-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/17/2010 1:14:25 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
trans-1,2-DCE	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/17/2010 1:14:25 PM
Vinyl chloride	ND	1.0		µg/L	1	7/17/2010 1:14:25 PM
Xylenes, Total	ND	1.5		µg/L	1	7/17/2010 1:14:25 PM
Surr: 1,2-Dichloroethane-d4	101	54.6-141		%REC	1	7/17/2010 1:14:25 PM
Surr: 4-Bromofluorobenzene	120	60.1-133		%REC	1	7/17/2010 1:14:25 PM
Surr: Dibromofluoromethane	101	78.5-130		%REC	1	7/17/2010 1:14:25 PM
Surr: Toluene-d8	105	79.5-126		%REC	1	7/17/2010 1:14:25 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 2 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 22-Jul-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1007591
Project: GBR
Lab ID: 1007591-02

Client Sample ID: Effluent
Collection Date: 7/15/2010 1:27:00 PM
Date Received: 7/16/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Toluene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Ethylbenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Naphthalene	ND	2.0		µg/L	1	7/17/2010 1:42:06 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	7/17/2010 1:42:06 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	7/17/2010 1:42:06 PM
Acetone	ND	10		µg/L	1	7/17/2010 1:42:06 PM
Bromobenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Bromodichloromethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Bromoform	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Bromomethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
2-Butanone	ND	10		µg/L	1	7/17/2010 1:42:06 PM
Carbon disulfide	ND	10		µg/L	1	7/17/2010 1:42:06 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Chlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Chloroethane	ND	2.0		µg/L	1	7/17/2010 1:42:06 PM
Chloroform	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Chloromethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
2-Chlorotoluene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
4-Chlorotoluene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
cis-1,2-DCE	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/17/2010 1:42:06 PM
Dibromochloromethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Dibromomethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	7/17/2010 1:42:06 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 3 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 22-Jul-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1007591
Project: GBR
Lab ID: 1007591-02

Client Sample ID: Effluent
Collection Date: 7/15/2010 1:27:00 PM
Date Received: 7/16/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
2-Hexanone	ND	10		µg/L	1	7/17/2010 1:42:06 PM
Isopropylbenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	7/17/2010 1:42:06 PM
Methylene Chloride	ND	3.0		µg/L	1	7/17/2010 1:42:06 PM
n-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
n-Propylbenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
sec-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Styrene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
tert-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/17/2010 1:42:06 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
trans-1,2-DCE	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/17/2010 1:42:06 PM
Vinyl chloride	ND	1.0		µg/L	1	7/17/2010 1:42:06 PM
Xylenes, Total	ND	1.5		µg/L	1	7/17/2010 1:42:06 PM
Surr: 1,2-Dichloroethane-d4	104	54.6-141		%REC	1	7/17/2010 1:42:06 PM
Surr: 4-Bromofluorobenzene	118	60.1-133		%REC	1	7/17/2010 1:42:06 PM
Surr: Dibromofluoromethane	104	78.5-130		%REC	1	7/17/2010 1:42:06 PM
Surr: Toluene-d8	105	79.5-126		%REC	1	7/17/2010 1:42:06 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 4 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 22-Jul-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1007591
Project: GBR
Lab ID: 1007591-03

Client Sample ID: TRIP BLANK
Collection Date:
Date Received: 7/16/2010
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Toluene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Ethylbenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Naphthalene	ND	2.0		µg/L	1	7/17/2010 2:09:47 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	7/17/2010 2:09:47 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	7/17/2010 2:09:47 PM
Acetone	ND	10		µg/L	1	7/17/2010 2:09:47 PM
Bromobenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Bromodichloromethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Bromoform	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Bromomethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
2-Butanone	ND	10		µg/L	1	7/17/2010 2:09:47 PM
Carbon disulfide	ND	10		µg/L	1	7/17/2010 2:09:47 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Chlorobenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Chloroethane	ND	2.0		µg/L	1	7/17/2010 2:09:47 PM
Chloroform	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Chloromethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
2-Chlorotoluene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
4-Chlorotoluene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
cis-1,2-DCE	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/17/2010 2:09:47 PM
Dibromochloromethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Dibromomethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	7/17/2010 2:09:47 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 5 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 22-Jul-10

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** TRIP BLANK**Lab Order:** 1007591**Collection Date:****Project:** GBR**Date Received:** 7/16/2010**Lab ID:** 1007591-03**Matrix:** TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
2-Hexanone	ND	10		µg/L	1	7/17/2010 2:09:47 PM
Isopropylbenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	7/17/2010 2:09:47 PM
Methylene Chloride	ND	3.0		µg/L	1	7/17/2010 2:09:47 PM
n-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
n-Propylbenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
sec-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Styrene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
tert-Butylbenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/17/2010 2:09:47 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
trans-1,2-DCE	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/17/2010 2:09:47 PM
Vinyl chloride	ND	1.0		µg/L	1	7/17/2010 2:09:47 PM
Xylenes, Total	ND	1.5		µg/L	1	7/17/2010 2:09:47 PM
Surr: 1,2-Dichloroethane-d4	106	54.6-141		%REC	1	7/17/2010 2:09:47 PM
Surr: 4-Bromofluorobenzene	115	60.1-133		%REC	1	7/17/2010 2:09:47 PM
Surr: Dibromofluoromethane	106	78.5-130		%REC	1	7/17/2010 2:09:47 PM
Surr: Toluene-d8	104	79.5-126		%REC	1	7/17/2010 2:09:47 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 6 of 6

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: GBR

Work Order: 1007591

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R39884 Analysis Date: 7/16/2010 8:44:26 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: GBR

Work Order: 1007591

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R39884 Analysis Date: 7/16/2010 8:44:26 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b8

MBLK

Batch ID: R39884 Analysis Date: 7/16/2010 9:39:36 PM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 1007591

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b8

MBLK

Batch ID: R39884 Analysis Date: 7/16/2010 9:39:36 PM

Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b13

MBLK

Batch ID: R39884 Analysis Date: 7/17/2010 10:01:25 AM

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

Page 3

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 1007591

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b13

MBLK

Batch ID: R39884 Analysis Date: 7/17/2010 10:01:25 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E Estimated value
J Analyte detected below quantitation limits
ND Not Detected at the Reporting LimitH Holding times for preparation or analysis exceeded
NC Non-Chlorinated
R RPD outside accepted recovery limits

Page 4

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 1007591

Analyte	Result	Units	PQL	SPK Va	SPK-ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b13 MBLK

Batch ID: R39884 Analysis Date: 7/17/2010 10:01:25 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng lcs

LCS

Batch ID: R39884 Analysis Date: 7/16/2010 10:07:10 AM

Benzene	20.22	µg/L	1.0	20	0	101	82.4	116
Toluene	23.09	µg/L	1.0	20	0	115	89.5	123
Chlorobenzene	21.99	µg/L	1.0	20	0	110	87.8	120
1,1-Dichloroethene	26.79	µg/L	1.0	20	0	134	90.3	138
Trichloroethene (TCE)	18.19	µg/L	1.0	20	0	90.9	64	129

Sample ID: 100ng lcs_b

LCS

Batch ID: R39884 Analysis Date: 7/16/2010 10:34:37 PM

Benzene	19.49	µg/L	1.0	20	0	97.4	82.4	116
Toluene	21.68	µg/L	1.0	20	0	108	89.5	123
Chlorobenzene	20.53	µg/L	1.0	20	0	103	87.8	120
1,1-Dichloroethene	25.31	µg/L	1.0	20	0	127	90.3	138
Trichloroethene (TCE)	17.80	µg/L	1.0	20	0	89.0	64	129

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name **WESTERN REFINING SOUT**

Date Received:

7/16/2010

Work Order Number **1007591**Received by: **ARS**

Sample ID labels checked by:

Checklist completed by:

Signature

Date

Initials

Matrix:

Carrier name: Greyhound

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☒	No ☐	Not Present ☐ Not Shipped ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	N/A ☒
Chain of custody present?	Yes ☒	No ☐	
Chain of custody signed when relinquished and received?	Yes ☒	No ☐	
Chain of custody agrees with sample labels?	Yes ☒	No ☐	
Samples in proper container/bottle?	Yes ☒	No ☐	
Sample containers intact?	Yes ☒	No ☐	
Sufficient sample volume for indicated test?	Yes ☒	No ☐	
All samples received within holding time?	Yes ☒	No ☐	
Water - VOA vials have zero headspace?	No VOA vials submitted ☐	Yes ☒	No ☐
Water - Preservation labels on bottle and cap match?	Yes ☐	No ☐	N/A ☒
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☒

Number of preserved bottles checked for pH:

<2 >12 unless noted below.

Container/Temp Blank temperature?

2.1°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: _____

Corrective Action _____



COVER LETTER

Wednesday, October 13, 2010

Bill Robertson
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413

TEL: (505) 632-4161
FAX (505) 632-3911

RE: GBR

Order No.: 1010364

Dear Bill Robertson:

Hall Environmental Analysis Laboratory, Inc. received 3 sample(s) on 10/7/2010 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman".

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

www.hallenvironmental.com

Hall Environmental Analysis Laboratory, Inc.

Date: 13-Oct-10

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR Effluent**Lab Order:** 1010364**Collection Date:** 10/6/2010 11:52:00 AM**Project:** GBR**Date Received:** 10/7/2010**Lab ID:** 1010364-01**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: MMS
Benzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Toluene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Ethylbenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Naphthalene	ND	2.0		µg/L	1	10/11/2010 6:41:17 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	10/11/2010 6:41:17 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	10/11/2010 6:41:17 PM
Acetone	ND	10		µg/L	1	10/11/2010 6:41:17 PM
Bromobenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Bromodichloromethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Bromoform	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Bromomethane	ND	3.0		µg/L	1	10/11/2010 6:41:17 PM
2-Butanone	ND	10		µg/L	1	10/11/2010 6:41:17 PM
Carbon disulfide	ND	10		µg/L	1	10/11/2010 6:41:17 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Chlorobenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Chloroethane	ND	2.0		µg/L	1	10/11/2010 6:41:17 PM
Chloroform	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Chloromethane	ND	3.0		µg/L	1	10/11/2010 6:41:17 PM
2-Chlorotoluene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
4-Chlorotoluene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
cis-1,2-DCE	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	10/11/2010 6:41:17 PM
Dibromochloromethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Dibromomethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	10/11/2010 6:41:17 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 1 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 13-Oct-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1010364
Project: GBR
Lab ID: 1010364-01

Client Sample ID: GBR Effluent
Collection Date: 10/6/2010 11:52:00 AM
Date Received: 10/7/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: MMS
2-Hexanone	ND	10		µg/L	1	10/11/2010 6:41:17 PM
Isopropylbenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	10/11/2010 6:41:17 PM
Methylene Chloride	ND	3.0		µg/L	1	10/11/2010 6:41:17 PM
n-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
n-Propylbenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
sec-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Styrene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
tert-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/11/2010 6:41:17 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
trans-1,2-DCE	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	10/11/2010 6:41:17 PM
Vinyl chloride	ND	1.0		µg/L	1	10/11/2010 6:41:17 PM
Xylenes, Total	ND	1.5		µg/L	1	10/11/2010 6:41:17 PM
Surr: 1,2-Dichloroethane-d4	84.2	54.6-141		%REC	1	10/11/2010 6:41:17 PM
Surr: 4-Bromofluorobenzene	103	60.1-133		%REC	1	10/11/2010 6:41:17 PM
Surr: Dibromofluoromethane	106	78.5-130		%REC	1	10/11/2010 6:41:17 PM
Surr: Toluene-d8	98.1	79.5-126		%REC	1	10/11/2010 6:41:17 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

Date: 13-Oct-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1010364
Project: GBR
Lab ID: 1010364-02

Client Sample ID: GBR Influent
Collection Date: 10/6/2010 12:18:00 PM
Date Received: 10/7/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: MMS
Benzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Toluene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Ethylbenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Naphthalene	ND	2.0		µg/L	1	10/11/2010 7:09:39 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	10/11/2010 7:09:39 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	10/11/2010 7:09:39 PM
Acetone	ND	10		µg/L	1	10/11/2010 7:09:39 PM
Bromobenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Bromodichloromethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Bromoform	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Bromomethane	ND	3.0		µg/L	1	10/11/2010 7:09:39 PM
2-Butanone	ND	10		µg/L	1	10/11/2010 7:09:39 PM
Carbon disulfide	ND	10		µg/L	1	10/11/2010 7:09:39 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Chlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Chloroethane	ND	2.0		µg/L	1	10/11/2010 7:09:39 PM
Chloroform	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Chloromethane	ND	3.0		µg/L	1	10/11/2010 7:09:39 PM
2-Chlorotoluene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
4-Chlorotoluene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
cis-1,2-DCE	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	10/11/2010 7:09:39 PM
Dibromochloromethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Dibromomethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	10/11/2010 7:09:39 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

Date: 13-Oct-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1010364
Project: GBR
Lab ID: 1010364-02

Client Sample ID: GBR Influent
Collection Date: 10/6/2010 12:18:00 PM
Date Received: 10/7/2010
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: MMS
2-Hexanone	ND	10		µg/L	1	10/11/2010 7:09:39 PM
Isopropylbenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	10/11/2010 7:09:39 PM
Methylene Chloride	ND	3.0		µg/L	1	10/11/2010 7:09:39 PM
n-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
n-Propylbenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
sec-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Styrene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
tert-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/11/2010 7:09:39 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
trans-1,2-DCE	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	10/11/2010 7:09:39 PM
Vinyl chloride	ND	1.0		µg/L	1	10/11/2010 7:09:39 PM
Xylenes, Total	ND	1.5		µg/L	1	10/11/2010 7:09:39 PM
Surr: 1,2-Dichloroethane-d4	85.5	54.6-141		%REC	1	10/11/2010 7:09:39 PM
Surr: 4-Bromofluorobenzene	98.3	60.1-133		%REC	1	10/11/2010 7:09:39 PM
Surr: Dibromofluoromethane	107	78.5-130		%REC	1	10/11/2010 7:09:39 PM
Surr: Toluene-d8	97.7	79.5-126		%REC	1	10/11/2010 7:09:39 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

Date: 13-Oct-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1010364
Project: GBR
Lab ID: 1010364-03

Client Sample ID: Trip Blank
Collection Date:
Date Received: 10/7/2010
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: MMS
Benzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Toluene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Ethylbenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Naphthalene	ND	2.0		µg/L	1	10/11/2010 7:38:02 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	10/11/2010 7:38:02 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	10/11/2010 7:38:02 PM
Acetone	ND	10		µg/L	1	10/11/2010 7:38:02 PM
Bromobenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Bromodichloromethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Bromoform	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Bromomethane	ND	3.0		µg/L	1	10/11/2010 7:38:02 PM
2-Butanone	ND	10		µg/L	1	10/11/2010 7:38:02 PM
Carbon disulfide	ND	10		µg/L	1	10/11/2010 7:38:02 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Chlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Chloroethane	ND	2.0		µg/L	1	10/11/2010 7:38:02 PM
Chloroform	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Chloromethane	ND	3.0		µg/L	1	10/11/2010 7:38:02 PM
2-Chlorotoluene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
4-Chlorotoluene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
cis-1,2-DCE	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	10/11/2010 7:38:02 PM
Dibromochloromethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Dibromomethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	10/11/2010 7:38:02 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 5 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 13-Oct-10

CLIENT: Western Refining Southwest, Inc.
Lab Order: 1010364
Project: GBR
Lab ID: 1010364-03

Client Sample ID: Trip Blank
Collection Date:
Date Received: 10/7/2010
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: MMS
2-Hexanone	ND	10		µg/L	1	10/11/2010 7:38:02 PM
Isopropylbenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	10/11/2010 7:38:02 PM
Methylene Chloride	ND	3.0		µg/L	1	10/11/2010 7:38:02 PM
n-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
n-Propylbenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
sec-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Styrene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
tert-Butylbenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/11/2010 7:38:02 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
trans-1,2-DCE	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	10/11/2010 7:38:02 PM
Vinyl chloride	ND	1.0		µg/L	1	10/11/2010 7:38:02 PM
Xylenes, Total	ND	1.5		µg/L	1	10/11/2010 7:38:02 PM
Surr: 1,2-Dichloroethane-d4	101	54.6-141		%REC	1	10/11/2010 7:38:02 PM
Surr: 4-Bromofluorobenzene	94.2	60.1-133		%REC	1	10/11/2010 7:38:02 PM
Surr: Dibromofluoromethane	121	78.5-130		%REC	1	10/11/2010 7:38:02 PM
Surr: Toluene-d8	98.6	79.5-126		%REC	1	10/11/2010 7:38:02 PM

Qualifiers:

* Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 NC Non-Chlorinated
 PQL Practical Quantitation Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

Page 6 of 6

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 1010364

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R41488 Analysis Date: 10/11/2010 9:17:47 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	3.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	3.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 1010364

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
---------	--------	-------	-----	--------	---------	------	----------	-----------	------	----------	------

Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R41488 Analysis Date: 10/11/2010 9:17:47 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng lcs

LCS

Batch ID: R41488 Analysis Date: 10/11/2010 10:29:54 AM

Benzene	20.15	µg/L	1.0	20	0	101	82.4	116
Toluene	21.22	µg/L	1.0	20	0	106	89.5	123
Chlorobenzene	20.97	µg/L	1.0	20	0	105	87.8	120
1,1-Dichloroethene	21.06	µg/L	1.0	20	0	105	90.3	138
Trichloroethene (TCE)	18.19	µg/L	1.0	20	0	91.0	64	129

Sample ID: 100ng lcs-2

LCSD

Batch ID: R41488 Analysis Date: 10/11/2010 5:44:43 PM

Benzene	17.86	µg/L	1.0	20	0	89.3	82.4	116	12.0	11	R
Toluene	19.65	µg/L	1.0	20	0	98.2	89.5	123	7.70	12.2	
Chlorobenzene	20.46	µg/L	1.0	20	0	102	87.8	120	2.43	12	
1,1-Dichloroethene	18.17	µg/L	1.0	20	0	90.9	90.3	138	14.7	19.3	
Trichloroethene (TCE)	16.71	µg/L	1.0	20	0	83.6	64	129	8.47	15.5	

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name WESTERN REFINING SOUT

Date Received:

10/7/2010

Work Order Number 1010364

Received by: MLW

AS

Checklist completed by:

Signature

Date

Sample ID labels checked by:

Initials

Matrix:

Carrier name Courier

Shipping container/cooler in good condition?

Yes ☒No ☐Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☒No ☐Not Present ☐Not Shipped ☐

Custody seals intact on sample bottles?

Yes ☐No ☐N/A ☒

Chain of custody present?

Yes ☒No ☐

Chain of custody signed when relinquished and received?

Yes ☒No ☐

Chain of custody agrees with sample labels?

Yes ☒No ☐

Samples in proper container/bottle?

Yes ☒No ☐

Sample containers intact?

Yes ☒No ☐

Sufficient sample volume for indicated test?

Yes ☒No ☐

All samples received within holding time?

Yes ☒No ☐

Water - VOA vials have zero headspace?

No VOA vials submitted ☐Yes ☒No ☐

Water - Preservation labels on bottle and cap match?

Yes ☒No ☐N/A ☐

Water - pH acceptable upon receipt?

Yes ☒No ☐N/A ☐Number of preserved
bottles checked for
pH:<2 >12 unless noted
below.

Container/Temp Blank temperature?

1.5°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted

Date contacted:

Person contacted

Contacted by:

Regarding:

Comments:

WESTERN REFINING MAKE TEMP BLANK

Corrective Action

Document Name	Date	Author	One-Sentence Summary
GBR 1987 Soil and GW Investigation Report.pdf	Jun-87	Geoscience Consultants, Ltd.	Soil and groundwater investigation and remedial action plan for the Giant Industries Bloomfield Refinery documenting contamination, hydrogeology, and proposed cleanup measures.
GBR 1988 Discharge Permit.pdf	1988	Geoscience Consultants, LTD.	Discharge permit application governing wastewater and discharge-related regulatory requirements associated with the GBR site.
GBR 1991 Annual Report.pdf	1991	Giant Refining Company	Annual report summarizing operations, environmental activities, and site-related status during 1991, including quarterly analytical results, potentiometric surface maps, total volume history, and specific conductance tracking.
GBR 1992 Monitoring Reports.pdf	1992	Giant Refining Company	Environmental monitoring report documenting groundwater, remediation, and site monitoring activities conducted during 1992.
GBR 1993 Monitoring Reports.pdf	1993	Giant Refining Company	Environmental monitoring report summarizing groundwater conditions, recovery system performance, and compliance monitoring activities during 1993.
GBR 1994 Soil Sampling and Analysis at Giant Industries Arizona, Inc.'s Former Firewater Storage Pond, San Juan County, New Mexico.pdf	1994	Burlington Environmental & Giant Industries, Inc.	Environmental monitoring report presenting results of ongoing groundwater monitoring and remedial system evaluation for 1994.
GBR 1995-1997 Annual Reports.pdf	1995-1997	Giant Refining Company	Annual reports covering refinery operations, environmental activities, remediation progress, and site status during 1995-1997.
GBR 1998-2001 Annual Reports.pdf	1998-2001	Giant Refining Company	Annual reports documenting refinery operations, environmental compliance, and remediation activities during 1998-2001.
GBR 1998-2001 Monitoring Reports.pdf	1998-2001	Giant Refining Company	Environmental monitoring reports summarizing groundwater monitoring results, remediation system performance, and site monitoring activities during 1998-2001.
GBR 2005 Annual Report 2005_final	2005	Giant Refining Company	Annual remediation and monitoring report for the former Giant Bloomfield Refinery summarizing groundwater sampling, groundwater elevations, product recovery, treatment system performance, and environmental compliance activities during 2005. [GBR 2005 A...2005_final Word]
GBR 2005 Discharge Plan Application 1005 (2)[1]	2005	Giant Refining Company (assumed from related site documents)	Discharge plan application associated with groundwater remediation and regulatory discharge management for the Giant Bloomfield Refinery site. [GBR 2005 D...005 (2)[1] PDF], [GBR 2005 A...2005_final Word]
GBR 2006 Annual Report 2006	2006	Giant Refining Company	Annual remediation and monitoring report documenting groundwater sampling, hydraulic control and recovery operations, treatment system performance, and environmental monitoring activities conducted during 2006 at the former Giant Bloomfield Refinery.
GBR 2007 Annual Report 2007_Refinery	2007	Lodestar Services, Incorporated	Annual groundwater remediation and monitoring report for the former Giant Bloomfield Refinery documenting groundwater sampling, recovery system operations, product recovery, water level monitoring, and environmental compliance activities conducted during 2007. [GBR 2007 A...7_Refinery PDF]
GBR 2007 Discharge permit	2007	Lodestar Services, Incorporated	Discharge permit document governing groundwater remediation system operations, treated water discharge, and regulatory compliance requirements for the former Giant Bloomfield Refinery site. [GBR 2007 D...rge permit PDF]
GBR 2008 Annual Report 2008_Refinery_Revised2	March 2009 (reporting 2008 activities)	Lodestar Services, Incorporated	Comprehensive annual report summarizing 2008 groundwater remediation activities, system evaluation, groundwater quality and hydrogeologic conditions, contaminant distribution, product recovery, and recommendations for future remediation and site closure efforts at the former Giant Bloomfield Refinery. [GBR 2008 A...y_Revised2 PDF]
GBR 2009 Annual Report DRAFT_2	March 2010 (reporting 2009 activities)	LT Environmental, Inc.	Annual report summarizing 2009 groundwater remediation activities, groundwater and product monitoring, analytical sampling results, recovery system performance, hydraulic control effectiveness, and recommendations for continued remediation at the former Giant Bloomfield Refinery. [GBR 2009 A...t DRAFT_2 PDF]
GBR 2010 annual report revised	April 2011 (reporting 2010 activities)	LT Environmental, Inc.	Annual remediation and monitoring report documenting groundwater recovery system operations, phase separated hydrocarbon recovery, groundwater monitoring, analytical sampling results, and evaluation of hydraulic containment and contaminant conditions during 2010. [GBR 2010 a...rt revised PDF]
GBR 2011 Annual Report	March 2012 (reporting 2011 activities)	LT Environmental, Inc.	Annual remediation and monitoring report describing groundwater recovery and treatment operations, increased phase separated hydrocarbon recovery efforts, groundwater quality monitoring, analytical results, system performance, and recommendations for continued management during 2011. [GBR 2011 A...ual Report PDF]
GBR 2012 Annual Report	March 2013 (reporting 2012 activities)	LT Environmental, Inc.	Annual groundwater remediation and monitoring report documenting recovery well operations, groundwater treatment, phase-separated hydrocarbon recovery, groundwater quality monitoring, and environmental compliance activities conducted during 2012 at the former Giant Bloomfield Refinery. [GBR 2012 A...ual Report PDF]
GBR 2012 Discharge Permit	11-Jan-12	New Mexico Oil Conservation Division (issued to Western Refining Southwest, Inc.)	Discharge Permit GW-040 governing groundwater remediation, monitoring, treatment, discharge, reporting, and regulatory compliance requirements for the former Bloomfield Refinery groundwater abatement program. [GBR 2012 D...rge Permit PDF]
GBR 2013 ANNUAL REPORT	March 2014 (reporting 2013 activities)	LT Environmental, Inc.	Annual groundwater remediation and monitoring report summarizing groundwater recovery and treatment, phase-separated hydrocarbon recovery, groundwater quality results, system performance, and recommendations for continued remediation during 2013 at the former Giant Bloomfield Refinery. [GBR 2013 A...UAL REPORT PDF]
GBR 2014 ANNUAL REPORT	March 2015 (reporting 2014 activities)	LT Environmental, Inc.	Annual groundwater remediation and monitoring report summarizing operation of the recovery system, groundwater quality monitoring, PSH recovery, treatment system performance, and environmental compliance activities conducted during 2014 at the former Giant Bloomfield Refinery. [GBR 2014 A...UAL REPORT PDF]
GBR 2015 ANNUAL REPORT	March 2016 (reporting 2015 activities)	LT Environmental, Inc.	Annual report documenting groundwater remediation system operations, compliance monitoring, enhanced groundwater assessment, shutdown of the recovery system, evaluation of static groundwater conditions, and conclusions regarding the effectiveness of long-term remediation activities at the former Giant Bloomfield Refinery for 2015. [GBR 2015 A...UAL REPORT Word]
GBR 2016 ANNUAL REPORT	March 2017 (reporting 2016 activities)	LT Environmental, Inc.	Annual report summarizing groundwater monitoring under static conditions following remediation system shutdown, evaluation of residual hydrocarbon impacts, compliance sampling, groundwater quality trends, and confirmation that long-term equilibrium conditions persisted at the former Giant Bloomfield Refinery for 2016.
GBR 2017 Annual Report	February 2018 (reporting 2017 activities)	LT Environmental, Inc.	Annual groundwater monitoring and compliance report documenting continued monitoring under static conditions following shutdown of the groundwater recovery system, annual compliance sampling, monthly groundwater monitoring, and abandonment of SHS-1 through SHS-5 monitoring wells at the former Giant Bloomfield Refinery in 2017. [GBR 2017 A...ual Report PDF]
GBR 2018 ANNUAL REPORT	December 2018 (reporting 2018 activities)	LT Environmental, Inc.	Annual groundwater monitoring report summarizing semi-annual groundwater elevation monitoring, annual compliance sampling, SHS well closure investigations, groundwater quality evaluation, and confirmation of stable post-remediation groundwater conditions at the former Giant Bloomfield Refinery in 2018. [GBR 2018 A...UAL REPORT PDF]
GBR 2019 ANNUAL REPORT-ALL-NO LAB REPORTS	February 2020 (reporting 2019 activities)	LT Environmental, Inc.	Annual 2019 groundwater monitoring and remediation closure report documenting compliance sampling, groundwater quality assessment, plugging and abandonment of SHS-area wells and GBR-51, removal of remediation infrastructure, and continued confirmation that residual hydrocarbon impacts remain stable under equilibrium conditions. [GBR 2019 A...AB REPORTS PDF]
GBR 2019 Discharge Permit Correspondence	26-Feb-19	Carl J. Chavez, New Mexico Oil Conservation Division (NMOCD)	NMOCD memorandum documenting a meeting regarding the GW-040 partial remediation system closure request, discharge permit status, future regulatory pathway, and required follow-up actions for transition from active remediation to long-term site management. [GBR 2019 D...espondence PDF]
GBR 2019 NMOCD approval for partial system closure	2019	Carl J. Chavez, New Mexico Oil Conservation Division (NMOCD)	Regulatory approval document authorizing partial closure of the GW-040 remediation system, including removal of selected remediation infrastructure and abandonment of designated monitoring wells while retaining key monitoring locations for continued groundwater oversight. [GBR 2019 N...em closure PDF]
GBR 2019 NMOCD GW-040 Correspondence letter for partial system closure	22-Mar-19	LT Environmental, Inc.	Technical correspondence responding to NMOCD comments on the partial remediation system closure request, presenting groundwater background threshold analyses, proposing retention of selected monitoring wells, and outlining closure and abandonment plans for the SHS monitoring network. [GBR 2019 N...em closure PDF]
GBR 2020 Stage 1_2020-03-27_GW-040_Stage 1 Abatement Plan-ALL	27-Mar-20	LT Environmental, Inc.	Stage 1 Abatement Plan summarizing the former refinery's environmental history, remediation system performance, groundwater monitoring results, background groundwater evaluation, and proposed site-wide groundwater assessment and well abandonment activities to support development of a Stage 2 Abatement Plan. [GBR 2020 S...t Plan-ALL PDF]

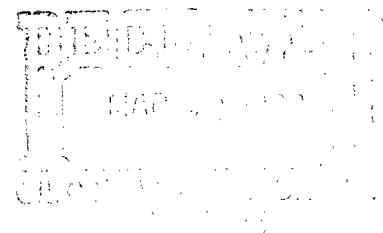
GBR 2020 Proof of Public Notice Discharge Permit GW-40	16-Jul-20	LT Environmental, Inc.	Proof of public notice for the approved discharge permit for the Giant Bloomfield Refinery site, Permit GW-40.
GBR 2021 Stage 2_DP GW-40_GBR_Stage 2 Abatement Plan-Final-ALL	18-May-21	WSP USA Inc.	Comprehensive Stage 2 Abatement Plan evaluating current groundwater conditions, identifying site-specific contaminants of concern, establishing background groundwater thresholds and closure standards, delineating residual impacts, and recommending continued monitoring, PSH recovery, soil investigation, and targeted well abandonment activities for long-term site closure. [GBR 2021 S...Final-ALL PDF]
GBR 2021 Annual Report_GW-40_Giant Bloomfield Refinery - 2021 Annual Report-ALL	March 8, 2022 (reporting 2021 activities)	WSP USA Inc.	Annual groundwater monitoring report summarizing 2021 groundwater gauging, phase-separated hydrocarbon monitoring, split-sampling investigations with the Bureau of Land Management, groundwater analytical results, and continued interim compliance activities pending NMOCD approval of the Stage 2 Abatement Plan. [GBR 2021 A...Report-ALL PDF]
NMOCD 2023-10-3 Approval Action ID 228042	3-Oct-23	Leigh Barr, New Mexico Oil Conservation Division (OCD)	OCD approval notification confirming approval of a discharge permit application (Application ID 228042) for Facility ID IFRM0000000001 associated with the Former Giant Bloomfield Refinery site. [NMOCD 2023...ID 228042 PDF]
NMOCD 2023-10-13 Former Giant Bloomfield Refinery GW#40_Stage 2 AP	13-Oct-23	Mike Buchanan, New Mexico Oil Conservation Division (OCD)	Regulatory correspondence notifying Western Refining Southwest LLC that the Stage 2 Abatement Plan for Discharge Permit GW-40 was administratively incomplete and identifying additional public notice, monitoring data, site mapping, and reporting requirements necessary for approval. [NMOCD 2023...Stage 2 AP PDF]
GBR 2023-11-13 NMOCD S2AP_Former Giant Bloomfield Refinery_Determination.11.13.23	13-Nov-23	Rosa Romero, New Mexico Oil Conservation Division (NMOCD)	Regulatory determination letter approving the modified Stage 2 Abatement Plan for the Former Giant Bloomfield Refinery and confirming compliance with the requirements of Discharge Permit GW-040 and applicable New Mexico regulations. [GBR 2023 N...n.11.13.23 PDF]
GBR 2023 Annual Report_GW-40_Former Giant Bloomfield Refinery - 2023 Annual Report_FINAL_all	May 31, 2024 (reporting 2023 activities)	Ensolum, LLC	Annual groundwater monitoring report documenting 2023 groundwater gauging, groundwater flow evaluation, Bureau of Land Management split-sampling events, analytical results from upgradient monitoring wells, and continued compliance monitoring pending implementation of the approved Stage 2 Abatement Plan. [GBR 2023 A...FINAL_all PDF]
NMOCD 2024-07-25 Approval Action ID 349779	25-Jul-24	Joel Stone, New Mexico Oil Conservation Division (OCD)	OCD notification confirming approval of a discharge permit application (Application ID 349779) for Facility ID IFRM0000000001 associated with the Former Giant Bloomfield Refinery site, with no additional approval conditions specified. [NMOCD 2024...ID 349779 PDF]
GBR 2024 Annual Report_GW-40_Former Giant Bloomfield Refinery - 2024 Annual Report_FINAL_All	June 13, 2025 (reporting 2024 activities)	Ensolum, LLC	Comprehensive annual report summarizing implementation of the approved Stage 2 Abatement Plan, including vadose-zone investigation drilling, installation of new monitoring wells, abandonment and replacement of selected wells, quarterly groundwater monitoring, PSH evaluation, contaminant trend assessment, and recommendations for continued remediation and monitoring activities. [GBR 2024 A...FINAL_All PDF]
NMOCD 2025-06-18 Approval Action ID 474083	18-Jun-25	Joel Stone, New Mexico Oil Conservation Division (OCD)	OCD notification confirming approval of a discharge permit application (Application ID 474083) for Facility ID IFRM0000000001 associated with the Former Giant Bloomfield Refinery site, with no additional approval conditions specified. [NMOCD 2025...ID 474083 PDF]
GBR 2025 Annual Report_Annual Report_Former Giant Bloomfield Refinery - 2025 Annual Report_Final	June 12, 2026 (reporting 2025 activities)	Ensolum, LLC	Semi-annual groundwater monitoring report documenting 2025 groundwater elevations, groundwater flow evaluation, contaminant monitoring, phase-separated hydrocarbon (PSH) assessment and recovery activities, and confirmation that groundwater conditions remain generally stable with localized residual impacts primarily associated with manganese and PSH at well GBR-55. [GBR 2025 A...port_Final PDF]

GW - 40

GENERAL CORRESPONDENCE

YEAR(S):

1988



**DISCHARGE PLAN APPLICATION
FOR
GIANT BLOOMFIELD REFINERY
BLOOMFIELD, NM**

March 1, 1988

Prepared for:

MONTGOMERY & ANDREWS, P.A.
*325 Paseo de Peralta
P.O. Box 2307
Santa Fe, NM 87504-2307*

For Submission to:

*Environmental Bureau
NM Oil Conservation Division
Santa Fe, NM 87105*

Prepared by:

GEOSCIENCE CONSULTANTS, LTD.

HEADQUARTERS
*500 Copper Avenue, NW
Suite 200
Albuquerque, New Mexico 87102
(505) 842-0001
FAX (505) 842-0595*

MONTGOMERY & ANDREWS
PROFESSIONAL ASSOCIATION
ATTORNEYS AND COUNSELORS AT LAW

OF COUNSEL
William R. Federici

J. O. Seth (1883-1963)
A. K. Montgomery (1903-1987)
Frank Andrews (1914-1981)

March 1, 1988

SANTA FE OFFICE
325 Paseo de Peralta
Post Office Box 2307
Santa Fe, New Mexico 87504-2307

Telephone (505) 982-3873
Telecopy (505) 982-4289

ALBUQUERQUE OFFICE
Suite 500
7 Broadway Place
707 Broadway, N.E.
Post Office Box 26927
Albuquerque, New Mexico 87125-6927

Telephone (505) 242-9677

LOS ALAMOS OFFICE
Suite 120
901 18th Street
Los Alamos, New Mexico 87544

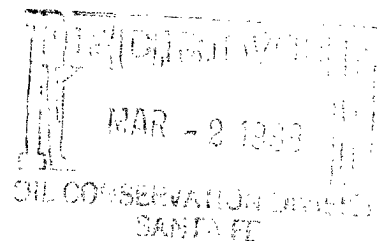
Telephone (505) 662-0005

REPLY TO SANTA FE OFFICE

Seth D. Montgomery	Katherine W. Hall
Victor R. Ortega	Edmund H. Kendrick
Jeffrey R. Brannen	Helen C. Sturm
John B. Pound	Richard L. Puglisi
Gary R. Kilpatrick	Arturo Rodriguez
Thomas W. Olson	Joan M. Waters
William C. Madison	James C. Murphy
Walter J. Melendres	James R. Jurgens
Bruce Herr	Ann M. Maloney
Robert P. Worcester	Deborah J. Van Vleck
James C. Compton	Anne B. Hemenway
John B. Draper	Roger L. Prucino
Nancy Anderson King	Deborah S. Dungan
Alison K. Schuler	Helen L. Stirling
Janet McL. McKay	Rosalise Olson
Jean-Nikole Wells	William P. Slattery
Joseph E. Earnest	Kenneth B. Baca
Stephen S. Hamilton	Daniel E. Gershon
W. Perry Pearce	Anne B. Tallmadge
Brad V. Coryell	Michael R. Roybal
Michael H. Harbour	Robert A. Bassett
Robert J. Mroz	Paula G. Maynes
Sarah M. Singleton	Neils L. Thompson
Jay R. Hone	Susan Andrews
Charles W. N. Thompson, Jr.	Joseph E. Whitley
John M. Hickey	David L. Skinner
Mack E. With	Elizabeth A. Glenn
Galen M. Buller	

FEDERAL EXPRESS

Mr. William J. LeMay
Director
Oil Conservation Division
State Land Office
310 Old Santa Fe Trail
Santa Fe, New Mexico 87501



Re: Discharge Plan Application (GW-40)
Giant Industries, Inc./Bloomfield Refinery

Dear Mr. LeMay:

On behalf of our client, Giant Industries, Inc., I am enclosing the discharge plan application for Giant's Bloomfield Refinery, prepared for us by Geoscience Consultants, Ltd. The application consists of one volume of text, two volumes of appendices and one volume of plates. After you have had an opportunity to review the application, we would be pleased to discuss it with you and with members of your staff.

Very truly yours,

Edmund H. Kendrick

EHK/gr:14
Enclosures

File #8361-85-09

✓ cc: Mr. David Boyer (w/3 sets of encls.)

DISCHARGE PLAN APPLICATION
FOR
GIANT BLOOMFIELD REFINERY
BLOOMFIELD, NM

SUBMITTED BY:

Randall T. Hod
GCL Program Manager

DATE:

2/25/88

Randall T. Hod for CLAUDE SCHLEYER
GCL Project Director

2/25/88

AFFIRMATION

I hereby certify that I am familiar with the information contained in and submitted with this application and that such information is true, accurate and complete to the best of my knowledge and belief.

Randall T. Hicks
Randall T. Hicks



2/25/88
(Date)

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1.0 EXECUTIVE SUMMARY

Giant Industries, Inc. (Giant), P.O. Box 256, Farmington, New Mexico, 87499, proposes to discharge approximately 81 acre feet per year of treated water to infiltration trenches and land application sites on the Giant Bloomfield Refinery property. The water is derived from wells which are part of a remedial action at the site. The water will meet WQCC limits after 25 to 30 days of tank storage and, if required, subsequent air stripping. Other discharges at the site are associated with domestic sewage from the offices and maintenance shops and are exempt from Water Quality Control Commission (WQCC) Discharge Plan Requirements (WQCC Regulation 3-105B).

The refinery is located in the NW $\frac{1}{4}$, Section 27, and SW $\frac{1}{4}$, Section 22, Township 29 N, Range 12 W, San Juan County, near Bloomfield, New Mexico. The ground water most likely affected by this discharge is at a depth of approximately 25 feet and has a Total Dissolved Solids content of about 5000 mg/l.

Giant proposes to adopt wastewater management and operation systems to provide environmental protection. These include:

- 1) Treatment of pumped water through tank storage and, if necessary, a packed-tower air stripper, prior to discharge.
- 2) Use of infiltration trenches for disposal of water which meets WQCC ground water limits.
- 3) Use of sprinklers, as necessary, for disposal of water which will meet WQCC ground water limits.
- 4) Land application of water which will meet WQCC ground water limits to enhance in-situ treatment of soil.
- 5) Thorough monitoring of the remedial action system and site operations to minimize the potential for spills and leaks associated with site activities.
- 6) Thorough ground-water monitoring to determine the impact of the remedial action discharges.
- 7) Reporting results of monitoring to NMOCD.

Giant is committed to carrying out sound disposal practices and to this end submits this application. Likewise, Giant is committed to cooperating fully with NMOCD in connection with obtaining NMOCD approval of a discharge plan.

2.0 GENERAL INFORMATION

2.1 NAME OF DISCHARGER/LEGALLY RESPONSIBLE PARTY

All correspondence regarding this discharge plan should be sent to the address below:

Robert L. McClenahan, Jr.
Environmental Coordinator
Giant Refining Company
Route 3, Box 7
Gallup, NM 87301
(505) 722-3833

Giant requests that copies of correspondence also be sent to:

Kim H. Bullerdick, Esquire
Giant Industries, Inc.
7227 North 16th Street
Building A
Phoenix, Arizona 85020
(602) 274-3584

Randall T. Hicks
Senior Vice President,
Geoscience Consultants, Ltd.
500 Copper Avenue, NW
Albuquerque, NM 87102
(505) 842-0001

2.2 LOCATION OF DISCHARGE

The Giant Bloomfield Refinery (GBR) is located along hydrologic flow lines extending between the Lee Acres Landfill to the north and the Lee Acres Subdivision to the south. The precise location of the refinery is NW $\frac{1}{4}$, Section 27, and SW $\frac{1}{4}$, Section 22, T.29 N., R.12 W. in San Juan County, New Mexico, approximately 5 miles west of the town of Bloomfield.

Figure 2-1 shows the location of the refinery and illustrates a one mile area around the Giant Bloomfield Refinery. All wells within one mile of the refinery are listed in Table 2-1. Figure 2-2 explains the township and range system of numbering wells in New Mexico. A large scale topographic map detailing the refinery site, on-site wells, etc. is shown in Plate 1.

2.3 LOCAL LAND USE

The Giant Bloomfield Refinery is bounded on the north and west by Federal and State lands. This includes Federal lands in Sections 21

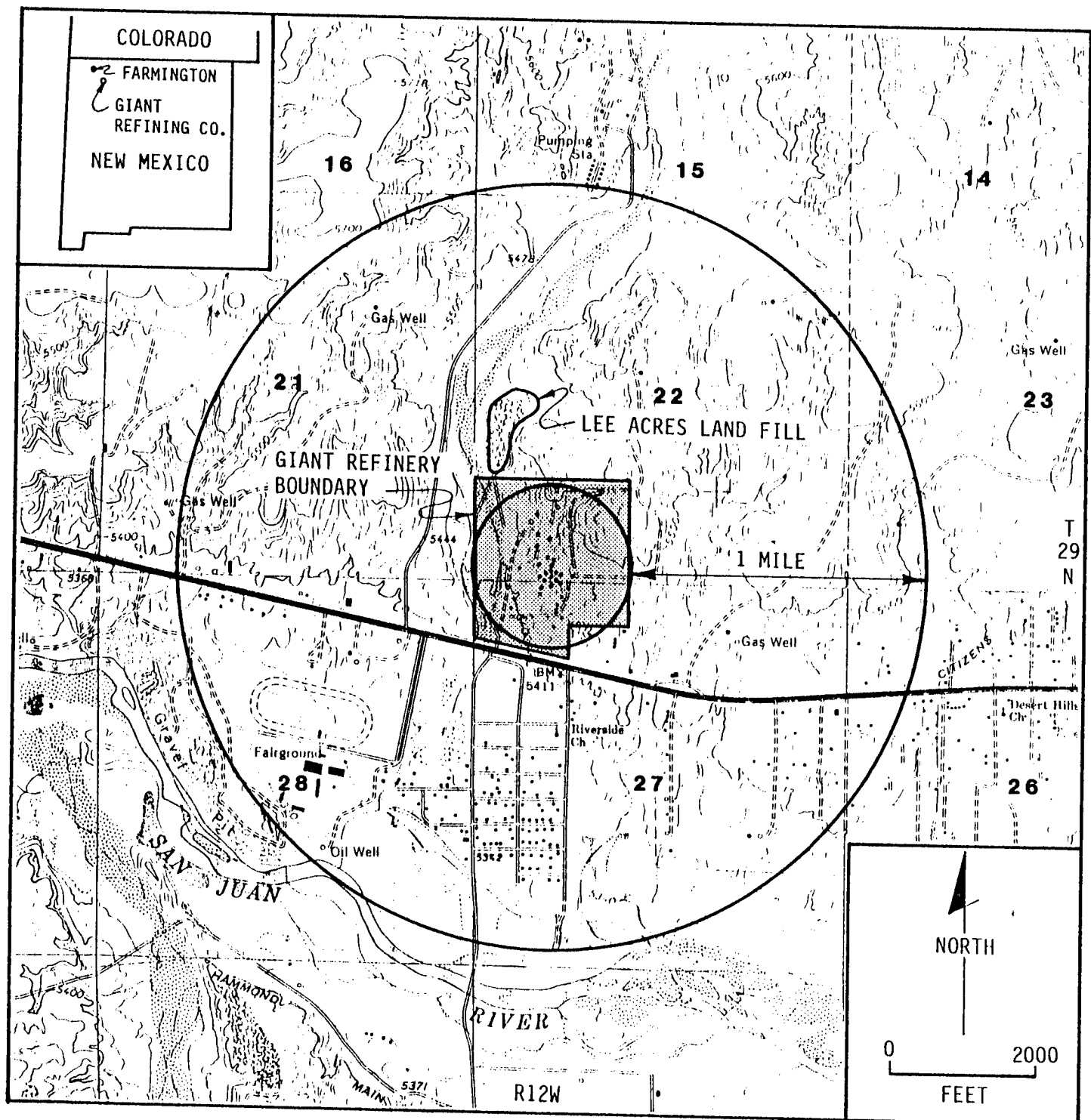


FIGURE 2-1

ONE MILE RADIUS, GIANT BLOOMFIELD REFINERY

SOURCE: USGS QUADRANGLE MAP-HORN CANYON, NM (7.5 MINUTE SERIES)

TABLE 2-1

ALL WELLS WITHIN A 1 MILE RADIUS OF THE
GIANT BLOOMFIELD REFINERY
(FEBRUARY 1988)

<u>WELL LOCATION</u>	<u>DEPTH (ft)</u>	<u>DATA SOURCE</u>
29.12.14.11	180	State Engineers Office
29.12.15.143	155	State Engineers Office
29.12.20.333	28	State Engineers Office
29.12.21.4222A	55	U.S. Geological Survey
29.12.21.4222B	46.5	U.S. Geological Survey
29.12.21.4244A	42.5	U.S. Geological Survey
29.12.21.4422	43.5	U.S. Geological Survey
29.12.21.4444	57	U.S. Geological Survey
29.12.22.1321	61.5	U.S. Geological Survey
29.12.22.1331	52.5	U.S. Geological Survey
29.12.26.21	47	State Engineers Office
29.12.26.211	100	State Engineers Office
29.12.26.24	38	State Engineers Office
29.12.26.34	47	State Engineers Office
29.12.26.42	70	State Engineers Office
29.12.26.42	50	State Engineers Office
29.12.26.422	45	State Engineers Office
29.12.26.422	45	State Engineers Office
29.12.27.13	63	State Engineers Office
29.12.27.131	50	State Engineers Office
29.12.27.133	55	State Engineers Office
29.12.27.133	51	State Engineers Office
29.12.27.134	35	State Engineers Office
29.12.27.31	35	State Engineers Office
29.12.27.31	87	State Engineers Office
29.12.27.31	25	State Engineers Office
29.12.27.311	25	State Engineers Office
29.12.27.311	32	State Engineers Office
29.12.27.313	32	State Engineers Office
29.12.27.414	24	State Engineers Office
29.12.29.114	20	State Engineers Office
29.12.29.114	21	State Engineers Office
29.12.29.114	19	State Engineers Office
29.12.29.124	20	State Engineers Office
29.12.29.132	16	State Engineers Office
29.12.29.133	18	State Engineers Office
29.12.33.2411	850	N.M. Bureau of Mines
29.12.33.2	51	State Engineers Office
29.12.34.11	15	State Engineers Office
29.12.34.113	15	State Engineers Office
29.12.34.421	43	N.M. Bureau of Mines
29.12.34.4341	100	N.M. Bureau of Mines
29.12.35.342	20	N.M. Bureau of Mines

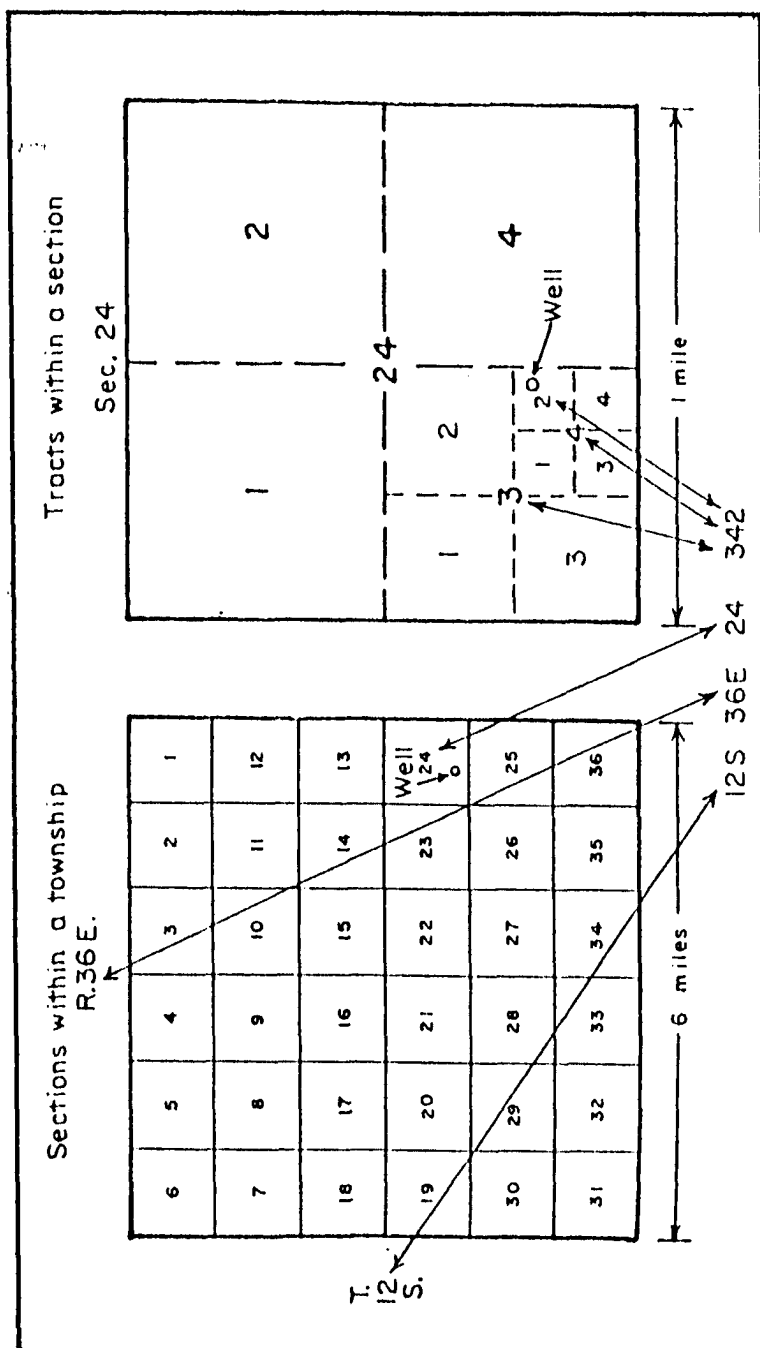


FIGURE 2-2

TOWNSHIP AND RANGE SYSTEM OF NUMBERING WELLS IN NEW MEXICO

and 22, T.29 N., R.12 W., and State lands in Sections 28 and 21, T.29 N., R.12 W. The southern perimeter of the refinery borders U.S. Highway 64. Privately-owned lands lie south of the highway in Sections 27 and 28, T.29 N., R.12 W. The refinery borders privately-owned lands on the east in Sections 22 and 27, T.29 N., R.12 W. Land ownership status is based upon data from the San Juan County Manager's office.

2.4 HISTORY OF OPERATION

This refinery is currently mothballed with respect to the refining of petroleum. The site was operated as a crude oil refinery from 1973 to 1982. The volume of crude refined at the site ranged from 2,000 bbls/day in the mid 1970's to 13,500 bbls/day in the early 1980's. The principal refined products produced were gasolines, diesel, kerosene, liquified petroleum gas (LPG), and fuel oil.

The site is currently used for several other activities by Giant. The Ciniza Pipe Line, Inc. Company office is located on the site. The Crude Oil Branch of Giant's Transportation Division runs its dispatching and truck maintenance operations from this location. These operations employ approximately 20 full-time personnel in addition to truck drivers and temporary laborers who are at the facility part-time.

The site is located downgradient from the Lee Acres Landfill. A remedial action is presently on-going at the refinery. The purpose of the remedial action is to contain and clean-up any contamination presently on Giant's property which has been caused by site operations.

2.5 REGULATORY INDEX

Table 2-2 presents the regulatory index. This table provides a guide to locating information that satisfies each of the requirements of the WQCC Regulations applicable to this discharge plan.

TABLE 2-2
REGULATORY INDEX

<u>WQCC REGULATION REQUIRED IN DISCHARGE PLAN</u>		<u>SECTION IN DISCHARGE PLAN</u>
1-201		1.0, 2.0
3-106	C.1	3.3
3-106	C.2	Plate 1, 2.2, 6.0
3-106	C.3	3.4
3-106	C.4	5.4
3-106	C.5	6.0
3-106	C.6	5.3
3-107		6.0

3.0 PROPOSED DISCHARGES

Giant proposes to discharge treated ground water as part of a remedial action at the site. The source of these discharges will be ground water recovered from the following four areas: the Diesel Spill, Truck Fueling and Southern Refinery areas and the firefighting drill area seep (see Plate 1). Figure 3-1 shows the conceptual design of the ground-water remedial action plan for these areas.

The remedial action will consist of pumping recovery wells, temporary storage of produced water in above-ground storage tanks, treatment by air-stripping, if necessary, and discharge to infiltration trenches and land application sites. Discharge to land application sites may be utilized to assist in the remediation of soil.

Six large tanks will be employed to store produced water from the entire remedial action:

Tank 23	210,000 gallon capacity
Tank 24	840,000 gallon capacity
Tank 27	210,000 gallon capacity
Tank 32	210,000 gallon capacity
Tank 34	210,000 gallon capacity
Tank 37	420,000 gallon capacity

Prior to discharge from a tank, the stored water will be sampled and chemically analyzed for dissolved hydrocarbon constituents using EPA methods 601/602. The results of the testing will determine the appropriate level of treatment required. If tank storage does not render the produced water acceptable for discharge, a packed tower air-stripper and/or sprinklers will be employed for final treatment of dissolved volatile hydrocarbon constituents to WQCC ground water limits.

3.1 SOURCES OF DISCHARGED WATER

3.1.1 Diesel Spill Area Ground Water Remedial Action

Three pumping wells (GBR-14, GBR-27, GBR-28) are utilized for remedial action in the Diesel Spill Area. They are designed to remove the floating product and associated dissolved phase plume in that area and

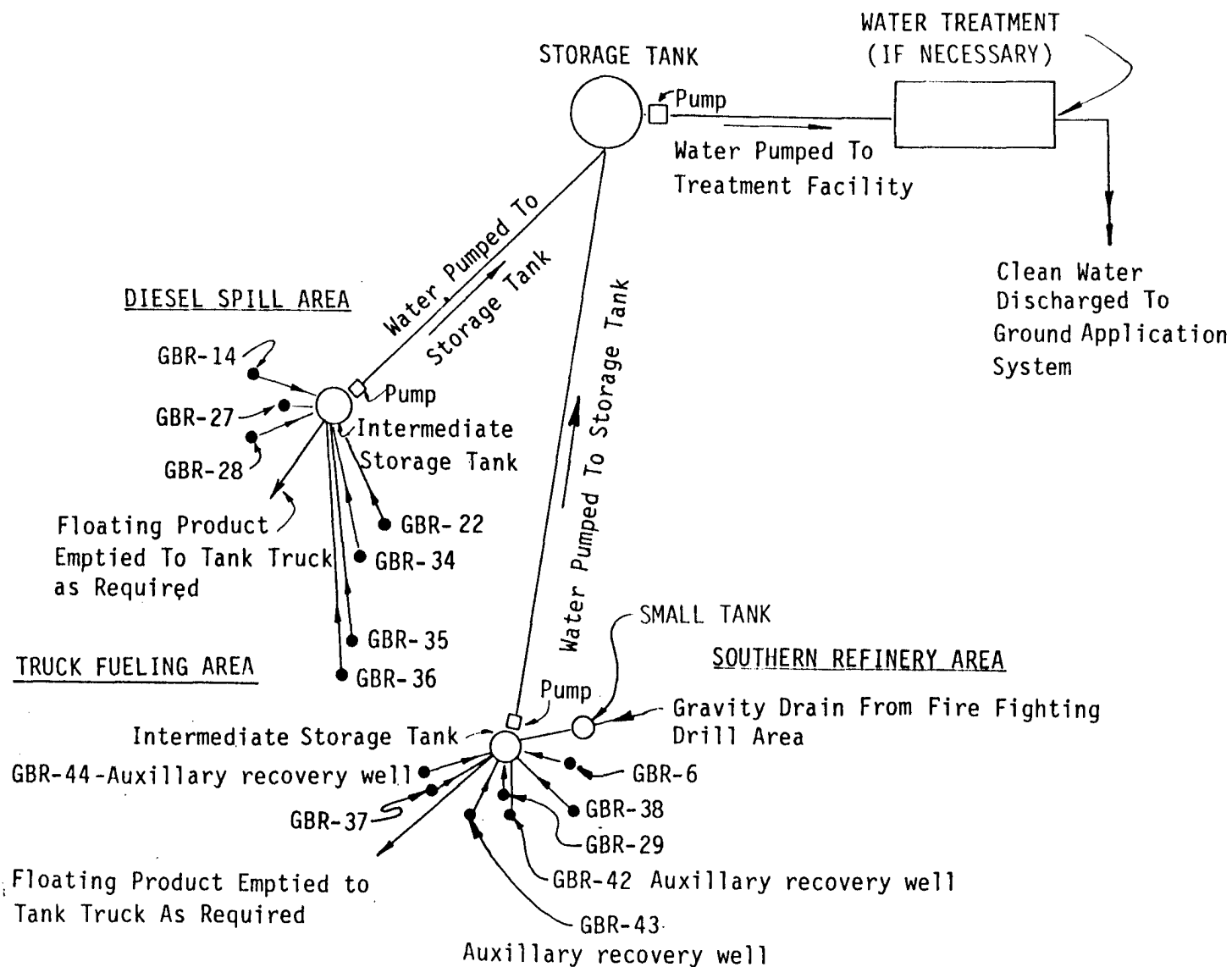


FIGURE 3-1

SCHEMATIC DIAGRAM OF GROUND WATER RECLAMATION SYSTEMFOR THE GIANT BLOOMFIELD REFINERY

any areas upgradient of their capture zone. Each well is equipped with an air-driven recovery pump as shown in Figure 3-2, and pumps about 1 gpm.

To assure long term, reliable operation, Giant has installed a large capacity air compressor and direct piping from the 21,000 gallon intermediate storage tank to long-term storage tanks, eliminating the necessity of truck transfer. It is expected that at least a year of pumping will be required in this area.

3.1.2 Southern Refinery Area Ground Water Remedial Action

A four-well pumping network (GBR-6, GBR-29, GBR-37 and GBR-38) has been installed to capture petroleum hydrocarbons which may have originated from the refinery site. Three additional wells (GBR-42, GBR-43, GBR-44) have been installed as auxiliary wells in the event that wells in the recovery system become inoperable. An air-operated recovery pump similar to those installed in the Diesel Spill Area is installed in GBR-6. Submersible pumps (Figure 3-3) are installed in the six other wells. GBR-6 is pumped routinely to remove floating product. The three recovery wells with submersible pumps yield approximately 30 gpm (total).

The system will operate as described unless monitoring data demonstrate that the system is inadequate or inefficient. Pumping will continue until it is determined that refinery-related contamination is below WQCC ground water limits.

3.1.3 Truck Fueling Area Ground Water Remedial Action

Air-operated recovery pumps, similar to those used in the Diesel Spill Area, are installed in wells GBR-22, GBR-34 and GBR-35. Each pump discharges into the intermediate storage tank in the Diesel Spill Area at a rate of about 1 gpm. A submersible recovery pump similar to those installed in the Southern Refinery Area has been installed in GBR-36 and will produce about 3-7 gpm. It is anticipated that pumping will continue in this area for about one year.

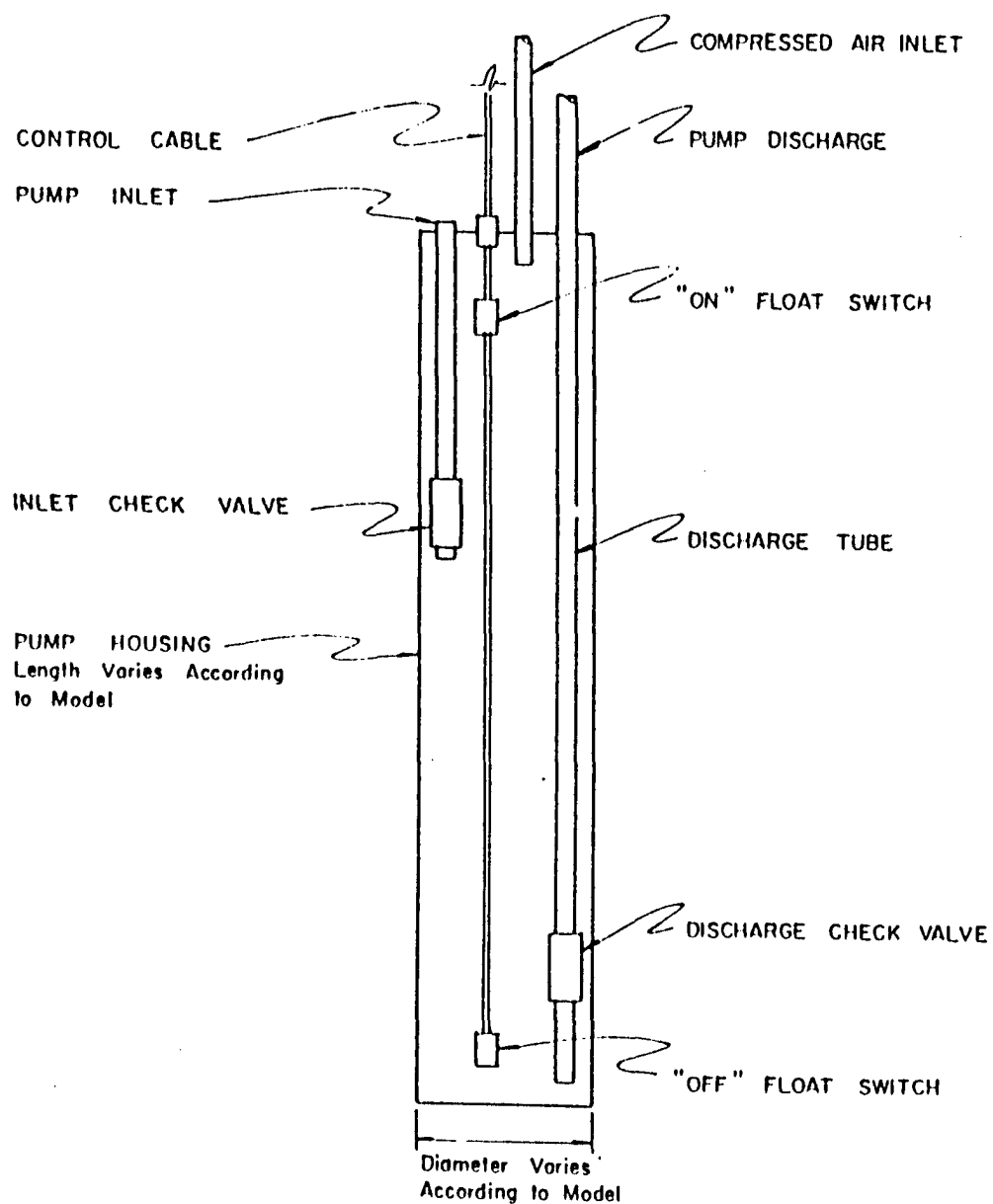


FIGURE 3-2
TYPICAL AIR DRIVEN HYDROCARBON RECOVERY PUMP

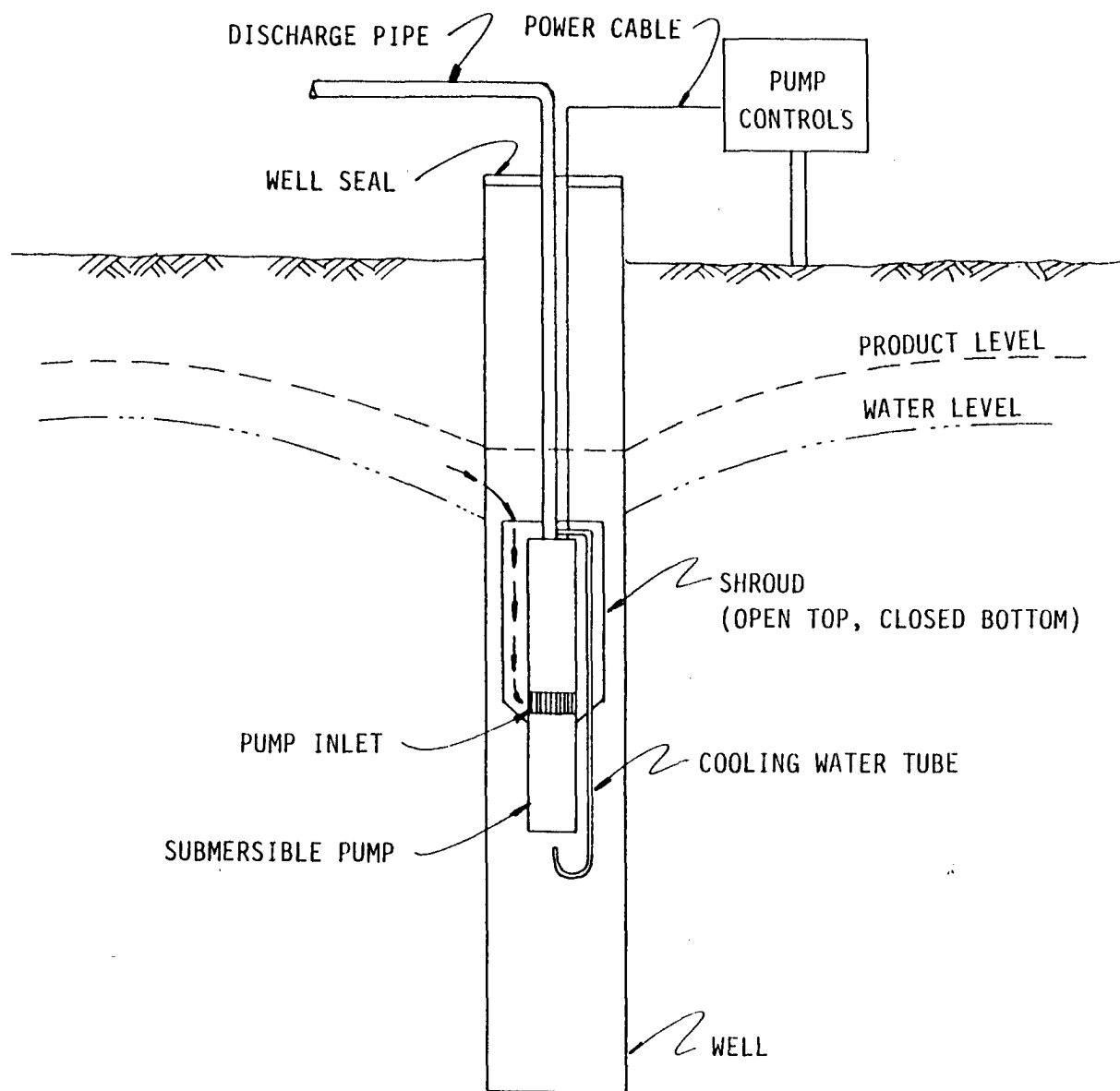


FIGURE 3-3

SUBMERSIBLE PUMP ADAPTED FOR FLOATING PRODUCT REMOVAL

3.1.4 Fire Fighting Drill Area Seep

Water from the fire fighting drill area seep in the Southern Refinery Area is currently being collected by a perforated PVC pipe laid in a gravel filled trench (Figure 3-4). The water is piped by gravity to a small intermediate storage tank that is periodically emptied by tank truck and transported for storage in above ground tanks.

3.1.5 Septic Tank Leach Fields

Discharge from three septic tanks at the refinery site is routed to three respective leach fields which were designed and built in compliance with NMEID specifications. Locations of the leach fields are shown on Plate 1. The domestic sewage discharged to the leach fields does not exceed 2000 gallons per day and is not commingled with the facility wastewater; therefore, the leach fields are not subject to WQCC Discharge Plan Requirements and are not discussed further.

3.2 TREATMENT OF WATER PRIOR TO DISCHARGE

3.2.1 Pumping and Storage

Most of the water pumped from the recovery systems contains dissolved hydrocarbon concentrations in the low ppm or ppb range. Samples taken from the Diesel Spill Area indicate that most dissolved petroleum hydrocarbons are removed by the action of pumping and discharging into the intermediate storage tank (Table 3-1). Samples of water from this tank are below WQCC limits and in most cases are below detectable limits.

Floating product and contaminated water from the recovery wells and water from the fire fighting drill area seep will be collected in intermediate storage tanks, one in the Southern Refinery Area near GBR-29 and the other near GBR-28 in the Diesel Spill Area. Floating product will be removed from these intermediate storage tanks, as it accumulates. The remaining water will be transferred to long-term storage tanks for testing and treatment as needed, or it will be directly routed to the air stripper after sampling indicates that dissolved hydrocarbon constituents

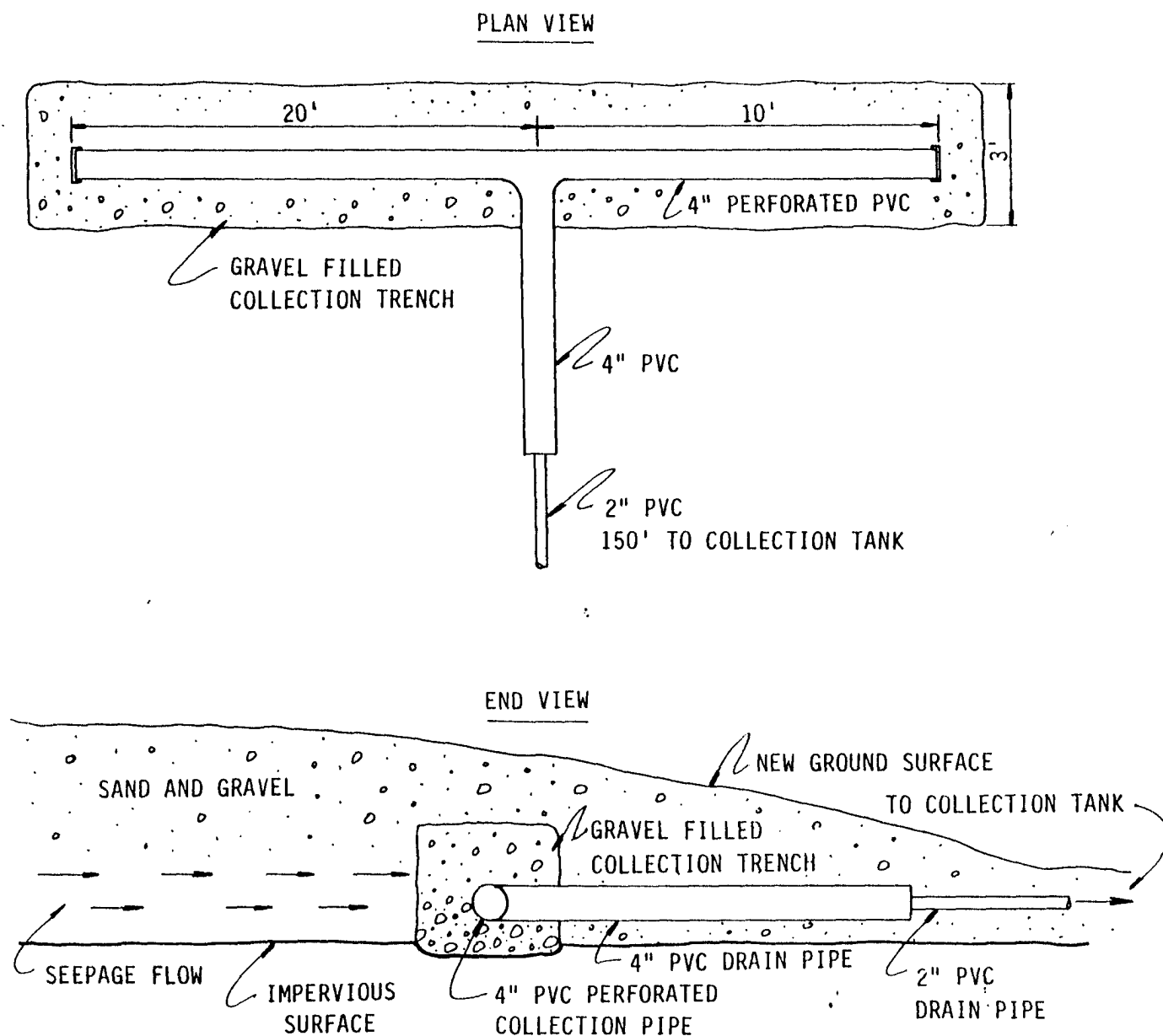


FIGURE 3-4
SEEPAGE COLLECTOR NEAR FIRE FIGHTING DRILL AREA
GIANT BLOOMFIELD REFINERY

TABLE 3-1
GIANT INDUSTRIES BLOOMFIELD REFINERY
SPRINKLER TEST RESULTS
BTX AND CHLORINATED HYDROCARBONS
(CONCENTRATIONS IN PPB)

	SPRINKLER TEST SAMPLES				SOURCE WELL SAMPLES				NOMINAL DETECTION LIMIT
	8611071410 PUMP HOSE IN STORAGE TANK	8611071400 BASE OF SPRINKLER	8611071420 DISCHARGE	8605052000 GBR-27 OCD	8605052000 GBR-27 GCL	8605291600 GBR-28 GCL	8607151900 GBR-28 GCL	861121113 GBR-14 OCD	
BENZENE	2	ND	7	410	50	2419	319	ND	1
CHLOROBENZENE	ND	ND	ND					ND	1
1,2-DICHLOROBENZENE	ND	ND	ND					ND	1
1,3-DICHLOROBENZENE	ND	ND	ND					ND	1
1,4-DICHLOROBENZENE	ND	ND	ND					ND	1
ETHYLBENZENE	ND	ND	ND					ND	1
TOLUENE	ND	ND	ND	120	74	819	143	ND	1
XYLENES	ND	ND	ND	506	457	4019	224	ND	1
ACROLEIN	ND	ND	ND					ND	1
ACRYLONITRILE	ND	ND	ND					ND	25
BROMOFORM	ND	ND	ND					ND	25
CCL4	ND	ND	ND					ND	5
CHLORODIBROMOMETHANE	ND	ND	ND					ND	5
2-CHLOROETHYLVINYL ETHER	ND	ND	ND					ND	5
CHCL3	ND	ND	ND					ND	5
DICHLOROBROMOMETHANE	ND	ND	ND					ND	5
1,1-DCA	ND	ND	ND					ND	5
1,2-DCA	7.1	6.3	ND	6				9	5
1,3-DICHLOROPROPYLENE	ND	ND	ND					ND	5
METHYL BROMIDE	ND	ND	ND					ND	5
METHYL CHLORIDE	ND	ND	ND					ND	5
METHYLENE CHLORIDE	ND	ND	ND					ND	5
1,1,2,1-TETRACHLOROETHANE	ND	ND	ND					ND	5
TETRACHOROETHENE	ND	ND	ND					ND	5
TRANS-1,2-DICHLORO	ND	ND	ND					ND	5
1,1,1-TCA	ND	ND	ND					ND	5
1,1,2-TCA	ND	ND	ND					ND	5
TRICHLOROETHENE	ND	ND	ND					ND	5
VINYL CHLORIDE	ND	ND	ND					ND	5

ND - not detected
GCL - Geoscience Consultants, Ltd.
OCD - Oil Conservation Division

are at or below the concentration levels for efficient operation of the air stripper.

Limited storage is available at the refinery. With a total pumping rate of about 30 gpm, the residence time of produced water stored at the refinery site is approximately 25-30 days.

Site evidence suggests that the agitation of pumping and exposure to air in the storage tanks will cause much of the dissolved hydrocarbon constituents to volatilize. Produced water which meets WQCC limits may be discharged without further treatment. If further treatment is necessary, air stripping will be utilized.

3.2.2 Air Stripping

Air stripping, if necessary, will be achieved by using two air stripping methods:

- air stripping through the use of an air stripper tower, and
- the use of sprinklers as air stripping devices, while applying water to the ground

Most of the recovered ground water which requires treatment will be sent through an air stripper tower. The air stripper will be designed for a maximum flow rate of 100 gpm and be capable of reducing the concentration of dissolved volatile hydrocarbon compounds in accordance to the following schedule:

<u>Compound</u>	<u>Influent (ppm)</u> Sample Source 8710070745	<u>Design Efficiency</u>	<u>Estimated Concentrations after Air Stripping (ppm)</u>
Benzene	10	99.90	0.01
Toluene	20	96.25	0.75
Ethyl Benzene	5	85.00	0.75
Xylene	12.5	95.04	0.62
PAH's	0.5	99.40	0.03

The stripper will be a forced draft type tower, with approximate dimensions of 23'-5" high and 3' in diameter. The stripper shell will be constructed of polyethylene with high efficiency packing. The blower required for the stripper will be a centrifugal type with a 5 hp, 1800 RPM motor. A complete control and monitor system will be provided. A typical air-stripper design is shown in Figure 3-5.

Sprinklers as air stripping devices will be used as required by Giant and after approval by NMOCD. It has been reported that this procedure reduces dissolved volatile hydrocarbons by at least 90% (Hazardous Waste Consultant, 1983). A test was conducted on November 7, 1986, to determine the extent to which dissolved hydrocarbon constituents would volatilize through application of recovered water to soil using a standard impulse-type irrigation sprinkler. Water for the sprinkler test was taken from the intermediate storage tank in the Diesel Spill Area that had received water from GBR-14, GBR-27 and GBR-28. Water from these three wells continued to be pumped into the tank so that both stored water and freshly-pumped water were used, which would be representative of normal operation. A jet pump was used to pump the water to a Rainbird model 25 BPJ impulse sprinkler at a rate of 3.3 gpm at 50 psi. Twelve quart jars were placed on the ground to collect the water that accumulated over a 30-minute period of sprinkling. Water from all of the jars was combined to make up the sample. Other samples of water were taken from the tank and from the pipe just before it entered the sprinkler.

Table 3-1 presents the chemical analyses of these samples and of water previously taken directly from the three pumped wells. Although BTEX levels of well water samples from GBR-27 and GBR-28 ranged from 50 to 4019 ppb, most of these compounds were not detected in the sprinkler-test samples. As another example, levels of 1,2-dichloroethane were reported at 6.0 ppb in a GBR-27 well water sample, 7.1 and 6.3 ppb from the tank before sprinkling, and were not detected after sprinkling.

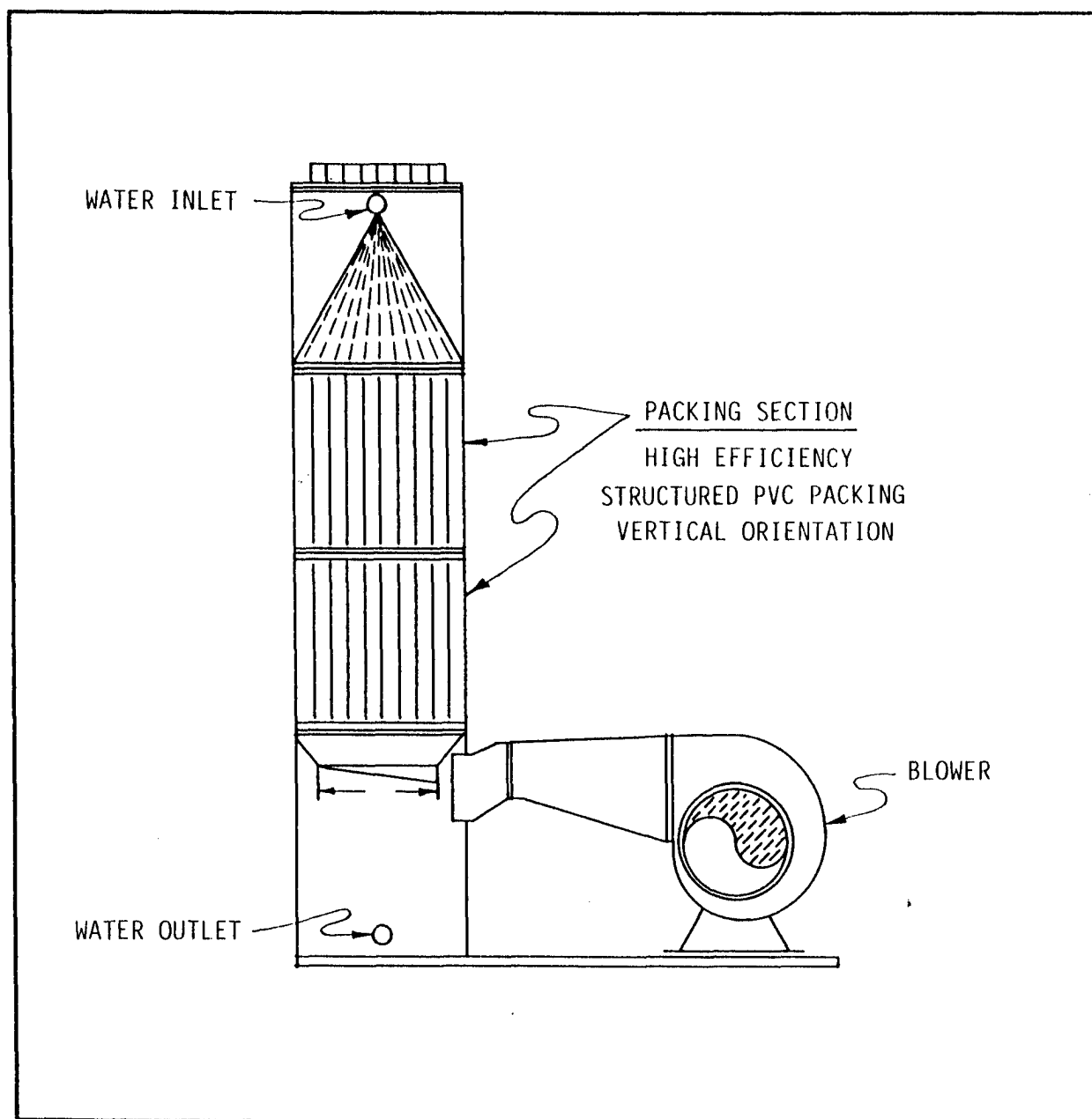


FIGURE 3-5
AIR STRIPPING TOWER SCHEMATIC

The data shows an anomaly where benzene was reportedly increased after sprinkling from 2 to 7 ppb. Since an actual increase in benzene is not probable, and because there is a significant overall reduction of benzene in the water when passing through the system, this appears to be caused by analytical variance or contamination in sample containers.

The sprinkler test did not show large reductions in dissolved hydrocarbon concentrations caused by sprinkling because most constituents had already been reduced below the limits of detection during storage in the intermediate storage tank. If this reduction continues to be observed, sprinkling will not be necessary, and direct discharge to land application sites may be used.

3.3 DISCHARGE LOCATIONS AND VOLUMES

3.3.1 Infiltration Trenches

Two locations are being considered for infiltration trenches:

- An infiltration trench upgradient of the Diesel Spill Area product plume, and
- an infiltration trench downgradient of the refinery site plumes, on the west bank of the arroyo.

The upgradient trench would provide a localized means of ground-water application, allowing for expediency in remediating the site. Aerated water from the air stripper can result in an increase of dissolved oxygen in ground water. The increased oxygen results in enhanced biodegradation of any downgradient petroleum hydrocarbons. Microorganisms can be added to this discharge to further enhance biodegradation. The downgradient trench would be utilized in concert with the recovery wells in the Southern Refinery Area to create a total hydraulic barrier at the site.

A schematic of a typical infiltration trench is shown in Figure 3-6. The infiltration trenches will be constructed according to New Mexico State requirements for septic tank effluent trenches (NMEID, 1983). They will be 2-feet deep (although the depth may vary to coincide with favorable

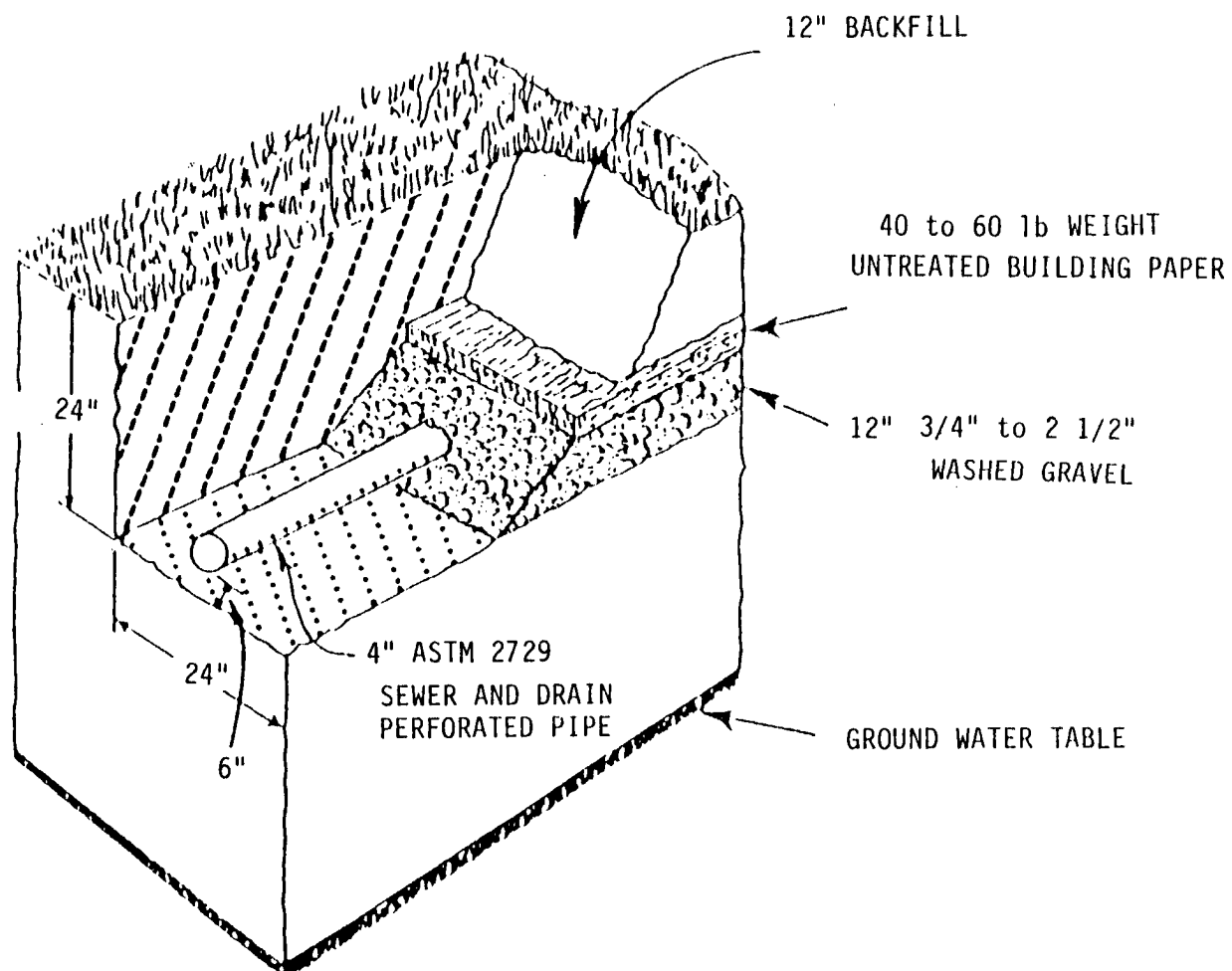


FIGURE 3-6
CUT AWAY VIEW OF TYPICAL DOWNGRADIENT INFILTRATION TRENCH

percolation rates) by 2 to 4 feet wide and filled with gravel. Perforated PVC pipe will be laid in the bottom of the trenches through which water will be discharged. The length of the trenches will be determined by percolation tests which will establish the absorption capacity of the soil.

Plans and specifications for this discharge system will be submitted to NMOC prior to construction. The plans will include results of the percolation test. It is anticipated that the bulk of the treated water will be discharged to the infiltration trenches.

3.3.2 Land Application Sites For Controlled Flooding

As part of the remedial action, Giant will discharge treated water to sites where contaminated soil is known to exist. At present, the only location where controlled flooding is planned is the Southern Refinery Area (Figure 3-7).

The area will be disked and leveled to facilitate infiltration of applied water. A 6-inch high berm will be constructed around the site to prevent any runoff. To ensure applied water will percolate into the zone of interest, the berms will be built upon native soils of the area, not the overlying gravel fill.

During frost-free periods, controlled flooding of treated ground water will be used in flushing the areas of contaminated soil in the Southern Refinery Area. Tests conducted on this soil demonstrate that the unsaturated zone (upper 25 feet) exhibits an average moisture content of 6.5% by weight and an open pore space of 25%. If enough water was supplied to saturate the upper 25 feet of soil, a significant volume of soil contamination would be flushed out of the soil as a wetted front of water and entrained product and would enter ground water and be subsequently captured by the recovery pumps. Assuming open pore space of 25%, saturation of the upper 25 feet of soil in the area of concern will require the application of 6.25 feet of reclaimed water over a relatively short period of time.

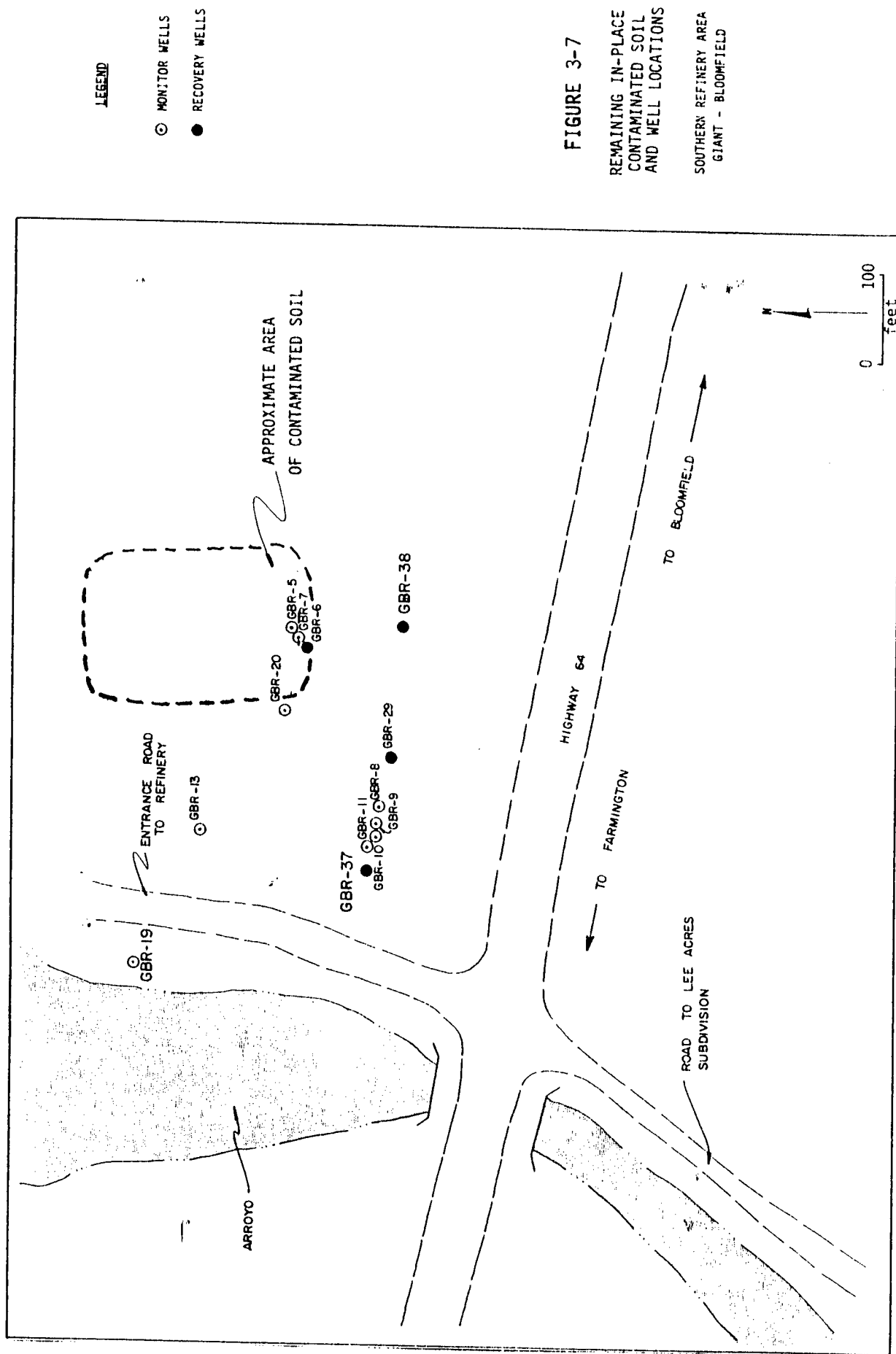


FIGURE 3-7

REMAINING IN-PLACE
CONTAMINATED SOIL
AND WELL LOCATIONS

SOUTHERN REFINERY AREA
GIANT - BLOOMFIELD

Giant proposes to approach this upper limit of water application through a series of test applications. After a period of 2 weeks during which total precipitation was less than 0.1 inch, eighteen inches of reclaimed ground water (about 25% of the maximum calculated open pore space) will be applied to the area of concern at a rate that does not result in excessive ponding on the area. The response of the soil and the aquifer will be monitored through the proposed monitoring schedule. The application rate will be adjusted after evaluation of the response. Water will be applied only during working hours when Giant personnel can monitor the application. It is anticipated that 5 days will be required to apply 18 inches of reclaimed water.

During water application, the recovery wells in the Southern Refinery Area will be pumped continuously, and the effects of the application of water will be monitored by evaluation of the thickness of floating product observed in GBR-5, GBR-7, GBR-13, GBR-20 and GBR-25. Tests will be conducted at successively higher or, if required, lower application rates until the floating product in the observation wells reaches a maximum thickness. Results of the test applications will determine the application rates of reclaimed water which will result in the desired flushing of product.

The tests described above will be performed in Spring 1988 unless weather conditions permit an earlier start date. Product recovery wells are in place and operational in the Southern Refinery Area and several months of ground-water level data are available to permit an adequate demonstration that the pumping network will capture any flushed product. Tables 3-2 and 3-3 present the available soil chemistry for this area.

3.3.3 Land Application Sites For Controlled Sprinkling

The purpose of controlled sprinkling is to dispose of water or to enhance in-situ treatment of soils. A location in the arroyo is presently proposed for periodic sprinkler application of treated water for water disposal. Other locations on the refinery site may be proposed in the future.

TABLE 3-2
GIANT INDUSTRIES BLOOMFIELD REFINERY
CHEMICAL ANALYSES, SOIL SAMPLES
SOUTHERN REFINERY AREA

ORGANIC PARAMETERS:

BTEX
CONCENTRATIONS LISTED IN PARTS PER BILLION

SAMPLE #	LOCATION	BENZENE	TOLUENE	ETHYL BENZENE	META	XYLENES ORTHO & PARA	XYLENES TOTAL
8512201240	GBR-5	ND (0.01)	ND (0.01)	ND (0.01)	N/A -	N/A -	ND (0.01)
8512201410	GBR-5	ND (0.01)	ND (0.01)	3.90 (0.01)	N/A -	N/A -	ND (0.01)
8605011412	GBR-11	ND (0.0001)	ND (0.0001)	ND (0.0001)	N/A -	N/A -	ND (0.001)
8605021516	GBR-13	ND (0.0001)	35000 (0.0001)	32000 (0.0001)	N/A -	N/A -	279000 (0.001)
8604021605	SSWCA	ND	167	468	NA	N/A	9950
	PIT #1	(1.0)	(0.1)	(0.1)	-	-	(1.0)
8604021550	SSWCA	ND	ND	ND	N/A	N/A	ND
	PIT #2	(0.1)	(0.1)	(0.1)	-	-	(1.0)
8604021618	SSWCA	ND	ND	ND	N/A	N/A	ND
	PIT #3	(0.1)	(0.1)	(0.1)	-	-	(1.0)
8604021635	SSWCA	ND	4842	3683	N/A	N/A	32569
	PIT #4	(1.0)	(0.1)	(0.1)	-	-	(1.0)

NA = not analyzed

ND = below detection limits

- = detection limits not provided

SSWCA = South Storm Water Containment Area

Detection limits in parentheses

M&A\TAB3-1.TAB

TABLE 3--3

GIANT INDUSTRIES BLOOMFIELD REFINERY
CHEMICAL ANALYSES, SOIL SAMPLES, SOUTHERN REFINERY AREA
ORGANIC PARAMETERS:
POLYNUCLEAR AROMATIC HYDROCARBONS,
CONCENTRATIONS LISTED IN PARTS PER BILLION

SAMPLE NO.	LOCATION	NAPTH	ANTHRA- CENE	PHENAN- THRACENE	BENZO (b) FLUORANTHENE	BENZO (k) FLUORANTHENE	BENZO (a) PYRENE	FLUOR- ANTHENE	1-METHYL NAPHTHLENE	PYRENE	FLUORENE
8604021516 GBR-13		2530	1920	1000	ND	ND	NA	ND	ND	ND	ND
8604021605 PIT #1		ND	3040	2040	ND	ND	NA	ND	ND	ND	ND
8604021550 PIT #2		ND	ND	ND	ND	ND	NA	ND	ND	ND	ND
8604021618 PIT #3		ND	339	330	ND	ND	NA	1254	ND	ND	ND
8604021635 PIT #4		2520	1540	2000	ND	ND	NA	4630	ND	5230	ND
8604021635 PIT #4 (split)		1500	ND	ND	ND	ND	ND	ND	NA	ND	150
Nominal Detection Limits		500	100	500	100	100	200	2000	-	2000	100

SAMPLE NO.	LOCATION	2-NITRO PHENOL	2,4-DIMETHYL PHENOL	2,4-DINITRO- PHENOL	4-NITRO- PHENOL	4,6-DINIT O-CRESOL	AMMONIA AS N	PHOSPHATE AS P	pH
8604021516 GBR-13		29000	31000	ND	ND	ND	NA	NA	NA
8604021605 PIT #1		ND	ND	ND	ND	ND	NA	NA	NA
8604021550 PIT #2		ND	3000	ND	ND	ND	NA	NA	NA
8605021618 PIT #3		ND	ND	ND	27000	ND	NA	NA	NA
8605021635 PIT #4		ND	50000	ND	ND	ND	NA	NA	NA
8605021635 PIT #4 (split)		NA	ND	NA	NA	NA	NA	NA	NA
Nominal Detection Limits		1000	1000	1000	1000	1000	-	-	-

ND = not detected NA = not analyzed - = detection limit not provided

The sprinkler system will consist of typical lawn sprinklers and associated piping. All piping will be placed above-ground. Pumps will be used as required to deliver the treated water to the sprinklers at a suitable water pressure.

Sprinkling of treated water on contaminated or uncontaminated soil will be carefully controlled. A water balance analysis shows that the average application allowed on an area of approximately 3 acres, based on potential evapotranspiration rates, is more than 170,000 gallons per week. However, the application rate varies greatly according to the time of year. Regular application during the winter months is not proposed. Thus storage of water during the months of November through February is required. This water can be subsequently discharged when evapotranspiration permits in the spring or during selected times in winter.

Table 3-4 presents the evapotranspiration data of the area and a water application schedule for a land application site of approximately 3 acres. The water will be distributed evenly over any land application sites through an automatic sprinkler system. Berms will be constructed around such sites, as necessary, to contain applied water and to prevent run-on of storm water.

3.4 GROUND-WATER QUALITY AT DISCHARGE LOCATIONS

Giant plans to discharge treated ground water produced from the remedial action at various locations at the refinery site. In order to understand the impact of any discharges to the chemistry of the aquifer, a hydrochemical database was developed. The database includes samples taken by GCL and NMOC. Tables 3-5 through 3-10 present all analytical results from existing monitor wells.

Increases in TDS and certain inorganic parameters must be accepted if dissolved petroleum hydrocarbons are to be removed from the aquifer. The flushing of contaminated soils could cause significant increases in the TDS of the aquifer.

TABLE 3-4
POTENTIAL EVAPOTRANSPIRATION (PET),
FARMINGTON, NEW MEXICO
AND
SCHEDULE FOR THE APPLICATION OF WATER TO
THE SOIL TREATMENT SITE

	NET LOSS PET-RAIN <u>IN/DAY</u>	APPLICATION RATE (IN/MIN)	APPLICATION TIMES		VOLUME APPLIED TO 3.1 ACRE SITE <u>GAL/WK</u>
			<u>MIN/DAY</u>	<u>MIN/WEEK</u>	
MAR	.03	.01	3	21*	17,679
APR	.28	.01	28	196	165,000
MAY	.35	.01	35	245	206,249
JUN	.50	.01	50	350	294,642
JUL	.42	.01	42	294	247,500
AUG	.36	.01	36	252	212,143
SEP	.20	.01	20	140	117,857
OCT	.14	.01	14	98	<u>82,499</u>
Total Gal/Yr					5,374,276

* During the month of March, a weekly application schedule will be used

References: Consumptive Use and Yields of Crops in New Mexico, New Mexico Water Resources Research Institute, WRRRI Report No. 115, 1979

Temperature and Precipitation Summaries for Selected New Mexico Locations, Dr. Kenneth Kunkel, December 1984

TABLE 3-5

GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES

PHYSICAL PARAMETERS

WELL NO.	SAMPLE NO.	SAMPLE SOURCE	pH	(uMHOS) CONDUCTIVITY	(CELSIUS) TEMP	TOTAL DISSOLVED SOLIDS (in parts) per million)
GBR-05	8606051745	OCD	7.00	3700	25.0	2865
GBR-07	8610171550	GCL	6.92	3600	19.0	NA
GBR-08	8610171615	GCL	6.86	7500	16.8	NA
GBR-09	8610171630	GCL	7.20	3550	17.0	NA
GBR-11	8606051705	OCD	7.00	7200	25.0	7593
GBR-13	8606051900	OCD	7.00	7800	18.5	10553
GBR-14	8610171215	GCL	6.80	2850	17.5	NA
GBR-15	8610171215	GCL	7.25	3450	15.6	NA
GBR-17	8605290830	GCL	NA	NA	NA	3024
GBR-17	8606051230	OCD	7.00	5500	18.5	4355
GBR-17	8610171050	GCL	6.97	2650	15.6	NA
GBR-18	8606051435	OCD	7.00	4100	17.0	4934
GBR-18	8610170815	GCL	7.55	4300	14.2	NA
GBR-19	8610171510	GCL	6.84	4250	17.2	NA
GBR-20	8606051730	OCD	7.00	3400	21.0	3473
GBR-20	8610171525	GCL	7.04	2800	18.2	NA
GBR-21D	8610170900	GCL	6.97	6000	14.1	NA
GBR-22	8610170950	GCL	6.45	6000	14.5	NA
GBR-24	8606052040	OCD	7.00	NA	NA	NA
GBR-24D	8610171130	GCL	7.28	3250	18.3	NA
GBR-25	8605091210	GCL	NA	NA	NA	5096
GBR-25	8610170925	GCL	6.81	5000	15.3	NA
GBR-26	8610171230	GCL	6.91	2300	18.2	NA
GBR-27	8606052000	OCD	7.00	7200	21.0	9023
	* SPLIT	GCL	7.00	7200	21.0	9023
GBR-29	8606051525	OCD	7.00	NA	NA	1293
GBR-30	8610171155	GCL	6.84	4300	17.1	NA
GBR-31	8610171350	GCL	6.60	5000	17.5	NA
GBR-32	8704301730	GCL	6.40	6300	15.8	NA
GBR-39	8610171330	GCL	7.28	2500	17.5	NA
SEEP (EAST)	8606051905	OCD	7.00	1600	21.5	NA
SEEP (WEST)	8510291450	OCD	NA	1550	21.0	NA
SEEP	8510241435	GCL	7.50	NA	NA	1258

GCL = Geoscience Consultants, Ltd.

OCD = Oil Conservation Division

NA = Not analyzed for this parameter

SEEP = Fire Fighting Drill Area Seep

M&A\TAB3-11.PRN

TABLE 3-6
GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSES

INORGANIC PARAMETERS

CHEMICAL CONCENTRATIONS
(mg/l)

WELLNO	SAMPLE NO.	SAMPLE SOURCE	HC03	CALCIUM	CL-	CO3	K	MG	NA	SO4
GBR-05	8608051745	OCD	837.	320.	464.	0.	6.79	97.6	588.8	491.
GBR-11	8606051705	OCD	474.	1030.	2200.	0.	5.85	68.	782.	314.
GBR-13	8606051900	OCD	470.	1464.	3070.	0.	2.73	70.8	377.2	1332.
GBR-17	8606051230	OCD	376.	712.	1105.	0.	1.17	63.4	616.4	1202.
GBR-18	8606051435	OCD	122.	420.	262.	0.	6.13	29.3	4321.	3141.
GBR-20	8606051730	OCD	428.	420.	290.	0.	10.1	14.6	248.4	1776.
GBR-24	8606052040	OCD	NA	NA	NA	NA	NA	NA	NA	NA
GBR-27	8606052000	OCD	350.	1100.	2816.	0.	1.17	141.1	526.7	1530.
GBR-29	8606051525	OCD	106.	800.	1513.	0.	0.	63.	349.	1113.
GBR-32	8708051110	EID	270.	820.	1260.	NA	1.95	98.	669.	1770.
GBR-17	8708051212	EID	305.	464.	337.	NA	0.78	88.	380.	1340.
GBR-13	8708051305	EID	415.	1004.	1960.	NA	4.29	71.	1056.	1560.
SEEP	8510241735	GCL	NA	NA	98.	NA	NA	NA	NA	9.

GCL = Geoscience Consultants Ltd.

OCD = Oil Conservation Division

EID = New Mexico Environmental Improvement Division

NA = Not analyzed for this parameter

SEEP = Fire Fighting Drill Area Seep

TABLE 3-7
GIANT INDUSTRIES BLOODFIELD REFINERY
GROUND WATER ANALYSIS
CHEMICAL ANALYSIS
CHEMICAL CONCENTRATIONS IN MG/L

SAMPLE			Ag	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg	Mg	Mn	Mo	Ni	Pb	Se	Si	Sn	Sr	V	Zn
BEDSHAW	8708051415	E10	<0.1	<0.1	NA	0.3	<0.1	<0.1	370	<0.1	<0.05	<0.1	<0.1	2.8	NA	45	0.27	NA	<0.1	<0.1	NA	7.9	<0.1	5.9	<0.1	<0.1
	8708051510	E10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	DUGGINS	8708051215	E10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GBR-13	8708051305	E10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8708051212	E10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8708051110	E10	<0.1	7.7	NA	0.3	0.1	<0.1	840	<0.1	<0.05	<0.1	0.1	9.2	NA	64	1.1	NA	0.3	<0.1	NA	13	<0.1	14.0	<0.1	<0.1
WATSON	8708051200	E10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8708051340	E10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8606051705	GCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	0.07	NA	NA	NA	NA	NA	NA
GBR-11	8605291615	GCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.08	NA	NA	NA	NA	NA	NA
	8605290830	GCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
	8606052000	OCD	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
GBR-27	8606052000	OCD	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
	8605300945	GCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.14	NA	NA	NA	NA	NA	NA
	8606051525	GCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
SEEP	8606051905	GCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
	8510241735	GCL	<0.05	NA	<0.05	NA	<1.0	NA	NA	<0.01	NA	<0.05	<0.01	32	<0.002	NA	1.2	NA	NA	<0.05	<0.01	NA	NA	NA	NA	NA
	8611201640	OCD	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GBR-09	8611210820	OCD	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8611201515	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8606051705	OCD	<0.1	<0.1	0.014	0.3	0.5	<0.1	970	<0.1	<0.1	<0.1	<0.1	6.9	<0.001	100	7.1	<0.1	0.2	<0.1	0	7.86	<0.1	19	<0.1	7.3
GBR-11	8611201735	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8611211450	OCD	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8606051230	OCD	<0.1	<0.1	0.01	0.3	<0.1	<0.1	730	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	60	<0.05	<0.1	<0.1	<0.1	0	5.9	<0.1	12	<0.1	<0.1
GBR-17	8611211510	OCD	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8611211105	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8611210945	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GBR-245	8611210945	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8611211220	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8606051525	OCD	<0.1	<0.1	0.08	0.4	<0.1	<0.1	814	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	83	5.8	<0.1	<0.1	<0.1	<0.1	9	<0.1	15	<0.1	<0.1
GBR-29	8606051525	OCD	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8611210930	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8611211205	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.1	ND	4.6	ND	0.1
SEEP	8510241430	OCD	NA	20	NA	5.4	0.8	ND	260	ND	ND	ND	ND	56	NA	36	7.2	ND	ND	ND	NA	NA	NA	NA	NA	NA
	8606051905	OCD	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1	0.1	0.1	0.1	.004

SEEP = Fire Fighting Drill Area Seep

E10 = New Mexico Environmental Improvement Division

OCD = Oil Conservation Division

GCL = Geoscience Consultants Ltd.

NA = Not analyzed for this parameter

TABLE 3-8
GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSIS

AROMATIC HYDROCARBONS
ORGANIC PARAMETERS

CONCENTRATIONS LISTED IN PARTS PER BILLION

WELL NO.	SAMPLE NO.	SAMPLE SOURCE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES			XYLENES TOTAL
						PARA	META	ORTHO	
GBR-01	8606051115	GCL	ND	ND	NA	ND	ND	ND	ND
GBR-05	8601231410	GCL	830	638	229	-	-	-	2204
GBR-05	8606051745	OCD	530	200	1000	1000	2300	300	3600
GBR-05	8611201640	OCD	210	31	700	550	1400	81	2031
GBR-06	8611201545	OCD	70	ND	ND	1000	ND	240	1240
GBR-07	8610171550	GCL	8	10	11	-	-	-	33
GBR-07	8611201615	OCD	21	ND	ND	15	14	ND	29
GBR-08	8610171615	GCL	2670	1460	1890	-	-	-	6980
GBR-09	8610171630	GCL	41	66	54	-	-	-	138
GBR-09	8611210820	OCD	49	ND	ND	1	ND	1	2
GBR-10	8611210845	OCD	9500	1100	670	940	1600	590	3130
GBR-11	8604011412	GCL	<100	<100	<100	NA	NA	NA	<1000
GBR-11	8604010845	GCL	9.7	14.1	2.7	-	-	-	14.2
GBR-11	8605291615	GCL	9025	3088	NA	-	-	-	6981
GBR-11	8606051705	OCD	4600	3100	960	1000	2100	1100	4200
GBR-11	8611201515	OCD	6500	2800	680	690	1400	690	2780
GBR-13	8604151545	GCL	42	25	11	-	-	-	99
GBR-13	8605091550	GCL	129	32	3	-	-	-	105
GBR-13	8606051900	OCD	1300	12	130	250	410	71	731
GBR-13	8611201735	OCD	2900	1800	520	740	1500	630	2870
GBR-14	8610171215	GCL	ND	ND	ND	ND	ND	ND	ND
GBR-14	8611211135	OCD	ND	ND	ND	ND	ND	ND	ND
GBR-15	8610171315	GCL	334	52	209	-	-	-	772
GBR-17	8605290830	GCL	ND	ND	NA	-	-	-	ND
GBR-17	8606051230	OCD	ND	ND	ND	ND	ND	ND	ND
GBR-17	8607150730	GCL	ND	ND	NA	-	-	-	ND
GBR-17	8611211450	OCD	ND	ND	ND	ND	ND	ND	ND
GBR-18	8605090925	GCL	ND	ND	ND	-	-	-	ND
GBR-18	8606051435	OCD	50	11	ND	ND	4	ND	4
GBR-18	8607081050	OCD	ND	1	ND	ND	ND	1	1
GBR-18	8607081100	OCD	ND	ND	ND	ND	ND	ND	ND
GBR-18	8611211425	OCD	ND	ND	ND	ND	ND	ND	ND
GBR-19	8610171515	GCL	112	105	111	-	-	-	306
GBR-19	8611211510	OCD	200	18	270	140	34	100	274
GBR-20	8605091040	GCL	ND	ND	ND	-	-	-	ND
GBR-20	8606051730	OCD	4	ND	<5	ND	ND	ND	ND
GBR-20	8611201711	OCD	41	ND	ND	28	22	ND	50
GBR-21	8605091700	GCL	ND	22	2	-	-	-	234
GBR-22	8605091350	GCL	ND	ND	ND	-	-	-	ND
GBR-23	8604181800	GCL	1513	823	NA	-	-	-	2092
GBR-24	8604181810	GCL	61160	58740	NA	-	-	-	120000
GBR-24	8605091625	GCL	1154	803	147	-	-	-	1020

TABLE 3-8 (CONT.)
GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSIS

AROMATIC HYDROCARBONS
ORGANIC PARAMETERS

CONCENTRATIONS LISTED IN PARTS PER BILLION

WELL NO.	SAMPLE NO.	SAMPLE SOURCE	BENZENE	TOLUENE	ETHYL BENZENE	PARA	XYLENES META	ORTHO	XYLENES TOTAL
GBR-24	8606052040	OCD	680	690	140	290	410	190	890
GBR-24S	8611210945	OCD	580	200	300	270	150	75	495
GBR-24D	8611211105	OCD	230	5	180	140	ND	7	147
GBR-25	8605091210	GCL	ND	ND	ND	-	-	-	ND
GBR-26	8605091515	GCL	ND	ND	ND	-	-	-	ND
GBR-26	8610171230	GCL	5280	119	54	-	-	-	1140
GBR-27	8605181400	GCL	ND	ND	ND	-	-	-	ND
GBR-27	8606052000A	OCD	410	120	ND	96	240	170	506
GBR-27	8606052000B	OCD	50	74	12	77	240	140	457
GBR-27	8510241435	GCL	5230	ND	3160	-	-	-	3250
GBR-27	8611211220	OCD	ND	ND	ND	ND	ND	ND	ND
GBR-28	8605291600	GCL	2419	819	NA	-	-	-	4019
GBR-28	8607151900	GCL	319	143	NA	-	-	-	224
GBR-29	8606051525	OCD	2600	3000	600	700	1500	670	2870
GBR-29	8606051525	GCL	3818	3338	NA	-	-	-	5210
GBR-29	8605300945	GCL	388	643	NA	-	-	-	2000
GBR-29	8611201440	OCD	240	72	98	340	710	350	1400
GBR-30	8610171155	GCL	ND	ND	ND	ND	ND	ND	ND
GBR-30	8611210930	OCD	ND	ND	ND	52	28	9	89
GBR-31	8610171350	GCL	4	6	ND	-	-	-	14
GBR-31	8611211205	OCD	ND	ND	ND	ND	ND	ND	ND
GBR-32	8704301730	GCL	ND	ND	ND	NA	NA	NA	ND
GBR-39	8605091140	GCL	ND	ND	ND	-	-	-	ND
GBR-39	8610171330	GCL	144	148	179	-	-	-	356
SUPPLY WELL	8601231380	GCL	ND	ND	ND	NA	NA	NA	ND
SEEP	8606051905	OCD	28000	18000	1200	2200	5500	3000	10700
SEEP	8606051905	GCL	15500	11900	NA	-	-	-	ND
SEEP	8604011495	GCL	<1000	85000	42000	NA	NA	NA	36000
SEEP	8604011435	GCL	511000	103	48	-	-	-	1518
SEEP	8510241735	GCL	5230	ND	3160	-	-	-	3250
SEEP	8510241430	OCD	4100	ND	200	28	860	ND	888
SEEP	8510241450	OCD	2200	110	80	ND	80	ND	80
Nominal Detection Limit			1	1	1	-	-	-	1

GCL = Geoscience Consultants, Ltd.

OCD = Oil Conservation Division

NA = not analyzed for this parameter

ND = below detection limits

SEEP = Fire Fighting Drill Area Seep

- = included in total xylene analysis

TABLE 3-9

GIANT BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSES

POLYNUCLEAR AROMATIC HYDROCARBONS
CONCENTRATIONS IN PARTS PER BILLION

WELL NO.	SAMPLE NO.	SOURCE	NAPH	1-METHYL NAPH	2-METHYL NAPH	ACENAPHTH -ALENE	ACENAPHTHENE	FLUORENE	ANTHRACENE	PHENAN- THRAENE	FLUOR- ANTHENE	PYRENE	BENZO(a) ANTHRACENE	CHRYSENE	BENZO(b) FLUOR- ANTHENE	BENZO(k) FLUOR- ANTHENE	DIBENZO(a,h) ANTHRACENE	INDENO PYRENE	BENZO (g,h,i) PERYLENE
GBR-7	8610171550	GCL	ND	NA	NA	7	22	ND	ND	ND	10	ND	ND	ND	ND	ND	ND	ND	ND
GBR-8	8610171615	GCL	50	NA	NA	244	473	78	69	4	ND	ND	3	ND	ND	ND	ND	ND	ND
GBR-9	8610171630	GCL	49	NA	NA	19	48	7	15	ND	ND	10	7	ND	ND	ND	ND	ND	ND
GBR-15	8610171315	GCL	ND	NA	NA	9	30	ND	7	ND	ND	8	ND	ND	ND	ND	ND	ND	ND
GBR-19	8610171515	GCL	28	NA	NA	71	160	122	21	ND	1	ND	ND	ND	ND	ND	ND	ND	ND
GBR-26	8610171230	GCL	9	NA	NA	ND	40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-27	8608052000	OCD	400	1100	2400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GBR-31	8610171350	GCL	3	NA	NA	19	15	ND	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-39	8610171330	GCL	ND	NA	NA	ND	6	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nominal	Detection Limits		1	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1

GCL = Geosciences Consultants Ltd.

OCD = Oil Conservation Division

ND = Below detection limits

NA = Not analyzed

- = No detection limit provided

TABLE 3-10
GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSIS
CHLORINATED HYDROCARBONS

CONCENTRATIONS LISTED IN PARTS PER BILLION

WELL NO.	SAMPLE NO.	SAMPLE SOURCE	ACRYLON- ITRILE	BROMOFORM	CC14	DIBROMO- METHANE	DICHLORO- METHANE	DICHLORO- BROMOMETHANE	CHLOROBI- BROMOMETHANE	CHLOROETHANE	VINYL ETHER	2-CHLOROETHYL-	1,1-DCA	1,2-DCA	1,1-DC
GBR-05	8608051745	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-05	8611201640	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-06	8611201545	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND
GBR-07	8611201615	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-09	8611210820	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	6	ND
GBR-10	8611210845	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	150	ND
GBR-11	8606051705	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND
GBR-11	8611201515	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	170	ND
GBR-13	8606051900	OC	NA	ND	ND	ND	25	ND	ND	ND	ND	ND	25	58	ND
GBR-13	8611201735	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	44	32	ND
GBR-14	8610171215	GCL	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-14	8611211135	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	ND
GBR-15	8610171315	GCL	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	78	ND
GBR-17	8606051230	OC	NA	ND	ND	ND	15	ND	ND	ND	ND	ND	20	ND	ND
GBR-17	8607150730	GCL	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND
GBR-17	8611211450	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	ND	ND
GBR-18	8606051435	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-18	8611211425	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-19	8610171515	GCL	ND	ND	ND	NA	NA	ND	ND	ND	ND	ND	12	5.9	ND
GBR-19	8611211510	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	10	ND
GBR-20	8606051730	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND
GBR-20	8611201711	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-24	8606052040	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-24S	8611210945	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	60	ND
GBR-24D	8611211105	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	69	ND
GBR-26	8610171230	GCL	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	66	ND
GBR-27	8606052000A	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-27	8606052000B	OC	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	ND

TABLE 3-10 (CONT.)
GIANT INDUSTRIES BLOOMFIELD REFINERY
GROUND WATER SAMPLES
CHEMICAL ANALYSIS

CHLORINATED HYDROCARBONS

CONCENTRATIONS LISTED IN PARTS PER BILLION

WELL NO.	SAMPLE NO.	SAMPLE SOURCE	ACRYLON-		BROMOFORM	DIBROMO- DICHLORO-		METHANE	METHANE	BROMOMETHANE	BROMOMETHANE	CHLOROETHANE	2-CHLOROETHYL-		VINYL ETHER	CHC13	1,1DCA	1,2-DCA	1,1-DCEE
			ITRILE	THIOL		METHANE	METHANE						CHLOROETHYL-	CHLOROETHYL-					
GBR-27	8510241435	GCL	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND
GBR-27	8611211220	OCD	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND
GBR-28	8607151900	GCL	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	NA	ND
GBR-29	8606051525	OCD	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	30	36	ND
GBR-29	8611201440	OCD	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	34	ND	ND
GBR-30	8610171155	GCL	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-30	8611210930	OCD	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GBR-31	8610171350	GCL	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	11	ND	ND
GBR-31	8611211205	OCD	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	22	ND	ND
GBR-32	8704301730	GCL	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	7.3	ND	ND
GBR-39	8610171330	GCL	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	31	ND
SEEP	8606051905	OCD	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50	ND	49	ND
SEEP	8611211535	OCD	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND
Nominal Detection Limits			25	25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

GCL = GEOSCIENCE CONSULTANTS, LTD.

OCD = OIL CONSERVATION DIVISION

NA = not analyzed

ND = below detection limits

It must be recognized that increased TDS in the aquifer could be due to a number of factors which have little or nothing to do with refinery activities, such as increased recovery of saline fluids which are naturally occurring or were disposed of in the Lee Acres Landfill.

3.5 CONTINGENCY PLAN

The design of the remedial action, appropriate monitoring and the presence of a trained systems operator will minimize the chances of implementing a contingency plan. At the present time the following system failures are possible and must be addressed:

- malfunction of the air stripper
- malfunction of recovery pumps

If an air stripper is required, its failure would not result in serious problems. Sufficient storage does exist on site to permit storage of pumped water during air stripper repair. Periodic cessation of pumping is often recommended for product recovery remedial actions. Therefore, periodic shutdown of the recovery system may accompany servicing of the air stripper.

Several auxiliary recovery wells are presently "on standby" in the Southern Refinery Area. If one of the primary wells requires service, one of these auxiliary wells may be called into service. Because the southern refinery recovery system is predicted to be able to intercept any petroleum hydrocarbons which may be emanating from the refinery (See Appendix A), auxiliary wells in the Truck Fueling Area or the diesel spill area are not necessary.

It is not practical to attempt to foresee all possible scenarios which might need to be addressed. Giant proposes to develop and implement such contingency plans when appropriate.

4.0 SPILL/LEAK PREVENTION AND HOUSEKEEPING PRACTICES

4.1 OPERATING AND MAINTENANCE PROCEDURES

Although the Giant Bloomfield Refinery is not currently an active refinery, the site is being used for other activities by Giant. An office of Ciniza Pipe Line, Inc. is located on the site. The Crude Oil branch of Giant's Transportation Division operates a dispatching and truck maintenance facility from this location. Although these operations are relatively small, they are operated in a manner to prevent and mitigate any unplanned releases to the environment.

Processes and storage units associated with the remedial action or on-site operations are regularly observed by a number of personnel during normal operations, and any evidence or sign of spills/leaks is promptly reported to supervisory personnel so that repairs or cleanup can be effected. Berms around storage tanks at the refinery site are designed to contain any unplanned spills or releases. The proposed berm at the truck fueling facility will also minimize the impact of accidental releases.

Routine maintenance procedures conducted at the Giant refinery also help to assure that equipment remains functional and that the possibility of spills/leaks is minimized.

4.1.1 Pipe Testing

In addition to routine visual inspection of above ground piping systems, all piping utilized in the remedial action will be subjected to an air pressure test prior to use. The piping will be pressurized to 1 1/2 times the working pressure but not less than 50 psi, and the pressure maintained and monitored for a minimum of 60 minutes. Prior to installation, leaks may be detected by soaping all joints, while the system is under pressure (API 1615, November 1979).

Hydraulic pressure tests, will also be conducted on an annual basis to ensure continued integrity.

4.1.2 Tank Inspection

The storage tanks to be used in remediation and the existing process tanks (diesel storage tank and waste oil tank) will be subject to a monthly visual inspection by plant personnel.

4.1.3 Berm Integrity

All diversion and containment berms will undergo monthly visual inspection to ensure integrity.

4.2 TRUCK FUELING

At the Truck Fueling Area, an underground piping system is used to transport diesel fuel and its condition is not visible. To determine the integrity of the existing pipe, the piping will be subjected to a hydraulic test of $1\frac{1}{2}$ times the working pressure but not less than 50 psig for a minimum of 60 minutes (Pace, February 1983).

In the event that a leak is detected, repairs will be made as necessary. Once the system is again operating, proper inventory control will be maintained to detect any product leakage. In addition, a monthly inspection of the Truck Fueling Area will be conducted to detect evidence of fuel surfacing from the system.

A concrete berm will be constructed around the fueling pad to contain loading spills.

A long term upgrade is proposed for the entire underground piping system. The pipe will be excavated and replaced with schedule 40 steel pipe that is galvanized, wrapped, or cathodically protected.

4.3 CHEMICAL AND ENVIRONMENTAL HAZARDS

Very small quantities of chemicals (such as Stoddard solvent and housekeeping supplies) are used at the Giant Refinery. Any spills or leaks would be very small in volume and easily contained in and removed from the immediate area.

4.4 CLEANUP PROCEDURES

Cleanup procedures would obviously vary with the nature and extent of any unplanned release. Potential methods are described below:

Spills or leaks of potentially contaminated water could occur from the long term storage tanks. Spills and leaks of product may occur from the diesel storage tank and the waste oil tank. Any release from these tanks would be contained in the berm around the tank.

If an oil spill occurs, general cleanup procedures would involve minor earthwork to prevent migration, and recovery of as much free liquid as possible. Recovered oil would then be transported to a pipeline injection system for inclusion as crude oil. Any material which may have soaked in the soil will be further investigated to determine if it can be left in place and allowed to naturally biodegrade or if removal or active remediation is necessary.

4.5 REPORTING

Should a release of materials occur, Giant will provide oral notification to NMOCD as soon as possible after discovery as required by WQCC Regulation 1-203.

4.6 GENERAL HOUSEKEEPING PROCEDURES

Chemicals are used in relatively small quantities at the refinery and are managed in a manner to prevent discharges to the environment. Any chemical spills which might occur would be immediately contained and disposed of according to proper practices.

Chemicals such as cleaning solvents are collected and recycled. Giant currently uses a non-halogenated solvent, Stoddard, for degreasing operations. The spent solvent which contains various aromatic and paraffinic hydrocarbons is combined with waste motor oil and is shipped off-site for recycling. No solvent is disposed of on site.

4.7 CLOSURE PLANS

The following closure plans explain the methods for closure of land discharge sprinkler systems and infiltration trenches, the network of monitoring/pumping wells, and the removal of any air strippers and their associated hardware. Abandonment of all trenches, wells, and hardware shall be started only after final confirmation by NMOCD that remediation is complete.

4.7.1 Sprinkler System/Infiltration Trench Closure

All plumbing/piping associated with the sprinkler system will be disconnected to prevent unauthorized use. All pipelines leading to the infiltration trenches will be disconnected and capped. The infiltration trenches shall be left in place.

4.7.2 Well Closures

All recovery and non-required monitor wells will be backfilled with bentonite grout.

4.7.3 Air Stripper Closure

Any air strippers and all associated hardware will be dismantled and removed from the site.

4.7.4 Berm Closure

Berms established for remedial actions - those around the contaminated soil site in the Southern Refinery Area and the excavated soil area - will be destroyed and the soil spread to resemble the original surface contours.

4.7.5 Fire Water Pond

The fire water storage pond is located at the northern end of the refinery property (Plate 1). The water is replenished on an as-needed basis from the San Juan River and is used by the County for McGee Park and San Juan Downs fire protection. Giant has discussed the need and obligation for the upkeep of this pond with San Juan County officials. As a result of these discussions the pond will be drained in the near future.

5.0 SITE CHARACTERISTICS

5.1 CLIMATE

The climate in the San Juan Basin is generally arid to semiarid, but precipitation varies considerably across the region (Table 5-1). Highest values of annual precipitation are associated with mountainous areas; 30 inches at Mount Taylor, 25 inches in the San Pedro Mountains, and 20 inches in the Chuska Mountains. In the central part of the basin, annual precipitation is generally 10 inches; values as low as 8 inches occur along the San Juan River west of Farmington and along the north-flowing reach of the Chaco River (Stone and others, 1983).

Most precipitation (approximately 60% of the total) occurs during summer months as local, often intense, thunderstorms. Higher elevations also receive considerable winter precipitation. The source of summer moisture generally is the Gulf of Mexico; the source of winter precipitation is the Pacific Ocean. Mountain barriers and the long distances lying between both of these sources and northwest New Mexico account for its aridity (Stone and others, 1983).

Maximum temperatures generally occur in July, and minimum temperatures in January. The highest maximum temperatures are associated with the lower elevations, such as the valleys of the Chaco and San Juan Rivers; lowest minimum temperatures are associated with the higher elevations (Stone and others, 1983).

Wind directions in the basin vary locally because of topography. Along the San Juan River, for example, easterly and westerly winds dominate, owing to the east-west orientation of the valley. Spring is the windiest season and spring wind velocities are strongest, averaging 10-12 mph, whereas summer winds average only 8 mph (Stone and others, 1983).

Class-A pan evaporation data for the region are sparse. An annual average of 67.37 inches has been reported for a station 3 miles northeast of Farmington for the period 1948-1962; the highest monthly value, 10.50 inches, was observed in June and the lowest value, 0.74 inches, was

TABLE 5-1 AVERAGE ANNUAL TEMPERATURE AND PRECIPITATION AT SELECTED STATIONS IN THE SAN JUAN BASIN

¹Figures and letters indicate distance (mi) and direction from Post Office; ²SJ = San Juan, MK = McKinley, SDV = Sandoval, RA = Rio Arriba, V = Valencia

Station	Elevation (ft)	Temperature		Precipitation		County and source ²
		Mean max. (°F)	Mean min. (°F)	Mean annual (inches)	Yrs of record	
Aztec Ruins National Monument	5,640	68	35	9.33	59	SJ
Bloomfield (35E) ¹	5,794	68	35	8.46	60	SJ
Chaco Canyon National Monument	6,125	68	34	8.67	28	SJ
Crownpoint	6,978	64	38	10.48	47	MK
Cuba	6,945	64	29	14	22	SDV
Dulce	6,950	63	25	17.08	52	RA
Farmington Airport	5,494	67	37	8.12	20	SJ
Fruitland	5,165	69	36	6.96	55	SJ
Ft. Wingate	7,000	64	36	13.62	69	MK
Gallup	6,465	67	31	9.44	12	MK
Grants-Milan Airport	6,520	66	32	8.83	13	V
Laguna	5,815	69	38	9.86	48	V
Lybrook	7,160	62	34	12.01	9	RA
Newcomb	5,565	70	35	5.35	13	SJ
Regina	7,450	62	29	16.15	46	SDV
Shiprock (1E) ¹	4,974	70	37	7.04	32	SJ
Tohatchi	6,800	66	39	10.47	43	MK

SOURCE: Stone, W.J. and others, 1983

observed in December. The average evaporation during the period May through October is 46 inches at El Vado Dam (28 mi southeast of Dulce) and 52 inches at Gallup; annual values of 63 inches and 72 inches have been estimated for these two stations, respectively (Stone and others, 1983). Potential evapotranspiration (PET) for the Farmington area is presented in Table 3-4 (Sammis and others, 1979).

5.2 REGIONAL GEOLOGY AND HYDROGEOLOGY

The Giant Bloomfield Refinery is located in the west-central part of the San Juan Basin, a large asymmetric structural depression that contains up to 15,000 feet of Paleozoic and Mesozoic sediments (Figure 5-1). The greatest recorded stratigraphic thickness in the basin is 14,423 feet in an oil well located in Section 7, T.29 N, R.5 W near the structural center of the basin (Fassett and Hines, 1971).

The stratigraphy of the San Juan Basin is comprised of sedimentary rocks ranging in age from Cambrian to Holocene. During Late Cretaceous time, three basin-wide cycles of transgression and regression resulted in an intertonguing lithology of sandstone, siltstone, shale and coal found throughout the Cretaceous rocks in the basin. Sedimentary rocks of Jurassic and Cretaceous age crop out around the rim of the basin and over a broad area in the southern and western parts of the basin. Tertiary sedimentary rocks cover most of the central basin. Quaternary deposits are restricted mainly to the major river valleys. Quaternary deposition included the formation of outwash terraces along the San Juan River and its tributaries (Pleistocene), the growth and migration of sand dunes on higher plateaus (Pleistocene and Holocene), and the cutting and filling of alluvial channels throughout the area (Stone and others, 1983). Figures 5-1 and 5-2 illustrate the geologic structures and stratigraphy in the region.

The alluvial material in the San Juan River Valley forms the aquifer utilized for many water supply wells. In the side canyons, bedrock aquifers are typically employed for small domestic water supply wells.

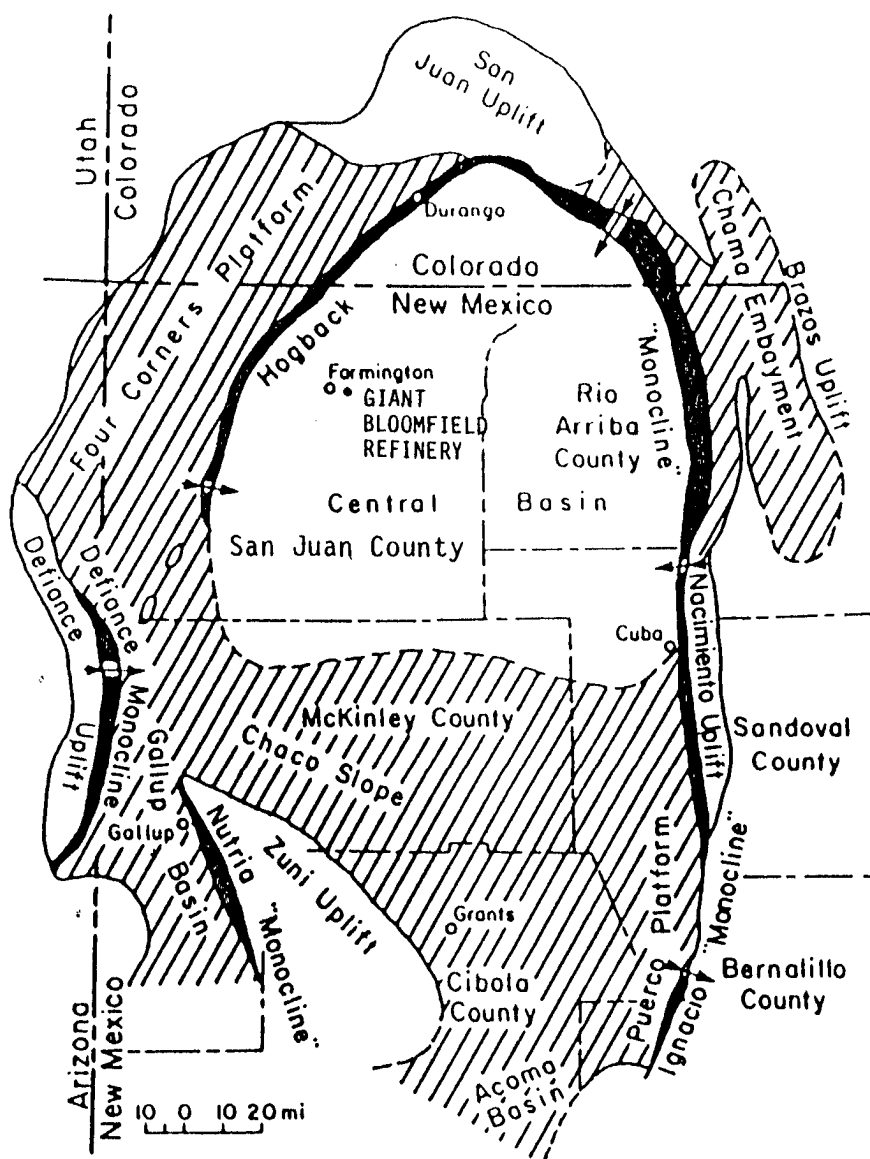


FIGURE 5-1

GEOLOGIC STRUCTURAL ELEMENTS IN THE SAN JUAN BASIN

(Source: Stone and Others, 1983)

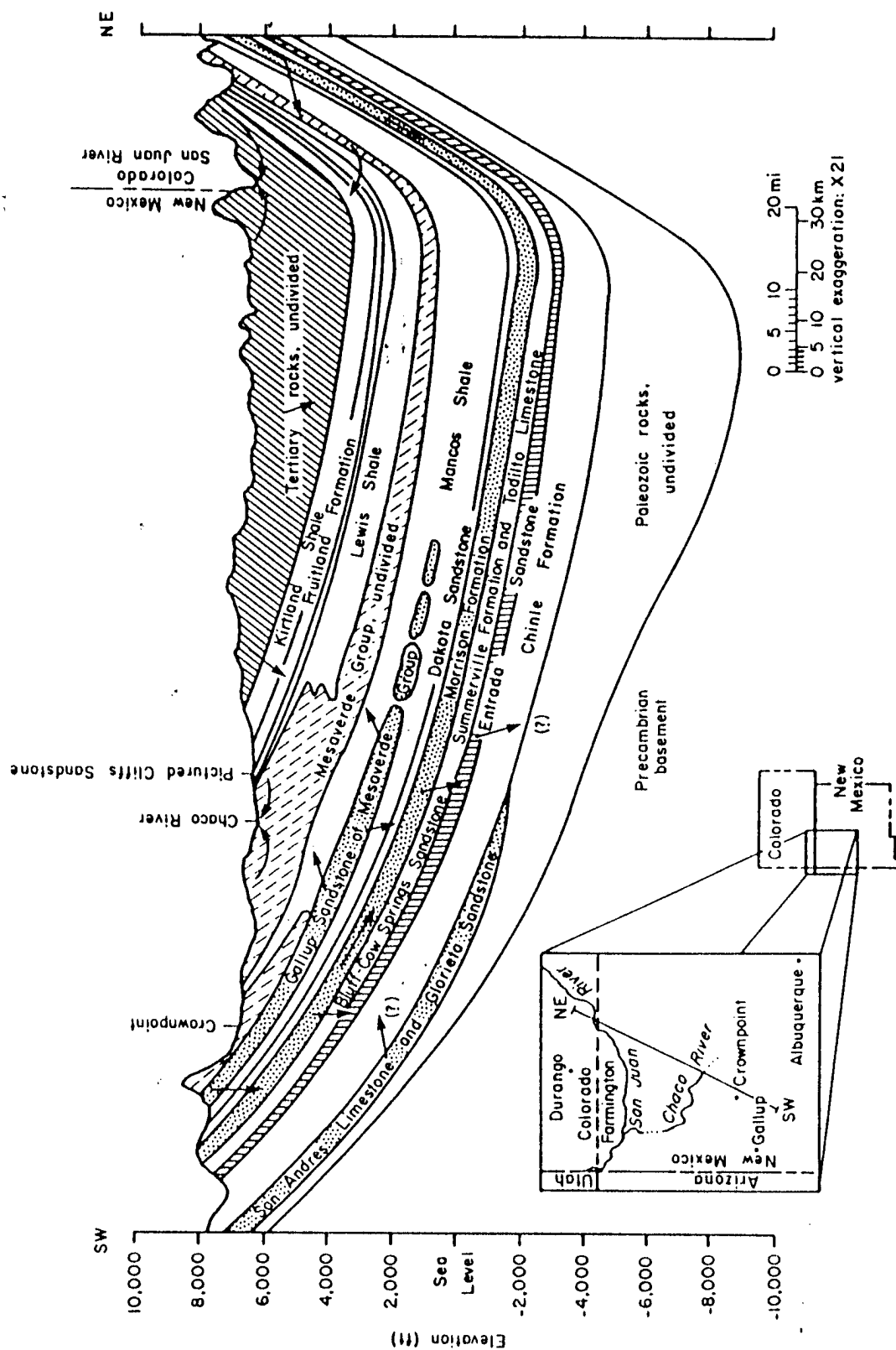


FIGURE 5-2

GENERALIZED HYDROGEOLOGIC CROSS-SECTION OF SAN JUAN BASIN, Showing Major Aquifers (stippled), Confining Beds (blank), And Directions of Ground Water Flow (arrows).
(Source: Stone and Others, 1983)

Three major ground-water systems are present in the Cretaceous and younger sedimentary deposits of this area of the San Juan Basin:

- Confined aquifers within Cretaceous and Tertiary sandstone units
- Water-table aquifers in Cretaceous and Tertiary sandstone units near outcrop areas
- Water-table aquifers in Quaternary alluvium in river valleys and along tributary channels

The Cretaceous sandstone aquifers of the San Juan Basin were deposited along strandplain beaches or at wave-dominated delta fronts in various coastal environments. The complexity of these intertonguing fluvial and marine deposits is a result of alternating transgressive/regressive pulses of the Cretaceous epicontinental sea. Occurrence of ground-water resources is associated with these sandstone aquifers, and is a function of their distribution and stratigraphic relationship with the less permeable units containing these sandstones. Recharge of the aquifers in Cretaceous sandstones is dependent upon outcrop distribution, elevation, climate in outcrop areas, lithologic characteristics of the unit and leakage from other units. Outcrops generally occur as narrow sinuous belts, few of which lie in areas of high precipitation. Most recharge is a result of the limited infiltration in outcrop areas, although leakage from adjacent units occurs locally. Hydraulic conductivity is generally low due to the fine-grained textures characteristic of these marine sediments.

Ground-water quality in Cretaceous sandstone aquifers is controlled by several factors. Total dissolved solids (TDS) concentrations increase as a function of increasing ground-water residence time and reduced transmissivity of aquifer materials. Fresher water is associated with high-transmissivity zones while saline water is associated with low-transmissivity zones. Ground water moving along the sandstone-shale interfaces that are common to these rocks tends to exhibit increased TDS concentrations (Stone and others, 1983). Water from these confined aquifers is

suitable for stock and domestic use in some areas, although in most cases it is not considered a major source.

The Tertiary sandstone aquifers of the basin were deposited in fluvial or alluvial environments. Recharge to ground water is by infiltration through formation exposures along the flanks of the Nacimiento Uplift and on the broad plateaus that occur in the central part of the basin. The amount of recharge to Tertiary aquifers is higher than that of Cretaceous aquifers due to broader exposures in areas of high precipitation. Ground water in these aquifers flows from upland recharge areas to discharge areas along canyon floors. Springs and seeps result due to regional topographic and geomorphic controls. The hydraulic gradient is controlled primarily by topography, but is also affected by the structural attitude of the formations. Erosion has removed these units from much of the basin flanks.

Tertiary-sandstone aquifers have generally lower TDS concentrations than Cretaceous aquifers and commonly provide major sources of water for domestic and agricultural usage. The complex intertonguing of sandstone and shale units is the primary influence on TDS, as shown by values of specific conductance, which can be as high as 10,500 micromhos per centimeter (umhos/cm). One umhos/cm is roughly equivalent to 0.65 parts per million (ppm) of TDS.

Quaternary-sediment hosted aquifers occur primarily as valley fill in the major river valleys and consist of gravel, sand, silt and clay. Groundwater recharge results from drainage from irrigated lands, infiltration of surface runoff and leakage from bedrock aquifers. Flow directions are concurrent with topographic slope and river-flow directions, and hydraulic conductivity can be extremely high.

The quality of ground water in Quaternary river valley alluvium is highly variable and specific conductance may range from less than 1,500 to 6,000 umhos/cm (Stone and others, 1983). Water from this source is used for stock, irrigation and domestic purposes. In arroyos and tributaries of

the major rivers, the ground-water quality is also highly variable; locally, specific conductance can be significantly higher than 6,000 umhos/cm.

5.3 SITE HYDROGEOLOGY

The refinery is located on weathered outcrops of the Nacimiento Formation which is comprised of shales, sandstones and siltstones of Cretaceous-Tertiary age. Immediately to the west is a large unnamed arroyo which is underlain by Quaternary alluvial sediments. Older Quaternary terrace deposits of cobbles and boulders are observed on the interfluvial ridges adjacent to the arroyo. These terrace deposits may have been utilized as fill on the refinery site. The San Juan River Valley is located south of the site and contains up to several hundred feet of alluvial fill.

The uppermost zone of ground water in the refinery area is an unconfined to partially confined water-table unit which is hosted by the weathered, locally porous sandstones and shales of the Nacimiento Formation and arroyo alluvium. These apparently discharge to the San Juan River alluvium to the south. Figure 5-3 is a generalized east-west cross section across the refinery site showing the relationship of the arroyo-fill to bedrock. Major hydrogeologic relationships are:

- An interconnected water-table aquifer, hosted by both valley and arroyo fill and the upper parts of the Nacimiento sandstone
- Ground water at a depth of 25 to 45 feet beneath the land surface
- An upper water-table surface generally conforming to topography; ground water slopes and flows from north or northeast to south (towards the San Juan River) through the refinery area
- Minor, local zones of perched ground water, lying 5 to 30 feet above the water table

Plate 1 shows an overall view of the site. Plates 2A and 2B present hydrogeologic cross sections of the refinery site, and the borings used to construct them. The specific locations of the cross sections on

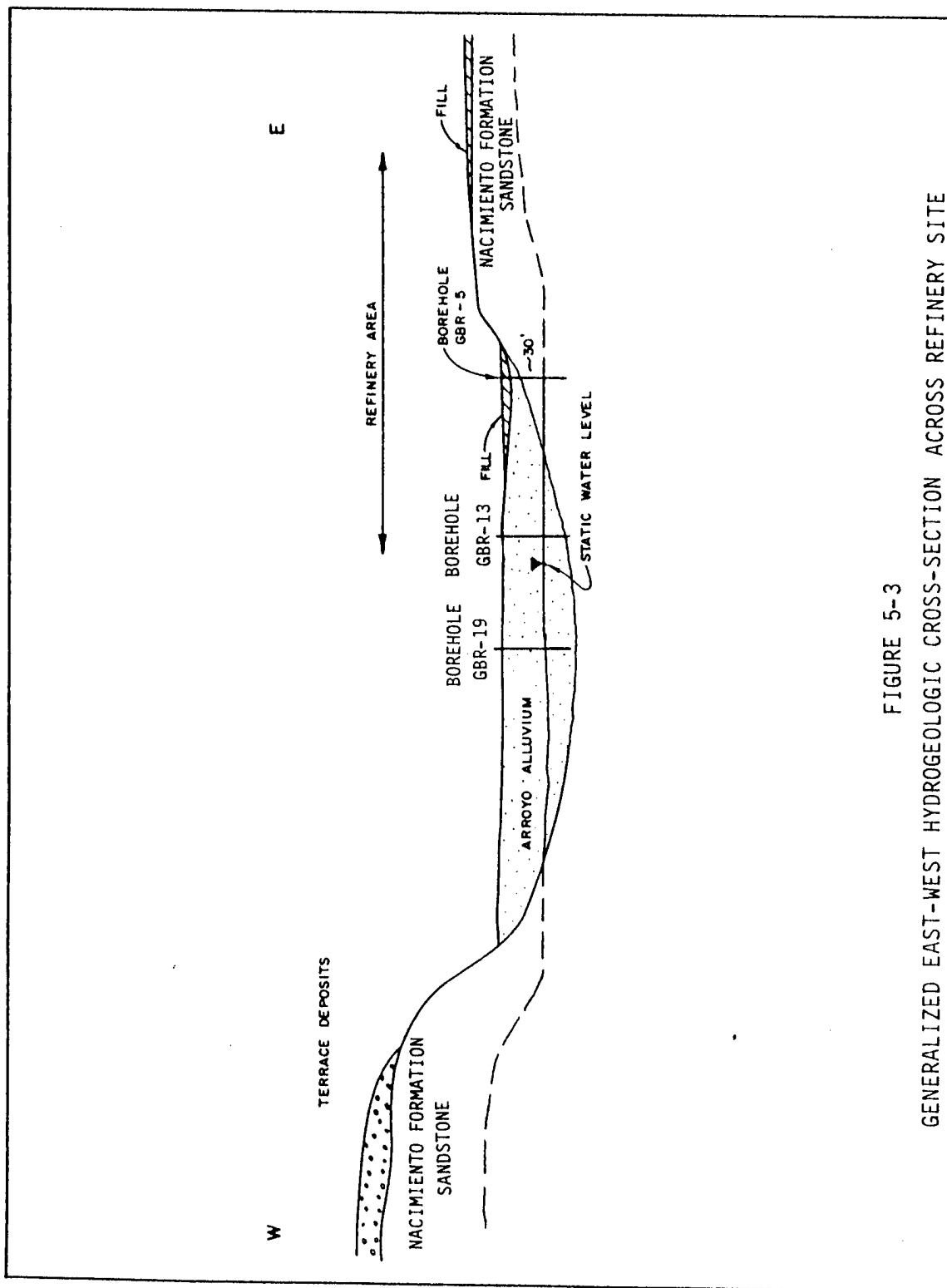


FIGURE 5-3
GENERALIZED EAST-WEST HYDROGEOLOGIC CROSS-SECTION ACROSS REFINERY SITE

the refinery site are shown on Plate 3. Appendix B presents lithologic logs and completion diagrams for the monitor wells on site.

Water levels and floating product thicknesses of all wells on the refinery property were measured from April 1986 through present. A record of these measurements is shown in Appendix C. A water-table contour map was prepared (Figure 5-4) based on the static water levels of all the wells at the refinery measured in November 1986. This map is representative of static conditions of the aquifer since recovery pumping was not being done at the time.

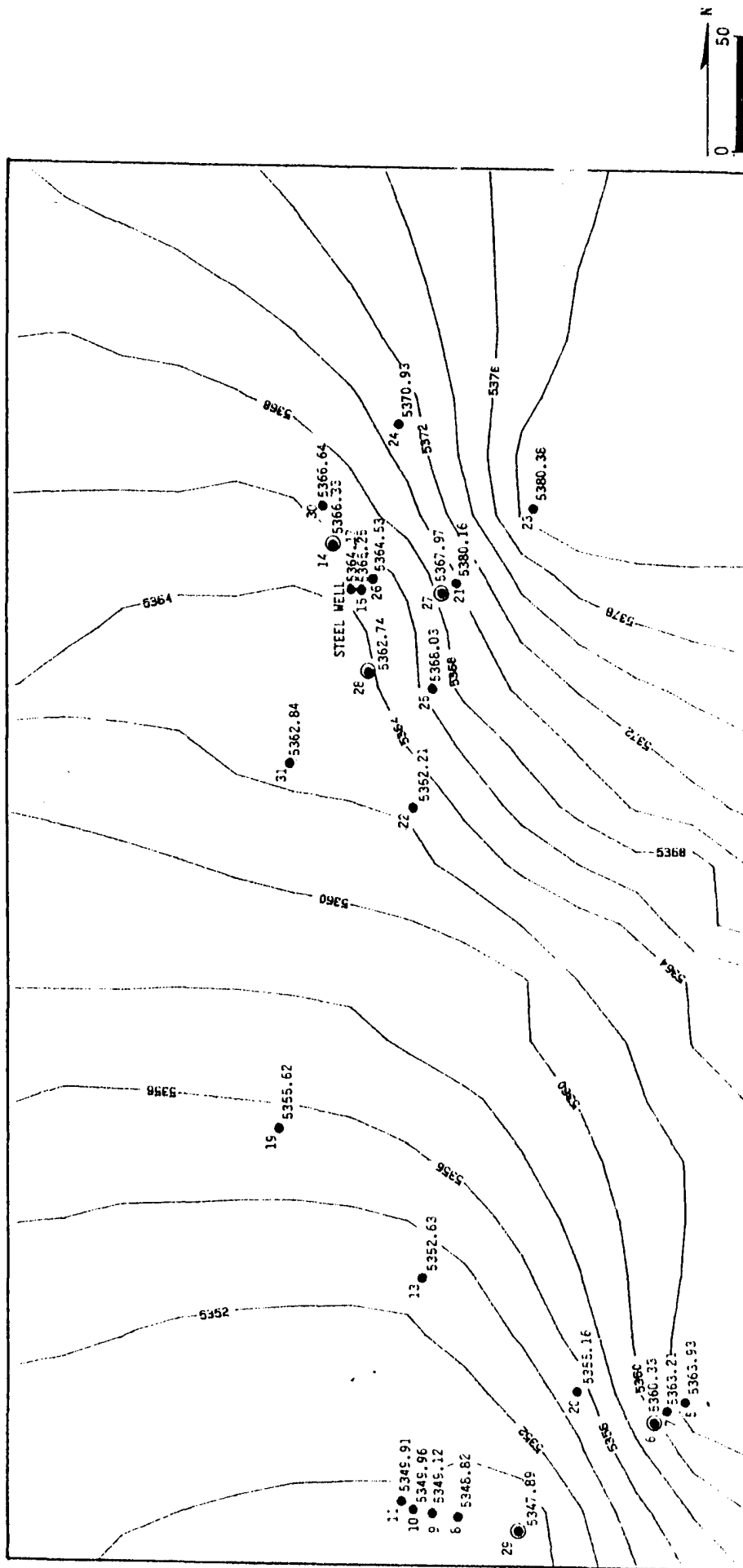
The effects of floating product on the water levels were considered in the maps by multiplying product thickness (Appendix C) by 0.8 and adding the result to the measured water elevation. Product density in the area is approximately 0.8 g/cm^3 (Table 5-2) and this calculation corrects for the difference in density between floating product and water. The result provides a value that is the actual potentiometric surface.

The water-table surface depicted in Figure 5-4 generally conforms to local topography. The ground-water gradient slopes and flows from:

- north to south in the arroyo toward the San Juan River
- northeast to southwest from east of the arroyo
- east to west at the arroyo boundary near the Diesel Spill Area

The water-table contour map presented in this report was generated by computer and represent the probable contour lines as interpreted from a significant number of data points.

Several pump tests were conducted in the Diesel Spill Area and the Southern Refinery Area. Analysis of the pump tests revealed small values of transmissivity and storativity observed near GBR-27 and GBR-14 and much higher values near GBR-29 in the Southern Refinery Area (Table 5-3).



Elevations in Feet above Sea Level, Measured in Monitor and Recovery Wells and Corrected for Floating Product, if Present.

FIGURE 5-4

GROUND WATER LEVEL CONTOUR MAP - GIANT BLOOMFIELD REFINERY, NOV. 1986

TABLE 5-2

GIANT BLOOMFIELD REFINERY
PRODUCT VISCOSITY DATA

<u>WELL NO.</u>	<u>SAMPLE NO.</u>	<u>API GRAVITY</u>	<u>SPECIFIC GRAVITY</u> ¹
GBR 5	8610071647	45.3	0.800
GBR 10	8610071630	46.1	0.797
GBR 11 ²	-----	46.1	0.797
GBR 13	8610071605	43.8	0.807
GBR 21 ²	-----	43.8	0.807
GBR 28	8610071540	34.2	0.854
GBR 29	8610071619	44.2	0.805

Samples Collected By GCL, Analyzed by Ciniza Refining Company

- 1 = at 20°C, calculated from API gravity
2 = determined by visual comparison with
analyzed samples

TABLE 5-3

SUMMARY OF TRANSMISSIVITIES (T)
AND STORATIVITIES (S)
GIANT BLOOMFIELD REFINERY

<u>DIESEL SPILL AREA</u>	<u>T(gpd/ft)</u>	<u>S</u>
GBR 14	792	NA
GBR 15	128	0.0045
GBR 25	387	0.00016
GBR 27	126	NA
 <u>SOUTHERN REFINERY AREA</u>		
GBR 8	2340	0.051
GBR 29	1040	NA

NA = Not Applicable
(S cannot be estimated at pumped wells due to borehole storage effects)

This implies that fine-grained sandstone, shale, and clay are more predominant in the northern part of the Diesel Spill Area and that coarse-grained sandstone dominates the geology in the southern part of the Diesel Spill Area and the Southern Refinery Area. Flow conditions appear to range from confined near GBR-27 where shale is present, to semi-confined near GBR-14 where clay is present, to unconfined near GBR-29, where clay and shale may be intermittently present but do not significantly affect flow. Descriptions of the pump tests and analysis of results are presented below.

5.3.1 Hydraulic Characteristics of the Diesel Spill Area

The first pump test was conducted using GBR-27 which is located in the center of the Diesel Spill Area plume. The well was pumped for 16 hours at a rate of 0.88 gpm on April 30 and May 1, 1986. A 24 hour test was planned but the well was pumped dry and the test was terminated early. The pumped well had a drawdown of 21 ft. at the end of the test, and an observation well 85 ft. away (GBR-25) had a drawdown of 8 inches.

Drawdown and recovery data for this pump test along with plots of drawdown and recovery versus time and a thorough analysis of the data are shown in Appendix D. These data were analyzed by both the Jacob and Theis methods and the following aquifer parameters were obtained using the data from both GBR-27 and GBR-25 correcting for borehole storage effects and for the effects of floating product which was present in GBR-27:

<u>WELL AND TYPE OF ANALYSIS</u>	<u>TRANSMISSIVITY (gpd/ft)</u>	<u>STORATIVITY</u>
GBR-27 Theis	20.2	NA
GBR-25 Theis	183.4	0.00028

Since floating product was not present in GBR-25, its calculated values for transmissivity and storativity are probably more reliable estimates of the consolidated aquifer parameters. For a saturated screened interval of 26 feet, the hydraulic conductivity was estimated to be 0.78 gpd/ft² near well GBR-25. This conductivity is well within the range of that normally encountered in sandstone (Freeze and Cherry, 1979). Storativities estimated on the basis of data from observation well GBR-25 are well within the range of storativities generally associated with confined or partially confined units.

A pump test was conducted using GBR-14 on November 6, 1986, in order to better define the characteristics of the alluvial aquifer in the Diesel Spill Area. GBR-14 was step tested at 1 and 5 gpm and subsequently test pumped at 2 gpm. Even at this low pumping rate, the well was pumped dry after 4 hours.

Data obtained during the pump test along with graphs of drawdown and recovery versus time and a detailed analysis of the data are shown in Appendix D. The graphs prepared from the drawdown data exhibit two distinct inflection points which occur at the end of casing and borehole dewatering.

Transmissivities obtained on the basis of early drawdown data at the pumped well (GBR-14) are fully discussed in Appendix D and are summarized below:

ESTIMATED TRANSMISSIVITY OF THE ALLUVIAL AQUIFER NEAR GBR-14

T (gpd/ft)

Pump Test	Theis Analysis
3 (Q = 5 gpm)	10.4
5 (Q = 2 gpm)	8.8

Using the average of the Theis values, the transmissivity of the alluvial aquifer was estimated at 9.6 gpd/ft. Assuming an average

saturated thickness of 28 ft., this translates into a hydraulic conductivity of 0.34. gpd/ft², which is within the range of conductivity expected for clayey gravel.

Drawdown observed at well GBR-15 was not analyzed because a sufficient number of points are not available to warrant pump test analysis.

Estimated transmissivities for the Diesel Spill Area suggest that the Area is underlain by nonhomogeneous units comprised of sandstone and silty-to-clean sand and gravel.

A combined pump test utilizing GBR-14, GBR-27 and GBR-28 was conducted on November 19-21, 1986, for the purpose of identifying the combined effects of the three wells on the aquifer in the area of the floating product plume. The data from the test is presented in Appendix D along with plots of drawdown verses time for the three pumped wells and 6 observation wells.

No measurable drawdown response was observed in GBR-26 and only small drawdowns were observed in GBR-30 and GBR-39 even though they were each about 50 feet from the pumped wells. These wells were screened within clayey sand or sandy clay located at the base of the alluvium in which GBR-14 was screened. Since there appears to be hydraulic communication between the coarser grained alluvium and the underlying clayey sand and sandy clay layers, as indicated by the response in well GBR-15 which was also screened in these layers, it is likely that silt has migrated through the gravel pack and may be lodged in the screens of the unresponsive wells. Alternatively, there could be a higher incidence of clay or shale between GBR-14 and the unresponsive observation wells than between GBR-14 and GBR-15, but given the closeness of the responsive and unresponsive observation wells this does not appear likely. Due to the nonhomogeneity of the deposits, it was not possible to explicitly separate drawdown effects due to pumping at each well. Analysis of the 3-well pump test data was therefore not performed.

5.3.2 Hydraulic Characteristics of the Southern Refinery Area

A pump test was conducted using GBR-29 in the Southern Refinery Area November 4-7, 1986. The data from this test and thorough analysis are presented in Appendix D.

It was expected from observations during drilling of the well and from the experience of other wells on the site that GBR-29 would probably have a capacity of only about 1 gpm. Test pumping at 1 gpm, however, produced almost no drawdown and a rate of 2 gpm was subsequently used for the test. At 2 gpm, GBR-29 exhibited a drawdown of 9.0 inches after 31 hours and the nearest observation well, GBR-8, had a drawdown of 2.0 inches.

Transmissivity calculated on the basis of data from GBR-29 was estimated as 1042 gpd/ft., while transmissivity and storativity from the observation well (GBR-8) were determined to be 2339 gpd/ft. and 0.051, respectively, as tabulated below:

<u>WELL</u>	<u>T(gpd/ft)</u>	<u>S</u>
GBR-29	1042	NA
GBR-8	2339	0.051

Transmissivities calculated from the test can be viewed as overall transmissivities for the unconfined system occurring throughout the alluvium and sandstone in the absence of containing shale units. An average transmissivity of 1690 gpd/ft. can therefore be used to characterize the unconfined alluvial system underlying the Southern Refinery Area. The larger transmissivity relative to values observed in the Diesel Spill Area suggests that coarse-grained sandstone predominates in the Southern Refinery Area.

It is concluded that the alluvium and sandstone underlying the Southern Refinery Area are hydraulically connected in the vicinity of GBR-29 and GBR-8. This system is generally unconfined, but confined conditions may exist locally beneath shale units of limited areal extent.

5.3.3 Hydrogeologic Characteristics of the Truck Fueling Area

Seven exploratory boreholes were drilled in the Truck Fueling Area. Three of these were developed into 2-inch diameter recovery wells (GBR-22, GBR-34 and GBR-35). A 6-inch diameter recovery well was also installed (GBR-36). The lithologic logs of all the wells and boreholes are presented in Appendix B.

The hydrogeologic characteristics of the Truck Fueling Area are similar to those of the nearby Diesel Spill Area. Since an aquifer analysis was performed previously in the Diesel Spill Area, it was not considered necessary to perform such analysis in the Truck Fueling Area.

5.4 SURFACE WATER HYDROLOGY AND FLOODING POTENTIAL

An unnamed arroyo, which drains the site area, is a tributary to the San Juan River. Surface flow in the San Juan River is controlled by Navajo Dam, which forms a reservoir with a 1,700,000 acre-feet capacity (Stone, et al., 1983). The site area is located downstream from Navajo Dam and upstream from the San Juan/Animas River and the San Juan/La Plata River confluences. Because the Giant Bloomfield Refinery is located 100 feet higher (outside the floodplain of the 100 yr. flood) than the San Juan River, flooding potential from the San Juan is negligible (Appendix E).

The major local drainage is the unnamed arroyo. This ephemeral drainage flows north to south for approximately 22,000 feet at a 0.024 topographic gradient before reaching the refinery area. The volume of water produced by a 100 year flood event (Table 5-4) can be easily contained by this arroyo; therefore no operation or remediation facilities at the refinery are subject to flooding from a 100-year flood event. Cross section B/B' (Plate 2A) illustrates the maximum extent of flooding on a 100-year cycle. The maximum flood extent in cross section B/B' illustrates a worst case scenario in consideration of the choking effects caused by the culvert beneath U.S. Highway 64.

TABLE 5-4

HYDROLOGIC DATA SHEET FOR UNNAMED ARROYO
WEST OF GIANT BLOOMFIELD REFINERY

RECURRENCE INTERVAL:	<u>10 YEARS</u>	<u>25 YEARS</u>	<u>50 YEARS</u>	<u>100 YEARS</u>
Rainfall (24 hour)	1.7 in.	2.0 in.	2.3 in.	2.6 in.
Direct Runoff (Q)	0.40 in.	0.58 in.	0.75 in.	1.0 in.
Net Runoff (Qn)	0.28 in.	0.41 in.	0.53 in.	0.70 in.
Peak Discharge (cfs)	591.72 cfs	866.44 cfs	1120.04 cfs	1479.30 cfs
Volume of Runoff (acre-ft)	94.82 acre-ft	138.85 acre-ft	179.49 acre-ft	237.06 acre-ft

Note: Computations in Appendix E follow methods cited in Chapter 2, U.S.D.A. Soil Conservation Service Engineering Manual for Conservation Practices.

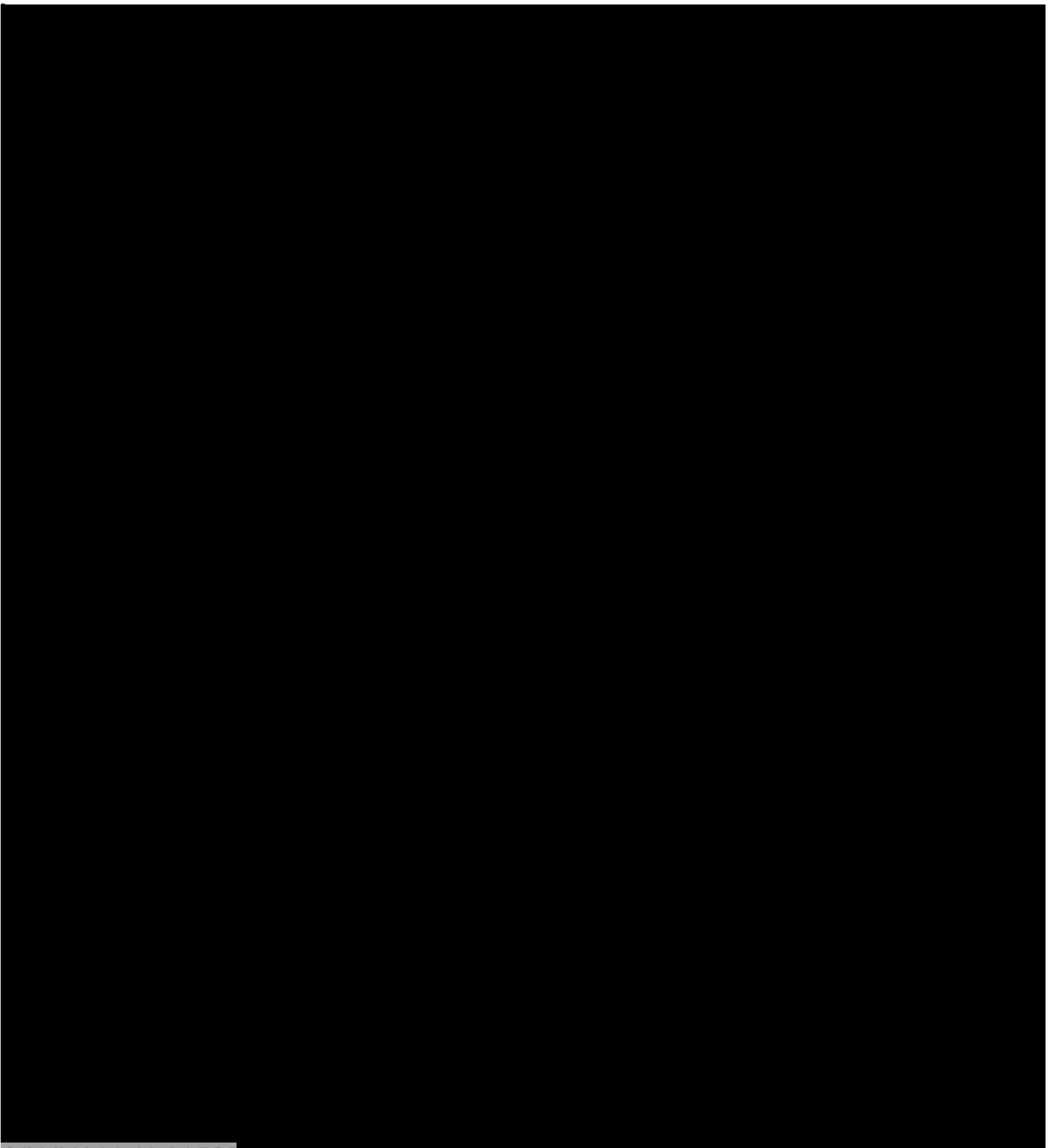
No distinct drainage patterns cut across refinery property. Sheet runoff is the only potential for run-on to remediation facilities. The natural gradient of the site will drain a 100 year runoff event of 2.6 inches in 24 hours (Table 5-4) with limited erosion and ponding.

6.0 MONITORING AND REPORTING

Two elements of the remedial design must be monitored:

- Quality and quantity of discharge
- Aquifer quality

All sampling will be conducted by personnel trained in sampling protocol. All samples will be analyzed pursuant to EPA methods outlined in appropriate guidance documents and in Standard Operating Procedures contained herein. Analytical Technologies (Tempe, AZ) and Radian Corporation (Austin, TX) will be used for most of the analytical services. Should circumstances arise which prohibit the use of the above laboratories, any laboratories selected to perform the analysis will



GW - 40

MONITORING REPORTS

DATE:

1991

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FOURTH QUARTER, 1991

RECEIVED

FEB 20 1992

OIL CONSERVATION DIV.
SANTA FE

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505)632-3306
FAX (505)632-2487

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INTRODUCTION AND SUMMARY QUARTERLY REPORT FOURTH QUARTER, 1991

INTRODUCTION

No significant changes were made to the remediation system during the fourth quarter of 1991. All treated water is being directed toward the infiltration gallery in the old stormwater containment area of the refinery. We continue to monitor its effect on the system. Recovery well SHS-11, part of the offsite recovery well network, has sanded in and is no longer operable. Replacement or repair is on hold pending completion of an offsite report.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevations and product thicknesses, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail on a weekly basis is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FOURTH QUARTER, 1991

STRIPPER INFLUENT	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.28	7.54	7.54
Lab conductivity, umhos/cm	3730.00	3720.00	3720.00
Lab resistivity, ohm-m	2.68	2.69	2.69
Total dissolved solids (180)	2930.00	2830.00	2830.00
Total dissolved solids (calc)	2820.00	2770.00	2770.00
Total alkalinity as CaCO ₃	164.00	267.00	267.00
Total hardness as CaCO ₃	983.00	1050.00	1050.00
Sodium absorption ratio	7.45	6.84	6.84
Bicarbonate as HCO ₃	201.00	326.00	326.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	494.00	413.00	413.00
Sulfate	1310.00	1270.00	1270.00
Calcium	370.00	385.00	385.00
Magnesium	14.60	22.20	22.20
Potassium	2.74	2.69	2.69
Sodium	537.00	510.00	510.00
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	0.50	0.40	0.70
1,2-Dichloroethane	0.50	0.70	0.40
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	3.10	3.20	2.60
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	0.30	0.50	0.20

STRIPPER INFLUENT (continued)

	10/91	11/91	12/91
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	0.20	0.40	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
AROMATICS			
Benzene	17.00	21.00	8.90
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	1.20	2.70	1.50
Toluene	ND	ND	ND
Xylenes	3.40	4.50	1.00
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.68	7.41	7.62
Lab conductivity, umhos/cm	3860.00	4030.00	1360.00
Lab resistivity, ohm-m	2.59	2.48	7.34
Total dissolved solids (180)	2830.00	2840.00	2540.00
Total dissolved solids (calc)	2680.00	2760.00	2670.00
Total alkalinity as CaCO ₃	200.00	144.00	130.00
Total hardness as CaCO ₃	1070.00	983.00	990.00
Sodium absorption ratio	6.32	7.13	6.62
Bicarbonate as HCO ₃	244.00	175.00	159.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	465.00	495.00	521.00
Sulfate	1210.00	1270.00	1200.00
Calcium	381.00	385.00	378.00
Magnesium	28.00	5.65	11.20
Potassium	1.96	2.78	2.44
Sodium	474.00	514.00	479.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	0.20	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	0.30	ND
1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

STRIPPER EFFLUENT (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

GRW-1

AROMATICS

Benzene

Chlorobenzene

1,2-Dichlorobenzene

1,3-Dichlorobenzene

1,4-Dichlorobenzene

Ethylbenzene

Toluene

Xylenes

10/91

11/91

12/91

1.70

2.80

ND

ND

ND

ND

ND

ND

ND

ND

6.90

11.00

2.60

3.50

6.80

4.90

GRW-3

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.72		
Lab conductivity, umhos/cm	4070.00		
Lab resistivity, ohm-m	2.46		
Total dissolved solids (180)	2770.00		
Total dissolved solids (calc)	2850.00		
Total alkalinity as CaCO ₃	888.00		
Total hardness as CaCO ₃	963.00		
Sodium absorption ratio	9.31		
Bicarbonate as HCO ₃	1090.00		
Carbonate as CO ₃	0.00		
Chloride	390.00		
Sulfate	897.00		
Calcium	329.00		
Magnesium	34.70		
Potassium	2.35		
Sodium	664.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	0.40
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.00
1,2-Dichloroethane	ND
1,1-Dichloroethene	1.00
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	7.00
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	10/91	11/91	12/91
AROMATICS			
Benzene	89.00	21.00	8.60
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	57.00	1.20	6.10
Toluene	ND	4.00	3.70
Xylenes	11.00	ND	ND
PAH			
Acenaphthene	ND		
Acenaphthylene	ND		
Anthracene	ND		
Benzo(a)anthracene	ND		
Benzo(a)pyrene	ND		
Benzo(b)fluoranthene	ND		
Benzo(g,h,i)perylene	ND		
Benzo(k)fluoranthene	ND		
Chrysene	ND		
Dibenzo(a,h)anthracene	ND		
Fluoranthene	ND		
Fluorene	3.10		
Indeno(1,2,3-cd)pyrene	ND		
Naphthalene	ND		
Phenanthrene	1.50		
Pyrene	ND		

GRW-4

10/91 11/91 12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.68
Lab conductivity, umhos/cm	3800.00
Lab resistivity, ohm-m	2.63
Total dissolved solids (180)	2280.00
Total dissolved solids (calc)	2240.00
Total alkalinity as CaCO ₃	887.00
Total hardness as CaCO ₃	720.00
Sodium absorption ratio	9.16
Bicarbonate as HCO ₃	1080.00
Carbonate as CO ₃	0.00
Chloride	532.00
Sulfate	339.00
Calcium	248.00
Magnesium	24.60
Potassium	1.17
Sodium	565.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	0.40
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	4.70
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	3.00
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND

GRW-4 (continued)

	10/91	11/91	12/91
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	2.00		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
1,2-Dichloroethene	3.00		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	2.00		
1,1,1-Trichloroethane	2.00		
1,1,2-Trichloroethane	ND		
Trichloroethene	3.00		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	570.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	49.00		
Toluene	3.00		
Xylenes	30.00		

GRW-6

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.73		
Lab conductivity, umhos/cm	4530.00		
Lab resistivity, ohm-m	2.21		
Total dissolved solids (180)	2760.00		
Total dissolved solids (calc)	2810.00		
Total alkalinity as CaCO ₃	700.00		
Total hardness as CaCO ₃	1040.00		
Sodium absorption ratio	8.09		
Bicarbonate as HCO ₃	854.00		
Carbonate as CO ₃	0.00		
Chloride	552.00		
Sulfate	839.00		
Calcium	382.00		
Magnesium	19.80		
Potassium	1.96		
Sodium	598.00		

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.60
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND

GRW-6 (continued)

	10/91	11/91	12/91
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	1.30		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	0.30		
1,2-Dichloroethene	3.70		
1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	1.20		
1,1,1-Trichloroethane	0.70		
1,1,2-Trichloroethane	ND		
Trichloroethene	1.10		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	13.50
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	0.80
Toluene	0.60
Xylenes	ND
Trichlorotrifluoroethane	ND

GRW-13

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab conductivity, umhos/cm	4480.00	4530.00	4343.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	15.50
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GRW-13 (continued)

	10/91	11/91	12/91
PAH			
Acenaphthene	ND		
Acenaphthylene	ND		
Anthracene	ND		
Benzo(a)anthracene	ND		
Benzo(a)pyrene	ND		
Benzo(b)fluoranthene	ND		
Benzo(g,h,i)perylene	ND		
Benzo(k)fluoranthene	ND		
Chrysene	ND		
Dibenzo(a,h)anthracene	ND		
Fluoranthene	ND		
Fluorene	ND		
Indeno(1,2,3-cd)pyrene	ND		
Naphthalene	ND		
Phenanthrene	ND		
Pyrene	ND		

GBR-15

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.41		
Lab conductivity, umhos/cm	4650.00		
Lab resistivity, ohm-m	2.15		
Total dissolved solids (180)	3160.00		
Total dissolved solids (calc)	3080.00		
Total alkalinity as CaCO ₃	273.00		
Total hardness as CaCO ₃	1060.00		
Sodium absorption ratio	7.83		
Bicarbonate as HCO ₃	333.00		
Carbonate as CO ₃	0.00		
Chloride	451.00		
Sulfate	1460.00		
Calcium	381.00		
Magnesium	26.70		
Potassium	7.43		
Sodium	586.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.20
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	2.30
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-15 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	3.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-17

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.21		
Lab conductivity, umhos/cm	2880.00		
Lab resistivity, ohm-m	3.47		
Total dissolved solids (180)	2150.00		
Total dissolved solids (calc)	2160.00		
Total alkalinity as CaCO ₃	240.00		
Total hardness as CaCO ₃	985.00		
Sodium absorption ratio	3.98		
Bicarbonate as HCO ₃	293.00		
Carbonate as CO ₃	0.00		
Chloride	66.20		
Sulfate	1280.00		
Calcium	348.00		
Magnesium	28.60		
Potassium	ND		
Sodium	287.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-17 (continued)

	10/91	10/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-24-D

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.56		
Lab conductivity, umhos/cm	5010.00		
Lab resistivity, ohm-m	20.00		
Total dissolved solids (180)	3860.00		
Total dissolved solids (calc)	3770.00		
Total alkalinity as CaCO ₃	216.00		
Total hardness as CaCO ₃	1950.00		
Sodium absorption ratio	4.80		
Bicarbonate as HCO ₃	264.00		
Carbonate as CO ₃	0.00		
Chloride	797.00		
Sulfate	1620.00		
Calcium	648.00		
Magnesium	82.20		
Potassium	4.30		
Sodium	488.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	1.00
& 1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.50
1,2-Dichloroethane	34.00
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.60
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.40
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-24-D (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	100.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	24.00		
Toluene	10.00		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-30

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.78		
Lab conductivity, umhos/cm	4000.00		
Lab resistivity, ohm-m	2.50		
Total dissolved solids (180)	2890.00		
Total dissolved solids (calc)	2870.00		
Total alkalinity as CaCO3	248.00		
Total hardness as CaCO3	1040.00		
Sodium absorption ratio	7.18		
Bicarbonate as HCO3	303.00		
Carbonate as CO3	0.00		
Chloride	489.00		
Sulfate	1290.00		
Calcium	390.00		
Magnesium	17.00		
Potassium	2.35		
Sodium	533.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-30 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-31

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.30		
Lab conductivity, umhos/cm	4240.00		
Lab resistivity, ohm-m	2.36		
Total dissolved solids (180)	2930.00		
Total dissolved solids (calc)	2900.00		
Total alkalinity as CaCO ₃	240.00		
Total hardness as CaCO ₃	1020.00		
Sodium absorption ratio	7.51		
Bicarbonate as HCO ₃	293.00		
Carbonate as CO ₃	0.00		
Chloride	468.00		
Sulfate	1340.00		
Calcium	356.00		
Magnesium	32.70		
Potassium	1.56		
Sodium	552.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.20
1,2-Dichloroethane	ND
1,2-Dichloroethene	2.70
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.50
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-31 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		

GBR-32

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.17
Lab conductivity, umhos/cm	4360.00
Lab resistivity, ohm-m	2.29
Total dissolved solids (180)	3590.00
Total dissolved solids (calc)	3500.00
Total alkalinity as CaCO3	248.00
Total hardness as CaCO3	1140.00
Sodium absorption ratio	8.56
Fluoride	0.88
Nitrate	0.37
Nitrite	0.03
Bicarbonate as HCO3	303.00
Carbonate as CO3	0.00
Chloride	199.00
Sulfate	2050.00
Calcium	407.00
Magnesium	30.30
Potassium	3.78
Sodium	665.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.60
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	49.00
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	5.20
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	2.50
Trichlorofluoromethane	0.30
Vinyl chloride	ND

GBR-48

10/91 11/91 12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.88
Lab conductivity, umhos/cm	6100.00
Lab resistivity, ohm-m	1.64
Total dissolved solids (180)	4680.00
Total dissolved solids (calc)	4470.00
Total alkalinity as CaCO ₃	377.00
Total hardness as CaCO ₃	1570.00
Sodium absorption ratio	10.00
Fluoride	0.71
Nitrate	8.42
Nitrite	0.04
Bicarbonate as HCO ₃	461.00
Carbonate as CO ₃	0.00
Chloride	873.00
Sulfate	1870.00
Calcium	530.00
Magnesium	58.90
Potassium	4.34
Sodium	912.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	0.50
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	2.70
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	140.00
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	11.00
1,1,1-Trichloroethane	0.50
1,1,2-Trichloroethane	ND
Trichloroethene	7.70
Trichlorofluoromethane	0.40
Vinyl chloride	ND

GBR-49

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.88
Lab conductivity, umhos/cm	5290.00
Lab resistivity, ohm-m	1.89
Total dissolved solids (180)	4200.00
Total dissolved solids (calc)	3840.00
Total alkalinity as CaCO ₃	382.00
Total hardness as CaCO ₃	1510.00
Sodium absorption ratio	8.11
Fluoride	0.52
Nitrate	0.72
Nitrite	0.04
Bicarbonate as HCO ₃	465.00
Carbonate as CO ₃	0.00
Chloride	631.00
Sulfate	1840.00
Calcium	121.00
Magnesium	293.00
Potassium	3.81
Sodium	724.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	6.30
1,2-Dichloroethane	ND
1,1-Dichloroethene	0.30
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	120.00
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	17.00
1,1,1-Trichloroethane	0.70
1,1,2-Trichloroethane	ND
Trichloroethene	12.00
Trichlorofluoromethane	0.20
Vinyl chloride	ND

GBR-50

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.15
Lab conductivity, umhos/cm	3260.00
Lab resistivity, ohm-m	3.07
Total dissolved solids (180)	2780.00
Total dissolved solids (calc)	2630.00
Total alkalinity as CaCO ₃	191.00
Total hardness as CaCO ₃	1000.00
Sodium absorption ratio	5.97
Fluoride	0.95
Nitrate	2.51
Nitrite	0.12
Bicarbonate as HCO ₃	233.00
Carbonate as CO ₃	0.00
Chloride	42.20
Sulfate	1650.00
Calcium	367.00
Magnesium	21.90
Potassium	2.42
Sodium	435.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	0.90
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	0.30
Vinyl chloride	ND

*ND - Not detected at specified detection limit

OFFSITE WELLS

SHS-3

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane ND

Bromoform ND

Bromomethane ND

Carbon tetrachloride ND

Chloroethane ND

2-Chloroethylvinylether ND

Chloroform ND

Chloromethane ND

Dibromochloromethane ND

1,2-Dichlorobenzene ND

1,3-Dichlorobenzene ND

1,4-Dichlorobenzene ND

1,1-Dichloroethane ND

1,2-Dichloroethane ND

1,2-Dichloroethene ND

cis-1,2-Dichloroethene ND

1,2-Dichloroethene ND

1,2-Dichloropropane ND

cis-1,3-Dichloropropene ND

trans-1,3-Dichloropropene ND

Methylene chloride ND

1,1,2,2-Tetrachloroethane ND

Tetrachloroethene ND

1,1,1-Trichloroethane ND

1,1,2-Trichloroethane ND

Trichloroethene ND

Trichlorofluoromethane ND

Vinyl chloride ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	0.60
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-6 (continued)

AROMATICS	10/91	11/91	12/91
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-10

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

ND

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

0.20

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-12

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

0.30

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

0.60

1,2-Dichloroethane

ND

1,2-Dichloroethene

3.20

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

0.90

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

0.40

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-10 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	37.00		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-12 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-13

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

0.90

1,2-Dichloroethane

ND

1,2-Dichloroethene

0.40

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-13 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-15

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

6.50

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-15 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-16 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

*ND - Not detected at specified detection limit

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: October, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	58.30	58.30	0.00	5336.00
GRW-2	5391.28	41.83	41.82	0.01	5349.46
GRW-3	5388.77	53.70	53.70	0.00	5335.07
GRW-4	5390.02	49.75	49.75	0.00	5340.27
GRW-5	5390.56	49.65	49.65	0.00	5340.91
GRW-6	5390.81	44.20	44.20	0.00	5346.61
GRW-10	5395.02	58.84	50.24	8.60	5343.06
GRW-11	5397.85	63.77	63.77	0.00	5334.08
GRW-12	5397.24	46.64	46.64	0.00	5350.60
GRW-13	5396.90	54.13	54.13	0.00	5342.77
GBR-5	5395.07	28.65	26.36	2.29	5368.25
GBR-6	5395.70	60.55	60.55	0.00	5335.15
GBR-7	5395.85	32.93	30.51	2.42	5364.86
GBR-8	5390.50	41.80	41.80	0.00	5348.70
GBR-9	5389.92	47.19	47.19	0.00	5342.73
GBR-10	5390.57	42.15	42.15	0.00	5348.42
GBR-11	5389.43	42.08	40.85	1.23	5348.33
GBR-13	5393.04	36.20	36.20	0.00	5356.84
GBR-15	5397.99	42.24	42.24	0.00	5355.75
GBR-17	5402.69	34.36	34.36	0.00	5368.33
GBR-18	5421.68	23.04	23.04	0.00	5398.64
GBR-19	5393.83	38.78	38.78	0.00	5355.05
GBR-20	5393.47	41.84	38.00	3.84	5354.70
GBR-21S	5400.65	19.81	19.70	0.11	5380.93
GBR-21D	5400.19	35.12	35.12	0.00	5365.07
GBR-22	5395.91	38.35	35.36	2.99	5359.95
GBR-23	5403.72	22.02	22.02	0.00	5381.70
GBR-24S	5396.08	26.80	26.09	0.71	5369.85
GBR-24D	5396.77	31.25	31.25	0.00	5365.52
GBR-25	5396.72	30.35	30.35	0.00	5366.37
GBR-26	5395.59	36.00	36.00	0.00	5359.59
GBR-30	5396.58	32.62	32.62	0.00	5363.96
GBR-31	5394.86	34.43	34.43	0.00	5360.43
GBR-33	5396.28	37.38	37.37	0.01	5358.91
GBR-34	5394.00	35.20	34.99	0.21	5358.97
GBR-35	5393.66	35.20	34.90	0.30	5358.70
GBR-39	5397.55	35.32	35.32	0.00	5362.23
GBR-40	5400.76	27.74	27.74	0.00	5373.02
GBR-41	5396.35	20.96	20.96	0.00	5375.39
GBR-51	5389.68	40.20	40.20	0.00	5349.48
GBR-52	5387.74	38.58	38.58	0.00	5349.16

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: October, 1991
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WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.02	40.94	0.08	5342.58
SHS-2	5381.66	36.80	36.80	0.00	5344.86
SHS-3	5383.33	35.80	35.80	0.00	5347.53
SHS-4	5383.62	41.01	41.01	0.00	5342.61
SHS-5	5378.36	38.29	38.29	0.00	5340.07
SHS-6	5378.17	35.40	35.40	0.00	5342.77
SHS-7	5378.77	39.52	38.72	0.80	5339.89
SHS-8	5380.25	38.60	38.60	0.00	5341.65
SHS-9	5380.79	44.60	44.60	0.00	5336.19
SHS-10	5373.80	37.18	37.18	0.00	5336.62
SHS-11	5373.17	46.12	46.12	0.00	5327.05
SHS-12	5373.94	40.22	40.22	0.00	5333.72
SHS-13	5367.81	37.15	37.15	0.00	5330.66
SHS-14	5367.07	45.08	45.08	0.00	5321.99
SHS-15	5366.21	34.49	34.49	0.00	5331.72
SHS-16	5362.58	32.18	32.18	0.00	5330.40

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GW - 40

MONITORING REPORTS

DATE:

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GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: November, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.10	59.10	0.00	5335.20
GRW-2	5391.28	64.06	64.06	0.00	5327.22
GRW-3	5388.77	53.37	53.37	0.00	5335.40
GRW-4	5390.02	47.93	47.93	0.00	5342.09
GRW-5	5390.56	59.60	59.60	0.00	5330.96
GRW-6	5390.81	48.08	48.08	0.00	5342.73
GRW-10	5395.02	57.25	47.65	9.60	5345.45
GRW-11	5397.85	64.20	64.20	0.00	5333.65
GRW-12	5397.24	46.91	46.91	0.00	5350.33
GRW-13	5396.90	55.18	55.18	0.00	5341.72
GBR-5	5395.07	28.63	26.35	2.28	5368.26
GBR-6	5395.70	60.95	60.95	0.00	5334.75
GBR-7	5395.85	33.34	30.93	2.41	5364.44
GBR-8	5390.50	42.00	42.00	0.00	5348.50
GBR-9	5389.92	47.57	47.57	0.00	5342.35
GBR-10	5390.57	42.18	42.18	0.00	5348.39
GBR-11	5389.43	42.34	40.96	1.38	5348.19
GBR-13	5393.04	39.30	39.30	0.00	5353.74
GBR-15	5397.99	42.42	42.42	0.00	5355.57
GBR-17	5402.69	34.43	34.43	0.00	5368.26
GBR-18	5421.68	23.06	23.06	0.00	5398.62
GBR-19	5393.83	38.90	38.90	0.00	5354.93
GBR-20	5393.47	42.38	38.48	3.90	5354.21
GBR-21S	5400.65	19.80	19.71	0.09	5380.92
GBR-21D	5400.19	35.20	35.20	0.00	5364.99
GBR-22	5395.91	38.37	35.35	3.02	5359.96
GBR-23	5403.72	22.00	22.00	0.00	5381.72
GBR-24S	5396.08	26.76	25.99	0.77	5369.94
GBR-24D	5396.77	31.03	31.03	0.00	5365.74
GBR-25	5396.72	30.13	30.13	0.00	5366.59
GBR-26	5395.59	36.19	36.19	0.00	5359.40
GBR-30	5396.58	32.80	32.80	0.00	5363.78
GBR-31	5394.86	34.42	34.42	0.00	5360.44
GBR-33	5396.28	37.38	37.38	0.00	5358.90
GBR-34	5394.00	35.24	35.00	0.24	5358.95
GBR-35	5393.66	35.32	34.90	0.42	5358.68
GBR-39	5397.55	35.75	35.75	0.00	5361.80
GBR-40	5400.76	28.75	28.75	0.00	5372.01
GBR-41	5396.35	21.54	21.54	0.00	5374.81
GBR-51	5389.68	40.30	40.30	0.00	5349.38
GBR-52	5387.74	38.68	38.68	0.00	5349.06

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: November, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.14	41.02	0.12	5342.50
SHS-2	5381.66	36.88	36.88	0.00	5344.78
SHS-3	5383.33	35.82	35.82	0.00	5347.51
SHS-4	5383.62	41.13	41.13	0.00	5342.49
SHS-5	5378.36	38.38	38.38	0.00	5339.98
SHS-6	5378.17	38.49	38.49	0.00	5339.68
SHS-7	5378.77	39.72	38.80	0.92	5339.79
SHS-8	5380.25	38.69	38.69	0.00	5341.56
SHS-9	5380.79	44.56	44.56	0.00	5336.23
SHS-10	5373.80	37.20	37.20	0.00	5336.60
SHS-11	5373.17	46.12	46.12	0.00	5327.05
SHS-12	5373.94	40.35	40.35	0.00	5333.59
SHS-13	5367.81	37.29	37.29	0.00	5330.52
SHS-14	5367.07	45.74	45.74	0.00	5321.33
SHS-15	5366.21	34.50	34.50	0.00	5331.71
SHS-16	5362.58	32.24	32.24	0.00	5330.34

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

[illegible]

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: December, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.17	60.17	0.00	5334.13
GRW-2	5391.28	49.95	49.95	0.00	5341.33
GRW-3	5388.77	52.50	52.50	0.00	5336.27
GRW-4	5390.02	49.70	49.70	0.00	5340.32
GRW-5	5390.56	47.00	47.00	0.00	5343.56
GRW-6	5390.81	46.28	46.28	0.00	5344.53
GRW-10	5395.02	53.20	48.50	4.70	5345.58
GRW-11	5397.85	31.14	31.14	0.00	5366.71
GRW-12	5397.24	46.38	46.38	0.00	5350.86
GRW-13	5396.90	56.48	56.48	0.00	5340.42
GBR-5	5395.07	29.43	27.06	2.37	5367.54
GBR-6	5395.70	61.30	61.30	0.00	5334.40
GBR-7	5395.85	34.03	31.56	2.47	5363.80
GBR-8	5390.50	42.13	42.10	0.03	5348.39
GBR-9	5389.92	49.67	49.67	0.00	5340.25
GBR-10	5390.57	42.19	42.19	0.00	5348.38
GBR-11	5389.43	42.45	41.10	1.35	5348.06
GBR-13	5393.04	39.66	39.66	0.00	5353.38
GBR-15	5397.99	34.62	34.62	0.00	5363.37
GBR-17	5402.69	34.45	34.45	0.00	5368.24
GBR-18	5421.68	22.93	22.93	0.00	5398.75
GBR-19	5393.83	38.86	38.86	0.00	5354.97
GBR-20	5393.47	42.78	38.95	3.83	5353.75
GBR-21S	5400.65	19.76	19.70	0.06	5380.94
GBR-21D	5400.19	30.17	30.17	0.00	5370.02
GBR-22	5395.91	39.10	35.02	4.08	5360.07
GBR-23	5403.72	21.92	21.92	0.00	5381.80
GBR-24S	5396.08	25.90	23.40	2.50	5372.18
GBR-24D	5396.77	28.60	28.60	0.00	5368.17
GBR-25	5396.72	28.13	28.13	0.00	5368.59
GBR-26	5395.59	33.01	33.01	0.00	5362.58
GBR-30	5396.58	32.64	32.64	0.00	5363.94
GBR-31	5394.86	34.44	34.44	0.00	5360.42
GBR-33	5396.28	37.34	37.34	0.00	5358.94
GBR-34	5394.00	35.09	34.94	0.15	5359.03
GBR-35	5393.66	34.96	34.94	0.02	5358.72
GBR-39	5397.55	34.35	34.35	0.00	5363.20
GBR-40	5400.76	29.40	29.40	0.00	5371.36
GBR-41	5396.35	22.15	22.15	0.00	5374.20
GBR-51	5389.68	40.25	40.25	0.00	5349.43
GBR-52	5387.74	38.54	38.54	0.00	5349.20

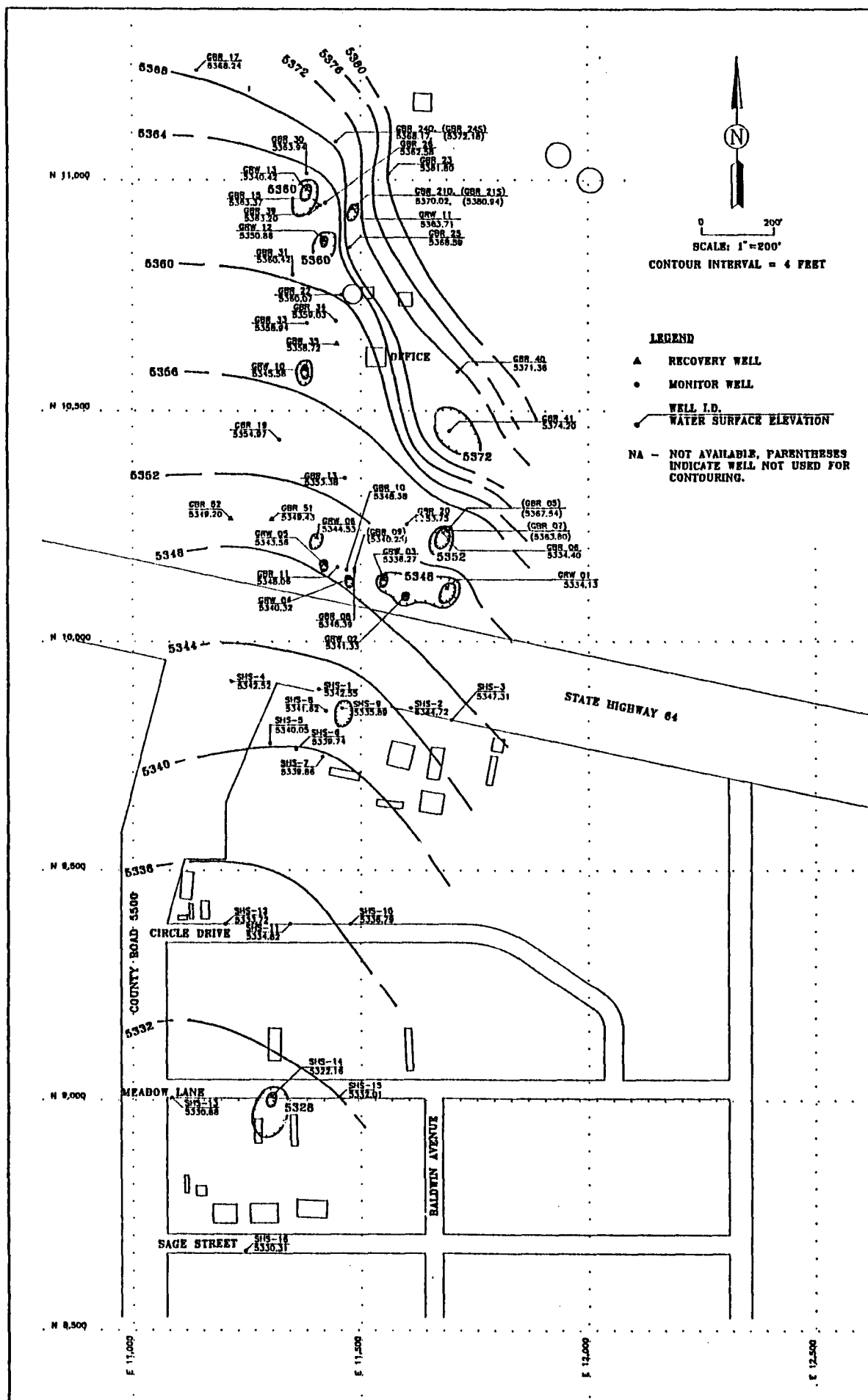
* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: December, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.07	40.97	0.10	5342.55
SHS-2	5381.66	36.94	36.94	0.00	5344.72
SHS-3	5383.33	36.02	36.02	0.00	5347.31
SHS-4	5383.62	41.10	41.10	0.00	5342.52
SHS-5	5378.36	38.31	38.31	0.00	5340.05
SHS-6	5378.17	38.43	38.43	0.00	5339.74
SHS-7	5378.77	39.58	38.74	0.84	5339.86
SHS-8	5380.25	38.63	38.63	0.00	5341.62
SHS-9	5380.79	44.90	44.90	0.00	5335.89
SHS-10	5373.80	37.01	37.01	0.00	5336.79
SHS-11	5373.17	38.35	38.35	0.00	5334.82
SHS-12	5373.94	40.22	40.22	0.00	5333.72
SHS-13	5367.81	37.13	37.13	0.00	5330.68
SHS-14	5367.07	44.91	44.91	0.00	5322.16
SHS-15	5366.21	34.20	34.20	0.00	5332.01
SHS-16	5362.58	32.27	32.27	0.00	5330.31

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

December 1991, Water Surface Contour Map
Giant-Bloomfield Refinery



Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Fourth Quarter, 1991

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Total Volume Of Water Recovered	1877501
Net Change In Storage Volume	-62528
Total Water Pumped To The Infiltration Gallery	1747586

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=====
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Difference	-192443
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Comments: The approximately 10% difference
can be accounted for in meter
error.

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Fourth Quarter, 1991

Tank Number	Beginning Volume	Ending Volume	Net Change
102	16763	15073	-1690
106	8010	8010	0
21	218449	247673	29224
22	331759	241697	-90062
27	182470	182470	0
32	88634	88634	0
34	87541	87541	0
35	0	0	0
37	138051	138051	0
Total Net Volume Change			-62528

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Fourth Quarter, 1991

	Well	Month #1	Month #2	Month #3	Total
	GRW-1	10760	7760	7850	26370
	GRW-2	7560	6340	6370	20270
	GRW-3	14350	11750	12310	38410
	GRW-4	22010	17950	16080	56040
	GRW-5	58150	49830	54800	162780
	GRW-6	16080	13980	18540	48600
	GRW-9	8510	6950	7150	22610
	GRW-10	316030	245720	236640	798390
	GRW-11	42060	9390	16590	68040
	GRW-12	2650	16630	20460	39740
	GRW-13	30600	25490	28870	84960
	SHS-9	6072	5171	5320	16563
	SHS-11	4133	1664	0	5797
	SHS-14	181165	148713	159053	488931
Total Volume Pumped In Gallons					1877501

SPECIFIC CONDUCTANCE VALUES

GRW-13

	10/91	11/91	12/91
Lab conductivity, umhos/cm	4480.00	4530.00	4343.00



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11284501

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GEOSCIENCE CONSULTANTS
 PROJECT # : C.O.C.4158
 PROJECT NAME : GIANT
 CLIENT I.D. : 9112161250 GBR 50
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/16/91
 DATE RECEIVED : 12/18/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 12/20/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.9
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	0.3
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	90
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11284502

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GEOSCIENCE CONSULTANTS
 PROJECT # : C.O.C.4158
 PROJECT NAME : GIANT
 CLIENT I.D. : 9112161400 GBR 32
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/16/91
 DATE RECEIVED : 12/18/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 12/20/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.6
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	49
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	5.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	2.5
TRICHLOROFLUOROMETHANE	0.3
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	95



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11284503

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GEOSCIENCE CONSULTANTS
 PROJECT # : C.O.C.4158
 PROJECT NAME : GIANT
 CLIENT I.D. : 9112161500 GBR 49
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/16/91
 DATE RECEIVED : 12/18/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 12/20/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	6.3
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	0.3
1,2-DICHLOROETHENE (TOTAL)	120 D
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	17
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.7
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	12
TRICHLOROFLUOROMETHANE	0.2
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	95



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11284504

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GEOSCIENCE CONSULTANTS
 PROJECT # : C.O.C.4158
 PROJECT NAME : GIANT
 CLIENT I.D. : 9112161130 GBR 48
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/16/91
 DATE RECEIVED : 12/18/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 12/20/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.5
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	2.7
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	140 D
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	11
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.5
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	7.7
TRICHLOROFLUOROMETHANE	0.4
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

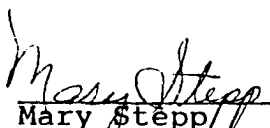
SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	90

2506 W. Main Street
Farmington, New Mexico 87401CLIENT: Geo Science Consultants
ID: 1250
SITE: GBR - 50
LAB NO: F7774DATE REPORTED: 01/02/92
DATE RECEIVED: 12/18/91
DATE COLLECTED: 12/16/91

Lab pH (s.u.).....	8.15
Lab Conductivity, umhos/cm @ 25C....	3260
Lab Resistivity, ohm-m.....	3.07
Total Dissolved Solids (180C), mg/L.	2780
Total Dissolved Solids (calc), mg/L.	2630
Total Alkalinity as CaCO ₃ , mg/L.....	191
Total Hardness as CaCO ₃ , mg/L.....	1000
Sodium Adsorption Ratio.....	5.97
Fluoride, mg/L.....	0.95
Nitrate, mg/L.....	2.51
Nitrite, mg/L.....	0.12

	mg/L	meq/L
Bicarbonate as HCO ₃	233	3.82
Carbonate as CO ₃	0	0
Chloride.....	42.2	1.19
Sulfate.....	1650	34.4
Calcium.....	367	18.3
Magnesium.....	21.9	1.8
Potassium.....	2.42	0.06
Sodium.....	435	18.9
Major Cations.....		39.1
Major Anions.....		39.6
Cation/Anion Difference.....		0.63 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

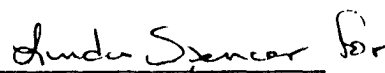
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Geo Science Consultants DATE REPORTED: 01/02/92
ID: 1130
SITE: GBR - 48 DATE RECEIVED: 12/18/91
LAB NO: F7773 DATE COLLECTED: 12/16/91

Lab pH (s.u.).....	7.88
Lab Conductivity, umhos/cm @ 25C....	6100
Lab Resistivity, ohm-m.....	1.64
Total Dissolved Solids (180C), mg/L.	4680
Total Dissolved Solids (calc), mg/L.	4470
Total Alkalinity as CaCO ₃ , mg/L.....	377
Total Hardness as CaCO ₃ , mg/L.....	1570
Sodium Adsorption Ratio.....	10.0
Fluoride, mg/L.....	0.71
Nitrate, mg/L.....	8.42
Nitrite, mg/L.....	0.04

	mg/L	meq/L
Bicarbonate as HCO ₃	461	7.55
Carbonate as CO ₃	0	0
Chloride.....	873	24.6
Sulfate.....	1870	38.9
Calcium.....	530	26.5
Magnesium.....	58.9	4.85
Potassium.....	4.34	0.11
Sodium.....	912	39.7
Major Cations.....		71.1
Major Anions.....		71.7
Cation/Anion Difference.....		0.43 %


Mary Stepp
Lab Director

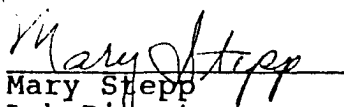

Wanda Orso
Water Lab Supervisor

2500 W. Main Street
Farmington, New Mexico 87401

CLIENT: Geo Science Consultants DATE REPORTED: 01/02/92
ID: 1400
SITE: GBR - 32 DATE RECEIVED: 12/18/91
LAB NO: F7772 DATE COLLECTED: 12/16/91

Lab pH (s.u.)..... 8.17
Lab Conductivity, umhos/cm @ 25C.... 4360
Lab Resistivity, ohm-m..... 2.29
Total Dissolved Solids (180C), mg/L. 3590
Total Dissolved Solids (calc), mg/L. 3500
Total Alkalinity as CaCO₃, mg/L..... 248
Total Hardness as CaCO₃, mg/L..... 1140
Sodium Adsorption Ratio..... 8.56
Fluoride, mg/L..... 0.88
Nitrate, mg/L..... 0.37
Nitrite, mg/L..... 0.03

	mg/L	meq/L
Bicarbonate as HCO ₃	303	4.96
Carbonate as CO ₃	0	0
Chloride.....	199	5.61
Sulfate.....	2050	42.7
Calcium.....	407	20.3
Magnesium.....	30.3	2.49
Potassium.....	3.78	0.1
Sodium.....	665	28.9
Major Cations.....		51.8
Major Anions.....		53.3
Cation/Anion Difference.....		1.39 %


Mary Stepp
Lab Director


Wanda Orsol
Water Lab Supervisor

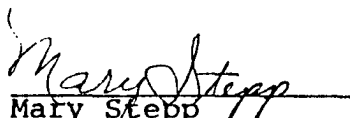
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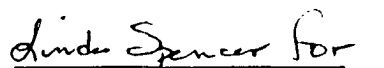
2906 W. Main Street
Farmington, New Mexico 87401

CLIENT: Geo Science Consultants DATE REPORTED: 01/02/92
ID: 1500
SITE: GBR - 49 DATE RECEIVED: 12/18/91
LAB NO: F7771 DATE COLLECTED: 12/16/91

Lab pH (s.u.)..... 7.88
Lab Conductivity, umhos/cm @ 25C.... 5290
Lab Resistivity, ohm-m..... 1.89
Total Dissolved Solids (180C), mg/L. 4200
Total Dissolved Solids (calc), mg/L. 3840
Total Alkalinity as CaCO₃, mg/L..... 382
Total Hardness as CaCO₃, mg/L..... 1510
Sodium Adsorption Ratio..... 8.11
Fluoride, mg/L..... 0.52
Nitrate, mg/L..... 0.72
Nitrite, mg/L..... 0.04

	mg/L	meq/L
Bicarbonate as HCO ₃	465	7.63
Carbonate as CO ₃	0	0
Chloride.....	631	17.8
Sulfate.....	1840	38.2
Calcium.....	121	6.03
Magnesium.....	293	24.1
Potassium.....	3.81	0.10
Sodium.....	724	31.5
Major Cations.....		61.7
Major Anions.....		63.7
Cation/Anion Difference.....		1.58 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 0835
SITE: Stripper Influent
LAB NO: F7638

DATE REPORTED: 12/02/91
DATE RECEIVED: 11/11/91
DATE COLLECTED: 11/11/91

Lab pH (s.u.)..... 7.54
Lab conductivity, umhos/cm..... 3720
Lab resistivity, ohm-m..... 2.69
Total dissolved solids (180), mg/L.. 2830
Total dissolved solids (calc), mg/L. 2770
Total alkalinity as CaCO₃, mg/L..... 267
Total hardness as CaCO₃, mg/L..... 1050
Sodium adsorption ratio..... 6.84

	mg/L	meq/L
Bicarbonate as HCO ₃	326	5.34
Carbonate as CO ₃	0	0
Chloride.....	413	11.6
Sulfate.....	1270	26.6
Calcium.....	385	19.2
Magnesium.....	22.2	1.83
Potassium.....	2.69	0.07
Sodium.....	510	22.2
Major cations.....		43.3
Major anions.....		43.5
Cation/anion difference.....		0.3 %

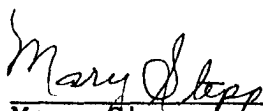

Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401CLIENT: Giant Refinery
ID: 0810
SITE: Stripper Influent
LAB NO: F7637DATE REPORTED: 12/02/91
DATE RECEIVED: 11/08/91
DATE COLLECTED: 11/08/91

Lab pH (s.u.).....	7.41
Lab conductivity, umhos/cm.....	4030
Lab resistivity, ohm-m.....	2.48
Total dissolved solids (180), mg/L..	2840
Total dissolved solids (calc), mg/L.	2760
Total alkalinity as CaCO ₃ , mg/L.....	144
Total hardness as CaCO ₃ , mg/L.....	983
Sodium adsorption ratio.....	7.13

	mg/L	meq/L
Bicarbonate as HCO ₃	175	2.87
Carbonate as CO ₃	0	0
Chloride.....	495	14
Sulfate.....	1270	26.4
Calcium.....	385	19.2
Magnesium.....	5.65	0.46
Potassium.....	2.78	0.07
Sodium.....	514	22.4
Major cations.....		42.1
Major anions.....		43.2
Cation/anion difference.....		1.35 %

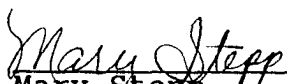

Mary Stepp
Lab Director
Wanda Orso
Water Lab Supervisor

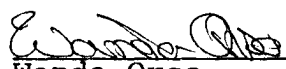
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 1558
SITE: RW 13
LAB NO: F7625

DATE REPORTED: 12/02/91
DATE RECEIVED: 11/07/91
DATE COLLECTED: 11/06/91

Lab conductivity, umhos/cm..... 4530


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 1430
SITE: Stripper Influent
LAB NO: F7624

DATE REPORTED: 12/02/91
DATE RECEIVED: 11/07/91
DATE COLLECTED: 10/31/91

Lab pH (s.u.).....	7.28
Lab conductivity, umhos/cm.....	3730
Lab resistivity, ohm-m.....	2.68
Total dissolved solids (180), mg/L..	2930
Total dissolved solids (calc), mg/L.	2820
Total alkalinity as CaCO ₃ , mg/L.....	164
Total hardness as CaCO ₃ , mg/L.....	983
Sodium adsorption ratio.....	7.45

	mg/L	meq/L
Bicarbonate as HC0 ₃	201	3.29
Carbonate as C0 ₃	0	0
Chloride.....	494	13.9
Sulfate.....	1310	27.2
Calcium.....	370	18.5
Magnesium.....	14.6	1.2
Potassium.....	2.74	0.07
Sodium.....	537	23.4
Major cations.....		43.1
Major anions.....		44.4
Cation/anion difference.....		1.51 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

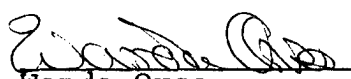
CLIENT: Giant Refinery
ID: 911011837
SITE: Stripper Influent
LAB NO: F7519

DATE REPORTED: 10/31/91
DATE RECEIVED: 10/11/91
DATE COLLECTED: 10/11/91

Lab pH (s.u.)..... 7.21
Lab conductivity, umhos/cm..... 3850
Lab resistivity, ohm-m..... 2.6
Total dissolved solids (180), mg/L.. 2890
Total dissolved solids (calc), mg/L. 2740
Total alkalinity as CaCO₃, mg/L..... 225
Total hardness as CaCO₃, mg/L..... 1090
Sodium absorption ratio..... 6.47

	mg/L	meq/L
Bicarbonate as HCO ₃	274	4.49
Carbonate as CO ₃	0	0
Chloride.....	422	11.9
Sulfate.....	1270	26.5
Calcium.....	380	19
Magnesium.....	34.6	2.85
Potassium.....	2.74	0.07
Sodium.....	492	21.4
Major cations.....		43.3
Major anions.....		42.9
Cation/anion difference.....		0.38 %


Mary Stepp
Lab Director

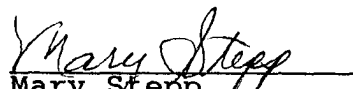

Wanda Orso
Water Lab Supervisor

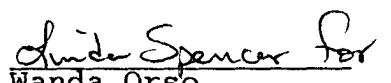
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery DATE REPORTED: 01/03/92
ID: 0813
SITE: Stripper Effluent DATE RECEIVED: 12/23/91
LAB NO: F7792 DATE COLLECTED: 12/23/91

Lab pH (s.u.)..... 7.62
Lab Conductivity, umhos/cm @ 25C.... 1360
Lab Resistivity, ohm-m..... 7.34
Total Dissolved Solids (180C), mg/L. 2540
Total Dissolved Solids (calc), mg/L. 2670
Total Alkalinity as CaCO₃, mg/L..... 130
Total Hardness as CaCO₃, mg/L..... 990
Sodium Adsorption Ratio..... 6.62

	mg/L	meq/L
Bicarbonate as HCO ₃	159	2.61
Carbonate as CO ₃	0	0
Chloride.....	521	14.7
Sulfate.....	1200	25
Calcium.....	378	18.9
Magnesium.....	11.2	0.92
Potassium.....	2.44	0.06
Sodium.....	479	20.8
Major Cations.....		40.7
Major Anions.....		42.3
Cation/Anion Difference.....		1.89 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

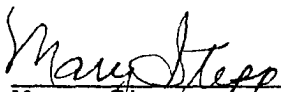
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 1202
SITE: Stripper Influent
LAB NO: F7724

DATE REPORTED: 12/19/91
DATE RECEIVED: 12/09/91
DATE COLLECTED: 12/09/91

Lab pH (s.u.)..... 6.62
Lab conductivity, umhos/cm..... 3660
Lab resistivity, ohm-m..... 2.73
Total dissolved solids (180), mg/L.. 2720
Total dissolved solids (calc), mg/L. 2710
Total alkalinity as CaCO₃, mg/L..... 263
Total hardness as CaCO₃, mg/L..... 1040
Sodium adsorption ratio..... 6.97

	mg/L	meq/L
Bicarbonate as HCO ₃	321	5.26
Carbonate as CO ₃	0	0
Chloride.....	416	11.7
Sulfate.....	1220	25.4
Calcium.....	364	18.2
Magnesium.....	31.4	2.58
Potassium.....	2.69	0.07
Sodium.....	516	22.4
Major cations.....		43.3
Major anions.....		42.4
Cation/anion difference.....		1.05 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11162601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 911111835 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 11/11/91
 DATE RECEIVED : 11/12/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 11/13/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	21
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.4
1,2-DICHLOROETHANE	0.7
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	2.7
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	4.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11160701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 911108810 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 11/08/91
 DATE RECEIVED : 11/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 11/13/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.3
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	92



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11268401

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 12/09/91
PROJECT #	: 9834	DATE RECEIVED	: 12/11/91
PROJECT NAME	: REFINERY REM	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9112091202 STRIPPER INFLUENT	DATE ANALYZED	: 12/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	8.9
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
1-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.7
1,2-DICHLOROETHANE	0.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	1.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	1.0
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

1-BROMOCHLOROMETHANE (%)	85
BROMOFLUOROBENZENE (%)	80

2506 W. Main Street
Farmington, New Mexico 87401CLIENT: Giant Refinery
ID: 9110011039
SITE: GBR -17
LAB NO: F7447DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.21
Lab conductivity, umhos/cm.....	2880
Lab resistivity, ohm-m.....	3.47
Total dissolved solids (180), mg/L..	2150
Total dissolved solids (calc), mg/L.	2160
Total alkalinity as CaCO ₃ , mg/L.....	240
Total hardness as CaCO ₃ , mg/L.....	985
Sodium absorption ratio.....	3.98

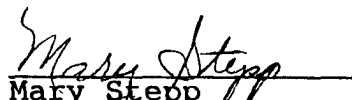
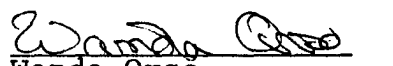
	mg/L	meq/L
Bicarbonate as HCO ₃	293	4.8
Carbonate as CO ₃	0	0
Chloride.....	66.2	1.87
Sulfate.....	1280	26.7
Calcium.....	348	17.4
Magnesium.....	28.6	2.35
Potassium.....	<0.1	<0.01
Sodium.....	287	12.5
Major cations.....		32.2
Major anions.....		33.4
Cation/anion difference.....		1.82 %


Mary Stepp
Lab Director
Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401CLIENT: Giant Refinery
ID: 9110011200
SITE: GBR -15
LAB NO: F7448DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.41
Lab conductivity, umhos/cm.....	4650
Lab resistivity, ohm-m.....	2.15
Total dissolved solids (180), mg/L..	3160
Total dissolved solids (calc), mg/L.	3080
Total alkalinity as CaCO ₃ , mg/L.....	273
Total hardness as CaCO ₃ , mg/L.....	1060
Sodium absorption ratio.....	7.83

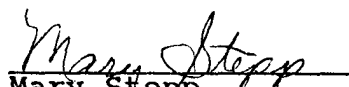
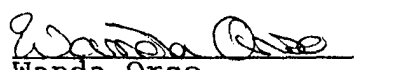
	mg/L	meq/L
Bicarbonate as HCO ₃	333	5.46
Carbonate as CO ₃	0	0
Chloride.....	451	12.7
Sulfate.....	1460	30.5
Calcium.....	381	19
Magnesium.....	26.7	2.19
Potassium.....	7.43	0.19
Sodium.....	586	25.5
Major cations.....		46.9
Major anions.....		48.6
Cation/anion difference.....		1.8 %


Mary Stepp
Lab Director
Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401CLIENT: Giant Refinery
ID: 9110011256
SITE: GBR -31
LAB NO: F7449DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.30
Lab conductivity, umhos/cm.....	4240
Lab resistivity, ohm-m.....	2.36
Total dissolved solids (180), mg/L..	2930
Total dissolved solids (calc), mg/L.	2900
Total alkalinity as CaCO ₃ , mg/L.....	240
Total hardness as CaCO ₃ , mg/L.....	1020
Sodium absorption ratio.....	7.51

	mg/L	meq/L
Bicarbonate as HCO ₃	293	4.8
Carbonate as CO ₃	0	0
Chloride.....	468	13.2
Sulfate.....	1340	28
Calcium.....	356	17.8
Magnesium.....	32.7	2.69
Potassium.....	1.56	0.04
Sodium.....	552	24
Major cations.....		44.5
Major anions.....		46
Cation/anion difference.....		1.65 %


Mary Stepp
Lab Director
Wanda Orso
Water Lab Supervisor

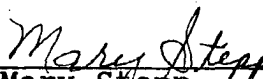
2506 W. Main Street
Farmington, New Mexico 87401

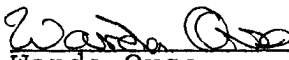
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ID: 9110011308
SITE: Stripper Effluent
LAB NO: F7450

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.)..... 7.68
Lab conductivity, umhos/cm..... 3860
Lab resistivity, ohm-m..... 2.59
Total dissolved solids (180), mg/L.. 2830
Total dissolved solids (calc), mg/L. 2680
Total alkalinity as CaCO₃, mg/L..... 200
Total hardness as CaCO₃, mg/L..... 1070
Sodium absorption ratio..... 6.32

	mg/L	meq/L
Bicarbonate as HC03.....	244	4
Carbonate as C03.....	0	0
Chloride.....	465	13.1
Sulfate.....	1210	25.2
Calcium.....	381	19
Magnesium.....	28	2.3
Potassium.....	1.96	0.05
Sodium.....	474	20.6
Major cations.....		42
Major anions.....		42.3
Cation/anion difference.....		0.39 %

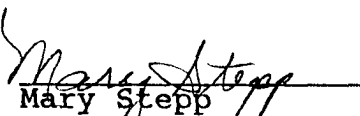
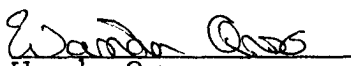

Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401CLIENT: Giant Refinery
ID: 9110011421
SITE: GBR -24D
LAB NO: F7451DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.56
Lab conductivity, umhos/cm.....	5010
Lab resistivity, ohm-m.....	2
Total dissolved solids (180), mg/L..	3860
Total dissolved solids (calc), mg/L.	3770
Total alkalinity as CaCO ₃ , mg/L.....	216
Total hardness as CaCO ₃ , mg/L.....	1950
Sodium absorption ratio.....	4.8

	mg/L	meq/L
Bicarbonate as HCO ₃	264	4.32
Carbonate as CO ₃	0	0
Chloride.....	797	22.5
Sulfate.....	1620	33.8
Calcium.....	648	32.3
Magnesium.....	82.2	6.76
Potassium.....	4.3	0.11
Sodium.....	488	21.2
Major cations.....		60.4
Major anions.....		60.6
Cation/anion difference.....		0.13 %


Mary Stepp
Lab Director
Wanda Orso
Water Lab Supervisor

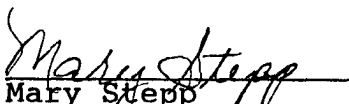
2506 W. Main Street
Farmington, New Mexico 87401

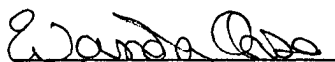
CLIENT: Giant Refinery
ID: 9110011455
SITE: GBR -30
LAB NO: F7452

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.78
Lab conductivity, umhos/cm.....	4000
Lab resistivity, ohm-m.....	2.5
Total dissolved solids (180), mg/L..	2890
Total dissolved solids (calc), mg/L.	2870
Total alkalinity as CaCO ₃ , mg/L.....	248
Total hardness as CaCO ₃ , mg/L.....	1040
Sodium absorption ratio.....	7.18

	mg/L	meq/L
Bicarbonate as HCO ₃	303	4.97
Carbonate as CO ₃	0	0
Chloride.....	489	13.8
Sulfate.....	1290	26.9
Calcium.....	390	19.5
Magnesium.....	17	1.4
Potassium.....	2.35	0.06
Sodium.....	533	23.2
Major cations.....		44.1
Major anions.....		45.6
Cation/anion difference.....		1.72 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

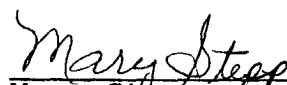
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 9110011504
SITE: RW -13
LAB NO: F7453

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.72
Lab conductivity, umhos/cm.....	4480
Lab resistivity, ohm-m.....	2.23
Total dissolved solids (180), mg/L..	3510
Total dissolved solids (calc), mg/L.	3470
Total alkalinity as CaCO ₃ , mg/L.....	219
Total hardness as CaCO ₃ , mg/L.....	1260
Sodium absorption ratio.....	7.99

	mg/L	meq/L
Bicarbonate as HCO ₃	267	4.38
Carbonate as CO ₃	0	0
Chloride.....	483	13.6
Sulfate.....	1710	35.6
Calcium.....	472	23.5
Magnesium.....	20.9	1.72
Potassium.....	4.3	0.11
Sodium.....	653	28.4
Major cations.....		53.8
Major anions.....		53.6
Cation/anion difference.....		0.14 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401CLIENT: Giant Refinery
ID: 9110011521
SITE: RW -3
LAB NO: F7454DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.72
Lab conductivity, umhos/cm.....	4070
Lab resistivity, ohm-m.....	2.46
Total dissolved solids (180), mg/L..	2770
Total dissolved solids (calc), mg/L.	2850
Total alkalinity as CaCO ₃ , mg/L.....	888
Total hardness as CaCO ₃ , mg/L.....	963
Sodium absorption ratio.....	9.31

	mg/L	meq/L
Bicarbonate as HCO ₃	1090	17.8
Carbonate as CO ₃	0	0
Chloride.....	390	11
Sulfate.....	897	18.7
Calcium.....	329	16.4
Magnesium.....	34.7	2.85
Potassium.....	2.35	0.06
Sodium.....	664	28.9
Major cations.....		48.2
Major anions.....		47.4
Cation/anion difference.....		0.81 %


Mary Stepp
Lab Director
Wanda Orso
Water Lab Supervisor

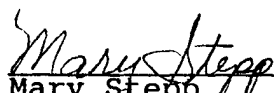
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 9110011531
SITE: RW -4
LAB NO: F7455

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.68
Lab conductivity, umhos/cm.....	3800
Lab resistivity, ohm-m.....	2.63
Total dissolved solids (180), mg/L..	2280
Total dissolved solids (calc), mg/L.	2240
Total alkalinity as CaCO ₃ , mg/L.....	887
Total hardness as CaCO ₃ , mg/L.....	720
Sodium absorption ratio.....	9.16

	mg/L	meq/L
Bicarbonate as HCO ₃	1080	17.7
Carbonate as CO ₃	0	0
Chloride.....	532	15
Sulfate.....	339	7.07
Calcium.....	248	12.4
Magnesium.....	24.6	2.02
Potassium.....	1.17	0.03
Sodium.....	565	24.6
Major cations.....		39
Major anions.....		39.8
Cation/anion difference.....		1.02 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

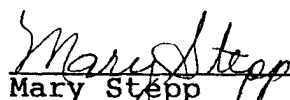
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 9110011541
SITE: RW.-6
LAB NO: F7456

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.73
Lab conductivity, umhos/cm.....	4530
Lab resistivity, ohm-m.....	2.21
Total dissolved solids (180), mg/L..	2760
Total dissolved solids (calc), mg/L.	2810
Total alkalinity as CaCO ₃ , mg/L.....	700
Total hardness as CaCO ₃ , mg/L.....	1040
Sodium absorption ratio.....	8.09

	mg/L	meq/L
Bicarbonate as HCO ₃	854	14
Carbonate as CO ₃	0	0
Chloride.....	552	15.6
Sulfate.....	839	17.5
Calcium.....	382	19.1
Magnesium.....	19.8	1.63
Potassium.....	1.96	0.05
Sodium.....	598	26
Major cations.....		46.8
Major anions.....		47
Cation/anion difference.....		0.28 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011039 GBR-17
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	89
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051602

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011200 GBR-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	3.0
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	2.3
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051603

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011256 GBR-31
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.7
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	84
BROMOFLUOROBENZENE (%)	85



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051604

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011308 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	81
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051605

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED. ^{TK}
 CLIENT I.D. : 9110011421 GBR-2480
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/05/91
 UNITS : UG/L
 DILUTION FACTOR : 2

COMPOUNDS

RESULTS

BENZENE	100
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1.0
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	<0.4
DIBROMOCHLOROMETHANE	<0.4
2-CHLOROETHYL VINYL ETHER	<1.0
1,3-DICHLOROBENZENE	<1.0
1,2 & 1,4-DICHLOROBENZENE	1.0
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	0.5
1,2-DICHLOROETHANE	34
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	<0.4
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	24
METHYLENE CHLORIDE	<4.0
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	0.6
TOLUENE	10
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<1.0
VINYL CHLORIDE	<0.4
TOTAL XYLENES	<1.0
TRICHLOROTRIFLUOROETHANE	<4.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051606

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011455 GBR-30
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	80
BROMOFLUOROBENZENE (%)	81



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051607

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011504 RW-13 (GBR-14)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/05/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	15.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051608

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011521 RW-3 (GPR-29)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/05/91
 UNITS : UG/L
 DILUTION FACTOR : 2

COMPOUNDS

RESULTS

BENZENE	89
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1.0
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	0.4
DIBROMOCHLOROMETHANE	<0.4
2-CHLOROETHYL VINYL ETHER	<1.0
1,3-DICHLOROBENZENE	<1.0
1,2 & 1,4-DICHLOROBENZENE	<1.0
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	1
1,2-DICHLOROETHANE	<0.4
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	1
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	57
METHYLENE CHLORIDE	<4.0
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	<0.4
TOLUENE	7
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	<0.4
TRICHLOROFLUOROMETHANE	<1.0
VINYL CHLORIDE	<0.4
TOTAL XYLENES	11
TRICHLOROTRIFLUOROETHANE	<4.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	90



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051609

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011531 RW-4 (602-43)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/04/91
 UNITS : UG/L
 DILUTION FACTOR : 5

COMPOUNDS	RESULTS
BENZENE	570 D
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	3
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	2
1,2-DICHLOROETHANE	<1.0
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	3
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	49
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	2
TOLUENE	3
1,1,1-TRICHLOROETHANE	2
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	3
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	30
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 90
 BROMOFLUOROBENZENE (%) 83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051610

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED.
 CLIENT I.D. : 9110011541 RW-6 (GBR-44)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
 DATE RECEIVED : 10/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	13.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.6
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.3
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	0.3
1,2-DICHLOROETHENE (TOTAL)	3.7
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	0.8
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.2
TOLUENE	0.6
1,1,1-TRICHLOROETHANE	0.7
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.1
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051607

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011504 RW-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : 10/03/91
DATE ANALYZED : 10/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051608

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011521 RW-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : 10/03/91
DATE ANALYZED : 10/10/91
UNITS : UG/L
DILUTION FACTOR : 10

COMPOUNDS

RESULTS

NAPHTHALENE	<3.0
ACENAPHTHYLENE	<3.0
ACENAPHTHENE	<5.0
FLUORENE	3.1
PHENANTHRENE	1.5
ANTHRACENE	<0.10
FLUORANTHENE	<0.30
PYRENE	<0.40
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.20
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<1.0
BENZO(g,h,i)PERYLENE	<0.40
INDENO(1,2,3-CD)PYRENE	<0.30



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051609

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011531 RW-4
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : 10/03/91
DATE ANALYZED : 10/10/91
UNITS : UG/L
DILUTION FACTOR : 10

COMPOUNDSRESULTS

NAPHTHALENE	<3.0
ACENAPHTHYLENE	<3.0
ACENAPHTHENE	<5.0
FLUORENE	4.7
PHENANTHRENE	<0.3
ANTHRACENE	<0.10
FLUORANTHENE	<0.30
PYRENE	<0.40
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	0.40
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<1.0
BENZO(g,h,i)PERYLENE	<0.40
INDENO(1,2,3-CD)PYRENE	<0.30



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051610

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011541 RW-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : 10/03/91
DATE ANALYZED : 10/10/91
UNITS : UG/L
DILUTION FACTOR : 10 *

COMPOUNDS	RESULTS
NAPHTHALENE	<3.0
ACENAPHTHYLENE	<3.0
ACENAPHTHENE	<5.0
FLUORENE	<0.40
PHENANTHRENE	<0.30
ANTHRACENE	<0.10
FLUORANTHENE	<0.30
PYRENE	<0.40
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.20
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<1.0
BENZO(g,h,i)PERYLENE	<0.40
INDENO(1,2,3-CD)PYRENE	<0.30

* A DILUTION WAS REQUIRED DUE TO MATRIX INTERFERENCE.



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-27
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 911002959 SHS-3
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
 DATE RECEIVED : 10/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	93



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-27
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9110021050 SHS-6
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
 DATE RECEIVED : 10/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	93



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053903

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-27
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9110021135 SHS-10
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
 DATE RECEIVED : 10/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/09/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	37
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	106



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053904

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-27
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9110021222 SHS-12
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
 DATE RECEIVED : 10/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.3
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.6
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.9
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053905

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-27
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9110021312 SHS-13
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
 DATE RECEIVED : 10/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.9
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.4
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	85
BROMOFLUOROBENZENE (%)	86



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053906

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-27
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9110021431 SHS-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
 DATE RECEIVED : 10/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	6.5
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053907

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-27
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9110021550 SHS-16
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
 DATE RECEIVED : 10/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11293801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 911223815 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/23/91
 DATE RECEIVED : 12/24/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 12/26/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	81
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11160701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 11/08/91
PROJECT #	: 9834	DATE RECEIVED	: 11/09/91
PROJECT NAME	: REF. REMED. <i>For Stepper Effluent</i>	DATE EXTRACTED	: N/A
CLIENT I.D.	: 911108810	DATE ANALYZED	: 11/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.3
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	92



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11162601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMED. *In Plant*
 CLIENT I.D. : 911111835
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 11/11/91
 DATE RECEIVED : 11/12/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 11/13/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	21
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.4
1,2-DICHLOROETHANE	0.7
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	2.7
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	4.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11152101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMEDIA
 CLIENT I.D. : 9110311430 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/31/91
 DATE RECEIVED : 11/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 11/05/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	17
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.5
1,2-DICHLOROETHANE	0.5
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.1
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	1.2
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.3
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	3.4
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

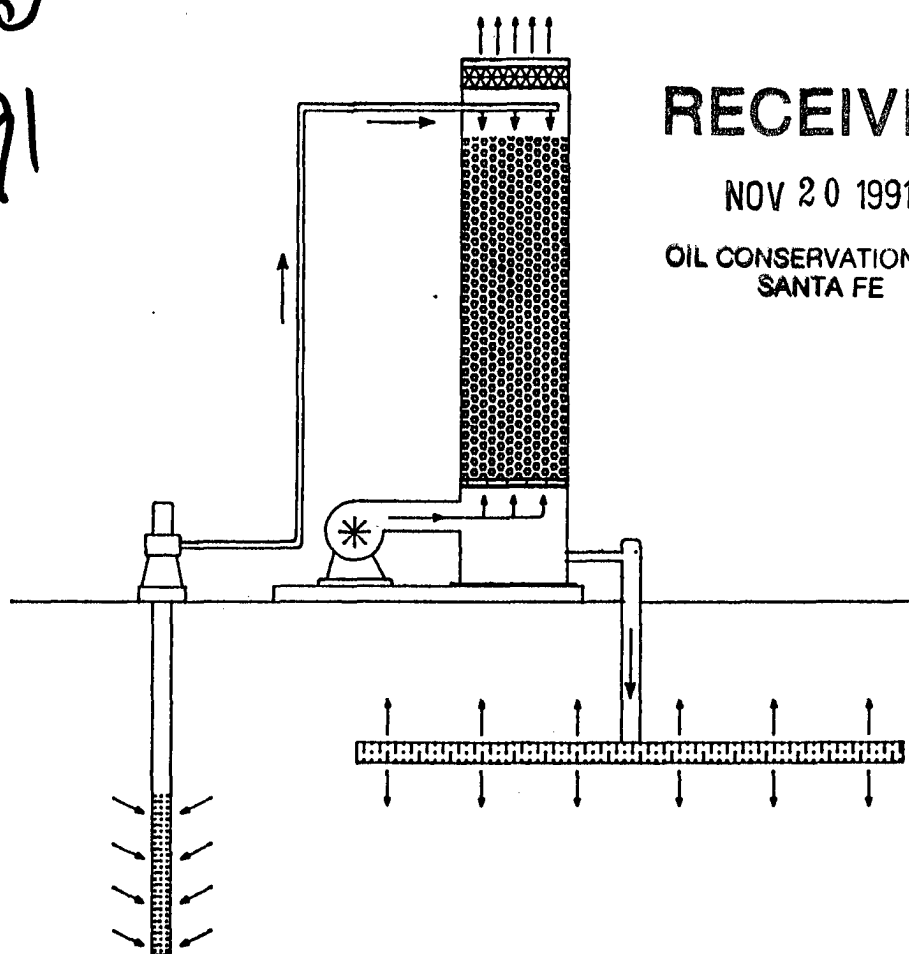
BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	99

GIANT

REFINING CO.

BLOOMFIELD REFINERY REMEDIATION PROJECT

3rd
Quarter
1991



RECEIVED

NOV 20 1991

OIL CONSERVATION DIV.
SANTA FE

Post Office Box 256
606 E. Highway 64
Farmington, New Mexico 87401

(505) 632-3306
FAX (505) 632-2487

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
THIRD QUARTER, 1991

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505)632-3306
FAX (505) 632-2487

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INTRODUCTION AND SUMMARY
QUARTERLY REPORT
THIRD QUARTER, 1991

INTRODUCTION

No significant changes were made to the remediation system during the third quarter of 1991. All treated water is being directed toward the infiltration gallery in the old stormwater containment area of the refinery. We continue to monitor its effect on the system. Monitor well SHS-7, part of the original proposed offsite recovery well network, has yet to be converted to a recovery well due to land access problems.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Subsequent reports will contain updates revealing historical trends of the analytes. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevations and product thicknesses, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail on a weekly basis is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
THIRD QUARTER, 1991

STRIPPER INFLUENT	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.37	7.00	6.79
Lab conductivity, umhos/cm	3550.00	4010.00	3840.00
Lab resistivity, ohm-m	2.81	2.50	2.61
Total dissolved solids (180)	2900.00	2740.00	2940.00
Total dissolved solids (calc)	2830.00	2740.00	2770.00
Total alkalinity as CaCO ₃	297.00	331.00	323.00
Total hardness as CaCO ₃	1090.00	1080.00	1080.00
Sodium absorption ratio	6.72	6.35	6.77
Bicarbonate as HCO ₃	363.00	404.00	394.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	423.00	336.00	386.00
Sulfate	1300.00	1310.00	1260.00
Calcium	376.00	383.00	380.00
Magnesium	36.70	31.40	32.50
Potassium	3.03	2.84	2.70
Sodium	510.00	481.00	512.00
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	4.00	ND	ND
1,2-Dichloroethane	9.00	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	14.00	2.80	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	1.00	0.40	ND

	7/91	8/91	9/91
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	2.00	0.40	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
AROMATICS			
Benzene	303.00	45.70	35.00
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	52.00	2.10	3.00
Toluene	43.00	0.70	ND
Xylenes	156.00	7.50	13.00
Trichlorotrifluoroethane			

STRIPPER EFFLUENT

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	8.21	7.97	7.76
Lab conductivity, umhos/cm	4180.00	4070.00	4020.00
Lab resistivity, ohm-m	2.39	2.46	2.49
Total dissolved solids (180)	2850.00	2900.00	2910.00
Total dissolved solids (calc)	2670.00	2720.00	2680.00
Total alkalinity as CaCO ₃	163.00	203.00	217.00
Total hardness as CaCO ₃	1080.00	1050.00	1040.00
Sodium absorption ratio	6.19	6.53	6.24
Bicarbonate as HCO ₃	198.00	248.00	264.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	481.00	389.00	430.00
Sulfate	1210.00	1320.00	1260.00
Calcium	385.00	374.00	365.00
Magnesium	29.40	28.70	32.30
Potassium	2.96	2.91	2.62
Sodium	468.00	487.00	464.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

GRW-6

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.44		
Lab conductivity, umhos/cm	4470.00		
Lab resistivity, ohm-m	2.24		
Total dissolved solids (180)	3320.00		
Total dissolved solids (calc)	3120.00		
Total alkalinity as CaCO3	732.00		
Total hardness as CaCO3	1230.00		
Sodium absorption ratio	7.67		
Bicarbonate as HCO3	891.00		
Carbonate as CO3	0.00		
Chloride	571.00		
Sulfate	1030.00		
Calcium	410.00		
Magnesium	50.80		
Potassium	2.25		
Sodium	619.00		
PAH			
Acenaphthene	3.30		
Acenaphthylene	ND		
Anthracene	0.50		
Benzo(a)anthracene	ND		
Benzo(a)pyrene	ND		
Benzo(b)fluoranthene	ND		
Benzo(g,h,i)perylene	ND		
Benzo(k)fluoranthene	ND		
Chrysene	ND		
Dibenzo(a,h)anthracene	ND		
Fluoranthene	ND		
Fluorene	1.30		
Indeno(1,2,3-cd)pyrene	ND		
Naphthalene	38.00		
Phenanthrene	2.70		
Pyrene			
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		

	7/91	8/91	9/91
1,1-Dichloroethane	1.50		
1,2-Dichloroethane	2.40		
1,2-Dichloroethene	ND		
1,2-Dichloroethene	4.60		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	0.90		
1,1,1-Trichloroethane	0.30		
1,1,2-Trichloroethane	ND		
Trichloroethene	1.10		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	66.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	46.00		
Toluene	2.00		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GRW-13

GENERAL WATER CHEMISTRY

Lab conductivity, umhos/cm

7/91

8/91

9/91

4200.00

4750.00

4500.00

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,1-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

AROMATICS

Benzene

25.00

Chlorobenzene

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

Ethylbenzene

ND

Toluene

ND

Xylenes

ND

Trichlorotrifluoroethane

ND

PAH

Acenaphthene

ND

Acenaphthylene

ND

Anthracene

ND

Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.07
Pyrene	ND

GBR-15

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.69		
Lab conductivity, umhos/cm	4780.00		
Lab resistivity, ohm-m	2.09		
Total dissolved solids (180)	3460.00		
Total dissolved solids (calc)	3260.00		
Total alkalinity as CaCO ₃	277.00		
Total hardness as CaCO ₃	1110.00		
Sodium absorption ratio	8.19		
Bicarbonate as HCO ₃	338.00		
Carbonate as CO ₃	0.00		
Chloride	479.00		
Sulfate	1540.00		
Calcium	422.00		
Magnesium	13.70		
Potassium	4.32		
Sodium	627.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	10.30
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	1.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-17

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.78		
Lab conductivity, umhos/cm	2970.00		
Lab resistivity, ohm-m	3.36		
Total dissolved solids (180)	2270.00		
Total dissolved solids (calc)	2120.00		
Total alkalinity as CaCO ₃	233.00		
Total hardness as CaCO ₃	932.00		
Sodium absorption ratio	4.21		
Bicarbonate as HCO ₃	284.00		
Carbonate as CO ₃	0.00		
Chloride	68.60		
Sulfate	1250.00		
Calcium	343.00		
Magnesium	18.40		
Potassium	0.86		
Sodium	295.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

GBR-24-D

7/91

8/91

9/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.59
Lab conductivity, umhos/cm	4810.00
Lab resistivity, ohm-m	2.08
Total dissolved solids (180)	3990.00
Total dissolved solids (calc)	3430.00
Total alkalinity as CaCO ₃	217.00
Total hardness as CaCO ₃	1860.00
Sodium absorption ratio	4.53
Bicarbonate as HCO ₃	265.00
Carbonate as CO ₃	0.00
Chloride	777.00
Sulfate	1370.00
Calcium	614.00
Magnesium	80.00
Potassium	5.33
Sodium	450.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	6.00
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	45.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	10.00		
Toluene	2.00		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

GBR-30

7/91

8/91

9/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.30
Lab conductivity, umhos/cm	4740.00
Lab resistivity, ohm-m	2.11
Total dissolved solids (180)	3340.00
Total dissolved solids (calc)	3140.00
Total alkalinity as CaCO ₃	219.00
Total hardness as CaCO ₃	1240.00
Sodium absorption ratio	6.53
Bicarbonate as HCO ₃	267.00
Carbonate as CO ₃	0.00
Chloride	517.00
Sulfate	1480.00
Calcium	439.00
Magnesium	36.00
Potassium	2.89
Sodium	529.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

GBR-31

7/91 8/91 9/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.39
Lab conductivity, umhos/cm	4140.00
Lab resistivity, ohm-m	2.41
Total dissolved solids (180)	3550.00
Total dissolved solids (calc)	3330.00
Total alkalinity as CaCO3	302.00
Total hardness as CaCO3	1270.00
Sodium absorption ratio	7.02
Bicarbonate as HCO3	369.00
Carbonate as CO3	0.00
Chloride	338.00
Sulfate	1760.00
Calcium	416.00
Magnesium	57.70
Potassium	2.49
Sodium	576.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	2.40
1,2-Dichloroethane	ND
1,2-Dichloroethene	57.00
1,1-Dichloroethene	0.20
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	6.00
1,1,1-Trichloroethane	0.50
1,1,2-Trichloroethane	ND
Trichloroethene	4.20
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-32

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.58		
Lab conductivity, umhos/cm	4180.00		
Lab resistivity, ohm-m	2.39		
Total dissolved solids (180)	3280.00		
Total dissolved solids (calc)	3300.00		
Total alkalinity as CaCO ₃	321.00		
Total hardness as CaCO ₃	1030.00		
Sodium absorption ratio	9.23		
Bicarbonate as HCO ₃	391.00		
Carbonate as CO ₃	0.00		
Chloride	275.00		
Sulfate	1750.00		
Calcium	369.00		
Magnesium	27.20		
Potassium	3.96		
Sodium	682.00		

GBR-48

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.16		
Lab conductivity, umhos/cm	6340.00		
Lab resistivity, ohm-m	1.58		
Total dissolved solids (180)	4720.00		
Total dissolved solids (calc)	4640.00		
Total alkalinity as CaCO ₃	425.00		
Total hardness as CaCO ₃	1610.00		
Sodium absorption ratio	10.30		
Bicarbonate as HCO ₃	518.00		
Carbonate as CO ₃	0.00		
Chloride	895.00		
Sulfate	1920.00		
Calcium	576.00		
Magnesium	41.90		
Potassium	5.27		
Sodium	951.00		

GBR-49

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.78		
Lab conductivity, umhos/cm	4180.00		
Lab resistivity, ohm-m	2.39		
Total dissolved solids (180)	3630.00		
Total dissolved solids (calc)	3450.00		
Total alkalinity as CaCO ₃	346.00		
Total hardness as CaCO ₃	1130.00		
Sodium absorption ratio	9.01		
Bicarbonate as HCO ₃	422.00		
Carbonate as CO ₃	0.00		
Chloride	379.00		
Sulfate	1720.00		
Calcium	432.00		
Magnesium	13.20		
Potassium	3.88		
Sodium	697.00		

GBR-50

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.38		
Lab conductivity, umhos/cm	2990.00		
Lab resistivity, ohm-m	3.34		
Total dissolved solids (180)	2770.00		
Total dissolved solids (calc)	2630.00		
Total alkalinity as CaCO3	190.00		
Total hardness as CaCO3	1010.00		
Sodium absorption ratio	5.92		
Bicarbonate as HCO3	232.00		
Carbonate as CO3	0.00		
Chloride	44.40		
Sulfate	1650.00		
Calcium	368.00		
Magnesium	22.30		
Potassium	4.17		
Sodium	432.00		

*ND - Not detected at specified detection limit

OFFSITE WELLS

SHS-3

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.64		
Lab conductivity, umhos/cm	4280.00		
Lab resistivity, ohm-m	2.34		
Total dissolved solids (180)	3800.00		
Total dissolved solids (calc)	3590.00		
Total alkalinity as CaCO ₃	236.00		
Total hardness as CaCO ₃	1780.00		
Sodium absorption ratio	4.62		
Bicarbonate as HCO ₃	288.00		
Carbonate as CO ₃	0.00		
Chloride	230.00		
Sulfate	2080.00		
Calcium	606.00		
Magnesium	65.50		
Potassium	11.20		
Sodium	449.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-6

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.72		
Lab conductivity, umhos/cm	2890.00		
Lab resistivity, ohm-m	3.46		
Total dissolved solids (180)	2580.00		
Total dissolved solids (calc)	2480.00		
Total alkalinity as CaCO ₃	295.00		
Total hardness as CaCO ₃	1190.00		
Sodium absorption ratio	4.18		
Bicarbonate as HCO ₃	360.00		
Carbonate as CO ₃	0.00		
Chloride	81.20		
Sulfate	1450.00		
Calcium	375.00		
Magnesium	61.90		
Potassium	4.95		
Sodium	332.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-10

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.30		
Lab conductivity, umhos/cm	2000.00		
Lab resistivity, ohm-m	5.01		
Total dissolved solids (180)	1440.00		
Total dissolved solids (calc)	1380.00		
Total alkalinity as CaCO ₃	304.00		
Total hardness as CaCO ₃	454.00		
Sodium absorption ratio	5.82		
Bicarbonate as HCO ₃	371.00		
Carbonate as CO ₃	0.00		
Chloride	64.30		
Sulfate	667.00		
Calcium	151.00		
Magnesium	18.50		
Potassium	7.78		
Sodium	285.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	0.50		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	47.00		
Toluene	1.80		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-12

ND

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.45
Lab conductivity, umhos/cm	4010.00
Lab resistivity, ohm-m	2.49
Total dissolved solids (180)	2810.00
Total dissolved solids (calc)	2630.00
Total alkalinity as CaCO ₃	363.00
Total hardness as CaCO ₃	1010.00
Sodium absorption ratio	6.45
Bicarbonate as HCO ₃	443.00
Carbonate as CO ₃	0.00
Chloride	324.00
Sulfate	1220.00
Calcium	367.00
Magnesium	23.70
Potassium	2.96
Sodium	472.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.20
1,2-Dichloroethane	ND
1,2-Dichloroethene	6.90
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.70
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.40
Trichlorofluoromethane	ND
Vinyl chloride	

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-13

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.38		
Lab conductivity, umhos/cm	3440.00		
Lab resistivity, ohm-m	2.91		
Total dissolved solids (180)	2050.00		
Total dissolved solids (calc)	1830.00		
Total alkalinity as CaCO3	670.00		
Total hardness as CaCO3	546.00		
Sodium absorption ratio	8.82		
Bicarbonate as HCO3	817.00		
Carbonate as CO3	0.00		
Chloride	464.00		
Sulfate	285.00		
Calcium	181.00		
Magnesium	23.30		
Potassium	1.98		
Sodium	474.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	0.90		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-15

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.91		
Lab conductivity, umhos/cm	1710.00		
Lab resistivity, ohm-m	5.86		
Total dissolved solids (180)	1300.00		
Total dissolved solids (calc)	1150.00		
Total alkalinity as CaCO3	282.00		
Total hardness as CaCO3	559.00		
Sodium absorption ratio	2.97		
Bicarbonate as HCO3	344.00		
Carbonate as CO3	0.00		
Chloride	25.50		
Sulfate	583.00		
Calcium	190.00		
Magnesium	20.80		
Potassium	2.75		
Sodium	161.00		
HALOCARBONS			
Bromodichloromethane	0.60		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	11.80		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

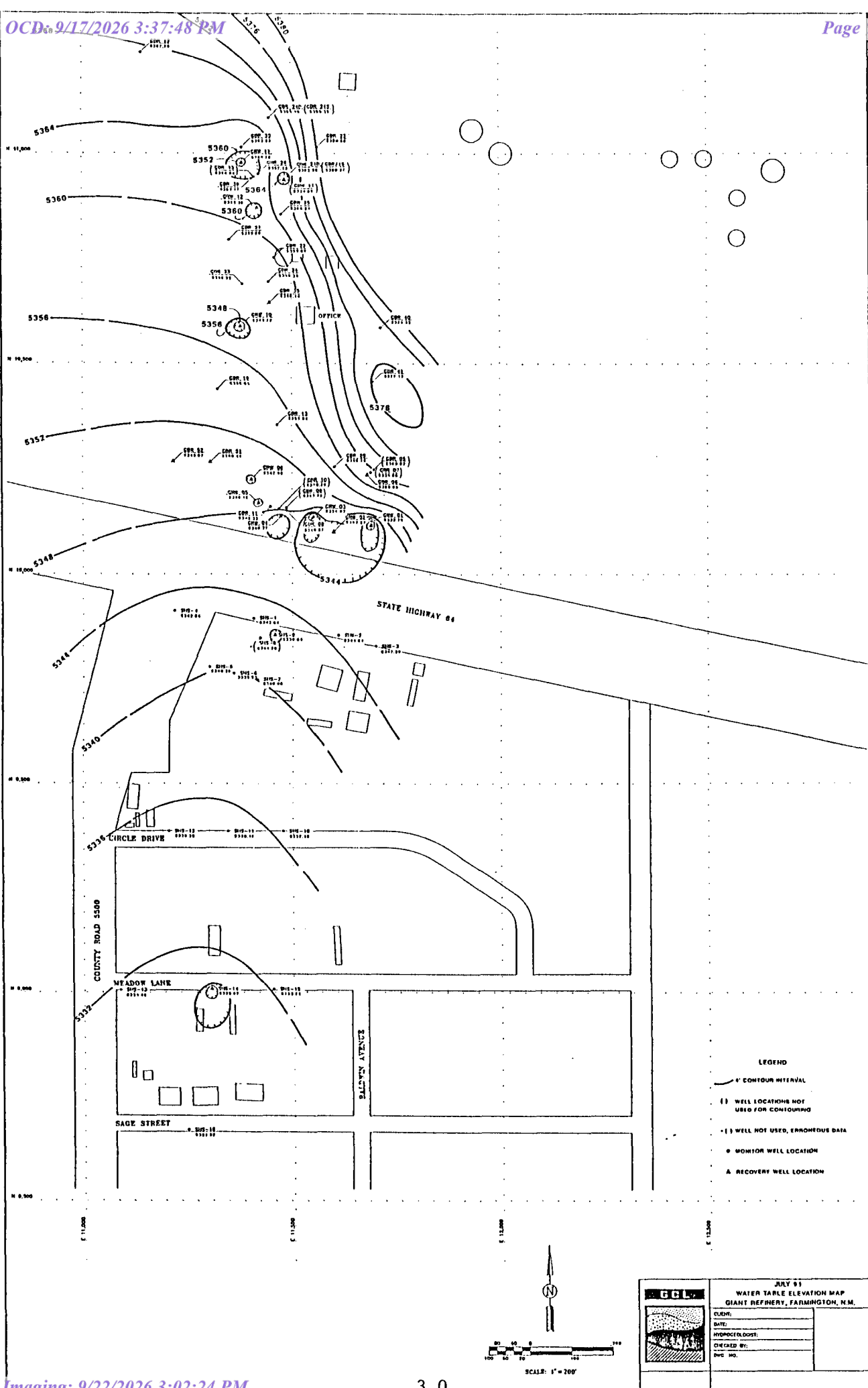
	7.84	8/91	9/91
GENERAL WATER CHEMISTRY	2930.00		
Lab pH (s.u.)	3.41		
Lab conductivity, umhos/cm	2590.00		
Lab resistivity, ohm-m	2270.00		
Total dissolved solids (180)	285.00		
Total dissolved solids (calc)	1250.00		
Total alkalinity as CaCO ₃	2.65		
Total hardness as CaCO ₃	347.00		
Sodium absorption ratio	0.00		
Bicarbonate as HCO ₃	36.20		
Carbonate as CO ₃	1360.00		
Chloride	456.00		
Sulfate	27.70		
Calcium	2.51		
Magnesium	216.00		
Potassium			
Sodium			

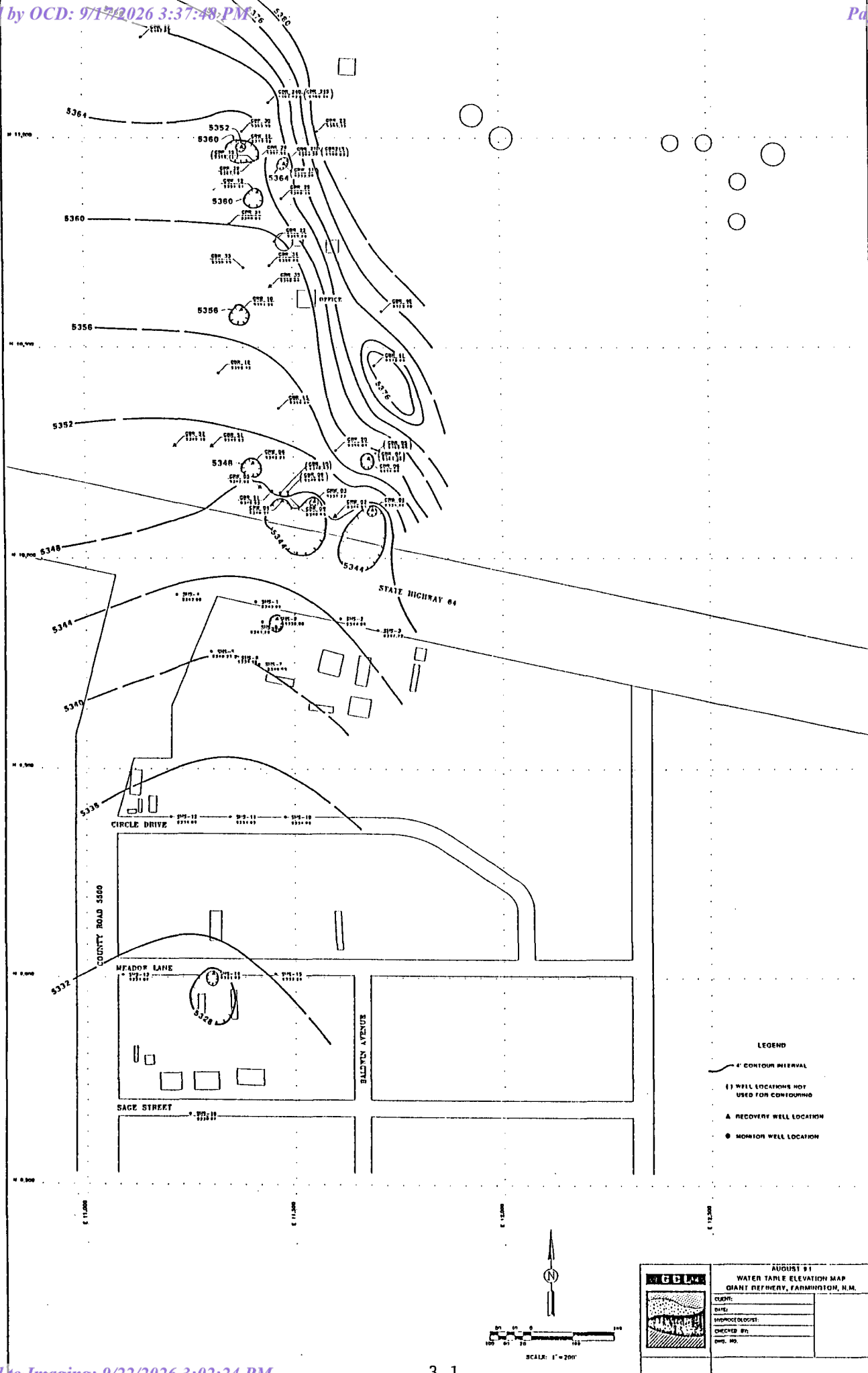
HALOCARBONS

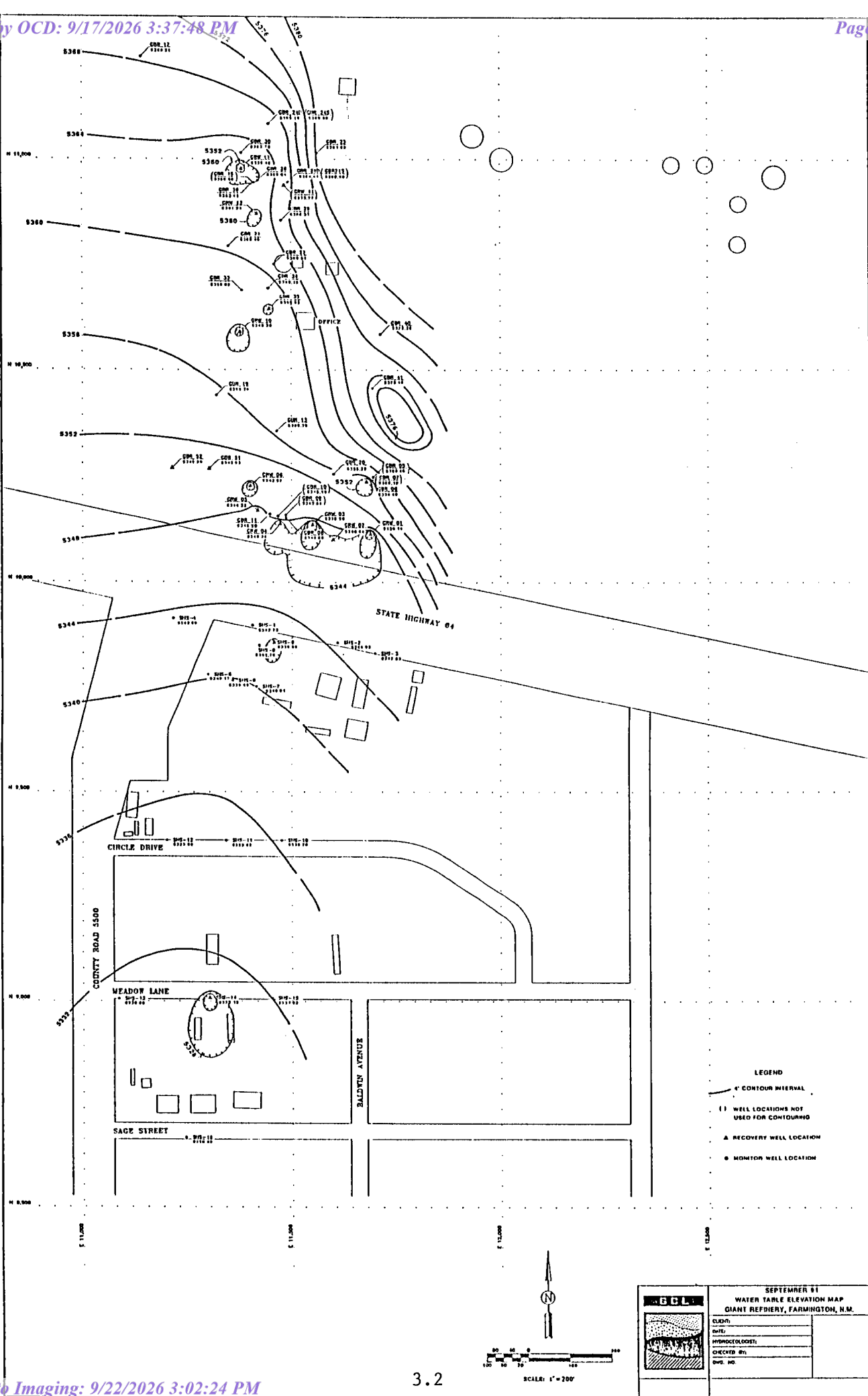
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

*ND - Not detected at specified detection limit







GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: July, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.51	61.51	0.00	5332.79
GRW-2	5391.28	48.80	48.75	0.05	5342.52
GRW-3	5388.77	54.75	54.75	0.00	5334.02
GRW-4	5390.02	49.75	49.75	0.00	5340.27
GRW-5	5390.56	44.10	44.10	0.00	5346.46
GRW-6	5390.81	42.86	42.86	0.00	5347.95
GRW-10	5395.02	59.06	51.80	7.26	5341.77
GRW-11	5397.85	63.00	63.00	0.00	5334.85
GRW-12	5397.24	45.94	45.94	0.00	5351.30
GRW-13	5396.90	56.14	56.14	0.00	5340.76
GBR-5	5395.07	27.87	25.60	2.27	5369.02
GBR-6	5395.70	60.04	60.04	0.00	5335.66
GBR-7	5395.85	32.23	29.82	2.41	5365.55
GBR-8	5390.50	41.93	41.93	0.00	5348.57
GBR-9	5389.92	45.94	45.94	0.00	5343.98
GBR-10	5390.57	42.32	42.32	0.00	5348.25
GBR-11	5389.43	42.15	40.84	1.31	5348.33
GBR-13	5393.04	38.00	38.00	0.00	5355.04
GBR-15	5397.99	43.35	43.35	0.00	5354.64
GBR-17	5402.69	34.94	34.94	0.00	5367.75
GBR-18	5421.68	23.05	23.05	0.00	5398.63
GBR-19	5393.83	38.83	38.82	0.01	5355.01
GBR-20	5393.47	38.55	36.26	2.29	5356.75
GBR-21S	5400.65	20.47	20.36	0.11	5380.27
GBR-21D	5400.19	36.23	36.23	0.00	5363.96
GBR-22	5395.91	38.89	35.55	3.34	5359.69
GBR-23	5403.72	23.07	23.06	0.01	5380.66
GBR-24S	5396.08	28.94	27.65	1.29	5368.17
GBR-24D	5396.77	32.29	32.29	0.00	5364.48
GBR-25	5396.72	29.78	29.78	0.00	5366.94
GBR-26	5395.59	38.46	38.46	0.00	5357.13
GBR-30	5396.58	34.05	34.05	0.00	5362.53
GBR-31	5394.86	35.20	35.20	0.00	5359.66
GBR-33	5396.28	37.99	37.92	0.07	5358.35
GBR-34	5394.00	36.61	35.40	1.21	5358.36
GBR-35	5393.66	36.42	35.30	1.12	5358.14
GBR-39	5397.55	36.08	36.08	0.00	5361.47
GBR-40	5400.76	26.44	26.44	0.00	5374.32
GBR-41	5396.35	19.22	19.22	0.00	5377.13
GBR-51	5389.68	40.24	40.24	0.00	5349.44
GBR-52	5387.74	38.67	38.67	0.00	5349.07

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: July, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.92	40.90	0.02	5342.64
SHS-2	5381.66	37.15	37.15	0.00	5344.51
SHS-3	5383.33	36.08	36.08	0.00	5347.25
SHS-4	5383.62	40.98	40.98	0.00	5342.64
SHS-5	5378.36	38.10	38.10	0.00	5340.26
SHS-6	5378.17	38.24	38.24	0.00	5339.93
SHS-7	5378.77	39.15	38.60	0.55	5340.06
SHS-8	5380.25	36.06	36.05	0.01	5344.20
SHS-9	5380.79	44.18	44.18	0.00	5336.61
SHS-10	5373.80	36.64	36.64	0.00	5337.16
SHS-11	5373.17	38.00	38.00	0.00	5335.17
SHS-12	5373.94	38.59	38.59	0.00	5335.35
SHS-13	5367.81	36.36	36.36	0.00	5331.45
SHS-14	5367.07	46.50	46.50	0.00	5320.57
SHS-15	5366.21	33.50	33.50	0.00	5332.71
SHS-16	5362.58	31.26	31.26	0.00	5331.32

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: August, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	58.65	58.65	0.00	5335.65
GRW-2	5391.28	42.35	42.35	0.00	5348.93
GRW-3	5388.77	51.54	51.54	0.00	5337.23
GRW-4	5390.02	49.75	49.75	0.00	5340.27
GRW-5	5390.56	42.94	42.94	0.00	5347.62
GRW-6	5390.81	48.60	48.60	0.00	5342.21
GRW-10	5395.02	48.51	42.59	5.92	5351.25
GRW-11	5397.85	63.89	63.89	0.00	5333.96
GRW-12	5397.24	46.13	46.13	0.00	5351.11
GRW-13	5396.90	57.35	57.35	0.00	5339.55
GBR-5	5395.07	27.95	25.60	2.35	5369.00
GBR-6	5395.70	61.02	61.02	0.00	5334.68
GBR-7	5395.85	32.51	30.09	2.42	5365.28
GBR-8	5390.50	41.65	41.65	0.00	5348.85
GBR-9	5389.92	49.23	49.23	0.00	5340.69
GBR-10	5390.57	41.95	41.95	0.00	5348.62
GBR-11	5389.43	41.74	40.69	1.05	5348.53
GBR-13	5393.04	38.45	38.45	0.00	5354.59
GBR-15	5397.99	42.88	42.88	0.00	5355.11
GBR-17	5402.69	34.85	34.85	0.00	5367.84
GBR-18	5421.68	23.19	23.19	0.00	5398.49
GBR-19	5393.83	38.70	38.70	0.00	5355.13
GBR-20	5393.47	39.30	36.90	2.40	5356.09
GBR-21S	5400.65	20.10	20.00	0.10	5380.63
GBR-21D	5400.19	35.81	35.81	0.00	5364.38
GBR-22	5395.91	38.62	35.49	3.13	5359.79
GBR-23	5403.72	22.59	22.59	0.00	5381.13
GBR-24S	5396.08	27.34	26.46	0.88	5369.44
GBR-24D	5396.77	31.95	31.95	0.00	5364.82
GBR-25	5396.72	30.57	30.57	0.00	5366.15
GBR-26	5395.59	38.04	38.04	0.00	5357.55
GBR-30	5396.58	33.60	33.60	0.00	5362.98
GBR-31	5394.86	34.85	34.85	0.00	5360.01
GBR-33	5396.28	37.51	37.48	0.03	5358.79
GBR-34	5394.00	35.35	35.14	0.21	5358.82
GBR-35	5393.66	35.25	34.96	0.29	5358.64
GBR-39	5397.55	35.76	35.76	0.00	5361.79
GBR-40	5400.76	26.98	26.98	0.00	5373.78
GBR-41	5396.35	19.51	19.51	0.00	5376.84
GBR-51	5389.68	40.15	40.15	0.00	5349.53
GBR-52	5387.74	38.55	38.55	0.00	5349.19

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: August, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.87	40.85	0.02	5342.69
SHS-2	5381.66	36.80	36.80	0.00	5344.86
SHS-3	5383.33	35.60	35.60	0.00	5347.73
SHS-4	5383.62	40.94	40.94	0.00	5342.68
SHS-5	5378.36	38.13	38.13	0.00	5340.23
SHS-6	5378.17	38.27	38.27	0.00	5339.90
SHS-7	5378.77	39.20	38.60	0.60	5340.05
SHS-8	5380.25	38.47	38.46	0.01	5341.79
SHS-9	5380.79	41.93	41.93	0.00	5338.86
SHS-10	5373.80	38.91	38.91	0.00	5334.89
SHS-11	5373.17	38.34	38.34	0.00	5334.83
SHS-12	5373.94	39.85	39.85	0.00	5334.09
SHS-13	5367.81	36.74	36.74	0.00	5331.07
SHS-14	5367.07	45.44	45.44	0.00	5321.63
SHS-15	5366.21	33.97	33.97	0.00	5332.24
SHS-16	5362.58	31.71	31.71	0.00	5330.87

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: September, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.16	59.16	0.00	5335.14
GRW-2	5391.28	50.34	50.34	0.00	5340.94
GRW-3	5388.77	53.27	53.27	0.00	5335.50
GRW-4	5390.02	49.78	49.78	0.00	5340.24
GRW-5	5390.56	46.34	46.34	0.00	5344.22
GRW-6	5390.81	48.24	48.24	0.00	5342.57
GRW-10	5395.02	55.88	43.31	12.57	5349.20
GRW-11	5397.85	64.08	64.08	0.00	5333.77
GRW-12	5397.24	46.00	46.00	0.00	5351.24
GRW-13	5396.90	57.44	57.44	0.00	5339.46
GBR-5	5395.07	28.39	26.16	2.23	5368.46
GBR-6	5395.70	61.30	61.30	0.00	5334.40
GBR-7	5395.85	32.67	30.27	2.40	5365.10
GBR-8	5390.50	41.70	41.70	0.00	5348.80
GBR-9	5389.92	47.08	47.08	0.00	5342.84
GBR-10	5390.57	41.98	41.98	0.00	5348.59
GBR-11	5389.43	41.83	40.70	1.13	5348.50
GBR-13	5393.04	33.76	33.76	0.00	5359.28
GBR-15	5397.99	42.39	42.39	0.00	5355.60
GBR-17	5402.69	34.48	34.48	0.00	5368.21
GBR-18	5421.68	23.23	23.23	0.00	5398.45
GBR-19	5393.83	38.59	38.59	0.00	5355.24
GBR-20	5393.47	40.50	37.47	3.03	5355.39
GBR-21S	5400.65	19.75	19.75	0.00	5380.90
GBR-21D	5400.19	35.78	35.78	0.00	5364.41
GBR-22	5395.91	35.42	35.40	0.02	5360.51
GBR-23	5403.72	22.20	22.20	0.00	5381.52
GBR-24S	5396.08	26.10	26.10	0.00	5369.98
GBR-24D	5396.77	31.58	31.58	0.00	5365.19
GBR-25	5396.72	30.41	30.41	0.00	5366.31
GBR-26	5395.59	36.55	36.55	0.00	5359.04
GBR-30	5396.58	32.83	32.83	0.00	5363.75
GBR-31	5394.86	34.40	34.40	0.00	5360.46
GBR-33	5396.28	37.20	37.20	0.00	5359.08
GBR-34	5394.00	34.85	34.85	0.00	5359.15
GBR-35	5393.66	37.74	37.74	0.00	5355.92
GBR-39	5397.55	35.14	35.14	0.00	5362.41
GBR-40	5400.76	27.48	27.48	0.00	5373.28
GBR-41	5396.35	20.89	20.89	0.00	5375.46
GBR-51	5389.68	40.05	40.05	0.00	5349.63
GBR-52	5387.74	38.45	38.45	0.00	5349.29

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: September, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.84	40.82	0.02	5342.72
SHS-2	5381.66	36.74	36.74	0.00	5344.92
SHS-3	5383.33	35.50	35.50	0.00	5347.83
SHS-4	5383.62	40.93	40.93	0.00	5342.69
SHS-5	5378.36	38.19	38.19	0.00	5340.17
SHS-6	5378.17	38.28	38.28	0.00	5339.89
SHS-7	5378.77	39.26	38.64	0.62	5340.01
SHS-8	5380.25	38.50	38.50	0.00	5341.75
SHS-9	5380.79	43.80	43.80	0.00	5336.99
SHS-10	5373.80	37.10	37.10	0.00	5336.70
SHS-11	5373.17	40.55	40.55	0.00	5332.62
SHS-12	5373.94	40.04	40.04	0.00	5333.90
SHS-13	5367.81	36.96	36.96	0.00	5330.85
SHS-14	5367.07	44.94	44.94	0.00	5322.13
SHS-15	5366.21	34.29	34.29	0.00	5331.92
SHS-16	5362.58	31.98	31.98	0.00	5330.60

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Third Quarter, 1991

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=====
Total Volume Of Water Recovered      2073800
Net Change In Storage Volume         -92631

Total Water Pumped To The            1724020
Infiltration Gallery

=====
Difference                           -442411
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Comments:

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Third Quarter, 1991

Tank Number	Beginning Volume	Ending Volume	Net Change
102	13735	16763	3028
106	8010	8010	0
21	351419	218449	-132970
22	294448	331759	37311
27	182470	182470	0
32	88634	88634	0
34	87541	87541	0
35	0	0	0
37	138051	138051	0
Total Net Volume Change			-92631

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Third Quarter of 1991

Well	Month #1	Month #2	Month #3	Total
GRW-1	13340	13050	14120	40510
GRW-2	4220	8090	6840	19150
GRW-3	22080	14140	17050	53270
GRW-4	23540	24420	26840	74800
GRW-5	65080	60310	69080	194470
GRW-6	23540	16700	18790	59030
GRW-9	11770	9460	11050	32280
GRW-10	300450	196160	262500	759110
GRW-11	47420	62800	67280	177500
GRW-12	6290	10660	6930	23880
GRW-13	40740	37200	41270	119210
SHS-9	5822	6089	7483	19394
SHS-11	5635	7571	5683	18889
SHS-14	177954	119607	184746	482307
Total Volume Pumped In Gallons				2073800

SPECIFIC CONDUCTANCE VALUES

GRW-13	7/91	8/91	9/91
Lab Conductivity, umhos/cm	4200	4750	4500



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10756901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 910703955 GBR 24D
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
 DATE RECEIVED : 07/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/16/91
 UNITS : UG/L
 DILUTION FACTOR : 4

COMPOUNDS

RESULTS

BENZENE	45
BROMODICHLOROMETHANE	<0.8
BROMOFORM	<0.8
BROMOMETHANE	<0.8
CARBON TETRACHLORIDE	<0.8
CHLOROBENZENE	<2.0
CHLOROETHANE	<0.8
CHLOROFORM	<0.8
CHLOROMETHANE	<0.8
DIBROMOCHLOROMETHANE	<0.8
2-CHLOROETHYL VINYL ETHER	<2.0
1,3-DICHLOROBENZENE	<2.0
1,2 & 1,4-DICHLOROBENZENE	<2.0
DICHLORODIFLUOROMETHANE	<0.8
1,1-DICHLOROETHANE	<0.8
1,2-DICHLOROETHANE	6
1,1-DICHLOROETHENE	<0.8
1,2-DICHLOROETHENE (TOTAL)	<0.8
1,2-DICHLOROPROPANE	<0.8
CIS-1,3-DICHLOROPROPENE	<0.8
TRANS-1,3-DICHLOROPROPENE	<0.8
ETHYLBENZENE	10
METHYLENE CHLORIDE	<8.0
1,1,2,2-TETRACHLOROETHANE	<0.8
TETRACHLOROETHENE	<0.8
TOLUENE	2
1,1,1-TRICHLOROETHANE	<0.8
1,1,2-TRICHLOROETHANE	<0.8
TRICHLOROETHENE	<0.8
TRICHLOROFLUOROMETHANE	<2.0
VINYL CHLORIDE	<0.8
TOTAL XYLENES	<2.0
TRICHLOROTRIFLUOROETHANE	<8.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	76
BROMOFLUOROBENZENE (%)	91



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10756902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9107031109 GBR 31
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
 DATE RECEIVED : 07/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/15/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	2.4
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	0.2
1,2-DICHLOROETHENE (TOTAL)	57.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	6.0
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.5
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	4.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	93



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10756903

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9107031145 RW-6 (6BR-44)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
 DATE RECEIVED : 07/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/15/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	66 D
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.5
1,2-DICHLOROETHANE	2.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	4.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	46
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.9
TOLUENE	2.0
1,1,1-TRICHLOROETHANE	0.3
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.1
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	116
BROMOFLUOROBENZENE (%)	95



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10756904

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9107031215 RW-13 (60R-14)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
 DATE RECEIVED : 07/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/15/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	25
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	10
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	118
BROMOFLUOROBENZENE (%)	86



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINER REMED
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 107569
 DATE EXTRACTED : 07/15/91
 DATE ANALYZED : 07/15/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	111
BROMOFLUOROBENZENE (%)	91



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107569
PROJECT #	: 9834	DATE EXTRACTED	: 07/16/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 07/16/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	93
BROMOFLUOROBENZENE (%)	97



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 107569

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 07/15/91

PROJECT NAME : REFINE REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10799803

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	DUP. %		DUP. %	RPD
	RESULT	SPIKED		REC.	SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	20	100	20	100	0
TETRACHLOROETHENE	<0.2	20	19	95	20	100	5
BENZENE	<0.5	20	18	90	16	80	12
BROMODICHLOROMETHANE	<0.2	20	21	105	21	105	0
CHLOROFORM	<0.2	20	22	110	22	110	0
1,1,1-TRICHLOROETHANE	<0.2	20	24	120	23	115	4
TOLUENE	<0.5	20	16	80	17	85	6
CHLOROBENZENE	<0.5	20	18	90	19	95	5
M-XYLENE	<0.5	20	16	80	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10756903

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9107031145 RW-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : 07/09/91
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	38
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	3.3
FLUORENE	1.3
PHENANTHRENE	2.7 B
ANTHRACENE	0.50
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10756904

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9107031215 RW-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : 07/09/91
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.07 B
ANTHRACENE	<0.02
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 107569
DATE EXTRACTED : 07/09/91
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.05
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 07/05/91
PROJECT #	: SHS 9002	DATE RECEIVED	: 07/06/91
PROJECT NAME	: OFF SITE	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9107051105 SHS-10	DATE ANALYZED	: 07/15/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	47 D
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	1.8
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	115
BROMOFLUOROBENZENE (%)	105



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757102

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 07/05/91
PROJECT #	: SHS 9002	DATE RECEIVED	: 07/06/91
PROJECT NAME	: OFF SITE	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9107051222 SHS-12	DATE ANALYZED	: 07/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	6.9
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.7
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	85



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757103

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : SHS 9002
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9107051330 SHS-13
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/05/91
 DATE RECEIVED : 07/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/16/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.9
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	86
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757104

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 07/05/91
PROJECT #	: SHS 9002	DATE RECEIVED	: 07/06/91
PROJECT NAME	: OFF SITE	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9107051451 SHS-15	DATE ANALYZED	: 07/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	0.6
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	11.8
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	82
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757105

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 07/05/91
PROJECT #	: SHS 9002	DATE RECEIVED	: 07/06/91
PROJECT NAME	: OFF SITE	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9107051551 SHS-16	DATE ANALYZED	: 07/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	84
BROMOFLUOROBENZENE (%)	87



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107571
PROJECT #	: SHS 9002	DATE EXTRACTED	: 07/16/91
PROJECT NAME	: OFF SITE	DATE ANALYZED	: 07/16/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	91



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 107571

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : SHS 9002

DATE ANALYZED : 07/16/91

PROJECT NAME : OFF SITE

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10799918

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	18	90	19	95	5
TRICHLOROETHENE	<0.2	20	22	110	21	105	5
TETRACHLOROETHENE	<0.2	20	22	110	21	105	5
BENZENE	<0.5	20	18	90	17	85	5
BROMODICHLOROMETHANE	<0.2	20	21	105	21	105	0
CHLOROFORM	<0.2	20	21	105	21	105	0
1,1,1-TRICHLOROETHANE	<0.2	20	16	80	20	100	20
TOLUENE	<0.5	20	18	90	18	90	0
CHLOROBENZENE	<0.5	20	21	105	19	95	15
M-XYLENE	<0.5	20	18	90	17	85	5

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10753301

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9107021204 GBR-17
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/02/91
 DATE RECEIVED : 07/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/12/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10753302

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9107021334 GBR-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/02/91
 DATE RECEIVED : 07/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/12/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	1.0
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	10.3
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	93
BROMOFLUOROBENZENE (%)	97



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10753303

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9107021412 GBR-30
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/02/91
 DATE RECEIVED : 07/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/12/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 98
 BROMOFLUOROBENZENE (%) 85



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10753304

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9107021440 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/02/91
 DATE RECEIVED : 07/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/12/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	89
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107533
PROJECT #	: 9834	DATE EXTRACTED	: 07/12/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 07/12/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	90



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 107533

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 07/12/91

PROJECT NAME : REFINERY REM

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10799802

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED %		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	19	95	20	100	5
TETRACHLOROETHENE	<0.2	20	20	100	20	100	0
BENZENE	<0.5	20	17	85	18	90	6
BROMODICHLOROMETHANE	<0.2	20	19	95	19	95	0
CHLOROFORM	<0.2	20	21	105	21	105	0
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	21	105	0
TOLUENE	<0.5	20	16	80	17	85	6
CHLOROBENZENE	<0.5	20	17	85	19	95	11
M-XYLENE	<0.5	20	16	80	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10760101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 07/08/91
PROJECT #	: 9834	DATE RECEIVED	: 07/10/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9107081223 STRIPPER INFLUENT	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 5

COMPOUNDS	RESULTS
BENZENE	303
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	4
1,2-DICHLOROETHANE	9
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	14
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	52
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	1
TOLUENE	43
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	2
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	156
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107601
PROJECT #	: 9834	DATE EXTRACTED	: 07/17/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 07/17/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	118



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 107601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 07/17/91

PROJECT NAME : REFINE REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10799928

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED	DUP.		DUP.	RPD
	RESULT	SPIKED		% SPIKED	% SPIKED		
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	24	120	21	105	13
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9
BENZENE	<0.5	20	20	100	21	105	5
BROMODICHLOROMETHANE	<0.2	20	24	120	21	105	13
CHLOROFORM	<0.2	20	22	110	20	100	10
1,1,1-TRICHLOROETHANE	<0.2	20	22	110	19	95	15
TOLUENE	<0.5	20	21	105	21	105	0
CHLOROBENZENE	<0.5	20	23	115	20	100	14
M-XYLENE	<0.5	20	21	105	22	110	5

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : SHS 9002-67
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9107031325 SHS-3
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
 DATE RECEIVED : 07/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/12/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	98



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757002

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : SHS 9002-67
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9107031419 SHS-6
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
 DATE RECEIVED : 07/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/12/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	81



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107570
PROJECT #	: SHS 9002-67	DATE EXTRACTED	: 07/12/91
PROJECT NAME	: REFINED REMED	DATE ANALYZED	: 07/12/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	90



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 107570

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : SHS 9002-67

PROJECT NAME : REFINER REMED

REF I.D. : 10799802

DATE ANALYZED : 07/12/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. %		RPD
	RESULT	SPIKED			SPIKED SAMPLE	DUP. REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	19	95	20	100	5
TETRACHLOROETHENE	<0.2	20	20	100	20	100	0
BENZENE	<0.5	20	17	85	18	90	6
BROMODICHLOROMETHANE	<0.2	20	19	95	19	95	0
CHLOROFORM	<0.2	20	21	105	21	105	0
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	21	105	0
TOLUENE	<0.5	20	16	80	17	85	6
CHLOROBENZENE	<0.5	20	17	85	19	95	11
M-XYLENE	<0.5	20	16	80	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



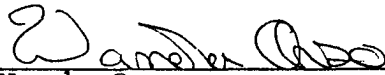
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 0955
SITE: GBR-24D
LAB NO: F6608

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.59
Lab conductivity, umhos/cm.....	4810
Lab resistivity, ohm-m.....	2.08
Total dissolved solids (180), mg/l..	3990
Total dissolved solids (calc), mg/l.	3430
Total alkalinity as CaCO ₃ , mg/l.....	217
Total hardness as CaCO ₃ , mg/l.....	1860
Sodium absorption ratio.....	4.53

	mg/l	meq/l
Bicarbonate as HCO ₃	265	4.34
Carbonate as CO ₃	0	0
Chloride.....	777	21.9
Sulfate.....	1370	28.6
Calcium.....	614	30.6
Magnesium.....	80	6.58
Potassium.....	5.33	0.14
Sodium.....	450	19.6
Major cations.....		56.9
Major anions.....		54.9
Cation/anion difference.....		1.79 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1109
SITE: GBR-31
LAB NO: F6609

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.39
Lab conductivity, umhos/cm.....	4140
Lab resistivity, ohm-m.....	2.41
Total dissolved solids (180), mg/l..	3550
Total dissolved solids (calc), mg/l.	3330
Total alkalinity as CaCO ₃ , mg/l.....	302
Total hardness as CaCO ₃ , mg/l.....	1270
Sodium absorption ratio.....	7.02

	mg/l	meq/l
Bicarbonate as HCO ₃	369	6.05
Carbonate as CO ₃	0	0
Chloride.....	338	9.55
Sulfate.....	1760	36.7
Calcium.....	416	20.8
Magnesium.....	57.7	4.74
Potassium.....	2.49	0.06
Sodium.....	576	25.1
Major cations.....		50.6
Major anions.....		52.3
Cation/anion difference.....		1.62 %


Wanda Orso
Water Lab Manager



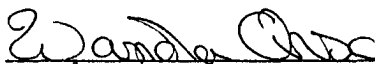
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1145
SITE: RW-6
LAB NO: F6610

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.44
Lab conductivity, umhos/cm.....	4470
Lab resistivity, ohm-m.....	2.24
Total dissolved solids (180), mg/l..	3320
Total dissolved solids (calc), mg/l.	3120
Total alkalinity as CaCO ₃ , mg/l.....	732
Total hardness as CaCO ₃ , mg/l.....	1230
Sodium absorption ratio.....	7.67

	mg/l	meq/l
Bicarbonate as HCO ₃	891	14.6
Carbonate as CO ₃	0	0
Chloride.....	571	16.1
Sulfate.....	1030	21.4
Calcium.....	410	20.5
Magnesium.....	50.8	4.18
Potassium.....	2.25	0.06
Sodium.....	619	26.9
Major cations.....		51.6
Major anions.....		52.2
Cation/anion difference.....		0.51 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1215
SITE: RW-13
LAB NO: F6611

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.85
Lab conductivity, umhos/cm.....	4200
Lab resistivity, ohm-m.....	2.38
Total dissolved solids (180), mg/l..	3730
Total dissolved solids (calc), mg/l.	3510
Total alkalinity as CaCO ₃ , mg/l.....	214
Total hardness as CaCO ₃ , mg/l.....	1300
Sodium absorption ratio.....	7.59

	mg/l	meq/l
Bicarbonate as HCO ₃	262	4.29
Carbonate as CO ₃	0	0
Chloride.....	484	13.7
Sulfate.....	1760	36.6
Calcium.....	473	23.6
Magnesium.....	28.8	2.37
Potassium.....	6.12	0.16
Sodium.....	629	27.4
Major cations.....		53.5
Major anions.....		54.5
Cation/anion difference.....		0.99 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1325
SITE: SHS-3
LAB NO: F6612

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.64
Lab conductivity, umhos/cm.....	4280
Lab resistivity, ohm-m.....	2.34
Total dissolved solids (180), mg/l..	3800
Total dissolved solids (calc), mg/l.	3590
Total alkalinity as CaCO ₃ , mg/l.....	236
Total hardness as CaCO ₃ , mg/l.....	1780
Sodium absorption ratio.....	4.62

	mg/l	meq/l
Bicarbonate as HCO ₃	288	4.72
Carbonate as CO ₃	0	0
Chloride.....	230	6.49
Sulfate.....	2080	43.4
Calcium.....	606	30.3
Magnesium.....	65.5	5.38
Potassium.....	11.2	0.29
Sodium.....	449	19.5
Major cations.....		55.4
Major anions.....		54.6
Cation/anion difference.....		0.77 %


Wanda Orso
Water Lab Manager



Inter-Mountain
Laboratories, Inc.

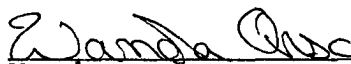
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1419
SITE: SHS-6
LAB NO: F6613

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.72
Lab conductivity, umhos/cm.....	2890
Lab resistivity, ohm-m.....	3.46
Total dissolved solids (180), mg/l..	2580
Total dissolved solids (calc), mg/l.	2480
Total alkalinity as CaCO ₃ , mg/l.....	295
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	4.18

	mg/l	meq/l
Bicarbonate as HCO ₃	360	5.9
Carbonate as CO ₃	0	0
Chloride.....	81.2	2.29
Sulfate.....	1450	30.2
Calcium.....	375	18.7
Magnesium.....	61.9	5.09
Potassium.....	4.95	0.13
Sodium.....	332	14.4
Major cations.....		38.4
Major anions.....		38.3
Cation/anion difference.....		0.02 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 0955
SITE: GBR-24D
LAB NO: F6614 Lab Split

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.80
Lab conductivity, umhos/cm.....	4820
Lab resistivity, ohm-m.....	2.07
Total dissolved solids (180), mg/l..	3920
Total dissolved solids (calc), mg/l.	3600
Total alkalinity as CaCO ₃ , mg/l.....	201
Total hardness as CaCO ₃ , mg/l.....	1870
Sodium absorption ratio.....	4.47

	mg/l	meq/l
Bicarbonate as HCO ₃	245	4.02
Carbonate as CO ₃	0	0
Chloride.....	776	21.9
Sulfate.....	1550	32.3
Calcium.....	628	31.3
Magnesium.....	74.5	6.12
Potassium.....	5.25	0.13
Sodium.....	445	19.3
Major cations.....		56.9
Major anions.....		58.2
Cation/anion difference.....		1.13 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1105
SITE: SHS-10
LAB NO: F6621

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.30
Lab conductivity, umhos/cm.....	2000
Lab resistivity, ohm-m.....	5.01
Total dissolved solids (180), mg/l..	1440
Total dissolved solids (calc), mg/l.	1380
Total alkalinity as CaCO ₃ , mg/l.....	304
Total hardness as CaCO ₃ , mg/l.....	454
Sodium absorption ratio.....	5.82

	mg/l	meq/l
Bicarbonate as HCO ₃	371	6.09
Carbonate as CO ₃	0	0
Chloride.....	64.3	1.81
Sulfate.....	667	13.9
Calcium.....	151	7.56
Magnesium.....	18.5	1.52
Potassium.....	7.78	0.2
Sodium.....	285	12.4
Major cations.....		21.7
Major anions.....		21.8
Cation/anion difference.....		0.26 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1222
SITE: SHS-12
LAB NO: F6622

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.45
Lab conductivity, umhos/cm.....	4010
Lab resistivity, ohm-m.....	2.49
Total dissolved solids (180), mg/l..	2810
Total dissolved solids (calc), mg/l.	2630
Total alkalinity as CaCO ₃ , mg/l.....	363
Total hardness as CaCO ₃ , mg/l.....	1010
Sodium absorption ratio.....	6.45

	mg/l	meq/l
Bicarbonate as HCO ₃	443	7.27
Carbonate as CO ₃	0	0
Chloride.....	324	9.15
Sulfate.....	1220	25.5
Calcium.....	367	18.3
Magnesium.....	23.7	1.95
Potassium.....	2.96	0.08
Sodium.....	472	20.5
Major cations.....		40.8
Major anions.....		41.9
Cation/anion difference.....		1.33 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1330
SITE: SHS-13
LAB NO: F6623

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.38
Lab conductivity, umhos/cm.....	3440
Lab resistivity, ohm-m.....	2.91
Total dissolved solids (180), mg/l..	2050
Total dissolved solids (calc), mg/l.	1830
Total alkalinity as CaCO ₃ , mg/l.....	670
Total hardness as CaCO ₃ , mg/l.....	546
Sodium absorption ratio.....	8.82

	mg/l	meq/l
Bicarbonate as HCO ₃	817	13.4
Carbonate as CO ₃	0	0
Chloride.....	464	13.1
Sulfate.....	285	5.93
Calcium.....	181	9.01
Magnesium.....	23.3	1.91
Potassium.....	1.98	0.05
Sodium.....	474	20.6
Major cations.....		31.6
Major anions.....		32.4
Cation/anion difference.....		1.28 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1451
SITE: SHS-15
LAB NO: F6624

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.91
Lab conductivity, umhos/cm.....	1710
Lab resistivity, ohm-m.....	5.86
Total dissolved solids (180), mg/l..	1300
Total dissolved solids (calc), mg/l.	1150
Total alkalinity as CaCO ₃ , mg/l.....	282
Total hardness as CaCO ₃ , mg/l.....	559
Sodium absorption ratio.....	2.97

	mg/l	meq/l
Bicarbonate as HCO ₃	344	5.64
Carbonate as CO ₃	0	0
Chloride.....	25.5	0.72
Sulfate.....	583	12.1
Calcium.....	190	9.47
Magnesium.....	20.8	1.71
Potassium.....	2.75	0.07
Sodium.....	161	7.02
Major cations.....		18.3
Major anions.....		18.5
Cation/anion difference.....		0.6 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1557
SITE: SHS-16
LAB NO: F6625

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.84
Lab conductivity, umhos/cm.....	2930
Lab resistivity, ohm-m.....	3.41
Total dissolved solids (180), mg/l..	2590
Total dissolved solids (calc), mg/l.	2270
Total alkalinity as CaCO ₃ , mg/l.....	285
Total hardness as CaCO ₃ , mg/l.....	1250
Sodium absorption ratio.....	2.65

	mg/l	meq/l
Bicarbonate as HCO ₃	347	5.69
Carbonate as CO ₃	0	0
Chloride.....	36.2	1.02
Sulfate.....	1360	28.4
Calcium.....	456	22.7
Magnesium.....	27.7	2.28
Potassium.....	2.51	0.06
Sodium.....	216	9.39
Major cations.....		34.5
Major anions.....		35.1
Cation/anion difference.....		0.98 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1330
SITE: SHS-13
LAB NO: F6626 Lab Split

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.35
Lab conductivity, umhos/cm.....	3430
Lab resistivity, ohm-m.....	2.92
Total dissolved solids (180), mg/l..	2030
Total dissolved solids (calc), mg/l.	1800
Total alkalinity as CaCO ₃ , mg/l.....	666
Total hardness as CaCO ₃ , mg/l.....	548
Sodium absorption ratio.....	8.77

	mg/l	meq/l
Bicarbonate as HCO ₃	811	13.3
Carbonate as CO ₃	0	0
Chloride.....	451	12.7
Sulfate.....	270	5.62
Calcium.....	189	9.42
Magnesium.....	18.8	1.55
Potassium.....	1.94	0.05
Sodium.....	472	20.5
Major cations.....		31.5
Major anions.....		31.7
Cation/anion difference.....		0.21 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1204
SITE: GBR-17
LAB NO: F6589

DATE REPORTED: 07/18/91
DATE RECEIVED: 07/02/91
DATE COLLECTED: 07/02/91

Lab pH (s.u.).....	7.78
Lab conductivity, umhos/cm.....	2970
Lab resistivity, ohm-m.....	3.36
Total dissolved solids (180), mg/l..	2270
Total dissolved solids (calc), mg/l.	2120
Total alkalinity as CaCO ₃ , mg/l.....	233
Total hardness as CaCO ₃ , mg/l.....	932
Sodium absorption ratio.....	4.21

	mg/l	meq/l
Bicarbonate as HCO ₃	284	4.66
Carbonate as CO ₃	0	0
Chloride.....	68.6	1.94
Sulfate.....	1250	26.1
Calcium.....	343	17.1
Magnesium.....	18.4	1.51
Potassium.....	0.86	0.02
Sodium.....	295	12.8
Major cations.....		31.5
Major anions.....		32.7
Cation/anion difference.....		1.84 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1334
SITE: GBR-15
LAB NO: F6590

DATE REPORTED: 07/18/91
DATE RECEIVED: 07/02/91
DATE COLLECTED: 07/02/91

Lab pH (s.u.).....	7.69
Lab conductivity, umhos/cm.....	4780
Lab resistivity, ohm-m.....	2.09
Total dissolved solids (180), mg/l..	3460
Total dissolved solids (calc), mg/l.	3260
Total alkalinity as CaCO ₃ , mg/l.....	277
Total hardness as CaCO ₃ , mg/l.....	1110
Sodium absorption ratio.....	8.19

	mg/l	meq/l
Bicarbonate as HCO ₃	338	5.54
Carbonate as CO ₃	0	0
Chloride.....	479	13.5
Sulfate.....	1540	32.2
Calcium.....	422	21.1
Magnesium.....	13.7	1.12
Potassium.....	4.32	0.11
Sodium.....	627	27.3
Major cations.....		49.6
Major anions.....		51.2
Cation/anion difference.....		1.65 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1412
SITE: GBR-30
LAB NO: F6591

DATE REPORTED: 07/18/91
DATE RECEIVED: 07/02/91
DATE COLLECTED: 07/02/91

Lab pH (s.u.).....	7.30
Lab conductivity, umhos/cm.....	4740
Lab resistivity, ohm-m.....	2.11
Total dissolved solids (180), mg/l..	3340
Total dissolved solids (calc), mg/l.	3140
Total alkalinity as CaCO ₃ , mg/l.....	219
Total hardness as CaCO ₃ , mg/l.....	1240
Sodium absorption ratio.....	6.53

	mg/l	meq/l
Bicarbonate as HC0 ₃	267	4.38
Carbonate as C0 ₃	0	0
Chloride.....	517	14.6
Sulfate.....	1480	30.9
Calcium.....	439	21.9
Magnesium.....	36	2.96
Potassium.....	2.89	0.07
Sodium.....	529	23
Major cations.....		48
Major anions.....		49.8
Cation/anion difference.....		1.9 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1440
SITE: Stripper Effluent
LAB NO: F6592

DATE REPORTED: 07/18/91
DATE RECEIVED: 07/02/91
DATE COLLECTED: 07/02/91

Lab pH (s.u.).....	8.21
Lab conductivity, umhos/cm.....	4180
Lab resistivity, ohm-m.....	2.39
Total dissolved solids (180), mg/l..	2850
Total dissolved solids (calc), mg/l.	2670
Total alkalinity as CaCO ₃ , mg/l.....	163
Total hardness as CaCO ₃ , mg/l.....	1080
Sodium absorption ratio.....	6.19

	mg/l	meq/l
Bicarbonate as HCO ₃	198	3.25
Carbonate as CO ₃	0	0
Chloride.....	481	13.6
Sulfate.....	1210	25.2
Calcium.....	385	19.2
Magnesium.....	29.4	2.42
Potassium.....	2.96	0.08
Sodium.....	468	20.4
Major cations.....		42.1
Major anions.....		42
Cation/anion difference.....		0.06 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1223
SITE: Stripper Influent
LAB NO: F6627

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/08/91
DATE COLLECTED: 07/08/91

Lab pH (s.u.).....	7.37
Lab conductivity, umhos/cm.....	3550
Lab resistivity, ohm-m.....	2.81
Total dissolved solids (180), mg/l..	2900
Total dissolved solids (calc), mg/l.	2830
Total alkalinity as CaCO ₃ , mg/l.....	297
Total hardness as CaCO ₃ , mg/l.....	1090
Sodium absorption ratio.....	6.72

	mg/l	meq/l
Bicarbonate as HCO ₃	363	5.95
Carbonate as CO ₃	0	0
Chloride.....	423	11.9
Sulfate.....	1300	27.2
Calcium.....	376	18.8
Magnesium.....	36.7	3.02
Potassium.....	3.03	0.08
Sodium.....	510	22.2
Major cations.....		44
Major anions.....		45
Cation/anion difference.....		1.13 %


Wanda Orso
Water Lab Manager

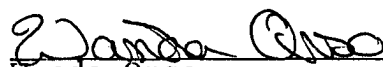
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 910809850
SITE: Stripper Influent
LAB NO: F6875

DATE REPORTED: 08/29/91
DATE RECEIVED: 08/09/91
DATE COLLECTED: 08/07/91

Lab pH (s.u.).....	7.00
Lab conductivity, umhos/cm.....	4010
Lab resistivity, ohm-m.....	2.5
Total dissolved solids (180), mg/l..	2740
Total dissolved solids (calc), mg/l.	2740
Total alkalinity as CaCO ₃ , mg/l.....	331
Total hardness as CaCO ₃ , mg/l.....	1080
Sodium absorption ratio.....	6.35

	mg/l	meq/l
Bicarbonate as HCO ₃	404	6.62
Carbonate as CO ₃	0	0
Chloride.....	336	9.48
Sulfate.....	1310	27.3
Calcium.....	383	19.1
Magnesium.....	31.4	2.58
Potassium.....	2.84	0.07
Sodium.....	481	20.9
Major cations.....		42.7
Major anions.....		43.4
Cation/anion difference.....		0.86 %


Wanda Orso
Water Lab Manager

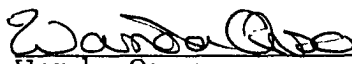
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 910807805
SITE: Stripper Effluent
LAB NO: F6876

DATE REPORTED: 08/29/91
DATE RECEIVED: 08/09/91
DATE COLLECTED: 08/07/91

Lab pH (s.u.).....	7.97
Lab conductivity, umhos/cm.....	4070
Lab resistivity, ohm-m.....	2.46
Total dissolved solids (180), mg/l..	2900
Total dissolved solids (calc), mg/l.	2720
Total alkalinity as CaCO ₃ , mg/l.....	203
Total hardness as CaCO ₃ , mg/l.....	1050
Sodium absorption ratio.....	6.53

	mg/l	meq/l
Bicarbonate as HC03.....	248	4.06
Carbonate as C03.....	0	0
Chloride.....	389	11
Sulfate.....	1320	27.4
Calcium.....	374	18.7
Magnesium.....	28.7	2.36
Potassium.....	2.91	0.07
Sodium.....	487	21.2
Major cations.....		42.3
Major anions.....		42.5
Cation/anion difference.....		0.24 %


Wanda Orso
Water Lab Manager

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 910807810
SITE: GRW -13
LAB NO: F6877

DATE REPORTED: 08/29/91
DATE RECEIVED: 08/09/91
DATE COLLECTED: 08/07/91

Lab conductivity, umhos/cm..... 4750


Wanda Orso
Water Lab Manager



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10863101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 08/09/91
PROJECT #	: 9831	DATE RECEIVED	: 08/10/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 910809850 STRIPPER INFLUENT	DATE ANALYZED	: 08/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	45.7
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.8
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	2.1
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.4
TOLUENE	0.7
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	7.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

DIBROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10863102

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 08/09/91
PROJECT #	: 9831	DATE RECEIVED	: 08/10/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9108091225	DATE ANALYZED	: 08/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	120



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 108631
PROJECT #	: 9831	DATE EXTRACTED	: 08/13/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 08/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	94



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9831
 PROJECT NAME : REFINER REMED
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 108631
 DATE EXTRACTED : 08/14/91
 DATE ANALYZED : 08/14/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	86
BROMOFLUOROBENZENE (%)	97



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 108631

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9831

DATE ANALYZED : 08/13/91

PROJECT NAME : REFINED REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10899904

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	22	110	22	110	0
TRICHLOROETHENE	<0.2	20	19	95	20	100	5
TETRACHLOROETHENE	<0.2	20	18	90	18	90	0
BENZENE	<0.2	20	18	90	18	90	0
BROMODICHLOROMETHANE	<0.2	20	20	100	21	105	5
CHLOROFORM	<0.2	20	20	100	20	100	0
1,1,1-TRICHLOROETHANE	<0.2	20	19	95	19	95	0
TOLUENE	<0.5	20	17	85	17	85	0
CHLOROBENZENE	<0.5	20	17	85	17	85	0
M-XYLENE	<0.5	20	16	80	16	80	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10858701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 910807805 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 08/07/91
 DATE RECEIVED : 08/08/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 08/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	108



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 108587
PROJECT #	: 9834	DATE EXTRACTED	: 08/08/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 08/08/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 108587

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 08/08/91

PROJECT NAME : REFINE REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10899903

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED	% SPIKED	DUP.		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	21	105	20	100	5
TETRACHLOROETHENE	<0.2	20	20	100	19	95	5
BENZENE	<0.5	20	17	85	16	80	6
BROMODICHLOROMETHANE	<0.2	20	23	115	22	110	4
CHLOROFORM	<0.2	20	22	110	21	105	5
1,1,1-TRICHLOROETHANE	<0.2	20	22	110	21	105	5
TOLUENE	<0.5	20	17	85	16	80	6
CHLOROBENZENE	<0.5	20	19	95	18	90	5
M-XYLENE	<0.5	20	17	85	16	80	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10963101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 910909810 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 09/09/91
 DATE RECEIVED : 09/10/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 09/13/91
 UNITS : UG/L
 DILUTION FACTOR : 5

COMPOUNDS	RESULTS
BENZENE	35
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	<1.0
1,2-DICHLOROETHANE	<1.0
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	<1.0
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	3
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	<1.0
TOLUENE	<2.5
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	<1.0
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	13
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	90
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 109631
PROJECT #	: 9834	DATE EXTRACTED	: 09/13/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	88



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 109631

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 09/13/91

PROJECT NAME : REFINE REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10999911

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. DUP.		RPD
	RESULT	SPIKED			SPIKED SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.2	20	18	85	18	85	0
TRICHLOROETHENE	<0.2	20	22	110	22	110	0
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9
BENZENE	<0.5	20	18	85	18	85	0
BROMODICHLOROMETHANE	<0.2	20	23	115	22	110	4
CHLOROFORM	3.5	20	27	118	27	118	0
1,1,1-TRICHLOROETHANE	<0.2	20	23	115	23	115	0
TOLUENE	<0.5	20	18	85	17	80	6
CHLOROBENZENE	<0.5	20	22	110	21	105	5
M-XYLENE	<0.5	20	17	80	17	80	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

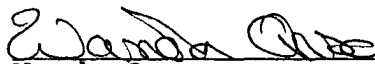
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 9109041518
SITE: Stripper effluent
LAB NO: F7129

DATE REPORTED: 09/25/91
DATE RECEIVED: 09/05/91
DATE COLLECTED: 09/04/91

Lab pH (s.u.).....	7.76
Lab conductivity, umhos/cm.....	4020
Lab resistivity, ohm-m.....	2.49
Total dissolved solids (180), mg/L..	2910
Total dissolved solids (calc), mg/L.	2680
Total alkalinity as CaCO ₃ , mg/L.....	217
Total hardness as CaCO ₃ , mg/L.....	1040
Sodium absorption ratio.....	6.24

	mg/L	meq/L
Bicarbonate as HCO ₃	264	4.33
Carbonate as CO ₃	0	0
Chloride.....	430	12.1
Sulfate.....	1260	26.2
Calcium.....	365	18.2
Magnesium.....	32.3	2.66
Potassium.....	2.62	0.07
Sodium.....	464	20.2
Major cations.....		41.1
Major anions.....		42.6
Cation/anion difference.....		1.8 %

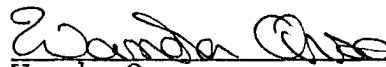

Wanda Orso
Water Lab Manager

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 9109051250
SITE: RW -13
LAB NO: F7130

DATE REPORTED: 09/25/91
DATE RECEIVED: 09/05/91
DATE COLLECTED: 09/04/91

Lab conductivity, umhos/cm..... 4500


Wanda Orso
Water Lab Manager

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: 910909810
SITE: Stripper influent
LAB NO: F7149

DATE REPORTED: 09/25/91
DATE RECEIVED: 09/09/91
DATE COLLECTED: 09/09/91

Lab pH (s.u.)..... 6.79
Lab conductivity, umhos/cm..... 3840
Lab resistivity, ohm-m..... 2.61
Total dissolved solids (180), mg/L.. 2940
Total dissolved solids (calc), mg/L. 2770
Total alkalinity as CaCO₃, mg/L..... 323
Total hardness as CaCO₃, mg/L..... 1080
Sodium absorption ratio..... 6.77

	mg/L	meq/L
Bicarbonate as HCO ₃	394	6.46
Carbonate as CO ₃	0	0
Chloride.....	386	10.9
Sulfate.....	1260	26.3
Calcium.....	380	19
Magnesium.....	32.5	2.67
Potassium.....	2.7	0.07
Sodium.....	512	22.3
Major cations.....		44
Major anions.....		43.6
Cation/anion difference.....		0.45 %


Wanda Orso
Water Lab Manager



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10958001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 09/04/91
PROJECT #	: 9834	DATE RECEIVED	: 09/06/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9109041518 STRIPPER EFFLUENT	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	109



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109580
 DATE EXTRACTED : 09/09/91
 DATE ANALYZED : 09/09/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	81



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 109580

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 09/09/91

PROJECT NAME : REFINE REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10999908

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% SPIKED REC.	DUP. % SPIKED REC.		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	21	105	0
TRICHLOROETHENE	<0.2	20	23	115	21	105	9
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9
BENZENE	<0.5	20	20	100	19	95	5
BROMODICHLOROMETHANE	<0.2	20	23	115	21	105	9
CHLOROFORM	<0.2	20	23	115	23	115	0
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	21	105	0
TOLUENE	<0.5	20	20	100	19	95	5
CHLOROBENZENE	<0.2	20	21	105	20	100	5
M-XYLENE	<0.5	20	18	90	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

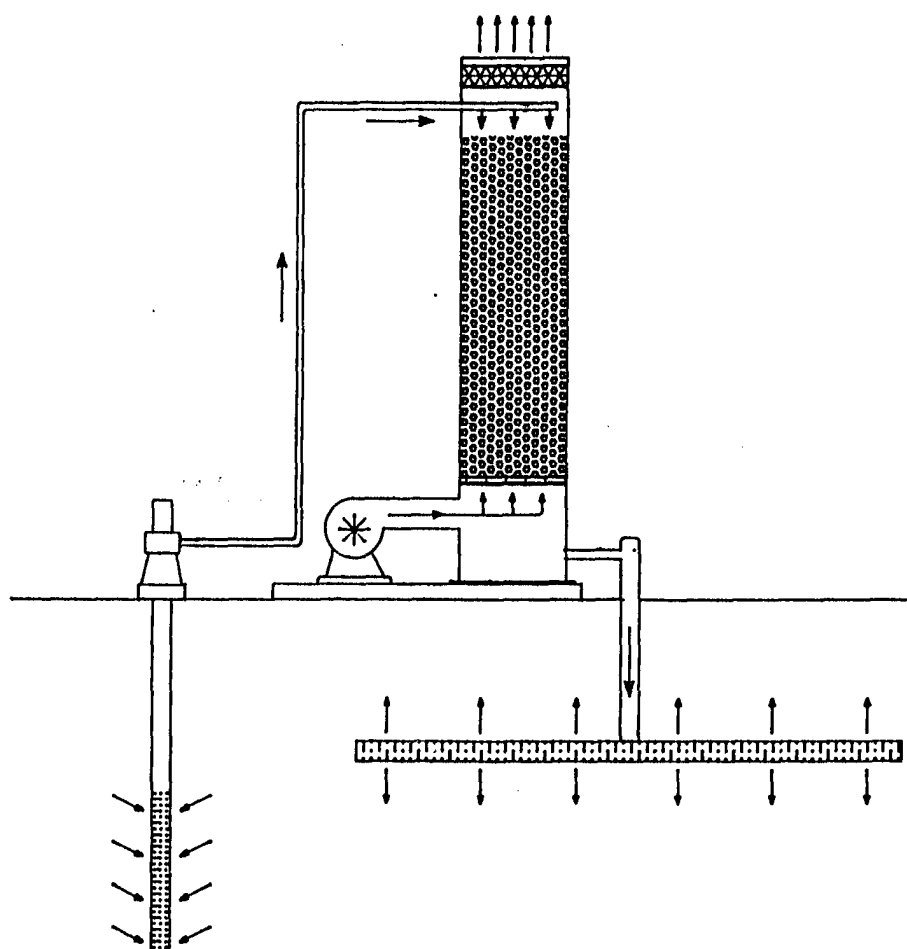
$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

2nd
Quarter
1991

GIANT

REFINING CO.

BLOOMFIELD REFINERY REMEDIATION PROJECT



Post Office Box 256
606 E. Highway 64
Farmington, New Mexico 87401

(505) 632-3306
FAX (505) 632-2487

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OIL CONSERVATION DIV.
SANTA FE

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
SECOND QUARTER, 1991

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87401
(505)632-3306
FAX (505)632-2487

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INTRODUCTION AND SUMMARY
QUARTERLY REPORT
SECOND QUARTER, 1991

INTRODUCTION

Changes were made to the remediation system during the second quarter of 1991. An infiltration gallery was constructed in the controlled application area of the refinery. All treated water is being directed toward it. We continue to monitor its effect on the system. Monitor well SHS-7, part of the original proposed offsite recovery well network, has yet to be converted to a recovery well due to land access problems.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Subsequent reports will contain updates revealing historical trends of the analytes. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevations and product thicknesses, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail on a weekly basis is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 QUARTERLY ANALYTICAL DATA SUMMARY
 SECOND QUARTER, 1991

STRIPPER INFLUENT

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.38	6.74	7.82
Lab conductivity, umhos/cm	4040.00	4110.00	3670.00
Lab resistivity, ohm-m	2.48	2.43	2.73
Total dissolved solids (180)	3150.00	3080.00	2830.00
Total dissolved solids (calc)	3040.00	3030.00	2890.00
Total alkalinity as CaCO ₃	217.00	169.00	271.00
Total hardness as CaCO ₃	1110.00	1130.00	1100.00
Sodium absorption ratio	7.44	7.62	6.89
Bicarbonate as HCO ₃	265.00	206.00	331.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	437.00	499.00	391.00
Sulfate	1460.00	1400.00	1380.00
Calcium	414.00	401.00	391.00
Magnesium	19.40	30.70	30.80
Potassium	2.95	2.94	2.90
Sodium	570.00	588.00	526.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	0.70
1,2-Dichloroethane	0.60	ND	1.20
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	1.50	ND	2.70
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	0.30

1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	0.30
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
AROMATICS			
Benzene	2.90	ND	25.20
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	4.50
Toluene	ND	ND	1.90
Xylenes	3.20	ND	46.00
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	8.31	8.04	7.72
Lab conductivity, umhos/cm	4000.00	4120.00	4100.00
Lab resistivity, ohm-m	2.50	2.43	2.44
Total dissolved solids (180)	3380.00	3130.00	3010.00
Total dissolved solids (calc)	3110.00	3030.00	2890.00
Total alkalinity as CaCO ₃	226.00	146.00	164.00
Total hardness as CaCO ₃	1090.00	1130.00	1090.00
Sodium absorption ratio	7.71	7.04	7.07
Bicarbonate as HCO ₃	275.00	178.00	200.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	452.00	503.00	491.00
Sulfate	1500.00	1460.00	1350.00
Calcium	409.00	407.00	389.00
Magnesium	16.50	27.80	29.40
Potassium	2.90	2.78	2.30
Sodium	585.00	544.00	537.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	2.20	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

PAH

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

GRW-4

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.36		
Lab conductivity, umhos/cm	4160.00		
Lab resistivity, ohm-m	2.41		
Total dissolved solids (180)	2980.00		
Total dissolved solids (calc)	2990.00		
Total alkalinity as CaCO3	703.00		
Total hardness as CaCO3	976.00		
Sodium absorption ratio	9.47		
Bicarbonate as HCO3	860.00		
Carbonate as CO3	0.00		
Chloride	462.00		
Sulfate	1040.00		
Calcium	370.00		
Magnesium	12.70		
Potassium	1.92		
Sodium	680.00		

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	3.30
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	5.20
Fluorene	31.00
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	33.00
Phenanthrene	79.00
Pyrene	4.50

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND

1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	1700.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	450.00
Toluene	ND
Xylenes	680.00

GRW-6

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.57		
Lab conductivity, umhos/cm	4840.00		
Lab resistivity, ohm-m	2.07		
Total dissolved solids (180)	3560.00		
Total dissolved solids (calc)	3580.00		
Total alkalinity as CaCO ₃	556.00		
Total hardness as CaCO ₃	1190.00		
Sodium absorption ratio	9.38		
Bicarbonate as HCO ₃	677.00		
Carbonate as CO ₃	0.00		
Chloride	624.00		
Sulfate	1410.00		
Calcium	435.00		
Magnesium	26.00		
Potassium	2.27		
Sodium	745.00		

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.08
Pyrene	

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND

1,2-Dichloroethane	4.10
1,2-Dichloroethene	ND
1,2-Dichloroethene	11.00
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.90
1,1,1-Trichloroethane	0.22
1,1,2-Trichloroethane	ND
Trichloroethene	2.30
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	9.90
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	3.30
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-15

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.24		
Lab conductivity, umhos/cm	4560.00		
Lab resistivity, ohm-m	2.19		
Total dissolved solids (180)	3480.00		
Total dissolved solids (calc)	3450.00		
Total alkalinity as CaCO ₃	272.00		
Total hardness as CaCO ₃	1130.00		
Sodium absorption ratio	9.46		
Bicarbonate as HCO ₃	332.00		
Carbonate as CO ₃	0.00		
Chloride	503.00		
Sulfate	1610.00		
Calcium	428.00		
Magnesium	14.20		
Potassium	4.95		
Sodium	730.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	14.00
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	5.20
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-17

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.45		
Lab conductivity, umhos/cm	2720.00		
Lab resistivity, ohm-m	3.68		
Total dissolved solids (180)	2210.00		
Total dissolved solids (calc)	2230.00		
Total alkalinity as CaCO ₃	268.00		
Total hardness as CaCO ₃	926.00		
Sodium absorption ratio	5.00		
Bicarbonate as HCO ₃	328.00		
Carbonate as CO ₃	0.00		
Chloride	91.40		
Sulfate	1260.00		
Calcium	360.00		
Magnesium	6.59		
Potassium	0.73		
Sodium	350.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

GBR-24-D

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.45		
Lab conductivity, umhos/cm	4890.00		
Lab resistivity, ohm-m	2.04		
Total dissolved solids (180)	3850.00		
Total dissolved solids (calc)	3730.00		
Total alkalinity as CaCO ₃	231.00		
Total hardness as CaCO ₃	1830.00		
Sodium absorption ratio	5.23		
Bicarbonate as HCO ₃	282.00		
Carbonate as CO ₃	0.00		
Chloride	802.00		
Sulfate	1580.00		
Calcium	623.00		
Magnesium	67.70		
Potassium	5.77		
Sodium	515.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	26.00
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	190.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	100.00
Toluene	15.00
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	1.70
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.80
Pyrene	ND

GBR-30

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.31		
Lab conductivity, umhos/cm	4110.00		
Lab resistivity, ohm-m	2.43		
Total dissolved solids (180)	3150.00		
Total dissolved solids (calc)	3090.00		
Total alkalinity as CaCO ₃	265.00		
Total hardness as CaCO ₃	1110.00		
Sodium absorption ratio	7.71		
Bicarbonate as HCO ₃	323.00		
Carbonate as CO ₃	0.00		
Chloride	528.00		
Sulfate	1370.00		
Calcium	428.00		
Magnesium	9.98		
Potassium	2.17		
Sodium	590.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	1.10
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	18.00
Fluorene	4.00
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	5.00
Pyrene	ND

GBR-31 4/91 5/91 6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.10
Lab conductivity, umhos/cm	4360.00
Lab resistivity, ohm-m	2.30
Total dissolved solids (180)	3360.00
Total dissolved solids (calc)	3210.00
Total alkalinity as CaCO ₃	212.00
Total hardness as CaCO ₃	1180.00
Sodium absorption ratio	7.72
Bicarbonate as HCO ₃	259.00
Carbonate as CO ₃	0.00
Chloride	543.00
Sulfate	1470.00
Calcium	425.00
Magnesium	28.30
Potassium	2.55
Sodium	609.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	0.66
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

*ND - Not detected at specified detection limit

OFFSITE WELLS

SHS-3

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	3.10
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.81
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-10

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	100.00
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-12

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.25
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.44
1,2-Dichloroethane	0.47
1,2-Dichloroethene	7.00
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.20
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.58
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	0.89
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-13

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

0.41

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

0.83

1,2-Dichloroethane

3.90

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-15

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

0.60

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-16

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

0.40

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

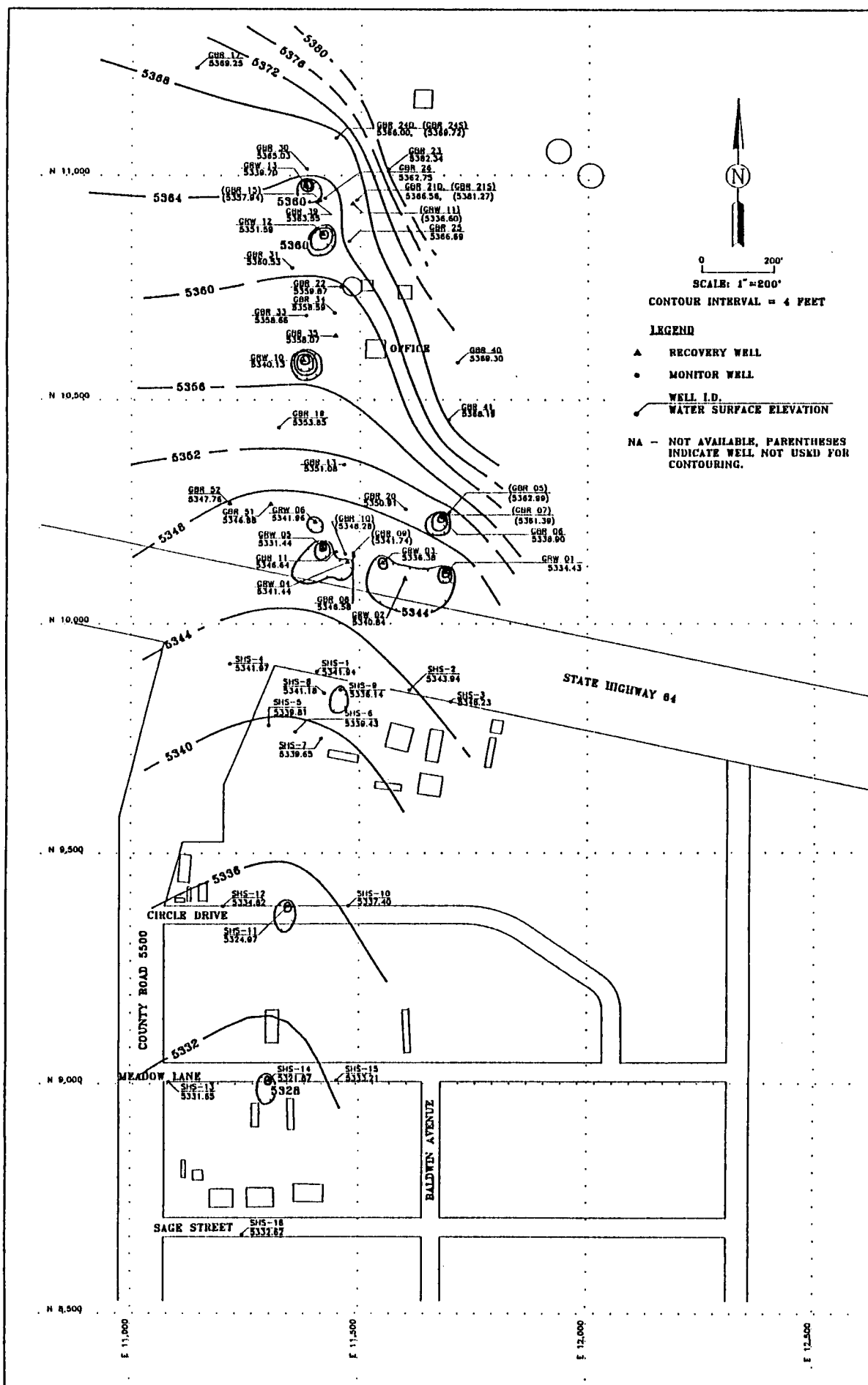
ND

AROMATICS

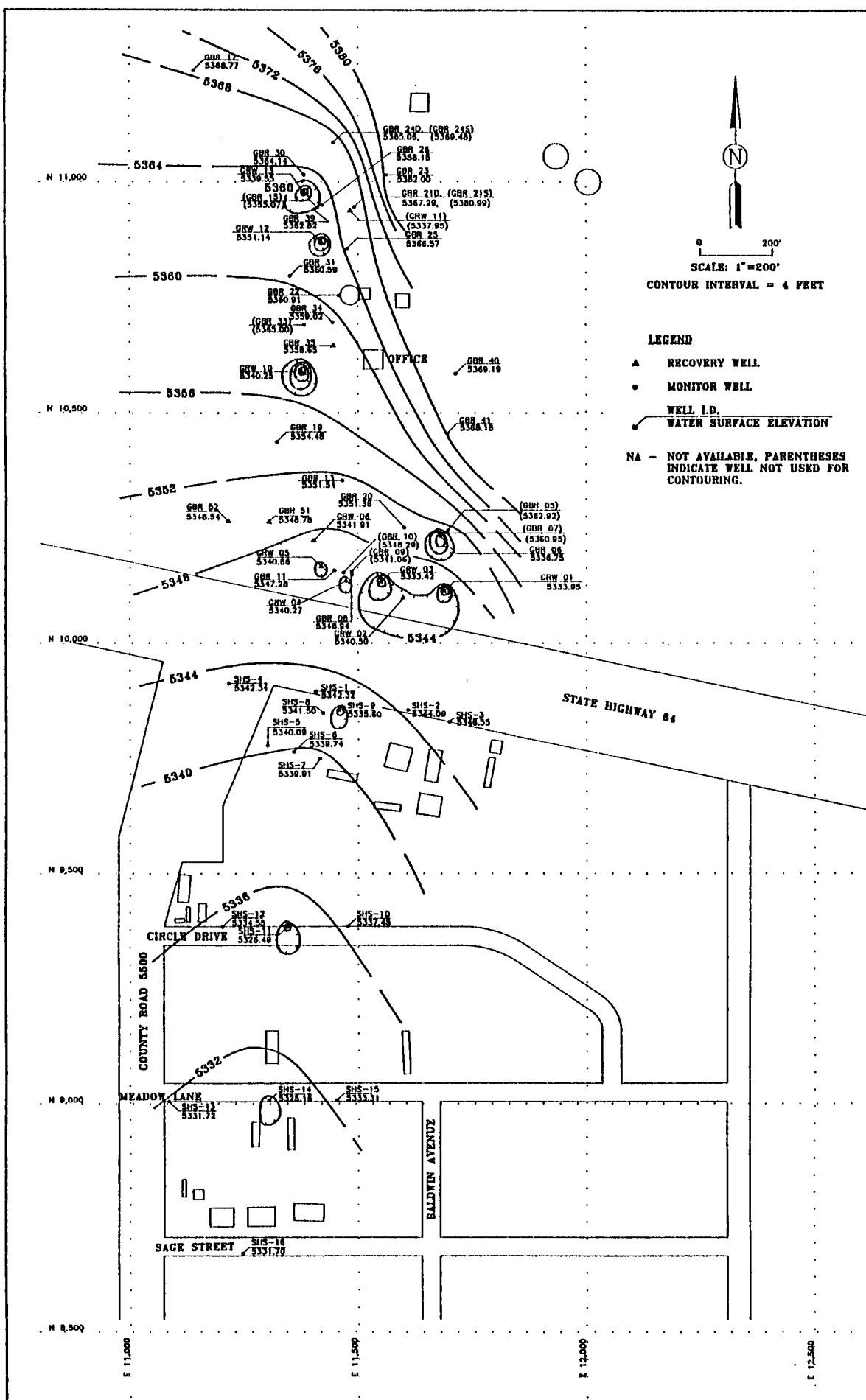
Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

*ND - Not detected at specified detection limit

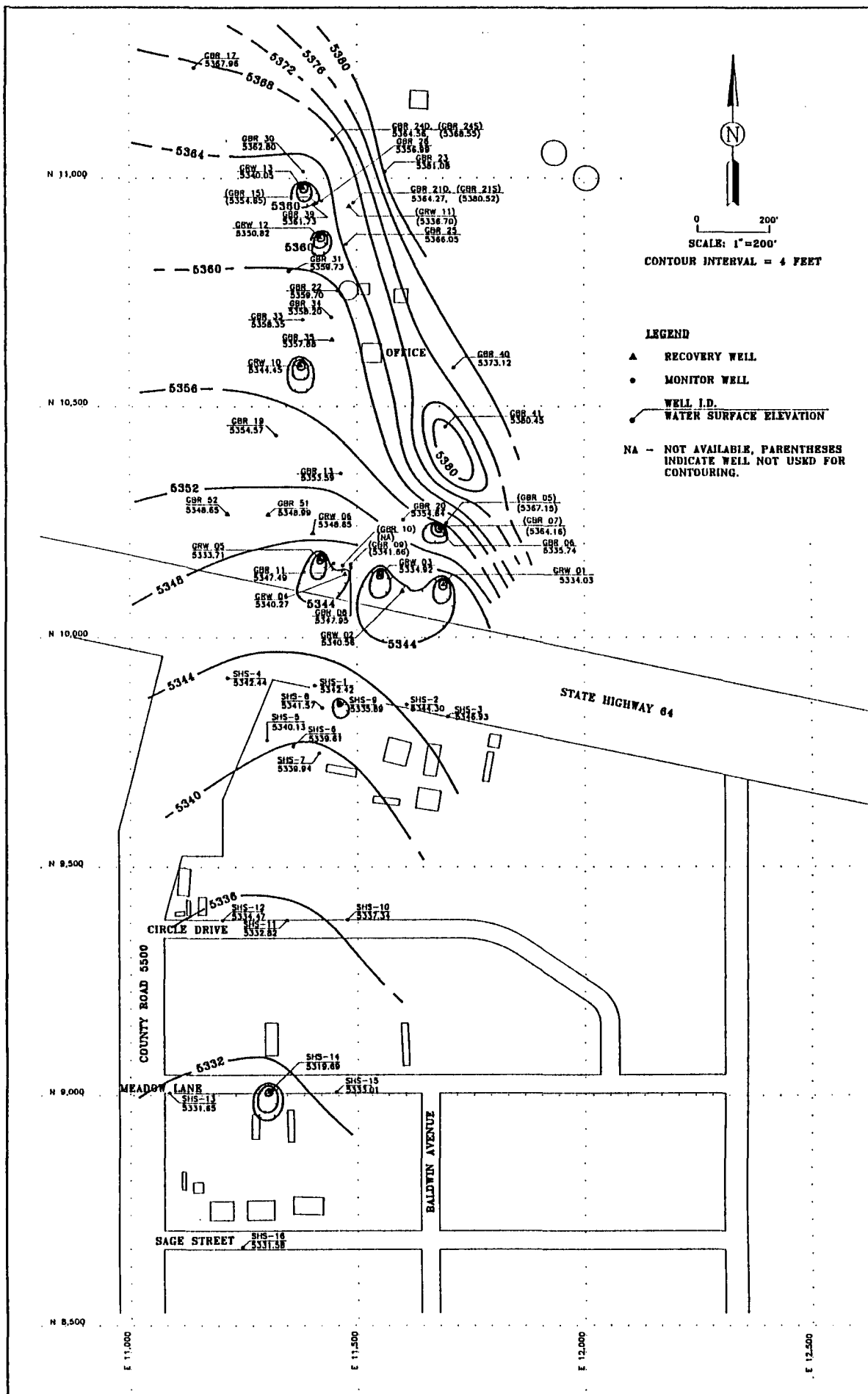
April Water Surface Contour Map Giant-Bloomfield Refinery



May Water Surface Contour Map Giant-Bloomfield Refinery



June Water Surface Contour Map Giant-Bloomfield Refinery



GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: April, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.87		0.00	5334.43
GRW-2	5391.28	50.44		0.00	5340.84
GRW-3	5388.77	52.40	52.39	0.01	5336.38
GRW-4	5390.02	48.58		0.00	5341.44
GRW-5	5390.56	59.12		0.00	5331.44
GRW-6	5390.81	48.85		0.00	5341.96
GRW-10	5395.02	58.22	54.06	4.16	5340.13
GRW-11	5397.85	61.25		0.00	5336.60
GRW-12	5397.24	45.65		0.00	5351.59
GRW-13	5396.90	57.20		0.00	5339.70
GBR-5	5395.07	34.00	31.60	2.40	5362.99
GBR-6	5395.70	56.80		0.00	5338.90
GBR-7	5395.85	35.67	34.16	1.51	5361.39
GBR-8	5390.50	45.58	43.50	2.08	5346.58
GBR-9	5389.92	48.18		0.00	5341.74
GBR-10	5390.57	42.29		0.00	5348.28
GBR-11	5389.43	44.25	42.42	1.83	5346.64
GBR-13	5393.04	43.20	41.65	1.55	5351.08
GBR-15	5397.99	40.05		0.00	5357.94
GBR-17	5402.69	33.44		0.00	5369.25
GBR-18	5421.68	21.77		0.00	5399.91
GBR-19	5393.83	40.04	39.97	0.07	5353.85
GBR-20	5393.47	44.40	42.10	2.30	5350.91
GBR-21S	5400.65	19.38		0.00	5381.27
GBR-21D	5400.19	33.63		0.00	5366.56
GBR-22	5395.91	38.63	35.39	3.24	5359.87
GBR-23	5403.72	21.38		0.00	5382.34
GBR-24S	5396.08	26.36		0.00	5369.72
GBR-24D	5396.77	30.77		0.00	5366.00
GBR-25	5396.72	30.03		0.00	5366.69
GBR-26	5395.59	32.84		0.00	5362.75
GBR-30	5396.58	31.55		0.00	5365.03
GBR-31	5394.86	34.33		0.00	5360.53
GBR-33	5396.28	37.77	37.58	0.19	5358.66
GBR-34	5394.00	35.85	35.30	0.55	5358.59
GBR-35	5393.66	36.40	35.39	1.01	5358.07
GBR-39	5397.55	34.00		0.00	5363.55
GBR-40	5400.76	31.46		0.00	5369.30
GBR-41	5396.35	28.16		0.00	5368.19
GBR-51	5389.68	42.80		0.00	5346.88
GBR-52	5387.74	39.98		0.00	5347.76

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 MONTHLY POTENTIOMETRIC SURFACE
 MONTH/YEAR: April, 1991
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.72	41.57	0.15	5341.94
SHS-2	5381.66	38.24	37.59	0.65	5343.94
SHS-3	5383.33	37.10		0.00	5346.23
SHS-4	5383.62	41.65		0.00	5341.97
SHS-5	5378.36	38.55		0.00	5339.81
SHS-6	5378.17	38.74		0.00	5339.43
SHS-7	5378.77	39.90	38.92	0.98	5339.65
SHS-8	5380.25	39.07		0.00	5341.18
SHS-9	5380.79	44.65		0.00	5336.14
SHS-10	5373.80	36.40		0.00	5337.40
SHS-11	5373.17	48.20		0.00	5324.97
SHS-12	5373.94	39.12		0.00	5334.82
SHS-13	5367.81	36.16		0.00	5331.65
SHS-14	5367.07	45.20		0.00	5321.87
SHS-15	5366.21	33.00		0.00	5333.21
SHS-16	5362.58	29.96		0.00	5332.62

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: May, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.35		0.00	5333.95
GRW-2	5391.28	50.78		0.00	5340.50
GRW-3	5388.77	55.35		0.00	5333.42
GRW-4	5390.02	49.75		0.00	5340.27
GRW-5	5390.56	49.70		0.00	5340.86
GRW-6	5390.81	48.90		0.00	5341.91
GRW-10	5395.02	57.14	54.18	2.96	5340.25
GRW-11	5397.85	59.90		0.00	5337.95
GRW-12	5397.24	46.10		0.00	5351.14
GRW-13	5396.90	57.35		0.00	5339.55
GBR-5	5395.07	34.16	31.65	2.51	5362.92
GBR-6	5395.70	58.95		0.00	5336.75
GBR-7	5395.85	36.00	34.62	1.38	5360.95
GBR-8	5390.50	44.26	43.38	0.88	5346.94
GBR-9	5389.92	48.86		0.00	5341.06
GBR-10	5390.57	42.28		0.00	5348.29
GBR-11	5389.43	42.16	42.15	0.01	5347.28
GBR-13	5393.04	41.68	41.45	0.23	5351.54
GBR-15	5397.99	42.92		0.00	5355.07
GBR-17	5402.69	33.92		0.00	5368.77
GBR-18	5421.68	22.16		0.00	5399.52
GBR-19	5393.83	39.35		0.00	5354.48
GBR-20	5393.47	43.96	41.65	2.31	5351.36
GBR-21S	5400.65	19.66		0.00	5380.99
GBR-21D	5400.19	32.90		0.00	5367.29
GBR-22	5395.91	35.01	35.00	0.01	5360.91
GBR-23	5403.72	21.72		0.00	5382.00
GBR-24S	5396.08	26.60		0.00	5369.48
GBR-24D	5396.77	31.71		0.00	5365.06
GBR-25	5396.72	30.15		0.00	5366.57
GBR-26	5395.59	37.44		0.00	5358.15
GBR-30	5396.58	32.44		0.00	5364.14
GBR-31	5394.86	34.27		0.00	5360.59
GBR-33	5396.28	31.28		0.00	5365.00
GBR-34	5394.00	34.98		0.00	5359.02
GBR-35	5393.66	35.02	35.01	0.01	5358.65
GBR-39	5397.55	34.73		0.00	5362.82
GBR-40	5400.76	31.57		0.00	5369.19
GBR-41	5396.35	28.17		0.00	5368.18
GBR-51	5389.68	40.90		0.00	5348.78
GBR-52	5387.74	39.20		0.00	5348.54

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 MONTHLY POTENTIOMETRIC SURFACE
 MONTH/YEAR: May, 1991
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.28	41.20	0.08	5342.32
SHS-2	5381.66	38.03	37.45	0.58	5344.09
SHS-3	5383.33	36.78		0.00	5346.55
SHS-4	5383.62	41.28		0.00	5342.34
SHS-5	5378.36	38.27		0.00	5340.09
SHS-6	5378.17	38.43		0.00	5339.74
SHS-7	5378.77	39.50	38.70	0.80	5339.91
SHS-8	5380.25	38.76	38.75	0.01	5341.50
SHS-9	5380.79	45.20	45.19	0.01	5335.60
SHS-10	5373.80	36.35		0.00	5337.45
SHS-11	5373.17	46.68		0.00	5326.49
SHS-12	5373.94	39.39		0.00	5334.55
SHS-13	5367.81	36.09		0.00	5331.72
SHS-14	5367.07	41.91		0.00	5325.16
SHS-15	5366.21	32.90		0.00	5333.31
SHS-16	5362.58	30.88		0.00	5331.70

* WSEL -- WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: June, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.27		0.00	5334.03
GRW-2	5391.28	50.72		0.00	5340.56
GRW-3	5388.77	53.85		0.00	5334.92
GRW-4	5390.02	49.75		0.00	5340.27
GRW-5	5390.56	56.85		0.00	5333.71
GRW-6	5390.81	42.16		0.00	5348.65
GRW-10	5395.02	54.92	49.48	5.44	5344.45
GRW-11	5397.85	61.15		0.00	5336.70
GRW-12	5397.24	46.42		0.00	5350.82
GRW-13	5396.90	56.85		0.00	5340.05
GBR-5	5395.07	29.78	27.46	2.32	5367.15
GBR-6	5395.70	59.96		0.00	5335.74
GBR-7	5395.85	33.54	31.23	2.31	5364.16
GBR-8	5390.50	42.56	42.55	0.01	5347.95
GBR-9	5389.92	48.26		0.00	5341.66
GBR-10	5390.57			0.00	5390.57
GBR-11	5389.43	43.22	41.62	1.60	5347.49
GBR-13	5393.04	39.45		0.00	5353.59
GBR-15	5397.99	43.34		0.00	5354.65
GBR-17	5402.69	34.73		0.00	5367.96
GBR-18	5421.68	22.75		0.00	5398.93
GBR-19	5393.83	39.26		0.00	5354.57
GBR-20	5393.47	40.75	38.35	2.40	5354.64
GBR-21S	5400.65	20.23	20.10	0.13	5380.52
GBR-21D	5400.19	35.92		0.00	5364.27
GBR-22	5395.91	39.04	35.50	3.54	5359.70
GBR-23	5403.72	22.65	22.64	0.01	5381.08
GBR-24S	5396.08	28.36	27.32	1.04	5368.55
GBR-24D	5396.77	32.21		0.00	5364.56
GBR-25	5396.72	30.67		0.00	5366.05
GBR-26	5395.59	38.60		0.00	5356.99
GBR-30	5396.58	33.78		0.00	5362.80
GBR-31	5394.86	35.13		0.00	5359.73
GBR-33	5396.28	38.07	37.90	0.17	5358.35
GBR-34	5394.00	37.00	35.50	1.50	5358.20
GBR-35	5393.66	37.00	35.47	1.53	5357.88
GBR-39	5397.55	35.82		0.00	5361.73
GBR-40	5400.76	27.64		0.00	5373.12
GBR-41	5396.35	15.90		0.00	5380.45
GBR-51	5389.68	40.69		0.00	5348.99
GBR-52	5387.74	39.09		0.00	5348.65

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 MONTHLY POTENTIOMETRIC SURFACE
 MONTH/YEAR: June, 1991
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.18	41.10	0.08	5342.42
SHS-2	5381.66	37.51	37.32	0.19	5344.30
SHS-3	5383.33	36.40		0.00	5346.93
SHS-4	5383.62	41.18		0.00	5342.44
SHS-5	5378.36	38.23		0.00	5340.13
SHS-6	5378.17	38.56		0.00	5339.61
SHS-7	5378.77	39.42	38.68	0.74	5339.94
SHS-8	5380.25	38.70	38.68	0.02	5341.57
SHS-9	5380.79	44.90		0.00	5335.89
SHS-10	5373.80	36.46		0.00	5337.34
SHS-11	5373.17	40.37	40.35	0.02	5332.82
SHS-12	5373.94	39.47		0.00	5334.47
SHS-13	5367.81	36.16		0.00	5331.65
SHS-14	5367.07	47.38		0.00	5319.69
SHS-15	5366.21	33.20		0.00	5333.01
SHS-16	5362.58	31.00		0.00	5331.58

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Second Quarter, 1991

```
=====
Total Volume Of Water Recovered      1878113
Net Change In Storage Volume         -287985

Total Water Pumped To The            1967784
Infiltration Gallery

Less April Unplanned Release         53550

=====
Difference                           -144764
```

Comments: The approximately 7% difference
can be accounted for in meter
error.

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Second Quarter, 1991

Tank Number	Beginning Volume	Ending Volume	Net Change
102	8692	13735	5043
106	8010	8010	0
21	311966	351419	39453
22	225523	294448	68925
27	185631	182470	-3161
32	159291	88634	-70657
34	200948	87541	-113407
35	0	0	0
37	352232	138051	-214181
Total Net Volume Change			-287985

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Second Quarter of 1991

Well	Month #1	Month #2	Month #3	Total
GRW-1	6350	6710	9470	22530
GRW-2	10890	13140	14480	38510
GRW-3	25470	23980	28980	78430
GRW-4	14030	13070	22400	49500
GRW-5	43480	62960	68100	174540
GRW-6	16080	19970	23140	59190
GRW-7	32520	0	0	32520
GRW-9	6990	5850	8690	21530
GRW-10	148910	209590	237480	595980
GRW-11	20340	34050	37510	91900
GRW-12	26680	19060	13770	59510
GRW-13	51920	43870	38510	134300
SHS-9	2338	3885	4105	10328
SHS-11	1442	1839	1126	4407
SHS-14	122829	186574	195535	504938
Total Volume Pumped In Gallons				1878113

SPECIFIC CONDUCTANCE VALUES

GRW-13

	4/91	5/91	6/91
Lab Conductivity, umhos/cm	4720.00	4599.00	4800.00



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 910408840 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
 DATE RECEIVED : 04/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/15/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	2.9
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.6
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	1.5
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	3.2
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	90



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 910408846 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
 DATE RECEIVED : 04/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/15/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	2.2
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	124
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460803

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9104081525 RW-4 (GPR-43)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
 DATE RECEIVED : 04/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/20/91
 UNITS : UG/L
 DILUTION FACTOR : 200

COMPOUNDS	RESULTS
BENZENE	1700
BROMODICHLOROMETHANE	<40
BROMOFORM	<40
BROMOMETHANE	<40
CARBON TETRACHLORIDE	<40
CHLOROBENZENE	<100
CHLOROETHANE	<40
CHLOROFORM	<40
CHLOROMETHANE	<40
DIBROMOCHLOROMETHANE	<40
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<100
1,2 & 1,4-DICHLOROBENZENE	<100
DICHLORODIFLUOROMETHANE	<40
1,1-DICHLOROETHANE	<40
1,2-DICHLOROETHANE	<40
1,1-DICHLOROETHENE	<40
1,2-DICHLOROETHENE (TOTAL)	<40
1,2-DICHLOROPROPANE	<40
CIS-1,3-DICHLOROPROPENE	<40
TRANS-1,3-DICHLOROPROPENE	<40
ETHYLBENZENE	450
METHYLENE CHLORIDE	<400
1,1,2,2-TETRACHLOROETHANE	<40
TETRACHLOROETHENE	<40
TOLUENE	<100
1,1,1-TRICHLOROETHANE	<40
1,1,2-TRICHLOROETHANE	<40
TRICHLOROETHENE	<40
TRICHLOROFLUOROMETHANE	<100
VINYL CHLORIDE	<40
TOTAL XYLENES	680
TRICHLOROTRIFLUOROETHANE	<40

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 108
 BROMOFLUOROBENZENE (%) 76



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460804

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9104081539 RW-6
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
 DATE RECEIVED : 04/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/20/91
 UNITS : UG/L
 DILUTION FACTOR : 1

(GBL-44)

COMPOUNDS	RESULTS
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BENZENE	9.9
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.2
1,2-DICHLOROETHANE	4.1
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	11
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	3.3
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.9
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.22
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	2.3
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	115
BROMOFLUOROBENZENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460805

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9104081554 RW-13 (GBR-14)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
 DATE RECEIVED : 04/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/20/91
 UNITS : UG/L
 DILUTION FACTOR : 2

COMPOUNDS

RESULTS

BENZENE	16
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	<0.4
DIBROMOCHLOROMETHANE	<0.4
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<1
1,2 & 1,4-DICHLOROBENZENE	<1
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	<0.4
1,2-DICHLOROETHANE	6.8
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	<0.4
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	<1
METHYLENE CHLORIDE	<4
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	<0.4
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	<0.4
TRICHLOROFLUOROMETHANE	<1
VINYL CHLORIDE	<0.4
TOTAL XYLENES	<2
TRICHLOROTRIFLUOROETHANE	<0.4

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	83
BROMOFLUOROBENZENE (%)	74



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10460803

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104081525 RW-4
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : 04/10/91
DATE ANALYZED : 04/17/91
UNITS : UG/L
DILUTION FACTOR : 10

COMPOUNDS

RESULTS

NAPHTHALENE	33
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
FLUORENE	31
PHENANTHRENE	79
ANTHRACENE	3.3
FLUORANTHENE	5.2
PYRENE	4.5
BENZO(A)ANTHRACENE	<1.0
CHRYSENE	<1.0
BENZO(B)FLUORANTHENE	<1.0
BENZO(K)FLUORANTHENE	<1.0
BENZO(A)PYRENE	<1.0
DIBENZ(a,h)ANTHRACENE	<2.0
BENZO(g,h,i)PERYLENE	<1.0
INDENO(1,2,3-CD)PYRENE	<1.0



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10460804

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINER REMED
CLIENT I.D. : 9104081539 RW-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : 04/12/91
DATE ANALYZED : 04/19/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	0.084
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<0.20
BENZO(g,h,i)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10460805

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104081554 RW-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : 04/12/91
DATE ANALYZED : 04/18/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<0.20
BENZO(g,h,i)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9104021030 GBR 17
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
 DATE RECEIVED : 04/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/10/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	116
BROMOFLUOROBENZENE (%)	81



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9104021205 GBR 15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
 DATE RECEIVED : 04/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/10/91
 UNITS : UG/L
 DILUTION FACTOR : 2

COMPOUNDS	RESULTS
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BENZENE	5.2
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	<0.4
DIBROMOCHLOROMETHANE	<1
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<1
1,2 & 1,4-DICHLOROBENZENE	<1
DICHLORODIFLUOROMETHANE	<1
1,1-DICHLOROETHANE	<0.4
1,2-DICHLOROETHANE	14
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	<0.4
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	<1
METHYLENE CHLORIDE	<4
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	<0.4
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	<0.4
TRICHLOROFLUOROMETHANE	<1
VINYL CHLORIDE	<0.4
TOTAL XYLENES	<2
TRICHLOROTRIFLUOROETHANE	<0.4

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	119
BROMOFLUOROBENZENE (%)	74



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453803

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9104021315 GBR 30
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
 DATE RECEIVED : 04/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/10/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	1.1
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	136
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453804

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINER REMED
 CLIENT I.D. : 9104021414 GBR 240
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
 DATE RECEIVED : 04/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/15/91
 UNITS : UG/L
 DILUTION FACTOR : 20

COMPOUNDS	RESULTS
BENZENE	190
BROMODICHLOROMETHANE	<4
BROMOFORM	<4
BROMOMETHANE	<4
CARBON TETRACHLORIDE	<4
CHLOROBENZENE	<10
CHLOROETHANE	<4
CHLOROFORM	<4
CHLOROMETHANE	<4
DIBROMOCHLOROMETHANE	<6
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<10
1,2 & 1,4-DICHLOROBENZENE	<10
DICHLORODIFLUOROMETHANE	<6
1,1-DICHLOROETHANE	<4
1,2-DICHLOROETHANE	26
1,1-DICHLOROETHENE	<4
1,2-DICHLOROETHENE (TOTAL)	<4
1,2-DICHLOROPROPANE	<4
CIS-1,3-DICHLOROPROPENE	<4
TRANS-1,3-DICHLOROPROPENE	<4
ETHYLBENZENE	100
METHYLENE CHLORIDE	<40
1,1,2,2-TETRACHLOROETHANE	<4
TETRACHLOROETHENE	<4
TOLUENE	15
1,1,1-TRICHLOROETHANE	<4
1,1,2-TRICHLOROETHANE	<4
TRICHLOROETHENE	<4
TRICHLOROFLUOROMETHANE	<10
VINYL CHLORIDE	<4
TOTAL XYLENES	<20
TRICHLOROTRIFLUOROETHANE	<4

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 85
 BROMOFLUOROBENZENE (%) 54 *

* Result out of limits due to sample matrix interference



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453805

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9104021455 GBR 31
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
 DATE RECEIVED : 04/03/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/10/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.5
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.66
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	69



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9104081035 SHS-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
 DATE RECEIVED : 04/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/20/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.6
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 107
 BROMOFLUOROBENZENE (%) 85



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9104081135 SHS-16
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
 DATE RECEIVED : 04/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/20/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.4
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 108
 BROMOFLUOROBENZENE (%) 84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9104051011 SHS-3
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
 DATE RECEIVED : 04/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/14/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	109
BROMOFLUOROBENZENE (%)	88



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458002

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9104051135 SHS-6
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
 DATE RECEIVED : 04/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/14/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	3.1
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.81
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	107
BROMOFLUOROBENZENE (%)	88



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458003

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9104051235 SHS-10
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
 DATE RECEIVED : 04/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/15/91
 UNITS : UG/L
 DILUTION FACTOR : 10

COMPOUNDS	RESULTS
BENZENE	<5.0
BROMODICHLOROMETHANE	<2.0
BROMOFORM	<2.0
BROMOMETHANE	<2.0
CARBON TETRACHLORIDE	<2.0
CHLOROBENZENE	<5.0
CHLOROETHANE	<2.0
CHLOROFORM	<2.0
CHLOROMETHANE	<2.0
DIBROMOCHLOROMETHANE	<2.0
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<5.0
1,2 & 1,4-DICHLOROBENZENE	<5.0
DICHLORODIFLUOROMETHANE	<2.0
1,1-DICHLOROETHANE	<2.0
1,2-DICHLOROETHANE	<2.0
1,1-DICHLOROETHENE	<2.0
1,2-DICHLOROETHENE (TOTAL)	<2.0
1,2-DICHLOROPROPANE	<2.0
CIS-1,3-DICHLOROPROPENE	<2.0
TRANS-1,3-DICHLOROPROPENE	<2.0
ETHYLBENZENE	100
METHYLENE CHLORIDE	<20
1,1,2,2-TETRACHLOROETHANE	<2.0
TETRACHLOROETHENE	<2.0
TOLUENE	<5.0
1,1,1-TRICHLOROETHANE	<2.0
1,1,2-TRICHLOROETHANE	<2.0
TRICHLOROETHENE	<2.0
TRICHLOROFLUOROMETHANE	<5.0
VINYL CHLORIDE	<2.0
TOTAL XYLENES	<10
TRICHLOROTRIFLUOROETHANE	<2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 108
 BROMOFLUOROBENZENE (%) 85



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458004

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9104051330 SHS-12
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
 DATE RECEIVED : 04/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/11/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	0.89
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.25
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.44
1,2-DICHLOROETHANE	0.47
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	7.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.58
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	102
BROMOFLUOROBENZENE (%)	78



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458005

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9104051447 SHS-13
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
 DATE RECEIVED : 04/06/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/15/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	0.41
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.83
1,2-DICHLOROETHANE	3.9
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	78



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

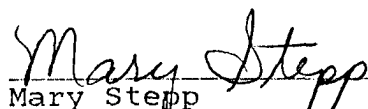
CLIENT: Giant Refinery
ID: 0840
SITE: Strip Infl. Disc.
LAB NO: F6062

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	7.38
Lab conductivity, umhos/cm.....	4040
Lab resistivity, ohm-m.....	2.48
Total dissolved solids (180), mg/l..	3150
Total dissolved solids (calc), mg/l.	3040
Total alkalinity as CaCO ₃ , mg/l.....	217
Total hardness as CaCO ₃ , mg/l.....	1110
Sodium absorption ratio.....	7.44

	mg/l	meq/l
Bicarbonate as HCO ₃	265	4.34
Carbonate as CO ₃	0	0
Chloride.....	437	12.3
Sulfate.....	1460	30.5
Calcium.....	414	20.6
Magnesium.....	19.4	1.59
Potassium.....	2.95	0.08
Sodium.....	570	24.8
Major cations.....		47.1
Major anions.....		47.2
Cation/anion difference.....		0.06 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



Inter-Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 0846
SITE: Strip Influ. Disc.
LAB NO: F6063

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	8.01
Lab conductivity, umhos/cm.....	4000
Lab resistivity, ohm-m.....	2.5
Total dissolved solids (180), mg/l..	3150
Total dissolved solids (calc), mg/l.	3060
Total alkalinity as CaCO ₃ , mg/l.....	203
Total hardness as CaCO ₃ , mg/l.....	1100
Sodium absorption ratio.....	7.61

	mg/l	meq/l
Bicarbonate as HCO ₃	248	4.07
Carbonate as CO ₃	0	0
Chloride.....	457	12.9
Sulfate.....	1470	30.6
Calcium.....	411	20.5
Magnesium.....	18.4	1.52
Potassium.....	3.1	0.08
Sodium.....	580	25.2
Major cations.....		47.3
Major anions.....		47.5
Cation/anion difference.....		0.25 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



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Tel. (505) 326-4737

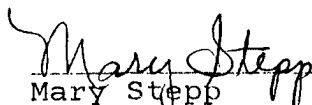
CLIENT: Giant Refinery
ID: 1525
SITE: RW-4
LAB NO: F6064

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	7.36
Lab conductivity, umhos/cm.....	4160
Lab resistivity, ohm-m.....	2.41
Total dissolved solids (180), mg/l..	2980
Total dissolved solids (calc), mg/l.	2990
Total alkalinity as CaCO ₃ , mg/l.....	703
Total hardness as CaCO ₃ , mg/l.....	976
Sodium absorption ratio.....	9.47

	mg/l	meq/l
Bicarbonate as HCO ₃	860	14.1
Carbonate as CO ₃	0	0
Chloride.....	462	13
Sulfate.....	1040	21.7
Calcium.....	370	18.5
Magnesium.....	12.7	1.05
Potassium.....	1.92	0.05
Sodium.....	680	29.6
Major cations.....		49.2
Major anions.....		48.8
Cation/anion difference.....		0.33 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1539
SITE: RW-6
LAB NO: 6065

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	7.57
Lab conductivity, umhos/cm.....	4840
Lab resistivity, ohm-m.....	2.07
Total dissolved solids (180), mg/l..	3560
Total dissolved solids (calc), mg/l.	3580
Total alkalinity as CaCO ₃ , mg/l.....	556
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	9.38

	mg/l	meq/l
Bicarbonate as HCO ₃	677	11.1
Carbonate as CO ₃	0	0
Chloride.....	624	17.6
Sulfate.....	1410	29.4
Calcium.....	435	21.7
Magnesium.....	26	2.14
Potassium.....	2.27	0.06
Sodium.....	745	32.4
Major cations.....		56.3
Major anions.....		58.1
Cation/anion difference.....		1.54 %

ND - Analyte "not detected" at the stated detection limit.

A handwritten signature in cursive script that reads 'Mary Stepp'. The signature is written over a horizontal line.

Mary Stepp
Lab Director



Inter-Mountain
Laboratories, Inc.

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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID:
SITE: Stripper Effl.
LAB NO: 6067

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	8.31
Lab conductivity, umhos/cm.....	4000
Lab resistivity, ohm-m.....	2.5
Total dissolved solids (180), mg/l..	3380
Total dissolved solids (calc), mg/l.	3110
Total alkalinity as CaCO ₃ , mg/l.....	226
Total hardness as CaCO ₃ , mg/l.....	1090
Sodium absorption ratio.....	7.71

	mg/l	meq/l
Bicarbonate as HCO ₃	275	4.51
Carbonate as CO ₃	0	0
Chloride.....	452	12.7
Sulfate.....	1500	31.3
Calcium.....	409	20.4
Magnesium.....	16.5	1.36
Potassium.....	2.9	0.07
Sodium.....	585	25.4
Major cations.....		47.3
Major anions.....		48.6
Cation/anion difference.....		1.37 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1205
SITE: GBR -15
LAB NO: F6030

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.24
Lab conductivity, umhos/cm.....	4560
Lab resistivity, ohm-m.....	2.19
Total dissolved solids (180), mg/l..	3480
Total dissolved solids (calc), mg/l.	3450
Total alkalinity as CaCO ₃ , mg/l.....	272
Total hardness as CaCO ₃ , mg/l.....	1130
Sodium absorption ratio.....	9.46

	mg/l	meq/l
Bicarbonate as HCO ₃	332	5.44
Carbonate as CO ₃	0	0
Chloride.....	503	14.2
Sulfate.....	1610	33.5
Calcium.....	428	21.4
Magnesium.....	14.2	1.17
Potassium.....	4.95	0.13
Sodium.....	730	31.8
Major cations.....		54.4
Major anions.....		53.1
Cation/anion difference.....		1.19 %

ND - Analyte "not detected" at the stated detection limit.

A handwritten signature in cursive script, reading 'Mary Stepp', is written over a horizontal line. Below the line, the name 'Mary Stepp' and the title 'Lab Director' are printed in a standard sans-serif font.

Mary Stepp
Lab Director



Inter-Mountain
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Tel. (505) 326-4737

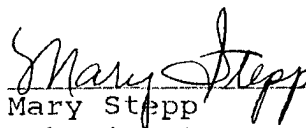
CLIENT: Giant Refinery
ID: 1030
SITE: GBR -17
LAB NO: F6031

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.45
Lab conductivity, umhos/cm.....	2720
Lab resistivity, ohm-m.....	3.68
Total dissolved solids (180), mg/l..	2210
Total dissolved solids (calc), mg/l.	2230
Total alkalinity as CaCO ₃ , mg/l.....	268
Total hardness as CaCO ₃ , mg/l.....	926
Sodium absorption ratio.....	5

	mg/l	meq/l
Bicarbonate as HCO ₃	328	5.37
Carbonate as CO ₃	0	0
Chloride.....	91.4	2.58
Sulfate.....	1260	26.2
Calcium.....	360	18
Magnesium.....	6.59	0.54
Potassium.....	0.73	0.02
Sodium.....	350	15.2
Major cations.....		33.8
Major anions.....		34.1
Cation/anion difference.....		0.51 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1414
SITE: GBR -24D
LAB NO: F6032

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.45
Lab conductivity, umhos/cm.....	4890
Lab resistivity, ohm-m.....	2.04
Total dissolved solids (180), mg/l..	3850
Total dissolved solids (calc), mg/l.	3730
Total alkalinity as CaCO ₃ , mg/l.....	231
Total hardness as CaCO ₃ , mg/l.....	1830
Sodium absorption ratio.....	5.23

	mg/l	meq/l
Bicarbonate as HCO ₃	282	4.62
Carbonate as CO ₃	0	0
Chloride.....	802	22.6
Sulfate.....	1580	32.9
Calcium.....	623	31.1
Magnesium.....	67.7	5.57
Potassium.....	5.77	0.15
Sodium.....	515	22.4
Major cations.....		59.2
Major anions.....		60.1
Cation/anion difference.....		0.78 %

ND - Analyte "not detected" at the stated detection limit.

A handwritten signature in cursive script, reading 'Mary Stepp', is written over a horizontal line. Below the line, the name 'Mary Stepp' and the title 'Lab Director' are printed in a standard sans-serif font.

Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1315
SITE: GBR -30
LAB NO: F6033

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.31
Lab conductivity, umhos/cm.....	4110
Lab resistivity, ohm-m.....	2.43
Total dissolved solids (180), mg/l..	3150
Total dissolved solids (calc), mg/l.	3090
Total alkalinity as CaCO ₃ , mg/l.....	265
Total hardness as CaCO ₃ , mg/l.....	1110
Sodium absorption ratio.....	7.71

	mg/l	meq/l
Bicarbonate as HCO ₃	323	5.3
Carbonate as CO ₃	0	0
Chloride.....	528	14.9
Sulfate.....	1370	28.6
Calcium.....	428	21.3
Magnesium.....	9.98	0.82
Potassium.....	2.17	0.06
Sodium.....	590	25.7
Major cations.....		47.9
Major anions.....		48.8
Cation/anion difference.....		0.99 %

ND - Analyte "not detected" at the stated detection limit.

A handwritten signature in cursive script, reading 'Mary Stepp', is written over a horizontal line. Below the line, the name 'Mary Stepp' and the title 'Lab Director' are printed in a standard sans-serif font.

Mary Stepp
Lab Director



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Laboratories, Inc.

2506 West Main Street
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Tel. (505) 326-4737

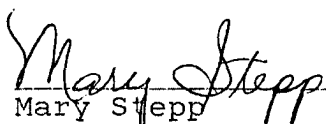
CLIENT: Giant Refinery
ID: 1455
SITE: GBR -31
LAB NO: F6034

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.10
Lab conductivity, umhos/cm.....	4360
Lab resistivity, ohm-m.....	2.3
Total dissolved solids (180), mg/l..	3360
Total dissolved solids (calc), mg/l.	3210
Total alkalinity as CaCO ₃ , mg/l.....	212
Total hardness as CaCO ₃ , mg/l.....	1180
Sodium absorption ratio.....	7.72

	mg/l	meq/l
Bicarbonate as HCO ₃	259	4.24
Carbonate as CO ₃	0	0
Chloride.....	543	15.3
Sulfate.....	1470	30.7
Calcium.....	425	21.2
Magnesium.....	28.3	2.33
Potassium.....	2.55	0.07
Sodium.....	609	26.5
Major cations.....		50.1
Major anions.....		50.3
Cation/anion difference.....		0.16 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



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2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID:
SITE: Stripper effluent
LAB NO: F6308

DATE REPORTED: 07/10/91
DATE RECEIVED: 06/04/91
DATE COLLECTED: 06/03/91

Lab pH (s.u.).....	7.72
Lab conductivity, umhos/cm.....	4100
Lab resistivity, ohm-m.....	2.44
Total dissolved solids (180), mg/l..	3010
Total dissolved solids (calc), mg/l.	2890
Total alkalinity as CaCO ₃ , mg/l.....	164
Total hardness as CaCO ₃ , mg/l.....	1090
Sodium absorption ratio.....	7.07

	mg/l	meq/l
Bicarbonate as HCO ₃	200	3.28
Carbonate as CO ₃	0	0
Chloride.....	491	13.9
Sulfate.....	1350	28.1
Calcium.....	389	19.4
Magnesium.....	29.4	2.42
Potassium.....	2.3	0.06
Sodium.....	537	23.3
Major cations.....		45.2
Major anions.....		45.2
Cation/anion difference.....		0.01 %

A handwritten signature in black ink, appearing to read 'Wanda Orso', is written over a horizontal line.

Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 0835
SITE: Stripper Influent
LAB NO: F6456

DATE REPORTED: 07/16/91
DATE RECEIVED: 06/07/91
DATE COLLECTED: 06/07/91

Lab pH (s.u.).....	7.82
Lab conductivity, umhos/cm.....	3670
Lab resistivity, ohm-m.....	2.73
Total dissolved solids (180), mg/l..	2830
Total dissolved solids (calc), mg/l.	2890
Total alkalinity as CaCO ₃ , mg/l.....	271
Total hardness as CaCO ₃ , mg/l.....	1100
Sodium absorption ratio.....	6.89

	mg/l	meq/l
Bicarbonate as HCO ₃	331	5.42
Carbonate as CO ₃	0	0
Chloride.....	391	11
Sulfate.....	1380	28.8
Calcium.....	391	19.5
Magnesium.....	30.8	2.54
Potassium.....	2.9	0.07
Sodium.....	526	22.9
Major cations.....		45
Major anions.....		45.3
Cation/anion difference.....		0.3 %


Wanda Orso
Water Lab Manager



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10662401

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMED
 CLIENT I.D. : 910607835 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/07/91
 DATE RECEIVED : 06/08/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 06/21/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	25.2
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.7
1,2-DICHLOROETHANE	1.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.7
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	4.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.3
TOLUENE	1.9
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.3
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	46.0
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	110



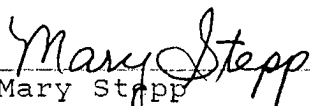
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID:
SITE: Stripper Influent
LAB NO: F6165

DATE REPORTED: 06/04/91
DATE RECEIVED: 05/01/91
DATE COLLECTED: 05/01/91

Lab pH (s.u.).....	6.74
Lab conductivity, umhos/cm.....	4110
Lab resistivity, ohm-m.....	2.43
Total dissolved solids (180), mg/l..	3080
Total dissolved solids (calc), mg/l.	3030
Total alkalinity as CaCO ₃ , mg/l.....	169
Total hardness as CaCO ₃ , mg/l.....	1130
Sodium absorption ratio.....	7.62

	mg/l	meq/l
Bicarbonate as HCO ₃	206	3.37
Carbonate as CO ₃	0	0
Chloride.....	499	14.1
Sulfate.....	1400	29.3
Calcium.....	401	20
Magnesium.....	30.7	2.52
Potassium.....	2.94	0.08
Sodium.....	588	25.6
Major cations.....		48.1
Major anions.....		46.7
Cation/anion difference.....		1.53 %


Mary Stepp
Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery DATE REPORTED: 06/04/91
ID: DATE RECEIVED: 05/01/91
SITE: Stripper Effluent DATE COLLECTED: 05/01/91
LAB NO: F6166

Lab pH (s.u.).....		8.04
Lab conductivity, umhos/cm.....		4120
Lab resistivity, ohm-m.....		2.43
Total dissolved solids (180), mg/l..		3130
Total dissolved solids (calc), mg/l.		3030
Total alkalinity as CaCO ₃ , mg/l.....		146
Total hardness as CaCO ₃ , mg/l.....		1130
Sodium absorption ratio.....		7.04
	mg/l	meq/l
Bicarbonate as HCO ₃	178	2.91
Carbonate as CO ₃	0	0
Chloride.....	503	14.2
Sulfate.....	1460	30.4
Calcium.....	407	20.3
Magnesium.....	27.8	2.28
Potassium.....	2.78	0.07
Sodium.....	544	23.7
Major cations.....		46.3
Major anions.....		47.5
Cation/anion difference.....		1.25 %


Mary Stepp
Lab Manager



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10553201

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMD
 CLIENT I.D. : 910501837 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 05/01/91
 DATE RECEIVED : 05/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 05/11/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	101



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10553202

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMD
 CLIENT I.D. : 910501840 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 05/01/91
 DATE RECEIVED : 05/02/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 05/11/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	116



InterMountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

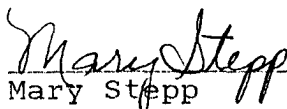
CLIENT: Giant Refinery
ID: 1554
SITE: RW-13
LAB NO: 6066

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	7.46
Lab conductivity, umhos/cm.....	4720
Lab resistivity, ohm-m.....	2.12
Total dissolved solids (180), mg/l..	3740
Total dissolved solids (calc), mg/l.	3690
Total alkalinity as CaCO ₃ , mg/l.....	203
Total hardness as CaCO ₃ , mg/l.....	1300
Sodium absorption ratio.....	8.57

	mg/l	meq/l
Bicarbonate as HCO ₃	248	4.07
Carbonate as CO ₃	0	0
Chloride.....	528	14.9
Sulfate.....	1810	37.8
Calcium.....	483	24.1
Magnesium.....	22.3	1.83
Potassium.....	6.13	0.16
Sodium.....	710	30.9
Major cations.....		57
Major anions.....		56.8
Cation/anion difference.....		0.21 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



Inter-Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID:
SITE: GRW-13
LAB NO: F6307

DATE REPORTED: 07/10/91
DATE RECEIVED: 06/04/91
DATE COLLECTED: 06/03/91

Lab pH (s.u.).....	7.55
Lab conductivity, umhos/cm.....	4800
Lab resistivity, ohm-m.....	2.08
Total dissolved solids (180), mg/l..	3590
Total dissolved solids (calc), mg/l.	3220
Total alkalinity as CaCO ₃ , mg/l.....	214
Total hardness as CaCO ₃ , mg/l.....	1250
Sodium absorption ratio.....	7.1

	mg/l	meq/l
Bicarbonate as HCO ₃	261	4.28
Carbonate as CO ₃	0	0
Chloride.....	493	13.9
Sulfate.....	1540	32
Calcium.....	464	23.1
Magnesium.....	21.7	1.79
Potassium.....	4.49	0.11
Sodium.....	576	25.1
Major cations.....	50.1	
Major anions.....	50.2	
Cation/anion difference.....	0.07	%

A handwritten signature in black ink, appearing to read 'Wanda Orso', is written over a horizontal line.

Wanda Orso
Water Lab Manager

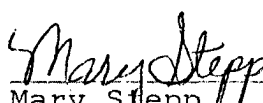


2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1505
SITE: RW - 13
LAB NO: F6214

DATE REPORTED: 05/14/91
DATE RECEIVED: 05/13/91
DATE COLLECTED: 05/13/91

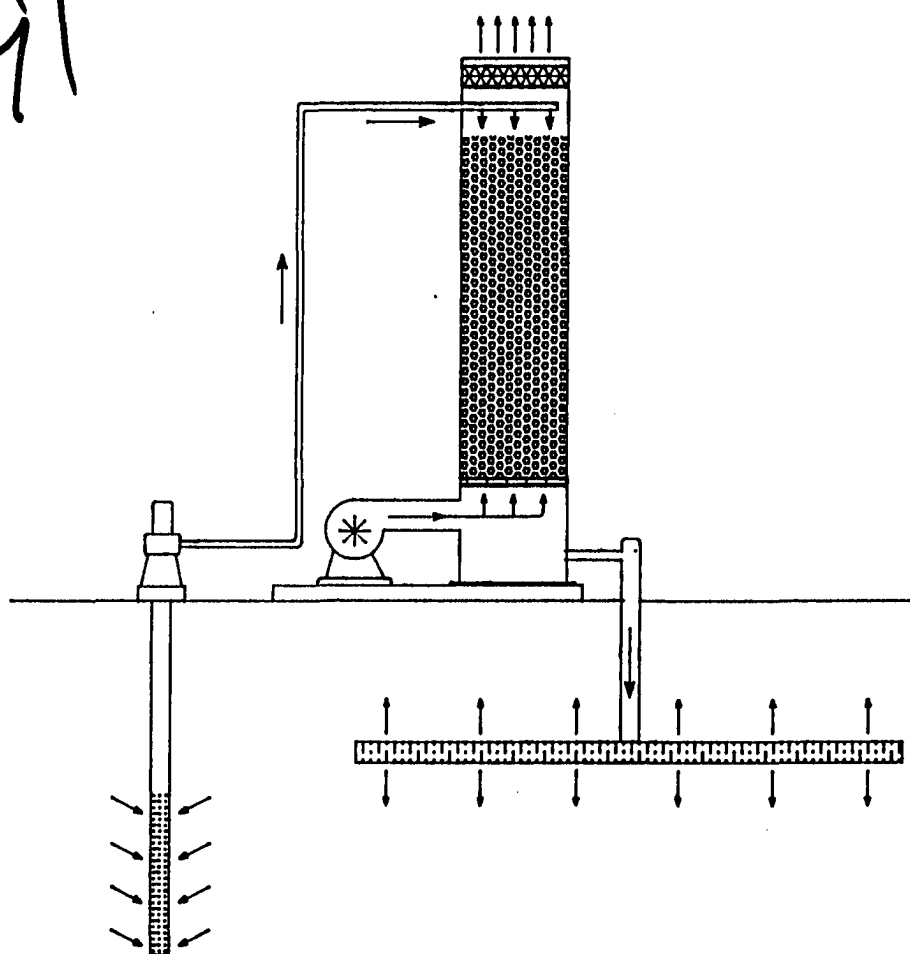
Lab conductivity, umhos/cm..... 4599


Mary Stepp
Lab Manager

GIANT

REFINING CO.

BLOOMFIELD REFINERY
REMEDATION PROJECT



Post Office Box 256
606 E. Highway 64
Farmington, New Mexico 87401

(505) 632-3306
FAX (505) 632-2487

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FIRST QUARTER, 1991

RECEIVED

MAY 22 1991

OIL CONSERVATION DIV.
SANTA FE

Prepared by:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87401
(505)632-3306
FAX (505)632-2487

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Miscellaneous Sampling Data.....	Section 7

INTRODUCTION AND SUMMARY
QUARTERLY REPORT
FIRST QUARTER, 1991

INTRODUCTION

Changes were made to the remediation system during the first quarter of 1991. The basic system for ground water recovery south of the refinery was completed at the end of March. Water recovery has begun. Pumping data will begin to appear in the next quarterly report. The new wells are integrated in the safety and control system located in the refinery. Monitor wells SHS-9, 11, and 14 have been converted to recovery wells. Monitor well SHS-7, part of the original proposed recovery well network, has yet to be converted due to land access problems.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Subsequent reports will contain updates revealing historical trends of the analytes. Data from wells south of the refinery is included for the first time in the quarterly report format. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Section 3 contains the results of the Annual Representative Stream Sampling. Again, the data is tabulated for easy review but is available in raw format on request.

Section 4

Potentiometric surface maps, as well as the adjusted water surface elevations and product thicknesses, are included in Section 4. The maps now include wells south of the refinery.

Section 5

Section 5 illustrates the volume history for the quarter. Total volume pumped from each well as well as current tank volumes and the reinjection volume is reported. Additional detail on a weekly basis is also available if desired.

Section 6

Specific conductance tracking for GRW-13 is included in this section.

Section 7

Periodically, samples in addition to those required in the discharge plan are collected. The results are included in this final section of the report.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FIRST QUARTER, 1991

STRIPPER INFLUENT

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.54	7.52	7.73
Lab conductivity, umhos/cm	4740.00	4610.00	4440.00
Lab resistivity, ohm-m	2.11	2.17	2.25
Total dissolved solids (180)	3390.00	3410.00	3240.00
Total dissolved solids (calc)	3310.00	3270.00	3120.00
Total alkalinity as CaCO3	265.00	222.00	145.00
Total hardness as CaCO3	1190.00	1200.00	1190.00
Sodium absorption ratio	8.50	7.76	7.07
Bicarbonate as HCO3	323.00	271.00	178.00
Carbonate as CO3	0.00	0.00	0.00
Chloride	602.00	568.00	528.00
Sulfate	1470.00	1480.00	1530.00
Calcium	275.00	461.00	298.00
Magnesium	123.00	12.40	109.00
Potassium	3.30	2.95	3.30
Sodium	675.00	619.00	561.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	1.50	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	1.30	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	8.09	8.00	7.90
Lab conductivity, umhos/cm	4720.00	4620.00	4460.00
Lab resistivity, ohm-m	2.12	2.17	2.24
Total dissolved solids (180)	3400.00	3430.00	3240.00
Total dissolved solids (calc)	3360.00	3280.00	3110.00
Total alkalinity as CaCO3	239.00	257.00	162.00
Total hardness as CaCO3	1210.00	1180.00	1160.00
Sodium absorption ratio	8.13	7.85	7.35
Bicarbonate as HCO3	292.00	313.00	198.00
Carbonate as CO3	0.00	0.00	0.00
Chloride	607.00	577.00	528.00
Sulfate	1490.00	1480.00	1530.00
Calcium	449.00	395.00	229.00
Magnesium	21.80	47.60	144.00
Potassium	3.05	3.00	4.20
Sodium	650.00	621.00	576.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND

1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	1.40	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	0.01
Benzo(a)anthracene	0.34
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	0.29
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.91
Pyrene	ND

GRW-3

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.93
Lab conductivity, umhos/cm	4300.00
Lab resistivity, ohm-m	2.32
Total dissolved solids (180)	3170.00
Total dissolved solids (calc)	3200.00
Total alkalinity as CaCO3	581.00
Total hardness as CaCO3	1050.00
Sodium absorption ratio	8.71
Bicarbonate as HCO3	708.00
Carbonate as CO3	0.00
Chloride	245.00
Sulfate	1550.00
Calcium	380.00
Magnesium	24.00
Potassium	3.84
Sodium	648.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	8.80
Benzo(a)anthracene	82.00
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	112.00
Fluorene	57.00
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	145.00
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND

1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	350.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	160.00
Toluene	ND
Xylenes	80.00
Trichlorotrifluoroethane	ND

GRW-4

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.05
Lab conductivity, umhos/cm	4360.00
Lab resistivity, ohm-m	2.30
Total dissolved solids (180)	3100.00
Total dissolved solids (calc)	3050.00
Total alkalinity as CaCO3	752.00
Total hardness as CaCO3	1100.00
Sodium absorption ratio	8.22
Bicarbonate as HCO3	915.00
Carbonate as CO3	0.00
Chloride	434.00
Sulfate	1100.00
Calcium	411.00
Magnesium	19.40
Potassium	2.04
Sodium	628.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	0.80
Benzo(a)anthracene	7.20
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	5.60
Dibenzo(a,h)anthracene	ND
Fluoranthene	9.40
Fluorene	8.80
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	12.00
Phenanthrene	18.00
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND

trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	600.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	150.00
Toluene	ND
Xylenes	ND

GRW-6

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.97
Lab conductivity, umhos/cm	5040.00
Lab resistivity, ohm-m	1.99
Total dissolved solids (180)	3520.00
Total dissolved solids (calc)	3480.00
Total alkalinity as CaCO3	795.00
Total hardness as CaCO3	1220.00
Sodium absorption ratio	9.31
Bicarbonate as HCO3	970.00
Carbonate as CO3	0.00
Chloride	648.00
Sulfate	1140.00
Calcium	418.00
Magnesium	42.90
Potassium	2.08
Sodium	748.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.14
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	3.50
Dibromochloromethane	ND
1,2-Dichlorobenzene	0.60
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	0.60
1,1-Dichloroethane	1.70
1,2-Dichloroethane	4.80
1,2-Dichloroethene	9.00
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND

1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.60
1,1,1-Trichloroethane	0.27
1,1,2-Trichloroethane	ND
Trichloroethene	2.00
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	93.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	24.00
Toluene	0.79
Xylenes	ND
Trichlorotrifluoroethane	ND

GRW-13

1/91 2/91 3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.82	
Lab conductivity, umhos/cm	4990.00	4860.00
Lab resistivity, ohm-m	2.00	
Total dissolved solids (180)	3680.00	
Total dissolved solids (calc)	3420.00	
Total alkalinity as CaCO3	368.00	
Total hardness as CaCO3	1310.00	
Sodium absorption ratio	7.72	
Bicarbonate as HCO3	448.00	
Carbonate as CO3	0.00	
Chloride	694.00	
Sulfate	1390.00	
Calcium	391.00	
Magnesium	80.60	
Potassium	4.14	
Sodium	642.00	

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	3.20
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

2.11

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.80
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

GBR-15

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.58
Lab conductivity, umhos/cm	5050.00
Lab resistivity, ohm-m	1.98
Total dissolved solids (180)	3760.00
Total dissolved solids (calc)	3730.00
Total alkalinity as CaCO3	248.00
Total hardness as CaCO3	1200.00
Sodium absorption ratio	9.17
Bicarbonate as HCO3	303.00
Carbonate as CO3	0.00
Chloride	482.00
Sulfate	1890.00
Calcium	445.00
Magnesium	21.80
Potassium	6.92
Sodium	731.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	21.40
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	59.40
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	0.80
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-17

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.64
Lab conductivity, umhos/cm	2900.00
Lab resistivity, ohm-m	3.45
Total dissolved solids (180)	2240.00
Total dissolved solids (calc)	2170.00
Total alkalinity as CaCO3	197.00
Total hardness as CaCO3	1040.00
Sodium absorption ratio	4.13
Bicarbonate as HCO3	240.00
Carbonate as CO3	0.00
Chloride	100.00
Sulfate	1280.00
Calcium	287.00
Magnesium	78.10
Potassium	0.52
Sodium	306.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	0.90
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND

1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND
PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

GBR-24-D

1/91 2/91 3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.84
Lab conductivity, umhos/cm	5070.00
Lab resistivity, ohm-m	1.97
Total dissolved solids (180)	3800.00
Total dissolved solids (calc)	3630.00
Total alkalinity as CaCO3	231.00
Total hardness as CaCO3	1820.00
Sodium absorption ratio	4.92
Bicarbonate as HCO3	282.00
Carbonate as CO3	0.00
Chloride	702.00
Sulfate	1650.00
Calcium	527.00
Magnesium	123.00
Potassium	4.98
Sodium	482.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	23.90
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	16.60
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	9.10
Toluene	2.40
Xylenes	15.90
Trichlorotrifluoroethane	ND
PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	1.70
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.80
Pyrene	ND

GBR-30

1/91 2/91 3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.43
Lab conductivity, umhos/cm	4400.00
Lab resistivity, ohm-m	2.27
Total dissolved solids (180)	3070.00
Total dissolved solids (calc)	2960.00
Total alkalinity as CaCO3	385.00
Total hardness as CaCO3	1150.00
Sodium absorption ratio	7.24
Bicarbonate as HCO3	470.00
Carbonate as CO3	0.00
Chloride	545.00
Sulfate	1220.00
Calcium	318.00
Magnesium	87.60
Potassium	2.16
Sodium	565.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	25.90
Toluene	5.70
Xylenes	39.90
Trichlorotrifluoroethane	ND

PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	18.00
Fluorene	4.00
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	5.00
Pyrene	ND

GBR-31

1/91 2/91 3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.03
Lab conductivity, umhos/cm	4950.00
Lab resistivity, ohm-m	2.02
Total dissolved solids (180)	3620.00
Total dissolved solids (calc)	3170.00
Total alkalinity as CaCO3	231.00
Total hardness as CaCO3	1260.00
Sodium absorption ratio	7.59
Bicarbonate as HCO3	282.00
Carbonate as CO3	0.00
Chloride	704.00
Sulfate	1260.00
Calcium	349.00
Magnesium	94.70
Potassium	2.30
Sodium	619.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	90.00
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	2.10
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.50
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.40
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND

PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

GIANT REFINING COMPANY
OFFSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FIRST QUARTER, 1991

OFFSITE WELLS

SHS-3

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.91		
Lab conductivity, umhos/cm	4550.00		
Lab resistivity, ohm-m	2.20		
Total dissolved solids (180)	3870.00		
Total dissolved solids (calc)	3690.00		
Total alkalinity as CaCO ₃	248.00		
Total hardness as CaCO ₃	1730.00		
Sodium absorption ratio	5.05		
Bicarbonate as HCO ₃	303.00		
Carbonate as CO ₃	0.00		
Chloride	254.00		
Sulfate	2200.00		
Calcium	445.00		
Magnesium	151.00		
Potassium	7.32		
Sodium	483.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND

1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.94
Lab conductivity, umhos/cm	3190.00
Lab resistivity, ohm-m	3.14
Total dissolved solids (180)	2580.00
Total dissolved solids (calc)	2460.00
Total alkalinity as CaCO3	316.00
Total hardness as CaCO3	1170.00
Sodium absorption ratio	4.23
Bicarbonate as HCO3	386.00
Carbonate as CO3	0.00
Chloride	120.00
Sulfate	1420.00
Calcium	263.00
Magnesium	125.00
Potassium	6.78
Sodium	333.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
---------	----

Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-10

1/91 2/91 3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.14
Lab conductivity, umhos/cm	1980.00
Lab resistivity, ohm-m	5.06
Total dissolved solids (180)	1370.00
Total dissolved solids (calc)	1350.00
Total alkalinity as CaCO3	299.00
Total hardness as CaCO3	494.00
Sodium absorption ratio	5.06
Bicarbonate as HCO3	365.00
Carbonate as CO3	0.00
Chloride	80.00
Sulfate	645.00
Calcium	149.00
Magnesium	29.60
Potassium	8.34
Sodium	259.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
---------	----

Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	106.00
Toluene	4.00
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-12

1/91 2/91 3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.07
Lab conductivity, umhos/cm	3800.00
Lab resistivity, ohm-m	2.63
Total dissolved solids (180)	2780.00
Total dissolved solids (calc)	2670.00
Total alkalinity as CaCO3	333.00
Total hardness as CaCO3	1070.00
Sodium absorption ratio	6.36
Bicarbonate as HCO3	407.00
Carbonate as CO3	0.00
Chloride	368.00
Sulfate	1260.00
Calcium	248.00
Magnesium	109.00
Potassium	3.16
Sodium	477.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.80
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.41
1,2-Dichloroethane	0.39
1,2-Dichloroethene	4.70
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.30
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.74
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
---------	----

Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	1.90
Xylenes	ND
Trichlorotrifluoroethane	

SHS-13

1/91 2/91 3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.96
Lab conductivity, umhos/cm	3190.00
Lab resistivity, ohm-m	3.14
Total dissolved solids (180)	1970.00
Total dissolved solids (calc)	1850.00
Total alkalinity as CaCO3	710.00
Total hardness as CaCO3	571.00
Sodium absorption ratio	8.69
Bicarbonate as HCO3	866.00
Carbonate as CO3	0.00
Chloride	434.00
Sulfate	293.00
Calcium	190.00
Magnesium	23.80
Potassium	3.58
Sodium	478.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	0.96
Carbon tetrachloride	ND
Chloroethane	0.96
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.00
1,2-Dichloroethane	3.80
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
---------	----

Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.95
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-15

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.14
Lab conductivity, umhos/cm	2860.00
Lab resistivity, ohm-m	3.50
Total dissolved solids (180)	1630.00
Total dissolved solids (calc)	1620.00
Total alkalinity as CaCO3	257.00
Total hardness as CaCO3	872.00
Sodium absorption ratio	2.45
Bicarbonate as HCO3	313.00
Carbonate as CO3	0.00
Chloride	56.20
Sulfate	901.00
Calcium	310.00
Magnesium	24.00
Potassium	3.96
Sodium	167.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
---------	----

Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-16

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.04
Lab conductivity, umhos/cm	2170.00
Lab resistivity, ohm-m	4.61
Total dissolved solids (180)	2350.00
Total dissolved solids (calc)	2270.00
Total alkalinity as CaCO3	299.00
Total hardness as CaCO3	1260.00
Sodium absorption ratio	2.70
Bicarbonate as HCO3	365.00
Carbonate as CO3	0.00
Chloride	56.20
Sulfate	1360.00
Calcium	364.00
Magnesium	85.30
Potassium	2.72
Sodium	220.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
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Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

*ND - Not detected at specified detection limit

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 ANNUAL REPRESENTATIVE STREAM SAMPLING
 FIRST QUARTER, 1991

TANK 21

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.48		
Lab conductivity, umhos/cm	4610.00		
Lab resistivity, ohm-m	2.17		
Total dissolved solids (180)	3340.00		
Total dissolved solids (calc)	3320.00		
Total alkalinity as CaCO3	419.00		
Total hardness as CaCO3	1190.00		
Sodium absorption ratio	8.60		
Bicarbonate as HCO3	511.00		
Carbonate as CO3	0.00		
Chloride	465.00		
Sulfate	1490.00		
Calcium	356.00		
Magnesium	73.50		
Potassium	3.12		
Sodium	683.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.80
1,2-Dichloroethane	1.70
1,1-Dichloroethene	12.00
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.00
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
1,1,1,2-Tetrachloroethane	1.40

Vinyl chloride	ND
AROMATICS	
Benzene	86.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	12.70
Toluene	2.90
Xylenes	25.60
Trichlorotrifluoroethane	ND
PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	0.12
Benzo(a)anthracene	0.23
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	3.40
Fluorene	1.70
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	3.70
Phenanthrene	2.90
Pyrene	1.80

TANK 27

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.88		
Lab conductivity, umhos/cm	5290.00		
Lab resistivity, ohm-m	1.89		
Total dissolved solids (180)	3620.00		
Total dissolved solids (calc)	3550.00		
Total alkalinity as CaCO3	333.00		
Total hardness as CaCO3	1290.00		
Sodium absorption ratio	8.80		
Bicarbonate as HCO3	407.00		
Carbonate as CO3	0.00		
Chloride	832.00		
Sulfate	1350.00		
Calcium	329.00		
Magnesium	113.00		
Potassium	2.60		
Sodium	726.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.80
1,2-Dichloroethane	2.40
1,2-Dichloroethene	2.80
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	1.70
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
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Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND
PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: January, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.37		0.00	5334.93
GRW-2	5391.28	50.98		0.00	5340.30
GRW-3	5388.77	51.44		0.00	5337.33
GRW-4	5390.02	45.30		0.00	5344.72
GRW-5	5390.56	57.20		0.00	5333.36
GRW-6	5390.81	45.45		0.00	5345.36
GRW-10	5395.02	45.34	43.35	1.99	5351.27
GRW-11	5397.85	63.40		0.00	5334.45
GRW-12	5397.24	36.06		0.00	5361.18
GRW-13	5396.90	57.75		0.00	5339.15
GBR-5	5395.07	33.14	30.76	2.38	5363.83
GBR-6	5395.70	39.33	39.30	0.03	5356.39
GBR-7	5395.85	34.28	33.20	1.08	5362.43
GBR-8	5390.50	45.12	43.45	1.67	5346.72
GBR-9	5389.92	46.82		0.00	5343.10
GBR-10	5390.57	42.98		0.00	5347.59
GBR-11	5389.43	44.18	42.26	1.92	5346.79
GBR-13	5393.04	42.58	41.61	0.97	5351.24
GBR-15	5397.99	29.57		0.00	5368.42
GBR-17	5402.69	33.58		0.00	5369.11
GBR-18	5421.68	20.56		0.00	5401.12
GBR-19	5393.83	39.65	39.64	0.01	5354.19
GBR-20	5393.47	40.37	40.08	0.29	5353.33
GBR-21S	5400.65	19.52	19.40	0.12	5381.23
GBR-21D	5400.19	22.97		0.00	5377.22
GBR-22	5395.91	39.35	35.28	4.07	5359.82
GBR-23	5403.72	21.35		0.00	5382.37
GBR-24S	5396.08	23.69		0.00	5372.39
GBR-24D	5396.77	26.55		0.00	5370.22
GBR-25	5396.72	28.76		0.00	5367.96
GBR-26	5395.59	32.10		0.00	5363.49
GBR-30	5396.58	31.05		0.00	5365.53
GBR-31	5394.86	34.15		0.00	5360.71
GBR-33	5396.28	37.35	37.33	0.02	5358.95
GBR-34	5394.00	35.17	35.15	0.02	5358.85
GBR-35	5393.66	36.08	35.15	0.93	5358.32
GBR-39	5397.55	32.68		0.00	5364.87
GBR-40	5400.76	31.98		0.00	5368.78
GBR-41	5396.35	27.68		0.00	5368.67
GBR-51	5389.68	41.13		0.00	5348.55
GBR-52	5387.74	39.44		0.00	5348.30

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: January, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.50	41.37	0.13	5342.14
SHS-2	5381.66	38.20	37.52	0.68	5344.00
SHS-3	5383.33	36.81		0.00	5346.52
SHS-4	5383.62	41.50		0.00	5342.12
SHS-5	5378.36	38.47		0.00	5339.89
SHS-6	5378.17	38.88		0.00	5339.29
SHS-7	5378.77	39.50	38.95	0.55	5339.71
SHS-8	5380.25	38.95	38.93	0.02	5341.32
SHS-9	5380.79	38.40	38.39	0.01	5342.40
SHS-10	5373.80	36.62		0.00	5337.18
SHS-11	5373.17	38.26	37.85	0.41	5335.24
SHS-12	5373.94	39.86		0.00	5334.08
SHS-13	5367.81	36.46		0.00	5331.35
SHS-14	5367.07	34.69	34.68	0.01	5332.39
SHS-15	5366.21	33.45		0.00	5332.76
SHS-16	5362.58	31.40		0.00	5331.18

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: February, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.34		0.00	5333.96
GRW-2	5391.28	50.70		0.00	5340.58
GRW-3	5388.77	54.80		0.00	5333.97
GRW-4	5390.02	49.83		0.00	5340.19
GRW-5	5390.56	43.10		0.00	5347.46
GRW-6	5390.81	43.28		0.00	5347.53
GRW-10	5395.02	53.70	50.20	3.50	5344.12
GRW-11	5397.85	62.15		0.00	5335.70
GRW-12	5397.24	35.62		0.00	5361.62
GRW-13	5396.90	58.25		0.00	5338.65
GBR-5	5395.07	33.95	31.58	2.37	5363.02
GBR-6	5395.70	56.54		0.00	5339.16
GBR-7	5395.85	35.45	33.95	1.50	5361.60
GBR-8	5390.50	44.60	43.35	1.25	5346.90
GBR-9	5389.92	49.20		0.00	5340.72
GBR-10	5390.57	42.28		0.00	5348.29
GBR-11	5389.43	43.75	41.93	1.82	5347.14
GBR-13	5393.04	42.48	41.61	0.87	5351.25
GBR-15	5397.99	42.96		0.00	5355.03
GBR-17	5402.69	33.96		0.00	5368.73
GBR-18	5421.68	20.93		0.00	5400.75
GBR-19	5393.83	39.84	39.76	0.08	5354.05
GBR-20	5393.47	42.98	41.23	1.75	5351.89
GBR-21S	5400.65	19.62		0.00	5381.03
GBR-21D	5400.19	30.32		0.00	5369.87
GBR-22	5395.91	39.25	35.49	3.76	5359.67
GBR-23	5403.72	21.72		0.00	5382.00
GBR-24S	5396.08	26.72		0.00	5369.36
GBR-24D	5396.77	31.96		0.00	5364.81
GBR-25	5396.72	29.91		0.00	5366.81
GBR-26	5395.59	37.93		0.00	5357.66
GBR-30	5396.58	32.28		0.00	5364.30
GBR-31	5394.86	34.58		0.00	5360.28
GBR-33	5396.28	37.96	37.76	0.20	5358.48
GBR-34	5394.00	36.58	35.37	1.21	5358.39
GBR-35	5393.66	37.10	35.44	1.66	5357.89
GBR-39	5397.55	34.73		0.00	5362.82
GBR-40	5400.76	31.32		0.00	5369.44
GBR-41	5396.35	27.87		0.00	5368.48
GBR-51	5389.68	41.10		0.00	5348.58
GBR-52	5387.74	39.42		0.00	5348.32

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: February, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.56	41.43	0.13	5342.08
SHS-2	5381.66	38.21	37.54	0.67	5343.99
SHS-3	5383.33	36.88		0.00	5346.45
SHS-4	5383.62	41.52		0.00	5342.10
SHS-5	5378.36	38.49		0.00	5339.87
SHS-6	5378.17	38.85		0.00	5339.32
SHS-7	5378.77	39.66	38.93	0.73	5339.69
SHS-8	5380.25	38.98	38.97	0.01	5341.28
SHS-9	5380.79	38.36	38.35	0.01	5342.44
SHS-10	5373.80	36.58		0.00	5337.22
SHS-11	5373.17	38.29	37.88	0.41	5335.21
SHS-12	5373.94	39.42		0.00	5334.52
SHS-13	5367.81	36.21		0.00	5331.60
SHS-14	5367.07	34.72	34.71	0.01	5332.36
SHS-15	5366.21	33.40		0.00	5332.81
SHS-16	5362.58	30.88		0.00	5331.70

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: March, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.07		0.00	5334.23
GRW-2	5391.28	50.55		0.00	5340.73
GRW-3	5388.77	52.75		0.00	5336.02
GRW-4	5390.02	49.73		0.00	5340.29
GRW-5	5390.56	43.65		0.00	5346.91
GRW-6	5390.81	48.05		0.00	5342.76
GRW-10	5395.02	55.21		0.00	5339.81
GRW-11	5397.85	63.28		0.00	5334.57
GRW-12	5397.24	45.65		0.00	5351.59
GRW-13	5396.90	57.48		0.00	5339.42
GBR-5	5395.07	33.94	31.56	2.38	5363.03
GBR-6	5395.70	53.77		0.00	5341.93
GBR-7	5395.85	35.46	34.95	0.51	5360.80
GBR-8	5390.50	45.44	43.42	2.02	5346.68
GBR-9	5389.92	49.13		0.00	5340.79
GBR-10	5390.57	42.28		0.00	5348.29
GBR-11	5389.43	44.15	42.24	1.91	5346.81
GBR-13	5393.04	42.93	41.97	0.96	5350.88
GBR-15	5397.99	43.10		0.00	5354.89
GBR-17	5402.69	33.58		0.00	5369.11
GBR-18	5421.68	21.04		0.00	5400.64
GBR-19	5393.83	40.21	40.11	0.10	5353.70
GBR-20	5393.47	42.93	41.18	1.75	5351.94
GBR-21S	5400.65	19.46	19.45	0.01	5381.20
GBR-21D	5400.19	34.66		0.00	5365.53
GBR-22	5395.91	38.99	35.65	3.34	5359.59
GBR-23	5403.72	21.36		0.00	5382.36
GBR-24S	5396.08	26.60		0.00	5369.48
GBR-24D	5396.77	31.87		0.00	5364.90
GBR-25	5396.72	29.96		0.00	5366.76
GBR-26	5395.59	36.07		0.00	5359.52
GBR-30	5396.58	31.71		0.00	5364.87
GBR-31	5394.86	34.55		0.00	5360.31
GBR-33	5396.28	38.14	37.88	0.26	5358.35
GBR-34	5394.00	36.84	35.49	1.35	5358.24
GBR-35	5393.66	37.34	35.63	1.71	5357.69
GBR-39	5397.55	34.38		0.00	5363.17
GBR-40	5400.76	31.35		0.00	5369.41
GBR-41	5396.35	28.06		0.00	5368.29
GBR-51	5389.68	42.73		0.00	5346.95
GBR-52	5387.74	39.98		0.00	5347.76

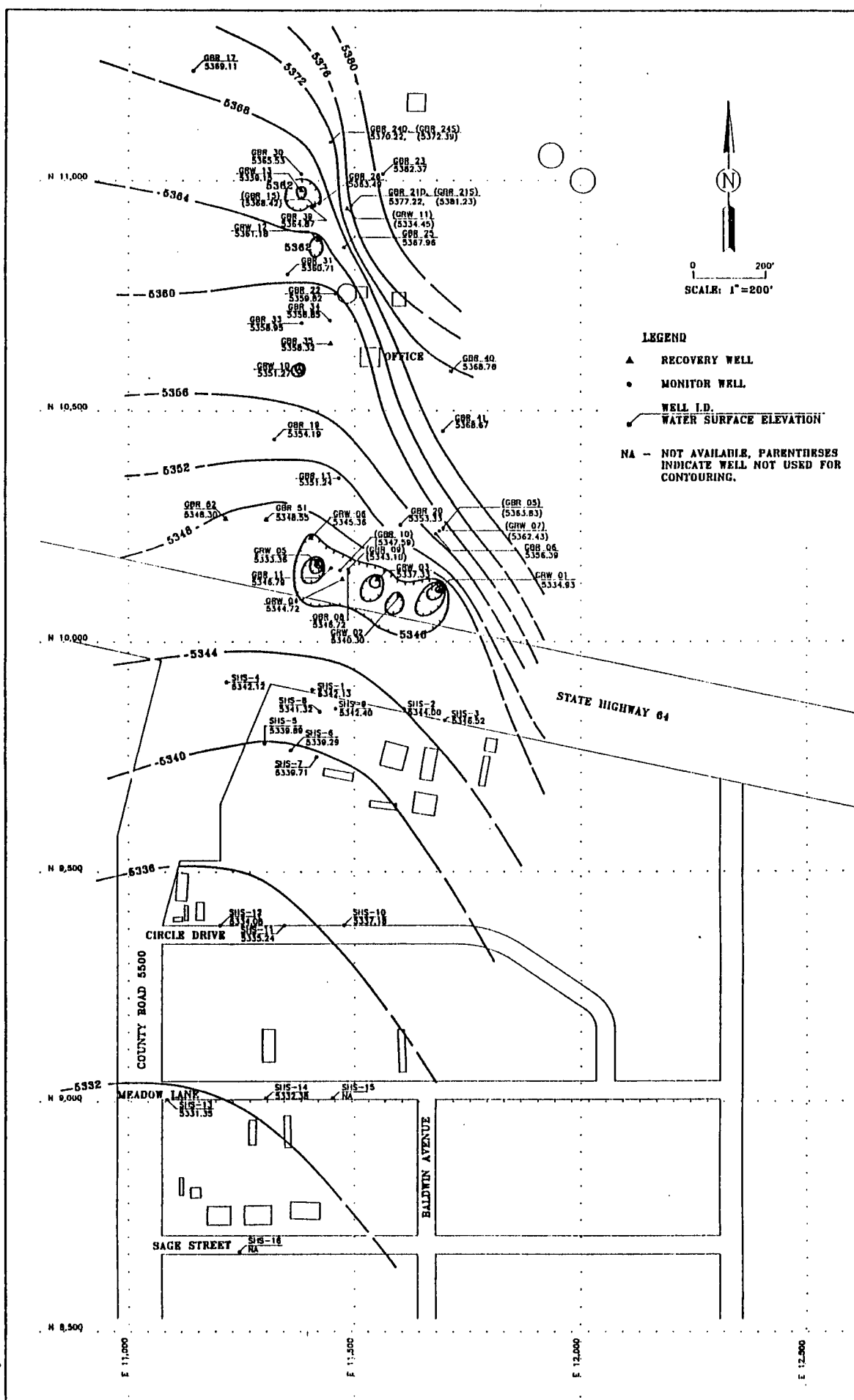
* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 MONTHLY POTENTIOMETRIC SURFACE
 MONTH/YEAR: March, 1991
 Page 2

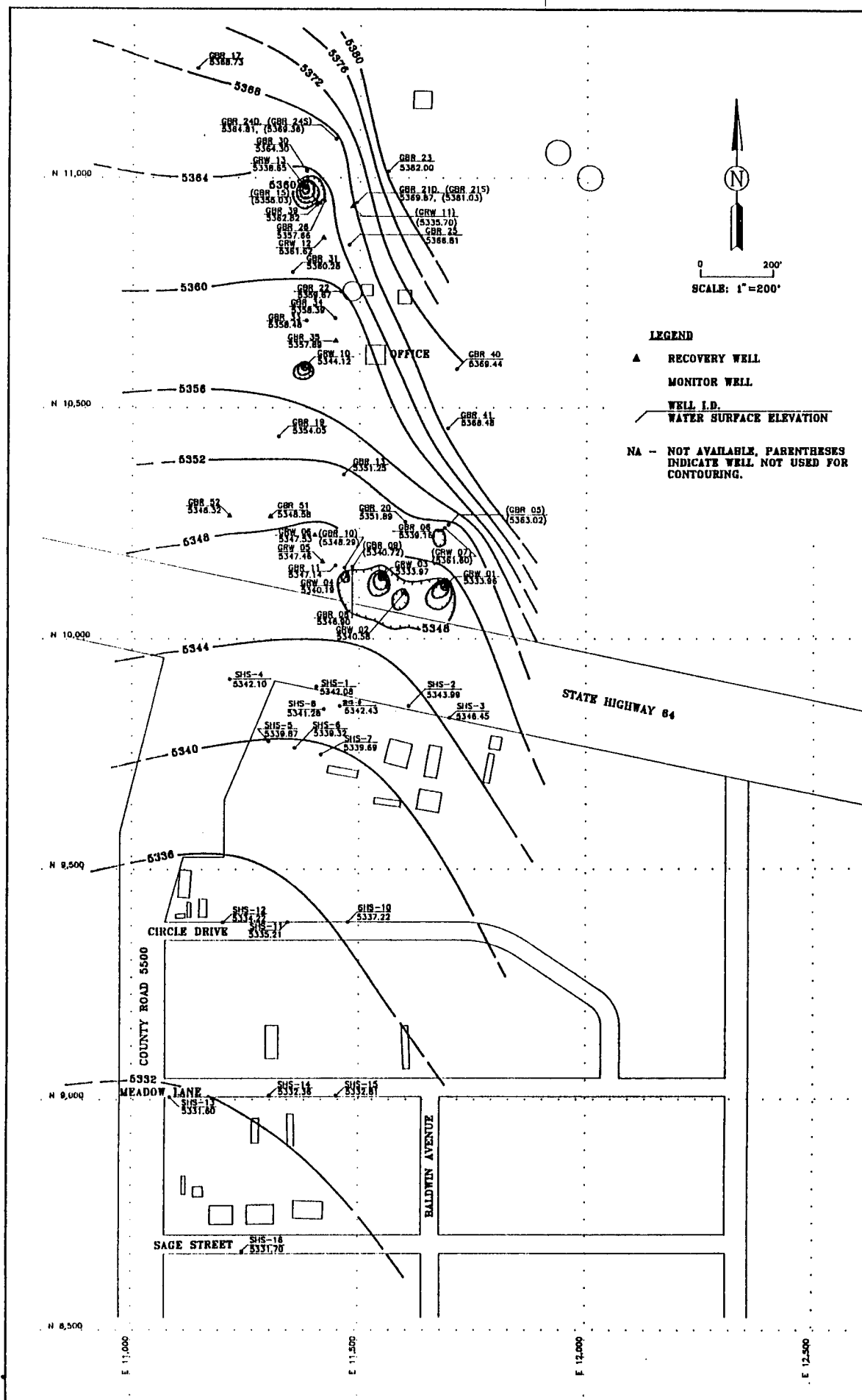
WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.53	41.51	0.02	5342.03
SHS-2	5381.66	38.23	37.57	0.66	5343.96
SHS-3	5383.33	36.92		0.00	5346.41
SHS-4	5383.62	41.58		0.00	5342.04
SHS-5	5378.36	38.51		0.00	5339.85
SHS-6	5378.17	38.89		0.00	5339.28
SHS-7	5378.77	39.78	38.92	0.86	5339.68
SHS-8	5380.25	38.99		0.00	5341.26
SHS-9	5380.79	38.38	38.37	0.01	5342.42
SHS-10	5373.80	36.48		0.00	5337.32
SHS-11	5373.17	38.30	37.89	0.41	5335.20
SHS-12	5373.94	39.33		0.00	5334.61
SHS-13	5367.81	36.14		0.00	5331.67
SHS-14	5367.07	34.74	34.73	0.01	5332.34
SHS-15	5366.21	33.28		0.00	5332.93
SHS-16	5362.58	30.17		0.00	5332.41

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

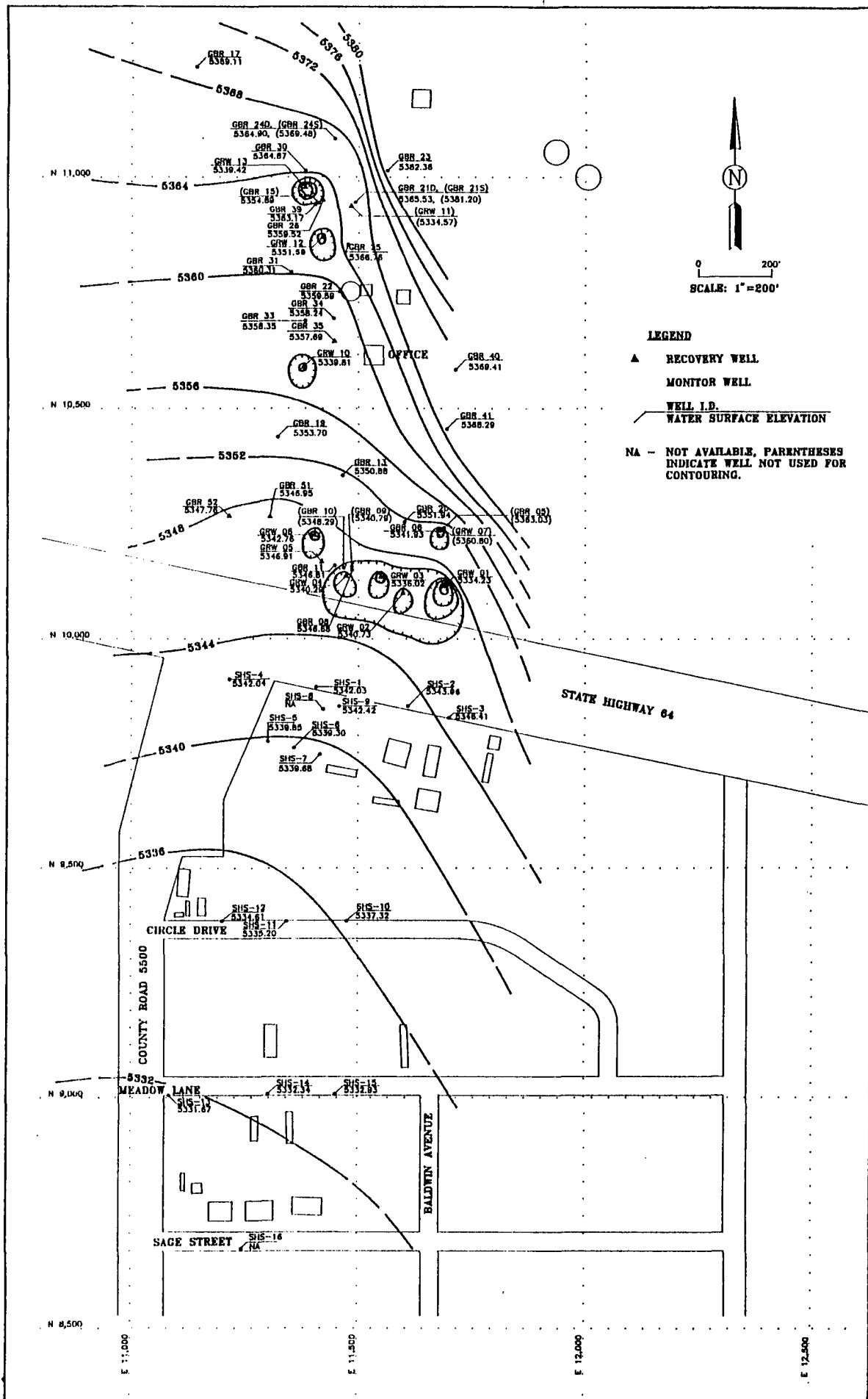
JANUARY 1991 WATER SURFACE CONTOUR MAP GIANT-BLOOMFIELD REFINERY



FEBRUARY 1991 WATER SURFACE CONTOUR MAP GIANT-BLOOMFIELD REFINERY



MARCH 1991 WATER SURFACE CONTOUR MAP GIANT-BLOOMFIELD REFINERY



Giant Refining Co. Bloomfield Refinery
Total Volume Summary

First Quarter, 1991

=====
Total Volume Of Water Recovered 1419620
Net Change In Storage Volume -107414

Total Water Pumped To The 1057350
Infiltration Gallery

=====
Difference -469684

Comments: The approximately 33% difference
can be accounted for in meter
failure.

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

First Quarter of 1991

	Well	Month #1	Month #2	Month #3	Total
	GRW-1	7660	7160	6550	21370
	GRW-2	11510	11200	9940	32650
	GRW-3	35300	32780	28840	96920
	GRW-4	22050	25460	18860	66370
	GRW-5	42320	8210	25340	75870
	GRW-6	18270	18350	16040	52660
	GRW-7	0	91160	160630	251790
	GRW-9	0	7120	8410	15530
	GRW-10	165710	242100	229320	637130
	GRW-11	6010	20640	21380	48030
	GRW-12	6720	10300	20410	37430
	GRW-13	10130	38650	35090	83870
Total Volume Pumped In Gallons					1419620

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

First Quarter, 1991

Tank Number	Beginning Volume	Ending Volume	Net Change
102	19722	8692	-11030
106	8010	8010	0
21	418451	311966	-106485
22	317423	225523	-91900
27	185631	185631	0
32	159291	159291	0
34	200948	200948	0
35	0	0	0
37	250231	352232	102001
Total Net Volume Change			-107414

SPECIFIC CONDUCTANCE VALUES
FOR GRW-13 IN umhos/cm
FIRST QUARTER, 1991

<u>1/91</u>	<u>2/91</u>	<u>3/91</u>
4990	*	4860

*-No data collected

GBR-51

1/91

2/91

3/91

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,1-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

0.40

1,1,1-Trichloroethane

2.10

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

AROMATICS

Benzene

ND

Chlorobenzene

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

Ethylbenzene

ND

Toluene

ND

Xylenes

ND

Trichlorotrifluoroethane

ND

GBR-52

1/91

2/91

3/91

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,1-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

AROMATICS

Benzene

ND

Chlorobenzene

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

Ethylbenzene

ND

Toluene

0.70

Xylenes

ND

Trichlorotrifluoroethane

ND



Analytical Technologies, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101868

February 25, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 01/30/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 610 analyses were performed by ATI, Ft. Collins.

If you have any questions or comments, please do not hesitate to contact us at (602) 438-1530.

Elizabeth Proffitt
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON

DATE RECEIVED : 01/30/91

PROJECT # : 9834

REPORT DATE : 02/20/91

PROJECT NAME : RIFINE REMED

ATI I.D. : 101868

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	910129822 STRIPPER INFLUENT	AQUEOUS	01/29/91
02	910129830 STRIPPER EFFLUENT	AQUEOUS	01/29/91
03	910129925 TANK 21	AQUEOUS	01/29/91
04	9101291050 TANK 27	AQUEOUS	01/29/91
05	TRIP BLANK	AQUEOUS	01/29/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 101868

CLIENT : GIANT REFINING, FARMINGTON

DATE RECEIVED : 01/30/91

PROJECT # : 9834

PROJECT NAME : RIFINE REMED

REPORT DATE : 02/20/91

PARAMETER	UNITS	02	03	04
		STRIP.EFF.	TANK21	TANK27
SILVER	MG/L	<0.010	<0.010	<0.010
ARSENIC	MG/L	<0.005	<0.005	<0.005
BERYLLIUM	MG/L	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.005	<0.005	<0.005
CHROMIUM	MG/L	<0.010	<0.010	<0.010
COPPER	MG/L	<0.010	<0.010	<0.010
MERCURY	MG/L	<0.0002	<0.0002	<0.0002
NICKEL	MG/L	0.087	0.093	0.157
LEAD	MG/L	<0.002	<0.002	0.003
ANTIMONY	MG/L	<0.05	<0.05	<0.05
SELENIUM	MG/L	<0.005	<0.005	<0.005
THALLIUM	MG/L	<0.005	<0.005	<0.005
ZINC	MG/L	0.020	0.014	0.067



Analytical Technologies, Inc.

METALS - QUALITY CONTROL

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : RIFINE REMED

ATI I.D. : 101868

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10187701	<0.010	<0.010	NA	0.100	0.100	100
ARSENIC	MG/L	10184904	<0.005	<0.005	NA	0.047	0.050	94
ARSENIC	MG/L	10250601	<0.005	<0.005	NA	0.055	0.050	110
BERYLLIUM	MG/L	10187701	<0.005	<0.005	NA	0.098	0.100	98
BERYLLIUM	MG/L	10186804	<0.005	<0.005	NA	0.086	0.100	86
CADMIUM	MG/L	10187701	<0.005	<0.005	NA	0.103	0.100	103
CHROMIUM	MG/L	10184904	<0.010	<0.010	NA	0.106	0.100	106
COPPER	MG/L	10184904	<0.010	<0.010	NA	0.099	0.100	99
MERCURY	MG/L	10250601	<0.0002	<0.0002	NA	0.0051	0.0050	102
NICKEL	MG/L	10184904	<0.020	<0.020	NA	0.086	0.100	86
LEAD	MG/L	10184904	0.003	0.004	28	0.042	0.050	78
ANTIMONY	MG/L	10187701	<0.05	<0.05	NA	0.90	1.00	90
SELENIUM	MG/L	10184904	<0.005	<0.005	NA	0.045	0.050	90
THALLIUM	MG/L	10186704	<0.005	<0.005	NA	0.043	0.050	86
THALLIUM	MG/L	10186804	<0.005	<0.005	NA	STDA	CC=	.995
ZINC	MG/L	10184904	0.733	0.711	3	1.81	1.00	108

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : RIFINE REMED
 CLIENT I.D. : 910129822 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
 DATE RECEIVED : 01/30/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	1.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	1.3
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	116
BROMOFLUOROBENZENE (%)	104



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : RIFINE REMED
 CLIENT I.D. : 910129830 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
 DATE RECEIVED : 01/30/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	1.4
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	118
BROMOFLUOROBENZENE (%)	105



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186803

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : RIFINE REMED
 CLIENT I.D. : 910129925 TANK 21
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
 DATE RECEIVED : 01/30/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	86
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	1.7
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	12.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	12.7
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.0
TOLUENE	2.9
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	25.6
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	101



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186804

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : RIFINE REMED
 CLIENT I.D. : 9101291050 TANK 27
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
 DATE RECEIVED : 01/30/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/11/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	2.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.8
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.7
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186805

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : RIFINE REMED
 CLIENT I.D. : TRIP BLANK
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
 DATE RECEIVED : 01/30/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	86



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101868
PROJECT #	: 9834	DATE EXTRACTED	: 02/08/91
PROJECT NAME	: RIFINE REMED	DATE ANALYZED	: 02/08/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	3.2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	110
BROMOFLUOROBENZENE (%)	106



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101868
PROJECT #	: 9834	DATE EXTRACTED	: N/A
PROJECT NAME	: RIFINE REMED	DATE ANALYZED	: 02/11/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	2.8
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	109



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101868

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 02/08/91

PROJECT NAME : RIFINE REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10183902

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	19	95	18	90	5
TRICHLOROETHENE	<0.2	20	19	95	18	90	5
TETRACHLOROETHENE	<0.2	20	18	90	18	90	0
BENZENE	<0.5	20	20	100	19	95	5
BROMODICHLOROMETHANE	<0.2	20	21	105	20	100	5
CHLOROFORM	<0.2	20	20	100	18	90	11
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	20	100	5
TOLUENE	0.8	20	19	91	18	86	5
CHLOROBENZENE	<0.5	20	16	80	17	85	6
M-XYLENE	<0.5	20	18	90	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10186802

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : 910129830 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
DATE RECEIVED : 01/30/91
DATE EXTRACTED : 01/31/91
DATE ANALYZED : 02/06/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.91
ANTHRACENE	0.01
FLUORANTHENE	0.29
PYRENE	<0.04
BENZO(A)ANTHRACENE	0.34
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10186803

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : 910129925 TANK 21
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
DATE RECEIVED : 01/30/91
DATE EXTRACTED : 01/31/91
DATE ANALYZED : 02/06/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	3.7
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	1.7
PHENANTHRENE	2.9
ANTHRACENE	0.12
FLUORANTHENE	3.4
PYRENE	1.8
BENZO(A)ANTHRACENE	0.23
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10186804

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : 9101291050 TANK 27
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
DATE RECEIVED : 01/30/91
DATE EXTRACTED : 01/31/91
DATE ANALYZED : 02/06/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDSRESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101868
DATE EXTRACTED : 01/31/91
DATE ANALYZED : 02/06/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
BENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101868

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : RIFINE REMED
 REF I.D. : 10299908

DATE ANALYZED : 02/06/91
 SAMPLE MATRIX : AQUEOUS
 UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT	SPIKED SPIKED	SAMPLE SAMPLE	% REC.	DUP. SAMPLE	DUP. REC.	% REC.	RPD
ACENAPHTHYLENE	<0.30	150	86	57	112	75		26
PYRENE	<0.04	20	14	70	15.8	79		12

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

Date: 1-29-91 Page 1 of 1

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LABORATORY ATI
ADDRESS 2113 548 St

TELEPHONE (602) 488-1530

SAMPLER'S SIGNATURE

Jeaney O'Herman

SAMPLE NUMBER	MATRIX	LOCATION
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**POLYNUCLEAR
AROMATICS 610/B310**

HALOGENATED
VOLATILES 601/8010

AROMATIC
VOLATILES 602/8020

GENERAL WATER CHEMISTRY

metals
ppm

NUMBER OF
CONTAINERS

910129822	Water	stripper influent
-----------	-------	----------------------

910129830	Water	Stripper effluent
-----------	-------	----------------------

910129925	Water	Tank 21
-----------	-------	---------

9101291050	Water Tank	27
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[illegible]

[illegible][illegible][illegible][illegible]

PM			
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PROJECT INFORMATION	SAMPLE
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PROJECT: Kettenberg	TOTAL NO. OF C
ama d's t' 08311	

PROJECT MANAGER:	CHAIN OF CUSTODY
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REC'D GOOD CON

9578355555

CONFORMS TO RE

SHIPPED VIA	LABORATORY NUM
10/19/91	

17	7-22	EXDPC22	10/80
SPECIAL INSTRUCTIONS OR COMMENTS			

Return Original

Recd

1004

100

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Released to Imaging: 9/22/2026 3:02:24 PM



Analytical**Technologies**, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 102548

February 25, 1991

Giant Refining Company
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refine Remediation 9834

Attention: Tim Kinney

On 02/05/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
ATI I.D. : 102548

DATE RECEIVED : 02/05/91

REPORT DATE : 02/25/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9102041244 GBR-52	AQUEOUS	02/04/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact the sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10254801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9102041244 GBR-52
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 02/04/91
 DATE RECEIVED : 02/05/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/12/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
1,1-DICHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.7
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	120
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 102548
 DATE EXTRACTED : 02/12/91
 DATE ANALYZED : 02/12/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	2.4
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	116
BROMOFLUOROBENZENE (%)	110



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 102548

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 02/12/91

PROJECT NAME : REFINE REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10299928

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% SPIKED REC.	DUP. % SPIKED DUP. % REC.		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	18	90	19	95	5
TRICHLOROETHENE	<0.2	20	20	100	20	100	0
TETRACHLOROETHENE	<0.2	20	18	90	19	95	5
BENZENE	<0.5	20	17	85	17	85	0
BROMODICHLOROMETHANE	<0.2	20	18	90	19	95	5
CHLOROFORM	<0.2	20	21	105	20	100	5
1,1,1-TRICHLOROETHANE	<0.2	20	18	90	18	90	0
TOLUENE	<0.5	20	17	85	16	80	6
CHLOROBENZENE	<0.5	20	18	90	19	90	5
M-XYLENE	<0.5	20	16	80	16	80	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

CHAIN OF CUSTODY

Date: 2-4-91 Page 1 of 2

REQUESTED ANALYSIS

LABORATORY		ADDRESS		TELEPHONE		SAMPLER'S SIGNATURE		SAMPLE NUMBER		MATRIX		LOCATION		POLYNUCLEAR AROMATICS 610/8310		HALOGENATED VOLATILES 601/8010		AROMATIC VOLATILES 602/8020		GENERAL WATER CHEMISTRY		NUMBER OF CONTAINERS	
ATI		213 S 48th St		Tempe AZ		Jenny Overman		9102041244		Water		G-BR-52				✓		✓				2	
PROJECT INFORMATION		TOTAL NO. OF CONTAINERS		CHAIN OF CUSTODY SEALS		REC'D GOOD CONDITION/COLD		CONFORMS TO RECORD		LABORATORY NUMBER		RELINQUISHED BY: (Signature)		RELINQUISHED BY: (Signature)		RELINQUISHED BY: (Signature)		DATE AND TIME		DATE AND TIME		DATE AND TIME	
PROJECT: Refinery Remediation 9834		2		Y		Y		Y		102548		Jenny Overman		Jenny Overman		Jenny Overman		2-4-91 1450		2-4-91		2-4-91	
PROJECT MANAGER: Tim Kinner												(Company)		(Company)		(Company)		DATE AND TIME		DATE AND TIME		DATE AND TIME	
SHIPPING I.D. NO. 9578355485												RECEIVED BY: (Signature)		RECEIVED BY: (Signature)		RECEIVED BY: (Signature)		DATE AND TIME		DATE AND TIME		DATE AND TIME	
SHIPPED VIA Fed Express												(Printed Name)		(Printed Name)		(Printed Name)		DATE AND TIME		DATE AND TIME		DATE AND TIME	
SPECIAL INSTRUCTIONS OR COMMENTS												(Company)		(Company)		(Company)		DATE AND TIME		DATE AND TIME		DATE AND TIME	
Please Return Original COC																							



Analytical Technologies, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101839

February 20, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation

Attention: Tim Kinney

On 01/26/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 610 analyses were performed by ATI, Fort Collins.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

M. Barry for

Elizabeth Proffitt
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
ATI I.D. : 101839

DATE RECEIVED : 01/26/91

REPORT DATE : 02/25/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	910125926 GRW-3	AQUEOUS	01/25/91
02	910125940 GRW-13	AQUEOUS	01/25/91
03	9101251332 SHS-15	AQUEOUS	01/25/91
04	9101251528 SHS-6	AQUEOUS	01/25/91
05	TRIP BLANK	AQUEOUS	01/25/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : (NONE)
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 910125926 GRW-3 (GBR-29)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
 DATE RECEIVED : 01/26/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/07/91
 UNITS : UG/L
 DILUTION FACTOR : 25

COMPOUNDS	RESULTS
BENZENE	350
BROMODICHLOROMETHANE	<5.0
BROMOFORM	<5.0
BROMOMETHANE	<5.0
CARBON TETRACHLORIDE	<5.0
CHLOROBENZENE	<12.5
CHLOROETHANE	<5.0
CHLOROFORM	<5.0
CHLOROMETHANE	<5.0
DIBROMOCHLOROMETHANE	<5.0
2-CHLOROETHYL VINYL ETHER	<12.5
1,3-DICHLOROBENZENE	<12.5
1,2 & 1,4-DICHLOROBENZENE	<12.5
DICHLORODIFLUOROMETHANE	<5.0
1,1-DICHLOROETHANE	<5.0
1,2-DICHLOROETHANE	<5.0
1,1-DICHLOROETHENE	<5.0
1,2-DICHLOROETHENE (TOTAL)	<5.0
1,2-DICHLOROPROPANE	<5.0
CIS-1,3-DICHLOROPROPENE	<5.0
TRANS-1,3-DICHLOROPROPENE	<5.0
ETHYLBENZENE	160
METHYLENE CHLORIDE	<50.0
1,1,2,2-TETRACHLOROETHANE	<5.0
TETRACHLOROETHENE	<5.0
TOLUENE	<12.5
1,1,1-TRICHLOROETHANE	<5.0
1,1,2-TRICHLOROETHANE	<5.0
TRICHLOROETHENE	<5.0
TRICHLOROFLUOROMETHANE	<12.5
VINYL CHLORIDE	<5.0
TOTAL XYLENES	80
TRICHLOROTRIFLUOROETHANE	<50.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 103
 BROMOFLUOROBENZENE (%) 83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : (NONE)
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 910125940 GRW-13 (GAR-14)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
 DATE RECEIVED : 01/26/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/07/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	3.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.8
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 107
 BROMOFLUOROBENZENE (%) 86



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183903

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : (NONE)
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9101251332 SHS-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
 DATE RECEIVED : 01/26/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/07/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	107



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183904

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 01/25/91
PROJECT #	: (NONE)	DATE RECEIVED	: 01/26/91
PROJECT NAME	: REFINERY REM	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9101251528 SHS- 8 16 R	DATE ANALYZED	: 02/07/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	97



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183905

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 01/25/91
PROJECT #	: (NONE)	DATE RECEIVED	: 01/26/91
PROJECT NAME	: REFINERY REM	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 02/07/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	87



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : (NONE)
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101839
 DATE EXTRACTED : 02/09/91
 DATE ANALYZED : 02/09/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	103
BROMOFLUOROBENZENE (%)	92



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101839
PROJECT #	: (NONE)	DATE EXTRACTED	: 02/07/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 02/07/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	110
BROMOFLUOROBENZENE (%)	100



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101839

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : (NONE)

DATE ANALYZED : 02/08/91

PROJECT NAME : REFINERY REM

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10183902

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	DUP.		RPD
				% REC.	% REC.	
1,1-DICHLOROETHENE	<0.2	20	19	95	18	5
TRICHLOROETHENE	<0.2	20	19	95	18	5
TETRACHLOROETHENE	<0.2	20	18	90	18	0
BENZENE	<0.5	20	20	100	19	5
BROMODICHLOROMETHANE	<0.2	20	21	105	20	5
CHLOROFORM	<0.2	20	20	100	18	11
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	20	5
TOLUENE	0.8	20	19	91	18	5
CHLOROBENZENE	<0.5	20	16	80	17	6
M-XYLENE	<0.5	20	18	90	17	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10183901

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : 910125926 GRW-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 25

COMPOUNDS	RESULTS
NAPHTHALENE	<75
ACENAPHTHYLENE	<75
ACENAPHTHENE	<125
FLUORENE	57
PHENANTHRENE	145
ANTHRACENE	8.8
FLUORANTHENE	112
PYRENE	<10
BENZO(A)ANTHRACENE	82
CHRYSENE	<5.0
BENZO(B)FLUORANTHENE	<2.5
BENZO(K)FLUORANTHENE	<2.5
BENZO(A)PYRENE	<2.5
DIBENZ(a,h)ANTHRACENE	<25
BENZO(g,h,i)PERYLENE	<10
INDENO(1,2,3-CD)PYRENE	<7.5

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10183902

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : 910125940 GRW-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101839
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101839

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : (NONE)

DATE ANALYZED : 02/05/91

PROJECT NAME : REFINERY REM

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10299902

UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT SPIKED	SPIKED % SAMPLE REC.	DUP. SPIKED % SAMPLE REC.	DUP. SPIKED % SAMPLE REC.	RPD
ACENAPHTHYLENE	<0.30 150	101 67	96 64	5	
PYRENE	<0.04 20	14.6 73	14.5 73	1	

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

CHAIN OF CUSTODY

Date: 1-25-91 Page 1 of 1

REQUESTED ANALYSIS

LABORATORY *ATI*
ADDRESS *2113 S 48th St*
Tempe Az
TELEPHONE *(602) 438-1530*

SAMPLER'S SIGNATURE

SIGNATURE Jelany Overman

SAMPLE NUMBER	MATRIX	LOCATION
910125926	Water	GRW-3
910125940	Water	GRW-13
9101251338	Water	SHS-15
9101251528	Water	SHS-16
Trip Blank		

[illegible]

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT: <i>Refiner-1</i>		TOTAL NO. OF CONTAINERS <i>11</i>	
<i>Remediation</i>		CHAIN OF CUSTODY SEALS <i>Y</i>	
PROJECT MANAGER:			
<i>Tim Kinney</i>		REC'D GOOD CONDITION/COLD <i>Y</i>	
SHIPPING I.D. NO.			
<i>957835581</i>		CONFORMS TO RECORD <i>Y</i>	
SHIPPED VIA		LABORATORY NUMBER:	
<i>Fed Express</i>		<i>101839</i>	

[illegible]

Please Return Original Coc

1004



Analytical Technologies, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101788

February 25, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 01/24/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 610 analyses were performed by ATI, Fort Collins. Sample 9101231433 SHS-10 was analyzed past the EPA 14-day holding time and is provided at no charge.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Project Manager

Robert V. Woods
Laboratory Manager

RVW:dkm
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON

DATE RECEIVED : 01/24/91

PROJECT # : 9834

PROJECT NAME : REFIN REMED

REPORT DATE : 02/15/91

ATI I.D. : 101788

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9101231045 GBR-31	AQUEOUS	01/23/91
02	9101231222 SHS-3	AQUEOUS	01/23/91
03	9101231331 SHS-6	AQUEOUS	01/23/91
04	9101231433 SHS-10	AQUEOUS	01/23/91
05	TRIP BLANK	AQUEOUS	01/23/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMED
 CLIENT I.D. : 9101231045 GBR-31
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
 DATE RECEIVED : 01/24/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/05/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	90
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.1
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 99
 BROMOFLUOROBENZENE (%) 91



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMED
 CLIENT I.D. : 9101231222 SHS-3
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
 DATE RECEIVED : 01/24/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/05/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 101
 BROMOFLUOROBENZENE (%) 97



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178803

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMED
 CLIENT I.D. : 9101231331 SHS-6
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
 DATE RECEIVED : 01/24/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/05/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178804

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMED
 CLIENT I.D. : 9101231433 SHS-10
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
 DATE RECEIVED : 01/24/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/09/91
 UNITS : UG/L
 DILUTION FACTOR : 5

COMPOUNDS	RESULTS
BENZENE	<2.5
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	<1.0
1,2-DICHLOROETHANE	<1.0
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	<1.0
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	106
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	<1.0
TOLUENE	4
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	<1.0
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	<2.5
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	103
BROMOFLUOROBENZENE (%)	119



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178805

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMED
 CLIENT I.D. : TRIP BLANK
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
 DATE RECEIVED : 01/24/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/05/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	89
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101788
PROJECT #	: 9834	DATE EXTRACTED	: 02/05/91
PROJECT NAME	: REFIN REMED	DATE ANALYZED	: 02/05/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	2.2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	112



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMED
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101788
 DATE EXTRACTED : 02/09/91
 DATE ANALYZED : 02/09/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	84
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101788

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMED
 REF I.D. : 10299903

DATE ANALYZED : 02/09/91
 SAMPLE MATRIX : AQUEOUS
 UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED %		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	20	100	20	100	0
TRICHLOROETHENE	<0.2	20	21	105	18	90	15
TETRACHLOROETHENE	<0.2	20	19	95	16	80	17
BENZENE	<0.5	20	19	95	17	85	11
BROMODICHLOROMETHANE	<0.2	20	20	100	19	95	5
CHLOROFORM	<0.2	20	20	100	20	100	0
1,1,1-TRICHLOROETHANE	<0.2	20	20	100	19	95	5
TOLUENE	<0.5	20	18	90	16	80	12
CHLOROBENZENE	<0.5	20	20	100	19	95	5
M-XYLENE	<0.5	20	19	95	16	80	17

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10178801

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : 9101231045 GBR-31
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101788
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101788

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : REFIN REMED

REF I.D. : 10299904

DATE ANALYZED : 02/05/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
ACENAPHTHYLENE	<0.30	150	101	67	96	64	5
PYRENE	<0.04	20	14.6	73	14.5	73	1

% Recovery =
$$\frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

RPD (Relative % Difference) =
$$\frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

**Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499**

Date: 1-23-91 Page 1 of 1

SAMPLER'S SIGNATURE

LUKE
Jeany Overman

[illegible]

1004



Analytical**Technologies**, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101817

February 19, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 01/25/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 601/602 analyses were performed by ATI, Seattle. Method 610 analyses were performed by ATI, Fort Collins.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
ATI I.D. : 101817

DATE RECEIVED : 01/25/91

REPORT DATE : 02/18/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9101241223 SHS-12	AQUEOUS	01/24/91
02	9101241300 SHS-13	AQUEOUS	01/24/91
03	9101241450 GRW-4	AQUEOUS	01/24/91
04	9101241504 GRW-6	AQUEOUS	01/24/91
05	9101241515 GRW-77	AQUEOUS	01/24/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9101241223 SHS-12
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
 DATE RECEIVED : 01/25/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/07/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.80
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.41 *
1,2-DICHLOROETHANE	0.39
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	4.7 *
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.3
TOLUENE	1.9
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.74
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	78
BROMOFLUOROBENZENE (%)	84

* 1,1-DICHLOROETHANE AND 1,2-DICHLOROETHANE (TOTAL) WERE TAKEN FROM
 A GC RUN ON 02/08/91, ONE DAY PAST HOLDING TIME.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181702

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9101241300 SHS-13
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
 DATE RECEIVED : 01/25/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/07/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	0.96 *
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	0.96 *
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.0
1,2-DICHLOROETHANE	3.8
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.95
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	76
BROMOFLUOROBENZENE (%)	99

* BROMOMETHANE AND CHLOROETHANE COELUTE. BECAUSE OF THIS BOTH COMPOUNDS ARE REPORTED.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181703

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9101241450 GRW-4 (GPR-43)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
 DATE RECEIVED : 01/25/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/07/91
 UNITS : UG/L
 DILUTION FACTOR : 100

COMPOUNDS	RESULTS
BENZENE	600
BROMODICHLOROMETHANE	<20
BROMOFORM	<20
BROMOMETHANE	<20
CARBON TETRACHLORIDE	<20
CHLOROBENZENE	<50
CHLOROETHANE	<20
CHLOROFORM	<20
CHLOROMETHANE	<20
DIBROMOCHLOROMETHANE	<20
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<50
1,2 & 1,4-DICHLOROBENZENE	<50
DICHLORODIFLUOROMETHANE	<20
1,1-DICHLOROETHANE	<20
1,2-DICHLOROETHANE	<20
1,1-DICHLOROETHENE	<20
1,2-DICHLOROETHENE (TOTAL)	<20
1,2-DICHLOROPROPANE	<20
CIS-1,3-DICHLOROPROPENE	<20
TRANS-1,3-DICHLOROPROPENE	<20
ETHYLBENZENE	150
METHYLENE CHLORIDE	<200
1,1,2,2-TETRACHLOROETHANE	<20
TETRACHLOROETHENE	<20
TOLUENE	<50
1,1,1-TRICHLOROETHANE	<20
1,1,2-TRICHLOROETHANE	<20
TRICHLOROETHENE	<20
TRICHLOROFLUOROMETHANE	<50
VINYL CHLORIDE	<20
TOTAL XYLENES	<50
TRICHLOROTRIFLUOROETHANE	<200

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	106



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181704

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9101241504 GRW-6
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
 DATE RECEIVED : 01/25/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/07/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	93 D
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	3.5
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	0.60
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.7
1,2-DICHLOROETHANE	4.8
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	9.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	24
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.6
TOLUENE	0.79
1,1,1-TRICHLOROETHANE	0.27
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	2.0
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	110



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181705

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9101241515 GRW-77 ?
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
 DATE RECEIVED : 01/25/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/07/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.91
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	80
BROMOFLUOROBENZENE (%)	104



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101817
PROJECT #	: 9834	DATE EXTRACTED	: 02/07/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 02/07/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	107



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101817
PROJECT #	: 9834	DATE EXTRACTED	: 02/07/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 02/07/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	77
BROMOFLUOROBENZENE (%)	103



Analytical Technologies, Inc.

QUALITY CONTROL DATA

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602) ATI I.D. : 101817

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 REF I.D. : 10299911

DATE ANALYZED : 02/07/91
 SAMPLE MATRIX : AQUEOUS
 UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. DUP.		RPD
	RESULT	SPIKED			SPIKED SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.20	2.0	1.7	85	1.8	90	6
TRICHLOROETHENE	0.74	2.0	2.6	95	2.5	90	5
TETRACHLOROETHENE	1.4	2.0	3.3	95	3.2	90	5
BENZENE	<0.50	2.0	1.8	90	1.8	90	0
BROMODICHLOROMETHANE	<0.20	2.0	2.3	115	1.9	95	19
CHLOROFORM	0.80	2.6	1.8	90	2.6	90	0
1,1,1-TRICHLOROETHANE	<0.20	2.0	1.8	90	1.9	95	5
TOLUENE	1.9	2.0	2.5	30	*2.4	25 *	4
CHLOROBENZENE	<0.50	2.0	1.9	95	1.9	95	0
M-XYLENE	NA	NA	NA	NA	NA	NA	NA

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

* Result out of limits due to sample matrix interference



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101817

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : REFINERY REM

REF I.D. : 10299912

DATE ANALYZED : 02/07/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED		RPD
	RESULT	SPIKED			SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.20	1.7	2.0	85	NA	NA	NA
TRICHLOROETHENE	<0.20	1.7	2.0	85	NA	NA	NA
TETRACHLOROETHENE	<0.20	1.8	2.0	90	NA	NA	NA
BENZENE	<0.50	3.5	4.0	88	NA	NA	NA
BROMODICHLOROMETHANE	<0.20	1.9	2.0	95	NA	NA	NA
CHLOROFORM	<0.20	1.9	2.0	95	NA	NA	NA
1,1,1-TRICHLOROETHANE	<0.20	2.0	2.0	100	NA	NA	NA
TOLUENE	<0.50	3.5	4.0	88	NA	NA	NA
CHLOROBENZENE	<0.50	3.6	4.0	90	NA	NA	NA
M-XYLENE	NA	NA	NA	NA	NA	NA	NA

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10181703

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101241450 GRW-4
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
DATE RECEIVED : 01/25/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 25

COMPOUNDSRESULTS

NAPHTHALENE	12
ACENAPHTHYLENE	<8
ACENAPHTHENE	<13
FLUORENE	8.8
PHENANTHRENE	18
ANTHRACENE	0.8
FLUORANTHENE	9.4
PYRENE	<1.0
BENZO(A)ANTHRACENE	7.2
CHRYSENE	5.6
BENZO(B)FLUORANTHENE	<0.25
BENZO(K)FLUORANTHENE	<0.25
BENZO(A)PYRENE	<0.25
DIBENZ(a,h)ANTHRACENE	<2.5
BENZO(g,h,i)PERYLENE	<1.0
INDENO(1,2,3-CD)PYRENE	<0.75

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10181704

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101241504 GRW-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
DATE RECEIVED : 01/25/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.14
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101817
PROJECT #	: 9834	DATE EXTRACTED	: 01/29/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 02/05/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101817

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : REFINERY REM

REF I.D. : 10299904

DATE ANALYZED : 02/05/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	% REC.	RPD
ACENAPHTHYLENE	<0.30 150	101	67	96	64	5
PYRENE	<0.04 20	14.6	73	14.5	73	1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

SIGNATURE

Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

CHAIN OF CUSTODY

Date: 1-24-91 Page 1 of 1

REQUESTED ANALYSIS

LABORATORY ATT

ADDRESS 2113 S 48th St Ste 101

TELEPHONE (602) 438-1530

SAMPLER'S SIGNATURE

SAMPLE NUMBER MATRIX LOCATION

POLYNUCLEAR AROMATICS 610/8310

HALOGENATED VOLATILES 601/8010

AROMATIC VOLATILES 602/8020

GENERAL WATER CHEMISTRY

NUMBER OF CONTAINERS

3101241223	Water	SHS-120	✓	✓																2
3101241300	Water	SHS-13	✓	✓																2
3101241450	Water	GRW-4	✓	✓																3
3101241504	Water	GRW-6	✓	✓																3
3101241515	Water	GRW-77	✓	✓																1

PROJECT INFORMATION

SAMPLE RECEIPT

RELINQUISHED BY: (Signature) 1.

RELINQUISHED BY: (Signature) 2.

RELINQUISHED BY: (Signature) 3.

PROJECT: Refinery

TOTAL NO. OF CONTAINERS

(Printed Name) Henry Overman

(Printed Name)

(Printed Name)

PROJECT MANAGER: Remediation 9834

CHAIN OF CUSTODY SEALS

(Company) Great Refinery

(Company)

(Company)

SHIPPING I.D. NO. 578355603

REC'D GOOD CONDITION/COLD

DATE AND TIME: 1-24-91 1537

DATE AND TIME:

DATE AND TIME:

SHIPPING I.D. NO. 578355603

CONFORMS TO RECORD

RECEIVED BY: (Signature) 1.

RECEIVED BY: (Signature) 2.

RECEIVED BY: (Signature) 3.

SHIPPING I.D. NO. 578355603

LABORATORY NUMBER: 101817

RECEIVED BY: (Signature) 1.

RECEIVED BY: (Signature) 2.

RECEIVED BY: (Signature) 3.

SHIPPING I.D. NO. 578355603

LABORATORY NUMBER: 101817

(Printed Name)

(Printed Name)

(Printed Name)

SHIPPING I.D. NO. 578355603

LABORATORY NUMBER: 101817

(Printed Name)

(Printed Name)

(Printed Name)

SHIPPING I.D. NO. 578355603

DATE AND TIME:

DATE AND TIME:

DATE AND TIME:



Analytical Technologies, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101770

February 25, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 01/23/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 610 analyses were performed by ATI, Ft. Collins. This report is being reissued to add your sample locations to the sample I.D.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

M. Barry for

Elizabeth Proffitt
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

RVW:dkm
Enclosure



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
ATI I.D. : 101770

DATE RECEIVED : 01/23/91

REPORT DATE : 02/25/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9101221045 GBR-17	AQUEOUS	01/22/91
02	9101221225 GBR-15	AQUEOUS	01/22/91
03	9101221342 GBR-30	AQUEOUS	01/22/91
04	9101221450 GBR-24D	AQUEOUS	01/22/91
05	TRIP BLANK	AQUEOUS	01/19/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMEDI
 CLIENT I.D. : 9101221045 GBR-17
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
 DATE RECEIVED : 01/23/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.9
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	97



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177002

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMEDI
 CLIENT I.D. : 9101221225 GBR-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
 DATE RECEIVED : 01/23/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	59.4
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	21.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	0.8
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	110
BROMOFLUOROBENZENE (%)	96



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177003

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMEDI
 CLIENT I.D. : 9101221342 GBR-30
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
 DATE RECEIVED : 01/23/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/05/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	25.9
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	5.7
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	39.9
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177004

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 01/22/91
PROJECT #	: 9834	DATE RECEIVED	: 01/23/91
PROJECT NAME	: REFIN REMEDI	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9101221450 GBR-24D	DATE ANALYZED	: 02/05/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	16.6
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	23.9
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	9.1
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	2.4
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	15.9
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	80



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177005

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMEDI
 CLIENT I.D. : TRIP BLANK
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/19/91
 DATE RECEIVED : 01/23/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/04/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	107
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101770
PROJECT #	: 9834	DATE EXTRACTED	: 02/04/91
PROJECT NAME	: REFIN REMEDI	DATE ANALYZED	: 02/04/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	8.9
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	93



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101770
PROJECT #	: 9834	DATE EXTRACTED	: 02/05/91
PROJECT NAME	: REFIN REMEDI	DATE ANALYZED	: 02/05/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	105
BROMOFLUOROBENZENE (%)	87



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101770

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 02/04/91

PROJECT NAME : REFIN REMEDI

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10299907

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	DUP.		RPD	
				% REC.	% REC.		
1,1-DICHLOROETHENE	<0.2	20	23	115	22	110	4
TRICHLOROETHENE	<0.2	20	24	120	21	105	13
TETRACHLOROETHENE	<0.2	20	24	120	24	120	0
BENZENE	<0.5	20	21	105	21	105	0
BROMODICHLOROMETHANE	<0.2	20	24	120	23	115	4
CHLOROFORM	<0.2	20	22	110	22	110	0
1,1,1-TRICHLOROETHANE	<0.2	20	23	115	22	110	4
TOLUENE	<0.5	20	20	100	19	95	5
CHLOROBENZENE	<0.5	20	21	105	21	105	0
M-XYLENE	<0.5	20	20	100	19	95	5

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10177001

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : 9101221045 GBR-17
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : 01/24/91
DATE ANALYZED : 02/01/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10177003

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : 9101221342 GBR-30
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : 01/24/91
DATE ANALYZED : 02/01/91
UNITS : UG/L
DILUTION FACTOR : 20

COMPOUNDSRESULTS

NAPHTHALENE	<6
ACENAPHTHYLENE	<6
ACENAPHTHENE	<10
FLUORENE	4
PHENANTHRENE	5
ANTHRACENE	<0.2
FLUORANTHENE	18
PYRENE	<0.8
BENZO(A)ANTHRENE	<0.2
CHRYSENE	<0.4
BENZO(B)FLUORANTHENE	<0.2
BENZO(K)FLUORANTHENE	<0.2
BENZO(A)PYRENE	<0.2
DIBENZ(a,h)ANTHRACENE	<2
BENZO(g,h,i)PERYLENE	<0.8
INDENO(1,2,3-CD)PYRENE	<0.6

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10177004

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : 9101221450 GBR-24D
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : 01/24/91
DATE ANALYZED : 02/01/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	1.7
PHENANTHRENE	0.8
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101770
DATE EXTRACTED : 01/24/91
DATE ANALYZED : 02/01/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101770

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : REFIN REMEDI

REF I.D. : 10299903

DATE ANALYZED : 02/01/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT SPIKED	SPIKED SAMPLE	% REC.	DUP. SAMPLE	DUP. REC.	RPD
ACENAPHTHYLENE	<0.30 150	123	82	118	79	3
PYRENE	<0.04 20	19	95	19	95	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

CHAIN OF CUSTODY

Date: 1-22-91 Page 1 of 1

REQUESTED ANALYSIS

LABORATORY ATI

ADDRESS 2113 S 48th St

Temp 42

TELEPHONE (602) 438-1530

SAMPLER'S SIGNATURE

Jenny Deenan

SAMPLE NUMBER	MATRIX	LOCATION
---------------	--------	----------

POLYNUCLEAR
AROMATICS 610/8310

HALOGENATED
VOLATILES 601/8010

AROMATIC
VOLATILES 602/8020

GENERAL WATER CHEMISTRY

NUMBER OF
CONTAINERS

PROJECT INFORMATION

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS

RELINQUISHED BY: (Signature) 1. Deputy C. Verma

CHAIN OF CUSTODY SEALS

(Printed Name) Jeany Overman

REC'D GOOD CONDITION/COLL

jeany overman
(Company) Giant Refinery

CONFORMS TO RECORD

DATE AND TIME: 0104t Kettingery
1-22-91 15:25

LABORATORY NUMBER

LABORATORY NUMBER:

1-22-91 15:25
RECEIVED BY: (Signature) L.

101770

TS

(Printed Name) _____

3

Original

(Printed name)

(Company)

10

(Company)

DATE AND TIME:

1004

Released to Imaging: 9/22/2026 3:02:24 PM



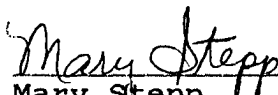
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101221045
SITE: GBR-17
LAB NO: F5644

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.64
Lab conductivity, umhos/cm.....	2900
Lab resistivity, ohm-m.....	3.45
Total dissolved solids (180), mg/l..	2240
Total dissolved solids (calc), mg/l.	2170
Total alkalinity as CaCO ₃ , mg/l.....	197
Total hardness as CaCO ₃ , mg/l.....	1040
Sodium absorption ratio.....	4.13

	mg/l	meq/l
Bicarbonate as HCO ₃	240	3.93
Carbonate as CO ₃	0	0
Chloride.....	100	2.82
Sulfate.....	1280	26.6
Calcium.....	287	14.3
Magnesium.....	78.1	6.42
Potassium.....	0.52	0.01
Sodium.....	306	13.3
Major cations.....		34
Major anions.....		33.4
Cation/anion difference.....		0.96 %



Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101221225
SITE: GBR-15
LAB NO: F5645

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.58
Lab conductivity, umhos/cm.....	5050
Lab resistivity, ohm-m.....	1.98
Total dissolved solids (180), mg/l..	3760
Total dissolved solids (calc), mg/l.	3730
Total alkalinity as CaCO ₃ , mg/l.....	248
Total hardness as CaCO ₃ , mg/l.....	1200
Sodium absorption ratio.....	9.17

	mg/l	meq/l
Bicarbonate as HCO ₃	303	4.96
Carbonate as CO ₃	0	0
Chloride.....	482	13.6
Sulfate.....	1890	39.4
Calcium.....	445	22.2
Magnesium.....	21.8	1.79
Potassium.....	6.92	0.18
Sodium.....	731	31.8
Major cations.....		56
Major anions.....		57.9
Cation/anion difference.....		1.7 %

Mary Stepp

Mary Stepp
Lab Director



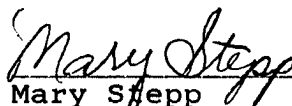
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101221450
SITE: GBR-24-D
LAB NO: F5646

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.84
Lab conductivity, umhos/cm.....	5070
Lab resistivity, ohm-m.....	1.97
Total dissolved solids (180), mg/l..	3800
Total dissolved solids (calc), mg/l.	3630
Total alkalinity as CaCO ₃ , mg/l.....	231
Total hardness as CaCO ₃ , mg/l.....	1820
Sodium absorption ratio.....	4.92

	mg/l	meq/l
Bicarbonate as HCO ₃	282	4.62
Carbonate as CO ₃	0	0
Chloride.....	702	19.8
Sulfate.....	1650	34.4
Calcium.....	527	26.3
Magnesium.....	123	10.1
Potassium.....	4.98	0.13
Sodium.....	482	21
Major cations.....		57.5
Major anions.....		58.8
Cation/anion difference.....		1.1 %


Mary Stepp
Lab Director



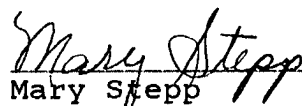
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101221342
SITE: GBR-30
LAB NO: F5647

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.43
Lab conductivity, umhos/cm.....	4400
Lab resistivity, ohm-m.....	2.27
Total dissolved solids (180), mg/l..	3070
Total dissolved solids (calc), mg/l.	2960
Total alkalinity as CaCO ₃ , mg/l.....	385
Total hardness as CaCO ₃ , mg/l.....	1150
Sodium absorption ratio.....	7.24

	mg/l	meq/l
Bicarbonate as HCO ₃	470	7.7
Carbonate as CO ₃	0	0
Chloride.....	545	15.4
Sulfate.....	1220	25.3
Calcium.....	318	15.8
Magnesium.....	87.6	7.2
Potassium.....	2.16	0.06
Sodium.....	565	24.6
Major cations.....		47.7
Major anions.....		48.4
Cation/anion difference.....		0.76 %


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Lab Director



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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101221045
SITE: GBR-17 L/S
LAB NO: F5648

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.74
Lab conductivity, umhos/cm.....	2890
Lab resistivity, ohm-m.....	3.46
Total dissolved solids (180), mg/l..	2240
Total dissolved solids (calc), mg/l.	2190
Total alkalinity as CaCO ₃ , mg/l.....	197
Total hardness as CaCO ₃ , mg/l.....	1020
Sodium absorption ratio.....	4.09

	mg/l	meq/l
Bicarbonate as HCO ₃	240	3.93
Carbonate as CO ₃	0	0
Chloride.....	105	2.96
Sulfate.....	1290	26.9
Calcium.....	341	17
Magnesium.....	40.5	3.33
Potassium.....	0.48	0.01
Sodium.....	300	13
Major cations.....		33.4
Major anions.....		33.8
Cation/anion difference.....		0.58 %

A handwritten signature in cursive script, reading 'Mary Stepp', is written over a horizontal line. Below the line, the name 'Mary Stepp' and the title 'Lab Director' are printed in a standard sans-serif font.

Mary Stepp
Lab Director



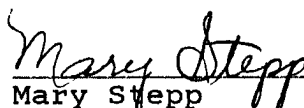
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101231045
SITE: GBR-31
LAB NO: F5659

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/23/91
DATE COLLECTED: 01/23/91

Lab pH (s.u.).....	8.03
Lab conductivity, umhos/cm.....	4950
Lab resistivity, ohm-m.....	2.02
Total dissolved solids (180), mg/l..	3620
Total dissolved solids (calc), mg/l.	3170
Total alkalinity as CaCO ₃ , mg/l.....	231
Total hardness as CaCO ₃ , mg/l.....	1260
Sodium absorption ratio.....	7.59

	mg/l	meq/l
Bicarbonate as HCO ₃	282	4.62
Carbonate as CO ₃	0	0
Chloride.....	704	19.9
Sulfate.....	1260	26.3
Calcium.....	349	17.4
Magnesium.....	94.7	7.78
Potassium.....	2.3	0.06
Sodium.....	619	26.9
Major cations.....		52.2
Major anions.....		50.8
Cation/anion difference.....		1.35 %



Mary Stepp
Lab Director



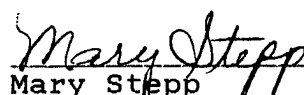
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101231222
SITE: SHS-3
LAB NO: F5660

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/23/91
DATE COLLECTED: 01/23/91

Lab pH (s.u.).....	7.91
Lab conductivity, umhos/cm.....	4550
Lab resistivity, ohm-m.....	2.2
Total dissolved solids (180), mg/l..	3870
Total dissolved solids (calc), mg/l.	3690
Total alkalinity as CaCO ₃ , mg/l.....	248
Total hardness as CaCO ₃ , mg/l.....	1730
Sodium absorption ratio.....	5.05

	mg/l	meq/l
Bicarbonate as HCO ₃	303	4.96
Carbonate as CO ₃	0	0
Chloride.....	254	7.16
Sulfate.....	2200	45.8
Calcium.....	445	22.2
Magnesium.....	151	12.4
Potassium.....	7.32	0.19
Sodium.....	483	21
Major cations.....		55.9
Major anions.....		57.9
Cation/anion difference.....		1.78 %


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Lab Director



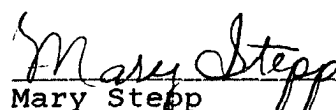
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101231331
SITE: SHS-6
LAB NO: F5661

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/23/91
DATE COLLECTED: 01/23/91

Lab pH (s.u.).....	7.94
Lab conductivity, umhos/cm.....	3190
Lab resistivity, ohm-m.....	3.14
Total dissolved solids (180), mg/l..	2580
Total dissolved solids (calc), mg/l.	2460
Total alkalinity as CaCO ₃ , mg/l.....	316
Total hardness as CaCO ₃ , mg/l.....	1170
Sodium absorption ratio.....	4.23

	mg/l	meq/l
Bicarbonate as HCO ₃	386	6.33
Carbonate as CO ₃	0	0
Chloride.....	120	3.38
Sulfate.....	1420	29.6
Calcium.....	263	13.1
Magnesium.....	125	10.3
Potassium.....	6.78	0.17
Sodium.....	333	14.5
Major cations.....		38.1
Major anions.....		39.4
Cation/anion difference.....		1.64 %


Mary Stepp
Lab Director



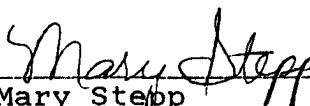
2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101231433
SITE: SHS-10
LAB NO: F5662

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/23/91
DATE COLLECTED: 01/23/91

Lab pH (s.u.).....	8.14
Lab conductivity, umhos/cm.....	1980
Lab resistivity, ohm-m.....	5.06
Total dissolved solids (180), mg/l..	1370
Total dissolved solids (calc), mg/l.	1350
Total alkalinity as CaCO ₃ , mg/l.....	299
Total hardness as CaCO ₃ , mg/l.....	494
Sodium absorption ratio.....	5.06

	mg/l	meq/l
Bicarbonate as HCO ₃	365	5.99
Carbonate as CO ₃	0	0
Chloride.....	80	2.26
Sulfate.....	645	13.4
Calcium.....	149	7.44
Magnesium.....	29.6	2.44
Potassium.....	8.34	0.21
Sodium.....	259	11.2
Major cations.....		21.3
Major anions.....		21.7
Cation/anion difference.....		0.8 %



Mary Stepp
Lab Director



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2506 West Main Street
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CLIENT: Giant Refinery
ID: N/A
SITE: SHS-12
LAB NO: F5669

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/24/91
DATE COLLECTED: 01/24/91

Lab pH (s.u.).....	8.07
Lab conductivity, umhos/cm.....	3800
Lab resistivity, ohm-m.....	2.63
Total dissolved solids (180), mg/l..	2780
Total dissolved solids (calc), mg/l.	2670
Total alkalinity as CaCO ₃ , mg/l.....	333
Total hardness as CaCO ₃ , mg/l.....	1070
Sodium absorption ratio.....	6.36

	mg/l	meq/l
Bicarbonate as HCO ₃	407	6.67
Carbonate as CO ₃	0	0
Chloride.....	368	10.4
Sulfate.....	1260	26.3
Calcium.....	248	12.4
Magnesium.....	109	8.94
Potassium.....	3.16	0.08
Sodium.....	477	20.7
Major cations.....		42.1
Major anions.....		43.4
Cation/anion difference.....		1.46 %

A handwritten signature in cursive script, reading 'Mary Stepp', is written over a horizontal line.
Mary Stepp
Lab Director



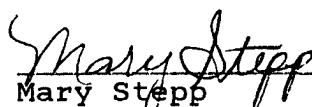
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101241300
SITE: SHS-13
LAB NO: F5670

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/24/91
DATE COLLECTED: 01/24/91

Lab pH (s.u.).....	7.96
Lab conductivity, umhos/cm.....	3190
Lab resistivity, ohm-m.....	3.14
Total dissolved solids (180), mg/l..	1970
Total dissolved solids (calc), mg/l.	1850
Total alkalinity as CaCO ₃ , mg/l.....	710
Total hardness as CaCO ₃ , mg/l.....	571
Sodium absorption ratio.....	8.69

	mg/l	meq/l
Bicarbonate as HCO ₃	866	14.2
Carbonate as CO ₃	0	0
Chloride.....	434	12.2
Sulfate.....	293	6.11
Calcium.....	190	9.47
Magnesium.....	23.8	1.96
Potassium.....	3.58	0.09
Sodium.....	478	20.8
Major cations.....		32.3
Major anions.....		32.5
Cation/anion difference.....		0.39 %


Mary Stepp
Lab Director



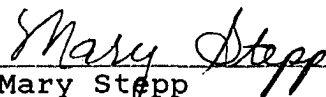
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101241450
SITE: GRW-4
LAB NO: F5671

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/24/91
DATE COLLECTED: 01/24/91

Lab pH (s.u.).....	8.05
Lab conductivity, umhos/cm.....	4360
Lab resistivity, ohm-m.....	2.3
Total dissolved solids (180), mg/l..	3100
Total dissolved solids (calc), mg/l.	3050
Total alkalinity as CaCO ₃ , mg/l.....	752
Total hardness as CaCO ₃ , mg/l.....	1100
Sodium absorption ratio.....	8.22

	mg/l	meq/l
Bicarbonate as HCO ₃	915	15
Carbonate as CO ₃	0	0
Chloride.....	434	12.2
Sulfate.....	1100	22.9
Calcium.....	411	20.5
Magnesium.....	19.4	1.59
Potassium.....	2.04	0.05
Sodium.....	628	27.3
Major cations.....		49.4
Major anions.....		50.2
Cation/anion difference.....		0.77 %



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Lab Director



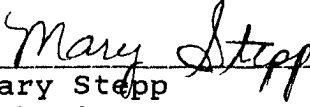
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101241504
SITE: GRW-6
LAB NO: F5672

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/24/91
DATE COLLECTED: 01/24/91

Lab pH (s.u.).....	7.97
Lab conductivity, umhos/cm.....	5040
Lab resistivity, ohm-m.....	1.99
Total dissolved solids (180), mg/l..	3520
Total dissolved solids (calc), mg/l.	3480
Total alkalinity as CaCO ₃ , mg/l.....	795
Total hardness as CaCO ₃ , mg/l.....	1220
Sodium absorption ratio.....	9.31

	mg/l	meq/l
Bicarbonate as HCO ₃	970	15.9
Carbonate as CO ₃	0	0
Chloride.....	648	18.3
Sulfate.....	1140	23.8
Calcium.....	418	20.9
Magnesium.....	42.9	3.53
Potassium.....	2.08	0.05
Sodium.....	748	32.5
Major cations.....		57
Major anions.....		58
Cation/anion difference.....		0.85 %



Mary Stepp
Lab Director



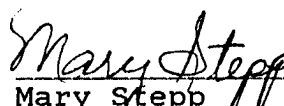
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101250926
SITE: GRW-3
LAB NO: F5678

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/25/91
DATE COLLECTED: 01/25/91

Lab pH (s.u.).....	7.93
Lab conductivity, umhos/cm.....	4300
Lab resistivity, ohm-m.....	2.32
Total dissolved solids (180), mg/l..	3170
Total dissolved solids (calc), mg/l.	3200
Total alkalinity as CaCO ₃ , mg/l.....	581
Total hardness as CaCO ₃ , mg/l.....	1050
Sodium absorption ratio.....	8.72

	mg/l	meq/l
Bicarbonate as HCO ₃	708	11.6
Carbonate as CO ₃	0	0
Chloride.....	245	6.91
Sulfate.....	1550	32.4
Calcium.....	380	18.9
Magnesium.....	24	1.98
Potassium.....	3.84	0.1
Sodium.....	648	28.2
Major cations.....		49.2
Major anions.....		50.9
Cation/anion difference.....		1.7 %


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Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101250940
SITE: GRW-13
LAB NO: F5679

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/25/91
DATE COLLECTED: 01/25/91

Lab pH (s.u.).....	7.82
Lab conductivity, umhos/cm.....	4990
Lab resistivity, ohm-m.....	2
Total dissolved solids (180), mg/l..	3680
Total dissolved solids (calc), mg/l.	3420
Total alkalinity as CaCO ₃ , mg/l.....	368
Total hardness as CaCO ₃ , mg/l.....	1310
Sodium absorption ratio.....	7.72

	mg/l	meq/l
Bicarbonate as HCO ₃	448	7.35
Carbonate as CO ₃	0	0
Chloride.....	694	19.6
Sulfate.....	1390	29
Calcium.....	391	19.5
Magnesium.....	80.6	6.63
Potassium.....	4.14	0.11
Sodium.....	642	27.9
Major cations.....		54.2
Major anions.....		55.9
Cation/anion difference.....		1.55 %


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Lab Director



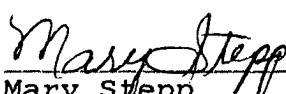
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101251332
SITE: SHS-15
LAB NO: F5680

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/25/91
DATE COLLECTED: 01/25/91

Lab pH (s.u.).....	8.14
Lab conductivity, umhos/cm.....	2860
Lab resistivity, ohm-m.....	3.5
Total dissolved solids (180), mg/l..	1630
Total dissolved solids (calc), mg/l.	1620
Total alkalinity as CaCO ₃ , mg/l.....	257
Total hardness as CaCO ₃ , mg/l.....	872
Sodium absorption ratio.....	2.45

	mg/l	meq/l
Bicarbonate as HCO ₃	313	5.13
Carbonate as CO ₃	0	0
Chloride.....	56.2	1.58
Sulfate.....	901	18.8
Calcium.....	310	15.5
Magnesium.....	24	1.97
Potassium.....	3.96	0.1
Sodium.....	167	7.25
Major cations.....		24.8
Major anions.....		25.5
Cation/anion difference.....		1.39 %



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Lab Director



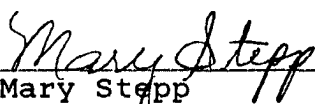
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101251528
SITE: SHS-16
LAB NO: F5681

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/25/91
DATE COLLECTED: 01/25/91

Lab pH (s.u.).....	8.04
Lab conductivity, umhos/cm.....	2170
Lab resistivity, ohm-m.....	4.61
Total dissolved solids (180), mg/l..	2350
Total dissolved solids (calc), mg/l.	2270
Total alkalinity as CaCO ₃ , mg/l.....	299
Total hardness as CaCO ₃ , mg/l.....	1260
Sodium absorption ratio.....	2.7

	mg/l	meq/l
Bicarbonate as HCO ₃	365	5.99
Carbonate as CO ₃	0	0
Chloride.....	56.2	1.58
Sulfate.....	1360	28.4
Calcium.....	364	18.2
Magnesium.....	85.3	7.01
Potassium.....	2.72	0.07
Sodium.....	220	9.57
Major cations.....		34.8
Major anions.....		36
Cation/anion difference.....		1.63 %



Mary Stepp
Lab Director



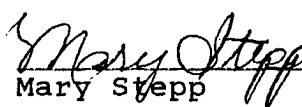
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101291050
SITE: Tank 27
LAB NO: F5691

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	7.88
Lab conductivity, umhos/cm.....	5290
Lab resistivity, ohm-m.....	1.89
Total dissolved solids (180), mg/l..	3620
Total dissolved solids (calc), mg/l.	3550
Total alkalinity as CaCO ₃ , mg/l.....	333
Total hardness as CaCO ₃ , mg/l.....	1290
Sodium absorption ratio.....	8.8

	mg/l	meq/l
Bicarbonate as HCO ₃	407	6.67
Carbonate as CO ₃	0	0
Chloride.....	832	23.5
Sulfate.....	1350	28.1
Calcium.....	329	16.4
Magnesium.....	113	9.33
Potassium.....	2.6	0.07
Sodium.....	726	31.6
Major cations.....		57.4
Major anions.....		58.2
Cation/anion difference.....		0.69 %


Mary Stepp
Lab Director



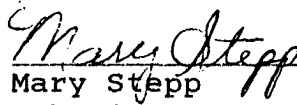
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101290925
SITE: Tank 21
LAB NO: F5690

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	7.48
Lab conductivity, umhos/cm.....	4610
Lab resistivity, ohm-m.....	2.17
Total dissolved solids (180), mg/l..	3340
Total dissolved solids (calc), mg/l.	3320
Total alkalinity as CaCO ₃ , mg/l.....	419
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	8.6

	mg/l	meq/l
Bicarbonate as HCO ₃	511	8.38
Carbonate as CO ₃	0	0
Chloride.....	465	13.1
Sulfate.....	1490	31.1
Calcium.....	356	17.8
Magnesium.....	73.5	6.04
Potassium.....	3.12	0.08
Sodium.....	683	29.7
Major cations.....		53.6
Major anions.....		52.6
Cation/anion difference.....		0.94 %


Mary Stepp
Lab Director



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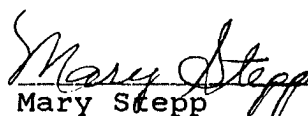
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101290822
SITE: Stripper Influent
LAB NO: F5692

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	7.54
Lab conductivity, umhos/cm.....	4740
Lab resistivity, ohm-m.....	2.11
Total dissolved solids (180), mg/l..	3390
Total dissolved solids (calc), mg/l.	3310
Total alkalinity as CaCO ₃ , mg/l.....	265
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	8.5

	mg/l	meq/l
Bicarbonate as HCO ₃	323	5.3
Carbonate as CO ₃	0	0
Chloride.....	602	17
Sulfate.....	1470	30.7
Calcium.....	275	13.7
Magnesium.....	123	10.1
Potassium.....	3.3	0.08
Sodium.....	675	29.3
Major cations.....		53.3
Major anions.....		53
Cation/anion difference.....		0.25 %


Mary Stepp
Lab Director



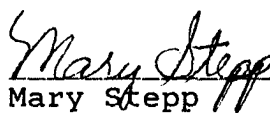
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101290830
SITE: Stripper Effluent
LAB NO: F5693

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	8.09
Lab conductivity, umhos/cm.....	4720
Lab resistivity, ohm-m.....	2.12
Total dissolved solids (180), mg/l..	3400
Total dissolved solids (calc), mg/l.	3360
Total alkalinity as CaCO ₃ , mg/l.....	239
Total hardness as CaCO ₃ , mg/l.....	1210
Sodium absorption ratio.....	8.13

	mg/l	meq/l
Bicarbonate as HCO ₃	292	4.79
Carbonate as CO ₃	0	0
Chloride.....	607	17.1
Sulfate.....	1490	31
Calcium.....	449	22.4
Magnesium.....	21.8	1.79
Potassium.....	3.05	0.08
Sodium.....	650	28.3
Major cations.....		52.6
Major anions.....		52.9
Cation/anion difference.....		0.34 %



Mary Stepp
Lab Director



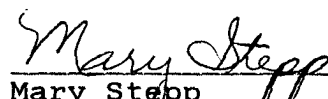
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101290925
SITE: Tank 21 L/S
LAB NO: F5694

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	8.07
Lab conductivity, umhos/cm.....	4620
Lab resistivity, ohm-m.....	2.16
Total dissolved solids (180), mg/l..	3310
Total dissolved solids (calc), mg/l.	3290
Total alkalinity as CaCO ₃ , mg/l.....	436
Total hardness as CaCO ₃ , mg/l.....	1180
Sodium absorption ratio.....	8.17

	mg/l	meq/l
Bicarbonate as HCO ₃	532	8.72
Carbonate as CO ₃	0	0
Chloride.....	465	13.1
Sulfate.....	1490	31
Calcium.....	364	18.2
Magnesium.....	66.4	5.46
Potassium.....	3.12	0.08
Sodium.....	645	28.1
Major cations.....		51.8
Major anions.....		52.8
Cation/anion difference.....		0.99 %



Mary Stepp
Lab Director



2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 103651

March 26, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation

Attention: Tim Kinney

On 03/09/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Michael G. Barry
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINE REMED
ATI I.D. : 103651

DATE RECEIVED : 03/09/91

REPORT DATE : 03/27/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	910308845-STRIPPER INFLUENT	AQUEOUS	03/08/91
02	910308850-STRIPPER EFFLUENT	AQUEOUS	03/08/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10365101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : (NONE)
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 910308845-STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 03/08/91
 DATE RECEIVED : 03/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 03/20/91
 UNITS : UG/L
 DILUTION FACTOR : 10

COMPOUNDS

RESULTS

COMPOUNDS	RESULTS
BENZENE	<5.0
BROMODICHLOROMETHANE	<2.0
BROMOFORM	<2.0
BROMOMETHANE	<2.0
CARBON TETRACHLORIDE	<2.0
CHLOROBENZENE	<5.0
CHLOROETHANE	<2.0
CHLOROFORM	<2.0
CHLOROMETHANE	<2.0
DIBROMOCHLOROMETHANE	<2.0
1,2-CHLOROETHYL VINYL ETHER	<5.0
1,3-DICHLOROBENZENE	<5.0
1,2 & 1,4-DICHLOROBENZENE	<5.0
DICHLORODIFLUOROMETHANE	<2.0
1,1-DICHLOROETHANE	<2.0
1,2-DICHLOROETHANE	<2.0
1,1-DICHLOROETHENE	<2.0
1,2-DICHLOROETHENE (TOTAL)	<2.0
1,2-DICHLOROPROPANE	<2.0
CIS-1,3-DICHLOROPROPENE	<2.0
TRANS-1,3-DICHLOROPROPENE	<2.0
ETHYLBENZENE	<5.0
METHYLENE CHLORIDE	<20.0
1,1,2,2-TETRACHLOROETHANE	<2.0
TETRACHLOROETHENE	<2.0
TOLUENE	<5.0
1,1,1-TRICHLOROETHANE	<2.0
1,1,2-TRICHLOROETHANE	<2.0
TRICHLOROETHENE	<2.0
TRICHLOROFLUOROMETHANE	<5.0
VINYL CHLORIDE	<2.0
TOTAL XYLENES	<5.0
TRICHLOROTRIFLUOROETHANE	<20.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	115



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10365102

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 03/08/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/09/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 910308850-STRIPPER EFFLUENT	DATE ANALYZED	: 03/20/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
1,2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	113



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 103651
PROJECT #	: (NONE)	DATE EXTRACTED	: 03/19/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 03/19/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	8.4
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	93
BROMOFLUOROBENZENE (%)	91



Analytical Technologies, Inc.

QUALITY CONTROL DATA

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602) ATI I.D. : 103651

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : (NONE)

PROJECT NAME : REFINE REMED

REF I.D. : 10399926

DATE ANALYZED : 03/20/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	DUP.		RPD
				% SPIKED REC.	% REC.	
1,1-DICHLOROETHENE	<0.2	20	19	95	19	0
TRICHLOROETHENE	<0.2	20	22	110	23	4
TETRACHLOROETHENE	<0.2	20	23	115	21	9
BENZENE	<0.5	20	19	95	19	0
BROMODICHLOROMETHANE	<0.2	20	24	120	24	0
CHLOROFORM	<0.2	20	21	105	22	5
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	23	9
TOLUENE	<0.5	20	19	95	18	5
CHLOROBENZENE	<0.5	20	19	95	18	5
M-XYLENE	<0.5	20	17	85	16	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

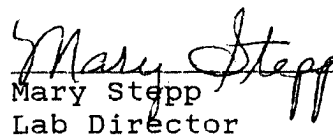


2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9103061505
SITE: GRW-13
LAB NO: F5874

DATE REPORTED: 03/14/91
DATE RECEIVED: 03/06/91
DATE COLLECTED: 03/06/91

Lab conductivity, umhos/cm..... 4860


Mary Stepp
Lab Director



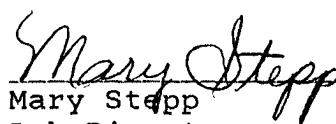
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: 910308845
SITE: Strip influent
LAB NO: F5890

DATE REPORTED: 03/20/91
DATE RECEIVED: 03/08/91
DATE COLLECTED: 03/08/91

Lab pH (s.u.).....	7.73
Lab conductivity, umhos/cm.....	4440
Lab resistivity, ohm-m.....	2.25
Total dissolved solids (180), mg/l..	3240
Total dissolved solids (calc), mg/l.	3120
Total alkalinity as CaCO ₃ , mg/l.....	145
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	7.07

	mg/l	meq/l
Bicarbonate as HCO ₃	178	2.91
Carbonate as CO ₃	0	0
Chloride.....	528	14.9
Sulfate.....	1530	31.9
Calcium.....	298	14.9
Magnesium.....	109	8.94
Potassium.....	3.3	0.08
Sodium.....	561	24.4
Major cations.....		48.3
Major anions.....		49.7
Cation/anion difference.....		1.4 %


Mary Stepp
Lab Director



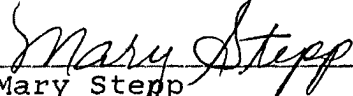
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: 910308850
SITE: Strip effluent
LAB NO: F5891

DATE REPORTED: 03/20/91
DATE RECEIVED: 03/08/91
DATE COLLECTED: 03/08/91

Lab pH (s.u.).....	7.90
Lab conductivity, umhos/cm.....	4460
Lab resistivity, ohm-m.....	2.24
Total dissolved solids (180), mg/l..	3240
Total dissolved solids (calc), mg/l.	3110
Total alkalinity as CaCO ₃ , mg/l.....	162
Total hardness as CaCO ₃ , mg/l.....	1160
Sodium absorption ratio.....	7.35

	mg/l	meq/l
Bicarbonate as HCO ₃	198	3.25
Carbonate as CO ₃	0	0
Chloride.....	528	14.9
Sulfate.....	1530	31.8
Calcium.....	229	11.4
Magnesium.....	144	11.8
Potassium.....	4.2	0.11
Sodium.....	576	25.1
Major cations.....		48.4
Major anions.....		50
Cation/anion difference.....		1.61 %



Mary Stepp
Lab Director



Analytical**Technologies**, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 102586

February 25, 1991

Giant Refining Company
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 02/07/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

M. Barry for

Elizabeth Proffitt
Project Manager

Jane Foster for RW

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMD
ATI I.D. : 102586

DATE RECEIVED : 02/07/91

REPORT DATE : 02/27/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	910206813 STRIPPER INFLUENT	AQUEOUS	02/06/91
02	910206821 STRIPPER EFFLUENT	AQUEOUS	02/06/91
03	9102061402 GBR-51	AQUEOUS	02/06/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10258601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMD
 CLIENT I.D. : 910206813 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 02/06/91
 DATE RECEIVED : 02/07/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/13/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	91



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10258602

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMD
 CLIENT I.D. : 910206821 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 02/06/91
 DATE RECEIVED : 02/07/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/13/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	96



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10258603

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMD
 CLIENT I.D. : 9102061402 GBR-51
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 02/06/91
 DATE RECEIVED : 02/07/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/13/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.4
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	2.1
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	85



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 102586
PROJECT #	: 9834	DATE EXTRACTED	: 02/13/91
PROJECT NAME	: REFIN REMD	DATE ANALYZED	: 02/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	3.2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	93



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 102586

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : REFIN REMD

REF I.D. : 10265102

DATE ANALYZED : 02/14/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	DUP. % SPIKED		DUP. %	RPD
	RESULT	SPIKED		REC.	SAMPLE	REC.	
1,1-DICHLOROETHENE	3.0	20	24	105	25	110	4
TRICHLOROETHENE	<0.2	20	21	105	22	110	5
TETRACHLOROETHENE	<0.2	20	23	115	22	110	4
BENZENE	<0.5	20	18	90	18	90	0
BROMODICHLOROMETHANE	<0.2	20	18	90	20	100	11
CHLOROFORM	<0.2	20	20	100	22	110	10
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	24	120	13
TOLUENE	0.9	20	19	91	18	86	5
CHLOROBENZENE	<0.5	20	22	110	21	105	5
M-XYLENE	2.2	20	22	99	22	99	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GIANT

Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

CHAIN OF CUSTODY

Date: 2-6-91 Page 1 of 1

Page 1137 of 2774

REQUESTED ANALYSIS

LABORATORY ATI
ADDRESS 2113 S 48 St
Tempe AZ
TELEPHONE () - -

SAMPLER'S SIGNATURE

Jeannine Overman

SAMPLE NUMBER MATRIX LOCATION

POLYNUCLEAR AROMATICS 610/8310

HALOGENATED VOLATILES 601/8010

AROMATIC VOLATILES 602/8020

GENERAL WATER CHEMISTRY

NUMBER OF CONTAINERS

910206 813 Water Stellipent
910206 821 Water Stellipent
910206 1402 Water GRR-51

✓
✓
✓

2
2
2

PROJECT INFORMATION

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS

6

CHAIN OF CUSTODY SEALS

Y

REC'D GOOD CONDITION/COLD

Y

CONFORMS TO RECORD

Y

PROJECT: Refinery
Remediation 9834
PROJECT MANAGER: Jim Kinney
SHIPPING I.D. NO. 9578355441
SHIPPED VIA Fed Express
SPECIAL INSTRUCTIONS OR COMMENTS

LABORATORY NUMBER: 102586

RELINQUISHED BY: (Signature) 1.

RELINQUISHED BY: (Signature) 2.

RELINQUISHED BY: (Signature) 3.

(Printed Name) Jeannine Overman

(Printed Name)

(Printed Name)

(Company) Giant Refinery

(Company)

(Company)

DATE AND TIME: 2-6-91 1450

DATE AND TIME:

DATE AND TIME:

RECEIVED BY: (Signature) 1.

RECEIVED BY: (Signature) 2.

RECEIVED BY: (Signature) 3.

(Printed Name)

(Printed Name)

(Printed Name) David L. Lohman

(Company)

(Company)

(Company) ATI - Tempe

DATE AND TIME:

DATE AND TIME:

DATE AND TIME: 2-7-91

Please Return Original COC

1004



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 0830
SITE: Stripper Influent
LAB NO: F5725

DATE REPORTED: 02/11/91
DATE RECEIVED: 02/07/91
DATE COLLECTED: 02/06/91

Lab pH (s.u.).....	7.52
Lab conductivity, umhos/cm.....	4610
Lab resistivity, ohm-m.....	2.17
Total dissolved solids (180), mg/l..	3410
Total dissolved solids (calc), mg/l.	3270
Total alkalinity as CaCO ₃ , mg/l.....	222
Total hardness as CaCO ₃ , mg/l.....	1200
Sodium absorption ratio.....	7.76

	mg/l	meq/l
Bicarbonate as HCO ₃	271	4.45
Carbonate as CO ₃	0	0
Chloride.....	568	16
Sulfate.....	1480	30.8
Calcium.....	461	23
Magnesium.....	12.4	1.02
Potassium.....	2.95	0.08
Sodium.....	619	26.9
Major cations.....		51
Major anions.....		51.2
Cation/anion difference.....		0.21 %



Mary Stepp
Lab Director

GW - 40

MONITORING REPORTS

DATE:

1992

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FOURTH QUARTER, 1992

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505) 632-3306
FAX (505) 632-2487

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Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Specific Conductance Tracking	Section 5

INTRODUCTION AND SUMMARY QUARTERLY REPORT FOURTH QUARTER, 1992

INTRODUCTION

One change was made to the remediation system during the fourth quarter of 1992. SHS-7 is now an operational recovery well. Other operations remain the same.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	Unit of <u>Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 QUARTERLY ANALYTICAL DATA SUMMARY
 FOURTH QUARTER, 1992

STRIPPER INFLUENT

	10/92	11/92	12/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.15	7.55	8.03
Lab conductivity, umhos/cm	3590.00	3550.00	3550.00
Lab resistivity, ohm-m	2.79	2.82	2.82
Total dissolved solids (180)	2720.00	2670.00	2690.00
Total dissolved solids (calc)	2620.00	2510.00	2520.00
Total alkalinity as CaCO ₃	364.00	408.00	299.00
Total hardness as CaCO ₃	1000.00	991.00	991.00
Sodium absorption ratio	6.86	6.72	6.63
Bicarbonate as HCO ₃	443.00	498.00	365.00
Carbonate as CO ₃	ND	ND	ND
Chloride	407.00	365.00	353.00
Sulfate	1100.00	1120.00	1150.00
Calcium	362.00	137.00	299.00
Magnesium	24.00	158.00	59.70
Potassium	2.46	2.51	2.50
Sodium	499.00	486.00	480.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	0.70	ND
1,2-Dichloroethane	0.40	0.50	ND
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	3.00	ND	1.00
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	3.30	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND

STRIPPER INFLUENT (Continued)

	10/92	11/92	12/92
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	0.20	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
AROMATICS			
Benzene	19.30	30.00	30.00
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	13.90	ND
Toluene	ND	ND	ND
Xylenes	11.20	16.00	11.00
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	10/92	11/92	12/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	6.86	7.12	
Lab conductivity, umhos/cm	3800.00	3600.00	3610.00
Lab resistivity, ohm-m	2.63	2.78	
Total dissolved solids (180)	2670.00	2650.00	
Total dissolved solids (calc)	2620.00	2570.00	
Total alkalinity as CaCO ₃	304.00	344.00	
Total hardness as CaCO ₃	996.00	988.00	
Sodium absorption ratio	6.72	6.62	
Bicarbonate as HCO ₃	371.00	420.00	
Carbonate as CO ₃	ND	ND	
Chloride	465.00	410.00	
Sulfate	1100.00	1100.00	
Calcium	363.00	325.00	
Magnesium	22.30	43.30	
Potassium	2.54	2.52	
Sodium	488.00	478.00	
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	0.60	0.20	ND
1,2-Dichloroethene	2.10	0.30	0.30
cis-1,2-Dic anthracene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

STRIPPER EFFLUENT (Continued)

	10/92	11/92	12/92
AROMATICS			
Benzene	2.20	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	1.80	ND	ND
Toluene	ND	ND	ND
Xylenes	2.00	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

GBR-17

10/92

11/92

12/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane ND

Bromoform ND

Bromomethane ND

Carbon tetrachloride ND

Chlorobenzene ND

Chloroethane ND

2-Chloroethylvinylether ND

Chloroform ND

Chloromethane ND

Dibromochloromethane ND

1,2-Dichlorobenzene ND

1,3-Dichlorobenzene ND

1,4-Dichlorobenzene ND

1,1-Dichloroethane ND

1,2-Dichloroethane ND

1,1-Dichloroethene ND

cis-1,2-Dichloroethene ND

trans-1,2-Dichloroethene ND

1,2-Dichloropropane ND

cis-1,3-Dichloropropene ND

trans-1,3-Dichloropropene ND

Methylene chloride ND

1,1,2,2-Tetrachloroethane ND

Tetrachloroethene ND

1,1,1-Trichloroethane ND

1,1,2-Trichloroethane ND

Trichloroethene ND

Trichlorofluoromethane ND

Vinyl chloride ND

GBR-17 (Continued)

	10/92	11/92	12/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-19

10/92

11/92

12/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chlorobenzene

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

0.80

1,2-Dichloroethane

2.70

1,2-Dichloroethene

2.70

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,1,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

1.00

Trichlorofluoromethane

ND

Vinyl chloride

ND

GBR-19 (Continued)

	10/92	11/92	12/92
AROMATICS			
Benzene	28.10		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	0.90		
Toluene	2.50		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

OFFSITE WELLS

SHS-3

10/92

11/92

12/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-3 (Continued)

10/92

11/92

12/92

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-4

10/92

11/92

12/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-4 (Continued)

	10/92	11/92	12/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-6

10/92

11/92

12/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

0.40

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-6 (Continued)

	10/92	11/92	12/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-10

10/92

11/92

12/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane ND

Bromoform ND

Bromomethane ND

Carbon tetrachloride ND

Chloroethane ND

2-Chloroethylvinylether ND

Chloroform ND

Chloromethane ND

Dibromochloromethane ND

1,2-Dichlorobenzene ND

1,3-Dichlorobenzene ND

1,4-Dichlorobenzene ND

1,1-Dichloroethane ND

1,2-Dichloroethane ND

1,2-Dichloroethene ND

cis-1,2-Dichloroethene ND

trans-1,2-Dichloroethene ND

1,2-Dichloropropane ND

cis-1,3-Dichloropropene ND

trans-1,3-Dichloropropene ND

Methylene chloride ND

1,1,2,2-Tetrachloroethane ND

Tetrachloroethene ND

1,1,1-Trichloroethane ND

1,1,2-Trichloroethane ND

Trichloroethene ND

Trichlorofluoromethane ND

Vinyl chloride ND

SHS-10 (Continued)

AROMATICS	10/92	11/92	12/92
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	13.30		
Toluene	1.00		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-12

GENERAL WATER CHEMISTRY

10/92

11/92

12/92

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

ND

SHS-12 (Continued)

AROMATICS	10/92	11/92	12/92
Benzene			
Chlorobenzene	0.50		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	4.90		
Xylenes	ND		
Trichlorotrifluoroethane	10.60		
	ND		

SHS-13

GENERAL WATER CHEMISTRY	10/92	11/92	12/92
Lab pH (s.u.)			
Lab conductivity, umhos/cm			
Lab resistivity, ohm-m			
Total dissolved solids (180)			
Total dissolved solids (calc)			
Total alkalinity as CaCO ₃			
Total hardness as CaCO ₃			
Sodium absorption ratio			
Bicarbonate as HCO ₃			
Carbonate as CO ₃			
Chloride			
Sulfate			
Calcium			
Magnesium			
Potassium			
Sodium			

HALOCARBONS

Bromodichloromethane	
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	1.50
1,2-Dichloroethene	4.70
cis-1,2-Dichloroethene	0.60
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-13 (Continued)

AROMATICS	10/92	11/92	12/92
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-15

GENERAL WATER CHEMISTRY	10/92	11/92	12/92
Lab pH (s.u.)			
Lab conductivity, umhos/cm			
Lab resistivity, ohm-m			
Total dissolved solids (180)			
Total dissolved solids (calc)			
Total alkalinity as CaCO ₃			
Total hardness as CaCO ₃			
Sodium absorption ratio			
Bicarbonate as HCO ₃			
Carbonate as CO ₃			
Chloride			
Sulfate			
Calcium			
Magnesium			
Potassium			
Sodium			
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	3.30		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

SHS-15 (Continued)

AROMATICS	10/92	11/92	12/92
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

GENERAL WATER CHEMISTRY	10/92	11/92	12/92
Lab pH (s.u.)			
Lab conductivity, umhos/cm			
Lab resistivity, ohm-m			
Total dissolved solids (180)			
Total dissolved solids (calc)			
Total alkalinity as CaCO ₃			
Total hardness as CaCO ₃			
Sodium absorption ratio			
Bicarbonate as HCO ₃			
Carbonate as CO ₃			
Chloride			
Sulfate			
Calcium			
Magnesium			
Potassium			
Sodium			

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-16 (Continued)

AROMATICS	10/92	11/92	12/92
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-17

GENERAL WATER CHEMISTRY	10/92	11/92	12/92
Lab pH (s.u.)			
Lab conductivity, umhos/cm			
Lab resistivity, ohm-m			
Total dissolved solids (180)			
Total dissolved solids (calc)			
Total alkalinity as CaCO ₃			
Total hardness as CaCO ₃			
Sodium absorption ratio			
Bicarbonate as HCO ₃			
Carbonate as CO ₃			
Chloride			
Sulfate			
Calcium			
Magnesium			
Potassium			
Sodium			

HALOCARBONS	
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-17 (Continued)

AROMATICS	10/92	11/92	12/92
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-18

GENERAL WATER CHEMISTRY	10/92	11/92	12/92
Lab pH (s.u.)			
Lab conductivity, umhos/cm			
Lab resistivity, ohm-m			
Total dissolved solids (180)			
Total dissolved solids (calc)			
Total alkalinity as CaCO ₃			
Total hardness as CaCO ₃			
Sodium absorption ratio			
Bicarbonate as HCO ₃			
Carbonate as CO ₃			
Chloride			
Sulfate			
Calcium			
Magnesium			
Potassium			
Sodium			

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	0.40
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-18 (Continued)

AROMATICS	10/92	11/92	12/92
Benzene	9.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
6.00	ND		
Ethylbenzene	76.00		
Toluene	ND		
Xylenes	150.00		
Trichlorotrifluoroethane	ND		

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

OCTOBER, 1992

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	58.30	58.30	0.00	5336.00
GRW-2	5391.28	46.52	46.52	0.00	5344.76
GRW-3	5388.77	46.77	46.77	0.00	5342.00
GRW-4	5390.02	49.80	49.80	0.00	5340.22
GRW-5	5390.56	47.55	47.55	0.00	5343.01
GRW-6	5390.81	45.71	45.71	0.00	5345.10
GRW-10	5395.02	46.10	46.10	0.00	5348.92
GRW-11	5397.85	59.10	59.10	0.00	5338.75
GRW-12	5397.24	46.93	46.93	0.00	5350.31
GRW-13	5396.90	55.90	55.90	0.00	5341.00
GBR-5	5395.07	26.44	25.13	1.31	5369.68
GBR-6	5395.70	58.85	58.85	0.00	5336.85
GBR-7	5395.85	30.87	30.21	0.66	5365.51
GBR-8	5390.50	41.20	40.74	0.46	5349.67
GBR-9	5389.92	49.56	49.56	0.00	5340.36
GBR-10	5390.57	41.29	41.29	0.00	5349.28
GBR-11	5389.43	40.20	40.19	0.01	5349.24
GBR-13	5393.04	37.72	37.72	0.00	5355.32
GBR-15	5397.99	42.53	42.53	0.00	5355.46
GBR-17	5402.69	35.48	35.48	0.00	5367.21
GBR-18	5421.68	26.09	26.09	0.00	5395.59
GBR-19	5393.83	38.36	38.36	0.00	5355.47
GBR-20	5393.47	37.90	37.30	0.60	5356.05
GBR-21S	5400.65	20.10	20.10	0.00	5380.55
GBR-21D	5400.19	34.61	34.61	0.00	5365.58
GBR-22	5395.91	36.59	35.58	1.01	5360.13
GBR-23	5403.72	22.97	22.97	0.00	5377.30
GBR-24S	5396.08	26.42	26.42	0.00	5364.73
GBR-24D	5396.77	31.35	31.35	0.00	5365.42
GBR-25	5396.72	30.54	30.54	0.00	5366.18
GBR-26	5395.59	37.31	37.31	0.00	5358.28
GBR-30	5396.58	33.77	33.77	0.00	5362.81
GBR-31	5394.86	34.85	34.85	0.00	5360.01
GBR-33	5396.28	37.44	37.44	0.00	5358.84
GBR-34	5394.00	35.27	35.00	0.27	5358.95
GBR-35	5393.66	34.88	34.81	0.07	5358.84
GBR-39	5397.55	39.81	39.81	0.00	5357.74
GBR-40	5400.76	27.88	27.88	0.00	5372.88
GBR-41	5396.35	20.76	20.76	0.00	5375.59
GBR-51	5389.68	39.79	39.79	0.00	5349.89
GBR-52	5387.74	38.20	38.20	0.00	5349.54

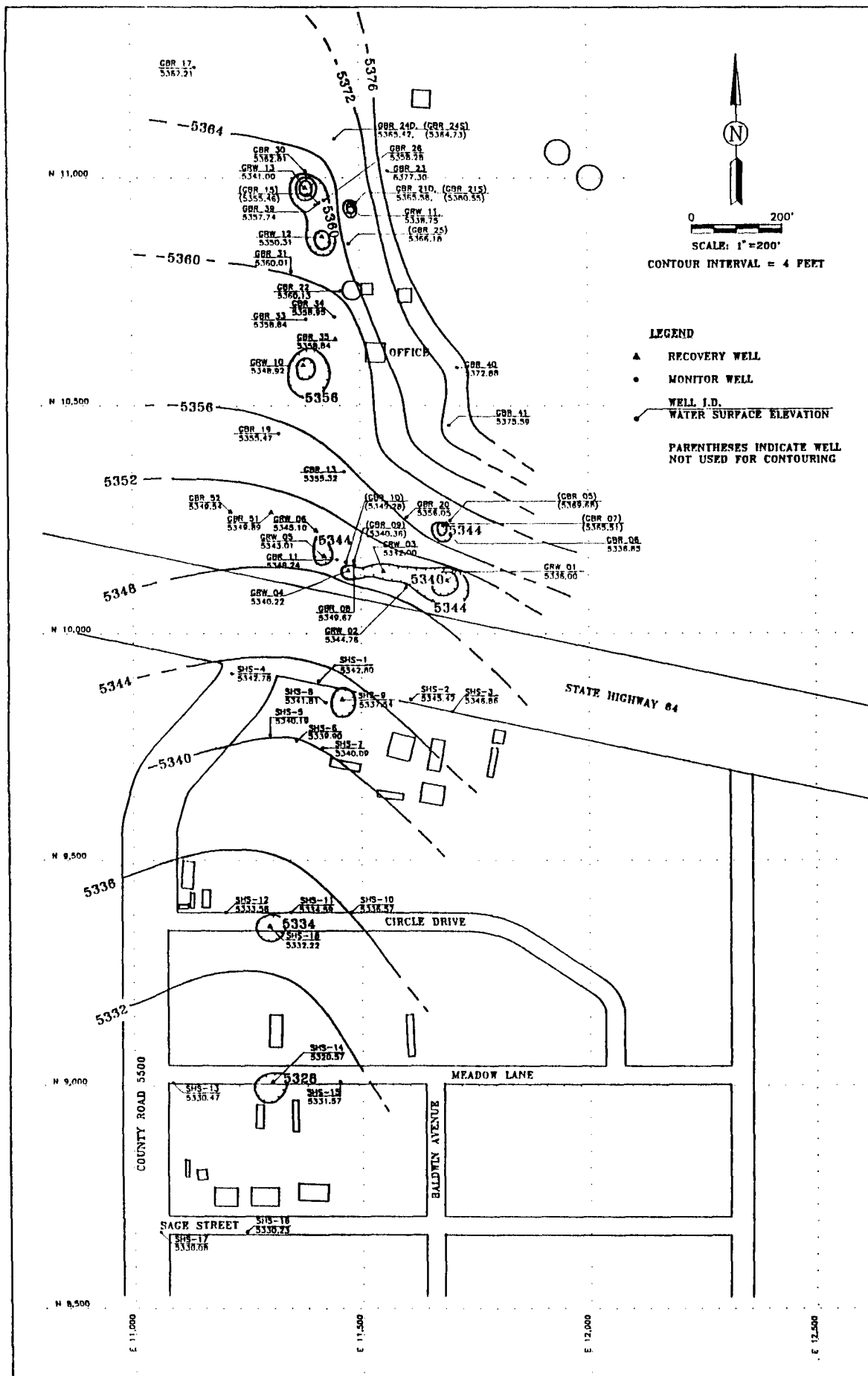
* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 1992
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.75	40.74	0.01	5342.80
SHS-2	5381.66	36.24	36.24	0.00	5345.42
SHS-3	5383.33	36.47	36.47	0.00	5346.86
SHS-4	5383.62	40.84	40.84	0.00	5342.78
SHS-5	5378.36	38.17	38.17	0.00	5340.19
SHS-6	5378.17	38.27	38.27	0.00	5339.90
SHS-7	5375.89	35.80	35.80	0.00	5340.09
SHS-8	5380.25	38.44	38.44	0.00	5341.81
SHS-9	5380.79	43.25	43.25	0.00	5337.54
SHS-10	5373.80	37.23	37.23	0.00	5336.57
SHS-11	5373.17	38.58	38.58	0.00	5334.59
SHS-12	5373.94	40.38	40.38	0.00	5333.56
SHS-13	5367.81	37.34	37.34	0.00	5330.47
SHS-14	5367.07	46.50	46.50	0.00	5320.57
SHS-15	5366.21	34.64	34.64	0.00	5331.57
SHS-16	5362.58	32.35	32.35	0.00	5330.23
SHS-17	5364.35	34.27	34.27	0.00	5330.08
SHS-18	5373.64	41.42	41.42	0.00	5332.22

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

October 1992, Water Surface Contour Map
Giant-Bloomfield Refinery



Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Fourth Quarter, 1992

Tank Number	Beginning Volume	Ending Volume	Net Change
102	14369	14509	140
106	8010	8010	0
21	363474	260459	-103015
22	259158	250887	-8271
27	0	0	0
32	0	0	0
34	0	0	0
35	0	0	0
37	0	0	0
Total Net Volume Change			-111146

4.0

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Fourth Quarter, 1992

Well	Month #1	Month #2	Month #3	Total
GRW-1	13750	6520	10910	31180
GRW-2	20680	9020	14010	43710
GRW-3	7550	7830	15390	30770
GRW-4	27160	13940	29050	70150
GRW-5	58450	24880	46080	129410
GRW-6	40630	22530	49080	112240
GRW-9	11850	4550	8030	24430
GRW-10	251720	106620	252450	610790
GRW-11	50930	21060	46450	118440
GRW-12	14900	7360	18120	40380
GRW-13	17520	8850	21790	48160
SHS-7	0	193	94	287
SHS-9	17273	7695	4802	29770
SHS-14	150524	76170	39252	265946
SHS-18	53949	24794	13922	92665
Total Volume Pumped In Gallons				1648328

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Fourth Quarter, 1992

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Total Volume Of Water Recovered	1648328
Net Change In Storage Volume	-111146

Total Water Pumped To The Infiltration Gallery	1594644
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=====

Difference	-164830
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Comments: Total Water Pumped To The
Infiltration Gallery was estimated
due to repeated meter failure
during December, 1992.

SECTION 5

Specific Conductance Tracking

GRW-13

GENERAL WATER CHEMISTRY

Lab conductivity, umhos/cm

10/92

11/92

12/92

4090.00

4180.00

4440.00



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20978901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 09/21/92
PROJECT #	: 9834	DATE RECEIVED	: 09/22/92
PROJECT NAME	: REF REMEDIAT	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9209211309 STRIPPER EFFLUENT	DATE ANALYZED	: 09/25/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	0.9
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.9
1,2-DICHLOROETHANE	0.5
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	1.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	1.6
TRICHLOROTRIFLUOROETHANE	<2.0

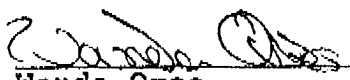
SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	104

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 10/26/92
ID: Stripper Influent
SITE: 9210121450 DATE RECEIVED: 10/12/92
LAB NO: 1004 DATE COLLECTED: 10/12/92

Lab pH (s.u.)..... 7.15
Lab Conductivity, umhos/cm @ 25C.... 3590
Lab Resistivity, ohm-m..... 2.79
Total Dissolved Solids (180C), mg/L. 2720
Total Dissolved Solids (calc), mg/L. 2620
Total Alkalinity as CaCO₃, mg/L..... 364
Total Hardness as CaCO₃, mg/L..... 1000
Sodium Adsorption Ratio..... 6.86

	mg/L	meq/L
Bicarbonate as HCO ₃	443	7.27
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	407	11.5
Sulfate.....	1100	23
Calcium.....	362	18.1
Magnesium.....	24	1.97
Potassium.....	2.46	0.06
Sodium.....	499	21.7
Major Cations.....		41.8
Major Anions.....		41.8
Cation/Anion Difference.....		0.05 %


Wanda Orso
Water Lab Supervisor

Post-It™ brand fax transmittal memo 7671

of pages 1

To: DEANNA	From: FRAN
Co: Giant Ref.	Co: FAL
Dept.	Phone #
Fax #	Fax #

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: Stripper Effluent
SITE: 9210161535
LAB NO: 1036

DATE REPORTED: 10/29/92
DATE RECEIVED: 10/16/92
DATE COLLECTED: 10/16/92

Lab pH (s.u.).....	6.86
Lab Conductivity, umhos/cm @ 25C....	3800
Lab Resistivity, ohm-m.....	2.63
Total Dissolved Solids (180C), mg/L.	2670
Total Dissolved Solids (calc), mg/L.	2620
Total Alkalinity as CaCO ₃ , mg/L.....	304
Total Hardness as CaCO ₃ , mg/L.....	996
Sodium Adsorption Ratio.....	6.72

	mg/L	meq/L
Bicarbonate as HCO ₃	371	6.08
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	465	13.1
Sulfate.....	1100	22.9
Calcium.....	363	18.1
Magnesium.....	22.3	1.84
Potassium.....	2.54	0.06
Sodium.....	488	21.2
Major Cations.....		41.2
Major Anions.....		42.1
Cation/Anion Difference.....		1.08 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery
ID: RW 13
SITE: 9210161540
LAB NO: 1037

DATE REPORTED: 10/29/92
DATE RECEIVED: 10/16/92
DATE COLLECTED: 10/16/92

Lab Conductivity, umhos/cm @ 25C.... 4090


Wanda Orso
Water Lab Supervisor



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21063601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINERY REM
 CLIENT I.D. : 9210081255 GBR-19
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/08/92
 DATE RECEIVED : 10/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/16/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	28.1
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	2.7
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.7
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	0.9
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	2.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.0
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21063701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210081339 SHS-3
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/08/92
 DATE RECEIVED : 10/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/20/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	101



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21063702

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210081438 SHS-6
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/08/92
 DATE RECEIVED : 10/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/20/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.4
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	90
BROMOFLUOROBENZENE (%)	95



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21063703

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210081528 SHS-10
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/08/92
 DATE RECEIVED : 10/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/20/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	13.3
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	1.0
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	99
BROMOFLUOROBENZENE (%)	91



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21065701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210091312 SHS-12
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/09/92
 DATE RECEIVED : 10/10/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/19/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	4.9
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	10.6
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	100
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21065702

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210091325 SHS-18
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/09/92
 DATE RECEIVED : 10/10/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/22/92
 UNITS : UG/L
 DILUTION FACTOR : 2

COMPOUNDS

RESULTS

BENZENE	9
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1.0
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	<0.4
DIBROMOCHLOROMETHANE	<0.4
2-CHLOROETHYL VINYL ETHER	<1.0
1,3-DICHLOROBENZENE	<1.0
1,2 & 1,4-DICHLOROBENZENE	<1.0
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	<0.4
1,2-DICHLOROETHANE	0.4
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	<0.4
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	76
METHYLENE CHLORIDE	<4.0
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	<0.4
TOLUENE	<1.0
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	<0.4
TRICHLOROFLUOROMETHANE	<1.0
VINYL CHLORIDE	<0.4
TOTAL XYLENES	150
TRICHLOROTRIFLUOROETHANE	<4.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	81
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21065703

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210091430 SHS-13
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/09/92
 DATE RECEIVED : 10/10/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/20/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.5
1,2-DICHLOROETHANE	4.7
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	82
BROMOFLUOROBENZENE (%)	98



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21065704

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210091528 SHS-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/09/92
 DATE RECEIVED : 10/10/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/19/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	3.3
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	91



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21065705

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210091555 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/09/92
 DATE RECEIVED : 10/10/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/19/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	2.2
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.6
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.1
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	1.8
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	2.0
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21068401

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 10/12/92
PROJECT #	: 9834	DATE RECEIVED	: 10/13/92
PROJECT NAME	: REFINERY REM	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9210121450 STRIPPER INFLUENT	DATE ANALYZED	: 10/17/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	19.3
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	11.2
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	90
BROMOFLUOROBENZENE (%)	95



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21068501

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210121315 SHS-16
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/12/92
 DATE RECEIVED : 10/13/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/19/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	99
ROMOFLUOROBENZENE (%)	96



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21068502

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9210121415 SHS-17
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/12/92
 DATE RECEIVED : 10/13/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/19/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	88

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 12/04/92
ID: Stripper Effluent
SITE: 9211231320 DATE RECEIVED: 11/23/92
LAB NO: F1348 DATE COLLECTED: 11/23/92

Lab pH (s.u.)..... 7.12
Lab Conductivity, umhos/cm @ 25C.... 3600
Lab Resistivity, ohm-m..... 2.78
Total Dissolved Solids (180C), mg/L. 2650
Total Dissolved Solids (calc), mg/L. 2570
Total Alkalinity as CaCO₃, mg/L..... 344
Total Hardness as CaCO₃, mg/L..... 988
Sodium Adsorption Ratio..... 6.62

	mg/L	meq/L
Bicarbonate as HCO ₃	420	6.88
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	410	11.6
Sulfate.....	1100	23
Calcium.....	325	16.2
Magnesium.....	43.3	3.56
Potassium.....	2.52	0.06
Sodium.....	478	20.8
Major Cations.....		40.6
Major Anions.....		41.4
Cation/Anion Difference.....		1.01 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 12/03/92
ID: Stripper Influent
SITE: 9211160855 DATE RECEIVED: 11/16/92
LAB NO: F1311 DATE COLLECTED: 11/16/92

Lab pH (s.u.)..... 7.55
Lab Conductivity, umhos/cm @ 25C.... 3550
Lab Resistivity, ohm-m..... 2.82
Total Dissolved Solids (180C), mg/L. 2670
Total Dissolved Solids (calc), mg/L. 2510
Total Alkalinity as CaCO₃, mg/L..... 408
Total Hardness as CaCO₃, mg/L..... 991
Sodium Adsorption Ratio..... 6.72

	mg/L	meq/L
Bicarbonate as HC03.....	498	8.16
Carbonate as C03.....	<0.10	<0.01
Chloride.....	365	10.3
Sulfate.....	1120	23.4
Calcium.....	137	6.82
Magnesium.....	158	13
Potassium.....	2.51	0.06
Sodium.....	486	21.1
Major Cations.....		41
Major Anions.....		41.8
Cation/Anion Difference.....		0.98 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 12/03/92
ID: RW 13
SITE: 9211161377 DATE RECEIVED: 11/16/92
LAB NO: F1312 DATE COLLECTED: 11/16/92

Lab Conductivity, umhos/cm @ 25C.... 4180


Wanda Orso
Water Lab Supervisor



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21174201

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 11/16/92
PROJECT #	: 9834	DATE RECEIVED	: 11/17/92
PROJECT NAME	: REFINERY REM	DATE EXTRACTED	: N/A
CLIENT I.D.	: 921116855 STRIPPER INFLUENT	DATE ANALYZED	: 11/18/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	30.0
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.7
1,2-DICHLOROETHANE	0.5
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	3.3
ETHYLBENZENE	13.9
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	16
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	110



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21186801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 11/23/92
PROJECT #	: 9834	DATE RECEIVED	: 11/24/92
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9211231320 STRIPPER EFFLUENT	DATE ANALYZED	: 12/04/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.3
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

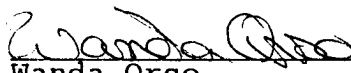
SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	111

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 12/08/92
ID: RW 13
SITE: 9212071600 DATE RECEIVED: 12/07/92
LAB NO: F1418 DATE COLLECTED: 12/07/92

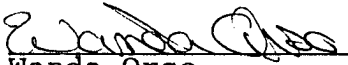
Lab Conductivity, umhos/cm @ 25C.... 4440


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 12/08/92
ID: Stripper Effluent
SITE: 9212071605 DATE RECEIVED: 12/07/92
LAB NO: F1419 DATE COLLECTED: 12/07/92

Lab Conductivity, umhos/cm @ 25C.... 3610


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 12/21/92
ID: 9212091305
SITE: Stripper Influent DATE RECEIVED: 12/09/92
LAB NO: F1440 DATE COLLECTED: 12/09/92

Lab pH (s.u.)..... 8.03
Lab Conductivity, umhos/cm @ 25C.... 3550
Lab Resistivity, ohm-m..... 2.82
Total Dissolved Solids (180C), mg/L. 2690
Total Dissolved Solids (calc), mg/L. 2520
Total Alkalinity as CaCO₃, mg/L..... 299
Total Hardness as CaCO₃, mg/L..... 991
Sodium Adsorption Ratio..... 6.63

	mg/L	meq/L
Bicarbonate as HC0 ₃	365	5.98
Carbonate as C0 ₃	<0.10	<0.01
Chloride.....	353	9.95
Sulfate.....	1150	23.9
Calcium.....	299	14.9
Magnesium.....	59.7	4.91
Potassium.....	2.51	0.06
Sodium.....	480	20.9
Major Cations.....		40.8
Major Anions.....		39.9
Cation/Anion Difference.....		1.1 %


Wanda Orso
Water Lab Supervisor

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 21264501

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 12/07/92
PROJECT #	: 9834	DATE RECEIVED	: 12/08/92
PROJECT NAME	: REFINERY REM	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9212071605 STRIPPER EFFLUENT	DATE ANALYZED	: 12/12/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
1-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.3
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	98

GAS CHROMATOGRAPHY ~ RESULTS

ATI I.D. : 21270301

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9212091305 STRIPPER INFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/09/92
DATE RECEIVED : 12/10/92
DATE EXTRACTED : N/A
DATE ANALYZED : 12/16/92
UNITS : UG/L
DILUTION FACTOR : 5

COMPOUNDS	RESULTS
BENZENE	30
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	<1.0
1,2-DICHLOROETHANE	<1.0
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	1
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	<2.5
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	<1.0
TOLUENE	<2.5
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	<1.0
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	11
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	86

OIL CONSERVATION DIVISION
RECEIVED

'92 NOV 13 AM 8 59



P.O. Box 256
Farmington, New Mexico
87499

505
632-3306

November 2, 1992

Mr. William Olson
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed is Giant Refining Company's quarterly report
for the Bloomfield Refinery Remediation Project for the
third quarter of 1992.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Timothy A. Kinney", with a long, sweeping horizontal stroke extending to the right.

Timothy A. Kinney
Remediation Project Manager

/dm

Enclosure

cc Carl Shook
Kim Bullerdick
Debbie Smith

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
THIRD QUARTER, 1992

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505) 632-3306
FAX (505) 632-2487

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Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Specific Conductance Tracking	Section 5
Construction/Completion of SHS-17 and SHS-18	Section 6

INTRODUCTION AND SUMMARY QUARTERLY REPORT THIRD QUARTER, 1992

INTRODUCTION

Some changes were made to the remediation system during the third quarter of 1992. Treated water is being split between the two infiltration galleries in the refinery. Recovery well SHS-11, part of the offsite recovery well network, has been replaced by SHS-18, which is now an operational recovery well. SHS-7 is in the process of being converted to a recovery well. It should be operational in the fourth quarter of 1992. Monitor well SHS-17 has been completed, and the results of its water analysis, as well as its lithologic and completion information, are included.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired. Tanks 27, 32, 34, 35, and 37 have been emptied and taken out of service.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

Section 6

Details of the construction and completion of SHS-17 and SHS-18 are included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	Unit of <u>Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
THIRD QUARTER, 1992**

STRIPPER INFLUENT

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	6.41	6.58	
Lab conductivity, umhos/cm	3190.00	3170.00	
Lab resistivity, ohm-m	3.13	3.15	
Total dissolved solids (180)	2700.00	2760.00	
Total dissolved solids (calc)	2680.00	2650.00	
Total alkalinity as CaCO ₃	252.00	263.00	
Total hardness as CaCO ₃	969.00	986.00	
Sodium absorption ratio	7.60	7.20	
Bicarbonate as HCO ₃	307.00	321.00	
Carbonate as CO ₃	<.10	<.10	
Chloride	427.00	470.00	
Sulfate	1190.00	1120.00	
Calcium	337.00	335.00	
Magnesium	31.30	36.60	
Potassium	3.10	5.08	
Sodium	544.00	520.00	
HALOCARBONS			
Bromodichloromethane	ND	ND	
Bromoform	ND	ND	
Bromomethane	ND	ND	
Carbon tetrachloride	ND	ND	
Chloroethane	ND	1.20	
2-Chloroethylvinylether	ND	ND	
Chloroform	ND	ND	
Chloromethane	ND	ND	
Dibromochloromethane	ND	ND	
1,2-Dichlorobenzene	ND	ND	
1,3-Dichlorobenzene	ND	ND	
1,4-Dichlorobenzene	ND	ND	
1,1-Dichloroethane	0.80	0.80	
1,2-Dichloroethane	0.40	0.40	
1,1-Dichloroethene	ND	ND	
1,2-Dichloroethene	1.80	1.20	
trans-1,2-Dichloroethene	ND	ND	
1,2-Dichloropropane	ND	ND	
cis-1,3-Dichloropropene	ND	ND	
trans-1,3-Dichloropropene	ND	ND	
Methylene chloride	ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND	
Tetrachloroethene	ND	ND	

STRIPPER INFLUENT (Continued)

	7/92	8/92	9/92
1,1,1-Trichloroethane	ND	ND	
1,1,2-Trichloroethane	ND	ND	
Trichloroethene	ND	ND	
Trichlorofluoromethane	ND	ND	
Vinyl chloride	ND	ND	

AROMATICS

Benzene	11.70	15.60	
Chlorobenzene	ND	ND	
1,2-Dichlorobenzene	ND	ND	
1,3-Dichlorobenzene	ND	ND	
1,4-Dichlorobenzene	ND	ND	
Ethylbenzene	3.30	4.40	
Toluene	ND	ND	
Xylenes	3.30	5.40	
Trichlorotrifluoroethane	ND		

STRIPPER EFFLUENT

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.32	6.92	
Lab conductivity, umhos/cm	3320.00	3670.00	
Lab resistivity, ohm-m	3.02	2.72	
Total dissolved solids (180)	2780.00	2820.00	
Total dissolved solids (calc)	2620.00	2630.00	
Total alkalinity as CaCO ₃	113.00	33.30	
Total hardness as CaCO ₃	1030.00	931.00	
Sodium absorption ratio	6.23	6.85	
Bicarbonate as HCO ₃	138.00	40.90	
Carbonate as CO ₃	<.10	<.10	
Chloride	545.00	599.00	
Sulfate	1160.00	1130.00	
Calcium	327.00	310.00	
Magnesium	52.40	38.20	
Potassium	2.74	53.60	
Sodium	460.00	480.00	

HALOCARBONS

Bromodichloromethane	ND	ND
Bromoform	ND	ND
Bromomethane	ND	ND
Carbon tetrachloride	ND	ND
Chloroethane	ND	ND
Chloroethane	ND	ND
2-Chloroethylvinylether	ND	ND
Chloroform	ND	ND
Chloromethane	ND	ND
Dibromochloromethane	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
1,1-Dichloroethane	ND	ND
1,2-Dichloroethane	ND	ND
1,2-Dichloroethene	ND	ND
cis-1,2-Dic anthracene	ND	ND
trans-1,2-Dichloroethene	ND	ND
1,2-Dichloropropane	ND	ND
cis-1,3-Dichloropropene	ND	ND
trans-1,3-Dichloropropene	ND	ND
Methylene chloride	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
1,1,1-Trichloroethane	ND	ND
1,1,2-Trichloroethane	ND	ND
Trichloroethene	ND	ND
Trichlorofluoromethane	ND	ND
Vinyl chloride	ND	ND

STRIPPER EFFLUENT (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND	ND	
Chlorobenzene	ND	ND	
1,2-Dichlorobenzene	ND	ND	
1,3-Dichlorobenzene	ND	ND	
1,4-Dichlorobenzene	ND	ND	
Ethylbenzene	ND	ND	
Toluene	ND	ND	
Xylenes	ND	ND	
Trichlorotrifluoroethane	ND	ND	

GRW-2

GENERAL WATER CHEMISTRY
Nitrate

7/92

8/92

9/92

ND

GBR-15

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.48
Lab conductivity, umhos/cm	4400.00
Lab resistivity, ohm-m	2.27
Total dissolved solids (180)	3450.00
Total dissolved solids (calc)	3340.00
Total alkalinity as CaCO ₃	270.00
Total hardness as CaCO ₃	1050.00
Sodium absorption ratio	9.89
Bicarbonate as HCO ₃	329.00
Carbonate as CO ₃	<.10
Chloride	650.00
Sulfate	1390.00
Calcium	369.00
Magnesium	32.00
Potassium	5.00
Sodium	737.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	23.30
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-15 (Continued)

7/92

8/92

9/92

AROMATICS

Benzene	2.50
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

GBR-17

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.22
Lab conductivity, umhos/cm	2580.00
Lab resistivity, ohm-m	3.87
Total dissolved solids (180)	2300.00
Total dissolved solids (calc)	2190.00
Total alkalinity as CaCO ₃	226.00
Total hardness as CaCO ₃	912.00
Sodium absorption ratio	5.11
Bicarbonate as HCO ₃	276.00
Carbonate as CO ₃	<.10
Chloride	58.00
Sulfate	1300.00
Calcium	317.00
Magnesium	29.60
Potassium	0.78
Sodium	355.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-17 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

GBR-24-D

7/92 8/92 9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.64
Lab conductivity, umhos/cm	4260.00
Lab resistivity, ohm-m	2.35
Total dissolved solids (180)	3880.00
Total dissolved solids (calc)	3750.00
Total alkalinity as CaCO ₃	234.00
Total hardness as CaCO ₃	1800.00
Sodium absorption ratio	5.51
Bicarbonate as HCO ₃	285.00
Carbonate as CO ₃	<.10
Chloride	741.00
Sulfate	1660.00
Calcium	579.00
Magnesium	85.40
Potassium	6.00
Sodium	537.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	1.40
1,1-Dichloroethane	0.80
1,2-Dichloroethane	36.60
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.50
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.30
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-24D (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	47.60		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	5.80		
Toluene	2.60		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

PAH

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

GBR-30

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	6.90		
Lab conductivity, umhos/cm	3690.00		
Lab resistivity, ohm-m	2.71		
Total dissolved solids (180)	2950.00		
Total dissolved solids (calc)	2940.00		
Total alkalinity as CaCO ₃	201.00		
Total hardness as CaCO ₃	1110.00		
Sodium absorption ratio	7.58		
Bicarbonate as HCO ₃	245.00		
Carbonate as CO ₃	<.10		
Chloride	590.00		
Sulfate	1230.00		
Calcium	381.00		
Magnesium	38.50		
Potassium	3.10		
Sodium	580.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-30 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

PAH

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

GBR-31

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	6.97
Lab conductivity, umhos/cm	3740.00
Lab resistivity, ohm-m	2.67
Total dissolved solids (180)	2940.00
Total dissolved solids (calc)	2860.00
Total alkalinity as CaCO ₃	167.00
Total hardness as CaCO ₃	1020.00
Sodium absorption ratio	7.65
Bicarbonate as HCO ₃	203.00
Carbonate as CO ₃	<.10
Chloride	578.00
Sulfate	1230.00
Calcium	351.00
Magnesium	36.20
Potassium	2.70
Sodium	563.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-31 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		

GBR-32

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.34
Lab conductivity, umhos/cm	4870.00
Lab resistivity, ohm-m	2.05
Total dissolved solids (180)	3990.00
Total dissolved solids (calc)	3910.00
Total alkalinity as CaCO ₃	363.00
Total hardness as CaCO ₃	1220.00
Sodium absorption ratio	10.70
Bicarbonate as HCO ₃	443.00
Carbonate as CO ₃	<.10
Chloride	497.00
Sulfate	1880.00
Calcium	411.00
Magnesium	47.20
Potassium	4.30
Sodium	856.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	3.70
1,2-Dichloroethane	ND
1,2-Dichloroethene	100D
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	5.60
1,1,1-Trichloroethane	0.30
1,1,2-Trichloroethane	ND
Trichloroethene	4.20
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-32 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		

GBR-48

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.21		
Lab conductivity, umhos/cm	5300.00		
Lab resistivity, ohm-m	1.89		
Total dissolved solids (180)	4300.00		
Total dissolved solids (calc)	4100.00		
Total alkalinity as CaCO3	344.00		
Total hardness as CaCO3	1350.00		
Sodium absorption ratio	10.20		
Bicarbonate as HCO3	420.00		
Carbonate as CO3	<.10		
Chloride	726.00		
Sulfate	1800.00		
Calcium	449.00		
Magnesium	55.90		
Potassium	5.08		
Sodium	858.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	4.00
1,2-Dichloroethane	ND
1,2-Dichloroethene	120.00
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	7.00
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	5.00
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-48 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		

GBR-49

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.63		
Lab conductivity, umhos/cm	4530.00		
Lab resistivity, ohm-m	2.21		
Total dissolved solids (180)	3740.00		
Total dissolved solids (calc)	3660.00		
Total alkalinity as CaCO3	372.00		
Total hardness as CaCO3	1094.00		
Sodium absorption ratio	10.70		
Bicarbonate as HCO3	454.00		
Carbonate as CO3	<.10		
Chloride	459.00		
Sulfate	1760.00		
Calcium	357.00		
Magnesium	49.60		
Potassium	3.91		
Sodium	810.00		

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	2.90		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	74D		
1,1-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	4.60		
1,1,1-Trichloroethane	0.20		
1,1,2-Trichloroethane	ND		
Trichloroethene	3.60		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

GBR-49 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		

GBR-50

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.21		
Lab conductivity, umhos/cm	2800.00		
Lab resistivity, ohm-m	3.57		
Total dissolved solids (180)	2750.00		
Total dissolved solids (calc)	2650.00		
Total alkalinity as CaCO ₃	196.00		
Total hardness as CaCO ₃	960.00		
Sodium absorption ratio	6.85		
Bicarbonate as HCO ₃	239.00		
Carbonate as CO ₃	<.10		
Chloride	39.30		
Sulfate	1640.00		
Calcium	331.00		
Magnesium	32.80		
Potassium	2.74		
Sodium	488.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	0.50
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.30
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-50 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		

OFFSITE WELLS

SHS-3

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	6.69		
Lab conductivity, umhos/cm	4290.00		
Lab resistivity, ohm-m	2.33		
Total dissolved solids (180)	3850.00		
Total dissolved solids (calc)	3780.00		
Total alkalinity as CaCO ₃	209.00		
Total hardness as CaCO ₃	1750.00		
Sodium absorption ratio	5.28		
Bicarbonate as HCO ₃	256.00		
Carbonate as CO ₃	>.10		
Chloride	352.00		
Sulfate	2130.00		
Calcium	579.00		
Magnesium	74.40		
Potassium	9.00		
Sodium	508.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-3 (Continued)

7/92

8/92

9/92

AROMATICS

Benzene

ND

Chlorobenzene

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

Ethylbenzene

ND

Toluene

ND

Xylenes

ND

Trichlorotrifluoroethane

ND

SHS-4

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-4 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-6

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.05		
Lab conductivity, umhos/cm	2790.00		
Lab resistivity, ohm-m	3.58		
Total dissolved solids (180)	2440.00		
Total dissolved solids (calc)	2390.00		
Total alkalinity as CaCO ₃	271.00		
Total hardness as CaCO ₃	1050.00		
Sodium absorption ratio	4.88		
Bicarbonate as HCO ₃	331.00		
Carbonate as CO ₃	<.10		
Chloride	108.00		
Sulfate	1350.00		
Calcium	369.00		
Magnesium	32.60		
Potassium	3.50		
Sodium	364.00		

SHS-10

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	6.83
Lab conductivity, umhos/cm	2060.00
Lab resistivity, ohm-m	4.85
Total dissolved solids (180)	1620.00
Total dissolved solids (calc)	1650.00
Total alkalinity as CaCO ₃	293.00
Total hardness as CaCO ₃	514.00
Sodium absorption ratio	6.69
Bicarbonate as HCO ₃	357.00
Carbonate as CO ₃	<.10
Chloride	56.50
Sulfate	867.00
Calcium	164.00
Magnesium	25.30
Potassium	8.99
Sodium	349.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.20
1,1,1-Trichloroethane	0.20
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-10 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	19.20		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-12

7/92 8/92 9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.17
Lab conductivity, umhos/cm	2420.00
Lab resistivity, ohm-m	4.13
Total dissolved solids (180)	2440.00
Total dissolved solids (calc)	2420.00
Total alkalinity as CaCO ₃	266.00
Total hardness as CaCO ₃	1260.00
Sodium absorption ratio	3.23
Bicarbonate as HCO ₃	325.00
Carbonate as CO ₃	<.10
Chloride	113.00
Sulfate	1400.00
Calcium	430.00
Magnesium	45.60
Potassium	3.04
Sodium	263.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.70
1,2-Dichloroethane	0.40
1,2-Dichloroethene	1.60
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.60
1,1,1-Trichloroethane	0.60
1,1,2-Trichloroethane	ND
Trichloroethene	0.20
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-12 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-13

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.19		
Lab conductivity, umhos/cm	3500.00		
Lab resistivity, ohm-m	2.86		
Total dissolved solids (180)	2250.00		
Total dissolved solids (calc)	2250.00		
Total alkalinity as CaCO ₃	824.00		
Total hardness as CaCO ₃	692.00		
Sodium absorption ratio	9.99		
Bicarbonate as HCO ₃	1010.00		
Carbonate as CO ₃	<.10		
Chloride	539.00		
Sulfate	359.00		
Calcium	222.00		
Magnesium	33.30		
Potassium	2.35		
Sodium	604.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.90
1,2-Dichloroethane	3.10
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-13 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-15

	7/92	8/92	9/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.23		
Lab conductivity, umhos/cm	3690.00		
Lab resistivity, ohm-m	2.71		
Total dissolved solids (180)	2700.00		
Total dissolved solids (calc)	2660.00		
Total alkalinity as CaCO ₃	381.00		
Total hardness as CaCO ₃	997.00		
Sodium absorption ratio	7.16		
Bicarbonate as HCO ₃	465.00		
Carbonate as CO ₃	<.10		
Chloride	455.00		
Sulfate	1070.00		
Calcium	349.00		
Magnesium	30.90		
Potassium	2.35		
Sodium	520.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	11.70
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-15 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.16
Lab conductivity, umhos/cm	1940.00
Lab resistivity, ohm-m	5.16
Total dissolved solids (180)	1620.00
Total dissolved solids (calc)	1570.00
Total alkalinity as CaCO ₃	258.00
Total hardness as CaCO ₃	800.00
Sodium absorption ratio	2.97
Bicarbonate as HCO ₃	315.00
Carbonate as CO ₃	<.10
Chloride	31.90
Sulfate	893.00
Calcium	259.00
Magnesium	37.60
Potassium	3.13
Sodium	193.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-16 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-17

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-17 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene		ND	
Chlorobenzene		ND	
1,2-Dichlorobenzene		ND	
1,3-Dichlorobenzene		ND	
1,4-Dichlorobenzene		ND	
Ethylbenzene		ND	
Toluene		ND	
Xylenes		ND	
Trichlorotrifluoroethane		ND	

SHS-18

7/92

8/92

9/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

0.30

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

0.60

1,1-Dichloroethane

ND

1,2-Dichloroethane

0.60

1,2-Dichloroethene

0.60

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

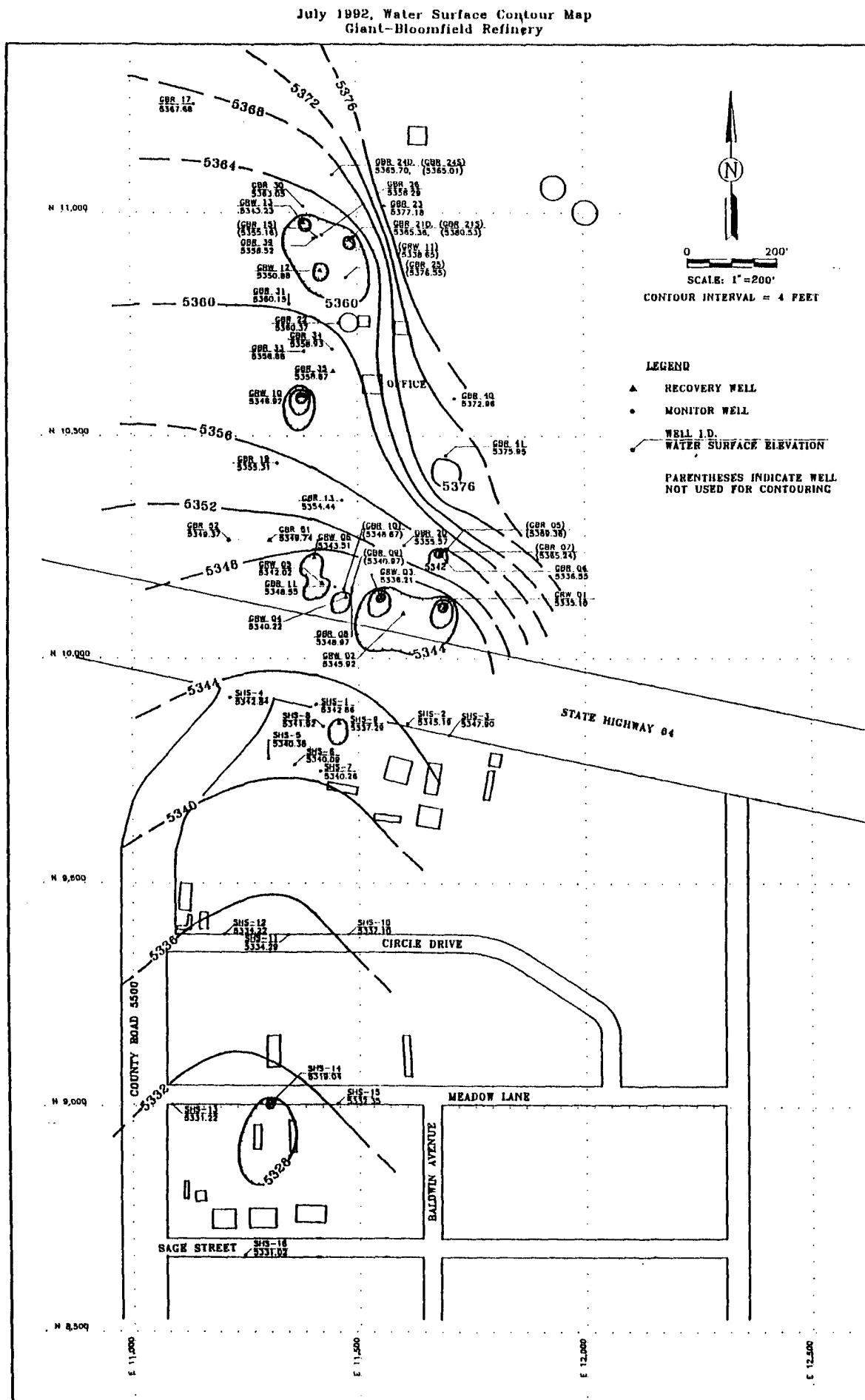
Vinyl chloride

ND

SHS-18 (Continued)

	7/92	8/92	9/92
AROMATICS			
Benzene		2.40	
Chlorobenzene		ND	
1,2-Dichlorobenzene		ND	
1,3-Dichlorobenzene		ND	
1,4-Dichlorobenzene		ND	
Ethylbenzene		8.90	
Toluene		ND	
Xylenes		10.90	
Trichlorotrifluoroethane		ND	

*ND - Not detected at specified detection limit



GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

JULY, 1992

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.20	59.20	0.00	5335.10
GRW-2	5391.28	45.36	45.36	0.00	5345.92
GRW-3	5388.77	52.56	52.56	0.00	5336.21
GRW-4	5390.02	49.80	49.80	0.00	5340.22
GRW-5	5390.56	48.54	48.54	0.00	5342.02
GRW-6	5390.81	47.30	47.30	0.00	5343.51
GRW-10	5395.02	48.10	48.10	0.00	5346.92
GRW-11	5397.85	59.20	59.20	0.00	5338.65
GRW-12	5397.24	46.36	46.36	0.00	5350.88
GRW-13	5396.90	53.67	53.67	0.00	5343.23
GBR-5	5395.07	26.75	25.45	1.30	5369.36
GBR-6	5395.70	59.15	59.15	0.00	5336.55
GBR-7	5395.85	31.13	30.48	0.65	5365.24
GBR-8	5390.50	41.54	41.53	0.01	5348.97
GBR-9	5389.92	48.95	48.95	0.00	5340.97
GBR-10	5390.57	41.90	41.90	0.00	5348.67
GBR-11	5389.43	41.62	40.70	0.92	5348.55
GBR-13	5393.04	38.60	38.60	0.00	5354.44
GBR-15	5397.99	42.83	42.83	0.00	5355.16
GBR-17	5402.69	35.01	35.01	0.00	5367.68
GBR-18	5421.68	25.24	25.24	0.00	5396.44
GBR-19	5393.83	38.52	38.52	0.00	5355.31
GBR-20	5393.47	38.30	37.80	0.50	5355.57
GBR-21S	5400.65	20.16	20.11	0.05	5380.53
GBR-21D	5400.19	34.83	34.83	0.00	5365.36
GBR-22	5395.91	36.58	35.28	1.30	5360.37
GBR-23	5403.72	22.66	22.66	0.00	5377.18
GBR-24S	5396.08	26.54	26.54	0.00	5365.01
GBR-24D	5396.77	31.07	31.07	0.00	5365.70
GBR-25	5396.72	20.17	20.17	0.00	5376.55
GBR-26	5395.59	37.30	37.30	0.00	5358.29
GBR-30	5396.58	33.53	33.53	0.00	5363.05
GBR-31	5394.86	34.71	34.71	0.00	5360.15
GBR-33	5396.28	37.40	37.40	0.00	5358.88
GBR-34	5394.00	35.35	35.00	0.35	5358.93
GBR-35	5393.66	35.53	34.85	0.68	5358.67
GBR-39	5397.55	39.03	39.03	0.00	5358.52
GBR-40	5400.76	27.80	27.80	0.00	5372.96
GBR-41	5396.35	20.40	20.40	0.00	5375.95
GBR-51	5389.68	39.94	39.94	0.00	5349.74
GBR-52	5387.74	38.37	38.37	0.00	5349.37

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 1992
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.68	40.68	0.00	5342.86
SHS-2	5381.66	36.47	36.47	0.00	5345.19
SHS-3	5383.33	35.43	35.43	0.00	5347.90
SHS-4	5383.62	40.78	40.78	0.00	5342.84
SHS-5	5378.36	37.98	37.98	0.00	5340.38
SHS-6	5378.17	38.08	38.08	0.00	5340.09
SHS-7	5378.77	38.78	38.44	0.34	5340.26
SHS-8	5380.25	38.33	38.33	0.00	5341.92
SHS-9	5380.79	43.50	43.50	0.00	5337.29
SHS-10	5373.80	36.70	36.70	0.00	5337.10
SHS-11	5373.17	38.88	38.88	0.00	5334.29
SHS-12	5373.94	39.72	39.72	0.00	5334.22
SHS-13	5367.81	36.59	36.59	0.00	5331.22
SHS-14	5367.07	48.03	48.03	0.00	5319.04
SHS-15	5366.21	33.86	33.86	0.00	5332.35
SHS-16	5362.58	31.56	31.56	0.00	5331.02

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Third Quarter, 1992

Tank Number	Beginning Volume	Ending Volume	Net Change
102	14369	14369	0
106	8010	8010	0
21	362743	363474	731
22	258239	259158	919
27	0	0	0
32	0	0	0
34	0	0	0
35	0	0	0
37	0	0	0
Total Net Volume Change			1650

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Third Quarter, 1992

Well	Month #1	Month #2	Month #3	Total
GRW-1	13850	12980	16490	43320
GRW-2	6510	12010	5257	23777
GRW-3	5400	8470	8890	22760
GRW-4	28540	26300	32330	87170
GRW-5	52210	55400	72190	179800
GRW-6	32890	24370	43080	100340
GRW-9	10450	10730	13360	34540
GRW-10	267800	223680	275790	767270
GRW-11	81960	67780	84280	234020
GRW-12	15230	12610	17280	45120
GRW-13	17730	50	3800	21580
SHS-9	17268	14193	19700	51161
SHS-14	184521	149285	174998	508804
SHS-18	0	62450	67409	129859
Total Volume Pumped In Gallons				2249521

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Third Quarter, 1992

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Total Volume Of Water Recovered	2249521
Net Change In Storage Volume	1650

Total Water Pumped To The Infiltration Gallery	2311134
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Difference	63263
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Comments: The approximately 3% difference
can be accounted for in meter
inaccuracy.

GRW-13

GENERAL WATER CHEMISTRY

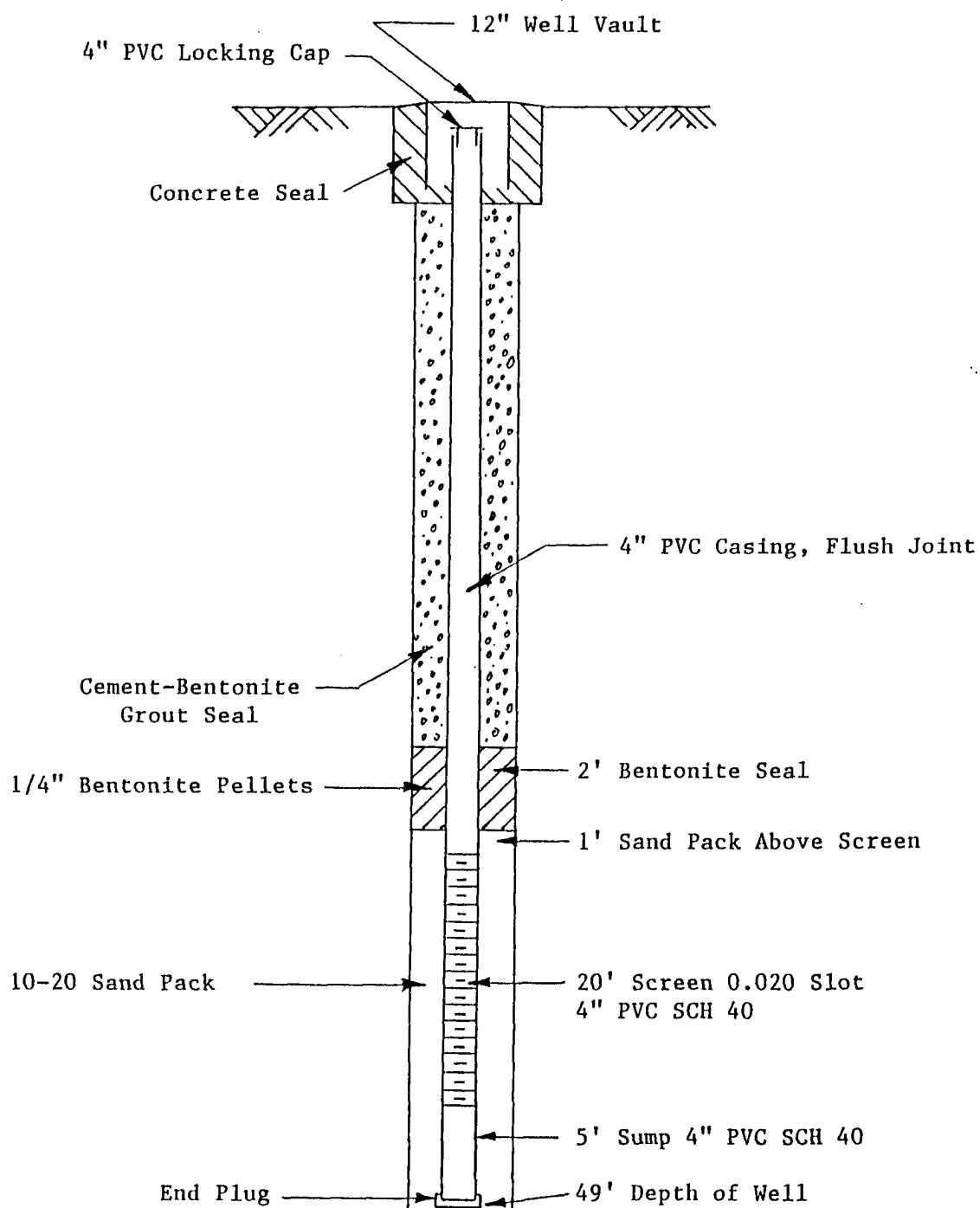
Lab conductivity, umhos/cm

7/92

8/92

9/92

4110.00



MONITOR WELL
SHS - 17

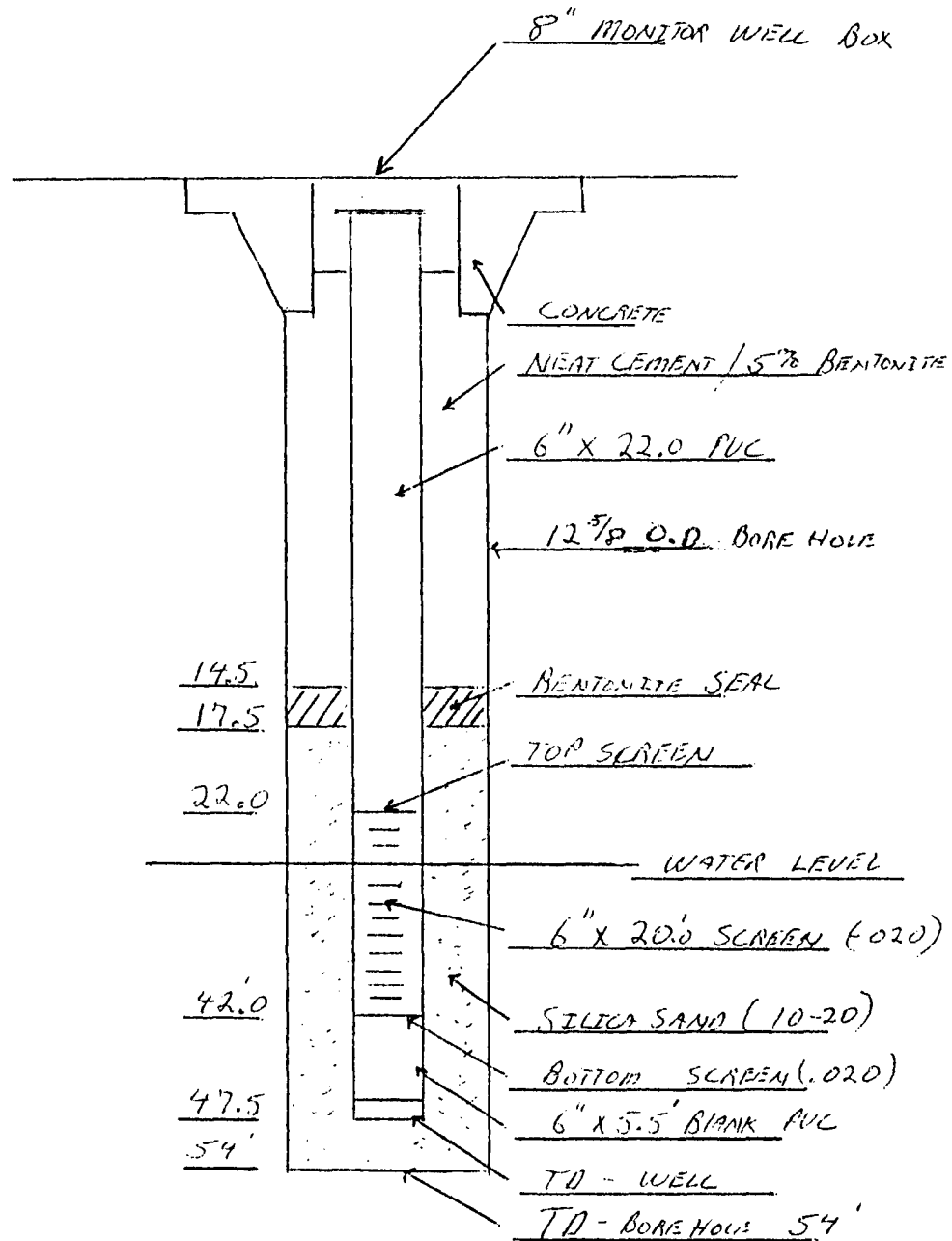
Prepared by L. E. Cynova/WT

Job No. 2132J032

Client Giant Refining Company

Plate 1

WESTERN WATER WELLS
TERRY G. HOOD
721 OLD AZTEC HWY.
FLORA VISTA, NEW MEXICO 87415



SHS-18



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20761501

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 920708940 SHS-10
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/08/92
 DATE RECEIVED : 07/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/13/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	19.2
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	106
BROMOFLUOROBENZENE (%)	117



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20761502

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9207081050 SHS-12
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/08/92
 DATE RECEIVED : 07/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/13/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.7
1,2-DICHLOROETHANE	0.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	1.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.6
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.6
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	106
BROMOFLUOROBENZENE (%)	103



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20761503

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9207081210 SHS-13
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/08/92
 DATE RECEIVED : 07/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/13/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.9
1,2-DICHLOROETHANE	3.1
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	102
BROMOFLUOROBENZENE (%)	101



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20761504

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9207081323 SHS-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/08/92
 DATE RECEIVED : 07/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/13/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	11.7
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	103
BROMOFLUOROBENZENE (%)	104



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20761505

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9207081435 SHS-16
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/08/92
 DATE RECEIVED : 07/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/13/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	109



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20776701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: HYGIENETICS/GEOSCIENCE CONSULTANTS	DATE SAMPLED	: 07/15/92
PROJECT #	: C.O.C. 5467	DATE RECEIVED	: 07/17/92
PROJECT NAME	: GIANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9207151720 GBR-49	DATE ANALYZED	: 07/17/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	2.9
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	74 D
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	4.6
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	3.6
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	81
BROMOFLUOROBENZENE (%)	100



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20776702

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: HYGIENETICS/GEOSCIENCE CONSULTANTS	DATE SAMPLED	: 07/15/92
PROJECT #	: C.O.C. 5467	DATE RECEIVED	: 07/17/92
PROJECT NAME	: GIANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9207151345 GBR-32	DATE ANALYZED	: 07/17/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	3.7
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	100 D
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	5.6
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.3
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	4.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	83
BROMOFLUOROBENZENE (%)	98



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20776703

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: HYGIENETICS/GEOSCIENCE CONSULTANTS	DATE SAMPLED	: 07/15/92
PROJECT #	: C.O.C. 5467	DATE RECEIVED	: 07/17/92
PROJECT NAME	: GIANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9207151607 GBR-50	DATE ANALYZED	: 07/20/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.5
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.3
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	99



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20776704

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: HYGIENETICS/GEOSCIENCE CONSULTANTS	DATE SAMPLED	: 07/15/92
PROJECT #	: 54029.01	DATE RECEIVED	: 07/17/92
PROJECT NAME	: GIANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9207151800 GBR-48	DATE ANALYZED	: 07/20/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 5

COMPOUNDS	RESULTS
BENZENE	<2.5
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	4
1,2-DICHLOROETHANE	<1.0
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	120
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	<2.5
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	7
TOLUENE	<2.5
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	5
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	<2.5
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

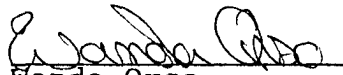
BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	101

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/09/92
ID: Stripper Effluent
SITE: 9206180805 DATE RECEIVED: 06/18/92
LAB NO: F9027 DATE COLLECTED: 06/18/92

Lab pH (s.u.).....	3.44
Lab Conductivity, umhos/cm @ 25C....	3870
Lab Resistivity, ohm-m.....	2.58
Total Dissolved Solids (180C), mg/L.	2890
Total Dissolved Solids (calc), mg/L.	2700
Total Alkalinity as CaCO ₃ , mg/L.....	<0.1
Total Hardness as CaCO ₃ , mg/L.....	964
Sodium Adsorption Ratio.....	7.25

	mg/L	meq/L
Bicarbonate as HCO ₃	<0.1	<0.10
Carbonate as CO ₃	<0.1	<0.10
Chloride.....	718	20.3
Sulfate.....	1090	22.8
Calcium.....	331	16.5
Magnesium.....	33.7	2.77
Potassium.....	5.87	0.15
Sodium.....	517	22.5
Major Cations.....		41.9
Major Anions.....		43
Cation/Anion Difference.....		1.3 %


Wanda Orso
Water Lab Supervisor



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: GBR-17
SITE: 9207071000 DATE RECEIVED: 07/07/92
LAB NO: F9108 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	7.22
Lab Conductivity, umhos/cm @ 25C....	2580
Lab Resistivity, ohm-m.....	3.87
Total Dissolved Solids (180C), mg/L.	2300
Total Dissolved Solids (calc), mg/L.	2190
Total Alkalinity as CaCO ₃ , mg/L.....	226
Total Hardness as CaCO ₃ , mg/L.....	912
Sodium Adsorption Ratio.....	5.11

	mg/L	meq/L
Bicarbonate as HC0 ₃	276	4.53
Carbonate as C0 ₃	<0.10	<0.01
Chloride.....	58.0	1.64
Sulfate.....	1300	27.0
Calcium.....	317	15.8
Magnesium.....	29.6	2.44
Potassium.....	0.78	0.02
Sodium.....	355	15.4
Major Cations.....		33.7
Major Anions.....		33.2
Cation/Anion Difference.....		0.74 %


Wanda Orso
Water Lab Supervisor



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: GBR-15
SITE: 9207071115 DATE RECEIVED: 07/07/92
LAB NO: F9109 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	7.48
Lab Conductivity, umhos/cm @ 25C....	4400
Lab Resistivity, ohm-m.....	2.27
Total Dissolved Solids (180C), mg/L.	3450
Total Dissolved Solids (calc), mg/L.	3340
Total Alkalinity as CaCO ₃ , mg/L.....	270
Total Hardness as CaCO ₃ , mg/L.....	1050
Sodium Adsorption Ratio.....	9.89

	mg/L	meq/L
Bicarbonate as HCO ₃	329	5.4
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	650	18.3
Sulfate.....	1390	28.9
Calcium.....	369	18.4
Magnesium.....	32.0	2.63
Potassium.....	5.00	0.13
Sodium.....	737	32.1
Major Cations.....		53.2
Major Anions.....		52.6
Cation/Anion Difference.....		0.56 %


Wanda Orso
Water Lab Supervisor



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Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: GBR-30
SITE: 9207071150 DATE RECEIVED: 07/07/92
LAB NO: F9110 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	6.90
Lab Conductivity, umhos/cm @ 25C....	3690
Lab Resistivity, ohm-m.....	2.71
Total Dissolved Solids (180C), mg/L.	2950
Total Dissolved Solids (calc), mg/L.	2940
Total Alkalinity as CaCO ₃ , mg/L.....	201
Total Hardness as CaCO ₃ , mg/L.....	1110
Sodium Adsorption Ratio.....	7.58

	mg/L	meq/L
Bicarbonate as HC0 ₃	245	4.01
Carbonate as C0 ₃	<0.10	<0.01
Chloride.....	590	16.6
Sulfate.....	1230	25.6
Calcium.....	381	19.0
Magnesium.....	38.5	3.16
Potassium.....	3.10	0.08
Sodium.....	580	25.2
Major Cations.....		47.5
Major Anions.....		46.3
Cation/Anion Difference.....		1.3 %

A handwritten signature in black ink, appearing to read 'Wanda Orso', is written over a horizontal line.

Wanda Orso
Water Lab Supervisor



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: GBR-24D
SITE: 9207071235 DATE RECEIVED: 07/07/92
LAB NO: F9111 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	7.64
Lab Conductivity, umhos/cm @ 25C....	4260
Lab Resistivity, ohm-m.....	2.35
Total Dissolved Solids (180C), mg/L.	3880
Total Dissolved Solids (calc), mg/L.	3750
Total Alkalinity as CaCO ₃ , mg/L.....	234
Total Hardness as CaCO ₃ , mg/L.....	1800
Sodium Adsorption Ratio.....	5.51

	mg/L	meq/L
Bicarbonate as HCO ₃	285	4.68
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	741	20.9
Sulfate.....	1660	34.6
Calcium.....	579	28.9
Magnesium.....	85.4	7.02
Potassium.....	6.00	0.15
Sodium.....	537	23.4
Major Cations.....		59.4
Major Anions.....		60.2
Cation/Anion Difference.....		0.62 %


Wanda Orso
Water Lab Supervisor



2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: GBR-31
SITE: 9207071324 DATE RECEIVED: 07/07/92
LAB NO: F9112 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	6.97
Lab Conductivity, umhos/cm @ 25C....	3740
Lab Resistivity, ohm-m.....	2.67
Total Dissolved Solids (180C), mg/L.	2940
Total Dissolved Solids (calc), mg/L.	2860
Total Alkalinity as CaCO ₃ , mg/L.....	167
Total Hardness as CaCO ₃ , mg/L.....	1020
Sodium Adsorption Ratio.....	7.65

	mg/L	meq/L
Bicarbonate as HC0 ₃	203	3.33
Carbonate as C0 ₃	<0.10	<0.01
Chloride.....	578	16.3
Sulfate.....	1230	25.6
Calcium.....	351	17.5
Magnesium.....	36.2	2.97
Potassium.....	2.70	0.07
Sodium.....	563	24.5
Major Cations.....		45
Major Anions.....		45.3
Cation/Anion Difference.....		0.26 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

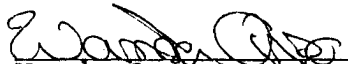
CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/28/92
ID: 9207200805
SITE: Stripper Effluent DATE RECEIVED: 07/20/92
LAB NO: F9287 DATE COLLECTED: 07/20/92

Lab pH (s.u.)..... 7.32
Lab Conductivity, umhos/cm @ 25C.... 3320
Lab Resistivity, ohm-m..... 3.02
Total Dissolved Solids (180C), mg/L. 2780
Total Dissolved Solids (calc), mg/L. 2620
Total Alkalinity as CaCO₃, mg/L..... 113
Total Hardness as CaCO₃, mg/L..... 1030
Sodium Adsorption Ratio..... 6.23

	mg/L	meq/L
Bicarbonate as HCO ₃	138	2.26
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	545	15.4
Sulfate.....	1160	24.2
Calcium.....	327	16.3
Magnesium.....	52.4	4.31
Potassium.....	2.74	0.07
Sodium.....	460	20.0
Major Cations.....		40.7
Major Anions.....		41.8
Cation/Anion Difference.....		1.39 %

Trace Metals by ICAP (Total Concentration), mg/L
Analytical Detection
Result: Limit:
Iron (Fe)..... 1.63 <0.05

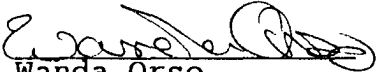
ND - Analyte "not detected" at the stated detection limit.


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
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CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/20/92
ID: 9207090940
SITE: RW-2 DATE RECEIVED: 07/09/92
LAB NO: F9155 DATE COLLECTED: 07/09/92

Nitrate, mg/L..... <0.02
Nitrite, mg/L..... <0.02


Wanda Orso
Water Lab Supervisor



2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: Stripper Influent
SITE: 9207071340 DATE RECEIVED: 07/07/92
LAB NO: F9113 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	6.41
Lab Conductivity, umhos/cm @ 25C....	3190
Lab Resistivity, ohm-m.....	3.13
Total Dissolved Solids (180C), mg/L.	2700
Total Dissolved Solids (calc), mg/L.	2680
Total Alkalinity as CaCO ₃ , mg/L.....	252
Total Hardness as CaCO ₃ , mg/L.....	969
Sodium Adsorption Ratio.....	7.60

	mg/L	meq/L
Bicarbonate as HCO ₃	307	5.04
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	427	12.0
Sulfate.....	1190	24.7
Calcium.....	337	16.8
Magnesium.....	31.3	2.58
Potassium.....	3.10	0.08
Sodium.....	544	23.7
Major Cations.....		43.1
Major Anions.....		41.8
Cation/Anion Difference.....		1.58 %

Trace Metals by ICAP (Total Concentration), mg/L

	Analytical Result:	Detection Limit:
Iron (Fe).....	0.64	<0.05

ND - Analyte "not detected" at the stated detection limit.


Wanda Orso
Water Lab Supervisor



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: GBR-24D Lab Split 9111
SITE: 9207071235 DATE RECEIVED: 07/07/92
LAB NO: F9116 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	7.61
Lab Conductivity, umhos/cm @ 25C....	4500
Lab Resistivity, ohm-m.....	2.22
Total Dissolved Solids (180C), mg/L.	3920
Total Dissolved Solids (calc), mg/L.	3670
Total Alkalinity as CaCO ₃ , mg/L.....	239
Total Hardness as CaCO ₃ , mg/L.....	1820
Sodium Adsorption Ratio.....	5.38

	mg/L	meq/L
Bicarbonate as HCO ₃	291	4.77
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	733	20.7
Sulfate.....	1590	33.1
Calcium.....	587	29.3
Magnesium.....	85.7	7.04
Potassium.....	5.50	0.14
Sodium.....	527	22.9
Major Cations.....		59.4
Major Anions.....		58.5
Cation/Anion Difference.....		0.75 %


Wanda Orso
Water Lab Supervisor



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20781101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF. REMEDI.
 CLIENT I.D. : 920720805 STRIPPER EFFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/20/92
 DATE RECEIVED : 07/21/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/21/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	84
BROMOFLUOROBENZENE (%)	100



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20759201

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF REMED
 CLIENT I.D. : 9207071000 GBR-17
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/07/92
 DATE RECEIVED : 07/08/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/11/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	86
BROMOFLUOROBENZENE (%)	120



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20759202

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF REMED
 CLIENT I.D. : 9207071115 GBR-15
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/07/92
 DATE RECEIVED : 07/08/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/13/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	2.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
?-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	23.3
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	102
BROMOFLUOROBENZENE (%)	107



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20759203

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF REMED
 CLIENT I.D. : 9207071150 GBR-30
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/07/92
 DATE RECEIVED : 07/08/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/11/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	97



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20759204

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF REMED
 CLIENT I.D. : 9207071235 GBR-24D
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/07/92
 DATE RECEIVED : 07/08/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/13/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	47.6
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	1.4
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	36.6
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	5.8
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	2.6
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.3
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	112
BROMOFLUOROBENZENE (%)	86



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20759205

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF REMED
 CLIENT I.D. : 9207071324 GBR-31
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/07/92
 DATE RECEIVED : 07/08/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/11/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	106



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20759206

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF REMED
 CLIENT I.D. : 9207071340 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/07/92
 DATE RECEIVED : 07/08/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/11/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	11.7
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
?-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	0.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	1.8
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	3.3
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	3.3
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	90
BROMOFLUOROBENZENE (%)	94



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20759101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9207071425 SHS-3
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/07/92
 DATE RECEIVED : 07/08/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/11/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
, 3-DICHLOROBENZENE	<0.5
1, 2 & 1, 4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1, 1-DICHLOROETHANE	<0.2
1, 2-DICHLOROETHANE	<0.2
1, 1-DICHLOROETHENE	<0.2
1, 2-DICHLOROETHENE (TOTAL)	<0.2
1, 2-DICHLOROPROPANE	<0.2
CIS-1, 3-DICHLOROPROPENE	<0.2
TRANS-1, 3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1, 1, 2, 2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1, 1, 1-TRICHLOROETHANE	<0.2
1, 1, 2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	111



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20759102

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9207071515 SHS-4
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/07/92
 DATE RECEIVED : 07/08/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 07/11/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	101

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/29/92
ID: 9207080940
SITE: SHS-10 DATE RECEIVED: 07/08/92
LAB NO: F9121 DATE COLLECTED: 07/08/92

Lab pH (s.u.)..... 6.83
Lab Conductivity, umhos/cm @ 25C.... 2060
Lab Resistivity, ohm-m..... 4.85
Total Dissolved Solids (180C), mg/L. 1620 *
Total Dissolved Solids (calc), mg/L. 1650
Total Alkalinity as CaCO₃, mg/L..... 293
Total Hardness as CaCO₃, mg/L..... 514
Sodium Adsorption Ratio..... 6.69

	mg/L	meq/L
Bicarbonate as HCO ₃	357	5.86
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	56.5	1.60
Sulfate.....	867	18.1
Calcium.....	164	8.20
Magnesium.....	25.3	2.08
Potassium.....	8.99	0.23
Sodium.....	349	15.2
Major Cations.....		25.7
Major Anions.....		25.5
Cation/Anion Difference.....		0.3 %

* Sample reanalyzed with no significant change.


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
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CLIENT:	Giant Bloomfield Refinery	DATE REPORTED:	07/29/92
ID:	9207081050		
SITE:	SHS-12	DATE RECEIVED:	07/08/92
LAB NO:	F9122	DATE COLLECTED:	07/08/92

Lab pH (s.u.).....	7.17
Lab Conductivity, umhos/cm @ 25C....	2420
Lab Resistivity, ohm-m.....	4.13
Total Dissolved Solids (180C), mg/L.	2440
Total Dissolved Solids (calc), mg/L.	2420
Total Alkalinity as CaCO ₃ , mg/L.....	266
Total Hardness as CaCO ₃ , mg/L.....	1260
Sodium Adsorption Ratio.....	3.23

	mg/L	meq/L
Bicarbonate as HC03.....	325	5.32
Carbonate as C03.....	<0.10	<0.01
Chloride.....	113	3.19
Sulfate.....	1400	29.2
Calcium.....	430	21.4
Magnesium.....	45.6	3.75
Potassium.....	3.04	0.08
Sodium.....	263	11.5
Major Cations.....		36.7
Major Anions.....		37.7
Cation/Anion Difference.....		1.3 %

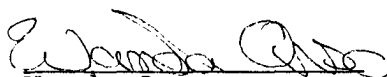

Wanda Orso
Water Lab Supervisor

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CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/29/92
ID: 9207081210
SITE: SHS-13 DATE RECEIVED: 07/08/92
LAB NO: F9123 DATE COLLECTED: 07/08/92

Lab pH (s.u.)..... 7.19
Lab Conductivity, umhos/cm @ 25C.... 3500
Lab Resistivity, ohm-m..... 2.86
Total Dissolved Solids (180C), mg/L. 2250
Total Dissolved Solids (calc), mg/L. 2250
Total Alkalinity as CaCO₃, mg/L..... 824
Total Hardness as CaCO₃, mg/L..... 692
Sodium Adsorption Ratio..... 9.99

	mg/L	meq/L
Bicarbonate as HCO ₃	1010	16.5
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	539	15.2
Sulfate.....	359	7.48
Calcium.....	222	11.1
Magnesium.....	33.3	2.74
Potassium.....	2.35	0.06
Sodium.....	604	26.3
Major Cations.....		40.2
Major Anions.....		39.2
Cation/Anion Difference.....		1.27 %


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Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/29/92
ID: 9207081323
SITE: SHS-15 DATE RECEIVED: 07/08/92
LAB NO: F9124 DATE COLLECTED: 07/08/92

Lab pH (s.u.)..... 7.23
Lab Conductivity, umhos/cm @ 25C.... 3690
Lab Resistivity, ohm-m..... 2.71
Total Dissolved Solids (180C), mg/L. 2700
Total Dissolved Solids (calc), mg/L. 2660
Total Alkalinity as CaCO₃, mg/L..... 381
Total Hardness as CaCO₃, mg/L..... 997
Sodium Adsorption Ratio..... 7.16

	mg/L	meq/L
Bicarbonate as HCO ₃	465	7.62
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	455	12.8
Sulfate.....	1070	22.3
Calcium.....	349	17.4
Magnesium.....	30.9	2.54
Potassium.....	2.35	0.06
Sodium.....	520	22.6
Major Cations.....		42.6
Major Anions.....		42.8
Cation/Anion Difference.....		0.18 %


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CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/29/92
ID: 9207081435
SITE: SHS-16 DATE RECEIVED: 07/08/92
LAB NO: F9125 DATE COLLECTED: 07/08/92

Lab pH (s.u.)..... 7.16
Lab Conductivity, umhos/cm @ 25C.... 1940
Lab Resistivity, ohm-m..... 5.16
Total Dissolved Solids (180C), mg/L. 1620
Total Dissolved Solids (calc), mg/L. 1570
Total Alkalinity as CaCO₃, mg/L..... 258
Total Hardness as CaCO₃, mg/L..... 800
Sodium Adsorption Ratio..... 2.97

	mg/L	meq/L
Bicarbonate as HCO ₃	315	5.16
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	31.9	0.90
Sulfate.....	893	18.6
Calcium.....	259	12.9
Magnesium.....	37.6	3.09
Potassium.....	3.13	0.08
Sodium.....	193	8.39
Major Cations.....		24.5
Major Anions.....		24.7
Cation/Anion Difference.....		0.42 %

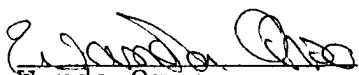

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Water Lab Supervisor

2506 W. Main Street
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CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/29/92
ID: 9207081210 Split 9123
SITE: SHS-16 DATE RECEIVED: 07/08/92
LAB NO: F9126 DATE COLLECTED: 07/08/92

Lab pH (s.u.)..... 7.18
Lab Conductivity, umhos/cm @ 25C.... 3390
Lab Resistivity, ohm-m..... 2.95
Total Dissolved Solids (180C), mg/L. 2250
Total Dissolved Solids (calc), mg/L. 2230
Total Alkalinity as CaCO₃, mg/L..... 820
Total Hardness as CaCO₃, mg/L..... 684
Sodium Adsorption Ratio..... 9.97

	mg/L	meq/L
Bicarbonate as HCO ₃	1000	16.4
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	540	15.2
Sulfate.....	344	7.17
Calcium.....	219	10.9
Magnesium.....	33.8	2.78
Potassium.....	1.56	0.04
Sodium.....	600	26.1
Major Cations.....		39.8
Major Anions.....		38.8
Cation/Anion Difference.....		1.27 %


Wanda Orso
Water Lab Supervisor

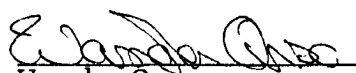


2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: SHS-3
SITE: 9207071425 DATE RECEIVED: 07/07/92
LAB NO: F9114 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	6.69
Lab Conductivity, umhos/cm @ 25C....	4290
Lab Resistivity, ohm-m.....	2.33
Total Dissolved Solids (180C), mg/L.	3850
Total Dissolved Solids (calc), mg/L.	3780
Total Alkalinity as CaCO ₃ , mg/L.....	209
Total Hardness as CaCO ₃ , mg/L.....	1750
Sodium Adsorption Ratio.....	5.28

	mg/L	meq/L
Bicarbonate as HCO ₃	256	4.19
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	352	9.93
Sulfate.....	2130	44.4
Calcium.....	579	28.9
Magnesium.....	74.4	6.12
Potassium.....	9.00	0.23
Sodium.....	508	22.1
Major Cations.....		57.4
Major Anions.....		58.5
Cation/Anion Difference.....		1 %


Wanda Orso
Water Lab Supervisor



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/22/92
ID: SHS-6
SITE: 9207071515 DATE RECEIVED: 07/07/92
LAB NO: F9115 DATE COLLECTED: 07/07/92

Lab pH (s.u.).....	7.05
Lab Conductivity, umhos/cm @ 25C....	2790
Lab Resistivity, ohm-m.....	3.58
Total Dissolved Solids (180C), mg/L.	2440
Total Dissolved Solids (calc), mg/L.	2390
Total Alkalinity as CaCO ₃ , mg/L.....	271
Total Hardness as CaCO ₃ , mg/L.....	1050
Sodium Adsorption Ratio.....	4.88

	mg/L	meq/L
Bicarbonate as HC03.....	331	5.42
Carbonate as C03.....	<0.10	<0.01
Chloride.....	108	3.04
Sulfate.....	1350	28.1
Calcium.....	369	18.4
Magnesium.....	32.6	2.68
Potassium.....	3.50	0.09
Sodium.....	364	15.8
Major Cations.....		37
Major Anions.....		36.5
Cation/Anion Difference.....		0.67 %


Wanda Orso
Water Lab Supervisor

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Farmington, New Mexico 87401

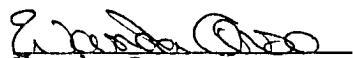
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CLIENT: H + GCL
ID: GBR-50
SITE: 9207151608
LAB NO: F9231

DATE REPORTED: 07/23/92
DATE RECEIVED: 07/16/92
DATE COLLECTED: 07/15/92

Lab pH (s.u.).....	7.21
Lab Conductivity, umhos/cm @ 25C....	2800
Lab Resistivity, ohm-m.....	3.57
Total Dissolved Solids (180C), mg/L.	2750
Total Dissolved Solids (calc), mg/L.	2650
Total Alkalinity as CaCO ₃ , mg/L.....	196
Total Hardness as CaCO ₃ , mg/L.....	960
Sodium Adsorption Ratio.....	6.85

	mg/L	meq/L
Bicarbonate as HCO ₃	239	3.92
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	39.3	1.11
Sulfate.....	1640	34.2
Calcium.....	331	16.5
Magnesium.....	32.8	2.69
Potassium.....	2.74	0.07
Sodium.....	488	21.2
Major Cations.....		40.5
Major Anions.....		39.2
Cation/Anion Difference.....		1.63 %


Wanda Orso
Water Lab Supervisor

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Farmington, New Mexico 87401

CLIENT: H + GCL
ID: GBR-48
SITE: 9207151801
LAB NO: F9232

DATE REPORTED: 07/23/92
DATE RECEIVED: 07/16/92
DATE COLLECTED: 07/15/92

Lab pH (s.u.).....	7.21
Lab Conductivity, umhos/cm @ 25C....	5300
Lab Resistivity, ohm-m.....	1.89
Total Dissolved Solids (180C), mg/L.	4300
Total Dissolved Solids (calc), mg/L.	4100
Total Alkalinity as CaCO ₃ , mg/L.....	344
Total Hardness as CaCO ₃ , mg/L.....	1350
Sodium Adsorption Ratio.....	10.2

	mg/L	meq/L
Bicarbonate as HC0 ₃	420	6.88
Carbonate as C0 ₃	<0.10	<0.01
Chloride.....	726	20.5
Sulfate.....	1800	37.5
Calcium.....	449	22.4
Magnesium.....	55.9	4.60
Potassium.....	5.08	0.13
Sodium.....	858	37.3
Major Cations.....		64.4
Major Anions.....		64.9
Cation/Anion Difference.....		0.33 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: H + GCL
ID: GBR-32
SITE: 9207151346
LAB NO: F9233

DATE REPORTED: 07/23/92
DATE RECEIVED: 07/16/92
DATE COLLECTED: 07/15/92

Lab pH (s.u.).....	7.34
Lab Conductivity, umhos/cm @ 25C....	4870
Lab Resistivity, ohm-m.....	2.05
Total Dissolved Solids (180C), mg/L.	3990
Total Dissolved Solids (calc), mg/L.	3910
Total Alkalinity as CaCO ₃ , mg/L.....	363
Total Hardness as CaCO ₃ , mg/L.....	1220
Sodium Adsorption Ratio.....	10.7

	mg/L	meq/L
Bicarbonate as HCO ₃	443	7.26
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	497	14.0
Sulfate.....	1880	39.1
Calcium.....	411	20.5
Magnesium.....	47.2	3.88
Potassium.....	4.30	0.11
Sodium.....	856	37.2
Major Cations.....		61.7
Major Anions.....		60.4
Cation/Anion Difference.....		1.1 %


Wanda Orso
Water Lab Supervisor

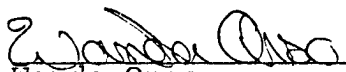
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: H + GCL
ID: GBR-49
SITE: 9207151721
LAB NO: F9234

DATE REPORTED: 07/23/92
DATE RECEIVED: 07/16/92
DATE COLLECTED: 07/15/92

Lab pH (s.u.).....	7.63
Lab Conductivity, umhos/cm @ 25C....	4530
Lab Resistivity, ohm-m.....	2.21
Total Dissolved Solids (180C), mg/L.	3740
Total Dissolved Solids (calc), mg/L.	3660
Total Alkalinity as CaCO ₃ , mg/L.....	372
Total Hardness as CaCO ₃ , mg/L.....	1094
Sodium Adsorption Ratio.....	10.7

	mg/L	meq/L
Bicarbonate as HCO ₃	454	7.44
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	459	12.9
Sulfate.....	1760	36.7
Calcium.....	357	17.8
Magnesium.....	49.6	4.08
Potassium.....	3.91	0.10
Sodium.....	810	35.2
Major Cations.....		57.2
Major Anions.....		57.1
Cation/Anion Difference.....		0.11 %

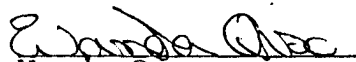

Wanda Orso
Water Lab Supervisor

CLIENT: H + GCL
ID: GBR-48
SITE: 9207151801
LAB NO: F9232

DATE REPORTED: 07/23/92
DATE RECEIVED: 07/16/92
DATE COLLECTED: 07/15/92

Lab pH (s.u.).....	7.21
Lab Conductivity, umhos/cm @ 25C....	5300
Lab Resistivity, ohm-m.....	1.89
Total Dissolved Solids (180C), mg/L.	4300
Total Dissolved Solids (calc), mg/L.	4100
Total Alkalinity as CaCO ₃ , mg/L.....	344
Total Hardness as CaCO ₃ , mg/L.....	1350
Sodium Adsorption Ratio.....	10.2

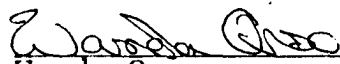
	mg/L	meq/L
Bicarbonate as HCO ₃	420	6.88
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	726	20.5
Sulfate.....	1800	37.5
Calcium.....	449	22.4
Magnesium.....	55.9	4.60
Potassium.....	5.08	0.13
Sodium.....	858	37.3
Major Cations.....		64.4
Major Anions.....		64.9
Cation/Anion Difference.....		0.33 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401CLIENT: H + GCL
ID: GBR-32
SITE: 9207151346
LAB NO: F9233DATE REPORTED: 07/23/92
DATE RECEIVED: 07/16/92
DATE COLLECTED: 07/15/92

Lab pH (s.u.).....	7.34
Lab Conductivity, umhos/cm @ 25C....	4870
Lab Resistivity, ohm-m.....	2.05
Total Dissolved Solids (180C), mg/L.	3990
Total Dissolved Solids (calc), mg/L.	3910
Total Alkalinity as CaCO ₃ , mg/L.....	363
Total Hardness as CaCO ₃ , mg/L.....	1220
Sodium Adsorption Ratio.....	10.7

	mg/L	meq/L
Bicarbonate as HCO ₃	443	7.26
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	497	14.0
Sulfate.....	1880	39.1
Calcium.....	411	20.5
Magnesium.....	47.2	3.88
Potassium.....	4.30	0.11
Sodium.....	856	37.2
Major Cations.....		61.7
Major Anions.....		60.4
Cation/Anion Difference.....		1.1 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: H + GCL
ID: GBR-49
SITE: 9207151721
LAB NO: F9234

DATE REPORTED: 07/23/92
DATE RECEIVED: 07/16/92
DATE COLLECTED: 07/15/92

Lab pH (s.u.).....	7.63
Lab Conductivity, umhos/cm @ 25C....	4530
Lab Resistivity, ohm-m.....	2.21
Total Dissolved Solids (180C), mg/L.	3740
Total Dissolved Solids (calc), mg/L.	3660
Total Alkalinity as CaCO ₃ , mg/L.....	372
Total Hardness as CaCO ₃ , mg/L.....	1094
Sodium Adsorption Ratio.....	10.7

	mg/L	meq/L
Bicarbonate as HCO ₃	454	7.44
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	459	12.9
Sulfate.....	1760	36.7
Calcium.....	357	17.8
Magnesium.....	49.6	4.08
Potassium.....	3.91	0.10
Sodium.....	810	35.2
Major Cations.....		57.2
Major Anions.....		57.1
Cation/Anion Difference.....		0.11 %

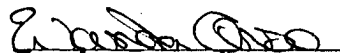

Wanda Orso
Water Lab Supervisor

CLIENT: H + GCL
ID: GBR-50
SITE: 9207151608
LAB NO: F9231

DATE REPORTED: 07/23/92
DATE RECEIVED: 07/16/92
DATE COLLECTED: 07/15/92

Lab pH (s.u.)..... 7.21
Lab Conductivity, umhos/cm @ 25C.... 2800
Lab Resistivity, ohm-m..... 3.57
Total Dissolved Solids (180C), mg/L. 2750
Total Dissolved Solids (calc), mg/L. 2650
Total Alkalinity as CaCO₃, mg/L..... 196
Total Hardness as CaCO₃, mg/L..... 960
Sodium Adsorption Ratio..... 6.85

	mg/L	meq/L
Bicarbonate as HC0 ₃	239	3.92
Carbonate as C0 ₃	<0.10	<0.01
Chloride.....	39.3	1.11
Sulfate.....	1640	34.2
Calcium.....	331	16.5
Magnesium.....	32.8	2.69
Potassium.....	2.74	0.07
Sodium.....	488	21.2
Major Cations.....		40.5
Major Anions.....		39.2
Cation/Anion Difference.....		1.63 %


Wanda Orso
Water Lab Supervisor



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20865601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFFSITE
 CLIENT I.D. : 9208101058 SHS-18
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 08/10/92
 DATE RECEIVED : 08/11/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 08/20/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS

RESULTS

COMPOUNDS	RESULTS
BENZENE	2.4
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.3
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	0.6
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.6
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	8.9
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	10.9
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	107
BROMOFLUOROBENZENE (%)	100



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20865501

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REF.REMEDIAT
 CLIENT I.D. : 920810835 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 08/10/92
 DATE RECEIVED : 08/11/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 08/21/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	15.6
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	1.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	0.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	1.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	4.4
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	5.4
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

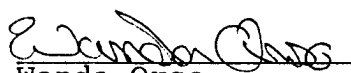
BROMOCHLOROMETHANE (%)	85
BROMOFLUOROBENZENE (%)	95

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 08/12/92
ID: Stripper Effluent
SITE: 9208030840 DATE RECEIVED: 08/03/92
LAB NO: F9413 DATE COLLECTED: 08/03/92

Lab pH (s.u.)..... 6.92
Lab Conductivity, umhos/cm @ 25C.... 3670
Lab Resistivity, ohm-m..... 2.72
Total Dissolved Solids (180C), mg/L. 2820
Total Dissolved Solids (calc), mg/L. 2630
Total Alkalinity as CaCO₃, mg/L..... 33.3
Total Hardness as CaCO₃, mg/L..... 931
Sodium Adsorption Ratio..... 6.85

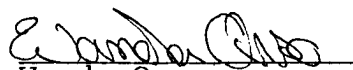
	mg/L	meq/L
Bicarbonate as HCO ₃	40.9	0.67
Carbonate as CO ₃	<0.10	<0.01
Chloride.....	599	16.9
Sulfate.....	1130	23.5
Calcium.....	310	15.5
Magnesium.....	38.2	3.14
Potassium.....	53.6	1.37
Sodium.....	480	20.9
Major Cations.....		40.9
Major Anions.....		41.1
Cation/Anion Difference.....		0.28 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 08/12/92
ID: 9208031415
SITE: RW-13 DATE RECEIVED: 08/03/92
LAB NO: F9414 DATE COLLECTED: 08/03/92

Lab Conductivity, umhos/cm @ 25C.... 4110


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 08/19/92
ID: Stripper Influent
SITE: 9208100835 DATE RECEIVED: 08/10/92
LAB NO: F9442 DATE COLLECTED: 08/10/92

Lab pH (s.u.)..... 6.58
Lab Conductivity, umhos/cm @ 25C.... 3170
Lab Resistivity, ohm-m..... 3.15
Total Dissolved Solids (180C), mg/L. 2760
Total Dissolved Solids (calc), mg/L. 2650
Total Alkalinity as CaCO₃, mg/L..... 263
Total Hardness as CaCO₃, mg/L..... 986
Sodium Adsorption Ratio..... 7.20

	mg/L	meq/L
Bicarbonate as HC0 ₃	321	5.26
Carbonate as C0 ₃	<0.10	<0.01
Chloride.....	470	13.3
Sulfate.....	1120	23.4
Calcium.....	335	16.7
Magnesium.....	36.6	3.01
Potassium.....	5.08	0.13
Sodium.....	520	22.6
Major Cations.....		42.4
Major Anions.....		41.9
Cation/Anion Difference.....		0.6 %


Wanda Orso
Water Lab Supervisor

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 07/09/92
ID: 9206180800
SITE: RW-13 DATE RECEIVED: 06/18/92
LAB NO: F9028 DATE COLLECTED: 06/18/92

Lab Conductivity, umhos/cm @ 25C.... 3800


Wanda Orso
Water Lab Supervisor



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20851901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 08/03/92
PROJECT #	: 9834	DATE RECEIVED	: 08/04/92
PROJECT NAME	: REF. REMEDIA	DATE EXTRACTED	: N/A
CLIENT I.D.	: 920803840 STRIPPER EFFLUENT	DATE ANALYZED	: 08/11/92
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	108

OIL CONSERVATION DIVISION
RECEIVED

'92 AUG 5 AM 9 10

GIANT
REFINING CO.

P.O. Box 256
Farmington, New Mexico
87499

505
632-3306

August 5, 1992

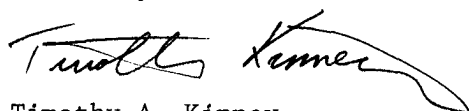
Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the second quarter of 1992.

Please contact me if you have any questions.

Sincerely,



Timothy A. Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Carl Shook - Giant
Kim Bullerdick - Giant
Debbie Smith - Giant
Bruce Davis - BLM
Dale Doremus - EID
Martin Nee - GCL
Bill Baggett - SJC
Monica Chapa - EPA
Maurie West - ATSDR
Chris Shuey - SWRIC

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
SECOND QUARTER, 1992

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505) 632-3306
FAX (505) 632-2487

TABLE OF CONTENTS

Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Specific Conductance Tracking	Section 5

INTRODUCTION AND SUMMARY QUARTERLY REPORT SECOND QUARTER, 1992

INTRODUCTION

No significant changes were made to the remediation system during the second quarter of 1992. All treated water is being directed toward the infiltration gallery in the old stormwater containment area of the refinery. We continue to monitor its effect on the system. Recovery well SHS-11, part of the offsite recovery well network, has sanded in and is no longer operable. Replacement is scheduled for the third quarter of 1992.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report. Also included is the recently approved, revised sampling matrix for the project.

Section 3

A potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

Page 1 of 3

GIANT BLOOMFIELD REFINERY
SAMPLE MATRIXRevised
6-29-92

<u>LOCATION</u>	<u>MONTHLY</u>	<u>QUARTERLY</u>	<u>SEMI ANNUALLY</u>	<u>ANNUALLY</u>
Stripper Influent	601 602 GWC	601 602 GWC	601 602 GWC	601 602 GWC
Stripper Effluent	601 602 GWC	601 602 GWC	601 602 GWC	601 602 GWC Metals PAH
GRW-3				601 602 GWC PAH
GRW-6				601 602 GWC PAH
GRW-13				601 602 GWC PAH
GBR-15			601 602 GWC	601 602 GWC
GBR-17			601 602 GWC	601 602 GWC PAH
GBR-24D			601 602 GWC	601 602 GWC PAH

Page 2 of 3

GIANT BLOOMFIELD REFINERY
SAMPLE MATRIX

<u>LOCATION</u>	<u>MONTHLY</u>	<u>QUARTERLY</u>	<u>SEMI ANNUALLY</u>	<u>ANNUALLY</u>
GBR-30			601 602 GWC	601 602 GWC PAH
GBR-31			601 602 GWC	601 602 GWC PAH
SHS-3		601 602	601 602 GWC	601 602 GWC
SHS-6		601 602	601 602 GWC	601 602 GWC
SHS-10		601 602	601 602 GWC	601 602 GWC
SHS-12		601 602	601 602 GWC	601 602 GWC
SHS-13		601 602	601 602 GWC	601 602 GWC
SHS-15		601 602	601 602 GWC	601 602 GWC
SHS-16		601 602	601 602 GWC	601 602 GWC

Page 3 of 3

GIANT BLOOMFIELD REFINERY
SAMPLE MATRIX

<u>LOCATION</u>	<u>MONTHLY</u>	<u>QUARTERLY</u>	<u>SEMI ANNUALLY</u>	<u>ANNUALLY</u>
SHS-7			601 602 GWC	601 602 GWC
SHS-9			601 602 GWC	601 602 GWC
SHS-11			601 602 GWC	601 602 GWC
Tank 21				601 602 GWC Metals PAH
Tank 27				
Offsite Stream				601 602 GWC Metals PAH

Notes

All wells will have water and free product elevations determined on a monthly basis.

Wells exhibiting free product will not be sampled.

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 QUARTERLY ANALYTICAL DATA SUMMARY
 SECOND QUARTER, 1992

STRIPPER INFLUENT

	4/92	5/92	6/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	6.83	6.55	5.86
Lab conductivity, umhos/cm	3750.00	3430.00	3450.00
Lab resistivity, ohm-m	2.67	2.92	2.90
Total dissolved solids (180	2740.00	2810.00	2670.00
Total dissolved solids (cal	2770.00	2710.00	2620.00
Total alkalinity as CaCO ₃	218.00	156.00	54.00
Total hardness as CaCO ₃	1200.00	1060.00	853.00
Sodium absorption ratio	5.77	6.72	8.23
Bicarbonate as HCO ₃	267.00	190.00	65.90
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	470.00	506.00	556.00
Sulfate	1250.00	1190.00	1160.00
Calcium	421.00	405.00	289.00
Magnesium	36.20	12.90	32.30
Potassium	2.07	2.52	0.60
Sodium	460.00	504.00	553.00

HALOCARBONS

Bromodichloromethane	ND	ND
Bromoform	ND	ND
Bromomethane	ND	ND
Carbon tetrachloride	ND	ND
Chloroethane	ND	ND
2-Chloroethylvinylether	ND	ND
Chloroform	ND	0.50
Chloromethane	ND	ND
Dibromochloromethane	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
1,1-Dichloroethane	0.60	0.60
1,2-Dichloroethane	0.50	0.60
1,1-Dichloroethene	ND	ND
1,2-Dichloroethene	1.30	1.30
trans-1,2-Dichloroethene	ND	ND
1,2-Dichloropropane	ND	ND
cis-1,3-Dichloropropene	ND	ND
trans-1,3-Dichloropropene	ND	ND
Methylene chloride	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	0.30

STRIPPER INFLUENT (Continued)

	4/92	5/92	6/92
1,1,1-Trichloroethane		ND	0.30
1,1,2-Trichloroethane		ND	ND
Trichloroethene		ND	0.30
Trichlorofluoromethane		ND	ND
Vinyl chloride		ND	ND
AROMATICS			
Benzene	12.00	5.10	5.30
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	2.90	0.60	0.70
Toluene	ND	ND	ND
Xylenes	4.10	4.80	3.80
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	4/92	5/92	6/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)		7.16	
Lab conductivity, umhos/cm		3270.00	
Lab resistivity, ohm-m		3.06	
Total dissolved solids (180)		2780.00	
Total dissolved solids (calc)		2740.00	
Total alkalinity as CaCO ₃		51.70	
Total hardness as CaCO ₃		981.00	
Sodium absorption ratio		7.01	
Bicarbonate as HCO ₃		62.80	
Carbonate as CO ₃		0.00	
Chloride		594.00	
Sulfate		1220.00	
Calcium		373.00	
Magnesium		12.50	
Potassium		2.10	
Sodium		505.00	
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,2-Dichloroethene	ND	ND	ND
cis-1,2-Danthracene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

STRIPPER EFFLUENT (Continued)

	4/92	5/92	6/92
AROMATICS			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

GRW-3

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.35
Lab conductivity, umhos/cm	3440.00
Lab resistivity, ohm-m	2.90
Total dissolved solids (180	2410.00
Total dissolved solids (cal	2410.00
Total alkalinity as CaCO ₃	934.00
Total hardness as CaCO ₃	711.00
Sodium absorption ratio	10.60
Bicarbonate as HCO ₃	1140.00
Carbonate as CO ₃	0.00
Chloride	428.00
Sulfate	505.00
Calcium	237.00
Magnesium	29.00
Potassium	2.09
Sodium	648.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.80
1,2-Dichloroethane	0.50
1,2-Dichloroethene	0.50
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GRW-3 (Continued)

	4/92	5/92	6/92
AROMATICS			
Benzene	27.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	44.00		
Toluene	0.70		
Xylenes	10.00		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene	ND		
Acenaphthylene	ND		
Anthracene	ND		
Benzo(a)anthracene	ND		
Benzo(a)pyrene	ND		
Benzo(b)fluoranthene	ND		
Benzo(g,h,i)perylene	ND		
Benzo(k)fluoranthene	ND		
Chrysene	ND		
Dibenzo(a,h)anthracene	ND		
Fluoranthene	ND		
Fluorene	4.30		
Indeno(1,2,3-cd)pyrene	ND		
Naphthalene	ND		
Phenanthrene	2.30		
Pyrene	ND		
1-Methylnaphthalene	8.30		
2-Methylnaphthalene	ND		

GRW-4 4/92 5/92 6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.20
Lab conductivity, umhos/cm	3370.00
Lab resistivity, ohm-m	2.96
Total dissolved solids (180	2290.00
Total dissolved solids (cal	2270.00
Total alkalinity as CaCO ₃	828.00
Total hardness as CaCO ₃	795.00
Sodium absorption ratio	8.43
Bicarbonate as HCO ₃	1010.00
Carbonate as CO ₃	0.00
Chloride	518.00
Sulfate	405.00
Calcium	270.00
Magnesium	29.70
Potassium	1.74
Sodium	547.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.60
1,2-Dichloroethane	1.00
1,1-Dichloroethene	ND
1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND

GRW-4 (Continued)	5/92	5/92	6/92
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	0.40		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene	ND		
Acenaphthylene	ND		
Anthracene	ND		
Benzo(a)anthracene	ND		
Benzo(a)pyrene	ND		
Benzo(b)fluoranthene	ND		
Benzo(g,h,i)perylene	ND		
Benzo(k)fluoranthene	ND		
Chrysene	ND		
Dibenzo(a,h)anthracene	ND		
Fluoranthene	1.90		
Fluorene	5.80		
Indeno(1,2,3-cd)pyrene	ND		
Naphthalene	ND		
Phenanthrene	ND		
Pyrene	ND		
1-Methylnaphthalene	9.80		
2-Methylnaphthalene	ND		

GRW-6

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.20
Lab conductivity, umhos/cm	3700.00
Lab resistivity, ohm-m	2.70
Total dissolved solids (180)	2330.00
Total dissolved solids (calc)	2560.00
Total alkalinity as CaCO ₃	718.00
Total hardness as CaCO ₃	833.00
Sodium absorption ratio	9.46
Bicarbonate as HCO ₃	878.00
Carbonate as CO ₃	0.00
Chloride	625.00
Sulfate	562.00
Calcium	287.00
Magnesium	28.70
Potassium	0.97
Sodium	628.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	0.01
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	0.22
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-15

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.40
Lab conductivity, umhos/cm	4360.00
Lab resistivity, ohm-m	2.29
Total dissolved solids (180)	3350.00
Total dissolved solids (calc)	3390.00
Total alkalinity as CaCO ₃	253.00
Total hardness as CaCO ₃	1160.00
Sodium absorption ratio	8.72
Bicarbonate as HCO ₃	309.00
Carbonate as CO ₃	0.00
Chloride	646.00
Sulfate	1450.00
Calcium	414.00
Magnesium	31.60
Potassium	3.91
Sodium	684.00

AROMATICS

Benzene	3.50
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-17

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.07
Lab conductivity, umhos/cm	2670.00
Lab resistivity, ohm-m	3.75
Total dissolved solids (180)	2150.00
Total dissolved solids (calc)	2160.00
Total alkalinity as CaCO ₃	234.00
Total hardness as CaCO ₃	942.00
Sodium absorption ratio	4.51
Bicarbonate as HCO ₃	285.00
Carbonate as CO ₃	0.00
Chloride	63.10
Sulfate	1280.00
Calcium	331.00
Magnesium	28.40
Potassium	0.10
Sodium	318.00

AROMATICS

Benzene	0.80
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-24-D

	4/92	5/92	6/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.23		
Lab conductivity, umhos/cm	5210.00		
Lab resistivity, ohm-m	1.92		
Total dissolved solids (180)	3820.00		
Total dissolved solids (calc)	3740.00		
Total alkalinity as CaCO3	210.00		
Total hardness as CaCO3	1930.00		
Sodium absorption ratio	4.69		
Bicarbonate as HCO3	257.00		
Carbonate as CO3	0.00		
Chloride	822.00		
Sulfate	1590.00		
Calcium	632.00		
Magnesium	85.70		
Potassium	5.09		
Sodium	474.00		
AROMATICS			
Benzene	24.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	7.00		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-30

	4/92	5/92	6/92
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.10		
Lab conductivity, umhos/cm	3670.00		
Lab resistivity, ohm-m	2.73		
Total dissolved solids (180)	2880.00		
Total dissolved solids (calc)	2820.00		
Total alkalinity as CaCO ₃	179.00		
Total hardness as CaCO ₃	1140.00		
Sodium absorption ratio	6.33		
Bicarbonate as HCO ₃	218.00		
Carbonate as CO ₃	0.00		
Chloride	531.00		
Sulfate	1250.00		
Calcium	402.00		
Magnesium	34.20		
Potassium	0.88		
Sodium	492.00		

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-31

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.25
Lab conductivity, umhos/cm	3720.00
Lab resistivity, ohm-m	2.69
Total dissolved solids (180)	2890.00
Total dissolved solids (calc)	2850.00
Total alkalinity as CaCO3	177.00
Total hardness as CaCO3	1100.00
Sodium absorption ratio	7.19
Bicarbonate as HCO3	216.00
Carbonate as CO3	0.00
Chloride	536.00
Sulfate	1240.00
Calcium	382.00
Magnesium	35.20
Potassium	1.65
Sodium	548.00

AROMATICS

AROMATICS	ND
Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND

*ND - Not detected at specified detection limit

OFFSITE WELLS

SHS-3

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-3 (Continued)

4/92

5/92

6/92

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-6 (Continued)

	4/92	5/92	6/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-10

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-10 (Continued)

	4/92	5/92	6/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	27.00		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane			

SHS-12

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

0.70

1,2-Dichloroethane

0.40

1,2-Dichloroethene

3.70

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

0.70

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

0.20

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-12 (Continued)

	4/92	5/92	6/92
AROMATICS			
Benzene	0.60		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-13

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.00
1,2-Dichloroethane	3.10
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-13 (Continued)

	4/92	5/92	6/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-15

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

Bromodichloromethane	0.30
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	6.50
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-15 (Continued)

	4/92	5/92	6/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

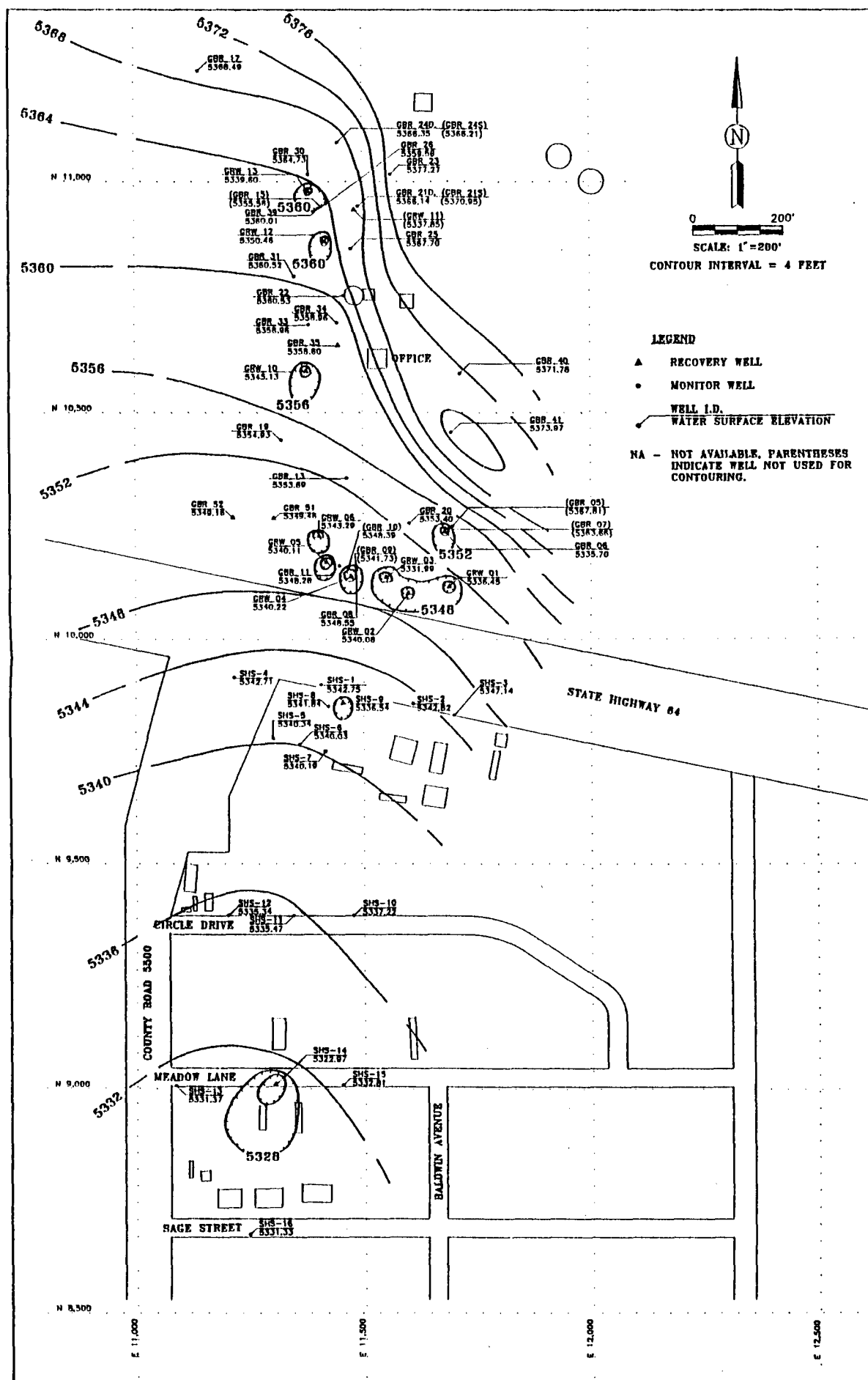
ND

SHS-16 (Continued)

	4/92	5/92	6/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

*ND - Not detected at specified detection limit

April 1992, Water Surface Contour Map
Giant-Bloomfield Refinery



GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

APRIL, 1992

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL*
GRW-1	5394.30	57.85	57.85	0.00	5336.45
GRW-2	5391.28	51.20	51.20	0.00	5340.08
GRW-3	5388.77	56.78	56.78	0.00	5331.99
GRW-4	5390.02	49.80	49.80	0.00	5340.22
GRW-5	5390.56	50.45	50.45	0.00	5340.11
GRW-6	5390.81	47.52	47.52	0.00	5343.29
GRW-10	5395.02	53.44	49.00	4.44	5345.13
GRW-11	5397.85	60.00	60.00	0.00	5337.85
GRW-12	5397.24	46.78	46.78	0.00	5350.46
GRW-13	5396.90	57.30	57.30	0.00	5339.60
GBR-5	5395.07	28.30	27.00	1.30	5367.81
GBR-6	5395.70	60.00	60.00	0.00	5335.70
GBR-7	5395.85	32.70	32.06	0.64	5363.66
GBR-8	5390.50	41.97	41.95	0.02	5348.55
GBR-9	5389.92	48.19	48.19	0.00	5341.73
GBR-10	5390.57	42.18	42.18	0.00	5348.39
GBR-11	5389.43	42.10	40.91	1.19	5348.28
GBR-13	5393.04	39.15	39.15	0.00	5353.89
GBR-15	5397.99	42.43	42.43	0.00	5355.56
GBR-17	5402.69	34.20	34.20	0.00	5368.49
GBR-18	5421.68	24.24	24.24	0.00	5397.44
GBR-19	5393.83	38.90	38.90	0.00	5354.93
GBR-20	5393.47	42.09	39.57	2.52	5353.40
GBR-21S	5400.65	29.72	29.70	0.02	5370.95
GBR-21D	5400.19	34.05	34.05	0.00	5366.14
GBR-22	5395.91	36.33	35.14	1.19	5360.53
GBR-23	5403.72	42.12	42.12	0.00	5377.27
GBR-24S	5396.08	26.45	25.76	0.69	5366.21
GBR-24D	5396.77	30.42	30.42	0.00	5366.35
GBR-25	5396.72	29.02	29.02	0.00	5367.70
GBR-26	5395.59	36.03	36.03	0.00	5359.56
GBR-30	5396.58	31.85	31.85	0.00	5364.73
GBR-31	5394.86	34.34	34.34	0.00	5360.52
GBR-33	5396.28	37.32	37.32	0.00	5358.96
GBR-34	5394.00	35.20	35.00	0.20	5358.96
GBR-35	5393.66	35.72	34.90	0.82	5358.60
GBR-39	5397.55	37.54	37.54	0.00	5360.01
GBR-40	5400.76	28.98	28.98	0.00	5371.78
GBR-41	5396.35	22.38	22.38	0.00	5373.97
GBR-51	5389.68	40.22	40.22	0.00	5349.46
GBR-52	5387.74	38.58	38.58	0.00	5349.16

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Second Quarter, 1992

=====
Total Volume Of Water Recovered 2135065
Net Change In Storage Volume -229208

Total Water Pumped To The 2260272
Infiltration Gallery

=====
Difference -104001

Comments: The approximately 5% difference
can be accounted for in meter
inaccuracy.

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Second Quarter, 1992

Tank Number	Beginning Volume	Ending Volume	Net Change
102	17468	14369	-3099
106	8010	8010	0
21	134430	362743	228313
22	215965	258239	42274
27	182470	0	-182470
32	88634	0	-88634
34	87541	0	-87541
35	0	0	0
37	138051	0	-138051
Total Net Volume Change			-229208

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Second Quarter, 1992

Well	Month #1	Month #2	Month #3	Total
GRW-1	12450	10540	12210	35200
GRW-2	5120	1280	14970	21370
GRW-3	9830	11610	12660	34100
GRW-4	25750	22340	25540	73630
GRW-5	51560	41050	50110	142720
GRW-6	36860	29260	30860	96980
GRW-9	10420	9780	9640	29840
GRW-10	352760	260280	217050	830090
GRW-11	121420	34680	78430	234530
GRW-12	26220	18470	18430	63120
GRW-13	31050	22410	24820	78280
SHS-9	13892	943	6098	20933
SHS-11	0	0	0	0
SHS-14	181083	163391	129798	474272
Total Volume Pumped In Gallons				2135065

GRW-13

4/92

5/92

6/92

GENERAL WATER CHEMISTRY

Lab conductivity, umhos/cm

4040.00

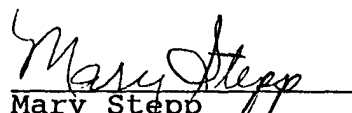
3625.00

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 04/29/92
ID: GBR-24D
SITE: 9204091320 DATE RECEIVED: 04/09/92
LAB NO: F8626 DATE COLLECTED: 04/09/92

Lab pH (s.u.)..... 7.23
Lab Conductivity, umhos/cm @ 25C.... 5210
Lab Resistivity, ohm-m..... 1.92
Total Dissolved Solids (180C), mg/L. 3820
Total Dissolved Solids (calc), mg/L. 3740
Total Alkalinity as CaCO₃, mg/L..... 210
Total Hardness as CaCO₃, mg/L..... 1930
Sodium Adsorption Ratio..... 4.69

	mg/L	meq/L
Bicarbonate as HCO ₃	257	4.21
Carbonate as CO ₃	0	0
Chloride.....	822	23.2
Sulfate.....	1590	33.2
Calcium.....	632	31.5
Magnesium.....	85.7	7.04
Potassium.....	5.09	0.13
Sodium.....	474	20.6
Major Cations.....		59.3
Major Anions.....		60.6
Cation/Anion Difference.....		1.04 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

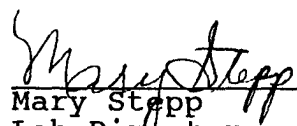
2508 W. Main Street
Farmington, New Mexico 87401

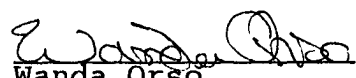
CLIENT: Giant Bloomfield Refinery DATE REPORTED: 04/29/92
ID: GBR-15
SITE: 9204091222 DATE RECEIVED: 04/09/92
LAB NO: F8625 DATE COLLECTED: 04/09/92

Lab pH (s.u.)..... 7.40
Lab Conductivity, umhos/cm @ 25C.... 4360
Lab Resistivity, ohm-m..... 2.29
Total Dissolved Solids (180C), mg/L. 3350 *
Total Dissolved Solids (calc), mg/L. 3390
Total Alkalinity as CaCO₃, mg/L..... 253
Total Hardness as CaCO₃, mg/L..... 1160
Sodium Adsorption Ratio..... 8.72

	mg/L	meq/L
Bicarbonate as HCO ₃	309	5.06
Carbonate as CO ₃	0	0
Chloride.....	646	18.2
Sulfate.....	1450	30.3
Calcium.....	414	20.7
Magnesium.....	31.6	2.60
Potassium.....	3.91	0.10
Sodium.....	684	29.8
Major Cations.....		53.1
Major Anions.....		53.6
Cation/Anion Difference.....		0.44 %

* Reanalyzed with no significant change.


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

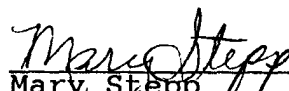
2506 W. Main Street
Farmington, New Mexico 87401

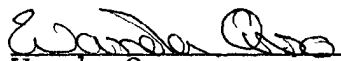
CLIENT: Giant Bloomfield Refinery DATE REPORTED: 04/29/92
ID: GBR-17
SITE: 9204091105 DATE RECEIVED: 04/09/92
LAB NO: F8624 DATE COLLECTED: 04/09/92

Lab pH (s.u.)..... 7.07
Lab Conductivity, umhos/cm @ 25C.... 2670
Lab Resistivity, ohm-m..... 3.75
Total Dissolved Solids (180C), mg/L. 2150 *
Total Dissolved Solids (calc), mg/L. 2160
Total Alkalinity as CaCO₃, mg/L..... 234
Total Hardness as CaCO₃, mg/L..... 942
Sodium Adsorption Ratio..... 4.51

	mg/L	meq/L
Bicarbonate as HCO ₃	285	4.67
Carbonate as CO ₃	0	0
Chloride.....	63.1	1.78
Sulfate.....	1280	26.6
Calcium.....	331	16.5
Magnesium.....	28.4	2.33
Potassium.....	0.10	<0.01
Sodium.....	318	13.8
Major Cations.....		32.7
Major Anions.....		33.1
Cation/Anion Difference.....		0.62 %

* Reanalyzed with no significant change.


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

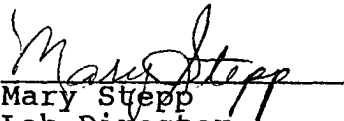
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery Bloomfield DATE REPORTED: 04/23/92
ID: RW-3
SITE: 9204081445 DATE RECEIVED: 04/09/92
LAB NO: F8613 DATE COLLECTED: 04/08/92

Lab pH (s.u.)..... 7.35
Lab Conductivity, umhos/cm @ 25C.... 3440
Lab Resistivity, ohm-m..... 2.9
Total Dissolved Solids (180C), mg/L. 2410 *
Total Dissolved Solids (calc), mg/L. 2410
Total Alkalinity as CaCO₃, mg/L..... 934
Total Hardness as CaCO₃, mg/L..... 711
Sodium Adsorption Ratio..... 10.6

	mg/L	meq/L
Bicarbonate as HCO ₃	1140	18.7
Carbonate as CO ₃	0	0
Chloride.....	428	12.1
Sulfate.....	505	10.5
Calcium.....	237	11.8
Magnesium.....	29.0	2.38
Potassium.....	2.09	0.05
Sodium.....	648	28.2
Major Cations.....		42.5
Major Anions.....		41.3
Cation/Anion Difference.....		1.42 %

* Reanalyzed with no significant change.


Mary Stepp
Lab Director

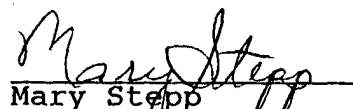

Wanda Orso
Water Lab Supervisor

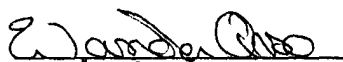
2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Refinery Bloomfield DATE REPORTED: 04/23/92
ID: RW-4
SITE: 9204081428 DATE RECEIVED: 04/09/92
LAB NO: F8612 DATE COLLECTED: 04/08/92

Lab pH (s.u.)..... 7.20
Lab Conductivity, umhos/cm @ 25C.... 3370
Lab Resistivity, ohm-m..... 2.96
Total Dissolved Solids (180C), mg/L. 2290
Total Dissolved Solids (calc), mg/L. 2270
Total Alkalinity as CaCO₃, mg/L..... 828
Total Hardness as CaCO₃, mg/L..... 795
Sodium Adsorption Ratio..... 8.43

	mg/L	meq/L
Bicarbonate as HCO ₃	1010	16.6
Carbonate as CO ₃	0	0
Chloride.....	518	14.6
Sulfate.....	405	8.44
Calcium.....	270	13.5
Magnesium.....	29.7	2.44
Potassium.....	1.74	0.04
Sodium.....	547	23.8
Major Cations.....		39.7
Major Anions.....		39.6
Cation/Anion Difference.....		0.14 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20461701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9204081428 RW-4 (602-43)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/92
DATE RECEIVED : 04/09/92
DATE EXTRACTED : N/A
DATE ANALYZED : 04/11/92
UNITS : UG/L
DILUTION FACTOR : 2

COMPOUNDS	RESULTS
BENZENE	<1.0
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1.0
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	<0.4
DIBROMOCHLOROMETHANE	<0.4
CHLOROETHYL VINYL ETHER	<1.0
1,3-DICHLOROBENZENE	<1.0
1,2 & 1,4-DICHLOROBENZENE	<1.0
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	1.6
1,2-DICHLOROETHANE	1.0
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	<0.4
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	<1.0
METHYLENE CHLORIDE	<4.0
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	<0.4
TOLUENE	<1.0
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<1.0
VINYL CHLORIDE	<0.4
TOTAL XYLENES	<1.0
TRICHLOROTRIFLUOROETHANE	<4.0

SURROGATE PERCENT RECOVERIES

1,1,2,2-TETRACHLOROETHANE (%)	97
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20461702

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 CLIENT I.D. : 9204081445 RW-3 (GDR-27)
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/92
 DATE RECEIVED : 04/09/92
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/11/92
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	27
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
1,1-DICHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	0.5
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.5
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	44
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.7
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	10
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

1,1-DIBROMOCHLOROMETHANE (%)	103
1,1-DIBROMOFLUOROBENZENE (%)	105



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20461701

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9204081428 RW-4
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/92
DATE RECEIVED : 04/09/92
DATE EXTRACTED : 04/11/92
DATE ANALYZED : 04/13/92
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	5.8 D
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	1.9
PYRENE	<0.04
BENZO (A) ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO (B) FLUORANTHENE	<0.01
BENZO (K) FLUORANTHENE	<0.01
BENZO (A) PYRENE	<0.01
DIBENZ (a, h) ANTHRACENE	<0.10
BENZO (g, h, i) PERYLENE	<0.04
INDENO (1, 2, 3-CD) PYRENE	<0.03
1-METHYLNAPHTHALENE	9.8
2-METHYLNAPHTHALENE	<0.30

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	71
------------------------	----



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 20461702

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9204081445 RW-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/92
DATE RECEIVED : 04/09/92
DATE EXTRACTED : 04/11/92
DATE ANALYZED : 04/13/92
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	4.3 D
PHENANTHRENE	2.3 D
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO (A) ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO (B) FLUORANTHENE	<0.01
BENZO (K) FLUORANTHENE	<0.01
BENZO (A) PYRENE	<0.01
DIBENZ (a, h) ANTHRACENE	<0.10
BENZO (g, h, i) PERYLENE	<0.04
INDENO (1, 2, 3-CD) PYRENE	<0.03
1-METHYLNAPHTHALENE	8.3
2-METHYLNAPHTHALENE	<0.30

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) 76

2506 W. Main Street
Farmington, New Mexico 87401

CLIENT: Giant Bloomfield Refinery DATE REPORTED: 04/29/92
ID: GBR-30
SITE: 9204091413 DATE RECEIVED: 04/09/92
LAB NO: F8627 DATE COLLECTED: 04/09/92

Lab pH (s.u.)..... 7.10
Lab Conductivity, umhos/cm @ 25C.... 3670
Lab Resistivity, ohm-m..... 2.73

GW - 40

MONITORING REPORTS

DATE:

1993



P.O. Box 256
Farmington, New Mexico
87499

505
632-3306

February 1, 1994

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the fourth quarter of 1993.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Tim Kinney". The signature is fluid and cursive, with a long horizontal stroke extending from the end.

Tim Kinney
Remediation Project Manager

/dm

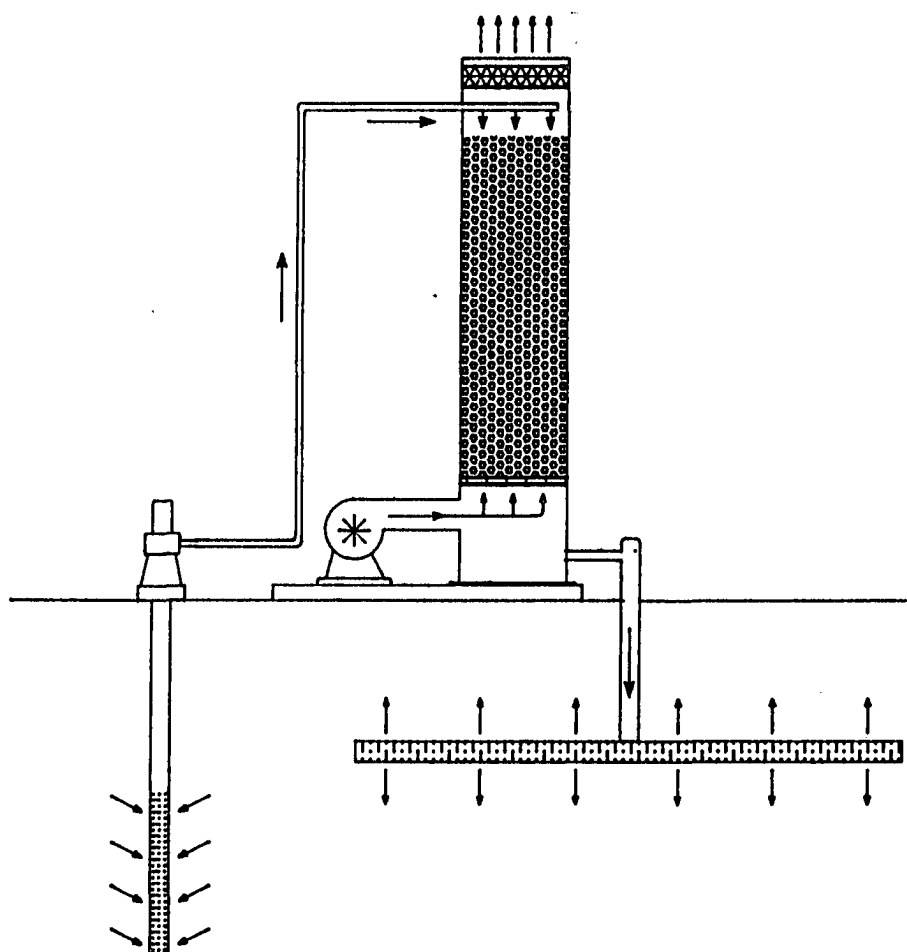
Enclosure

ccw/enc: Carl Shook-Giant
Kim Bullerdick-Giant
Debbie Smith-Giant
Stephanie Odell-BLM
Dale Doremus-EID
Chris Shuey-SWRIC
Valda Terauds-GCL
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

GIANT

REFINING CO.

BLOOMFIELD REFINERY REMEDIATION PROJECT



Post Office Box 256
606 E. Highway 64
Farmington, New Mexico 87401

(505) 632-3306
FAX (505) 632-2487

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FOURTH QUARTER, 1993

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505) 632-3306
FAX (505) 632-2487

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INTRODUCTION AND SUMMARY QUARTERLY REPORT FOURTH QUARTER, 1993

INTRODUCTION

Installation of the carbon filter system was completed in the fourth quarter. All water is currently carbon filtered prior to discharge.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

Section 6

Section 6 contains a summary of the quarterly analytical results for the Bioremediation Project. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FOURTH QUARTER, 1993

STRIPPER INFLUENT

	October	November	December
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.10	6.10	7.10
Lab conductivity, umhos/cm	3500.00	3620.00	3420.00
Total dissolved solids (180)	2620.00	2650.00	2560.00
Total dissolved solids (calc)	2100.00	2110.00	2460.00
Total alkalinity as CaCO ₃	337.00	112.00	306.00
Total hardness as CaCO ₃	999.00	1020.00	1000.00
Bicarbonate as HCO ₃	412.00	137.00	373.00
Carbonate as CO ₃	0.00	0.00	0.00
Hydroxide as OH	0.00	0.00	0.00
Chloride	357.00	516.00	350.00
Sulfate	1160.00	1140.00	1130.00
Calcium	341.00	346.00	319.00
Magnesium	36.00	37.00	51.00
Potassium	5.10	2.70	2.40
Sodium	3.00	1.60	433.00
Total Iron			0.93
Total Manganese			1.84
Dissolved Iron			0.58
Dissolved Manganese			1.78

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND

STRIPPER INFLUENT (Continued)

	October	November	December
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	3.40	3.90	2.80
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	4.90	11.00	57.00
Toluene	7.70	23.00	ND
Xylenes	ND	ND	110.00
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	October	November	December
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	6.20	5.70	7.10
Lab conductivity, umhos/cm	3580.00	3770.00	3610.00
Total dissolved solids (180)	2590.00	2630.00	2690.00
Total dissolved solids (calc)	2040.00	2560.00	2550.00
Total alkalinity as CaCO ₃	136.00	78.00	233.00
Total hardness as CaCO ₃	950.00	1010.00	1060.00
Bicarbonate as HCO ₃	166.00	95.00	284.00
Carbonate as CO ₃	0.00	0.00	0.00
Hydroxide as OH	0.00	0.00	0.00
Chloride	518.00	536.00	393.00
Sulfate	1080.00	1140.00	1190.00
Calcium	303.00	338.00	314.00
Magnesium	47.00	40.00	69.00
Potassium	7.80	2.70	4.00
Sodium	4.60	455.00	446.00
Total Iron			0.65
Total Manganese			1.64
Dissolved Iron			0.50
Dissolved Manganese			1.77

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND

STRIPPER EFFLUENT (Continued)

	October	November	December
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	ND	2.20	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	18.00	ND
Toluene	ND	ND	ND
Xylenes	ND	36.00	ND
Trichlorotrifluoroethane	ND	ND	ND

FILTER DISCHARGE

	October	November	December
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	3.90		7.50
Lab conductivity, umhos/cm	3830.00		3610.00
Total dissolved solids (180)	2680.00		2800.00
Total dissolved solids (calc)	2570.00		2560.00
Total alkalinity as CaCO ₃	41.00		233.00
Total hardness as CaCO ₃	1000.00		1040.00
Bicarbonate as HCO ₃	0.00		284.00
Carbonate as CO ₃	0.00		0.00
Hydroxide as OH	0.00		0.00
Chloride	640.00		393.00
Sulfate	1100.00		1200.00
Calcium	310.00		316.00
Magnesium	44.00		61.00
Potassium	8.20		3.90
Sodium	466.00		453.00
Total Iron			ND
Total Manganese			1.73
Dissolved Iron			ND
Dissolved Manganese			1.65

HALOCARBONS

Bromodichloromethane	ND	ND
Bromoform	ND	ND
Bromomethane	ND	ND
Carbon tetrachloride	ND	ND
Chloroethane	ND	ND
Chloroethane	ND	ND
2-Chloroethylvinylether	ND	ND
Chloroform	ND	ND
Chloromethane	ND	ND
Dibromochloromethane	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
1,1-Dichloroethane	ND	ND
1,2-Dichloroethane	ND	ND
1,2-Dichloroethene	ND	ND
cis-1,2-Dichloroanthracene	ND	ND
trans-1,2-Dichloroethene	ND	ND
1,2-Dichloropropane	ND	ND
cis-1,3-Dichloropropene	ND	ND
trans-1,3-Dichloropropene	ND	ND
Methylene chloride	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
1,1,1-Trichloroethane	ND	ND
1,1,2-Trichloroethane	ND	ND
Trichloroethene	ND	ND
Trichlorofluoromethane	ND	ND
Vinyl chloride	ND	ND

FILTER DISCHARGE (Continued)

	October	November	December
AROMATICS			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND
PAH			
Naphthalene	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Fluorene	ND	ND	ND
Phenanthrene	ND	ND	ND
Anthracene	ND	ND	ND
Fluoranthene	ND	ND	ND
Pyrene	ND	ND	ND
Benzo(A)Anthracene	ND	ND	ND
Chrysene	ND	ND	ND
Benzo(B)Fluoranthene	ND	ND	ND
Benzo(K)Fluoranthene	ND	ND	ND
Benzo(A)Pyrene	ND	ND	ND
Dibenzo(a,h)Anthracene	ND	ND	ND
Benzo(g,h,i)Perylene	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND

TANK 102 DISCHARGE

	October	November	December
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)			7.70
Lab conductivity, umhos/cm			3520.00
Total dissolved solids (180)			2660.00
Total dissolved solids (calc)			2530.00
Total alkalinity as CaCO ₃			341.00
Total hardness as CaCO ₃			1050.00
Bicarbonate as HCO ₃			415.00
Carbonate as CO ₃			0.00
Hydroxide as OH			0.00
Chloride			308.00
Sulfate			1160.00
Calcium			312.00
Magnesium			66.00
Potassium			4.10
Sodium			468.00
Total Iron			0.84
Total Manganese			1.77
Dissolved Iron			0.48
Dissolved Manganese			1.77

GBR-17

	October	November	December
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)			7.20
Lab conductivity, umhos/cm			2760.00
Total dissolved solids (180)			2260.00
Total dissolved solids (calc)			2230.00
Total alkalinity as CaCO ₃			218.00
Total hardness as CaCO ₃			998.00
Bicarbonate as HCO ₃			267.00
Carbonate as CO ₃			0.00
Hydroxide as OH			0.00
Chloride			67.00
Sulfate			1330.00
Calcium			303.00
Magnesium			58.00
Potassium			0.90
Sodium			338.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-17 (Continued)

	October	November	December
AROMATICS			
Benzene			ND
Chlorobenzene			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
Ethylbenzene			ND
Toluene			ND
Xylenes			ND
Trichlorotrifluoroethane			ND

GBR-32

October November

December

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.10
Lab conductivity, umhos/cm	5240.00
Total dissolved solids (180)	4120.00
Total dissolved solids (calc)	4050.00
Total alkalinity as CaCO ₃	352.00
Total hardness as CaCO ₃	1540.00
Bicarbonate as HCO ₃	429.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	571.00
Sulfate	1980.00
Calcium	453.00
Magnesium	99.00
Potassium	3.80
Sodium	740.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.40
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.80
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	11.00
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	5.90
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-32 (Continued)

	October	November	December
AROMATICS			
Benzene			ND
Chlorobenzene			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
Ethylbenzene			ND
Toluene			ND
Xylenes			ND
Trichlorotrifluoroethane			ND

*(D)10=Diluted 10X

GBR-48

	October	November	December
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)			7.20
Lab conductivity, umhos/cm			5740.00
Total dissolved solids (180)			4550.00
Total dissolved solids (calc)			4460.00
Total alkalinity as CaCO ₃			272.00
Total hardness as CaCO ₃			1670.00
Bicarbonate as HCO ₃			332.00
Carbonate as CO ₃			0.00
Hydroxide as OH			0.00
Chloride			699.00
Sulfate			2110.00
Calcium			507.00
Magnesium			99.00
Potassium			4.40
Sodium			869.00
HALOCARBONS			
Bromodichloromethane			ND
Bromoform			ND
Bromomethane			ND
Carbon tetrachloride			ND
Chloroethane			ND
Chloroethane			ND
2-Chloroethylvinylether			ND
Chloroform			0.40
Chloromethane			ND
Dibromochloromethane			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
1,1-Dichloroethane			0.60
1,2-Dichloroethane			ND
1,2-Dichloroethene			ND
cis-1,2-Dichloroethene			48.00
trans-1,2-Dichloroethene			ND
1,2-Dichloropropane			ND
cis-1,3-Dichloropropene			ND
trans-1,3-Dichloropropene			ND
Methylene chloride			ND
1,1,2,2-Tetrachloroethane			ND
Tetrachloroethene			4.00
1,1,1-Trichloroethane			ND
1,1,2-Trichloroethane			ND
Trichloroethene			2.30
Trichlorofluoromethane			ND
Vinyl chloride			ND

GBR-48 (Continued)

	OCTOBER	NOVEMBER	DECEMBER
AROMATICS			
Benzene			ND
Chlorobenzene			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
Ethylbenzene			ND
Toluene			ND
Xylenes			ND
Trichlorotrifluoroethane			ND

GBR-49

October November

December

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.20
Lab conductivity, umhos/cm	4570.00
Total dissolved solids (180)	3600.00
Total dissolved solids (calc)	3580.00
Total alkalinity as CaCO ₃	352.00
Total hardness as CaCO ₃	1350.00
Bicarbonate as HCO ₃	429.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	409.00
Sulfate	1800.00
Calcium	393.00
Magnesium	90.00
Potassium	3.80
Sodium	672.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.20
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.60
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	94 (D) 10
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	7.40
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	3.90
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-49 (Continued)

	October	November	December
AROMATICS			
Benzene			ND
Chlorobenzene			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
Ethylbenzene			ND
Toluene			ND
Xylenes			ND
Trichlorotrifluoroethane			ND

(D)10=Diluted 10X

GBR-50

October November December

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.30
Lab conductivity, umhos/cm	3120.00
Total dissolved solids (180)	2630.00
Total dissolved solids (calc)	2580.00
Total alkalinity as CaCO ₃	216.00
Total hardness as CaCO ₃	1080.00
Bicarbonate as HCO ₃	263.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	43.00
Sulfate	1630.00
Calcium	318.00
Magnesium	70.00
Potassium	2.50
Sodium	395.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	0.60
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.30
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-50 (Continued)

	October	November	December
AROMATICS			
Benzene			ND
Chlorobenzene			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
Ethylbenzene			ND
Toluene			ND
Xylenes			ND
Trichlorotrifluoroethane			ND

OFFSITE WELLS

SHS-3

October

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6

October

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-10

October

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	9.00
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-12

October

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-13

October

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	3.30
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-15

October

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	3.90
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-16

October

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-17

October

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

*ND - Not detected at specified detection limit

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

OCTOBER, 1993

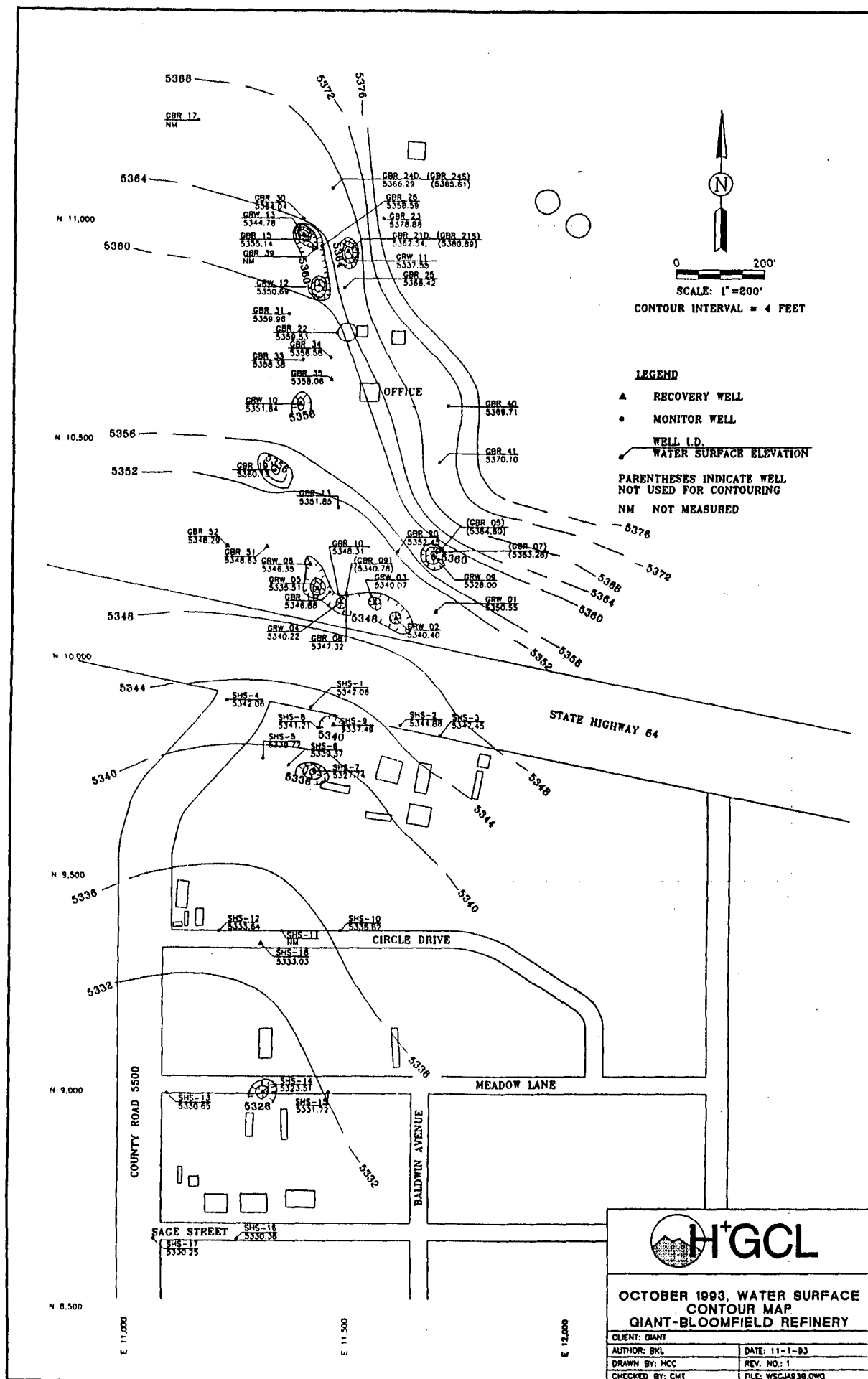
WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	43.75	43.75	0.00	5350.55
GRW-2	5391.28	50.88	50.88	0.00	5340.40
GRW-3	5388.77	48.70	48.70	0.00	5340.07
GRW-4	5390.02	49.80	49.80	0.00	5340.22
GRW-5	5390.56	55.05	55.05	0.00	5335.51
GRW-6	5390.81	44.46	44.46	0.00	5346.35
GRW-10	5395.02	44.85	42.76	2.09	5351.84
GRW-11	5397.85	60.30	60.30	0.00	5337.55
GRW-12	5397.24	46.55	46.55	0.00	5350.69
GRW-13	5396.90	52.12	52.12	0.00	5344.78
GBR-5	5395.07	31.55	30.20	1.35	5364.60
GBR-6	5395.70	67.70	67.70	0.00	5328.00
GBR-7	5395.85	33.08	32.44	0.64	5363.28
GBR-8	5390.50	44.30	42.90	1.40	5347.32
GBR-9	5389.92	49.14	49.14	0.00	5340.78
GBR-10	5390.57	42.26	42.26	0.00	5348.31
GBR-11	5389.43	43.55	42.30	1.25	5346.88
GBR-13	5393.04	41.19	41.19	0.00	5351.85
GBR-15	5397.99	42.85	42.85	0.00	5355.14
GBR-18	5421.68	29.45	29.45	0.00	5392.23
GBR-19	5393.83	33.70	33.70	0.00	5360.13
GBR-20	5393.47	43.08	40.50	2.58	5352.45
GBR-21S	5400.65	19.77	19.76	0.01	5380.89
GBR-21D	5400.19	37.65	37.65	0.00	5362.54
GBR-22	5395.91	36.86	36.26	0.60	5359.53
GBR-23	5403.72	22.06	22.06	0.00	5378.88
GBR-24S	5396.08	24.85	24.84	0.01	5365.61
GBR-24D	5396.77	30.48	30.48	0.00	5366.29
GBR-25	5396.72	30.30	30.30	0.00	5366.42
GBR-26	5395.59	37.00	37.00	0.00	5358.59
GBR-30	5396.58	32.54	32.54	0.00	5364.04
GBR-31	5394.86	34.90	34.90	0.00	5359.96
GBR-33	5396.28	37.90	37.90	0.00	5358.38
GBR-34	5394.00	36.10	35.25	0.85	5358.58
GBR-35	5393.66	36.50	35.38	1.12	5358.06
GBR-39	5397.55	0.00	0.00	0.00	5397.55
GBR-40	5400.76	31.05	31.05	0.00	5369.71
GBR-41	5396.35	26.25	26.25	0.00	5370.10
GBR-51	5389.68	41.05	41.05	0.00	5348.63
GBR-52	5387.74	39.45	39.45	0.00	5348.29

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE
OCTOBER, 1993
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.58	41.45	0.13	5342.06
SHS-2	5381.66	36.78	36.78	0.00	5344.88
SHS-3	5383.33	35.88	35.88	0.00	5347.45
SHS-4	5383.62	41.54	41.54	0.00	5342.08
SHS-5	5378.36	38.64	38.64	0.00	5339.72
SHS-6	5378.17	38.80	38.80	0.00	5339.37
SHS-7	5375.89	48.15	48.15	0.00	5327.74
SHS-8	5380.25	39.04	39.04	0.00	5341.21
SHS-9	5380.79	43.30	43.30	0.00	5337.49
SHS-10	5373.80	37.18	37.18	0.00	5336.62
SHS-12	5373.94	40.30	40.30	0.00	5333.64
SHS-13	5367.81	37.16	37.16	0.00	5330.65
SHS-14	5367.07	44.02	43.44	0.58	5323.51
SHS-15	5366.21	34.49	34.49	0.00	5331.72
SHS-16	5362.58	32.20	32.20	0.00	5330.38
SHS-17	5364.35	34.10	34.10	0.00	5330.25
SHS-18	5373.64	40.61	40.61	0.00	5333.03

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Fourth Quarter, 1993

Tank Number	Beginning Volume	Ending Volume	Net Change
102	10,847	15,777	4,930
106	8,010	8,010	0
21	149,042	61,370	-87,672
22	223,317	250,887	27,570
Total Net Volume Change			-55,172

4.0

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Fourth Quarter, 1993

Well	Month #1	Month #2	Month #3	Total
GRW-1	7,590	7,020	4,890	19,500
GRW-2	12,230	11,730	18,720	42,680
GRW-3	6,190	6,160	9,690	22,040
GRW-4	7,180	150	7,700	15,030
GRW-5	49,430	38,360	24,870	112,660
GRW-6	25,770	23,500	27,140	76,410
GRW-9	7,580	5,490	10,710	23,780
GRW-10	148,750	114,600	329,850	593,200
GRW-11	36,800	39,020	28,960	104,780
GRW-12	17,690	13,430	11,930	43,050
GRW-13	28,110	22,840	25,710	76,660
SHS-7	101	82	247	430
SHS-9	13,787	11,257	15,501	40,545
SHS-14	127,637	120,577	165,193	413,407
SHS-18	8,029	5,554	9,406	22,989
Total Volume Pumped In Gallons				1,607,161

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Fourth Quarter, 1993

=====

Total Volume Of Water Recovered	1,607,161
Net Change In Storage Volume	(55,172)

Total Water Pumped To The Infiltration Gallery	1,497,889
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=====

Difference	(54,100)
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Comments: The approximately 3.6% difference
is due to meter inaccuracy.

SECTION 5

SPECIFIC CONDUCTANCE TRACKING

GRW-13

October November

December

Lab Conductivity	4020.00	4200.00
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SECTION 6

BIOREMEDIATION PROJECT

October November December

GBR-20

Lab pH, s.u.	8.30	7.80
Lab conductivity, umhos/cm	2950.00	2820.00
Dissolved Oxygen, mg/l	3.50	8.70
Benzene	22.00	97.90
Toluene	1.00	ND
Ethylbenzene	62.00	194.00
m,p-Xylenes		517.00
o-Xylene		93.40
Total Xylenes	110.00	
Iron	5600.00	9060.00
Manganese	430.00	980.00
Potassium	1200.00	390.00
Total Heterotrophic Bacteria 12/1/93		7.3×10^4
Total Heterotrophic Bacteria 12/16/93		8.3×10^5

GBR-41

Lab pH, s.u.	7.20
Lab conductivity, umhos/cm	3250.00
Dissolved Oxygen, mg/l	2.89
Orthophosphate	20.00
Ammonia	350.00
Nitrate	20.00
Potassium	1170.00
Iron	33800.00
Manganese	740.00
Benzene	232.00
Toluene	11.20
Ethylbenzene	1060.00
m,p-Xylenes	1050.00
o-Xylene	20.70
Total Heterotrophic Bacteria 12/1/93	8.8×10^3
Total Heterotrophic Bacteria 12/16/93	9.0×10^3

GRW-6

October November December

Lab pH, s.u.	7.40
Lab conductivity, umhos/cm	3500.00
Dissolved Oxygen, mg/l	3.15
Orthophosphate	10.00
Ammonia	100.00
Nitrate	120.00
Potassium	3510.00
Iron	810.00
Manganese	1030.00
Benzene	6.27
Toluene	ND
Ethylbenzene	3.15
m,p-Xylenes	2.32
o-Xylene	ND
Total Heterotrophic Bacteria 12/1/93	(2.8 X 10 ⁵)
Total Heterotrophic Bacteria 12/16/93	(2.1 X 10 ⁵)

GBR-40

Lab pH, s.u.	7.90
Lab conductivity, umhos/cm	2900.00
Dissolved Oxygen, mg/l	7.25
Orthophosphate	0.01
Ammonia	ND
Nitrate	0.10
Potassium	1.17
Iron	7.42
Manganese	0.63
Benzene	51.10
Toluene	0.70
Ethylbenzene	40.20
m,p-Xylenes	74.70
o-Xylene	ND

INFILTRATION GALLERY

Dissolved Oxygen	7.70
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QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
THIRD QUARTER, 1993

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505) 632-3306
FAX (505) 632-2487

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Introduction and Summary.....	Section 1
Quarterly Analytical Results.....	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Specific Conductance Tracking	Section 5

INTRODUCTION AND SUMMARY QUARTERLY REPORT THIRD QUARTER, 1993

INTRODUCTION

Installation of the carbon filter system was initiated in the third quarter. Completion is scheduled for the fourth quarter of 1993.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 QUARTERLY ANALYTICAL DATA SUMMARY
 THIRD QUARTER, 1993

STRIPPER INFLUENT

	7/93	8/93	9/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.20	6.50	6.30
Lab conductivity, umhos/cm	3470.00	3650.00	3800.00
Total dissolved solids (180)	2030.00	2590.00	2600.00
Total dissolved solids (calc)	2550.00	2550.00	2530.00
Total alkalinity as CaCO ₃	431.00	114.00	169.00
Total hardness as CaCO ₃	926.00	935.00	936.00
Bicarbonate as HCO ₃	526.00	139.00	206.00
Carbonate as CO ₃	0.00	0.00	0.00
Hydroxide as OH	0.00	0.00	0.00
Chloride	322.00	537.00	480.00
Sulfate	1110.00	1080.00	1120.00
Calcium	334.00	321.00	310.00
Magnesium	23.00	33.00	40.00
Potassium	2.50	14.00	3.90
Sodium	499.00	498.00	476.00
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	0.60	0.30	ND
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	1.20	0.80	0.30
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	0.30	ND

STRIPPER INFLUENT (Continued)

	7/93	8/93	9/93
1,1,1-Trichloroethane	0.40	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
	ND	ND	ND
AROMATICS	ND	ND	ND
Benzene	9.40	9.20	4.60
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	1.70	1.70	0.70
Toluene	ND	ND	ND
Xylenes	2.50	1.50	ND
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	7/93	8/93	9/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.30	7.30	5.80
Lab conductivity, umhos/cm	3540.00	3560.00	3580.00
Total dissolved solids (180)	2320.00	2560.00	2610.00
Total dissolved solids (calc)	2480.00	2500.00	2550.00
Total alkalinity as CaCO ₃	188.00	168.00	129.00
Total hardness as CaCO ₃	922.00	917.00	915.00
Bicarbonate as HCO ₃	229.00	205.00	158.00
Carbonate as CO ₃	0.00	0.00	0.00
Hydroxide as OH	0.00	0.00	0.00
Chloride	479.00	494.00	517.00
Sulfate	1050.00	1080.00	1080.00
Calcium	330.00	298.00	306.00
Magnesium	24.00	42.00	37.00
Potassium	2.70	3.00	7.40
Sodium	475.00	482.00	523.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	0.30	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	0.20	ND
1,2-Dichloroethene	ND	0.80	ND
cis-1,2-Dic anthracene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

STRIPPER EFFLUENT (Continued)

	7/93	8/93	9/93
AROMATICS			
Benzene	ND	0.90	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

GBR-15

7/93

8/93

9/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.40
Lab conductivity, umhos/cm	4220.00
Total dissolved solids (180)	3060.00
Total dissolved solids (calc)	2970.00
Total alkalinity as CaCO ₃	375.00
Total hardness as CaCO ₃	1050.00
Bicarbonate as HCO ₃	457.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	564.00
Sulfate	1220.00
Calcium	387.00
Magnesium	20.00
Potassium	4.60
Sodium	550.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	11.00
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.30
1,1,1-Trichloroethane	0.50
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-15 (Continued)

	7/93	8/93	9/93
AROMATICS			
Benzene	5.60		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	4.40		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-24D

7/93

8/93

9/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.20
Lab conductivity, umhos/cm	4560.00
Total dissolved solids (180)	3530.00
Total dissolved solids (calc)	3400.00
Total alkalinity as CaCO ₃	208.00
Total hardness as CaCO ₃	1640.00
Bicarbonate as HCO ₃	253.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	690.00
Sulfate	1460.00
Calcium	540.00
Magnesium	72.00
Potassium	4.60
Sodium	515.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	22.00
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.40
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-24D (Continued)

	7/93	8/93	9/93
AROMATICS			
Benzene	6.60		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	4.50		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-30

7/93

8/93

9/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.00
Lab conductivity, umhos/cm	3720.00
Total dissolved solids (180)	2660.00
Total dissolved solids (calc)	2650.00
Total alkalinity as CaCO ₃	226.00
Total hardness as CaCO ₃	996.00
Bicarbonate as HCO ₃	276.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	504.00
Sulfate	1120.00
Calcium	362.00
Magnesium	23.00
Potassium	2.80
Sodium	500.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-30 (Continued)

	7/93	8/93	9/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-31 7/93 8/93 9/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.30
Lab conductivity, umhos/cm	3510.00
Total dissolved solids (180)	2560.00
Total dissolved solids (calc)	2550.00
Total alkalinity as CaCO ₃	269.00
Total hardness as CaCO ₃	926.00
Bicarbonate as HCO ₃	328.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	406.00
Sulfate	1120.00
Calcium	337.00
Magnesium	21.00
Potassium	2.50
Sodium	505.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-31 (Continued)

	7/93	8/93	9/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

OFFSITE WELLS

SHS-3

7/93

8/93

9/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	6.90
Lab conductivity, umhos/cm	4470.00
Total dissolved solids (180)	3900.00
Total dissolved solids (calc)	3780.00
Total alkalinity as CaCO ₃	210.00
Total hardness as CaCO ₃	1880.00
Bicarbonate as HCO ₃	257.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	386.00
Sulfate	2060.00
Calcium	616.00
Magnesium	83.00
Potassium	7.40
Sodium	500.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-3 (Continued)

	7/93	8/93	9/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-6	7/93	8/93	9/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.40		
Lab conductivity, umhos/cm	2880.00		
Total dissolved solids (180)	2380.00		
Total dissolved solids (calc)	2340.00		
Total alkalinity as CaCO ₃	279.00		
Total hardness as CaCO ₃	936.00		
Bicarbonate as HCO ₃	340.00		
Carbonate as CO ₃	0.00		
Hydroxide as OH	0.00		
Chloride	85.00		
Sulfate	1340.00		
Calcium	348.00		
Magnesium	17.00		
Potassium	2.50		
Sodium	378.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

SHS-6 (Continued)

	7/93	8/93	9/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-10

	7/93	8/93	9/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.10		
Lab conductivity, umhos/cm	2350.00		
Total dissolved solids (180)	1790.00		
Total dissolved solids (calc)	1800.00		
Total alkalinity as CaCO ₃	317.00		
Total hardness as CaCO ₃	691.00		
Bicarbonate as HCO ₃	387.00		
Carbonate as CO ₃	0.00		
Hydroxide as OH	0.00		
Chloride	70.00		
Sulfate	951.00		
Calcium	227.00		
Magnesium	30.00		
Potassium	7.80		
Sodium	320.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.20
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-10 (Continued)

ND

7/93

8/93

9/93

AROMATICS

Benzene

0.60

Chlorobenzene

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

Ethylbenzene

11.00

Toluene

ND

Xylenes

1.30

Trichlorotrifluoroethane

ND

SHS-12

	7/93	8/93	9/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.30		
Lab conductivity, umhos/cm	3670.00		
Total dissolved solids (180)	2510.00		
Total dissolved solids (calc)	2710.00		
Total alkalinity as CaCO ₃	1070.00		
Total hardness as CaCO ₃	883.00		
Bicarbonate as HCO ₃	1310.00		
Carbonate as CO ₃	0.00		
Hydroxide as OH	0.00		
Chloride	504.00		
Sulfate	694.00		
Calcium	287.00		
Magnesium	41.00		
Potassium	2.00		
Sodium	540.00		
	ND		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	0.20		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

SHS-12 (Continued)

7/93

8/93

9/93

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-13

	7/93	8/93	9/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.40		
Lab conductivity, umhos/cm	3350.00		
Total dissolved solids (180)	2070.00		
Total dissolved solids (calc)	2040.00		
Total alkalinity as CaCO ₃	909.00		
Total hardness as CaCO ₃	700.00		
Bicarbonate as HCO ₃	1110.00		
Carbonate as CO ₃	0.00		
Hydroxide as OH	0.00		
Chloride	487.00		
Sulfate	248.00		
Calcium	211.00		
Magnesium	42.00		
Potassium	1.80		
Sodium	507.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	2.00
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-13 (Continued)

7/93 8/93 9/93

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-15

7/93

8/93

9/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.30
Lab conductivity, umhos/cm	1700.00
Total dissolved solids (180)	1260.00
Total dissolved solids (calc)	1290.00
Total alkalinity as CaCO ₃	260.00
Total hardness as CaCO ₃	677.00
Bicarbonate as HCO ₃	318.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	29.00
Sulfate	700.00
Calcium	224.00
Magnesium	29.00
Potassium	2.00
Sodium	146.00

HALOCARBONS

Bromodichloromethane	1.20
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	15.00
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-15 (Continued)

7/93

8/93

9/93

AROMATICS

Benzene

ND

Chlorobenzene

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

Ethylbenzene

ND

Toluene

ND

Xylenes

ND

Trichlorotrifluoroethane

ND

SHS-16

	7/93	8/93	9/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.30		
Lab conductivity, umhos/cm	2740.00		
Total dissolved solids (180)	2490.00		
Total dissolved solids (calc)	2310.00		
Total alkalinity as CaCO ₃	262.00		
Total hardness as CaCO ₃	1270.00		
Bicarbonate as HCO ₃	319.00		
Carbonate as CO ₃	0.00		
Hydroxide as OH	0.00		
Chloride	46.00		
Sulfate	1400.00		
Calcium	437.00		
Magnesium	43.00		
Potassium	2.40		
Sodium	229.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-16 (Continued)

7/93

8/93

9/93

AROMATICS

Benzene

ND

Chlorobenzene

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

Ethylbenzene

ND

Toluene

ND

Xylenes

ND

Trichlorotrifluoroethane

ND

SHS-17

	7/93	8/93	9/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.40		
Lab conductivity, umhos/cm	3380.00		
Total dissolved solids (180)	2900.00		
Total dissolved solids (calc)	2770.00		
Total alkalinity as CaCO ₃	262.00		
Total hardness as CaCO ₃	1320.00		
Bicarbonate as HCO ₃	320.00		
Carbonate as CO ₃	0.00		
Hydroxide as OH	0.00		
Chloride	114.00		
Sulfate	1630.00		
Calcium	447.00		
Magnesium	51.00		
Potassium	3.50		
Sodium	363.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	0.30
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-17 (Continued)

	7/93	8/93	9/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

*ND - Not detected at specified detection limit

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

JULY, 1993

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	58.36	58.36	0.00	5335.94
GRW-2	5391.28	50.84	50.84	0.00	5340.44
GRW-3	5388.77	48.28	48.28	0.00	5340.49
GRW-4	5390.02	49.80	49.80	0.00	5340.22
GRW-5	5390.56	45.40	45.40	0.00	5345.16
GRW-6	5390.81	45.80	45.80	0.00	5345.01
GRW-10	5395.02	54.30	46.92	7.38	5346.62
GRW-11	5397.85	60.05	60.05	0.00	5337.80
GRW-12	5397.24	45.30	45.30	0.00	5351.94
GRW-13	5396.90	53.75	53.75	0.00	5343.15
GBR-5	5395.07	30.80	29.45	1.35	5365.35
GBR-6	5395.70	56.15	56.15	0.00	5339.55
GBR-7	5395.85	32.68	32.04	0.64	5363.68
GBR-8	5390.50	43.63	42.50	1.13	5347.77
GBR-9	5389.92	48.90	48.90	0.00	5341.02
GBR-10	5390.57	42.22	42.22	0.00	5348.35
GBR-11	5389.43	42.05	41.85	0.20	5347.54
GBR-13	5393.04	40.78	40.78	0.00	5352.26
GBR-15	5397.99	43.20	43.20	0.00	5354.79
GBR-18	5421.68	39.17	39.17	0.00	5382.51
GBR-19	5393.83	35.56	35.56	0.00	5358.27
GBR-20	5393.47	42.75	40.14	2.61	5352.81
GBR-21S	5400.65	19.76	19.76	0.00	5380.89
GBR-21D	5400.19	36.02	36.02	0.00	5364.17
GBR-22	5395.91	35.44	35.44	0.00	5360.47
GBR-23	5403.72	22.15	22.15	0.00	5377.77
GBR-24S	5396.08	25.95	25.95	0.00	5364.92
GBR-24D	5396.77	31.16	31.16	0.00	5365.61
GBR-25	5396.72	30.77	30.77	0.00	5365.95
GBR-26	5395.59	37.30	37.30	0.00	5358.29
GBR-30	5396.58	33.53	33.53	0.00	5363.05
GBR-31	5394.86	35.10	35.10	0.00	5359.76
GBR-33	5396.28	38.00	38.00	0.00	5358.28
GBR-34	5394.00	35.11	35.10	0.01	5358.90
GBR-35	5393.66	35.29	35.30	-0.01	5358.36
GBR-39	5397.55	40.85	40.85	0.00	5356.70
GBR-40	5400.76	30.60	30.60	0.00	5370.16
GBR-41	5396.35	25.56	25.56	0.00	5370.79
GBR-51	5389.68	40.80	40.80	0.00	5348.88
GBR-52	5387.74	39.17	39.17	0.00	5348.57

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

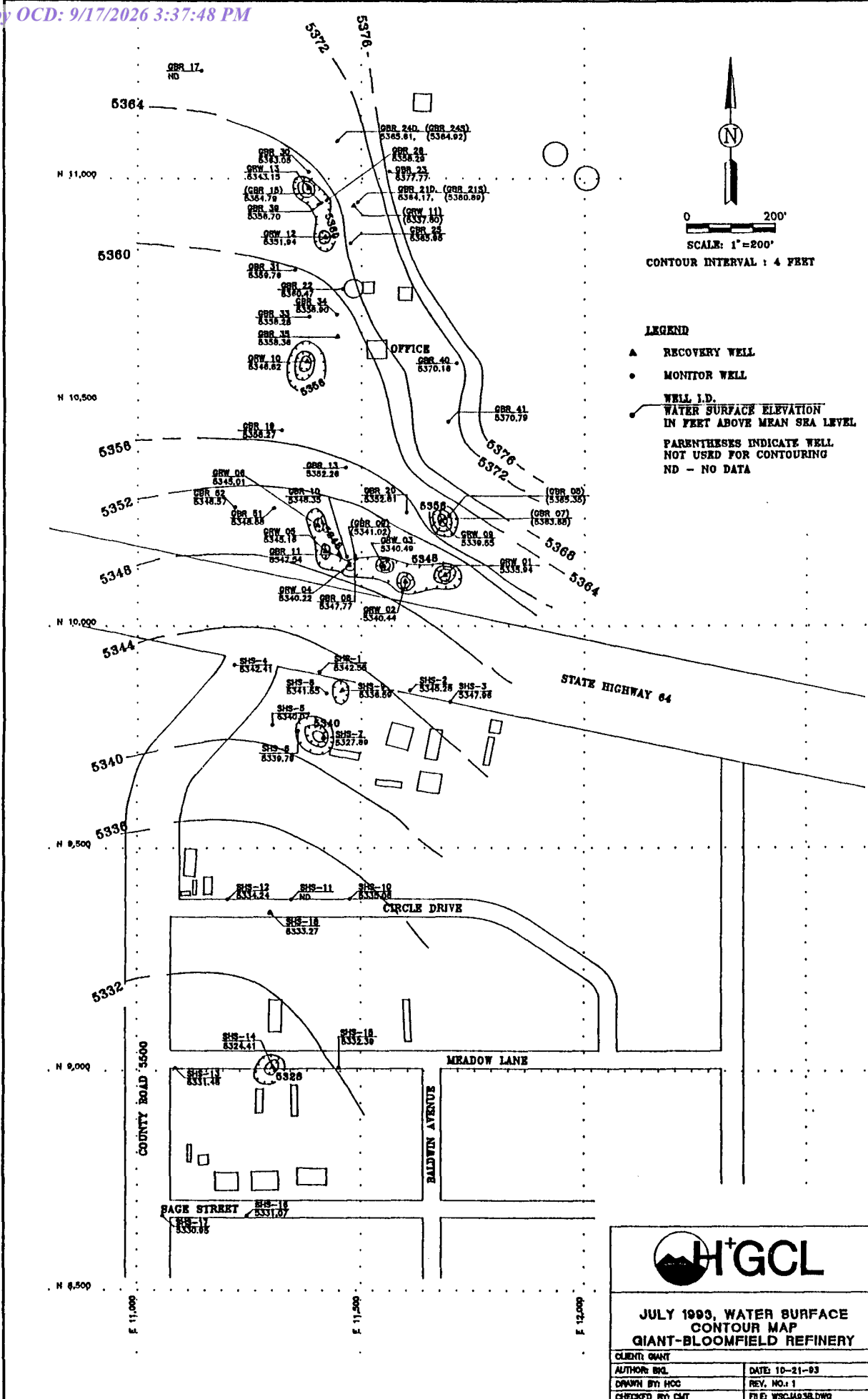
QUARTERLY POTENTIOMETRIC SURFACE

JULY, 1993

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.15	40.95	0.20	5342.55
SHS-2	5381.66	36.38	36.38	0.00	5345.28
SHS-3	5383.33	35.37	35.37	0.00	5347.96
SHS-4	5383.62	41.21	41.21	0.00	5342.41
SHS-5	5378.36	38.29	38.29	0.00	5340.07
SHS-6	5378.17	38.38	38.38	0.00	5339.79
SHS-7	5375.89	48.00	48.00	0.00	5327.89
SHS-8	5380.25	38.70	38.70	0.00	5341.55
SHS-9	5380.79	44.20	44.20	0.00	5336.59
SHS-10	5373.80	38.74	38.74	0.00	5335.06
SHS-12	5373.94	39.70	39.70	0.00	5334.24
SHS-13	5367.81	36.33	36.33	0.00	5331.48
SHS-14	5367.07	42.66	42.66	0.00	5324.41
SHS-15	5366.21	33.82	33.82	0.00	5332.39
SHS-16	5362.58	31.51	31.51	0.00	5331.07
SHS-17	5364.35	33.40	33.40	0.00	5330.95
SHS-18	5373.64	40.37	40.37	0.00	5333.27

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Third Quarter, 1993

Tank Number	Beginning Volume	Ending Volume	Net Change
102	17609	10847	-6762
106	8010	8010	0
21	404752	149042	-255710
22	223317	223317	0
Total Net Volume Change			-262472

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Third Quarter, 1993

Well	Month #1	Month #2	Month #3	Total
GRW-1	10520	8660	8770	27950
GRW-2	11460	10880	13310	35650
GRW-3	6890	6370	7100	20360
GRW-4	20710	18880	17080	56670
GRW-5	57670	46270	51310	155250
GRW-6	31950	26040	30220	88210
GRW-9	6340	9200	10940	26480
GRW-10	213740	207210	180780	601730
GRW-11	36210	16370	37260	89840
GRW-12	16260	17700	19600	53560
GRW-13	36340	36540	37150	110030
SHS-7	36	58	112	206
SHS-9	15484	14448	16515	46447
SHS-14	112474	89650	114882	317006
SHS-18	19355	7431	3155	29941
Total Volume Pumped In Gallons				1659330

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Third Quarter, 1993

=====

Total Volume Of Water Recovered	1,659,330
Net Change In Storage Volume	(262,472)
 Total Water Pumped To The Infiltration Gallery	 1,336,720

=====

Difference	(60,138)
------------	----------

Comments: The approximately 4.5% difference
is due to meter inaccuracy.

SECTION 5

SPECIFIC CONDUCTANCE TRACKING

GRW-13	7/93	8/93	9/93
Lab Conductivity	4040.00	3890.00	4310.00

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
SECOND QUARTER, 1993

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505) 632-3306
FAX (505) 632-2487

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Quarterly Analytical Results	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Specific Conductance Tracking	Section 5

INTRODUCTION AND SUMMARY QUARTERLY REPORT SECOND QUARTER, 1993

INTRODUCTION

No changes were made to the operation during the second quarter. There was no significant downtime.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 QUARTERLY ANALYTICAL DATA SUMMARY
 SECOND QUARTER, 1993

STRIPPER INFLUENT

	4/93	5/93	6/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.30	6.80	
Lab conductivity, umhos/cm	3420.00	3460.00	
Total dissolved solids (180)	2560.00	2640.00	
Total dissolved solids (calc)	2540.00	2500.00	
Total alkalinity as CaCO ₃	369.00	311.00	
Total hardness as CaCO ₃	951.00	954.00	
Bicarbonate as HCO ₃	450.00	379.00	
Carbonate as CO ₃	0.00	0.00	
Hydroxide as OH	0.00	0.00	
Chloride	334.00	380.00	
Sulfate	1100.00	1110.00	
Calcium	357.00	304.00	
Magnesium	15.00	48.00	
Potassium	2.50	2.60	
Sodium	501.00	464.00	

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	0.30	ND	ND
1,2-Dichloroethane	0.50	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	ND	ND	0.40
trans-1,2-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	1.50	0.50	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND

STRIPPER INFLUENT (Continued)

	4/93	5/93	6/93
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	0.30	ND	ND
Trichloroethene	0.20	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
AROMATICS			
Benzene	16.00	12.00	5.50
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	5.80	3.90	1.70
Toluene	0.20	ND	ND
Xylenes	6.50	ND	1.80
Trichlorotrifluoroethane	ND	ND	12.00

STRIPPER EFFLUENT

	4/93	5/93	6/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.00	7.80	6.70
Lab conductivity, umhos/cm	3490.00	3520.00	3500.00
Total dissolved solids (180)	2570.00	2620.00	2610.00
Total dissolved solids (calc)	2560.00	2500.00	2470.00
Total alkalinity as CaCO ₃	278.00	244.00	243.00
Total hardness as CaCO ₃	945.00	954.00	920.00
Bicarbonate as HCO ₃	339.00	298.00	297.00
Carbonate as CO ₃	0.00	0.00	0.00
Hydroxide as OH	0.00	0.00	0.00
Chloride	404.00	418.00	445.00
Sulfate	1110.00	1110.00	1070.00
Calcium	351.00	301.00	323.00
Magnesium	17.00	49.00	28.00
Potassium	2.40	2.30	2.40
Sodium	505.00	467.00	448.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	0.60
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	0.20	ND	ND
1,2-Dichloroethene	ND	ND	ND
cis-1,2-Dic anthracene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

STRIPPER EFFLUENT (Continued)

	4/93	5/93	6/93
AROMATICS			
Benzene	ND	3.40	1.80
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	1.40	1.20
Toluene	ND	ND	ND
Xylenes	ND	3.00	1.80
Trichlorotrifluoroethane	ND	ND	ND

GBR-17	4/93	5/93	6/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)			7.40
Lab conductivity, umhos/cm			2630.00
Total dissolved solids (180)			3.80
Total dissolved solids (calc)			2090.00
Total alkalinity as CaCO ₃			239.00
Total hardness as CaCO ₃			950.00
Bicarbonate as HCO ₃			292.00
Carbonate as CO ₃			0.00
Hydroxide as OH			0.00
Chloride			54.00
Sulfate			1250.00
Calcium			346.00
Magnesium			21.00
Potassium			0.40
Sodium			270.00
HALOCARBONS			
Bromodichloromethane			ND
Bromoform			ND
Bromomethane			ND
Carbon tetrachloride			ND
Chloroethane			ND
Chloroethane			ND
2-Chloroethylvinylether			ND
Chloroform			ND
Chloromethane			ND
Dibromochloromethane			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
1,1-Dichloroethane			ND
1,2-Dichloroethane			ND
1,2-Dichloroethene			ND
cis-1,2-Dichloroethene			ND
trans-1,2-Dichloroethene			ND
1,2-Dichloropropane			ND
cis-1,3-Dichloropropene			ND
trans-1,3-Dichloropropene			ND
Methylene chloride			ND
1,1,2,2-Tetrachloroethane			ND
Tetrachloroethene			ND
1,1,1-Trichloroethane			0.50
1,1,2-Trichloroethane			ND
Trichloroethene			ND
Trichlorofluoromethane			ND
Vinyl chloride			ND
AROMATICS			
Benzene			ND
Chlorobenzene			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
Ethylbenzene			ND
Toluene			ND
Xylenes			ND
Trichlorotrifluoroethane			ND

GBR-32

4/93

5/93

6/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.20
Lab conductivity, umhos/cm	4980.00
Total dissolved solids (180)	2.01
Total dissolved solids (calc)	3790.00
Total alkalinity as CaCO ₃	363.00
Total hardness as CaCO ₃	1350.00
Bicarbonate as HCO ₃	443.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	480.00
Sulfate	1920.00
Calcium	469.00
Magnesium	45.00
Potassium	4.10
Sodium	654.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.60
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	3.40
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	99.00
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	9.60
1,1,1-Trichloroethane	0.30
1,1,2-Trichloroethane	ND
Trichloroethene	6.40
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.50
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-48

4/93

5/93

6/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.10
Lab conductivity, umhos/cm	5730.00
Total dissolved solids (180)	1.75
Total dissolved solids (calc)	4240.00
Total alkalinity as CaCO ₃	328.00
Total hardness as CaCO ₃	1440.00
Bicarbonate as HCO ₃	400.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	671.00
Sulfate	1980.00
Calcium	544.00
Magnesium	21.00
Potassium	5.50
Sodium	818.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.30
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	40.00
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	3.80
1,1,1-Trichloroethane	0.30
1,1,2-Trichloroethane	ND
Trichloroethene	2.40
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.50
Xylenes	ND
Trichlorotrifluoroethane	

GBR-49

4/93

5/93

6/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.30
Lab conductivity, umhos/cm	4230.00
Total dissolved solids (180)	2.36
Total dissolved solids (calc)	3260.00
Total alkalinity as CaCO ₃	375.00
Total hardness as CaCO ₃	1150.00
Bicarbonate as HCO ₃	457.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	318.00
Sulfate	1680.00
Calcium	410.00
Magnesium	31.00
Potassium	3.70
Sodium	592.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.30
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	84.00
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	11.00
1,1,1-Trichloroethane	0.30
1,1,2-Trichloroethane	ND
Trichloroethene	6.50
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	0.90
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-50

4/93 5/93 6/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.40
Lab conductivity, umhos/cm	3110.00
Total dissolved solids (180)	3.22
Total dissolved solids (calc)	2520.00
Total alkalinity as CaCO3	228.00
Total hardness as CaCO3	980.00
Bicarbonate as HCO3	278.00
Carbonate as CO3	0.00
Hydroxide as OH	0.00
Chloride	42.00
Sulfate	1580.00
Calcium	369.00
Magnesium	15.00
Potassium	2.70
Sodium	382.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	0.90
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.50
1,1,1-Trichloroethane	0.50
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

OFFSITE WELLS

SHS-3

4/93

5/93

6/93

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6	4/93	5/93	6/93
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	0.80		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	0.30		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-10

4/93

5/93

6/93

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	16.00
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-12

4/93

5/93

6/93

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.30
1,2-Dichloroethane	0.40
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	0.40
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.20
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-13

4/93

5/93

6/93

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	0.30
1,1-Dichloroethane	ND
1,2-Dichloroethane	2.30
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-15

4/93

5/93

6/93

HALOCARBONS

Bromodichloromethane	0.50		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	7.90		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

4/93

5/93

6/93

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-17

4/93

5/93

6/93

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

*ND - Not detected at specified detection limit

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

APRIL, 1993

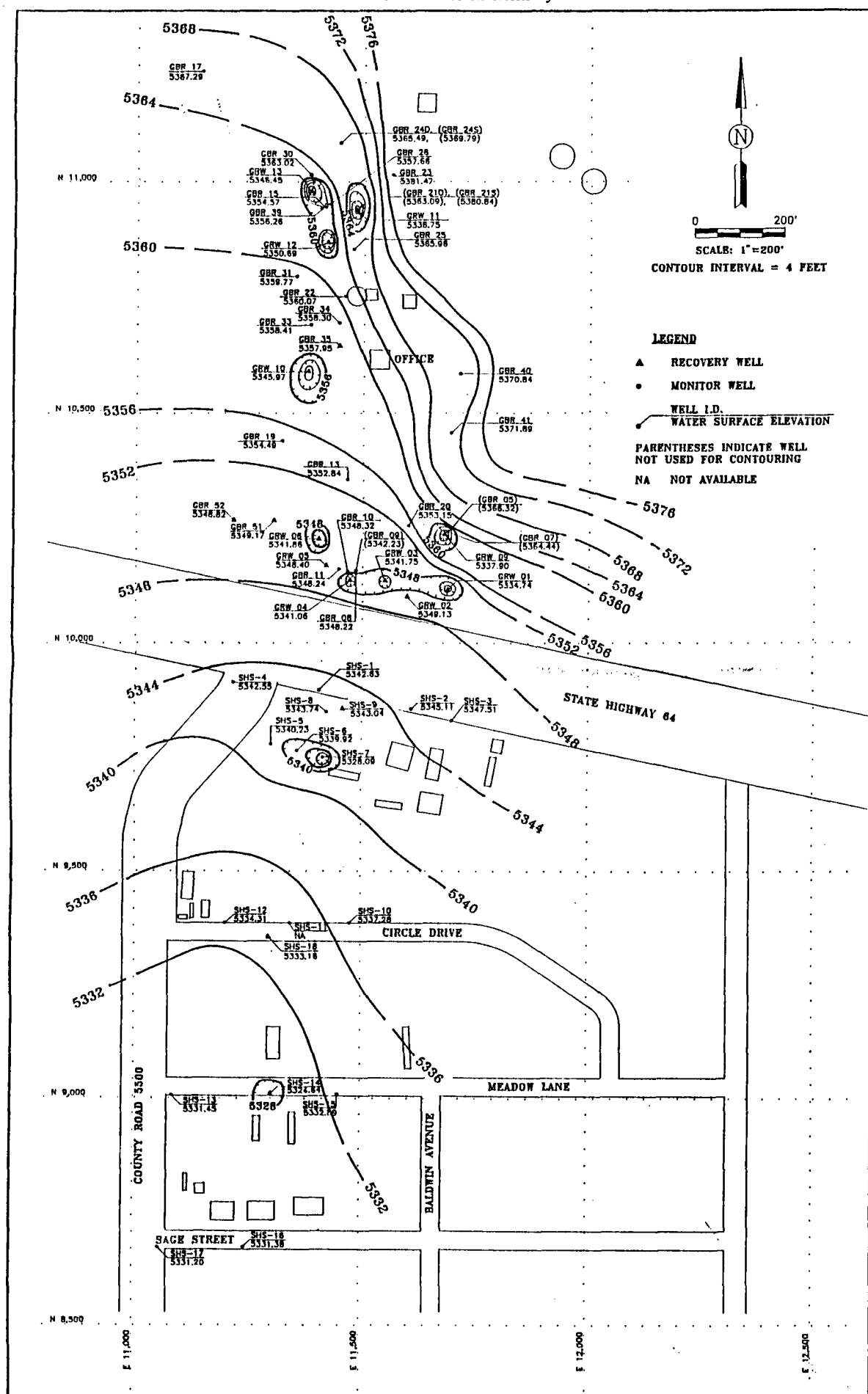
WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.56	59.56	0.00	5334.74
GRW-2	5391.28	42.15	42.15	0.00	5349.13
GRW-3	5388.77	47.02	47.02	0.00	5341.75
GRW-4	5390.02	48.96	48.96	0.00	5341.06
GRW-5	5390.56	42.16	42.16	0.00	5348.40
GRW-6	5390.81	48.95	48.95	0.00	5341.86
GRW-10	5395.02	60.25	46.30	13.95	5345.93
GRW-11	5397.85	59.10	59.10	0.00	5338.75
GRW-12	5397.24	46.55	46.55	0.00	5350.69
GRW-13	5396.90	50.45	50.45	0.00	5346.45
GBR-5	5395.07	29.76	28.50	1.26	5366.32
GBR-6	5395.70	57.80	57.80	0.00	5337.90
GBR-7	5395.85	31.94	31.28	0.66	5364.44
GBR-8	5390.50	42.40	42.25	0.15	5348.22
GBR-9	5389.92	47.69	47.69	0.00	5342.23
GBR-10	5390.57	42.25	42.25	0.00	5348.32
GBR-11	5389.43	41.25	41.17	0.08	5348.24
GBR-13	5393.04	40.20	40.20	0.00	5352.84
GBR-15	5397.99	43.42	43.42	0.00	5354.57
GBR-17	5402.69	35.40	35.40	0.00	5367.29
GBR-18	5421.68	27.69	27.69	0.00	5393.99
GBR-19	5393.83	39.34	39.34	0.00	5354.49
GBR-20	5393.47	42.40	39.81	2.59	5353.14
GBR-21S	5400.65	19.81	19.81	0.00	5380.84
GBR-21D	5400.19	37.10	37.10	0.00	5363.09
GBR-22	5395.91	36.53	35.67	0.86	5360.07
GBR-23	5403.72	22.25	22.25	0.00	5377.43
GBR-24S	5396.08	26.29	26.29	0.00	5364.80
GBR-24D	5396.77	31.28	31.28	0.00	5365.49
GBR-25	5396.72	30.76	30.76	0.00	5365.96
GBR-26	5395.59	37.93	37.93	0.00	5357.66
GBR-30	5396.58	33.56	33.56	0.00	5363.02
GBR-31	5394.86	35.09	35.09	0.00	5359.77
GBR-33	5396.28	37.89	37.87	0.02	5358.41
GBR-34	5394.00	36.75	35.44	1.31	5358.30
GBR-35	5393.66	37.04	35.38	1.66	5357.95
GBR-39	5397.55	41.29	41.29	0.00	5356.26
GBR-40	5400.76	29.92	29.92	0.00	5370.84
GBR-41	5396.35	24.46	24.46	0.00	5371.89
GBR-51	5389.68	40.51	40.51	0.00	5349.17
GBR-52	5387.74	38.92	38.92	0.00	5348.82

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 APRIL, 1993
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.93	40.91	0.02	5342.63
SHS-2	5381.66	36.55	36.55	0.00	5345.11
SHS-3	5383.33	35.82	35.82	0.00	5347.51
SHS-4	5383.62	41.07	41.07	0.00	5342.55
SHS-5	5378.36	38.13	38.13	0.00	5340.23
SHS-6	5378.17	38.25	38.25	0.00	5339.92
SHS-7	5375.89	47.80	47.80	0.00	5328.09
SHS-8	5380.25	36.51	36.51	0.00	5343.74
SHS-9	5380.79	37.75	37.75	0.00	5343.04
SHS-10	5373.80	36.52	36.52	0.00	5337.28
SHS-12	5373.94	39.63	39.63	0.00	5334.31
SHS-13	5367.81	36.36	36.36	0.00	5331.45
SHS-14	5367.07	42.43	42.43	0.00	5324.64
SHS-15	5366.21	33.32	33.32	0.00	5332.89
SHS-16	5362.58	31.20	31.20	0.00	5331.38
SHS-17	5364.35	33.15	33.15	0.00	5331.20
SHS-18	5373.64	40.48	40.48	0.00	5333.16

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Second Quarter, 1993

Tank Number	Beginning Volume	Ending Volume	Net Change
102	13101	17609	4508
106	8010	8010	0
21	289683	404752	115069
22	217803	223317	5514
Total Net Volume Change			125091

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Second Quarter, 1993

Well	Month #1	Month #2	Month #3	Total
GRW-1	15400	10280	11870	37550
GRW-2	0	7920	10940	18860
GRW-3	11480	6680	7530	25690
GRW-4	26850	17450	20410	64710
GRW-5	28220	84330	63470	176020
GRW-6	42590	23930	36090	102610
GRW-9	8840	6410	6350	21600
GRW-10	263180	154250	173400	590830
GRW-11	50400	35620	42610	128630
GRW-12	18020	11990	15220	45230
GRW-13	34930	23890	33100	91920
SHS-7	104	119	100	323
SHS-9	20443	16297	21522	58262
SHS-14	166763	123171	165626	455560
SHS-18	69050	68730	35216	172996
Total Volume Pumped In Gallons				1990791

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Second Quarter, 1993

=====

Total Volume Of Water Recovered	1990791
Net Change In Storage Volume	125091
 Total Water Pumped To The	 1663704
Infiltration Gallery	

=====

Difference	-201996
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Comments: The approximately 10% difference
is due to meter inaccuracy.

SECTION 5

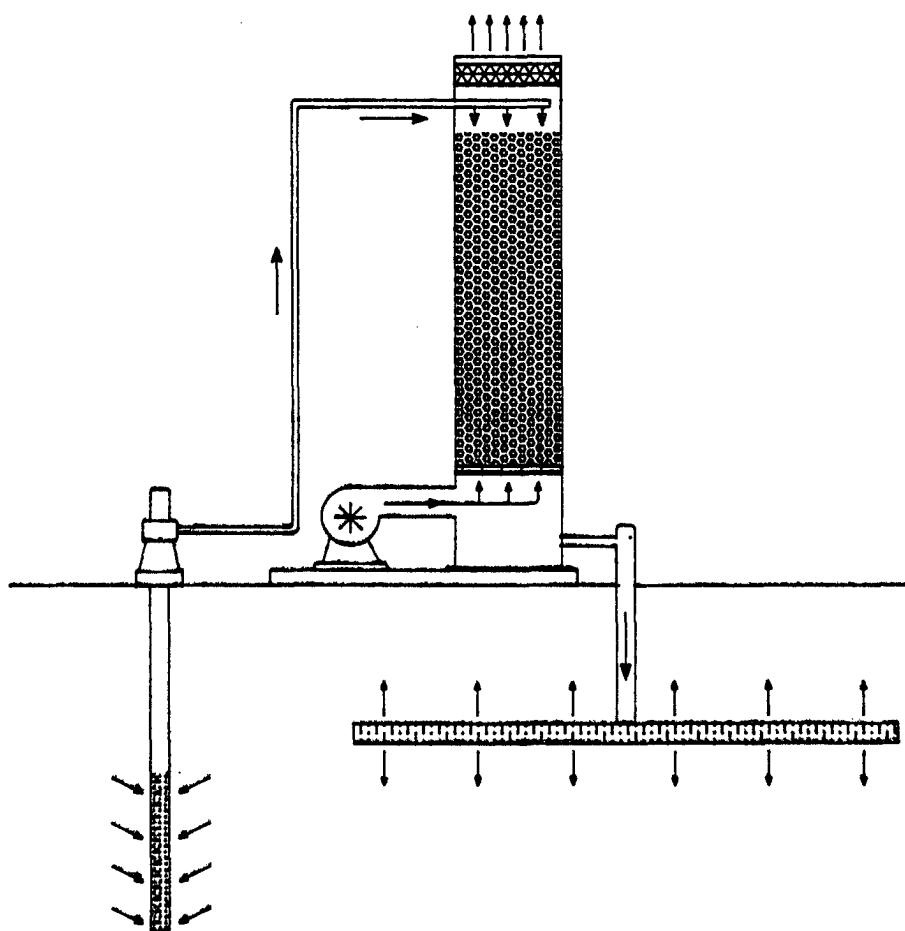
SPECIFIC CONDUCTANCE TRACKING

GRW-13	4/93	5/93	6/93
Lab Conductivity	4160.00	4140.00	4090.00

GIANT

REFINING CO.

BLOOMFIELD REFINERY REMEDIATION PROJECT



Post Office Box 256
606 E. Highway 64
Farmington, New Mexico 87401

(505) 632-3306
FAX (505) 632-2487

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APR 13 1993

**OIL CONSERVATION DIV.
SANTA FE**

**QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FIRST QUARTER, 1993**

Prepared By:

**GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505) 632-3306
FAX (505) 632-2487**

TABLE OF CONTENTS

Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Specific Conductance Tracking	Section 5

INTRODUCTION AND SUMMARY QUARTERLY REPORT FIRST QUARTER, 1993

INTRODUCTION

No changes were made to the operation during the first quarter. There was no significant downtime.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FIRST QUARTER, 1993**

STRIPPER INFLUENT

	1/93	2/93	3/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.40	7.20	7.10
Lab conductivity, umhos/cm	3530.00	3480.00	3420.00
Total dissolved solids (180)	2620.00	2580.00	2560.00
Total dissolved solids (calc)	2540.00	2510.00	2510.00
Total alkalinity as CaCO ₃	309.00	324.00	411.00
Total hardness as CaCO ₃	970.00	959.00	950.00
Bicarbonate as HCO ₃	377.00	395.00	501.00
Carbonate as CO ₃	ND	ND	ND
Hydroxide as OH	ND	ND	ND
Chloride	389.00	370.00	333.00
Sulfate	1120.00	1130.00	1090.00
Calcium	325.00	305.00	329.00
Magnesium	39.00	48.00	31.00
Potassium	3.00	2.60	20.00
Sodium	477.00	467.00	452.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	0.80	ND
1,2-Dichloroethane	0.50	0.60	ND
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	3.40	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	2.20
1,2-Dichloropropane	ND	3.20	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	17.60	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND

STRIPPER INFLUENT (Continued)

	1/93	2/93	3/93
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
AROMATICS			
Benzene	14.90	17.00	18.00
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	15.00	17.00
Toluene	0.70	ND	ND
Xylenes	42.50	25.00	24.00
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	1/93	2/93	3/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	8.00	7.60	7.30
Lab conductivity, umhos/cm	3540.00	3570.00	3470.00
Total dissolved solids (180)	2610.00	2610.00	2590.00
Total dissolved solids (calc)	2540.00	2520.00	2520.00
Total alkalinity as CaCO ₃	264.00	229.00	341.00
Total hardness as CaCO ₃	959.00	963.00	948.00
Bicarbonate as HCO ₃	322.00	280.00	416.00
Carbonate as CO ₃	ND	ND	ND
Hydroxide as OH	ND	ND	ND
Chloride	420.00	450.00	377.00
Sulfate	1110.00	1090.00	1110.00
Calcium	323.00	333.00	319.00
Magnesium	37.00	32.00	37.00
Potassium	2.40	24.00	2.60
Sodium	490.00	460.00	475.00
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	0.40
1,2-Dichloroethene	1.00	1.00	0.50
cis-1,2-Dic anthracene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

STRIPPER EFFLUENT (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	1.00	1.90	1.00
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	1.00	2.50	1.20
Toluene	ND	ND	ND
Xylenes	5.00	7.10	2.10
Trichlorotrifluoroethane	ND	ND	ND
PAH			
Naphthalene	9.30		
Acenaphthylene	ND		
Acenaphthene	ND		
Fluorene	21.00		
Phenanthrene	33.00		
Anthracene	ND		
Fluoranthene	47.00		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	100.00		
2-Methylnaphthalene	33.00		

GRW-3

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.90
Lab conductivity, umhos/cm	4010.00
Total dissolved solids (180)	3100.00
Total dissolved solids (calc)	3020.00
Total alkalinity as CaCO ₃	506.00
Total hardness as CaCO ₃	1070.00
Bicarbonate as HCO ₃	617.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	304.00
Sulfate	1400.00
Calcium	343.00
Magnesium	52.00
Potassium	3.80
Sodium	614.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GRW-3 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	8.60		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	4.80		
Toluene	ND		
Xylenes	1.90		
Trichlorotrifluoroethane	ND		
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenapgtene	ND		
Fluorene	1.20		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GRW-6

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.20
Lab conductivity, umhos/cm	3520.00
Total dissolved solids (180)	2260.00
Total dissolved solids (calc)	2180.00
Total alkalinity as CaCO ₃	691.00
Total hardness as CaCO ₃	593.00
Bicarbonate as HCO ₃	844.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	495.00
Sulfate	444.00
Calcium	212.00
Magnesium	16.00
Potassium	2.10
Sodium	596.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.20
1,2-Dichloroethane	0.90
1,2-Dichloroethene	1.20
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GRW-6 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	0.80		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	4.80		
Toluene	ND		
Xylenes	1.90		
Trichlorotrifluoroethane	ND		
PAH			
Naphthalene	ND		
Acenaphthylene	3.50		
Acenapgtene	ND		
Fluorene	0.91		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GRW-13

1/93 2/93 3/93

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	5.70
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GRW-13 (Continued)

1/93 2/93 3/93

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Naphthalene	ND
Acenaphthylene	ND
Acenapgtene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(A)Anthracene	ND
Chrysene	ND
Benzo(B)Fluoranthene	ND
Benzo(K)Fluoranthene	ND
Benzo(A)Pyrene	ND
Dibenzo(a,h)Anthracene	ND
Benzo(g,h,i)Perylene	ND
Indeno(1,2,3-CD)Pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND

GBR-15

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.70
Lab conductivity, umhos/cm	4540.00
Total dissolved solids (180)	3290.00
Total dissolved solids (calc)	3230.00
Total alkalinity as CaCO ₃	319.00
Total hardness as CaCO ₃	1120.00
Bicarbonate as HCO ₃	389.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	607.00
Sulfate	1340.00
Calcium	389.00
Magnesium	37.00
Potassium	4.60
Sodium	667.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	16.60
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-15 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	1.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	0.60		
Toluene	2.10		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-17

1/93

2/93

12/92

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.10
Lab conductivity, umhos/cm	2670.00
Total dissolved solids (180)	2180.00
Total dissolved solids (calc)	2140.00
Total alkalinity as CaCO ₃	218.00
Total hardness as CaCO ₃	922.00
Bicarbonate as HCO ₃	266.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	59.00
Sulfate	1270.00
Calcium	315.00
Magnesium	33.00
Potassium	1.40
Sodium	337.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-17 (Continued)

	1/93	2/93	12/92
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenapgtene	ND		
Fluorene	ND		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-24D

	1/93	2/93	3/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.70	7.20	
Lab conductivity, umhos/cm	4890.00	3480.00	
Total dissolved solids (180)	3810.00	2580.00	
Total dissolved solids (calc)	3490.00	2510.00	
Total alkalinity as CaCO ₃	192.00	324.00	
Total hardness as CaCO ₃	1730.00	959.00	
Bicarbonate as HCO ₃	235.00	395.00	
Carbonate as CO ₃	ND	ND	
Hydroxide as OH	ND	ND	
Chloride	727.00	370.00	
Sulfate	1530.00	1130.00	
Calcium	569.00	305.00	
Magnesium	75.00	48.00	
Potassium	5.10	2.60	
Sodium	467.00	467.00	

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	23.60
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-24D (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	6.90		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	3.20		
Toluene	3.20		
Xylenes	2.40		
Trichlorotrifluoroethane	ND		
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenapgtene	ND		
Fluorene	1.60		
Phenanthrene	0.20		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-30

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.50
Lab conductivity, umhos/cm	3650.00
Total dissolved solids (180)	2700.00
Total dissolved solids (calc)	2580.00
Total alkalinity as CaCO ₃	259.00
Total hardness as CaCO ₃	1020.00
Bicarbonate as HCO ₃	315.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	435.00
Sulfate	1150.00
Calcium	333.00
Magnesium	45.00
Potassium	2.60
Sodium	457.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-30 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenapgtene	ND		
Fluorene	ND		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-31

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.90
Lab conductivity, umhos/cm	3700.00
Total dissolved solids (180)	2770.00
Total dissolved solids (calc)	2660.00
Total alkalinity as CaCO ₃	266.00
Total hardness as CaCO ₃	1020.00
Bicarbonate as HCO ₃	324.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	431.00
Sulfate	1190.00
Calcium	337.00
Magnesium	43.00
Potassium	3.10
Sodium	502.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	5.20
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.30
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-31 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenapgthene	ND		
Fluorene	ND		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

OFFSITE WELLS

SHS-3

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.20
Lab conductivity, umhos/cm	4520.00
Total dissolved solids (180)	3920.00
Total dissolved solids (calc)	3690.00
Total alkalinity as CaCO ₃	201.00
Total hardness as CaCO ₃	1870.00
Bicarbonate as HCO ₃	245.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	379.00
Sulfate	2080.00
Calcium	579.00
Magnesium	103.00
Potassium	7.00
Sodium	425.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-3 (Continued)

1/93

2/93

3/93

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6 1/93 2/93 3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.30
Lab conductivity, umhos/cm	3050.00
Total dissolved solids (180)	2470.00
Total dissolved solids (calc)	2400.00
Total alkalinity as CaCO ₃	268.00
Total hardness as CaCO ₃	1050.00
Bicarbonate as HCO ₃	327.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	148.00
Sulfate	1330.00
Calcium	353.00
Magnesium	41.00
Potassium	2.80
Sodium	364.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	0.60
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.20
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-6 (Continued)

1/93

2/93

3/93

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-10

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.70
Lab conductivity, umhos/cm	2250.00
Total dissolved solids (180)	1690.00
Total dissolved solids (calc)	1680.00
Total alkalinity as CaCO ₃	288.00
Total hardness as CaCO ₃	642.00
Bicarbonate as HCO ₃	351.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	61.00
Sulfate	905.00
Calcium	208.00
Magnesium	30.00
Potassium	7.90
Sodium	299.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.60
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	

SHS-10 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	21.00		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-12

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.60
Lab conductivity, umhos/cm	3730.00
Total dissolved solids (180)	2660.00
Total dissolved solids (calc)	2580.00
Total alkalinity as CaCO ₃	577.00
Total hardness as CaCO ₃	941.00
Bicarbonate as HCO ₃	704.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	417.00
Sulfate	937.00
Calcium	325.00
Magnesium	32.00
Potassium	4.50
Sodium	517.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	0.30
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	0.40
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.40
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-12 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-13

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.90
Lab conductivity, umhos/cm	4870.00
Total dissolved solids (180)	4000.00
Total dissolved solids (calc)	3830.00
Total alkalinity as CaCO ₃	650.00
Total hardness as CaCO ₃	1850.00
Bicarbonate as HCO ₃	793.00
Carbonate as CO ₃	ND
Hydroxide as OH	ND
Chloride	502.00
Sulfate	1700.00
Calcium	601.00
Magnesium	86.00
Potassium	3.70
Sodium	546.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.80
1,2-Dichloroethane	12.00
1,2-Dichloroethene	0.60
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	0.20
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	0.20
1,1,2-Trichloroethane	ND
Trichloroethene	0.40
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-13 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	0.30		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-15

1/93

2/93

3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.90
Lab conductivity, umhos/cm	2230.00
Total dissolved solids (180)	1880.00
Total dissolved solids (calc)	1800.00
Total alkalinity as CaCO ₃	273.00
Total hardness as CaCO ₃	1020.00
Bicarbonate as HCO ₃	334.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	44.00
Sulfate	1040.00
Calcium	343.00
Magnesium	41.00
Potassium	2.00
Sodium	168.00

HALOCARBONS

ND

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.40
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-15 (Continued)

	1/93	2/93	3/93
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

	1/93	2/93	3/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	8.10		
Lab conductivity, umhos/cm	2610.00		
Total dissolved solids (180)	2260.00		
Total dissolved solids (calc)	2170.00		
Total alkalinity as CaCO3	277.00		
Total hardness as CaCO3	1180.00		
Bicarbonate as HCO3	338.00		
Carbonate as CO3	0.00		
Hydroxide as OH	0.00		
Chloride	42.00		
Sulfate	1300.00		
Calcium	389.00		
Magnesium	51.00		
Potassium	2.50		
Sodium	224.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-16 (Continued)

1/93

2/93

3/93

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-17 1/93 2/93 3/93

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.90
Lab conductivity, umhos/cm	3130.00
Total dissolved solids (180)	2630.00
Total dissolved solids (calc)	2520.00
Total alkalinity as CaCO ₃	272.00
Total hardness as CaCO ₃	1180.00
Bicarbonate as HCO ₃	331.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	97.00
Sulfate	1480.00
Calcium	375.00
Magnesium	60.00
Potassium	4.20
Sodium	345.00

HALOCARBONS ND

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-17 (Continued)	1/93	2/93	3/93
AROMATICS	ND		
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane			

*ND - Not detected at specified detection limit

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

JANUARY, 1993

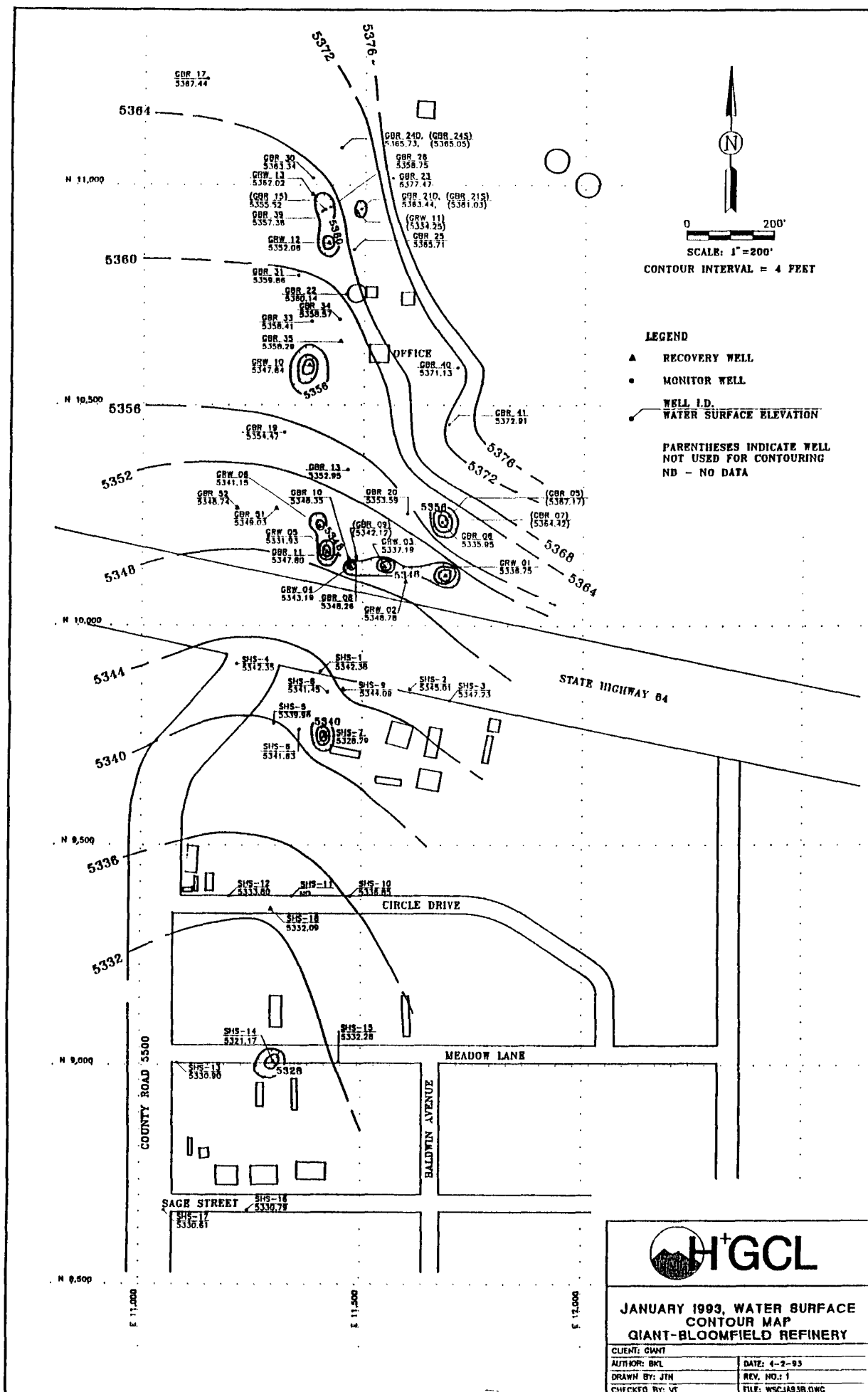
WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	57.55	57.55	0.00	5336.75
GRW-2	5391.28	42.50	42.50	0.00	5348.78
GRW-3	5388.77	51.58	51.58	0.00	5337.19
GRW-4	5390.02	46.83	46.83	0.00	5343.19
GRW-5	5390.56	58.63	58.63	0.00	5331.93
GRW-6	5390.81	49.66	49.66	0.00	5341.15
GRW-10	5395.02	47.40	47.37	0.03	5347.64
GRW-11	5397.85	63.60	63.60	0.00	5334.25
GRW-12	5397.24	45.18	45.18	0.00	5352.06
GRW-13	5396.90	34.88	34.88	0.00	5362.02
GBR-5	5395.07	28.92	27.65	1.27	5367.17
GBR-6	5395.70	59.75	59.75	0.00	5335.95
GBR-7	5395.85	31.44	31.43	0.01	5364.42
GBR-8	5390.50	42.26	42.24	0.02	5348.26
GBR-9	5389.92	47.80	47.80	0.00	5342.12
GBR-10	5390.57	42.22	42.22	0.00	5348.35
GBR-11	5389.43	41.64	41.63	0.01	5347.80
GBR-13	5393.04	40.09	40.09	0.00	5352.95
GBR-15	5397.99	42.47	42.47	0.00	5355.52
GBR-17	5402.69	35.25	35.25	0.00	5367.44
GBR-18	5421.68	26.27	26.27	0.00	5395.41
GBR-19	5393.83	39.36	39.36	0.00	5354.47
GBR-20	5393.47	39.90	39.88	0.02	5353.59
GBR-21S	5400.65	19.62	19.62	0.00	5381.03
GBR-21D	5400.19	36.75	36.75	0.00	5363.44
GBR-22	5395.91	35.78	35.77	0.01	5360.14
GBR-23	5403.72	22.22	22.22	0.00	5377.47
GBR-24S	5396.08	26.25	26.24	0.01	5365.05
GBR-24D	5396.77	31.04	31.04	0.00	5365.73
GBR-25	5396.72	31.01	31.01	0.00	5365.71
GBR-26	5395.59	36.84	36.84	0.00	5358.75
GBR-30	5396.58	33.24	33.24	0.00	5363.34
GBR-31	5394.86	35.00	35.00	0.00	5359.86
GBR-33	5396.28	37.87	37.87	0.00	5358.41
GBR-34	5394.00	35.45	35.43	0.02	5358.57
GBR-35	5393.66	35.37	35.37	0.00	5358.29
GBR-39	5397.55	40.17	40.17	0.00	5357.38
GBR-40	5400.76	29.63	29.63	0.00	5371.13
GBR-41	5396.35	23.44	23.44	0.00	5372.91
GBR-51	5389.68	40.65	40.65	0.00	5349.03
GBR-52	5387.74	39.00	39.00	0.00	5348.74

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JANUARY, 1993
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.16	41.16	0.00	5342.38
SHS-2	5381.66	36.65	36.65	0.00	5345.01
SHS-3	5383.33	36.10	36.10	0.00	5347.23
SHS-4	5383.62	41.27	41.27	0.00	5342.35
SHS-5	5378.36	38.40	38.40	0.00	5339.96
SHS-6	5378.17	36.54	36.54	0.00	5341.63
SHS-7	5375.89	47.60	47.60	0.00	5328.29
SHS-8	5380.25	38.80	38.80	0.00	5341.45
SHS-9	5380.79	36.70	36.70	0.00	5344.09
SHS-10	5373.80	36.95	36.95	0.00	5336.85
SHS-12	5373.94	40.14	40.14	0.00	5333.80
SHS-13	5367.81	36.91	36.91	0.00	5330.90
SHS-14	5367.07	45.90	45.90	0.00	5321.17
SHS-15	5366.21	33.93	33.93	0.00	5332.28
SHS-16	5362.58	31.79	31.79	0.00	5330.79
SHS-17	5364.35	33.74	33.74	0.00	5330.61
SHS-18	5373.64	41.55	41.55	0.00	5332.09

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



JANUARY 1993, WATER SURFACE
CONTOUR MAP
QIANT-BLOOMFIELD REFINERY

CUSTOMER: GWMT	DATE: 4-2-93
AUTHOR: BKL	REV. NO: 1
DRAWN BY: JTH	FILE: WSCJAS38.DWG
CHECKED BY: VI	

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

First Quarter, 1993

Tank Number	Beginning Volume	Ending Volume	Net Change
102	14509	13101	-1408
106	8010	8010	0
21	260459	289683	29224
22	250887	217803	-33084
Total Net Volume Change			-5268

4.0

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

First Quarter, 1993

Well	Month #1	Month #2	Month #3	Total
GRW-1	8870	9460	14470	32800
GRW-2	2030	10760	60	12850
GRW-3	13790	12520	12650	38960
GRW-4	23110	22360	26610	72080
GRW-5	48800	31270	46480	126550
GRW-6	48280	51680	43220	143180
GRW-9	6720	7220	12010	25950
GRW-10	257450	232000	237820	727270
GRW-11	37320	37070	54450	128840
GRW-12	14850	15950	20000	50800
GRW-13	18270	19670	27490	65430
SHS-7	337	227	92	656
SHS-9	20512	14226	20489	55227
SHS-14	167146	157340	139547	464033
SHS-18	61983	71748	37079	170810
Total Volume Pumped In Gallons				2115436

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

First Quarter, 1993

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Total Volume Of Water Recovered	2115436
Net Change In Storage Volume	-5268

Total Water Pumped To The Infiltration Gallery	1934390
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Difference	-186314
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Comments: The approximately 8.8% difference
is due to meter inaccuracy.

SECTION 5

Specific Conductance Tracking

GRW-13

	1/93	2/93	3/93
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.70		
Lab conductivity, umhos/cm	4480.00	3820.00	4100.00
Total dissolved solids (180)	3480.00		
Total dissolved solids (calc)	3390.00		
Total alkalinity as CaCO3	228.00		
Total hardness as CaCO3	1200.00		
Bicarbonate as HCO3	278.00		
Carbonate as CO3	ND		
Hydroxide as OH	ND		
Chloride	489.00		
Sulfate	1650.00		
Calcium	413.00		
Magnesium	41.00		
Potassium	5.50		
Sodium	655.00		

GW - 40

MONITORING REPORTS

DATE:

1994



Crude Gathering Operations

5764 US Highway 64
Farmington, New Mexico
87401

505
632-8024
632-8006

October 27, 1994

Mr. William Olson
New Mexico Oil Conservation Division
2040 South Pacheco Street
Santa Fe, NM 87505

Dear Mr. Olson:

RE: FIREWATER POND SAMPLING

Enclosed is a report of the soil investigation performed in the former firewater pond area within the Giant Bloomfield Refinery. Please call me with any questions or comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Timothy A. Kinney". The signature is fluid and cursive, with a long horizontal stroke at the end.

Timothy A. Kinney
Project Manager
Bloomfield Remediation Project

/dm

Enclosure — *see a firewater pond soil analysis file*

cc w/enc.: Stephanie Odell-BLM
Maura Hanning-NMED
Herbert Gorrod-EPA

cc w/o enc.: Carl Shook-Giant
Kim Bullerdick-Giant
Martin Nee-Burlington

**BURLINGTON
ENVIRONMENTAL**

October 27, 1994
Project 12641

Mr. Timothy Kinney
Manager, Crude Gathering Operations
Giant Industries Arizona, Inc.
5764 Highway 64
Farmington, New Mexico 87401

Dear Mr. Kinney:

**Subject: Soil Sampling and Analysis at Giant Industries Arizona, Inc.' s
Former Firewater Storage Pond, San Juan County, New Mexico.**

During July and August 1994, Burlington Environmental Inc. (Burlington) initiated a soil sampling and analysis program for the former firewater storage pond (firewater pond) at Giant Industries Arizona, Inc.'s. (Giant's) former Giant Bloomfield Refinery. The site is located in San Juan County, New Mexico in the southwest corner of Section 22, Township 29 North, Range 12 West, as shown in Figure 1. The firewater pond was used to stockpile water for emergency purposes at the refinery. The project was designed and initiated to investigate the possible presence of low concentrations of volatile organic compounds reported by the Bureau of Land Management (BLM) from soil sampling conducted on March 21, 1990. In addition to soil sampling, one groundwater sample was collected from the existing groundwater Monitoring Well GBR-18 located downgradient of the firewater pond.

The investigation at the firewater pond included:

- hand augering and collection of soil samples;
- on-site field screening with a photoionization detector (PID); and
- soil and groundwater sample collection and submission for laboratory analysis.

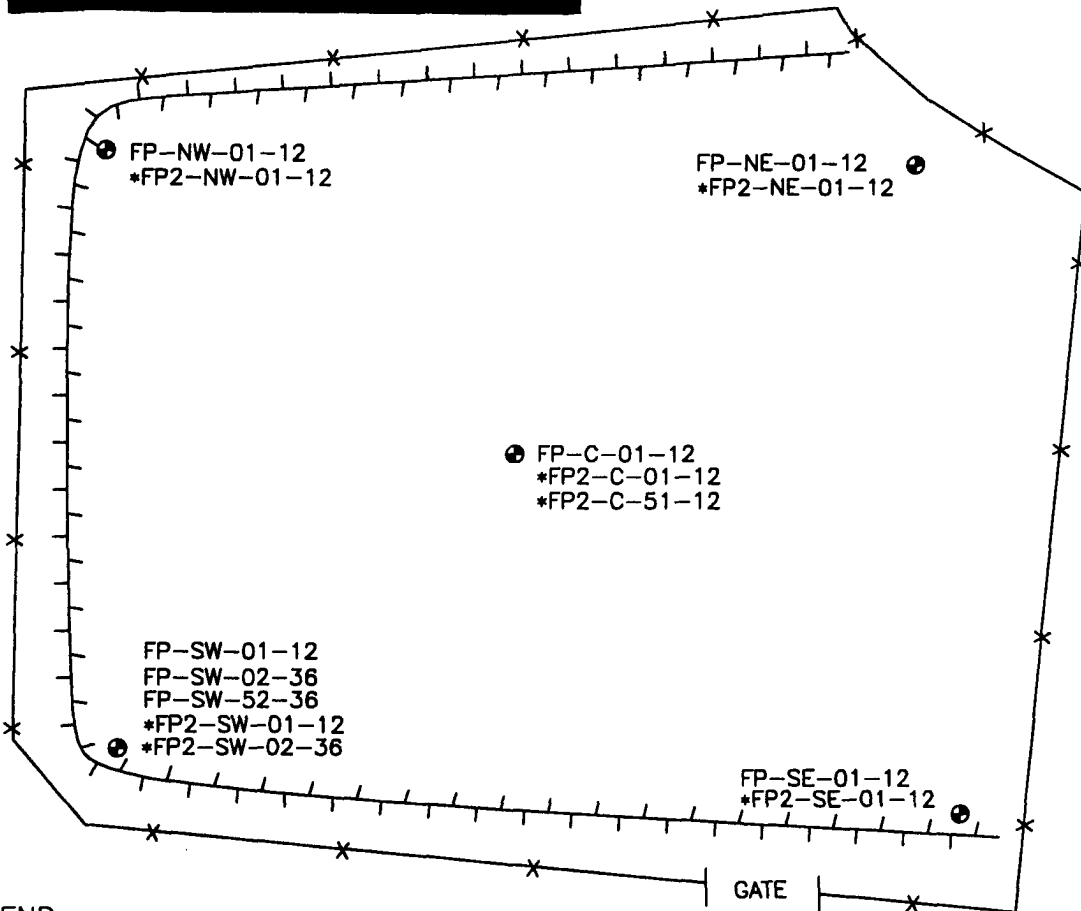
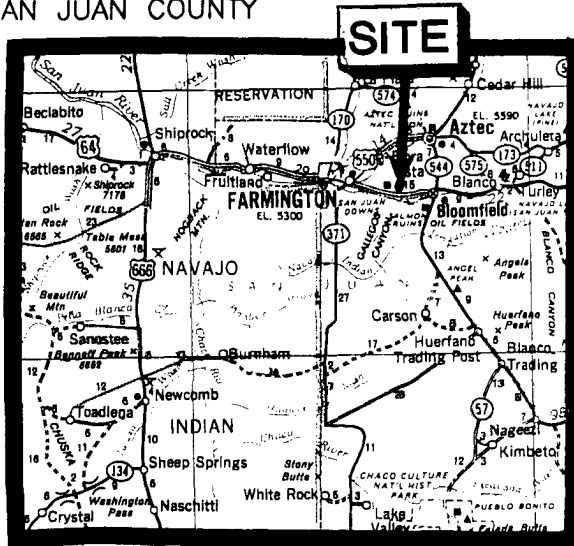
METHODOLOGY

Two individual sampling events were performed at the former firewater pond during this investigation. The first sampling event took place on July 26, 1994, and included collecting six soil samples. Samples were collected at approximately 12 inches below ground surface (bgs) from each corner and from the center of the former pond, similar to locations sampled by the BLM. One additional sample was collected at approximately 36 inches bgs from the southwest corner where the BLM's sampling indicated highest concentrations of organic compounds in the soil. In addition, one duplicate sample was collected from the southwest corner at a depth of approximately 36 inches bgs. A rinsate sample was collected from the hand-auger bucket and sampling bowl. The investigation of the firewater pond began with the southwest corner and progressed counter clockwise to the northwest corner with the center location being sampled last.

Burlington Environmental Inc.
4000 Monroe Road • Farmington, NM 87401
Phone 505/326-2262 • FAX 505/326-2388



SAN JUAN COUNTY



LEGEND

X—X—X FENCE LINE

┌───┐ BERM

● FP-SW-01-12 APPROXIMATE SAMPLING LOCATION AND NUMBER

* Resample locations. All resample locations were collected within 1'-2' of original sample location.



 BURLINGTON ENVIRONMENTAL - A Public Environmental Company -	TITLE: Giant Industries Arizona, Inc. Former Fire Water Storage Pond Giant Bloomfield Refinery	DWN: JEN	DES:	PROJECT NO.: 12641 GIANT FIRE WATER POND SAN JUAN COUNTY, NM
		CHKD:	APPD:	
		DATE: 10/12/94	REV.:	Figure 1

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Following receipt of the initial laboratory reports it was evident that the laboratory did not follow the required protocol for EPA Methods 8010/8020. Therefore, the analyses were canceled and a new round of sampling was initiated.

On August 29, 1994, each sample location was resampled using the same techniques as used during the July 26 sampling event. All resample locations were approximately 2 feet from the original sample point with the exception of the duplicate, which was collected from the 1-foot depth interval at the center location of the firewater pond.

The following methods were used at all of the hand augering locations at the firewater pond. Soil borings were completed using a 3-inch inside diameter stainless-steel hand-auger bucket with one 5-foot extension. The hand auger was advanced by rotating the bucket clockwise while applying downward pressure. Each hand-auger bucket was decontaminated between sampling events with an Alconox™ wash followed by a potable water rinse and a final distilled water rinse. Each soil boring was advanced to the sampling depth with one hand-auger bucket and sampled with another, previously decontaminated bucket. The soil sample was then transferred into a precleaned stainless-steel bowl and then immediately transferred to the laboratory sample container. The sample container was then sealed, labeled and preserved on ice for transport to the laboratory.

During the initial sampling event, once the soil had been placed in the sample container, additional soil from the sample point was collected in a 1-gallon sealable plastic bag for field screening for volatile compounds with an HNU PI 101 PID. After placing the material in the 1-gallon sealable bag, it was allowed to heat to a minimum of 80 degrees Fahrenheit before the concentration of volatile constituents was measured. Headspace field screening techniques were not used during the second sampling event as no volatile compounds were detected during the first sampling event.

Each soil sample collected during each sampling event was express shipped on ice under strict Chain-of-Custody procedures to Analytical Technologies, Inc. (ATI) in Albuquerque, New Mexico as requested by Giant. The samples collected from the first sampling event were analyzed for volatile aromatic and halogenated hydrocarbons by US Environmental Protection Agency (EPA) Methods 8010/8020 and for sulfate by U.S. EPA Method 375.2. The soil samples collected during the second sampling event were analyzed for volatile organic compounds by EPA Method 8240 which provides mass spectrometry confirmation of any analytes indicated by gas chromatography analyses. Level 4 Quality Assurance/Quality Control (QA/QC) documentation was requested of the laboratory.

The groundwater from Monitoring Well GBR-18 was purged until dry using a disposable bailer. The groundwater sample was collected using a precleaned disposable bailer after one bail-down due to poor recovery. The groundwater sample was stored on ice during transport to ATI's laboratory. ATI analyzed the groundwater sample for volatile organic compounds by EPA Methods 8010 and 8020. Strict chain-of-custody procedures and sample documentation were followed during transport to the laboratory.

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RESULTS

The results from field headspace screening performed during the first sampling event showed no ionizable constituents detected in any of the samples screened.

The soil analysis from the initial sampling event was conducted using gas chromatography techniques (EPA Methods 8010/8020). Preliminary results from these samples showed no target analytes detected in any samples except for FP-C-01-12, which was collected at 12 inches bgs in the center of the fire water pond. The target analytes detected at this location are shown below.

Analytes	Sample Result (mg/kg)	Detection Limit (mg/kg)
Tetrachloroethene	0.027	0.025
Toluene	0.028	0.025
Trichlorofluoromethane	0.028	0.010
Total Xylenes	0.028	0.025

mg/kg - milligrams per kilogram

Because the preliminary results showed organic compounds very close to laboratory detection limits, and because the laboratory did not follow the required protocol for EPA Methods 8010 and 8020, resampling and subsequent analyses of soil samples were completed using more quantitative gas chromatography and mass spectrometry techniques (EPA Method 8240). The analytical results from the second round of sampling indicate that no target analytes were detected at the method detection limits.

No target compounds were detected in the groundwater sample collected from Monitoring Well GBR-18. Detection limits met data quality objectives for the initial groundwater sample. Laboratory reports for analysis of the sample from GBR-18 are attached. In the laboratory report and on the chain-of-custody documentation the reference to GBR-18 was incorrectly recorded as HBR-18.

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The concentrations of sulfate detected in the soil samples from the first round of sampling are shown below. Samples for sulfate analysis were not collected during the second sampling event.

Sample ID	Sample Result (mg/kg)
FP-C-01-12	450
FP-NW-01-12	520
FP-SW-52-36	240
FP-SW-02-36	130
FP-NE-01-12	970
FP-SE-01-12	1400
FP-SW-01-12	810

mg/kg - milligrams per kilogram

Laboratory reports, including the Level 4 QA/QC, are enclosed herein.

CONCLUSIONS AND RECOMMENDATIONS

Giant has not been privileged to review the BLM laboratory reports or laboratory QA/QC data. Giant does not know which methods were used for laboratory analysis of their samples or the field techniques used to collect the samples.

The results from the first round of sampling for this project are questionable because the laboratory did not follow the required EPA protocol. Further, the presence of the organic compounds detected in those analyses were not confirmed using mass spectrometry during analysis in the second sampling event.

The lack of detectable organic compounds found in the soil and downgradient Monitoring Well GBR-18 samples indicates that the former firewater storage pond is not a source of organic compounds in the soil or groundwater.

Based upon the available data, Burlington does not recommend further action at the firewater storage pond.

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Mr. Kinney

October 13, 1994

If you have any questions or require additional information please do not hesitate to contact me at (505) 326-2262.

Respectfully Submitted,

BURLINGTON ENVIRONMENTAL INC.

A handwritten signature in black ink, appearing to read 'Martin J. Nee', is written over the company name.

Martin J. Nee, P.G.
Project Manager

MJN/STP/br/257wb



Analytical **Technologies**, Inc.

2709-D Pan American Freeway, NE Albuquerque, NM 87107
Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 408420

October 03, 1994

Burlington Environmental
4000 Monroe Road
Farmington, NM 87401

Project Name/Number: GIANT REFINERY 12641

Attention: S. Pope

On 08/30/94, Analytical Technologies, Inc., (ADHS License No. AZ0015), received a request to analyze **aqueous and non-aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

All analyses were performed by Analytical Technologies Inc., 11 East Olive Road, Pensacola, FL.

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

Letitia Krakowski, Ph.D.
Project Manager

MR:jt

Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : BURLINGTON ENVIRONMENTAL DATE RECEIVED : 08/30/94
PROJECT # : 12641
PROJECT NAME : GIANT REFINERY REPORT DATE : 10/03/94

ATI ID: 408420

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	FP2-SW-01-12	NON-AQ	08/29/94
02	FP2-SW-02-36	NON-AQ	08/29/94
03	FP2-SE-01-12	NON-AQ	08/29/94
04	FP2-NE-01-12	NON-AQ	08/29/94
05	FP2-NW-01-12	NON-AQ	08/29/94
06	FP2-C-01-12	NON-AQ	08/29/94
07	FP2-C-51-12	NON-AQ	08/29/94
08	FP2-R-01	AQUEOUS	08/29/94

---TOTALS---

<u>MATRIX</u>	<u>#SAMPLES</u>
NON-AQ	7
AQUEOUS	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

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Date 14-Sep-94

"FINAL REPORT FORMAT - SINGLE"

Accession: 409099
 Client: ANALYTICAL TECHNOLOGIES, INC.
 Project Number: 408420
 Project Name: BE
 Project Location: N/S
 Test: VOLATILES (8240) CLP 1988
 Analysis Method: 8240 / SW-846, 3rd Edition, September 1986 and Rev. 1, July 1992
 Extraction Method: N/A
 Matrix: SOIL
 QC Level: N

Lab Id:	001	Sample Date/Time:	29-AUG-94 1045
Client Sample Id:	408420-01	Received Date:	31-AUG-94
Batch: BUS006		Extraction Date:	N/A
Blank: A	Dry Weight %: 94	Analysis Date:	01-SEP-94

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHLOROMETHANE	UG/KG	ND	11	
BROMOMETHANE	UG/KG	ND	11	
VINYL CHLORIDE	UG/KG	ND	11	
CHLOROETHANE	UG/KG	ND	11	
METHYLENE CHLORIDE	UG/KG	ND	5	
ACETONE	UG/KG	ND	11	
CARBON DISULFIDE	UG/KG	ND	5	
1,1-DICHLOROETHENE	UG/KG	ND	5	
1,1-DICHLOROETHANE	UG/KG	ND	5	
TOTAL 1,2-DICHLOROETHENE	UG/KG	ND	5	
CHLOROFORM	UG/KG	ND	5	
1,2-DICHLOROETHANE	UG/KG	ND	5	
2-BUTANONE (MEK)	UG/KG	ND	11	
1,1,1-TRICHLOROETHANE	UG/KG	ND	5	
CARBON TETRACHLORIDE	UG/KG	ND	5	
VINYL ACETATE	UG/KG	ND	11	
BROMODICHLOROMETHANE	UG/KG	ND	5	
1,2-DICHLOROPROPANE	UG/KG	ND	5	
CIS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
TRICHLOROETHENE	UG/KG	ND	5	
DIBROMOCHLOROMETHANE	UG/KG	ND	5	
1,1,2-TRICHLOROETHANE	UG/KG	ND	5	
BENZENE	UG/KG	ND	5	
TRANS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
BROMOFORM	UG/KG	ND	5	
4-METHYL-2-PENTANONE	UG/KG	ND	11	
2-HEXANONE	UG/KG	ND	11	
TETRACHLOROETHENE	UG/KG	ND	5	
1,1,2,2-TETRACHLOROETHANE	UG/KG	ND	5	
TOLUENE	UG/KG	ND	5	
CHLOROBENZENE	UG/KG	ND	5	
ETHYL BENZENE	UG/KG	ND	5	
STYRENE	UG/KG	ND	5	
TOTAL XYLENES	UG/KG	ND	5	
TOLUENE-D8	%REC/SURR	92	81-117	
BROMOFLUOROBENZENE	%REC/SURR	98	74-121	
1,2-DICHLOROETHANE-D4	%REC/SURR	94	70-121	
ANALYST	INITIALS	DWB		

Comments:



Analytical Technologies, Inc.

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Date 14-Sep-94

"FINAL REPORT FORMAT - SINGLE"

Accession: 409099
 Client: ANALYTICAL TECHNOLOGIES, INC.
 Project Number: 408420
 Project Name: BE
 Project Location: N/S
 Test: VOLATILES (8240) CLP 1988
 Analysis Method: 8240 / SW-846, 3rd Edition, September 1986 and Rev. 1, July 1992
 Extraction Method: N/A
 Matrix: SOIL
 QC Level: N

Lab Id: 002
 Client Sample Id: 408420-02
 Sample Date/Time: 29-AUG-94 1100
 Received Date: 31-AUG-94
 Batch: BUS006
 Blank: A
 Dry Weight %: 89
 Extraction Date: N/A
 Analysis Date: 01-SEP-94

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHLOROMETHANE	UG/KG	ND	11	
BROMOMETHANE	UG/KG	ND	11	
VINYL CHLORIDE	UG/KG	ND	11	
CHLOROETHANE	UG/KG	ND	11	
METHYLENE CHLORIDE	UG/KG	ND	6	
ACETONE	UG/KG	ND	11	
CARBON DISULFIDE	UG/KG	ND	6	
1,1-DICHLOROETHENE	UG/KG	ND	6	
1,1-DICHLOROETHANE	UG/KG	ND	6	
TOTAL 1,2-DICHLOROETHENE	UG/KG	ND	6	
CHLOROFORM	UG/KG	ND	6	
1,2-DICHLOROETHANE	UG/KG	ND	6	
2-BUTANONE (MEK)	UG/KG	ND	11	
1,1,1-TRICHLOROETHANE	UG/KG	ND	6	
CARBON TETRACHLORIDE	UG/KG	ND	6	
VINYL ACETATE	UG/KG	ND	11	
BROMODICHLOROMETHANE	UG/KG	ND	6	
1,2-DICHLOROPROPANE	UG/KG	ND	6	
CIS-1,3-DICHLOROPROPENE	UG/KG	ND	6	
TRICHLOROETHENE	UG/KG	ND	6	
DIBROMOCHLOROMETHANE	UG/KG	ND	6	
1,1,2-TRICHLOROETHANE	UG/KG	ND	6	
BENZENE	UG/KG	ND	6	
TRANS-1,3-DICHLOROPROPENE	UG/KG	ND	6	
BROMOFORM	UG/KG	ND	6	
4-METHYL-2-PENTANONE	UG/KG	ND	11	
2-HEXANONE	UG/KG	ND	11	
TETRACHLOROETHENE	UG/KG	ND	6	
1,1,2,2-TETRACHLOROETHANE	UG/KG	ND	6	
TOLUENE	UG/KG	ND	6	
CHLOROBENZENE	UG/KG	ND	6	
ETHYL BENZENE	UG/KG	ND	6	
STYRENE	UG/KG	ND	6	
TOTAL XYLENES	UG/KG	ND	6	
TOLUENE-D8	%REC/SURR	94	81-117	
BROMOFLUOROBENZENE	%REC/SURR	96	74-121	
1,2-DICHLOROETHANE-D4	%REC/SURR	93	70-121	
ANALYST	INITIALS	DWB		

Comments:



Analytical Technologies, Inc.

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"FINAL REPORT FORMAT - SINGLE"

Accession: 409099
 Client: ANALYTICAL TECHNOLOGIES, INC.
 Project Number: 408420
 Project Name: BE
 Project Location: N/S
 Test: VOLATILES (8240) CLP 1988
 Analysis Method: 8240 / SW-846, 3rd Edition, September 1986 and Rev. 1, July 1992
 Extraction Method: N/A
 Matrix: SOIL
 QC Level: N

Lab Id: 003
 Client Sample Id: 408420-03
 Sample Date/Time: 29-AUG-94 1120
 Received Date: 31-AUG-94
 Batch: BUS006
 Blank: A
 Dry Weight %: 97
 Extraction Date: N/A
 Analysis Date: 02-SEP-94

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHLOROMETHANE	UG/KG	ND	10	
BROMOMETHANE	UG/KG	ND	10	
VINYL CHLORIDE	UG/KG	ND	10	
CHLOROETHANE	UG/KG	ND	10	
METHYLENE CHLORIDE	UG/KG	ND	5	
ACETONE	UG/KG	ND	10	
CARBON DISULFIDE	UG/KG	ND	5	
1,1-DICHLOROETHENE	UG/KG	ND	5	
1,1-DICHLOROETHANE	UG/KG	ND	5	
TOTAL 1,2-DICHLOROETHENE	UG/KG	ND	5	
CHLOROFORM	UG/KG	ND	5	
1,2-DICHLOROETHANE	UG/KG	ND	5	
2-BUTANONE (MEK)	UG/KG	ND	10	
1,1,1-TRICHLOROETHANE	UG/KG	ND	5	
CARBON TETRACHLORIDE	UG/KG	ND	5	
VINYL ACETATE	UG/KG	ND	10	
BROMODICHLOROMETHANE	UG/KG	ND	5	
1,2-DICHLOROPROPANE	UG/KG	ND	5	
CIS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
TRICHLOROETHENE	UG/KG	ND	5	
DIBROMOCHLOROMETHANE	UG/KG	ND	5	
1,1,2-TRICHLOROETHANE	UG/KG	ND	5	
BENZENE	UG/KG	ND	5	
TRANS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
BROMOFORM	UG/KG	ND	5	
4-METHYL-2-PENTANONE	UG/KG	ND	10	
2-HEXANONE	UG/KG	ND	10	
TETRACHLOROETHENE	UG/KG	ND	5	
1,1,2,2-TETRACHLOROETHANE	UG/KG	ND	5	
TOLUENE	UG/KG	ND	5	
CHLOROBENZENE	UG/KG	ND	5	
ETHYL BENZENE	UG/KG	ND	5	
STYRENE	UG/KG	ND	5	
TOTAL XYLENES	UG/KG	ND	5	
TOLUENE-D8	%REC/SURR	94	81-117	
BROMOFLUOROBENZENE	%REC/SURR	99	74-121	
1,2-DICHLOROETHANE-D4	%REC/SURR	93	70-121	
ANALYST	INITIALS	DWB		

Comments:



Analytical Technologies, Inc.

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Date 14-Sep-94

"FINAL REPORT FORMAT - SINGLE"

Accession: 409099
 Client: ANALYTICAL TECHNOLOGIES, INC.
 Project Number: 408420
 Project Name: BE
 Project Location: N/S
 Test: VOLATILES (8240) CLP 1988
 Analysis Method: 8240 / SW-846, 3rd Edition, September 1986 and Rev. 1, July 1992
 Extraction Method: N/A
 Matrix: SOIL
 QC Level: N

Lab Id: 004
 Client Sample Id: 408420-04
 Sample Date/Time: 29-AUG-94 1140
 Received Date: 31-AUG-94
 Batch: BUS006
 Blank: A
 Dry Weight %: 93
 Extraction Date: N/A
 Analysis Date: 02-SEP-94

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHLOROMETHANE	UG/KG	ND	11	
BROMOMETHANE	UG/KG	ND	11	
VINYL CHLORIDE	UG/KG	ND	11	
CHLOROETHANE	UG/KG	ND	11	
METHYLENE CHLORIDE	UG/KG	ND	5	
ACETONE	UG/KG	ND	11	
CARBON DISULFIDE	UG/KG	ND	5	
1,1-DICHLOROETHENE	UG/KG	ND	5	
1,1-DICHLOROETHANE	UG/KG	ND	5	
TOTAL 1,2-DICHLOROETHENE	UG/KG	ND	5	
CHLOROFORM	UG/KG	ND	5	
1,2-DICHLOROETHANE	UG/KG	ND	5	
2-BUTANONE (MEK)	UG/KG	ND	11	
1,1,1-TRICHLOROETHANE	UG/KG	ND	5	
CARBON TETRACHLORIDE	UG/KG	ND	5	
VINYL ACETATE	UG/KG	ND	11	
BROMODICHLOROMETHANE	UG/KG	ND	5	
1,2-DICHLOROPROPANE	UG/KG	ND	5	
CIS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
TRICHLOROETHENE	UG/KG	ND	5	
DIBROMOCHLOROMETHANE	UG/KG	ND	5	
1,1,2-TRICHLOROETHANE	UG/KG	ND	5	
BENZENE	UG/KG	ND	5	
TRANS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
BROMOFORM	UG/KG	ND	5	
4-METHYL-2-PENTANONE	UG/KG	ND	11	
2-HEXANONE	UG/KG	ND	11	
TETRACHLOROETHENE	UG/KG	ND	5	
1,1,2,2-TETRACHLOROETHANE	UG/KG	ND	5	
TOLUENE	UG/KG	ND	5	
CHLOROBENZENE	UG/KG	ND	5	
ETHYL BENZENE	UG/KG	ND	5	
STYRENE	UG/KG	ND	5	
TOTAL XYLENES	UG/KG	ND	5	
TOLUENE-D8	%REC/SURR	89	81-117	
BROMOFLUOROBENZENE	%REC/SURR	102	74-121	
1,2-DICHLOROETHANE-D4	%REC/SURR	92	70-121	
ANALYST	INITIALS	DWB		

Comments:



Analytical Technologies, Inc.

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Date 14-Sep-94

"FINAL REPORT FORMAT - SINGLE"

Accession: 409099
 Client: ANALYTICAL TECHNOLOGIES, INC.
 Project Number: 408420
 Project Name: BE
 Project Location: N/S
 Test: VOLATILES (8240) CLP 1988
 Analysis Method: 8240 / SW-846, 3rd Edition, September 1986 and Rev. 1, July 1992
 Extraction Method: N/A
 Matrix: SOIL
 QC Level: N

Lab Id: 005
 Client Sample Id: 408420-05
 Sample Date/Time: 29-AUG-94 1200
 Received Date: 31-AUG-94
 Batch: BUS006
 Blank: A Dry Weight %: 94
 Extraction Date: N/A
 Analysis Date: 02-SEP-94

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHLOROMETHANE	UG/KG	ND	11	
BROMOMETHANE	UG/KG	ND	11	
VINYL CHLORIDE	UG/KG	ND	11	
CHLOROETHANE	UG/KG	ND	11	
METHYLENE CHLORIDE	UG/KG	ND	5	
ACETONE	UG/KG	ND	11	
CARBON DISULFIDE	UG/KG	ND	5	
1,1-DICHLOROETHENE	UG/KG	ND	5	
1,1-DICHLOROETHANE	UG/KG	ND	5	
TOTAL 1,2-DICHLOROETHENE	UG/KG	ND	5	
CHLOROFORM	UG/KG	ND	5	
1,2-DICHLOROETHANE	UG/KG	ND	5	
2-BUTANONE (MEK)	UG/KG	ND	11	
1,1,1-TRICHLOROETHANE	UG/KG	ND	5	
CARBON TETRACHLORIDE	UG/KG	ND	5	
VINYL ACETATE	UG/KG	ND	11	
BROMODICHLOROMETHANE	UG/KG	ND	5	
1,2-DICHLOROPROPANE	UG/KG	ND	5	
CIS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
TRICHLOROETHENE	UG/KG	ND	5	
DIBROMOCHLOROMETHANE	UG/KG	ND	5	
1,1,2-TRICHLOROETHANE	UG/KG	ND	5	
BENZENE	UG/KG	ND	5	
TRANS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
BROMOFORM	UG/KG	ND	5	
4-METHYL-2-PENTANONE	UG/KG	ND	11	
2-HEXANONE	UG/KG	ND	11	
TETRACHLOROETHENE	UG/KG	ND	5	
1,1,2,2-TETRACHLOROETHANE	UG/KG	ND	5	
TOLUENE	UG/KG	ND	5	
CHLOROBENZENE	UG/KG	ND	5	
ETHYL BENZENE	UG/KG	ND	5	
STYRENE	UG/KG	ND	5	
TOTAL XYLENES	UG/KG	ND	5	
TOLUENE-D8	%REC/SURR	91	81-117	
BROMOFLUOROBENZENE	%REC/SURR	98	74-121	
1,2-DICHLOROETHANE-D4	%REC/SURR	93	70-121	
ANALYST	INITIALS	DWB		

Comments:



Analytical Technologies, Inc.

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Date 14-Sep-94

"FINAL REPORT FORMAT - SINGLE"

Accession: 409099
 Client: ANALYTICAL TECHNOLOGIES, INC.
 Project Number: 408420
 Project Name: BE
 Project Location: N/S
 Test: VOLATILES (8240) CLP 1988
 Analysis Method: 8240 / SW-846, 3rd Edition, September 1986 and Rev. 1, July 1992
 Extraction Method: N/A
 Matrix: SOIL
 QC Level: N

Lab Id:	006	Sample Date/Time:	29-AUG-94 1225
Client Sample Id:	408420-06	Received Date:	31-AUG-94
Batch: BUS006		Extraction Date:	N/A
Blank: A	Dry Weight %: 94	Analysis Date:	02-SEP-94

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHLOROMETHANE	UG/KG	ND	11	
BROMOMETHANE	UG/KG	ND	11	
VINYL CHLORIDE	UG/KG	ND	11	
CHLOROETHANE	UG/KG	ND	11	
METHYLENE CHLORIDE	UG/KG	ND	5	
ACETONE	UG/KG	ND	11	
CARBON DISULFIDE	UG/KG	ND	5	
1,1-DICHLOROETHENE	UG/KG	ND	5	
1,1-DICHLOROETHANE	UG/KG	ND	5	
TOTAL 1,2-DICHLOROETHENE	UG/KG	ND	5	
CHLOROFORM	UG/KG	ND	5	
1,2-DICHLOROETHANE	UG/KG	ND	5	
2-BUTANONE (MEK)	UG/KG	ND	11	
1,1,1-TRICHLOROETHANE	UG/KG	ND	5	
CARBON TETRACHLORIDE	UG/KG	ND	5	
VINYL ACETATE	UG/KG	ND	11	
BROMODICHLOROMETHANE	UG/KG	ND	5	
1,2-DICHLOROPROPANE	UG/KG	ND	5	
CIS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
TRICHLOROETHENE	UG/KG	ND	5	
DIBROMOCHLOROMETHANE	UG/KG	ND	5	
1,1,2-TRICHLOROETHANE	UG/KG	ND	5	
BENZENE	UG/KG	ND	5	
TRANS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
BROMOFORM	UG/KG	ND	5	
4-METHYL-2-PENTANONE	UG/KG	ND	11	
2-HEXANONE	UG/KG	ND	11	
TETRACHLOROETHENE	UG/KG	ND	5	
1,1,2,2-TETRACHLOROETHANE	UG/KG	ND	5	
TOLUENE	UG/KG	ND	5	
CHLOROBENZENE	UG/KG	ND	5	
ETHYL BENZENE	UG/KG	ND	5	
STYRENE	UG/KG	ND	5	
TOTAL XYLENES	UG/KG	ND	5	
TOLUENE-D8	%REC/SURR	93	81-117	
BROMOFLUOROBENZENE	%REC/SURR	101	74-121	
1,2-DICHLOROETHANE-D4	%REC/SURR	95	70-121	
ANALYST	INITIALS	DWB		

Comments:



Analytical Technologies, Inc.

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Date 14-Sep-94

"FINAL REPORT FORMAT - SINGLE"

Accession: 409099
 Client: ANALYTICAL TECHNOLOGIES, INC.
 Project Number: 408420
 Project Name: BE
 Project Location: N/S
 Test: VOLATILES (8240) CLP 1988
 Analysis Method: 8240 / SW-846, 3rd Edition, September 1986 and Rev. 1, July 1992
 Extraction Method: N/A
 Matrix: SOIL
 QC Level: N

Lab Id:	007	Sample Date/Time:	29-AUG-94 1230
Client Sample Id:	408420-07	Received Date:	31-AUG-94
Batch: BUS006		Extraction Date:	N/A
Blank: A	Dry Weight %: 95	Analysis Date:	02-SEP-94

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHLOROMETHANE	UG/KG	ND	11	
BROMOMETHANE	UG/KG	ND	11	
VINYL CHLORIDE	UG/KG	ND	11	
CHLOROETHANE	UG/KG	ND	11	
METHYLENE CHLORIDE	UG/KG	ND	5	
ACETONE	UG/KG	ND	11	
CARBON DISULFIDE	UG/KG	ND	5	
1,1-DICHLOROETHENE	UG/KG	ND	5	
1,1-DICHLOROETHANE	UG/KG	ND	5	
TOTAL 1,2-DICHLOROETHENE	UG/KG	ND	5	
CHLOROFORM	UG/KG	ND	5	
1,2-DICHLOROETHANE	UG/KG	ND	5	
2-BUTANONE (MEK)	UG/KG	ND	11	
1,1,1-TRICHLOROETHANE	UG/KG	ND	5	
CARBON TETRACHLORIDE	UG/KG	ND	5	
VINYL ACETATE	UG/KG	ND	11	
BROMODICHLOROMETHANE	UG/KG	ND	5	
1,2-DICHLOROPROPANE	UG/KG	ND	5	
CIS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
TRICHLOROETHENE	UG/KG	ND	5	
DIBROMOCHLOROMETHANE	UG/KG	ND	5	
1,1,2-TRICHLOROETHANE	UG/KG	ND	5	
BENZENE	UG/KG	ND	5	
TRANS-1,3-DICHLOROPROPENE	UG/KG	ND	5	
BROMOFORM	UG/KG	ND	5	
4-METHYL-2-PENTANONE	UG/KG	ND	11	
2-HEXANONE	UG/KG	ND	11	
TETRACHLOROETHENE	UG/KG	ND	5	
1,1,2,2-TETRACHLOROETHANE	UG/KG	ND	5	
TOLUENE	UG/KG	ND	5	
CHLOROBENZENE	UG/KG	ND	5	
ETHYL BENZENE	UG/KG	ND	5	
STYRENE	UG/KG	ND	5	
TOTAL XYLENES	UG/KG	ND	5	
TOLUENE-D8	%REC/SURR	91	81-117	
BROMOFLUOROBENZENE	%REC/SURR	98	74-121	
1,2-DICHLOROETHANE-D4	%REC/SURR	93	70-121	
ANALYST	INITIALS	DWB		

Comments:



Analytical Technologies, Inc.

[0] Page 8
Date 14-Sep-94

"FINAL REPORT FORMAT - SINGLE"

Accession: 409099
 Client: ANALYTICAL TECHNOLOGIES, INC.
 Project Number: 408420
 Project Name: BE
 Project Location: N/S
 Test: VOLATILES (8240) CLP 1988
 Analysis Method: 8240 / SW-846, 3rd Edition, September 1986 and Rev. 1, July 1992
 Extraction Method: N/A
 Matrix: LIQUID
 QC Level: N

Lab Id:	008	Sample Date/Time:	29-AUG-94 1245
Client Sample Id:	408420-08	Received Date:	31-AUG-94
Batch: BUS006		Extraction Date:	N/A
Blank: A	Dry Weight %: N/A	Analysis Date:	02-SEP-94

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHLOROMETHANE	UG/L	ND	10	
BROMOMETHANE	UG/L	ND	10	
VINYL CHLORIDE	UG/L	ND	10	
CHLOROETHANE	UG/L	ND	10	
METHYLENE CHLORIDE	UG/L	ND	5	
ACETONE	UG/L	7	10	J
CARBON DISULFIDE	UG/L	ND	5	
1,1-DICHLOROETHENE	UG/L	ND	5	
1,1-DICHLOROETHANE	UG/L	ND	5	
TOTAL 1,2-DICHLOROETHENE	UG/L	ND	5	
CHLOROFORM	UG/L	ND	5	
1,2-DICHLOROETHANE	UG/L	ND	5	
2-BUTANONE (MEK)	UG/L	ND	10	
1,1,1-TRICHLOROETHANE	UG/L	ND	5	
CARBON TETRACHLORIDE	UG/L	ND	5	
VINYL ACETATE	UG/L	ND	10	
BROMODICHLOROMETHANE	UG/L	ND	5	
1,2-DICHLOROPROPANE	UG/L	ND	5	
CIS-1,3-DICHLOROPROPENE	UG/L	ND	5	
TRICHLOROETHENE	UG/L	ND	5	
DIBROMOCHLOROMETHANE	UG/L	ND	5	
1,1,2-TRICHLOROETHANE	UG/L	ND	5	
BENZENE	UG/L	ND	5	
TRANS-1,3-DICHLOROPROPENE	UG/L	ND	5	
BROMOFORM	UG/L	1	5	J
4-METHYL-2-PENTANONE	UG/L	ND	10	
2-HEXANONE	UG/L	ND	10	
TETRACHLOROETHENE	UG/L	ND	5	
1,1,2,2-TETRACHLOROETHANE	UG/L	ND	5	
TOLUENE	UG/L	ND	5	
CHLOROBENZENE	UG/L	ND	5	
ETHYL BENZENE	UG/L	ND	5	
STYRENE	UG/L	ND	5	
TOTAL XYLENES	UG/L	ND	5	
TOLUENE-D8	%REC/SURR	93	88-110	
BROMOFLUOROBENZENE	%REC/SURR	102	86-115	
1,2-DICHLOROETHANE-D4	%REC/SURR	94	76-114	
ANALYST	INITIALS	DWB		

Comments:

Analytical **Technologies**, Inc.[0] Page 9
Date 14-Sep-94

"Method Report Summary"

Accession Number: 409099
Client: ANALYTICAL TECHNOLOGIES, INC.
Project Number: 408420
Project Name: BE
Project Location: N/S
Test: VOLATILES (8240) CLP 1988

Client Sample Id:	Parameter:	Unit:	Result:
408420-08	ACETONE	UG/L	7
	BROMOFORM	UG/L	1



Analytical Technologies, Inc.

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Date 14-Sep-94

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
D = DILUTED OUT
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
MG/M3 = MILLIGRAMS PER CUBIC METER.
NG = NANOGRAMS.
UG = MICROGRAMS.
PPBV = PARTS PER BILLION/VOLUME.
< = LESS THAN DETECTION LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS
J = THE REPORTED VALUE IS EITHER LESS THAN THE REPORTING LIMIT BUT
GREATER THAN ZERO, OR QUANTITATED AS A TIC; THEREFORE, IT IS
ESTIMATED.
JJ = REPORTED VALUE IS ESTIMATED DUE TO MATRIX INTERFERENCE.
ND = NOT DETECTED ABOVE REPORT LIMIT.
RPT LIMIT = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.
RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE
PROGRAM AND REFERENCED METHOD.

ORGANIC SOILS ARE REPORTED ON A DRY WEIGHT BASIS.

DUE TO THE NATURE OF THE SAMPLE MATRIX, MATRIX SPIKE/MATRIX SPIKE
DUPLICATE ANALYSIS CANNOT BE PERFORMED FOR AIR ANALYSIS.

LP = LEVERNE PETERSON	RW = RITA WINGO
DWB = DAVID BOWERS	LD = LARRY DILMORE
DB = DENNIS BESON	LL = LANCE LARSON
RB = RAFAEL BARRAZA	JA = JENNIFER ALEXANDER

BURLINGTON ENVIRONMENTAL
 A Philip Environmental Company

Chain-of Custody Record
 4000 Monroe Road
 Farmington, NM 87401
 (505) 326-2262 Phone
 (505) 326-2388 FAX

Accession # 408420
 COC Serial No. C 1888

Project Name		Project Number		Phase . Task		Total Number of Bottles		Type of Analysis and Bottle		Comments	
Samplers		Laboratory		Name		Location		Sample Number (and depth)		Date	
Sample Number		Time		Matrix							
Giant Refinery		12641		2000 .77							
S. Pope		Analytical Technologies Inc									
FP2-SW-01-12		8/29/94		1045		Soil		1			
FP2-SW-02-36		8/29/94		1100		Soil		1			
FP2-SE-01-12		8/29/94		1120		Soil		1			
FP2-NE-01-12		8/29/94		1140		Soil		1			
FP2-NW-01-12		8/29/94		1200		Soil		1			
FP2-C-01-12		8/29/94		1225		Soil		1			
FP2-C-51-12		8/29/94		1230		Soil		1			
FP2-R-01		8/29/94		1245		Water		2			

Relinquished by:

Signature

Date

Time

Received By:

Signature

Date

Time

Signature: *S. Pope* Date: 8/29/94 Time: 1500

Signature: *D. Little* Date: 8/30 Time: 09:00

Samples Iced: ☒ Yes ☐ No

Carrier: Fed Ex

Shipping and Lab Notes:

Airbill No. 1389025665

Preservatives (ONLY for Water Samples)

☐ Cyanide☒ Volatile Organic Analysis☐ Metals☐ TPH (418.1)☐ Other (Specify)☐ Other (Specify)☐ Sodium hydroxide (NaOH)☐ Hydrochloric acid (HCl)☐ Nitric acid (HNO3)☐ Sulfuric acid (H2SO4)

Level 4 QA/QC

Bill Giant Refinery Direct



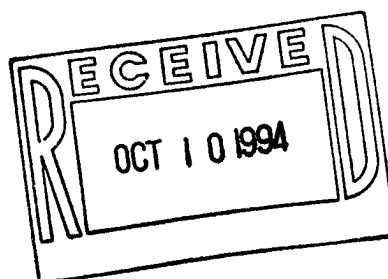
Analytical **Technologies**, Inc.

2709-D Pan American Freeway, NE Albuquerque, NM 87107
Phone (505) 344-3777 FAX (505) 344-4413

ATI I.D. 407412

October 3, 1994

Burlington Environmental
4000 Monroe Road
Farmington, NM 87401



Project Name/Number: GIANT 12641

Attention: S. Pope

On **07/28/94**, Analytical Technologies, Inc., (ADHS License No. AZ0015), received a request to analyze **aqueous and non-aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA Method 8010/8020 analyses were cancelled for all soil samples.

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

Letitia Krakowski, Ph.D.
Project Manager

MR:jt

Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141



Analytical Technologies, Inc.

CLIENT : BURLINGTON ENVIRONMENTAL DATE RECEIVED : 07/28/94
PROJECT # : 12641
PROJECT NAME : GIANT REPORT DATE : 10/03/94

ATI ID: 407412

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	FP-C-01-12	NON-AQ	07/26/94
02	FP-NW-01-12	NON-AQ	07/26/94
03	FP-SW-52-36	NON-AQ	07/26/94
04	FP-SW-02-36	NON-AQ	07/26/94
05	FP-NE-01-12	NON-AQ	07/26/94
06	FP-SE-01-12	NON-AQ	07/26/94
07	FP-SW-01-12	NON-AQ	07/26/94
08	FP-R-01	AQUEOUS	07/26/94
09	HBR-18	AQUEOUS	07/27/94

---TOTALS---

<u>MATRIX</u>	<u>#SAMPLES</u>
NON-AQ	7
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 407412

CLIENT : BURLINGTON ENVIRONMENTAL

DATE RECEIVED : 07/28/94

PROJECT # : 12641

PROJECT NAME : GIANT

REPORT DATE : 10/03/94

PARAMETER	UNITS	01	02	03	04	05
SULFATE (EPA 375.2)	MG/KG	450	520	240	130	970



Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 407412

CLIENT : BURLINGTON ENVIRONMENTAL

DATE RECEIVED : 07/28/94

PROJECT # : 12641

PROJECT NAME : GIANT

REPORT DATE : 10/03/94

PARAMETER	UNITS	06	07
SULFATE (EPA 375.2)	MG/KG	1400	810



Analytical Technologies, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : BURLINGTON ENVIRONMENTAL
PROJECT # : 12641
PROJECT NAME : GIANT

ATI I.D. : 407412

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SULFATE -	MG/KG	40741201	450	470	4	860	400	102

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



Analytical Technologies, Inc. GAS CHROMATOGRAPHY RESULTS

TEST : PURGEABLE HALOCARBONS/AROMATICS (EPA 8010/8020)
 CLIENT : BURLINGTON ENVIRONMENTAL ATI I.D.: 407412
 PROJECT # : 12641
 PROJECT NAME : GIANT

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
08	FP-R-01	AQUEOUS	07/26/94	NA	07/29/94	1
09	HBR-18	AQUEOUS	07/27/94	NA	07/30/94	1

PARAMETER	UNITS	08	09
BENZENE	UG/L	<0.5	<0.5
BROMODICHLOROMETHANE	UG/L	<0.2	<0.2
BROMOFORM	UG/L	<0.5	<0.5
BROMOMETHANE	UG/L	<1.0	<1.0
CARBON TETRACHLORIDE	UG/L	<0.2	<0.2
CHLOROBENZENE	UG/L	<0.5	<0.5
CHLOROETHANE	UG/L	<0.5	<0.5
CHLOROFORM	UG/L	<0.5	<0.5
CHLOROMETHANE	UG/L	<1.0	<1.0
DIBROMOCHLOROMETHANE	UG/L	<0.2	<0.2
1,2-DIBROMOETHANE (EDB)	UG/L	<0.2	<0.2
1,2-DICHLOROBENZENE	UG/L	<0.5	<0.5
1,3-DICHLOROBENZENE	UG/L	<0.5	<0.5
1,4-DICHLOROBENZENE	UG/L	<0.5	<0.5
1,1-DICHLOROETHANE	UG/L	<0.2	<0.2
1,2-DICHLOROETHANE (EDC)	UG/L	<0.5	<0.5
1,1-DICHLOROETHENE	UG/L	<0.2	<0.2
CIS-1,2-DICHLOROETHENE	UG/L	<0.2	<0.2
TRANS-1,2-DICHLOROETHENE	UG/L	<1.0	<1.0
1,2-DICHLOROPROPANE	UG/L	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	UG/L	<0.2	<0.2
TRANS-1,3-DICHLOROPROPENE	UG/L	<0.2	<0.2
ETHYLBENZENE	UG/L	<0.5	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<2.5
METHYLENE CHLORIDE	UG/L	<2.0	<2.0
1,1,2,2-TETRACHLOROETHANE	UG/L	<0.2	<0.2
TETRACHLOROETHENE	UG/L	<0.5	<0.5
TOLUENE	UG/L	<0.5	<0.5
1,1,1-TRICHLOROETHANE	UG/L	<1.0	<1.0
1,1,2-TRICHLOROETHANE	UG/L	<0.2	<0.2
TRICHLOROETHENE	UG/L	<0.2	<0.2
TRICHLOROFLUOROMETHANE	UG/L	<0.2	<0.2
VINYL CHLORIDE	UG/L	<0.5	<0.5
TOTAL XYLENES	UG/L	<0.5	<0.5

SURROGATES:

BROMOCHLOROMETHANE (%)	104	98
TRIFLUOROTOLUENE (%)	112	97



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS - QUALITY CONTROL

REAGENT BLANK

TEST	: EPA 8010/8020	ATI I.D.	: 407412
BLANK I.D.	: 072994	MATRIX	: AQUEOUS
CLIENT	: BURLINGTON ENVIRONMENTAL	DATE EXTRACTED	: NA
PROJECT #	: 12641	DATE ANALYZED	: 07/29/94
PROJECT NAME	: GIANT	DIL. FACTOR	: 1

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
BROMODICHLOROMETHANE	UG/L	<0.2
BROMOFORM	UG/L	<0.5
BROMOMETHANE	UG/L	0.5
CARBON TETRACHLORIDE	UG/L	<0.2
CHLOROBENZENE	UG/L	<0.5
CHLOROETHANE	UG/L	<0.5
CHLOROFORM	UG/L	<0.5
CHLOROMETHANE	UG/L	<1.0
DIBROMOCHLOROMETHANE	UG/L	<0.2
1,2-DIBROMOETHANE (EDB)	UG/L	<0.2
1,2-DICHLOROBENZENE	UG/L	<0.5
1,3-DICHLOROBENZENE	UG/L	<0.5
1,4-DICHLOROBENZENE	UG/L	<0.5
1,1-DICHLOROETHANE	UG/L	<0.2
1,2-DICHLOROETHANE (EDC)	UG/L	<0.5
1,1-DICHLOROETHENE	UG/L	<0.2
CIS-1,2-DICHLOROETHENE	UG/L	<0.2
TRANS-1,2-DICHLOROETHENE	UG/L	<1.0
1,2-DICHLOROPROPANE	UG/L	<0.2
CIS-1,3-DICHLOROPROPENE	UG/L	<0.2
TRANS-1,3-DICHLOROPROPENE	UG/L	<0.2
ETHYLBENZENE	UG/L	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5
METHYLENE CHLORIDE	UG/L	<2.0
1,1,2,2-TETRACHLOROETHANE	UG/L	<0.2
TETRACHLOROETHENE	UG/L	<0.2
TOLUENE	UG/L	<0.5
1,1,1-TRICHLOROETHANE	UG/L	<1.0
1,1,2-TRICHLOROETHANE	UG/L	<0.2
TRICHLOROETHENE	UG/L	<0.2
TRICHLOROFLUOROMETHANE	UG/L	<0.2
VINYL CHLORIDE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5

SURROGATES:

BROMOCHLOROMETHANE (%)	98
TRIFLUOROTOLUENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : PURGEABLE HALOCARBONS/AROMATICS (EPA 8010/8020)
 MSMSD # : 40741209 ATI I.D. : 407412
 CLIENT : BURLINGTON ENVIRONMENTAL DATE EXTRACTED : NA
 PROJECT # : 12641 DATE ANALYZED : 07/30/94
 PROJECT NAME : GIANT SAMPLE MATRIX : AQUEOUS
 REF. I.D. : 40741209 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10	9.9	99	11	110	11
CHLOROBENZENE	<0.5	10	10	100	10	100	0
1,1-DICHLOROETHENE	<0.2	10	9.7	97	10	100	3
TOLUENE	<0.5	10	10	100	11	110	10
TRICHLOROETHENE	<0.2	10	10	100	11	110	10

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



BURLINGTON ENVIRONMENTAL

A Philip Environmental Company

Chain-of Custody Record

4000 Monroe Road
Farmington, NM 87401
(505) 326-2262 Phone
(505) 326-2388 FAX

COC Serial No. C 1877

Project Name <i>Giant</i>		Project Number <i>18641</i>		Phase, Task <i>0077-77</i>		
Samplers <i>S. Pope</i>						
Laboratory	Name <i>Analytical Technologies, Inc</i>					
Location						
Sample Number (and depth)	Date	Time	Matrix	Total Number of Bottles	Type of Analysis and Bottle	Comments
FP-C-01-12	7/26/94	1415	Soil	2	X	01
FP-NW-01-12	7/26/94	1350	Soil	2	X	02
FP-SW-02-36	7/26/94	1125	Soil	2	X	03
FP-SW-02-36	7/26/94	1125	Soil	2	X	04
FP-NE-01-12	7/26/94	1335	Soil	2	X	05
FP-SE-01-12	7/26/94	1150	Soil	2	X	06
FP-SW-01-12	7/26/94	1050	Soil	2	X	07
FP-R-01	7/26/94	1430	Water	2	X	08
HBR-18	7/27/94	0930	Water	2	X	09

Relinquished by:

Signature <i>Don T. Pope</i>	Date <i>7/27/94</i>	Time <i>1045</i>	Received By: Signature <i>[Signature]</i>	Date <i>7/28/94</i>	Time <i>09:00</i>
---------------------------------	------------------------	---------------------	---	------------------------	----------------------

Samples Iced: ☒ Yes ☐ No	Carrier: <i>FedEx</i>	Airbill No. <i>880927373</i>
Preservatives (ONLY for Water Samples)		
☐ Cyanide	☐ Sodium hydroxide (NaOH)	
☒ Volatile Organic Analysis	☐ Hydrochloric acid (HCl)	
☐ Metals	☐ Nitric acid (HNO ₃)	
☐ TPH (418.1)	☐ Sulfuric acid (H ₂ SO ₄)	
☐ Other (Specify)		
☐ Other (Specify)		
<i>Level 4 QA/QC</i> <i>Bill Giant Direct for Analytical Costs.</i> <i>(Giant Refinery, Farmington NM, Attn: Tim Kinney)</i>		



Analytical Technologies, Inc.

CASE NARRATIVE

LABORATORY NAME: Analytical Technologies, Inc.
CLIENT NAME: Burlington Environmental
ATI I.D.#: 407412
PROJECT NAME: Giant/12641

<u>CLIENT SAMPLE NUMBER</u>	<u>ATI NUMBER</u>
FP-C-01-12	40741201
FP-NW-01-12	40741202
FP-SW-52-36	40741203
FP-SW-02-36	40741204
FP-NE-01-12	40741205
FP-SE-01-12	40741206
FP-SW-01-12	40741207

The samples were received at ATI, Phoenix on July 29, 1994 in good condition. The sample tags were correct.

CASE NARRATIVE - GENERAL CHEMISTRY

SULFATE: Soil sample analysis for sulfate was performed on a 20 g:200 mL leachate. The leaching process took place on 08/05/94.

Sulfate analysis by EPA method 375.2 took place on 08/05/94. Sample FP-C-01-12 was used as the QC sample. This QC and all other QC associated with this analysis met method and ATI acceptance criteria. There were no problems associated with the sulfate analysis of this sample set.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 407412

CLIENT : BURLINGTON ENVIRONMENTAL

DATE RECEIVED : 07/28/94

PROJECT # : 12641

PROJECT NAME : GIANT

REPORT DATE : 08/22/94

PARAMETER	UNITS	01	02	03	04	05
SULFATE (EPA 375.2)	MG/KG	450	520	240	130	970

GENERAL CHEMISTRY RESULTS

ATI I.D. : 407412

CLIENT : BURLINGTON ENVIRONMENTAL

DATE RECEIVED : 07/28/94

PROJECT # : 12641

PROJECT NAME : GIANT

REPORT DATE : 08/22/94

PARAMETER	UNITS	06	07
SULFATE (EPA 375.2)	MG/KG	1400	810

LAB NAME: ANALYTICAL TECHNOLOGIES, INC.

ATI LAB ID 407412

INITIAL AND CONTINUING CALIBRATION VERIFICATION

INITIAL CALIBRATION SOURCE: Solutions Plus, Lot 930614
 CONTINUING CALIBRATION SOURCE: ATI - Na₂SO₄

Concentration Units: mg/L

ANALYTE	INITIAL CALIBRATION			CONTINUING CALIBRATION				
	TRUE	FOUND	%	TRUE	FOUND	%	FOUND	%
Sulfate	25	24	96	25	23	92	24	96

LABORATORY CONTROL SAMPLE

LCS SOURCE:

ANALYTE	AQUEOUS (mg/L)					SOLID (mg/kg)				
	TRUE	FOUND	%	LIMITS		TRUE	FOUND	%	LIMITS	
Sulfate	25	24	96	22	28					
	25	23	92	22	28					

REAGENT BLANK

PREPARATION BLANK CONCENTRATION UNITS: mg/L

ANALYTE	PREPARATION BLANK
Sulfate	< 5

QUALITY CONTROL DATA
ANALYTICAL TECHNOLOGIES, INC.Reviewer TW
Date: 8-8-94PARAMETER: Sulfate METHOD: RFA 375.2 ACCESSION #'SNO. OF SAMPLES: 21
DATE: 8-5-94 TIME: 4:30PM ANALYST: CW

<u>407412-1</u>	<u>48594(1-3)</u>
<u>408514-2</u>	<u>408581-1</u>
<u>48547-23</u>	<u>408618-4</u>
<u>408571-1</u>	
<u>408592-1</u>	

CALIBRATION CURVE

	VALUE mg/l	ABS/PK.HT	CONC.	
BLANK	<u>None</u>		<u>2.28</u>	CORR. COEFF. <u>0.9995</u>
1ST STANDARD	<u>5.0</u>		<u>5.48</u>	SLOPE <u>1.6820</u>
2ND STANDARD	<u>10.0</u>		<u>9.70</u>	INTERCEPT <u>-2.86</u>
3RD STANDARD	<u>25.0</u>		<u>24.41</u>	
4TH STANDARD	<u>40.0</u>		<u>40.51</u>	
5TH STANDARD	<u>50.0</u>		<u>49.90</u>	

DUPLICATE AND SPIKE RESULTS

MATRIX/UNITS	504N mg/kg	504 mg/l	504 mg/l		
SAMPLE #	<u>407412-1</u>	<u>408514-2</u>	<u>408616-1</u>		
OBS. CONC.	<u>450</u>	<u>290</u>	<u>2800</u>		
DUPLICATE	<u>470</u>	<u>290</u>	<u>2900</u>		
% RPD	<u>4</u>	<u>0</u>	<u>8.50</u>		
SPIKE RES.	<u>860</u>	<u>470</u>	<u>7500</u>		
SPIKE CONC.	<u>400</u>	<u>200</u>	<u>5000</u>		
% RECOVERY	<u>102</u>	<u>90</u>	<u>94</u>		
SAMPLES:	<u>407412-1</u>	<u>408514-2</u>	<u>408616-1</u>		
	<u>-2</u>	<u>408547-2</u>	<u>-2</u>		
	<u>-3</u>	<u>-3</u>	<u>-3</u>		
	<u>-4</u>	<u>408571-1</u>			
	<u>-5</u>	<u>408592-1</u>			
	<u>-6</u>	<u>408584-1</u>			
	<u>-7</u>	<u>-2</u>			
		<u>-3</u>			
		<u>408581-1</u>			
		<u>408618-4</u>			

QUALITY CONTROL CHECKS (ug/l) OR (mg/l)

Q.C. I.D. OBSERVED CONC. TRUE VALUE 95% CONF. LIMITS

<u>Sol. p/w 8951</u>	<u>24.48, 23.21</u>	<u>25</u>	<u>22-29</u>
<u>Lot 930614</u>			

COMMENTS:

TOTAL RUN: 20 TOTAL REPORTED: 20 QC RUN: 2 QC ACCEPTABLE: 2
 WAR: 2 NO. LATE: 0

004

Sulfate

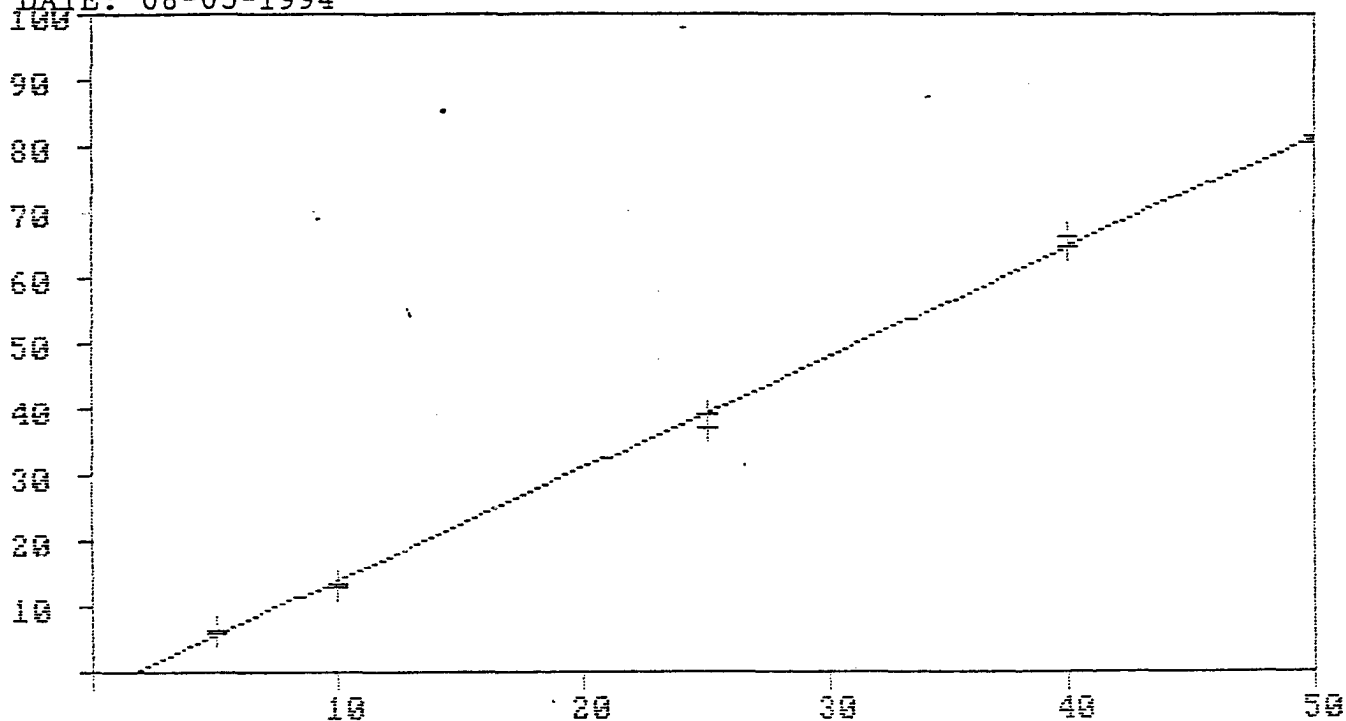
8/5/94 4:30 PM

CW

CHANNEL NAME: SULFATE

RUN NAME: 080594S4

RUN DATE: 08-05-1994



DATA TYPE: CF

INTERCEPT = -2.86

CALIBRATION ORDER: 1

SLOPE = 1.68195

CORRELATION: .9994799

8/5/94 4:30pm CL

CHANNEL NAME:	SULFATE
RUN DATE:	08-05-1994
SAMPLE TABLE NAME:	080594S4
METHOD NAME:	SULFATE
NUMBER OF SAMPLES:	100
SAMPLE TIME:	80
TYPE OF ANALYSIS:	CF
Y PEAK HEIGHT/AREA:	HEIGHT

PEAK SEARCH VARIABLES

THRESHOLD:	10
APEX:	10
ASCENDING SLOPE:	1.0
DESCENDING SLOPE:	1.0
PLATEAU POINTS:	3
INTEGRATION POINTS:	7

CALIBRATION INFORMATION

CALIBRATION TYPE:	LINEAR
NUMBER OF STANDARDS:	10
INTERCEPT:	-2.86
LINEAR COEF:	1.6819
QUADRATIC COEF:	0.0000
CUBIC COEF:	0.0000
CORRELATION COEF:	0.999480

UP#	SAMPLE ID	DIL	WGT	HEIGHT	CONCENTRATION mg/l EF	mg/l
	SYNC	1.00	1.000	3297	49.57	
	SCALE	1.00	1.000	3983	59.53 R	
	BLANK	1.00	1.000	69	2.70 R	2.28
	BLANK	1.00	1.000	11	1.86 R	
	S1	1.00	1.000	267	5.58	5.48
	S1	1.00	1.000	254	5.39	
	S2	1.00	1.000	560	9.83	9.70
	S2	1.00	1.000	541	9.56	
	S3	1.00	1.000	1523	23.81	24.41
0	S3	1.00	1.000	1605	25.01	
1	S4	1.00	1.000	2647	40.13	40.51
2	S4	1.00	1.000	2699	40.89	
3	S5	1.00	1.000	3303	49.66	49.90
4	S5	1.00	1.000	3336	50.14	
5	BLANK	1.00	1.000	23	2.04 R	1.87
6	BLANK	1.00	1.000	0	1.70 R	
7	QC	1.00	1.000	1545	24.13	24.48
8	QC	1.00	1.000	1592	24.82	
9	LEACH BLK	1.00	1.000	30	2.14 R	1.92
0	B	1.00	1.000	0	1.70 b	
1	407412-1	2.00	1.000	1397	43.97	451 mg/kg 45.10
2	407412-1	2.00	1.000	1475	46.24	
3	407412-1DUP	2.00	1.000	1479	46.35	466 mg/kg 46.66

407412-1DUP	2.00	1.000	1500	46.96	
407412-1SPK	4.00	1.000	1366	5.14	857 ms/kg 85.76
407412-1SPK	4.00	1.000	1353	85.39	
407412-2	2.00	1.000	1757	54.42	519 ms/kg 51.74
407412-2	2.00	1.000	1572	49.05	
407412-3	1.00	1.000	1556	24.29	243 ms/kg 24.24
407412-3	1.00	1.000	1549	24.19	
SYNC	1.00	1.000	2591	39.32	
SCALE	1.00	1.000	3269	49.16	
BLANK	1.00	1.000	43	2.33	R
BLANK	1.00	1.000	13	1.89	R
STD1	1.00	1.000	262	5.51	
STD1	1.00	1.000	247	5.29	
407412-4	1.00	1.000	767	12.84	131 ms/kg 13.17
407412-4	1.00	1.000	812	13.49	
407412-4DUP	1.00	1.000	775	12.95	134 ms/kg 13.47
407412-4DUP	1.00	1.000	846	13.99	
407412-5	2.50	1.000	2524	95.87	966 ms/kg 96.56
407412-5	2.50	1.000	2562	97.25	
407412-6	2.50	1.000	3432	128.83	over calibration (1285 ms/kg 128.57)
407412-6	2.50	1.000	3418	128.32	separate
407412-7	2.50	1.000	2153	82.40	813 ms/kg 81.19
407412-7	2.50	1.000	2086	79.97	
407737-1	10.00	1.000	1840	284.17	284.90
407737-1	10.00	1.000	1850	285.63	
BLANK	1.00	1.000	15	1.92	R 1.81
B	1.00	1.000	0	1.70	b
STD3	1.00	1.000	1478	23.16	23.49
D3	1.00	1.000	1523	23.81	d
408514-2	10.00	1.000	1894	292.01	291.36
408514-2	10.00	1.000	1885	290.71	
408514-2DUP	10.00	1.000	1898	292.59	292.89
408514-2DUP	10.00	1.000	1902	293.18	
408514-2SPK	20.00	1.000	1525	476.88	472.09
408514-2SPK	20.00	1.000	1492	467.30	
408547-2	250.00	1.000	759	3180.62	3189.70
408547-2	250.00	1.000	764	3198.77	
408547-3	20.00	1.000	1120	359.28	364.21
408547-3	20.00	1.000	1154	369.15	
408571-1	1.00	1.000	1826	28.21	28.24
408571-1	1.00	1.000	1830	28.27	
408582-1	250.00	1.000	382	1812.22	1752.33
408582-1	250.00	1.000	349	1692.44	
408584-1	62.50	1.000	645	691.71	691.71
408584-1	62.50	1.000	645	691.71	
408584-2	250.00	1.000	719	3035.43	3044.51
408584-2	250.00	1.000	724	3053.58	
408584-3	125.00	1.000	1106	2220.07	2251.83
408584-3	125.00	1.000	1141	2283.59	
408581-1	125.00	1.000	983	1996.84	2040.40
408581-1	125.00	1.000	1031	2083.95	
408618-4	25.00	1.000	737	310.08	320.78
408618-4	25.00	1.000	796	331.49	
STD3	1.00	1.000	1535	23.99	23.90
D3	1.00	1.000	1523	23.81	d
BLANK	1.00	1.000	12	1.88	R 1.79
B	1.00	1.000	0	1.70	b
408616-1	250.00	1.000	655	2803.13	2833.98
408616-1	250.00	1.000	672	2864.84	
408616-1DUP	250.00	1.000	684	2908.39	2906.58

408616-1SPK	500.00	1.000	683	2904.76	
408616-1SPK	500.00	1.000	912	7457.42	7464.68
408616-2	125.00	1.000	910	1746.39	1752.74
408616-2	125.00	1.000	845	1759.09	
408616-3	200.00	1.000	852	2280.25	2270.09
408616-3	200.00	1.000	668	2259.93	
407412-6	5.00	1.000	661	137.22	1373.37
407412-6	5.00	1.000	1773	137.51	
407737-1	10.00	1.000	1777	273.87	274.08
407737-1	10.00	1.000	1769	274.30	
QC	1.00	1.000	1772	23.31	23.21
QC	1.00	1.000	1488	23.10	
D3	1.00	1.000	1474	23.81 d	
	1.00	1.000	1523	13.51	
BLANK	1.00	1.000	813	2.09 R	1.90
B	1.00	1.000	27	1.70 b	
			0		

JP#	SAMPLE ID	DIL	WGT	CUP#	SAMPLE ID	DIL	WGT
1	SYNC	1	1	2	SCALE	1	1
3	BLANK	1	1	4	BLANK	1	1
5	S1	1	1	6	S1	1	1
7	S2	1	1	8	S2	1	1
9	S3	1	1	10	S3	1	1
11	S4	1	1	12	S4	1	1
13	S5	1	1	14	S5	1	1
15	BLANK	1	1	16	BLANK	1	1
17	QC	1	1	18	QC	1	1
19	LEACH BLK	1	1	20	B	1	1
21	407412-1	2	1	22	407412-1	2	1
23	407412-1DUP	2	1	24	407412-1DUP	2	1
25	407412-1SPK	4	1	26	407412-1SPK	4	1
27	407412-2	2	1	28	407412-2	2	1
29	407412-3	1	1	30	407412-3	1	1
31	SYNC	1	1	32	SCALE	1	1
33	BLANK	1	1	34	BLANK	1	1
35	STD1	1	1	36	STD1	1	1
37	407412-4	1	1	38	407412-4	1	1
39	407412-4DUP	1	1	40	407412-4DUP	1	1
41	407412-5	2.5	1	42	407412-5	2.5	1
43	407412-6	2.5	1	44	407412-6	2.5	1
45	407412-7	2.5	1	46	407412-7	2.5	1
47	407737-1	10	1	48	407737-1	10	1
49	BLANK	1	1	50	B	1	1
51	STD3	1	1	52	STD3	1	1
53	408514-2	10	1	54	408514-2	10	1
55	408514-2DUP	10	1	56	408514-2DUP	10	1
57	408514-2SPK	20	1	58	408514-2SPK	20	1
59	408547-2	250	1	60	408547-2	250	1
61	408547-3	20	1	62	408547-3	20	1
63	408571-1	1	1	64	408571-1	1	1
65	408582-1	250	1	66	408582-1	250	1
67	408584-1	62.5	1	68	408584-1	62.5	1
69	408584-2	250	1	70	408584-2	250	1
71	408584-3	125	1	72	408584-3	125	1
73	408581-1	125	1	74	408581-1	125	1
75	408618-4	25	1	76	408618-4	25	1
77	STD3	1	1	78	STD3	1	1
79	BLANK	1	1	80	B	1	1
81	408616-1	250	1	82	408616-1	250	1
83	408616-1DUP	250	1	84	408616-1DUP	250	1
85	408616-1SPK	500	1	86	408616-1SPK	500	1
87	408616-2	125	1	88	408616-2	125	1
89	408616-3	200	1	90	408616-3	200	1
91	407412-6	5	1	92	407412-6	5	1
93	407737-1	10	1	94	407737-1	10	1
95	QC	1	1	96	QC	1	1
97	STD3	1	1	98		1	1
99	BLANK	1	1	100	B	1	1

Sulfate

8-5-94 4:30 PM

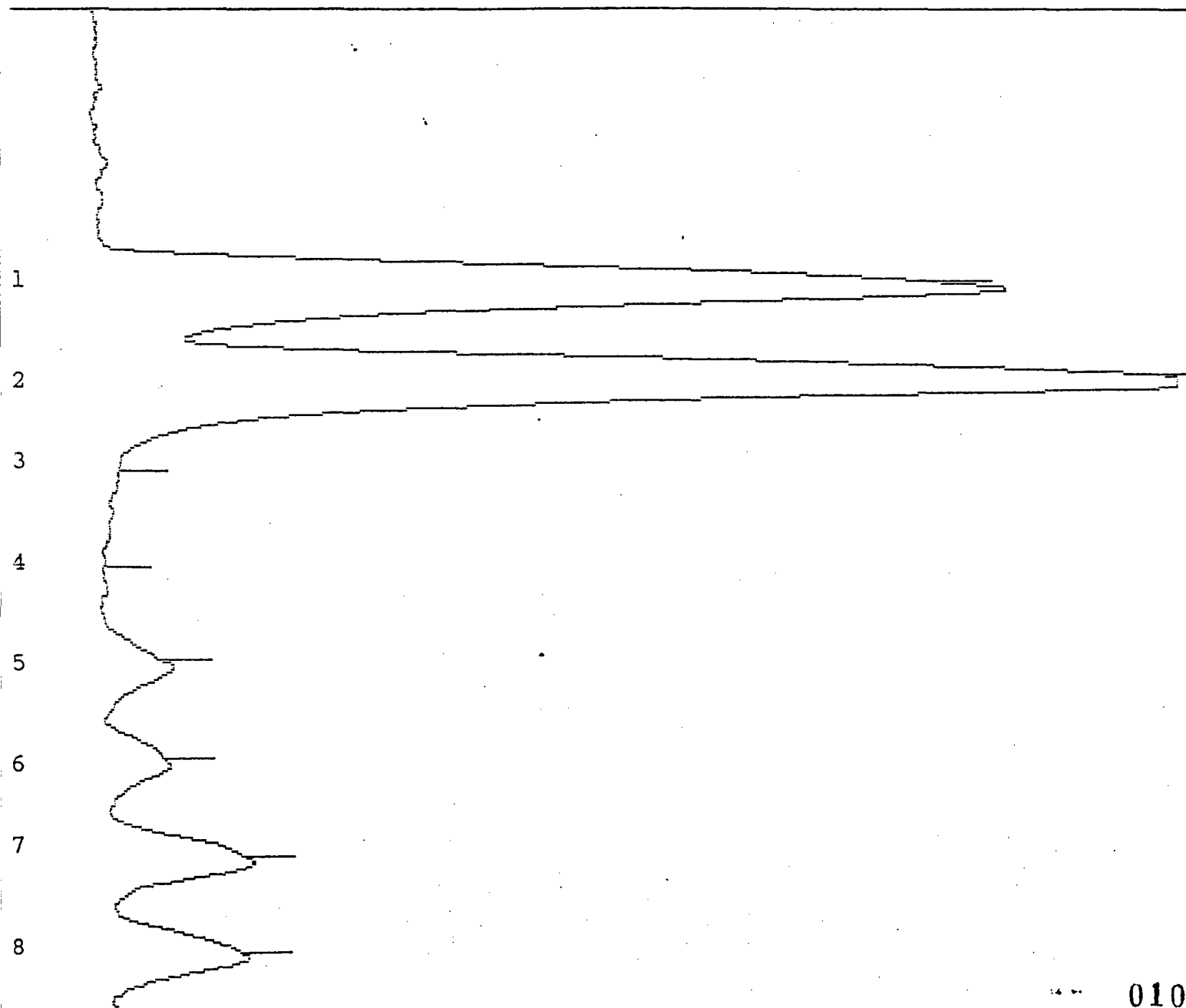
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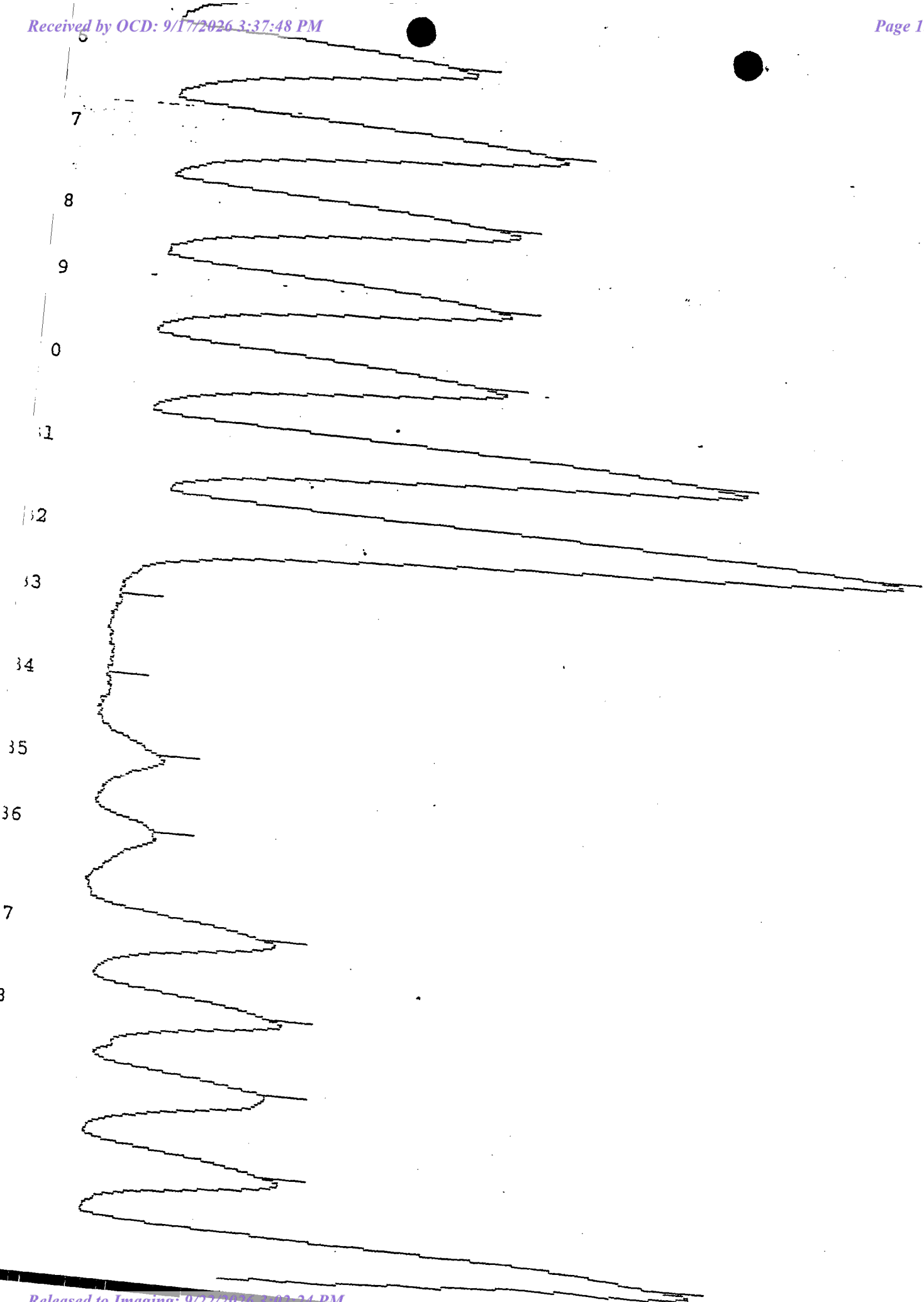
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HART SPEED: 60

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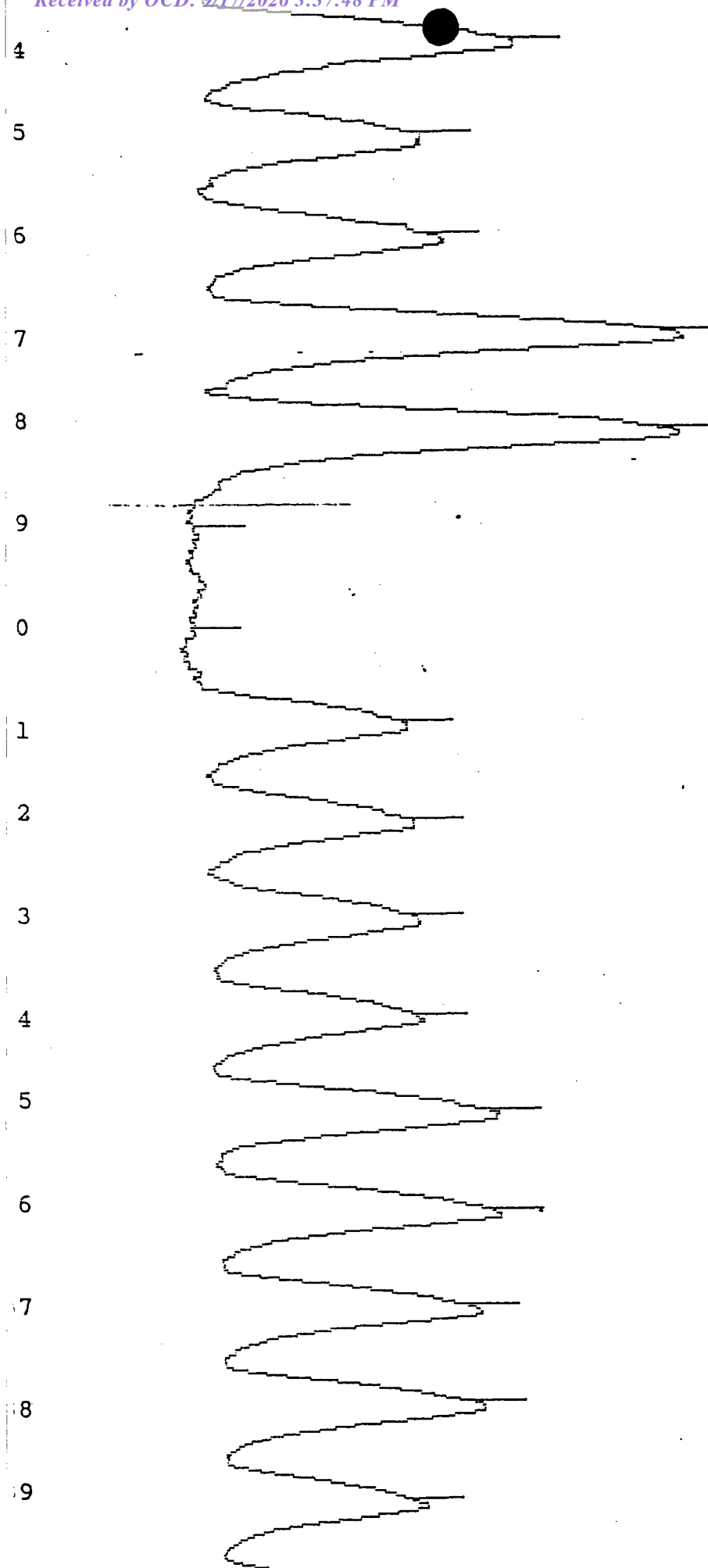
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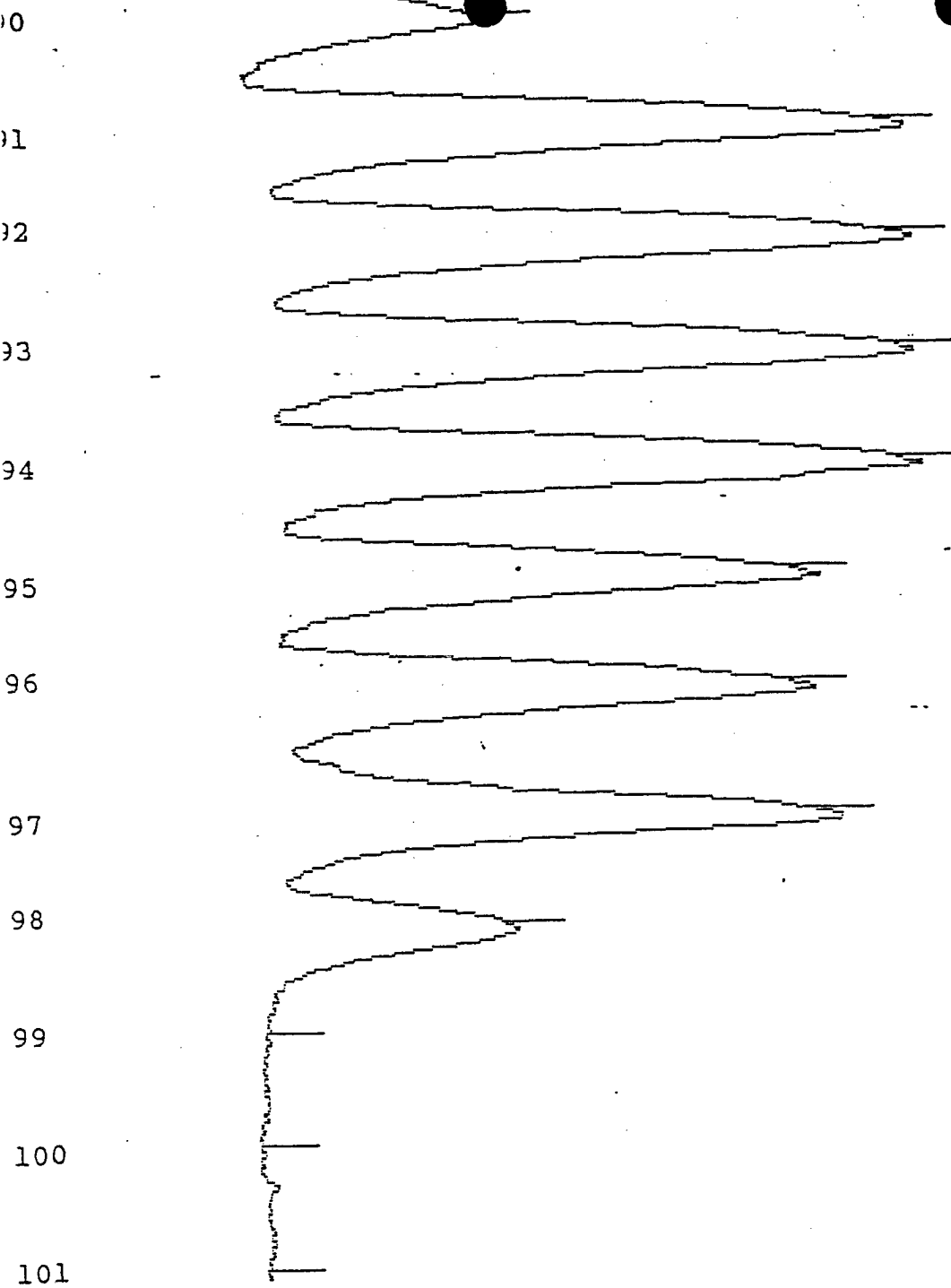
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PARAMETER: Sulfate
 METHOD REFERENCE: RFA 375.2

 ANALYST: aw
 DATE: 8-5-94 4:30 PM

CUP #	SAMPLE #	CLIENT I.D.	DILUTION		CUP #	SAMPLE #	CLIENT I.D.	DILUTION		Factor
			ml. spile	Final vol.				ml. spile	Final vol.	
1	Signc	-			31	407412-4	See Leachate Log			-
2	Sulf	-			32	407412-4				-
3	Blk	-			33	407412-4				x2.5
4	Std1	-			34	407412-4				x2.5
5	Std1	-			35	407412-4				x2.5
6	Std2	-			36	407412-4				x2.5
7	Std2	-			37	407412-4				x2.5
8	Std3	-			38	407412-4				x2.5
9	Std3	-			39	407412-4				x2.5
10	Std4	-			40	407412-4				x2.5
11	Std4	-			41	407412-4				x2.5
12	Std5	-			42	407412-4				x2.5
13	Blank	-			43	407412-4				x2.5
14	Q.C.	-			44	407412-4				x2.5
15	Leach. Blk	-			45	407412-4				x2.5
16	407412-1	See Leachate Log			46	407412-1				x2.5
17	Dup -1				47	407412-1				x2.5
18	SPT -1				48	407412-1				x2.5
19	-2				49	407412-1				x2.5
20	-3				50	407412-1				x2.5
21	UPPER Wash Drain				51	407412-1				x2.5
22					52	407412-1				x2.5
23					53	407412-1				x2.5
24					54	407412-1				x2.5
25					55	407412-1				x2.5
26					56	407412-1				x2.5
27					57	407412-1				x2.5
28					58	407412-1				x2.5
29					59	407412-1				x2.5
30					60	407412-1				x2.5

 STANDARD CAL: 2-70 DAMP: 10 SAMPLE/WASH TIME: 35/45 WRITTEN UP BY: aw

PARAMETER: SulfateANALYST: KEVMETHOD REFERENCE: REA 375.2DATE: 8-5-94 4:30 PM

CUP #	SAMPLE #	CLIENT I.D.	DILUTION			COMMENTS
			ml. spile	Final vol.	Factor	
61	408584-2	W-370966			x250	*I put 407412-4 on tray twice by accident
62	1					
63	408584-3	W-308305			x125	
64	1					
65	408581-1	W-308 Slurry				Tray did not advance to second ring (cup 31). Caps 1-6 were resampled before I noticed and reset tray to cup 31.
66	1				x125	
67	408618-4	RICE Tank			x25	
68	1					
69	std 3	-			-	
70	1					
71	Blank	-			-	
72	1					
73	408616-1	W-309			x250	
74	1					
75	408616-1 Dup				x250	
76	1					
77	408616-1 SR				x500	
78	1					
79	408616-2	W-308			x125	
80	1					
81	408616-3	W-307			x700	
82	1					
83	407412-6	SLC Leachate Log.			x5	
84	1					
85	407737-1	SR-1			x100	
86	1					
87	Q.C.	-			-	
88	1					
89	std	-			-	
90						

STANDARD CAL.: 2.70 DAMP: 4 SAMPLE/WASH TIME: 35/45 WRITTEN UP BY:

7/12/94 TLP

406110-1	40013495	20.02	200 ml
-1 MD	↓	20.10	
-2	40013498	20.05	
-3	40013501	20.03	
-4	40013504	10.10	100 ml
Blank	nanopure	20	200 ml

7/27/94 TLP

Blank		200 ml
407759-2	40014621	20.12 g
-3	40014623	20.00
-4	40014625	20.36
-5	40014627	20.18
-5 MD	↓	20.15
-6	40014629	20.50
-7	40014631	20.07

8/5/94 CW

Blank		200 ml nanopure
407412-1	FP-C-01-12	20.01
-1	↓	20.01
-2	FP-NW-01-12	19.99
-3	FP-SW-02-36	19.99
-4	FP-SW-02-36	20.08
-5	FP-NE-01-12	20.01 19.99
-6	FP-SE-01-12	20.01
-7	FP-SW-01-12	19.99

CHECK LIST FOR REVIEW OF DATA

ANALYSIS

DATE

8-5-94

The following information is complete and correct on all pages of the write up:

- ☒ Analyst initials
- ☒ Parameter
- ☒ Method #
- ☒ Date and time of analysis

Chromatograms, chart recordings, computer printouts are all labeled with the following:

- ☒ Parameter
- ☒ Date and time of analysis
- ☒ Analyst initials
- ☒ Sample ID's
- ☒ Dilution factors

The following analysis information has been checked:

- ☒ The correlation coefficient is ≥ 0.9950 .
- ☒ Absorbances/peak hts/mV readings are comparable to historical data.
- ☒ Client ID's (taken from the bottle at the time of analysis) are recorded on the raw data sheets.
- ☒ Calculations are complete, correct and the final results are being reported in the correct units (i.e. mg/l or mg/kg).
- ☒ The correct number of significant figures are being used (no more than 3)
- ☒ The sample #'s on the raw data sheets, QC sheets and computer worksheets all match. (Check client ID's at this time also.)
- ☒ All samples being reported are attached to the proper QC.
- ☒ There is sufficient quality control for the number of samples run (10%).
- ☒ All quality control data for samples being reported meets ATI criteria.
- ☒ Holding times were met.
- ☒ Data looks reasonable.
- ☒ Anything that looks out of control has an OOC form stating the corrective action taken and the results of that action.
- ☒ All data has been checked to make sure that the correct result is being recorded on the worksheets for data entry.
- ☒ QC and spike data has been entered on the control chart and evaluated for possible problems.
- ☒ The QC value matches the corresponding sample result.

I have checked all of the information listed above and I believe this write up is complete and correct.

C. L. Miller



Chain-of Custody Record

**BURLINGTON
ENVIRONMENTAL**
A Philip Environmental Company

4000 Monroe Road
Farmington, NM 87401

(505) 326-2262 Phone
(505) 326-2388 FAX

Ass # 401410

COC Serial No. C 1877

Project Name <u>Giant</u>		Phase . Task <u>0077-77</u>		Type of Analysis and Bottle		Comments
Project Number <u>18641</u>	Phase . Task <u>0077-77</u>	Total Number of Bottles				
Samplers		Name <u>S. Pope</u>		Location		
Laboratory		Name <u>Analytical Technologies, Inc.</u>		Location		
Sample Number (and depth)	Date	Time	Matrix			
FP-C-01-12	7/26/94	1415	Soil	2	X	01
FP-NW-01-12	7/26/94	1350	Soil	2	X	02
FP-SW-02-36	7/26/94	1125	Soil	2	X	03
FP-SW-02-36	7/26/94	1125	Soil	2	X	04
FP-NE-01-12	7/26/94	1325	Soil	2	X	05
FP-SE-01-12	7/26/94	1150	Soil	2	X	06
FP-SW-01-12	7/26/94	1050	Soil	2	X	07
FP-R-01	7/26/94	1430	Water	2	X	08
HR-18	7/27/94	0930	Water	2	X	09

Relinquished by:

Received By:

Signature	Date	Time	Signature	Date	Time
<u>Ann T. Pope</u>	<u>7/27/94</u>	<u>1045</u>	<u>[Signature]</u>	<u>7/28/94</u>	<u>09:00</u>

Samples Iced: ☒ Yes ☐ No

Preservatives (ONLY for Water Samples)

- ☐ Cyanide Sodium hydroxide (NaOH)
☒ Volatile Organic Analysis Hydrochloric acid (HCl)
☐ Metals Nitric acid (HNO₃)
☐ TPH (418.1) Sulfuric acid (H₂SO₄)
☐ Other (Specify) _____
☐ Other (Specify) _____

Carrier: Fed Ex

Shipping and Lab Notes:

Level 4 QA/QC

Bill Giant Direct for Analytical Costs.

(Giant Refinery, Farmington NM, Attn: Tim Kinney)

Airbill No. 8809273783



Analytical Technologies, Inc. Albuquerque, NM

Chain of Custody

DATE 7/28/94 PAGE 1 OF 1

NETWORK PROJECT MANAGER: LETITIA KRAKOWSKI				ANALYSIS REQUEST																																																																																																																																																																																																																										
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DUE DATE: 8/18 RUSH SURCHARGE: CLIENT DISCOUNT: 0%				RECEIVED BY: (LAB) 1. [Signature] Time: 10:10 RECEIVED BY: (LAB) 2. [Signature] Time: 10:10 PRINTED NAME: [Signature] Date: 7-29-94 COMPANY: [Signature]																																																																																																																																																																																																																										

ATT Labs: San Diego (619) 458-9141 • Phoenix (602) 496-4400 • Seattle (206) 228-8335 • Pensacola (904) 474-1001 • Portland (503) 684-0447 • Albuquerque (505) 344-3777 DISTRIBUTION: White, Canary - ATT • Pink - ORIGINATOR



Analytical Technologies, Inc.

CASE NARRATIVE

CLIENT SAMPLE NUMBERATI-ALBUQUERQUE ID

FP-C-01-12	407412-01
FP-NW-01-12	407412-02
FP-SW-52-36	407412-03
FP-SW-02-36	407412-04
FP-NE-01-12	407412-05
FP-SE-01-12	407412-06
FP-SW-01-12	407412-07
FP-R-01	407412-08
HBR-18	407412-09

SULFATE: ATI-Phoenix performed sulfate analyses on samples 01-07 and are reported within. There were no problems associated with these sulfate analyses.

SW-846; 8010/8020: The soil samples were performed at a medium level. It was determined that these samples (01-07) did not meet the detection requirements as needed by this project. The samples were resampled and analyzed subsequent to this data package. However, the water samples (08-09) did meet the client's criteria and are reported within this report.

It should also be noted that the closing continuing standard for July 29, 1994 (file ID: 021R0101.D) failed to meet acceptance criteria for two compounds: trichlorotrifluoromethane and trichloroethene. Per our SOP the opening standard for the next shift was examined and passed criteria. The data, therefore, meets criteria for reporting. All other QC criteria were met for this sample lot.

ATI certifies that this data is in compliance with the terms and conditions as set forth in SW-846; ATI Quality Assurance Plan; and other related documents, both technically and for completeness, for other than the exceptions noted above (if any). Release of the data contained in this hardcopy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.


H. Mitchell Rubenstein, Ph.D.
Laboratory Manager

10-01-94
Date

SAMPLE RESULTS

GAS CHROMATOGRAPHY RESULTS

TEST : PURGEABLE HALOCARBONS/AROMATICS (EPA 8010/8020)
 CLIENT : BURLINGTON ENVIRONMENTAL ATI I.D.: 407412
 PROJECT # : 12641
 PROJECT NAME : GIANT

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
08	FP-R-01	AQUEOUS	07/26/94	NA	07/29/94	1
09	HBR-18	AQUEOUS	07/27/94	NA	07/30/94	1

PARAMETER	UNITS	08	09
BENZENE	UG/L	<0.5	<0.5
BROMODICHLOROMETHANE	UG/L	<0.2	<0.2
BROMOFORM	UG/L	<0.5	<0.5
BROMOMETHANE	UG/L	<1.0	<1.0
CARBON TETRACHLORIDE	UG/L	<0.2	<0.2
CHLOROBENZENE	UG/L	<0.5	<0.5
CHLOROETHANE	UG/L	<0.5	<0.5
CHLOROFORM	UG/L	<0.5	<0.5
CHLOROMETHANE	UG/L	<1.0	<1.0
DIBROMOCHLOROMETHANE	UG/L	<0.2	<0.2
1,2-DIBROMOETHANE (EDB)	UG/L	<0.2	<0.2
1,2-DICHLOROBENZENE	UG/L	<0.5	<0.5
1,3-DICHLOROBENZENE	UG/L	<0.5	<0.5
1,4-DICHLOROBENZENE	UG/L	<0.5	<0.5
1,1-DICHLOROETHANE	UG/L	<0.2	<0.2
1,2-DICHLOROETHANE (EDC)	UG/L	<0.5	<0.5
1,1-DICHLOROETHENE	UG/L	<0.2	<0.2
CIS-1,2-DICHLOROETHENE	UG/L	<0.2	<0.2
TRANS-1,2-DICHLOROETHENE	UG/L	<1.0	<1.0
1,2-DICHLOROPROPANE	UG/L	<0.2	<0.2
CIS-1,3-DICHLOROPROPENE	UG/L	<0.2	<0.2
TRANS-1,3-DICHLOROPROPENE	UG/L	<0.2	<0.2
ETHYLBENZENE	UG/L	<0.5	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5	<2.5
METHYLENE CHLORIDE	UG/L	<2.0	<2.0
1,1,2,2-TETRACHLOROETHANE	UG/L	<0.2	<0.2
TETRACHLOROETHENE	UG/L	<0.5	<0.5
TOLUENE	UG/L	<0.5	<0.5
1,1,1-TRICHLOROETHANE	UG/L	<1.0	<1.0
1,1,2-TRICHLOROETHANE	UG/L	<0.2	<0.2
TRICHLOROETHENE	UG/L	<0.2	<0.2
TRICHLOROFLUOROMETHANE	UG/L	<0.2	<0.2
VINYL CHLORIDE	UG/L	<0.5	<0.5
TOTAL XYLENES	UG/L	<0.5	<0.5

SURROGATES:

BROMOCHLOROMETHANE (%)	104	98
TRIFLUOROTOLUENE (%)	112	97

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\014R0101.D		
Operator	: C. FROELICH & J.EPLEY	Page Number	: 1
Instrument	: GC#3 5890	Vial Number	: 14
Sample Name	: 407412-08	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 29 Jul 94 11:55 PM	Instrument Method	: 0727PID.MTH
Report Created on	: 30 Jul 94 01:45 PM	Analysis Method	: 0729ELCD.MTH
Last Recalib on	: 30 JUL 94 10:30 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	: 100

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\014R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
4.955	17311	BB	0.070	1	-0.330	Chloromethane <
5.635	* not found *			1		Vinylchloride
6.609	21936	BB	0.103	1	0.0911	Bromomethane <
7.174	* not found *			1		Chloroethane
8.486	15357	BB	0.035	1	-0.399	TCFM <
9.879	* not found *			1		1,1 DCEthene
10.150	92187	BV	0.050	1	-2.603	Methylene chloride <
10.296	3525472	VV	0.087	1	267.445	unknown
11.668	* not found *			1		trans 1,2 DCEthene
12.165	* not found *			1		1,1 DCEthane
13.300	* not found *			1		cis 1,2 DCEthene
13.469	4376293	VV	0.071	1-R	103.656	BCM (surrogate)
13.719	* not found *			1		Chloroform
14.836	98873	VV	0.064	1	-0.841	1,2 DCEthane (EDC) <
14.998	88857	VV	0.082	1	-1.179	1,1,1 TCethane <
15.786	* not found *			1		Carbon Tetrachloride
17.048	* not found *			1		1,2 DCPropene
17.137	* not found *			1		TCethene (TCE)
17.227	* not found *			1		BDCM
18.447	2059	VV	0.196	1	-0.613	cis 1,3 DCPropene <
19.418	* not found *			1		trans 1,3 DCPropene
19.698	* not found *			1		1,1,2 TCethane
20.689	* not found *			1		DBCM
21.190	* not found *			1		1,2 DBrEthane (EDB)
21.566	* not found *			1		Tetrachloroethene (PCE)
22.904	7559	PV	0.073	1	-0.345	Chlorobenzene <
24.026	* not found *			1		Bromoform
24.719	* not found *			1		1,1,2,2 TCethane
25.513	2216098	BV	0.074	1-IR	100.000	BFB (I.S.)
28.272	53239	PV	0.053	1	-0.597	1,3 DCB <
28.406	12353	VV	0.072	1	-0.624	1,4 DCB <
28.996	28159	PV	0.056	1	-0.833	1,2 DCB ~
3.523	16742	PV	0.052		16742.49	* uncalibrated *
4.445	5480	BB	0.068		5480.254	* uncalibrated *
17.576	131046	PV	0.119		131045.8	* uncalibrated *
26.413	2466	VV	0.183		2466.070	* uncalibrated *
29.845	5572	VV	0.080		5571.761	* uncalibrated *

Time Reference Peak

Expected RT

Actual RT

Difference

12

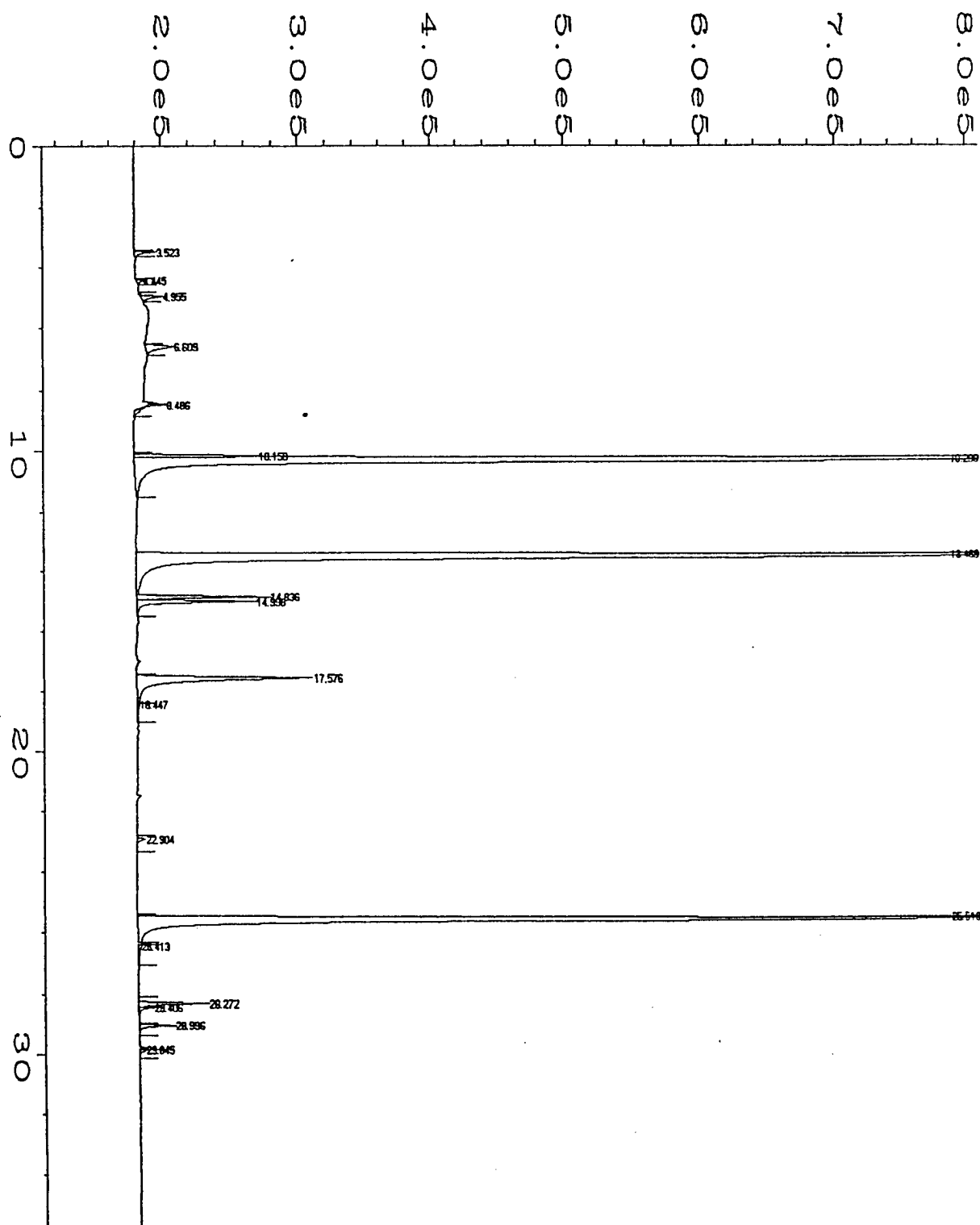
13.537

13.469

-0.068

Not all calibrated peaks were found

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\014R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 14
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 407412-08	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 11:55 PM	Analysis Method	: 0727ELCD.MTH
Report Created on:	30 Jul 94 00:33 AM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 06:11 PM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\014F0101.D		
Operator	: C. FROEHLICH & J.EPLEY	Page Number	: 1
Instrument	: GC#3 5890	Vial Number	: 14
Sample Name	: 407412-08	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 29 Jul 94 11:55 PM	Instrument Method:	0727PID.MTH
Report Created on:	02 Aug 94 05:09 PM	Analysis Method	0729PID.MTH
Last Recalib on	: 30 JUL 94 11:37 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	: 100

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\014F0101.D

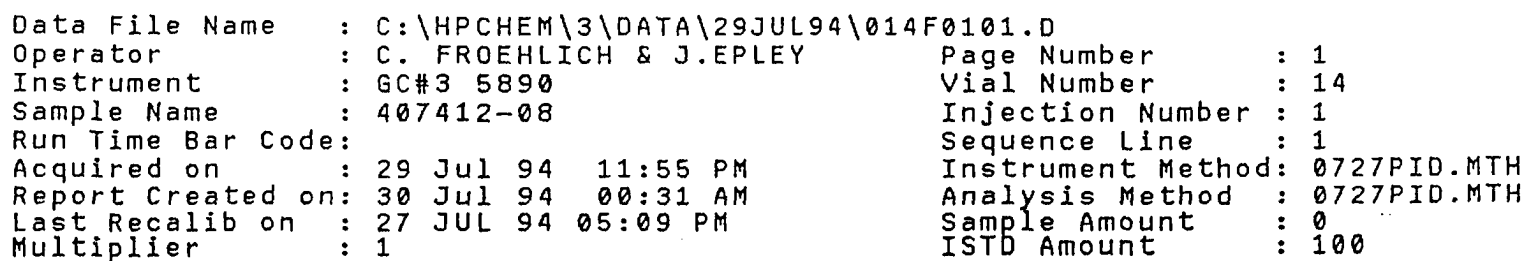
Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.611	875	PV	0.040	1	0.494	VinylChloride <
9.778	* not found *			1		1,1DCEthene
11.590	* not found *			1		trans 1,2-DCEthene
11.920	* not found *			1		Methyl-tert-ButylEther
13.223	* not found *			1		cis 1,2-DCEthene
15.750	1936	BV	0.050	1	0.133	Benzene <
17.057	* not found *			1		TCEthene (TCE)
17.537	272018	PV	0.059	1-R	111.825	Trifluorotoluene (Surr.)
18.449	* not found *			1		cis 1,3DCPropene
19.328	* not found *			1		trans-1,3-DCPropene
19.956	6479	VV	0.056	1	0.295	Toluene <
21.461	* not found *			1		Tetrachloroethene (PCE)
22.865	2758	VV	0.085	1	0.164	Chlorobenzene <
23.328	2125	VV	0.071	1	0.178	Ethylbenzene <
23.762	6520	VV	0.075	1	0.338	M & P Xylene <
24.621	3541	VV	0.057	1	0.204	O-Xylene <
25.481	588976	VV	0.053	1-IR	100.000	Bromofluorobenzene (I.S.)
28.240	7059	VV	0.049	1	0.181	1,3 DCB <
28.369	2249	VV	0.056	1	0.0998	1,4 DCB <
28.963	5156	VV	0.070	1	0.140	1,2 DCB <
4.198	1351	BV	0.045		1350.600	* uncalibrated *
4.430	357	PV	0.088		356.829	* uncalibrated *
8.631	1316	VV	0.127		1316.434	* uncalibrated *
8.821	1936	VV	0.089		1936.475	* uncalibrated *
8.928	4323	VV	0.098		4323.489	* uncalibrated *
9.250	566	VV	0.086		565.608	* uncalibrated *
9.369	755	VV	0.061		754.849	* uncalibrated *
12.753	427	PV	0.075		426.869	* uncalibrated *
12.895	2526	VV	0.055		2526.087	* uncalibrated *
13.040	888	VV	0.074		887.694	* uncalibrated *
13.441	973	PV	0.049		973.269	* uncalibrated *
20.161	777	PV	0.070		776.908	* uncalibrated *
20.694	4870	VV	0.070		4870.291	* uncalibrated *
20.807	1560	VV	0.085		1559.563	* uncalibrated *
21.195	1738	PV	0.074		1738.274	* uncalibrated *
21.590	843	BV	0.054		843.089	* uncalibrated *
21.798	1812	PV	0.069		1812.220	* uncalibrated *
21.877	1078	VV	0.062		1078.038	* uncalibrated *
22.036	3373	VV	0.069		3372.796	* uncalibrated *
22.327	885	VV	0.074		885.134	* uncalibrated *
22.518		VV	0.068		1284.399	* uncalibrated *

23.005	1880	VV	0.070	1879.682	*	uncalibrated	*
23.149	1739	VV	0.090	1739.444	*	uncalibrated	*
23.469	493	VV	0.081	493.242	*	uncalibrated	*
24.039	746	VV	0.071	745.638	*	uncalibrated	*
24.117	990	VV	0.050	990.387	*	uncalibrated	*
24.190	2158	VV	0.060	2158.413	*	uncalibrated	*
24.372	1682	PV	0.067	1681.501	*	uncalibrated	*
24.468	3568	VV	0.055	3568.413	*	uncalibrated	*
25.373	834	BV	0.054	834.083	*	uncalibrated	*
25.690	1274	VV	0.064	1274.103	*	uncalibrated	*
25.773	1027	VV	0.092	1026.619	*	uncalibrated	*
26.206	1144	VV	0.069	1143.569	*	uncalibrated	*
26.338	809	VV	0.066	808.745	*	uncalibrated	*
26.629	3961	PV	0.083	3961.249	*	uncalibrated	*
26.743	986	VV	0.052	986.448	*	uncalibrated	*
26.880	797	VV	0.058	796.657	*	uncalibrated	*
26.970	967	VV	0.063	967.336	*	uncalibrated	*
27.188	1789	PV	0.063	1788.944	*	uncalibrated	*
27.417	2265	VV	0.119	2265.193	*	uncalibrated	*
27.675	3861	PV	0.051	3861.072	*	uncalibrated	*
27.774	1028	VV	0.050	1027.618	*	uncalibrated	*
27.979	3785	PV	0.046	3784.572	*	uncalibrated	*
28.112	740	VV	0.049	739.850	*	uncalibrated	*
28.526	3815	VV	0.063	3814.692	*	uncalibrated	*
28.734	1893	VV	0.084	1893.053	*	uncalibrated	*
29.069	2878	VV	0.097	2878.327	*	uncalibrated	*
29.224	1628	VV	0.058	1628.123	*	uncalibrated	*
29.288	2206	VV	0.063	2205.004	*	uncalibrated	*
29.336	1849	VV	0.107	1848.782	*	uncalibrated	*
29.756	5273	VV	0.129	5273.480	*	uncalibrated	*
29.861	1534	VV	0.025	1533.547	*	uncalibrated	*
30.027	9845	VV	0.071	9844.956	*	uncalibrated	*
30.337	2210	VV	0.164	2209.865	*	uncalibrated	*
30.465	3134	VV	0.085	3134.109	*	uncalibrated	*
30.666	2709	VV	0.123	2709.497	*	uncalibrated	*
30.787	1796	VV	0.055	1795.908	*	uncalibrated	*
30.927	1725	VV	0.070	1725.329	*	uncalibrated	*
31.011	2158	VV	0.075	2158.233	*	uncalibrated	*
31.184	2565	VV	0.130	2564.570	*	uncalibrated	*
31.305	1845	VV	0.101	1845.182	*	uncalibrated	*
31.558	3807	VV	0.151	3806.722	*	uncalibrated	*
31.949	3944	VV	0.139	3944.240	*	uncalibrated	*
32.005	3658	VV	0.055	3657.949	*	uncalibrated	*
32.142	2100	VV	0.123	2099.823	*	uncalibrated	*
32.306	5242	VV	0.062	5242.292	*	uncalibrated	*
32.529	2580	VV	0.154	2579.816	*	uncalibrated	*
32.896	1878	VBA	0.117	1877.639	*	uncalibrated	*

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.623	17.537	-0.086
17	25.536	25.481	-0.055

Calibration table contains at least one peak with amt = 0

Not all calibrated peaks were found



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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\015R0101.D
 Operator : C. FROEHLICH & J.EPLEY Page Number : 1
 Instrument : GC#3 5890 Vial Number : 15
 Sample Name : 407412-09 Injection Number : 1
 Run Time Bar Code: Sequence Line : 1
 Acquired on : 30 Jul 94 00:38 AM Instrument Method: 0727PID.MTH
 Report Created on: 30 Jul 94 01:46 PM Analysis Method : 0729ELCD.MTH
 Last Recalib on : 30 JUL 94 10:30 AM Sample Amount : 0
 Multiplier : 1 ISTD Amount : 100

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\015R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.014	93206	BB	0.077	1	0.154	Chloromethane
5.635	* not found *			1		Vinylchloride
6.663	22069	BB	0.096	1	0.0864	Bromomethane
7.174	* not found *			1		Chloroethane
8.521	19603	BB	0.085	1	-0.369	TCFM
9.879	* not found *			1		1,1 DCEthene
10.284	* not found *			1		Methylene chloride
10.306	3337814	PV	0.086	1	248.627	unknown
11.668	* not found *			1		trans 1,2 DCEthene
12.165	* not found *			1		1,1 DCEthane
13.300	* not found *			1		cis 1,2 DCEthene
13.462	4221002	VV	0.069	1-R	98.169	BCM (surrogate)
13.719	* not found *			1		Chloroform
14.822	97464	VV	0.064	1	-0.855	1,2 DCEthane (EDC)
14.987	28782	VV	0.095	1	-1.417	1,1,1 TCETHANE
15.653	9321	VV	0.034	1	-0.797	Carbon Tetrachloride
17.048	* not found *			1		1,2 DCPropane
17.137	* not found *			1		TCETHENE (TCE)
17.227	* not found *			1		BDCM
18.531	* not found *			1		cis 1,3 DCPropene
19.418	* not found *			1		trans 1,3 DCPropene
19.698	* not found *			1		1,1,2 TCETHANE
20.689	* not found *			1		DBCM
21.190	* not found *			1		1,2 DBREthane (EDB)
21.566	* not found *			1		Tetrachloroethene (PCE)
22.867	7074	BV	0.070	1	-0.350	Chlorobenzene
24.026	* not found *			1		Bromoform
24.719	* not found *			1		1,1,2,2 TCETHANE
25.460	2256940	BV	0.077	1-IR	100.000	BFB (I.S.)
28.340	* not found *			1		1,3 DCB
28.253	52794	PV	0.054	1	-0.462	1,4 DCB
28.987	27130	VV	0.055	1	-0.840	1,2 DCB
3.554	26772	BV	0.057		26772.49	* uncalibrated *
4.502	5517	BB	0.085		5517.020	* uncalibrated *
10.836	6648	VV	0.255		6648.463	* uncalibrated *
17.555	113813	PV	0.114		113813.4	* uncalibrated *
26.365	2638	VV	0.137		2638.189	* uncalibrated *
28.388	9031	VV	0.074		9031.407	* uncalibrated *

Time Reference Peak

Expected RT

Actual RT

Difference

29

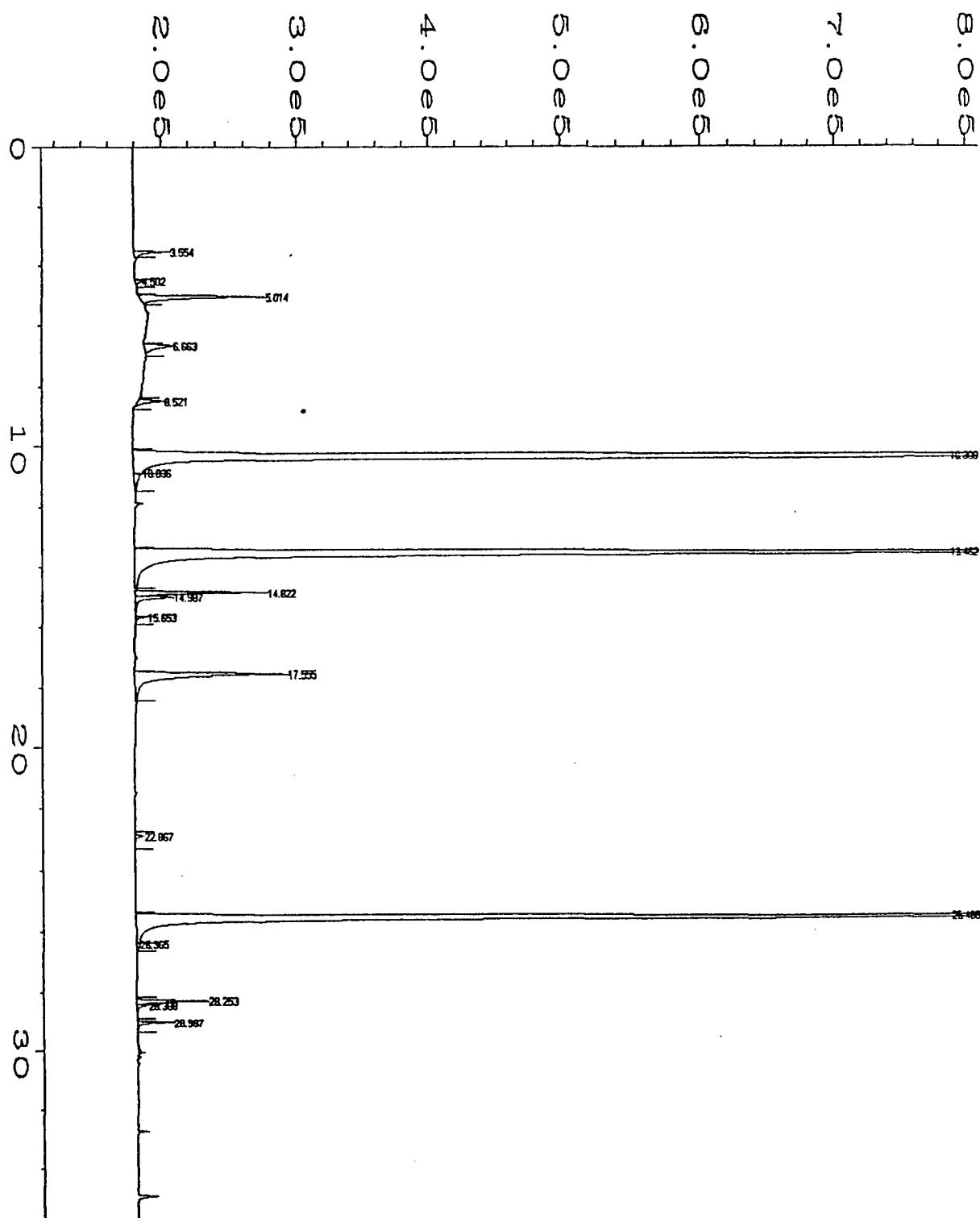
25.609

25.460

-0.149

Not all calibrated peaks were found

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\015R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 15
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 407412-09	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 30 Jul 94 00:38 AM	Analysis Method	: 0727ELCD.MTH
Report Created on	: 30 Jul 94 01:15 AM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 06:11 PM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

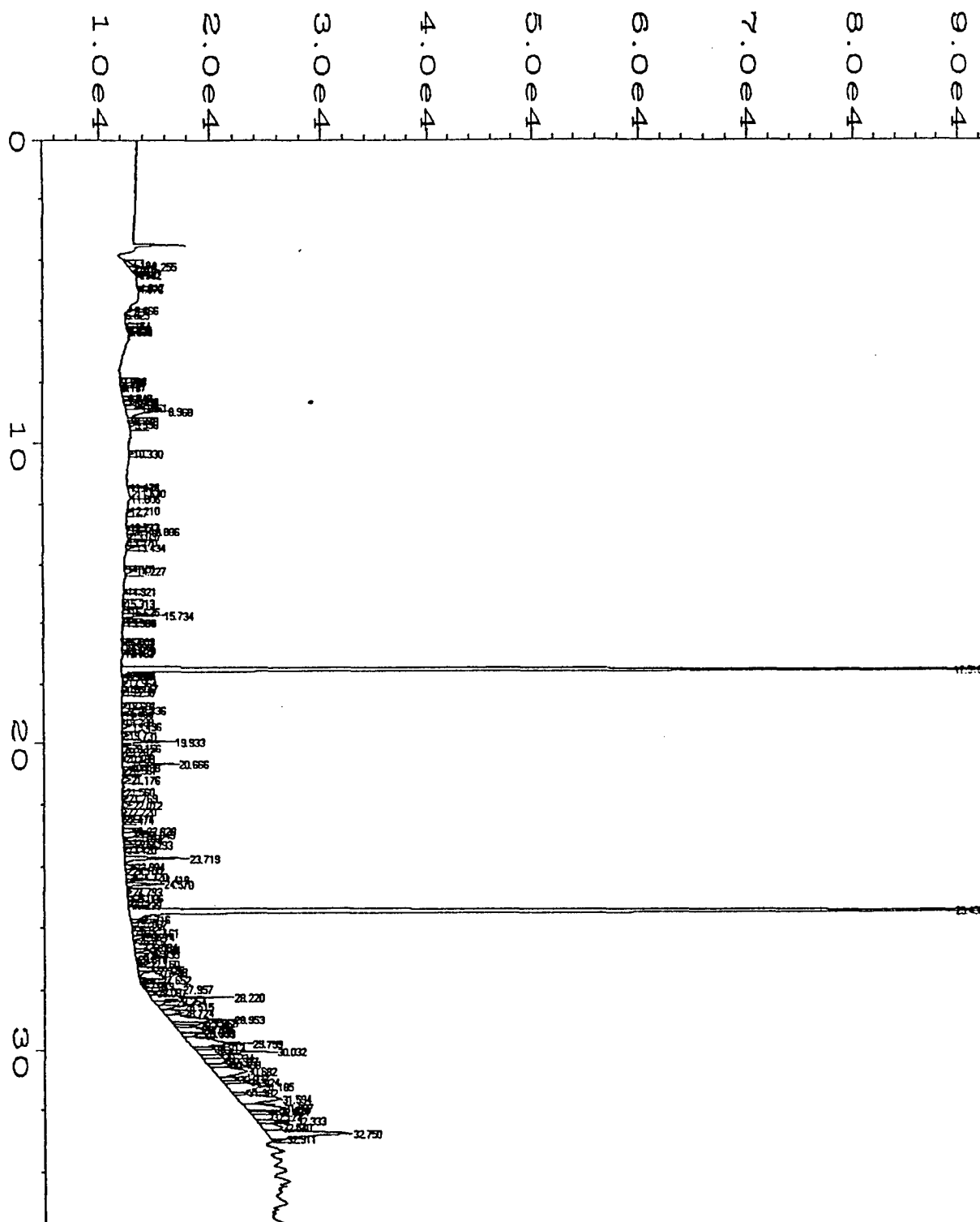
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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\015F0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 15
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 407412-09	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	0727PID.MTH
Acquired on	: 30 Jul 94 00:38 AM	Analysis Method	: 0729PID.MTH
Report Created on:	02 Aug 94 05:13 PM	Sample Amount	: 0
Last Recalib on	: 30 JUL 94 11:37 AM	ISTD Amount	: 100
Multiplier	: 1		

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\015F0101.D

Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.594	*	not found *		1		VinylChloride
9.778	*	not found *		1		1,10CEthene
11.590	*	not found *		1		trans 1,2-DCEthene
11.920	*	not found *		1		Methyl-tert-ButylEther
13.223	*	not found *		1		cis 1,2-DCEthene
15.734		3815 VV	0.060	1	0.202	Benzene <
16.911		435 BV	0.102	1	0.106	TCEthene (TCE)
17.516		244701 PV	0.060	1-R	96.968	Trifluorotoluene (Surr.)
18.449	*	not found *		1		cis 1,3DCPropene
19.328	*	not found *		1		trans-1,3-DCPropene
19.933		4884 VV	0.056	1	0.225	Toluene <
21.461	*	not found *		1		Tetrachloroethene (PCE)
22.829		2181 PV	0.060	1	0.140	Chlorobenzene <
23.293		1747 VV	0.075	1	0.158	Ethylbenzene <
23.719		5941 BV	0.070	1	0.301	M & P Xylene <
24.570		3450 VV	0.057	1	0.195	O-Xylene <
25.430		611013 BV	0.054	1-IR	100.000	Bromofluorobenzene (I.S.)
28.220		7439 VV	0.056	1	0.185	1,3 DCB <
28.354		2033 VV	0.071	1	0.0898	1,4 DCB <
28.953		5749 VV	0.091	1	0.156	1,2 DCB <
4.194		404 BV	0.103		403.679	* uncalibrated *
4.255		2124 VV	0.059		2123.532	* uncalibrated *
5.666		715 VV	0.043		715.118	* uncalibrated *
8.584		523 BV	0.104		523.009	* uncalibrated *
8.649		1018 VV	0.078		1018.086	* uncalibrated *
8.852		1623 VV	0.091		1623.333	* uncalibrated *
8.967		3849 VV	0.102		3848.815	* uncalibrated *
9.279		560 VV	0.067		559.902	* uncalibrated *
9.396		529 VV	0.068		529.296	* uncalibrated *
10.331		467 BV	0.062		467.473	* uncalibrated *
11.630		874 BV	0.158		873.541	* uncalibrated *
11.730		563 VB	0.096		562.629	* uncalibrated *
12.747		399 BV	0.065		399.459	* uncalibrated *
12.887		2190 VV	0.064		2189.817	* uncalibrated *
13.036		621 VV	0.100		621.417	* uncalibrated *
13.434		902 PV	0.052		902.005	* uncalibrated *
14.226		1067 VV	0.077		1066.582	* uncalibrated *
15.622		672 BV	0.064		672.187	* uncalibrated *
16.629		368 PB	0.097		367.588	* uncalibrated *
18.148		602 PV	0.050		601.986	* uncalibrated *
18.690		512 BV	0.065		511.728	* uncalibrated *

19.436	1000	VV	0.064	1000.414	*	uncalibrated	*
19.731	683	PV	0.072	682.822	*	uncalibrated	*
20.156	941	VV	0.095	941.094	*	uncalibrated	*
20.666	5175	VV	0.072	5174.815	*	uncalibrated	*
20.783	801	VV	0.060	801.442	*	uncalibrated	*
20.865	540	VB	0.077	540.381	*	uncalibrated	*
21.170	770	BB	0.089	769.868	*	uncalibrated	*
21.770	532	BV	0.057	531.575	*	uncalibrated	*
22.011	926	PV	0.080	926.246	*	uncalibrated	*
22.221	475	VV	0.079	475.084	*	uncalibrated	*
22.949	2067	VV	0.084	2067.011	*	uncalibrated	*
23.046	907	VV	0.055	906.553	*	uncalibrated	*
23.993	931	VV	0.063	931.476	*	uncalibrated	*
24.103	705	VV	0.091	704.506	*	uncalibrated	*
24.320	1098	VV	0.063	1098.479	*	uncalibrated	*
24.419	3081	VV	0.055	3081.476	*	uncalibrated	*
24.793	495	PV	0.074	494.899	*	uncalibrated	*
25.008	522	PV	0.068	521.928	*	uncalibrated	*
25.717	751	VV	0.073	750.580	*	uncalibrated	*
25.867	524	VV	0.079	524.180	*	uncalibrated	*
26.160	1496	VV	0.073	1496.326	*	uncalibrated	*
26.274	1073	VV	0.071	1073.266	*	uncalibrated	*
26.580	1177	PV	0.094	1177.360	*	uncalibrated	*
26.694	1397	VV	0.075	1397.421	*	uncalibrated	*
26.835	1305	VV	0.086	1304.586	*	uncalibrated	*
27.149	1189	PV	0.066	1188.624	*	uncalibrated	*
27.322	1472	VV	0.073	1472.148	*	uncalibrated	*
27.396	1754	VV	0.080	1754.480	*	uncalibrated	*
27.652	2035	VV	0.057	2035.341	*	uncalibrated	*
27.958	3538	PV	0.054	3538.312	*	uncalibrated	*
28.088	887	VV	0.058	886.685	*	uncalibrated	*
28.515	2347	VV	0.072	2347.237	*	uncalibrated	*
28.723	1851	VV	0.082	1851.187	*	uncalibrated	*
29.067	3149	VV	0.097	3148.790	*	uncalibrated	*
29.288	2270	VV	0.093	2269.591	*	uncalibrated	*
29.394	2151	VV	0.128	2150.759	*	uncalibrated	*
29.759	5580	VV	0.119	5579.930	*	uncalibrated	*
29.910	1738	VV	0.083	1738.129	*	uncalibrated	*
30.032	7127	VV	0.069	7126.573	*	uncalibrated	*
30.339	2040	VV	0.180	2040.264	*	uncalibrated	*
30.474	1985	VV	0.092	1984.654	*	uncalibrated	*
30.681	3014	VV	0.163	3014.254	*	uncalibrated	*
30.933	1590	VV	0.075	1590.129	*	uncalibrated	*
31.025	2423	VV	0.070	2422.886	*	uncalibrated	*
31.187	3347	VV	0.160	3346.575	*	uncalibrated	*
31.379	1480	VV	0.064	1479.887	*	uncalibrated	*
31.593	4033	VV	0.147	4032.737	*	uncalibrated	*
31.895	3494	VV	0.118	3494.474	*	uncalibrated	*
31.968	3046	VV	0.048	3046.236	*	uncalibrated	*
32.033	2844	VV	0.059	2844.466	*	uncalibrated	*
32.213	1746	VV	0.127	1746.054	*	uncalibrated	*
32.333	3624	VV	0.067	3624.068	*	uncalibrated	*
32.540	1876	VV	0.116	1876.095	*	uncalibrated	*
32.750	7936	VV	0.136	7936.164	*	uncalibrated	*
32.911	1470	VBA	0.092	1469.788	*	uncalibrated	*



Data File Name	: C:\HPCHEM\3\DATA\29JUL94\015F0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 15
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 407412-09	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	0727PID.MTH
Acquired on	: 30 Jul 94 00:38 AM	Analysis Method	: 0727PID.MTH
Report Created on:	30 Jul 94 01:14 AM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 05:09 PM	ISTD Amount	: 100
Multiplier	: 1		

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

TEST : PURGEABLE HALOCARBONS/AROMATICS (EPA 8010/8020)
 MSMSD # : 40741209 ATI I.D. : 407412
 CLIENT : BURLINGTON ENVIRONMENTAL DATE EXTRACTED : NA
 PROJECT # : 12641 DATE ANALYZED : 07/30/94
 PROJECT NAME : GIANT SAMPLE MATRIX : AQUEOUS
 REF. I.D. : 40741209 UNITS : UG/L

PARAMETER	SAMPLE RESULT	CONC SPIKE	SPIKED SAMPLE	% REC	DUP SPIKE	DUP % REC	RPD
BENZENE	<0.5	10	9.9	99	11	110	11
CHLOROBENZENE	<0.5	10	10	100	10	100	0
1,1-DICHLOROETHENE	<0.2	10	9.7	97	10	100	3
TOLUENE	<0.5	10	10	100	11	110	10
TRICHLOROETHENE	<0.2	10	10	100	11	110	10

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Internal Standard Report

```

ata File Name      : C:\HPCHEM\3\DATA\29JUL94\016R0101.D
perator           : C. FROELICH & J.EPLEY
nstrument         : GC#3 5890
ample Name        : 407412-09MS
un Time Bar Code  :
quired on         : 30 Jul 94 01:20 AM
eport Created on  : 30 Jul 94 01:47 PM
ast Recalib on   : 30 JUL 94 10:30 AM
ultiplier        : 1
Page Number       : 1
Vial Number       : 16
Injection Number  : 1
Sequence Line    : 1
Instrument Method : 0727PID.MTH
Analysis Method  : 0729ELCD.MTH
Sample Amount    : 0
ISTD Amount      : 100

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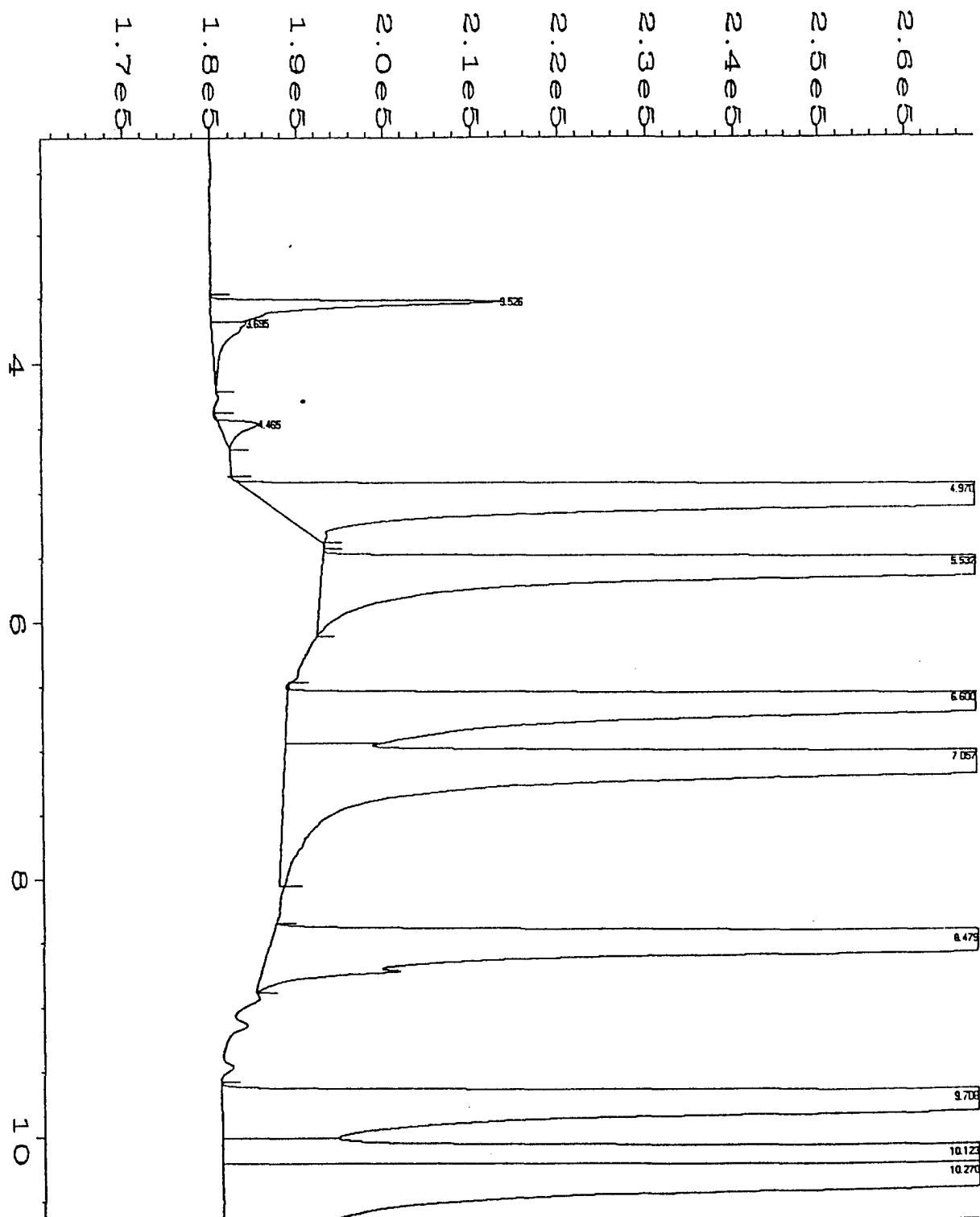
Fig. 2 in C:\HPCHEM\3\DATA\29JUL94\016R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
4.970	1431458	MM T	0.083	1	8.868	Chloromethane
5.532	1141197	BB	0.066	1	8.885	Vinylchloride
6.600	517637	MF T	0.112	1	8.783	Bromomethane
7.057	1048583	FM T	0.106	1	10.047	Chloroethane
8.479	1448083	MM T	0.091	1	10.822	TCFM
9.708	2439447	PV	0.068	1	9.667	1,1 DCEthene
10.123	2999973	VV	0.066	1	8.422	Methylene chloride
10.270	1472908	VV	0.097	1	111.526	unknown
11.498	3090568	VV	0.060	1	10.335	trans 1,2 DCEthene
11.991	2820170	VV	0.071	1	10.232	1,1 DCEthene
13.122	3128058	VV	0.062	1	10.344	cis 1,2 DCEthene
13.411	4166562	VV	0.064	1-R	98.503	BCM (surrogate)
13.540	4009229	VV	0.070	1	10.854	Chloroform
14.770	2627126	VV	0.062	1	10.078	1,2 DCEthane (EDC)
14.934	3002742	VV	0.079	1	10.224	1,1,1 TCEthane
15.621	3283485	VV	0.079	1	10.220	Carbon Tetrachloride
16.899	2492491	VV	0.061	1	10.259	1,2 DCPropane
16.991	3438659	VV	0.063	1	10.325	TCEthane (TCE)
17.084	2595626	VV	0.074	1	10.268	BDCM
18.403	2463613	VV	0.063	1	10.843	cis 1,3 DCPropene
19.300	1911441	VV	0.061	1	9.251	trans 1,3 DCPropene
19.581	2335084	VV	0.068	1	10.139	1,1,2 TCEthane
20.576	1525643	VV	0.076	1	9.882	DBCM
21.080	890466	VV	0.081	1	9.474	1,2 DBrEthane (EDB)
21.460	3579140	VV	0.068	1	10.689	Tetrachloroethene (PCE)
22.890	1585447	VV	0.066	1	10.474	Chlorobenzene
23.929	858348	VV	0.081	1	9.362	Bromoform
24.628	1550643	VV	0.069	1	10.016	1,1,2,2 TCEthane
25.521	2220273	VV	0.075	1-IR	100.000	BFB (I.S.)
28.273	2598105	PV	0.051	1	10.428	1,3 DCB
28.401	2651856	VV	0.053	1	10.213	1,4 DCB
28.994	2528623	VV	0.052	1	10.318	1,2 DCB
3.526	33591	PV	0.059		33590.85	* uncalibrated *
3.695	3939	VB	0.117		3939.386	* uncalibrated *
4.465	4457	BB	0.081		4456.740	* uncalibrated *
12.815	4187	VV	0.107		4187.161	* uncalibrated *
13.903	32099	VV	0.156		32099.48	* uncalibrated *
14.154	12317	VV	0.226		12316.54	* uncalibrated *
16.714	5905	VV	0.065		5904.515	* uncalibrated *
17.540	173880	VV	0.121		173879.7	* uncalibrated *
17.927	15645	VV	0.089		15645.21	* uncalibrated *
18.064	14198	VV	0.152		14197.81	* uncalibrated *

18.854	13355	VV	0.153	13355.13	*	uncalibrated	*
20.253	9916	VV	0.147	9916.266	*	uncalibrated	*
22.486	4746	VV	0.149	4745.823	*	uncalibrated	*
22.752	3769	VV	0.082	3769.198	*	uncalibrated	*
26.309	3758	VV	0.077	3758.365	*	uncalibrated	*
26.418	3246	VV	0.129	3246.047	*	uncalibrated	*
27.255	32600	BV	0.073	32600.38	*	uncalibrated	*
29.927	3714	VV	0.171	3713.534	*	uncalibrated	*

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.537	13.411	-0.126
29	25.609	25.521	-0.088

User Modified



Data File Name : C:\HPCHEM\3\DATA\29JUL94\016R0101.D

Operator : C. FROELICH & J.EPLEY

Instrument : GC#3 5890

Sample Name : 407412-09MS

Run Time Bar Code:

Acquired on : 30 Jul 94 01:20 AM

Report Created on: 30 Jul 94 01:47 PM

Last Recalib on : 30 JUL 94 10:30 AM

Multiplier : 1

Page Number : 1

Vial Number : 16

Injection Number : 1

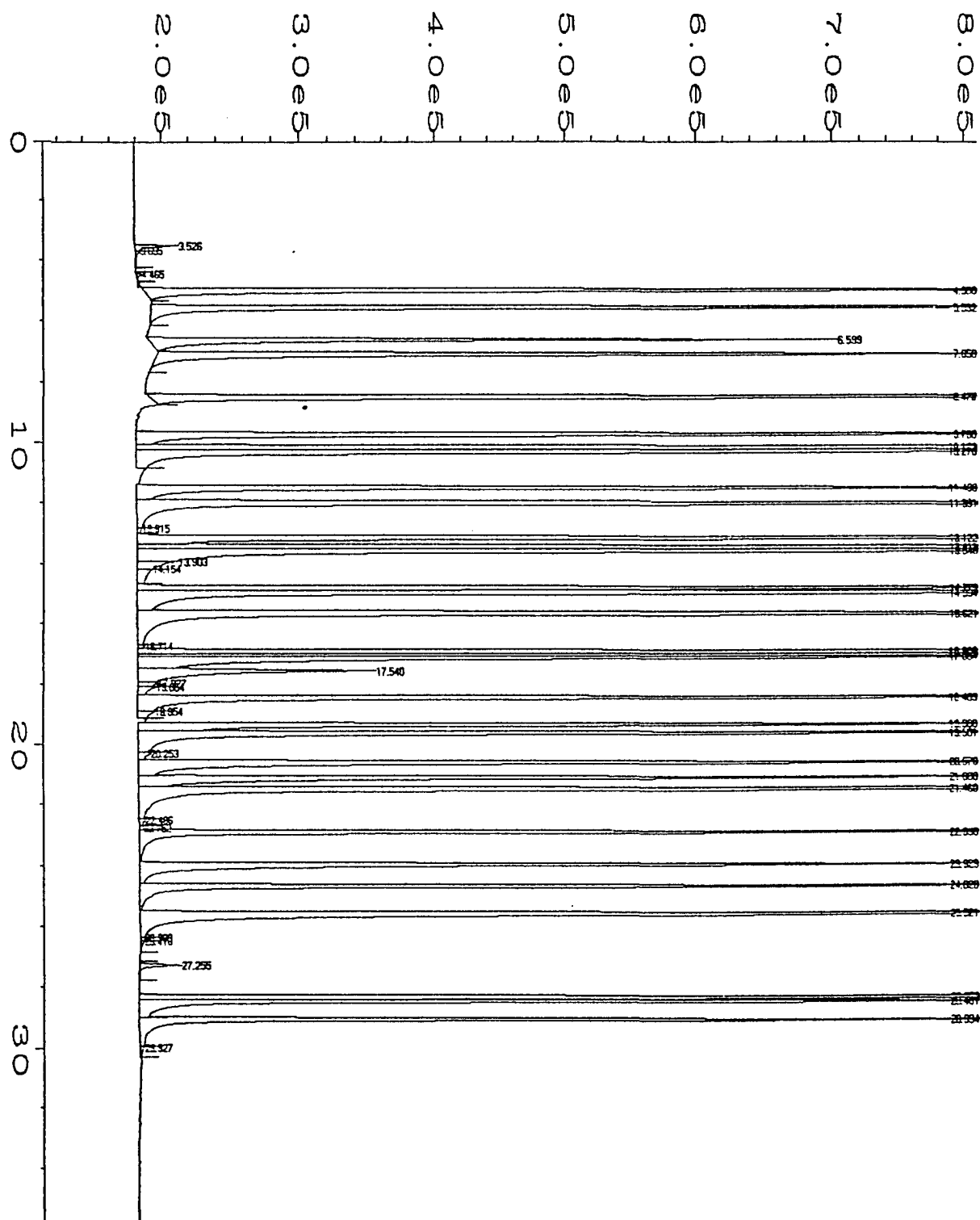
Sequence Line : 1

Instrument Method: 0727PID.MTH

Analysis Method : 0729ELCD.MT

Sample Amount : 0

ISTD Amount : 100



Data File Name	: C:\HPCHEM\3\DATA\29JUL94\016R0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 16
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 407412-09MS	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	0727PID.MTH
Acquired on	: 30 Jul 94 01:20 AM	Analysis Method	: 0727ELCD.MTH
Report Created on:	30 Jul 94 01:58 AM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 06:11 PM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\016F0101.D	
Operator	: C. FROELICH & J.EPLEY	Page Number : 1
Instrument	: GC#3 5890	Vial Number : 16
Sample Name	: 407412-0SMS	Injection Number : 1
Run Time Bar Code:		Sequence Line : 1
Acquired on	: 30 Jul 94 01:20 AM	Instrument Method: 0727PID.MTH
Report Created on:	: 02 Aug 94 05:17 PM	Analysis Method : 0729PID.MTH
Last Recalib on	: 30 JUL 94 11:37 AM	Sample Amount : 0
Multiplier	: 1	ISTD Amount : 100

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\016F0101.D

Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.507	22922	BV	0.054	1	9.234	VinylChloride
9.685	78280	MM T	0.064	1	8.936	1,1DCEthene
11.474	225799	BF	0.051	1	9.722	trans 1,2-DCEthene
11.793	55087	FF	0.078	1	9.519	Methyl-tert-ButylEther
13.098	121204	FF	0.054	1	9.753	cis 1,2-DCEthene
15.700	240927	BF	0.057	1	9.872	Benzene
16.968	137243	BF	0.055	1	9.598	TEthene (TCE)
17.506	240149	FF	0.061	1-R	100.193	Trifluorotoluene (Surr.)
18.379	55301	BF	0.054	1	10.319	cis 1,3DCPropene
19.276	58509	FF	0.052	1	8.493	trans-1,3-DCPropene
19.944	248610	FF	0.055	1	10.058	Toluene
21.436	109605	FF	0.056	1	9.792	Tetrachloroethene (PCE)
22.864	261707	FF	0.053	1	10.021	Chlorobenzene
23.338	222220	FF	0.055	1	9.905	Ethylbenzene
23.776	445115	FF	0.057	1	20.880	M & P Xylene
24.628	228649	FF	0.055	1	10.500	O-Xylene
25.490	580342	BF	0.054	1-IR	100.000	Bromofluorobenzene (I.S.)
28.249	284146	FF	0.044	1	9.773	1,3 DCB
28.378	279738	FF	0.042	1	9.790	1,4 DCB
28.971	231053	FF	0.042	1	9.676	1,2 DCB
3.508	8742	MM T	0.038		8741.644	* uncalibrated *
4.217	1772	VV	0.056		1771.627	* uncalibrated *
4.879	968	PV	0.060		967.783	* uncalibrated *
6.571	4305	VV	0.061		4305.375	* uncalibrated *
8.927	41618	MM R	0.107		41618.43	* uncalibrated *
9.357	646	MM T	0.077		646.495	* uncalibrated *
10.098	2142	BF	0.060		2141.689	* uncalibrated *
12.173	514	FB	0.088		513.967	* uncalibrated *
12.837	1475	FF	0.062		1474.855	* uncalibrated *
13.386	894	FF	0.047		894.356	* uncalibrated *
14.183	1087	BF	0.069		1087.294	* uncalibrated *
18.018	527	FF	0.089		526.757	* uncalibrated *
18.833	974	FF	0.077		974.433	* uncalibrated *
20.161	647	FF	0.095		647.280	* uncalibrated *
20.540	1358	FF	0.063		1358.027	* uncalibrated *
20.687	4674	FF	0.075		4673.741	* uncalibrated *
20.799	1158	FF	0.064		1157.857	* uncalibrated *
21.045	2937	FF	0.054		2937.460	* uncalibrated *
21.195	1017	FF	0.071		1017.049	* uncalibrated *
24.041	1551	FF	0.073		1551.176	* uncalibrated *
24.374	1839	FF	0.059		1838.661	* uncalibrated *

25.784	785	FF	0.063	784.914	* uncalibrated *
26.213	2083	BF	0.062	2082.686	* uncalibrated *
26.356	611	FF	0.057	610.599	* uncalibrated *
26.642	3868	BF	0.081	3867.786	* uncalibrated *
26.761	970	FF	0.055	970.374	* uncalibrated *
26.894	1913	FF	0.072	1912.762	* uncalibrated *
27.196	1307	BF	0.064	1307.265	* uncalibrated *
27.366	1919	FF	0.110	1919.351	* uncalibrated *
27.688	7047	FF	0.050	7047.388	* uncalibrated *
27.990	1695	FF	0.050	1694.583	* uncalibrated *
28.159	1671	FF	0.051	1670.729	* uncalibrated *
28.555	3174	FF	0.083	3174.353	* uncalibrated *
28.662	2291	FF	0.073	2291.062	* uncalibrated *
28.737	1744	FF	0.056	1744.137	* uncalibrated *
29.143	3135	FF	0.081	3134.656	* uncalibrated *
29.294	2597	FF	0.139	2596.702	* uncalibrated *
29.768	5853	FF	0.122	5852.728	* uncalibrated *
30.037	23013	FF	0.057	23012.65	* uncalibrated *
30.344	2115	FF	0.152	2115.432	* uncalibrated *
30.477	19986	FF	0.072	19985.59	* uncalibrated *
30.680	2587	FF	0.109	2587.153	* uncalibrated *
30.803	3060	FF	0.068	3060.007	* uncalibrated *
31.157	2951	FF	0.226	2950.840	* uncalibrated *
31.553	4056	FF	0.169	4056.123	* uncalibrated *
31.966	3772	FF	0.152	3772.181	* uncalibrated *
32.019	4152	FF	0.059	4152.301	* uncalibrated *
32.152	1882	FF	0.121	1881.697	* uncalibrated *
32.319	8701	FF	0.056	8700.799	* uncalibrated *
32.543	2172	FF	0.138	2172.498	* uncalibrated *
32.826	2170	FBA	0.148	2170.498	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.623	17.506	-0.117
17	25.536	25.490	-0.046

Calibration table contains at least one peak with amt = 0

User Modified

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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\017R0101.D

Operator : C. FROELICH & J.EPLEY Page Number : 1

Instrument : GC#3 5890 Vial Number : 17

Sample Name : 407412-09MSD Injection Number : 1

Run Time Bar Code: Sequence Line : 1

Acquired on : 30 Jul 94 02:03 AM Instrument Method: 0727PID.MTH

Report Created on: 30 Jul 94 01:50 PM Analysis Method : 0729ELCD.MTH

Last Recalib on : 30 JUL 94 10:30 AM Sample Amount : 0

Multiplier : 1 ISTD Amount : 100

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\017R0101.D

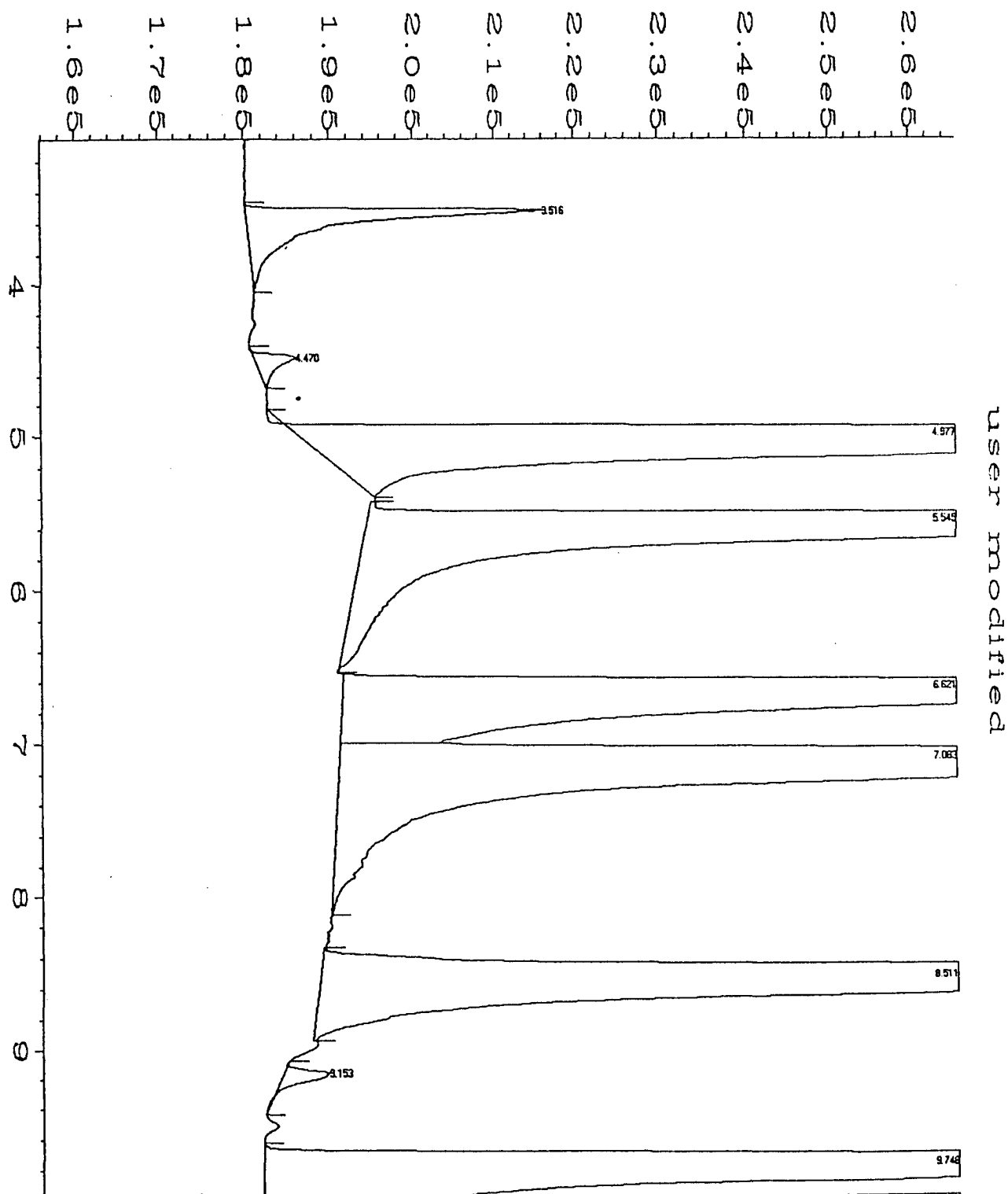
Ret Time	Height	Type	Width	Ref#	ug/L	Name
4.977	1560522	BB	0.072	1	9.341	Chloromethane
5.545	1284087	MM T	0.078	1	9.662	Vinylchloride
6.621	563081	MF T	0.100	1	9.223	Bromomethane
7.083	1158307	FM T	0.096	1	10.698	Chloroethane
8.511	1660128	MM T	0.093	1	12.013	TCFM
9.748	2709515	PV	0.070	1	10.375	1,1 DCEthene
10.161	3233143	VV	0.066	1	8.863	Methylene chloride
10.309	1548954	VV	0.098	1	113.047	unknown
11.547	3368983	VV	0.063	1	10.892	trans 1,2 DCEthene
12.045	3106055	VV	0.071	1	10.905	1,1 DCEthane
13.181	3404933	VV	0.062	1	10.888	cis 1,2 DCEthene
13.470	4339566	VV	0.063	1-R	98.887	BCM (surrogate)
13.598	4314584	VV	0.070	1	11.318	Chloroform
14.824	2727731	VV	0.062	1	10.087	1,2 DCEthane (EDC)
14.985	3228597	VV	0.081	1	10.652	1,1,1 TCETHANE
15.666	3573072	VV	0.077	1	10.760	Carbon Tetrachloride
16.931	2691715	VV	0.060	1	10.706	1,2 DCPropane
17.019	3823568	VV	0.062	1	11.137	TCETHENE (TCE)
17.110	2841607	VV	0.071	1	10.867	BDCM
18.415	2633214	VV	0.064	1	11.189	cis 1,3 DCPropene
19.303	2106521	VV	0.061	1	9.868	trans 1,3 DCPropene
19.581	2467158	VV	0.069	1	10.341	1,1,2 TCETHANE
20.570	1664409	VV	0.078	1	10.403	DBCM
21.073	968734	VV	0.081	1	9.939	1,2 DBrETHANE (EDB)
21.449	3815535	VV	0.068	1	11.007	Tetrachloroethene (PCE)
22.871	1721404	VV	0.066	1	10.980	Chlorobenzene
23.907	921536	VV	0.082	1	9.683	Bromoform
24.603	1654072	VV	0.068	1	10.323	1,1,2,2 TCETHANE
25.493	2303489	VV	0.076	1-IR	100.000	BFB (I.S.)
28.247	2620924	PV	0.050	1	10.117	1,3 DCB
28.376	2789852	VV	0.053	1	10.366	1,4 DCB
28.970	2596268	VV	0.051	1	10.201	1,2 DCB
3.516	35968	BB	0.078		35967.70	* uncalibrated *
4.470	4840	BB	0.080		4839.676	* uncalibrated *
9.153	5222	BV	0.065		5221.981	* uncalibrated *
10.849	10050	VV	0.213		10050.14	* uncalibrated *
16.651	8496	VV	0.086		8496.281	* uncalibrated *
17.560	190175	VV	0.120		190175.0	* uncalibrated *
17.943	17992	VV	0.092		17991.69	* uncalibrated *
18.076	16174	VV	0.155		16173.55	* uncalibrated *
18.950	15523	VV	0.139		15523.82	* uncalibrated *

20.248	11705 VV	0.152	11704.86	* uncalibrated *
22.466	5761 VV	0.153	5761.117	* uncalibrated *
22.734	5195 VV	0.084	5195.168	* uncalibrated *
24.918	13063 VV	0.169	13062.68	* uncalibrated *
26.289	5755 VV	0.087	5754.631	* uncalibrated *
26.387	4973 VV	0.221	4972.703	* uncalibrated *
27.224	35792 VV	0.080	35792.16	* uncalibrated *
29.896	4599 VV	0.178	4599.017	* uncalibrated *

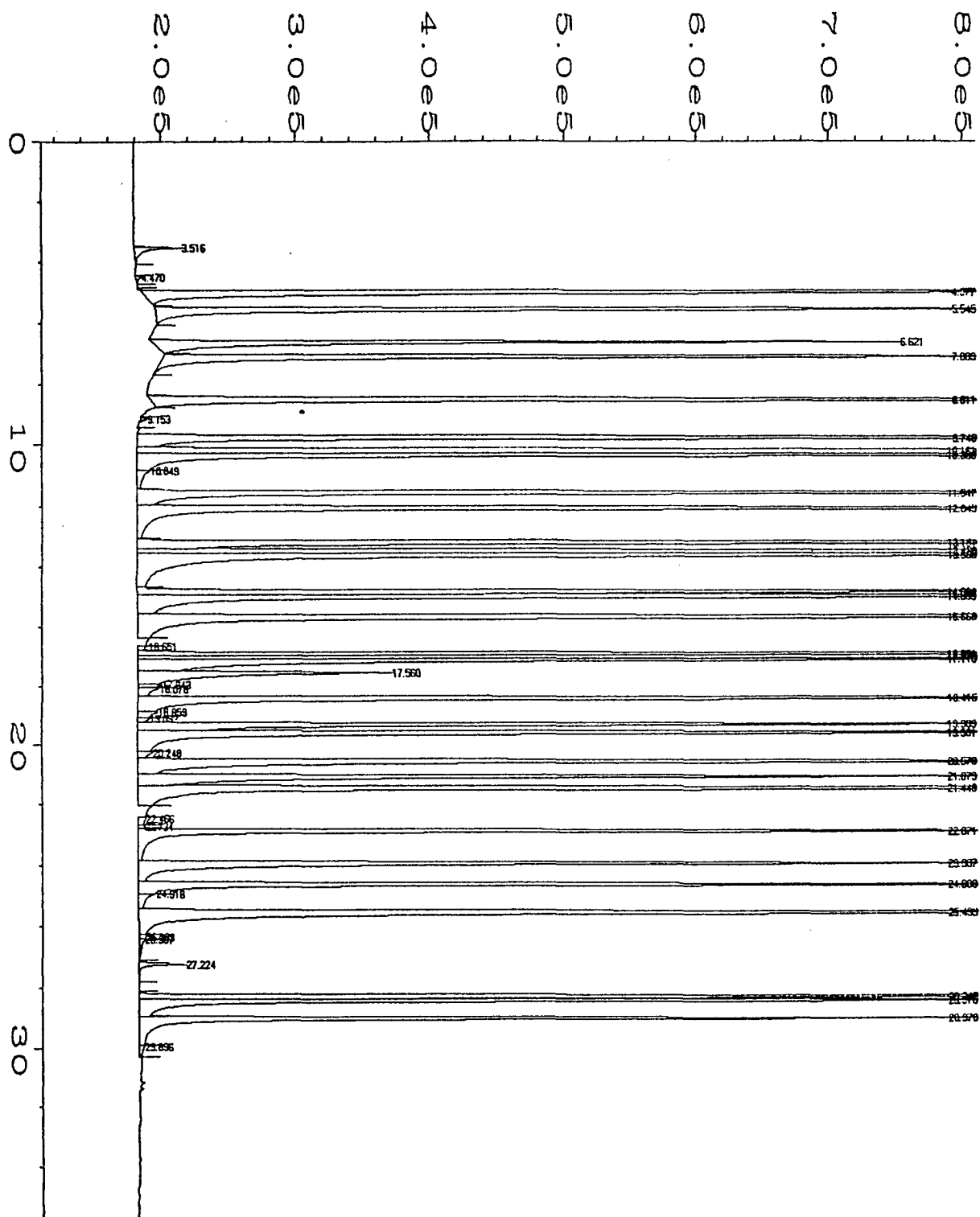
Time Reference Peak	Expected RT	Actual RT	Difference
12	13.537	13.470	-0.067
29	25.609	25.493	-0.116

User Modified

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\017R0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 17
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 407412-09MSD	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 30 Jul 94 02:03 AM	Analysis Method	: 0729ELCD.MTH
Report Created on	: 30 Jul 94 01:50 PM	Sample Amount	: 0
Last Recalib on	: 30 JUL 94 10:30 AM	ISTD Amount	: 100
Multiplier	: 1		



Data File Name	: C:\HPCHEM\3\DATA\29JUL94\017R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 17
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 407412-09MSD	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 30 Jul 94 02:03 AM	Analysis Method	: 0727ELCD.MTH
Report Created on:	30 Jul 94 02:41 AM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 06:11 PM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\017F0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 17
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 407412-09MSD	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	0727PID.MTH
Acquired on	: 30 Jul 94 02:03 AM	Analysis Method	: 0729PID.MTH
Report Created on:	02 Aug 94 05:20 PM	Sample Amount	: 0
Last Recalib on	: 30 JUL 94 11:37 AM	ISTD Amount	: 100
Multiplier	: 1		

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\017F0101.D

Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.520	25532	BV	0.053	1	10.030	VinylChloride
9.722	87869	BV	0.058	1	9.776	1,10CEthene
11.523	248190	PV	0.052	1	10.428	trans 1,2-DCEthene
11.847	61079	VV	0.075	1	10.328	Methyl-tert-ButylEther
13.157	131260	PV	0.054	1	10.309	cis 1,2-DCEthene
15.743	256957	BV	0.056	1	10.678	Benzene
16.996	153622	BV	0.055	1	10.484	TCEthene (TCE)
17.527	250613	PV	0.060	1-R	102.108	Trifluorotoluene (Surr.)
18.390	60445	BV	0.053	1	11.012	cis 1,30CPropene
19.278	63902	VV	0.052	1	9.056	trans-1,3-DCPropene
19.942	267885	PV	0.054	1	10.582	Toluene
21.425	118937	VV	0.056	1	10.368	Tetrachloroethane (PCE)
22.846	278477	PV	0.054	1	10.411	Chlorobenzene
23.317	239130	VV	0.055	1	10.405	Ethylbenzene
23.753	476164	VV	0.067	1	21.812	M & P Xylene
24.603	243339	VV	0.054	1	10.911	O-Xylene
25.463	594269	VV	0.053	1-IR	100.000	Bromofluorobenzene (I.S.)
28.223	296428	VV	0.044	1	9.957	1,3 DCB
28.353	292409	VV	0.042	1	9.993	1,4 DCB
28.946	242006	VV	0.042	1	9.899	1,2 DCB
4.219	1840	BV	0.068		1839.740	* uncalibrated *
4.888	940	PV	0.057		939.998	* uncalibrated *
6.422	260	VV	0.124		259.607	* uncalibrated *
6.594	4855	VF	0.066		4855.385	* uncalibrated *
8.962	47685	MM T	0.097		47684.71	* uncalibrated *
10.134	2397	BV	0.048		2397.381	* uncalibrated *
10.330	493	VV	0.052		492.982	* uncalibrated *
12.231	435	VV	0.073		435.094	* uncalibrated *
12.894	1570	VV	0.054		1569.826	* uncalibrated *
13.444	887	BV	0.048		887.055	* uncalibrated *
14.239	1162	VV	0.081		1162.125	* uncalibrated *
18.035	555	BB	0.075		554.639	* uncalibrated *
18.837	1426	VV	0.073		1426.212	* uncalibrated *
20.189	689	VV	0.096		688.618	* uncalibrated *
20.533	1422	VV	0.071		1421.615	* uncalibrated *
20.680	7859	VV	0.072		7858.683	* uncalibrated *
20.788	913	VV	0.055		913.438	* uncalibrated *
21.038	3213	VV	0.055		3212.560	* uncalibrated *
21.178	1017	VV	0.070		1016.854	* uncalibrated *
24.023	809	VV	0.077		808.673	* uncalibrated *
24.352	1356	PV	0.058		1355.730	* uncalibrated *

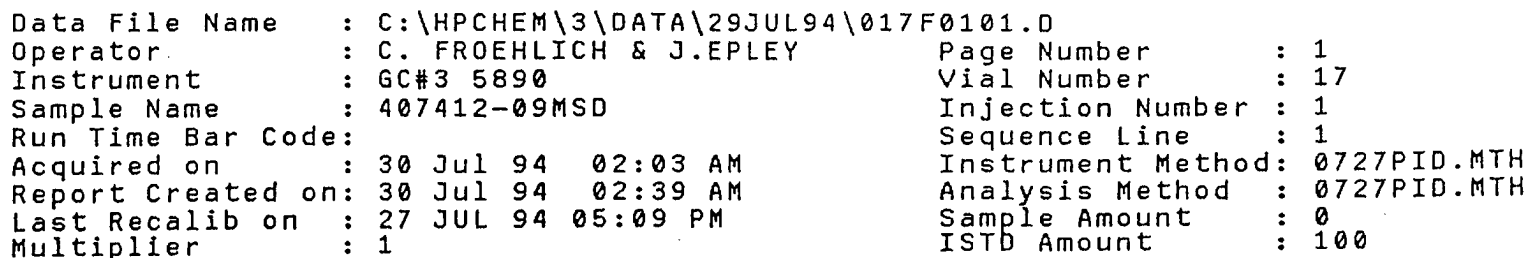
25.753	1035 VV	0.097	1035.005	* uncalibrated *
26.187	1309 VV	0.068	1308.727	* uncalibrated *
26.321	654 VV	0.056	653.598	* uncalibrated *
26.610	2784 PV	0.082	2784.419	* uncalibrated *
26.728	880 VV	0.056	880.476	* uncalibrated *
26.865	1309 PV	0.075	1309.069	* uncalibrated *
27.166	930 VV	0.065	930.042	* uncalibrated *
27.338	1389 VV	0.071	1388.975	* uncalibrated *
27.413	1177 VV	0.093	1176.743	* uncalibrated *
27.661	5661 VV	0.052	5660.973	* uncalibrated *
27.964	1384 PV	0.048	1384.162	* uncalibrated *
28.536	2665 VV	0.084	2665.256	* uncalibrated *
28.714	2021 VV	0.106	2020.628	* uncalibrated *
29.060	4055 VV	0.057	4054.549	* uncalibrated *
29.117	3514 VV	0.074	3514.344	* uncalibrated *
29.264	3097 VV	0.076	3097.312	* uncalibrated *
29.383	2688 VV	0.114	2688.202	* uncalibrated *
29.744	5372 VV	0.144	5372.056	* uncalibrated *
29.910	1994 VV	0.060	1994.256	* uncalibrated *
30.012	21754 VV	0.055	21754.45	* uncalibrated *
30.334	2709 VV	0.208	2709.117	* uncalibrated *
30.451	14501 VV	0.076	14501.22	* uncalibrated *
30.660	3636 VV	0.127	3635.613	* uncalibrated *
30.773	3675 VV	0.071	3675.303	* uncalibrated *
31.144	3383 VV	0.274	3383.287	* uncalibrated *
31.535	4303 VV	0.191	4303.421	* uncalibrated *
31.907	3566 VV	0.145	3566.074	* uncalibrated *
31.992	3506 VV	0.067	3505.509	* uncalibrated *
32.123	2446 VV	0.123	2445.639	* uncalibrated *
32.288	9992 VV	0.061	9991.612	* uncalibrated *
32.520	2621 VV	0.158	2620.625	* uncalibrated *
32.878	1609 VBA	0.161	1608.726	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.523	17.527	-0.006
17	25.536	25.463	-0.073

Calibration table contains at least one peak with amt = 0

User Modified

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METHOD BLANKS

GAS CHROMATOGRAPHY RESULTS - QUALITY CONTROL

REAGENT BLANK

TEST	: EPA 8010/8020	ATI I.D.	: 407412
BLANK I.D.	: 070994	MATRIX	: AQUEOUS
CLIENT	: BURLINGTON ENVIRONMENTAL	DATE EXTRACTED	: NA
PROJECT #	: 12641	DATE ANALYZED	: 07/29/94
PROJECT NAME	: GIANT	DIL. FACTOR	: 1

PARAMETER	UNITS	
BENZENE	UG/L	<0.5
BROMODICHLOROMETHANE	UG/L	<0.2
BROMOFORM	UG/L	<0.5
BROMOMETHANE	UG/L	0.5
CARBON TETRACHLORIDE	UG/L	<0.2
CHLOROBENZENE	UG/L	<0.5
CHLOROETHANE	UG/L	<0.5
CHLOROFORM	UG/L	<0.5
CHLOROMETHANE	UG/L	<1.0
DIBROMOCHLOROMETHANE	UG/L	<0.2
1,2-DIBROMOETHANE (EDB)	UG/L	<0.2
1,2-DICHLOROBENZENE	UG/L	<0.5
1,3-DICHLOROBENZENE	UG/L	<0.5
1,4-DICHLOROBENZENE	UG/L	<0.5
1,1-DICHLOROETHANE	UG/L	<0.2
1,2-DICHLOROETHANE (EDC)	UG/L	<0.5
1,1-DICHLOROETHENE	UG/L	<0.2
CIS-1,2-DICHLOROETHENE	UG/L	<0.2
TRANS-1,2-DICHLOROETHENE	UG/L	<1.0
1,2-DICHLOROPROPANE	UG/L	<0.2
CIS-1,3-DICHLOROPROPENE	UG/L	<0.2
TRANS-1,3-DICHLOROPROPENE	UG/L	<0.2
ETHYLBENZENE	UG/L	<0.5
METHYL-t-BUTYL ETHER	UG/L	<2.5
METHYLENE CHLORIDE	UG/L	<2.0
1,1,2,2-TETRACHLOROETHANE	UG/L	<0.2
TETRACHLOROETHENE	UG/L	<0.2
TOLUENE	UG/L	<0.5
1,1,1-TRICHLOROETHANE	UG/L	<1.0
1,1,2-TRICHLOROETHANE	UG/L	<0.2
TRICHLOROETHENE	UG/L	<0.2
TRICHLOROFLUOROMETHANE	UG/L	<0.2
VINYL CHLORIDE	UG/L	<0.5
TOTAL XYLENES	UG/L	<0.5

SURROGATES:

BROMOCHLOROMETHANE (%)	98
TRIFLUOROTOLUENE (%)	102

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\012R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 12
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: WRB 7/29/94	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 10:29 PM	Analysis Method	: 0729ELCD.MTH
Report Created on:	: 30 Jul 94 01:43 PM	Sample Amount	: 0
Last Recalib on	: 30 JUL 94 10:30 AM	ISTD Amount	: 100
Multiplier	: 1		

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\012R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.034	30488	BB	0.080	1	-0.259	Chloromethane
5.592	6580	BB	0.078	1	-0.257	Vinylchloride
6.682	50496	BB	0.113	1	0.526	Bromomethane BDL
7.174	* not found *			1		Chloroethane
8.551	32948	BB	0.077	1	-0.281	TCFM
9.786	11204	PV	0.063	1	-0.335	1,1 DCEthene
10.190	747476	VV	0.060	1	-0.328	Methylene chloride
10.336	3949409	VV	0.093	1	277.065	unknown
11.679	3838	VV	0.178	1	-0.624	trans 1,2 DCEthene
12.084	6303	VV	0.108	1	-0.671	1,1 DCEthene
13.222	9091	PV	0.066	1	-0.697	cis 1,2 DCEthene
13.496	4486732	VV	0.071	1-R	98.277	BCM (surrogate)
13.719	* not found *			1		Chloroform
14.860	124917	VV	0.064	1	-0.769	1,2 DCEthene (EDC)
15.021	65759	VV	0.088	1	-1.289	1,1,1 TCethane
15.706	20771	VV	0.080	1	-0.763	Carbon Tetrachloride
16.970	16947	BV	0.057	1	-0.616	1,2 DCPropene
17.058	47775	VV	0.069	1	-0.839	TCethene (TCE)
17.142	22212	VV	0.076	1	-0.486	BDCM
18.463	18437	VV	0.083	1	-0.543	cis 1,3 DCPropene
19.352	14814	BV	0.069	1	-0.598	trans 1,3 DCPropene
19.628	29705	VV	0.073	1	-0.724	1,1,2 TCethane
20.625	6820	PV	0.094	1	-0.187	DBCM
21.136	6708	VV	0.094	1	-0.0216	1,2 DBrEthane (EDB)
21.492	34852	VV	0.068	1	-0.754	Tetrachloroethene (PCE)
22.917	18816	BV	0.067	1	-0.278	Chlorobenzene
23.969	5834	BV	0.084	1	0.197	Bromoform
24.647	31760	BV	0.068	1	-0.656	1,1,2,2 TCethane
25.524	2396388	BV	0.073	1-IR	100.000	BFB (I.S.)
28.264	85185	VV	0.054	1	-0.486	1,3 DCB
28.395	41125	VV	0.075	1	-0.519	1,4 DCB
28.984	62026	VV	0.061	1	-0.703	1,2 DCB
3.586	8392	VV	0.057		8391.842	* uncalibrated *
4.518	6698	BB	0.078		6697.617	* uncalibrated *
11.586	15480	VV	0.071		15480.41	* uncalibrated *
14.066	18348	VV	0.142		18348.36	* uncalibrated *
17.592	140093	VV	0.116		140093.4	* uncalibrated *
26.431	2574	VV	0.198		2573.737	* uncalibrated *
31.715	22084	VV	0.030		22083.95	* uncalibrated *
32.646	4304	VV	0.073		4304.324	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.537	13.496	-0.041
29	25.609	25.524	-0.085

Not all calibrated peaks were found

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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\012F0101.D
 Operator : C. FROELICH & J.EPLEY Page Number : 1
 Instrument : GC#3 5890 Vial Number : 12
 Sample Name : WRB 7/29/94 Injection Number : 1
 Run Time Bar Code: Sequence Line : 1
 Acquired on : 29 Jul 94 10:29 PM Instrument Method: 0727PID.MTH
 Report Created on: 01 Aug 94 08:12 PM Analysis Method : 0729PID.MTH
 Last Recalib on : 30 JUL 94 11:37 AM Sample Amount : 0
 Multiplier : 1 ISTD Amount : 100

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\012F0101.D

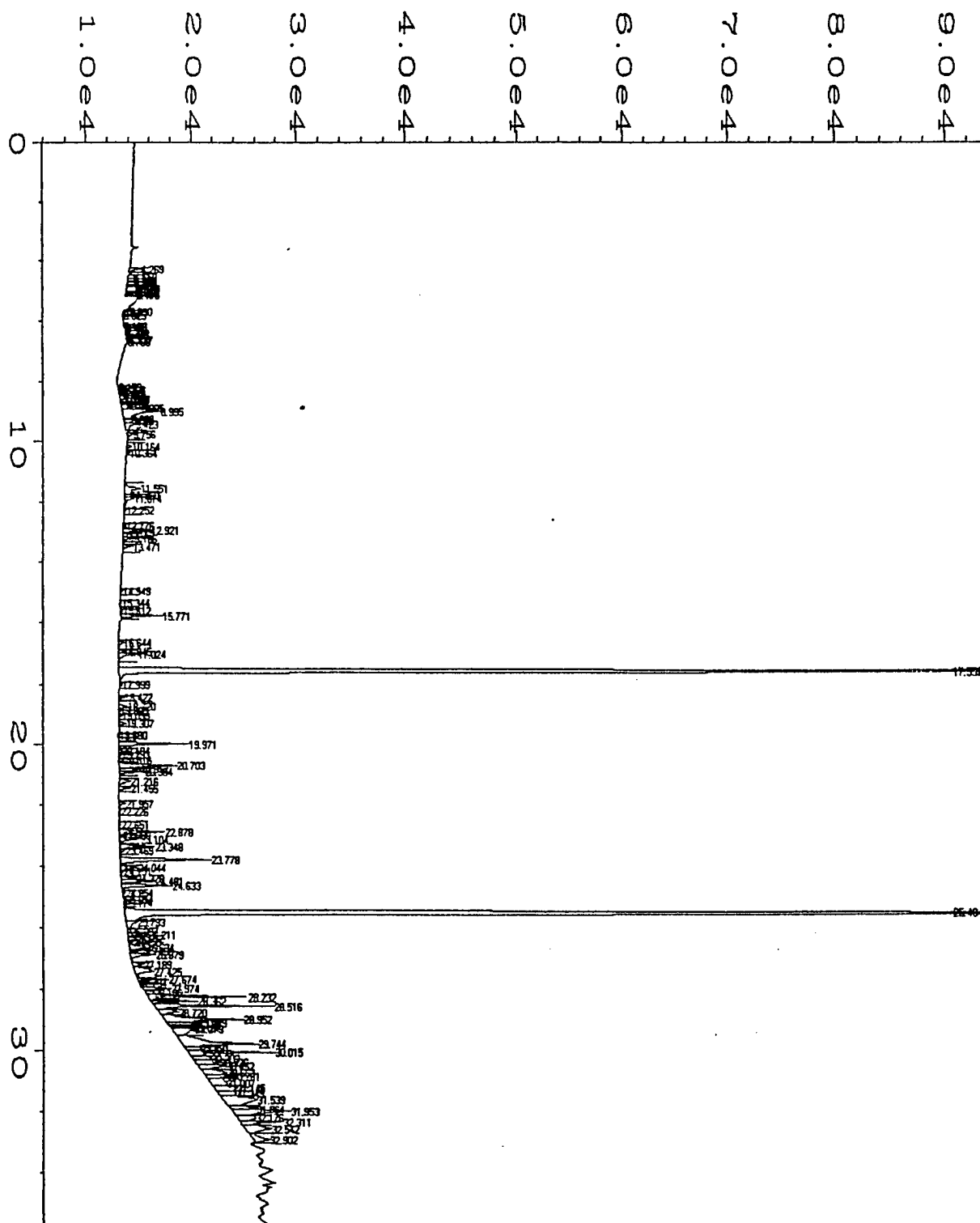
Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.594	* not found *			1		VinylChloride
9.754	498	BB	0.076	1	0.253	1,1DCEthene ✓
11.552	1517	BV	0.097	1	0.159	trans 1,2-DCEthene <
11.873	890	VB	0.092	1	-0.110	Methyl-tert-ButylEther <
13.183	562	VV	0.061	1	0.135	cis 1,2-DCEthene <
15.771	4158	VB	0.062	1	0.209	Benzene <
17.024	1899	VB	0.077	1	0.197	TCEthene (TCE) <
17.553	268118	BV	0.060	1-R	101.699	Trifluorotoluene (Surr.)
18.449	* not found *			1		cis 1,3DCPropene
19.309	743	PV	0.067	1	0.133	trans-1,3-DCPropene <
19.971	6759	BV	0.056	1	0.286	Toluene <
21.455	1164	VB	0.059	1	0.242	tetrachloroethene (PCE) ← NO CONF. ON ELCS
22.878	4420	BV	0.057	1	0.214	Chlorobenzene <
23.348	3370	VV	0.061	1	0.220	Ethylbenzene <
23.779	8700	PV	0.074	1	0.407	M & P Xylene <
24.633	4859	VV	0.059	1	0.247	O-Xylene <
25.494	638337	BV	0.054	1-IR	100.000	Bromofluorobenzene (I.S.)
28.232	9498	VV	0.048	1	0.239	1,3 DCB <
28.362	4346	VV	0.046	1	0.160	1,4 DCB <
28.952	7467	VV	0.065	1	0.212	1,2 DCB <
4.269	1030	PV	0.044		1030.476	* uncalibrated *
8.592	471	VV	0.127		470.898	* uncalibrated *
8.886	1688	VV	0.075		1688.366	* uncalibrated *
8.994	3473	VV	0.107		3472.783	* uncalibrated *
9.299	610	VV	0.087		609.671	* uncalibrated *
9.423	764	VB	0.080		763.717	* uncalibrated *
10.163	533	BV	0.063		532.955	* uncalibrated *
11.758	646	VV	0.070		646.143	* uncalibrated *
12.921	2671	VV	0.062		2670.670	* uncalibrated *
13.061	436	VV	0.068		435.633	* uncalibrated *
13.471	1001	BV	0.059		1000.778	* uncalibrated *
16.644	465	BV	0.089		464.553	* uncalibrated *
16.943	530	VV	0.065		530.467	* uncalibrated *
18.722	830	BV	0.066		830.482	* uncalibrated *
20.292	314	VV	0.085		314.260	* uncalibrated *
20.517	457	PV	0.075		456.723	* uncalibrated *
20.703	5591	VV	0.071		5590.969	* uncalibrated *
20.811	2080	VV	0.056		2080.234	* uncalibrated *
20.903	2462	VB	0.072		2461.976	* uncalibrated *
21.218	1087	BV	0.089		1086.548	* uncalibrated *
21.957	614	BV	0.063		613.661	* uncalibrated *
			0.076		2068.951	* uncalibrated *

23.470	526	VV	0.071	526.253	*	uncalibrated	*
24.044	1671	VV	0.069	1671.292	*	uncalibrated	*
24.378	1462	BV	0.056	1461.947	*	uncalibrated	*
24.481	3285	VV	0.055	3284.563	*	uncalibrated	*
25.793	1080	VV	0.126	1079.643	*	uncalibrated	*
26.211	2014	VV	0.068	2014.147	*	uncalibrated	*
26.352	803	VV	0.068	802.772	*	uncalibrated	*
26.450	463	VV	0.067	462.871	*	uncalibrated	*
26.634	1641	VV	0.086	1640.911	*	uncalibrated	*
26.749	1081	VV	0.058	1080.604	*	uncalibrated	*
26.879	2489	PV	0.073	2488.586	*	uncalibrated	*
27.189	1131	PV	0.067	1130.576	*	uncalibrated	*
27.425	1869	VV	0.113	1869.081	*	uncalibrated	*
27.674	3004	PV	0.050	3004.400	*	uncalibrated	*
27.974	2611	PV	0.045	2610.953	*	uncalibrated	*
28.105	742	VV	0.065	741.598	*	uncalibrated	*
28.516	11323	VV	0.049	11323.27	*	uncalibrated	*
28.720	1746	VV	0.091	1745.838	*	uncalibrated	*
29.069	2909	VV	0.095	2908.933	*	uncalibrated	*
29.197	2044	VV	0.052	2044.005	*	uncalibrated	*
29.273	2165	VV	0.122	2164.507	*	uncalibrated	*
29.744	7155	VV	0.096	7155.095	*	uncalibrated	*
29.891	1418	VV	0.074	1417.635	*	uncalibrated	*
30.015	8212	VV	0.059	8212.075	*	uncalibrated	*
30.203	1695	VV	0.083	1695.049	*	uncalibrated	*
30.326	2224	VV	0.104	2224.211	*	uncalibrated	*
30.452	2540	VV	0.093	2539.769	*	uncalibrated	*
30.663	2170	VV	0.103	2170.265	*	uncalibrated	*
30.781	2453	VV	0.077	2452.798	*	uncalibrated	*
31.007	1458	VV	0.193	1457.589	*	uncalibrated	*
31.145	2136	VV	0.133	2135.765	*	uncalibrated	*
31.349	1591	VV	0.117	1591.028	*	uncalibrated	*
31.539	3235	VV	0.165	3235.228	*	uncalibrated	*
31.864	2555	VV	0.122	2554.785	*	uncalibrated	*
31.953	5608	VV	0.094	5607.872	*	uncalibrated	*
32.176	1666	VV	0.123	1665.824	*	uncalibrated	*
32.311	4133	VV	0.061	4132.778	*	uncalibrated	*
32.542	2443	VV	0.146	2442.772	*	uncalibrated	*
32.902	1507	VBA	0.131	1507.165	*	uncalibrated	*

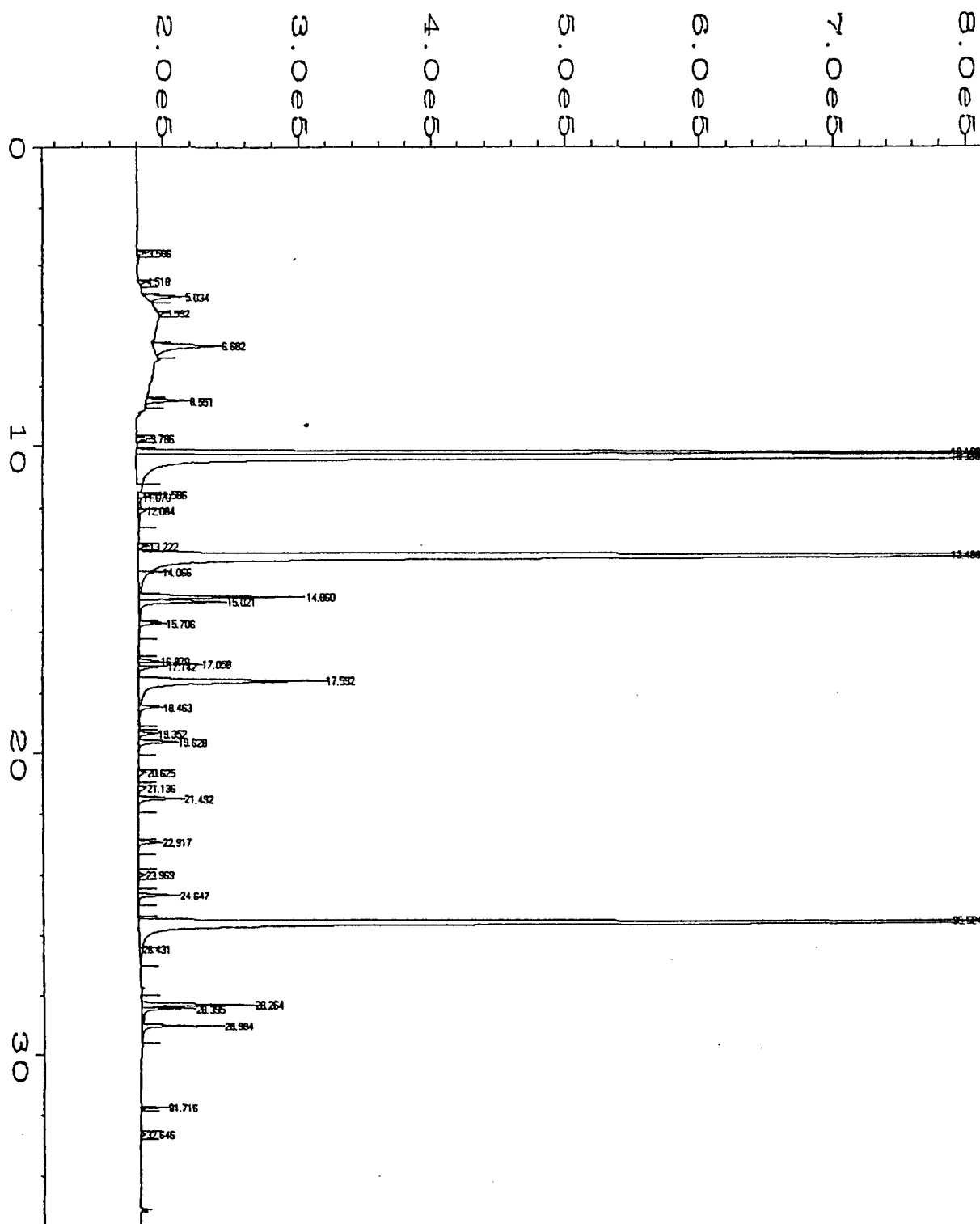
Time Reference Peak	Expected RT	Actual RT	Difference
8	17.623	17.553	-0.070
17	25.536	25.494	-0.042

Calibration table contains at least one peak with amt = 0

Not all calibrated peaks were found



Data File Name	: C:\HPCHEM\3\DATA\29JUL94\012F0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 12
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: WRB 7/29/94	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 10:29 PM	Analysis Method	: 0727PID.MTH
Report Created on	: 29 Jul 94 11:05 PM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 05:09 PM	ISTD Amount	: 100
Multiplier	: 1		



Data File Name	: C:\HPCHEM\3\DATA\29JUL94\012R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 12
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: WRB 7/29/94	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	: 0727PID.MTH
Acquired on	: 29 Jul 94 10:29 PM	Analysis Method	: 0727ELCD.MTH
Report Created on:	: 29 Jul 94 11:07 PM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 06:11 PM	ISTD Amount	: 100
Multiplier	: 1		

INITIAL CALIBRATIONS

INITIAL CALIBRATION

EPA METHOD 8020

JULY 29, 1994

GC 3 PID

COMPOUNDS	RESPONSE FACTORS (AMOUNT/HEIGHT)						Correlation of Determination*
VINYL CHLORIDE	3.16E-04	3.67E-04	3.62E-04	3.68E-04	3.49E-04	3.51E-04	0.999
1,1 DICHLOROETHENE	1.60E-04	8.70E-05	1.05E-04	1.06E-04	9.54E-05	1.00E-04	0.996
t 1,2 DICHLOROETHENE	3.54E-05	3.58E-05	3.93E-05	3.68E-05	3.68E-05	3.80E-05	0.999
METHYL-t-BUTYL ETHER	1.15E-04	1.27E-04	1.39E-04	1.54E-04	1.51E-04	1.56E-04	0.999
c 1,2 DICHLOROETHENE	6.32E-05	6.70E-05	7.40E-05	7.29E-05	6.90E-05	7.09E-05	0.999
BENZENE	2.95E-05	3.47E-05	3.74E-05	3.72E-05	3.51E-05	3.62E-05	0.999
TRICHLOROETHENE	5.09E-05	5.93E-05	6.40E-05	6.40E-05	5.95E-05	6.18E-05	0.998
TRIFLUOROTOLUENE surr	3.84E-04	3.50E-04	3.86E-04	3.72E-04	3.61E-04	3.56E-04	NA
c 1,3 DICHLOROPROPENE	1.35E-04	1.52E-04	1.68E-04	1.68E-04	1.62E-04	1.64E-04	0.999
t 1,3 DICHLOROPROPENE	1.94E-04	2.06E-04	1.90E-04	2.10E-04	1.92E-04	1.77E-04	0.997
TOLUENE	2.81E-05	3.21E-05	3.74E-05	3.66E-05	3.51E-05	3.56E-05	0.999
TETRACHLOROETHENE	6.83E-05	7.64E-05	8.39E-05	8.16E-05	7.71E-05	7.79E-05	0.998
CHLOROBENZENE	2.78E-05	3.12E-05	3.51E-05	3.47E-05	3.33E-05	3.36E-05	0.999
ETHYLBENZENE	3.40E-05	3.66E-04	4.09E-04	4.04E-05	3.87E-05	3.90E-05	0.999
M & P XYLENE	3.43E-05	3.72E-05	4.21E-05	4.23E-05	4.09E-05	4.13E-05	0.999
O XYLENE	3.33E-05	3.67E-05	4.19E-05	4.16E-05	4.00E-05	4.03E-05	0.999
BROMOFLUOROBENZENE I.S.	1.41E-04	1.49E-04	1.48E-04	1.49E-04	1.52E-04	1.53E-04	NA
1,3 DICHLOROBENZENE	2.24E-05	2.59E-05	3.09E-05	3.10E-05	3.01E-05	3.03E-05	0.999
1,4 DICHLOROBENZENE	2.58E-05	2.77E-05	3.18E-05	3.11E-05	3.07E-05	3.07E-05	0.999
1,2 DICHLOROBENZENE	2.68E-05	3.14E-05	3.71E-05	3.78E-05	3.70E-05	3.68E-05	0.999

*Square root of correlation determination is equal to the correlation coefficient

Square root of 0.990 is equal to 0.995 correlation coefficient

EPA METHOD 8010

JULY 29, 1994

GC 3 ELCD

STANDARD CONC.	1.0PPB	2.0PPB	5.0PPB	10.0PPB	15.0PPB	20.0PPB	
FILE I.D.	005F0101	006F0101	007F0101	008F0101	009F0101	010F0101	
COMPOUNDS	RESPONSE FACTORS (AMOUNT/HEIGHT)						Correlation of Determination*
CHLOROMETHANE	3.22E-06	4.53E-06	5.80E-06	5.39E-06	5.43E-06	5.74E-06	0.996
VINYLCHLORIDE	6.96E-06	6.42E-06	5.93E-06	6.91E-06	6.79E-06	7.20E-06	0.996
BROMOMETHANE	7.39E-06	1.29E-05	1.63E-05	1.55E-05	1.54E-05	1.50E-05	0.996
CHLOROETHANE	8.13E-06	7.99E-06	8.32E-06	8.44E-06	8.42E-06	8.55E-06	0.999
TCFM	5.29E-06	5.30E-06	6.37E-06	6.46E-06		7.17E-06	0.998
1,1 DICHLOROETHENE	4.85E-06	2.78E-06	3.16E-06	3.45E-06		3.77E-06	0.997
METHYLENE CHLORIDE	8.80E-07	1.32E-06	2.03E-09	2.53E-06		3.05E-06	0.999
1,2 DICHLOROETHENE	2.39E-06	2.35E-06	2.63E-06	2.85E-06	2.91E-06	3.15E-06	0.995
1,1 DICHLOROETHENE	2.48E-06	2.44E-06	2.88E-06	3.12E-06	3.15E-06	3.43E-06	0.994
1,2 DICHLOROETHENE	2.19E-06	2.28E-06	2.57E-06	2.82E-06	2.90E-06	2.12E-06	0.996
BROMOCHLOROMETHANE	2.03E-05	2.06E-05	2.01E-06	2.03E-06	2.07E-06	2.15E-06	NA
CHLOROFORM	1.22E-06	1.48E-06	2.00E-06	2.28E-06	2.40E-06	2.63E-06	0.994
1,2 DICHLOROETHANE	1.89E-06	2.35E-06	2.88E-06	3.27E-06	3.42E-06	3.71E-06	0.995
1,1,1 TRICHLOROETHANE	1.33E-06	2.12E-02	2.55E-06	2.94E-06	2.99E-06	3.35E-06	0.992
CARBON TETRACHLORIDE	1.96E-06	2.11E-06	2.40E-06	2.65E-06	2.72E-06	2.96E-06	0.994
1,2 DICHLOROPROPANE	2.61E-06	2.89E-06	3.24E-06	3.52E-06	3.62E-06	3.86E-06	0.997
TRICHLOROETHENE	1.67E-06	2.03E-06	2.27E-06	2.55E-06	2.63E-06	2.88E-06	0.994
BROMODICHLOROMETHANE	2.60E-06	2.78E-06	3.19E-06	3.43E-06	3.46E-06	3.69E-06	0.997
1,3 DICHLOROPROPENE	2.77E-06	3.00E-06	3.46E-06	3.89E-06	3.85E-06		0.997
1,3 DICHLOROPROPENE	3.20E-06	3.39E-06	3.82E-06	4.17E-06	4.31E-06	4.55E-06	0.997
1,1,2 TRICHLOROETHANE	2.55E-06	2.85E-06	3.37E-06	3.74E-06	3.85E-06	4.10E-06	0.997
DIBROMOCHLOROMETHANE	5.21E-06	5.10E-06	5.53E-06	5.50E-06	5.72E-06	5.91E-06	0.998
1,2 DIBROMOETHANE	8.71E-06	8.69E-06	8.95E-06	9.37E-06	9.47E-06	9.50E-06	1.000
TETRACHLOROETHENE	1.79E-06	1.98E-06	2.31E-06	2.52E-06	2.64E-06	2.82E-06	0.996
CHLOROBENZENE	4.60E-06	4.88E-06	5.55E-06	5.63E-06	5.85E-06	6.05E-06	0.998
BROMOFORM	1.01E-05	9.57E-06	9.30E-06	9.87E-06	9.62E-06	9.56E-06	0.999
1,1,2,2, TETRACHLOROETHANE	3.84E-06	4.13E-06	5.16E-06	5.38E-06	5.89E-06	6.05E-06	0.998
BROMOFLUOROBENZENE	3.87E-05	3.91E-05	3.82E-05	3.89E-05	4.07E-05	3.98E-05	NA
1,3 DICHLOROBENZENE	2.29E-06	2.54E-06	3.14E-06	3.51E-06	3.59E-06	3.73E-06	0.998
1,4 DICHLOROBENZENE	2.47E-06	2.56E-06	3.11E-06	3.29E-06	3.43E-06	3.58E-06	0.998
1,2 DICHLOROBENZENE	2.44E-06	2.59E-06	3.09E-06	3.48E-06	3.64E-06	3.86E-06	0.997

*Square root of correlation determination is equal to the correlation coefficient

Square root of 0.990 is equal to 0.995 correlation coefficient

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Internal Standard Report

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Data File Name   : C:\HPCHEM\3\DATA\29JUL94\005F0101.D
Operator        : C. FROEHLICH & J.EPLEY
Instrument       : GC#3 5890
Sample Name     : 1.0PPB VOA STD
Run Time Bar Code:
Acquired on     : 29 Jul 94   05:28 PM
Report Created on: 30 Jul 94   11:13 AM
Last Recalib on : 30 Jul 94   11:13 AM
Multiplier     : 1

Page Number      : 1
Vial Number     : 5
Injection Number : 1
Sequence Line   : 1
Instrument Method: 0727PID.MTH
Analysis Method : 0727PID.MTH
Sample Amount   : 0
ISTD Amount     : 100
  
```

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\005F0101.D

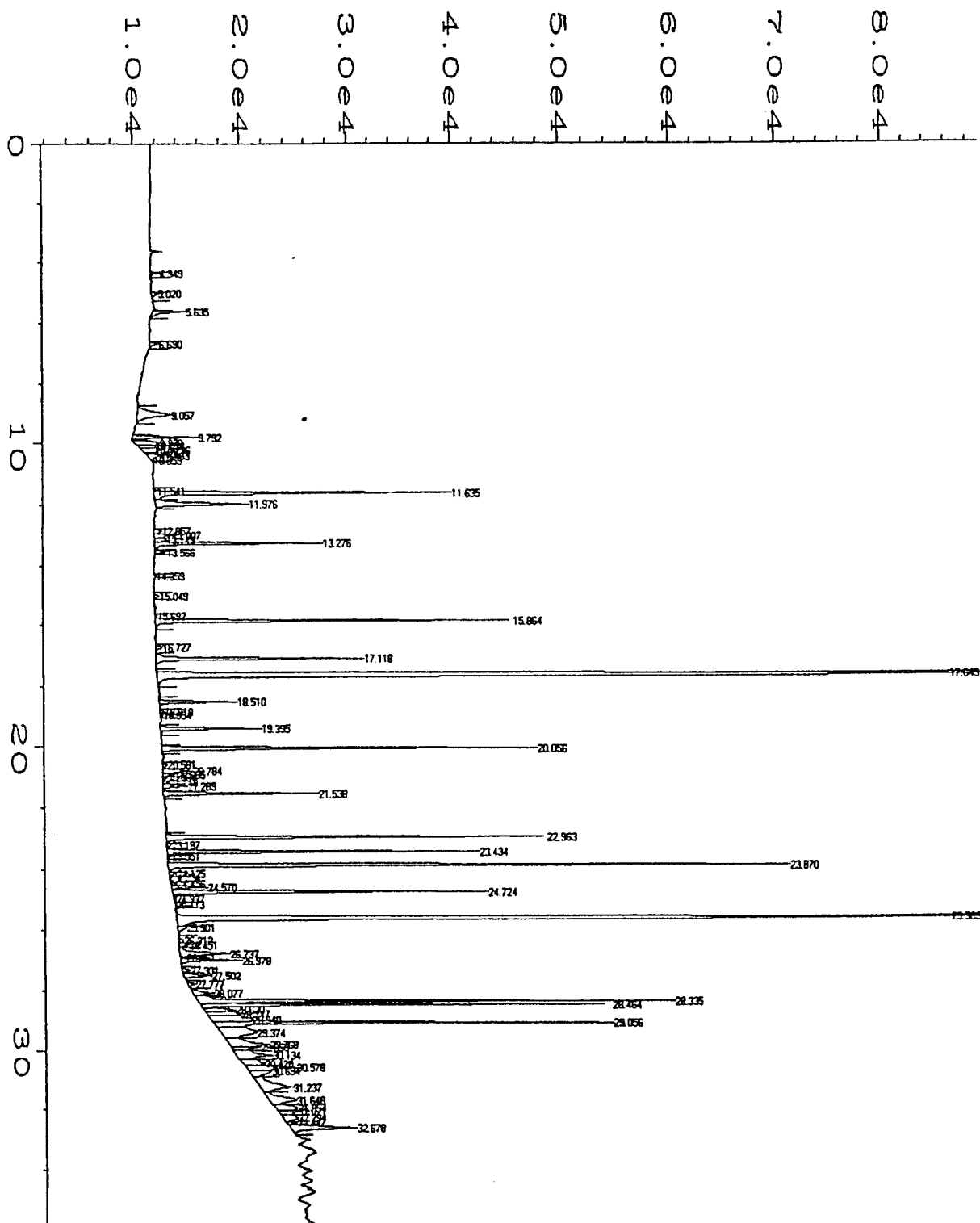
Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.635	3169	VV	0.063	1	1.105	VinylChloride
9.792	6243	BV	0.056	1	1.064	1,1DCEthene
11.635	28225	VV	0.058	1	1.004	trans 1,2-DCEthene
11.976	8733	VV	0.074	1	1.264	Methyl-tert-ButylEther
13.276	15812	VV	0.056	1	1.055	cis 1,2-DCEthene
15.864	33901	VV	0.058	1	1.078	Benzene
17.118	19642	PV	0.059	1	1.119	TCEthene (TCE)
17.645	286002	PV	0.060	1-R	99.188	Trifluorotoluene (Surr.)
18.510	7386	VV	0.056	1	1.137	cis 1,3DCPropene
19.395	9543	BV	0.053	1	1.191	trans-1,3-DCPropene
20.056	35526	BV	0.055	1	1.118	Toluene
21.538	14641	PV	0.057	1	1.073	Tetrachloroethene (PCE)
22.963	35956	PV	0.054	1	1.118	Chlorobenzene
23.434	29677	VV	0.056	1	1.054	Ethylbenzene
23.870	58325	PV	0.067	1	2.164	M & P Xylene
24.724	30014	VV	0.055	1	1.115	O-Xylene
25.589	710880	BV	0.054	1-IR	100.000	Bromofluorobenzene (I.S.)
28.335	44647	VV	0.047	1	1.181	1,3 DCB
28.464	38756	VV	0.043	1	1.168	1,4 DCB
29.056	37344	VV	0.049	1	1.380	1,2 DCB
4.349	891	BV	0.046		890.729	* uncalibrated *
5.020	569	BB	0.078		568.698	* uncalibrated *
6.690	940	VV	0.062		939.774	* uncalibrated *
9.057	3211	PV	0.143		3210.514	* uncalibrated *
9.978	2321	PV	0.083		2321.032	* uncalibrated *
10.059	1738	VV	0.066		1737.559	* uncalibrated *
10.134	1445	VV	0.014		1445.146	* uncalibrated *
10.206	1937	VV	0.081		1936.760	* uncalibrated *
10.282	1059	VV	0.049		1058.572	* uncalibrated *
10.403	1294	VV	0.079		1294.416	* uncalibrated *
10.553	140	VB	0.030		139.980	* uncalibrated *
11.541	345	PV	0.033		344.570	* uncalibrated *
12.857	770	PV	0.068		769.553	* uncalibrated *
13.007	1732	VV	0.061		1731.917	* uncalibrated *
13.149	1175	VV	0.069		1174.534	* uncalibrated *
13.566	1143	VV	0.043		1143.359	* uncalibrated *
14.359	171	PV	0.041		170.779	* uncalibrated *
15.049	518	BV	0.059		518.359	* uncalibrated *
15.692	248	VV	0.070		248.044	* uncalibrated *
16.727	669	VV	0.081		668.871	* uncalibrated *
18.810	468	PV	0.061		467.959	* uncalibrated *
			0.059		258.976	* uncalibrated *

20.581	512 BV	0.068	512.245	* uncalibrated *
20.784	2888 VV	0.069	2888.045	* uncalibrated *
20.885	1366 VV	0.061	1366.475	* uncalibrated *
20.984	514 VV	0.068	513.839	* uncalibrated *
21.149	649 VV	0.054	649.269	* uncalibrated *
21.289	2360 VV	0.078	2359.743	* uncalibrated *
23.187	471 VV	0.074	471.301	* uncalibrated *
23.551	420 VV	0.053	419.560	* uncalibrated *
24.125	734 VV	0.063	733.787	* uncalibrated *
24.234	276 VV	0.084	275.583	* uncalibrated *
24.456	618 PV	0.050	618.006	* uncalibrated *
24.570	3516 VV	0.052	3515.829	* uncalibrated *
24.937	263 VV	0.111	263.008	* uncalibrated *
25.113	124 VB	0.090	124.014	* uncalibrated *
25.901	898 VV	0.103	898.000	* uncalibrated *
26.312	500 VV	0.074	499.975	* uncalibrated *
26.451	987 VV	0.082	986.981	* uncalibrated *
26.737	4739 VV	0.096	4738.763	* uncalibrated *
26.861	597 VV	0.046	597.123	* uncalibrated *
26.978	5748 VV	0.064	5747.502	* uncalibrated *
27.301	768 PV	0.067	767.657	* uncalibrated *
27.502	2607 VV	0.070	2606.693	* uncalibrated *
27.777	798 PV	0.060	797.813	* uncalibrated *
28.077	1987 PV	0.068	1987.291	* uncalibrated *
28.620	2928 VV	0.065	2927.849	* uncalibrated *
28.747	3161 VV	0.095	3160.690	* uncalibrated *
28.940	3838 VV	0.135	3837.986	* uncalibrated *
29.374	3402 VV	0.218	3401.784	* uncalibrated *
29.768	3801 VV	0.130	3801.195	* uncalibrated *
29.858	2762 VV	0.069	2761.958	* uncalibrated *
30.134	3332 VV	0.130	3332.124	* uncalibrated *
30.428	2004 VV	0.163	2003.981	* uncalibrated *
30.578	4737 VV	0.090	4737.019	* uncalibrated *
30.694	2145 VV	0.108	2145.082	* uncalibrated *
31.237	3090 VV	0.185	3089.520	* uncalibrated *
31.648	2635 VV	0.159	2634.934	* uncalibrated *
31.954	2043 VV	0.125	2042.806	* uncalibrated *
32.071	1847 VV	0.097	1846.541	* uncalibrated *
32.294	1418 VV	0.126	1417.688	* uncalibrated *
32.447	998 VV	0.057	997.824	* uncalibrated *
32.678	6142 VV	0.085	6142.177	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.645	17.645	0.000
17	25.589	25.589	0.000

Calibration table contains at least one peak with amt = 0

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\005F0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 5
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 1.0PPB VOA STD	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 05:28 PM	Analysis Method	: 0727PID.MTH
Report Created on	: 30 Jul 94 11:13 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 11:13 AM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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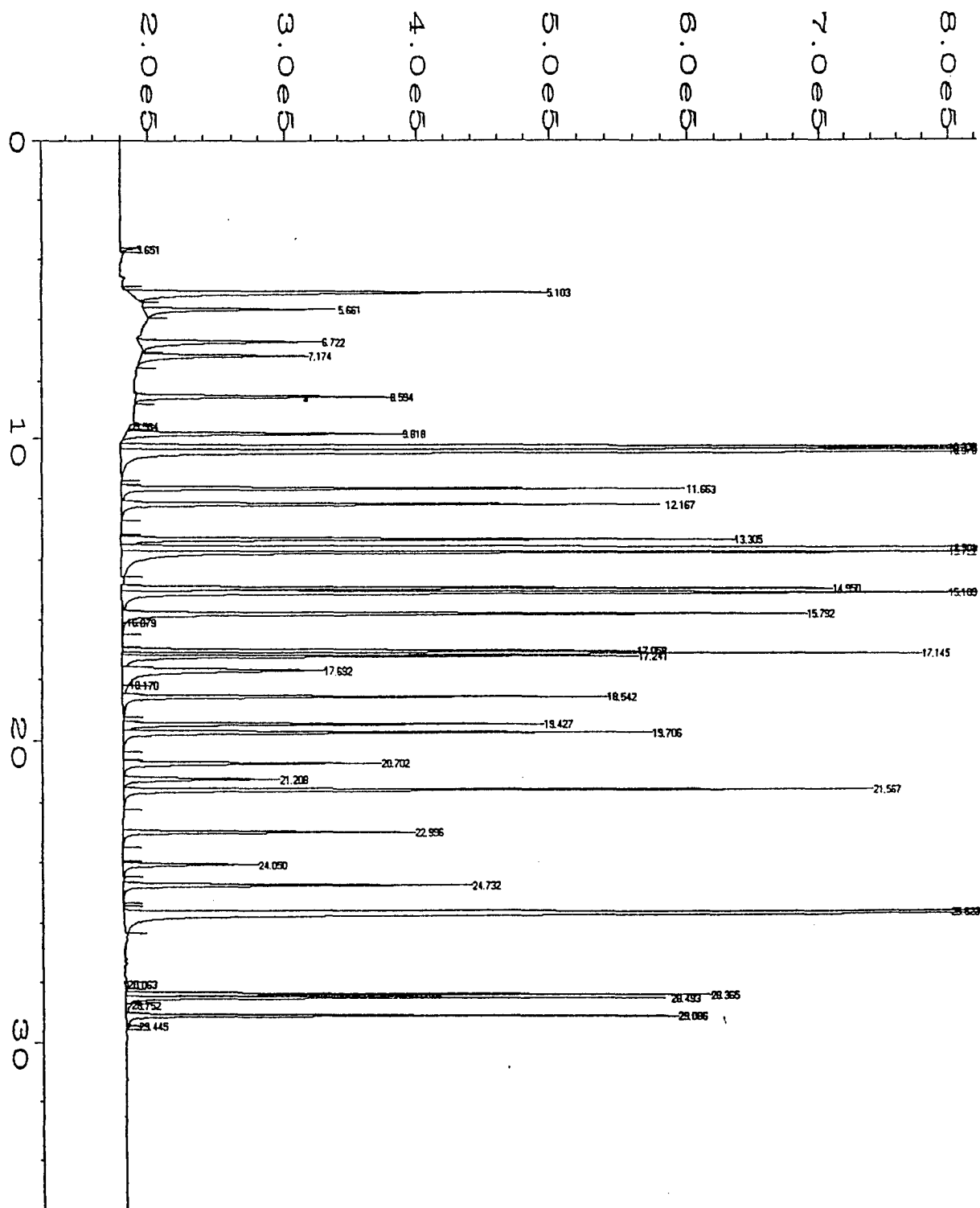
Data File Name	: C:\HPCHEM\3\DATA\29JUL94\005R0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 5
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 1.0PPB VOA STD	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 05:28 PM	Analysis Method	: 0727ELCD.MTH
Report Created on:	30 Jul 94 09:26 AM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 06:11 PM	ISTD Amount	: 100
Multiplier	: 1		

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\005R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.103	310992	BB	0.083	1	3.347	Chloromethane
5.661	143758	BB	0.063	1	1.207	Vinylchloride
6.722	135400	BB	0.080	1	2.857	Bromomethane
7.174	122936	BB	0.077	1	1.897	Chloroethane
8.594	189119	BB	0.073	1	0.643	TCFM
9.818	206050	VV	0.067	1	0.728	1,1 DCEthene
10.237	1136355	PV	0.058	1	2.466	Methylene chloride
10.378	1536852	VV	0.091	1	142.341	unknown
11.663	418892	BV	0.059	1	0.718	trans 1,2 DCEthene
12.167	403098	VV	0.063	1	0.768	1,1 DCEthane
13.305	456705	BV	0.058	1	0.826	cis 1,2 DCEthene
13.591	4922220	VV	0.061	1-R	100.174	BCM (surrogate)
13.722	819893	VV	0.074	1	0.895	Chloroform
14.950	529938	VV	0.057	1	1.390	1,2 DCEthane (EDC)
15.109	751476	VV	0.075	1	1.420	1,1,1 TCEthane
15.792	509647	VV	0.073	1	0.826	Carbon Tetrachloride
17.058	383159	PV	0.057	1	0.215	1,2 DCP propane
17.145	599567	VV	0.061	1	1.669	TCEthane (TCE)
17.241	383948	VV	0.074	1	0.754	BDCM
18.542	361113	VV	0.063	1	0.995	cis 1,3 DCP propene
19.427	313862	VV	0.059	1	1.051	trans 1,3 DCP propene
19.706	392447	VV	0.065	1	1.067	1,1,2 TCEthane
20.702	192016	BV	0.075	1	0.965	DBCM
21.208	114775	VV	0.074	1	1.137	1,2 DBrEthane (EDB)
21.567	559549	VV	0.065	1	0.763	Tetrachloroethene (PCE)
22.996	217352	VV	0.061	1	1.072	Chlorobenzene
24.050	98621	BV	0.077	1	1.226	Bromoform
24.732	260470	VV	0.063	1	1.305	1,1,2,2 TCEthane
25.623	2583679	BV	0.071	1-IR	100.000	BFB (I.S.)
28.365	435986	VV	0.050	1	1.111	1,3 DCB
28.493	404217	VV	0.051	1	0.911	1,4 DCB
29.086	409484	VV	0.050	1	1.201	1,2 DCB
3.651	11468	BV	0.044		11468.40	* uncalibrated *
9.564	2960	VV	0.114		2959.577	* uncalibrated *
16.079	3570	VV	0.160		3569.621	* uncalibrated *
17.692	148884	VV	0.117		148883.7	* uncalibrated *
18.170	5064	VV	0.190		5064.094	* uncalibrated *
28.063	2182	VV	0.126		2182.093	* uncalibrated *
28.752	4560	VV	0.138		4559.763	* uncalibrated *
29.445	9797	VV	0.030		9797.135	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.580	13.591	0.011
29	25.672	25.623	-0.049

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\005R0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 5
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 1.0PPB VOA STD	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 05:28 PM	Analysis Method	: 0727ELCD.MT
Report Created on:	30 Jul 94 09:26 AM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 06:11 PM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\006F0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 6
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 2.0PPB VOA	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 06:11 PM	Analysis Method	: 0727PID.MTH
Report Created on:	: 30 Jul 94 11:16 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 11:16 AM	ISTD Amount	: 100
Multiplier	: 1		

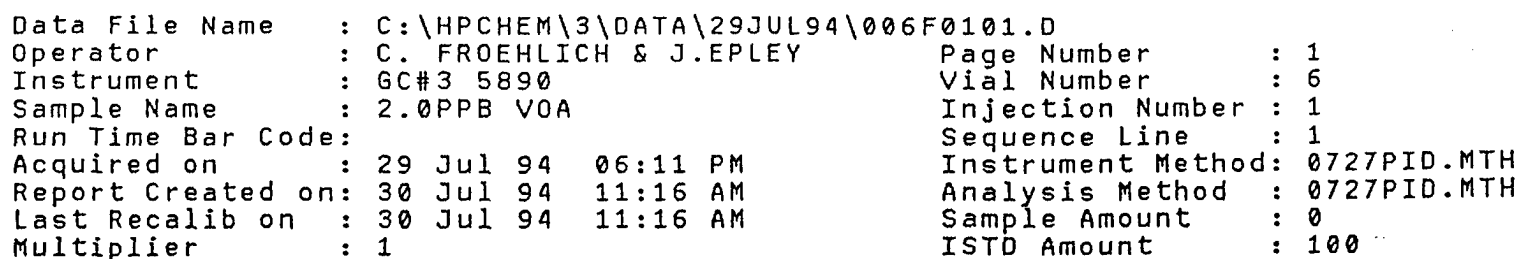
Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\006F0101.D

Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.624	5453	BV	0.052	1	1.898	VinylChloride
9.779	22986	VV	0.066	1	2.812	1,1DCEthene
11.637	55826	BV	0.053	1	2.119	trans 1,2-DCEthene
11.967	15699	VV	0.079	1	2.172	Methyl-tert-ButylEther
13.272	29869	VV	0.055	1	2.111	cis 1,2-DCEthene
15.861	58200	VV	0.057	1	2.007	Benzene
17.115	33727	VV	0.056	1	2.059	TCEthene (TCE)
17.642	258754	PV	0.060	1-R	90.299	Trifluorotoluene (Surr.)
18.507	13167	PV	0.054	1	2.106	cis 1,3DCPropene
19.392	16887	PV	0.053	1	2.106	trans-1,3-DCPropene
20.054	62220	BV	0.055	1	2.130	Toluene
21.534	26168	VV	0.056	1	2.050	Tetrachloroethene (PCE)
22.960	64132	VV	0.056	1	2.124	Chlorobenzene
23.431	54629	VV	0.056	1	2.085	Ethylbenzene
23.868	107592	VV	0.069	1	4.317	M & P Xylene
24.724	54537	VV	0.055	1	2.197	O-Xylene
25.590	673322	BV	0.054	1-IR	100.000	Bromofluorobenzene (I.S.)
28.338	77210	VV	0.044	1	2.263	1,3 DCB
28.467	72221	VV	0.043	1	2.279	1,4 DCB
29.060	63789	VV	0.046	1	2.479	1,2 DCB
4.337	703	PV	0.047		702.523	* uncalibrated *
5.023	892	BV	0.074		892.017	* uncalibrated *
6.681	888	PV	0.057		888.358	* uncalibrated *
8.938	902	PV	0.057		902.275	* uncalibrated *
9.039	1541	VV	0.129		1540.519	* uncalibrated *
9.953	791	VV	0.089		790.517	* uncalibrated *
10.205	940	BV	0.056		939.634	* uncalibrated *
12.849	710	BV	0.077		709.671	* uncalibrated *
13.006	3014	VV	0.065		3014.417	* uncalibrated *
13.127	1227	VV	0.073		1227.399	* uncalibrated *
13.559	1093	VV	0.054		1093.158	* uncalibrated *
15.042	1235	VV	0.065		1235.481	* uncalibrated *
15.688	547	PV	0.071		546.924	* uncalibrated *
16.722	1385	VV	0.078		1385.147	* uncalibrated *
17.022	1390	VV	0.054		1390.268	* uncalibrated *
18.804	1847	VV	0.065		1847.390	* uncalibrated *
18.963	299	VV	0.087		299.398	* uncalibrated *
19.124	592	VV	0.064		591.996	* uncalibrated *
20.346	1065	VV	0.073		1065.090	* uncalibrated *
20.577	2477	VV	0.073		2476.681	* uncalibrated *
20.778	5338	VV	0.073		5338.248	* uncalibrated *
20.883	4983	VV	0.062		4982.942	* uncalibrated *

20.984	1958 VV	0.065	1957.644	* uncalibrated *
21.147	998 VV	0.057	998.401	* uncalibrated *
21.287	3418 VV	0.077	3418.374	* uncalibrated *
22.027	1801 VV	0.077	1801.083	* uncalibrated *
22.420	898 VV	0.090	898.173	* uncalibrated *
22.615	727 VV	0.069	726.991	* uncalibrated *
22.716	934 VV	0.080	933.611	* uncalibrated *
22.783	836 VV	0.049	836.193	* uncalibrated *
23.191	2585 VV	0.106	2584.561	* uncalibrated *
23.542	800 VV	0.082	800.270	* uncalibrated *
24.115	5666 VV	0.065	5665.925	* uncalibrated *
24.285	1210 VV	0.073	1210.215	* uncalibrated *
24.456	3339 VV	0.061	3339.158	* uncalibrated *
24.570	3889 VV	0.056	3889.293	* uncalibrated *
25.130	402 VV	0.069	402.216	* uncalibrated *
25.789	1431 VV	0.071	1431.334	* uncalibrated *
25.895	1058 VV	0.078	1057.884	* uncalibrated *
26.303	3875 VV	0.061	3875.103	* uncalibrated *
26.462	770 PV	0.063	770.157	* uncalibrated *
26.561	537 VV	0.085	537.170	* uncalibrated *
26.734	2014 VV	0.094	2014.102	* uncalibrated *
26.864	1483 VV	0.061	1483.352	* uncalibrated *
26.975	15914 VV	0.064	15914.15	* uncalibrated *
27.296	1923 PV	0.075	1922.709	* uncalibrated *
27.450	3314 VV	0.058	3313.530	* uncalibrated *
27.519	2750 VV	0.067	2750.390	* uncalibrated *
27.774	5624 PV	0.048	5623.688	* uncalibrated *
28.078	4364 PV	0.052	4364.416	* uncalibrated *
28.232	2829 VV	0.073	2828.735	* uncalibrated *
28.619	10684 VV	0.050	10684.20	* uncalibrated *
28.756	1840 VV	0.075	1840.386	* uncalibrated *
28.828	2300 VV	0.054	2299.883	* uncalibrated *
29.242	6554 VV	0.088	6553.613	* uncalibrated *
29.305	6125 VV	0.108	6125.401	* uncalibrated *
29.769	8474 VV	0.092	8474.025	* uncalibrated *
29.866	10423 VV	0.058	10422.84	* uncalibrated *
30.141	10542 VV	0.077	10541.94	* uncalibrated *
30.293	2047 VV	0.083	2047.161	* uncalibrated *
30.427	1488 VV	0.086	1488.369	* uncalibrated *
30.584	5586 VV	0.093	5585.941	* uncalibrated *
30.736	1615 VV	0.085	1614.772	* uncalibrated *
30.919	2667 VV	0.061	2666.798	* uncalibrated *
31.156	2134 VV	0.129	2134.068	* uncalibrated *
31.261	2085 VV	0.091	2084.742	* uncalibrated *
31.665	2960 VV	0.121	2959.805	* uncalibrated *
31.816	2592 VV	0.067	2592.281	* uncalibrated *
31.990	2421 VV	0.109	2421.286	* uncalibrated *
32.096	5924 VV	0.088	5924.453	* uncalibrated *
32.338	2269 VV	0.118	2269.421	* uncalibrated *
32.456	5469 VV	0.064	5469.385	* uncalibrated *
32.689	8147 VV	0.076	8147.458	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.645	17.642	-0.003
17	25.590	25.590	0.000

Calibration table contains at least one peak with amt = 0



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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\006R0101.D

Operator : C. FROEHLICH & J.EPLEY Page Number : 1

Instrument : GC#3 5890 Vial Number : 6

Sample Name : 2.0PPB VOA Injection Number : 1

Run Time Bar Code: Sequence Line : 1

Acquired on : 29 Jul 94 06:11 PM Instrument Method: 0727PID.MTH

Report Created on: 30 Jul 94 09:29 AM Analysis Method : 0727ELCD.MTH

Last Recalib on : 30 Jul 94 09:27 AM Sample Amount : 0

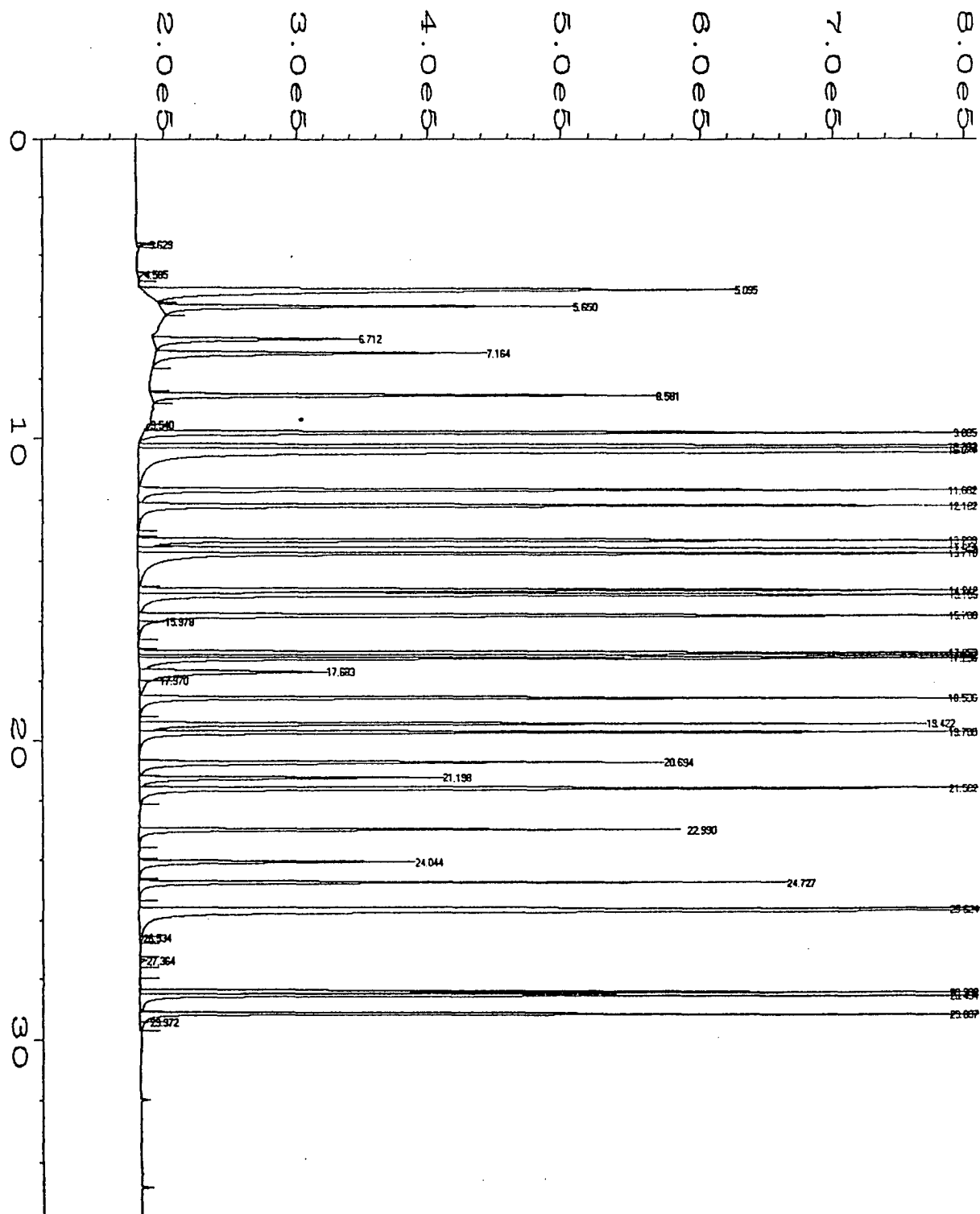
Multiplier : 1 ISTD Amount : 100

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\006R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.095	441477	BB	0.102	1	4.424	Chloromethane
5.650	311404	BB	0.065	1	2.394	Vinylchloride
6.712	155118	BB	0.083	1	3.071	Bromomethane
7.164	250433	BB	0.079	1	3.392	Chloroethane
8.581	377696	BB	0.071	1	2.181	TCFM
9.805	720729	PV	0.061	1	2.884	1,1 DCEthene
10.232	1510857	PV	0.061	1	3.475	Methylene chloride
10.371	4201352	VV	0.098	1	276.458	unknown
11.662	851269	VV	0.059	1	2.123	trans 1,2 DCEthene
12.162	818634	VV	0.069	1	2.203	1,1 DCEthene
13.299	877442	PV	0.061	1	2.142	cis 1,2 DCEthene
13.587	4861707	VV	0.065	1-R	99.885	BCM (surrogate)
13.716	1352660	VV	0.073	1	2.390	Chloroform
14.942	849578	VV	0.061	1	2.432	1,2 DCEthene (EDC)
15.105	943936	VV	0.076	1	1.919	1,1,1 TCEthene
15.788	947838	VV	0.070	1	2.117	Carbon Tetrachloride
17.053	690917	PV	0.059	1	1.212	1,2 DCP propane
17.142	983861	VV	0.062	1	2.885	TCEthene (TCE)
17.236	719098	VV	0.072	1	1.986	BDCM
18.536	667513	VV	0.063	1	2.111	cis 1,3 DCPpropene
19.422	590293	BV	0.061	1	2.122	trans 1,3 DCPpropene
19.700	702204	VV	0.067	1	2.139	1,1,2 TCEthene
20.694	392218	PV	0.075	1	1.999	DBCM
21.198	230155	VV	0.075	1	2.019	1,2 DBrEthane (EDB)
21.562	1008991	VV	0.064	1	1.994	Tetrachloroethene (PCE)
22.990	409469	VV	0.062	1	2.182	Chlorobenzene
24.044	208904	PV	0.078	1	2.101	Bromoform
24.727	483866	VV	0.066	1	2.396	1,1,2,2 TCEthene
25.624	2554858	PV	0.073	1-IR	100.000	BFB (I.S.)
28.366	786086	BV	0.049	1	2.411	1,3 DCB
28.494	782600	VV	0.052	1	2.307	1,4 DCB
29.087	771328	VV	0.050	1	2.627	1,2 DCB
3.629	9832	PV	0.044		9832.323	* uncalibrated *
4.585	5893	BB	0.080		5892.850	* uncalibrated *
9.540	2604	VV	0.114		2603.608	* uncalibrated *
15.978	20162	VV	0.115		20162.36	* uncalibrated *
17.683	140567	VV	0.112		140567.0	* uncalibrated *
17.970	15917	VV	0.106		15916.65	* uncalibrated *
26.534	2435	VV	0.116		2435.424	* uncalibrated *
27.364	5095	BV	0.071		5095.392	* uncalibrated *
29.372	7749	VV	0.098		7749.434	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.591	13.587	-0.004
29	25.623	25.624	0.001

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\006R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 6
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 2.0PPB VOA	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 06:11 PM	Analysis Method	: 0727ELCD.MT
Report Created on	: 30 Jul 94 09:30 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 09:27 AM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\007F0101.D		
Operator	: C. FROELICH & J.EPLEY	Page Number	: 1
Instrument	: GC#3 5890	Vial Number	: 7
Sample Name	: 5.0PPB VOA	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 29 Jul 94 06:54 PM	Instrument Method	: 0727PID.MTH
Report Created on	: 30 Jul 94 11:18 AM	Analysis Method	: 0727PID.MTH
Last Recalib on	: 30 Jul 94 11:18 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	: 100

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\007F0101.D

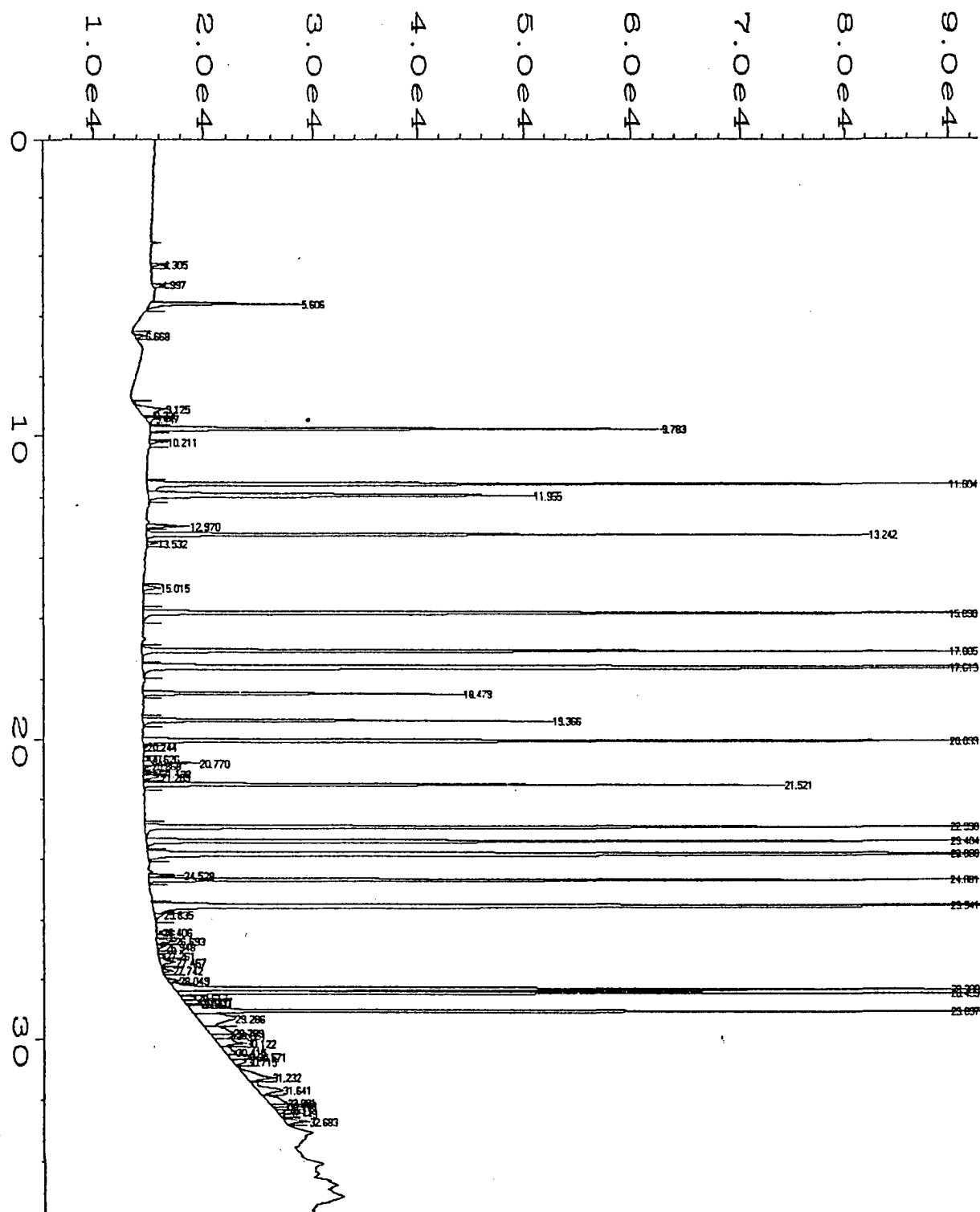
Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.606	13798	VV	0.057	1	4.875	VinylChloride
9.783	47659	BV	0.060	1	5.141	1,1DCEthene
11.604	127103	BV	0.052	1	4.893	trans 1,2-DCEthene
11.955	35992	VV	0.071	1	4.831	Methyl-tert-ButylEther
13.242	67545	VV	0.054	1	4.856	cis 1,2-DCEthene
15.830	133784	PV	0.058	1	4.677	Benzene
17.085	78182	PV	0.056	1	4.807	TCEthene (TCE)
17.613	268767	PV	0.061	1-R	97.187	Trifluorotoluene (Surr.)
18.479	29770	BV	0.055	1	4.813	cis 1,3DCPropene
19.366	38266	BV	0.054	1	4.697	trans-1,3-DCPropene
20.033	133552	PV	0.055	1	4.716	Toluene
21.521	59617	VV	0.057	1	4.720	Tetrachloroethene (PCE)
22.938	142559	BV	0.054	1	4.774	Chlorobenzene
23.404	122380	VV	0.055	1	4.745	Ethylbenzene
23.836	237298	PV	0.066	1	9.782	M & P Xylene
24.681	119454	VV	0.055	1	4.953	O-Xylene
25.541	674844	VV	0.055	1-IR	100.000	Bromofluorobenzene (I.S.)
28.309	161930	VV	0.045	1	4.998	1,3 DCB
28.439	157230	VV	0.043	1	5.056	1,4 DCB
29.037	134744	VV	0.044	1	5.454	1,2 DCB
4.305	1172	BV	0.048		1172.204	* uncalibrated *
4.997	875	BV	0.065		875.052	* uncalibrated *
6.668	1026	BV	0.039		1025.563	* uncalibrated *
9.125	2548	BV	0.128		2547.988	* uncalibrated *
9.336	984	VV	0.046		984.434	* uncalibrated *
9.447	910	VB	0.091		910.402	* uncalibrated *
10.211	1636	PV	0.057		1635.761	* uncalibrated *
12.970	4014	VV	0.063		4013.577	* uncalibrated *
13.532	1033	VV	0.054		1033.454	* uncalibrated *
15.015	1624	BV	0.077		1623.744	* uncalibrated *
20.244	372	VV	0.072		372.257	* uncalibrated *
20.626	659	BV	0.066		659.131	* uncalibrated *
20.770	5116	VV	0.073		5115.525	* uncalibrated *
20.868	848	VV	0.053		847.597	* uncalibrated *
21.132	1671	VV	0.054		1671.482	* uncalibrated *
21.269	1600	VV	0.080		1600.461	* uncalibrated *
24.528	3259	VV	0.051		3259.050	* uncalibrated *
25.835	866	VB	0.101		865.979	* uncalibrated *
26.406	626	PV	0.056		626.219	* uncalibrated *
26.693	1764	BV	0.088		1764.008	* uncalibrated *
26.948	766	VB	0.070		765.842	* uncalibrated *
27.261	664	BV	0.065		664.191	* uncalibrated *

27.467	1445	VV	0.090	1444.911	*	uncalibrated	*
27.742	921	VV	0.075	921.096	*	uncalibrated	*
28.049	999.8	PV	0.051	999.795	*	uncalibrated	*
28.617	1396	VV	0.079	1396.315	*	uncalibrated	*
28.737	1540	VV	0.090	1539.732	*	uncalibrated	*
28.803	1296	VV	0.049	1296.493	*	uncalibrated	*
29.286	3324	VV	0.218	3323.810	*	uncalibrated	*
29.763	2095	VV	0.157	2094.609	*	uncalibrated	*
29.851	2100	VV	0.095	2100.419	*	uncalibrated	*
30.122	2482	VV	0.124	2481.869	*	uncalibrated	*
30.415	948	VV	0.146	947.911	*	uncalibrated	*
30.571	2481	VV	0.082	2480.788	*	uncalibrated	*
30.715	1241	VV	0.106	1241.128	*	uncalibrated	*
31.232	2355	PV	0.157	2355.379	*	uncalibrated	*
31.641	2272	VV	0.153	2271.628	*	uncalibrated	*
32.061	1713	VV	0.160	1712.539	*	uncalibrated	*
32.150	1586	VV	0.061	1585.707	*	uncalibrated	*
32.221	1549	VV	0.072	1549.191	*	uncalibrated	*
32.313	1182	VV	0.070	1181.698	*	uncalibrated	*
32.443	928	VV	0.054	927.817	*	uncalibrated	*
32.683	2312	VV	0.080	2312.226	*	uncalibrated	*

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.645	17.613	-0.032
17	25.541	25.541	0.000

Calibration table contains at least one peak with amt = 0

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\007F0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 7
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 5.0PPB VOA	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 06:54 PM	Analysis Method	: 0727PID.MTH
Report Created on	: 30 Jul 94 11:18 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 11:18 AM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\007R0101.D
 Operator : C. FROEHLICH & J.EPLEY Page Number : 1
 Instrument : GC#3 5890 Vial Number : 7
 Sample Name : 5.0PPB VOA Injection Number : 1
 Run Time Bar Code: Sequence Line : 1
 Acquired on : 29 Jul 94 06:54 PM Instrument Method: 0727PID.MTH
 Report Created on: 30 Jul 94 09:34 AM Analysis Method : 0727ELCD.MTH
 Last Recalib on : 30 Jul 94 09:34 AM Sample Amount : 0
 Multiplier : 1 ISTD Amount : 100

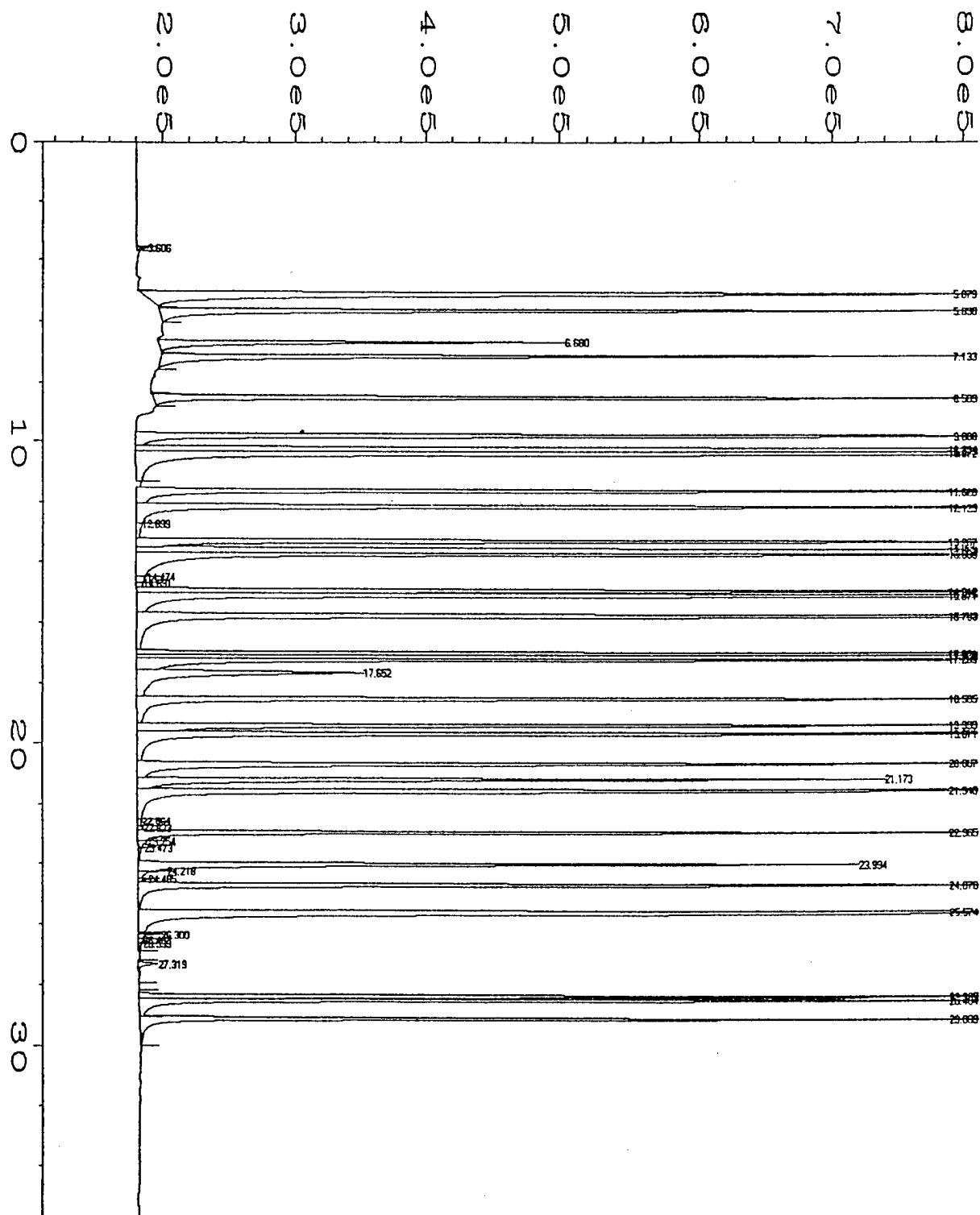
Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\007R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.073	861435	BB	0.093	1	26.466	Chloromethane
5.630	842488	BB	0.064	1	5.652	Vinylchloride
6.680	306526	BB	0.075	1	5.630	Bromomethane
7.133	600664	BB	0.078	1	7.397	Chloroethane
8.569	784500	BB	0.078	1	5.738	TCFM
9.808	1580059	PV	0.067	1	5.697	1,1 DCEthene
10.234	2412107	VV	0.065	1	5.400	Methylene chloride
10.372	3113546	VV	0.092	1	200.145	unknown
11.628	1900000	VV	0.060	1	5.423	trans 1,2 DCEthene
12.129	1737576	VV	0.069	1	5.295	1,1 DCEthene
13.267	1947753	VV	0.061	1	5.432	cis 1,2 DCEthene
13.557	4971842	VV	0.064	1-R	99.788	BCM (surrogate)
13.689	2498304	VV	0.073	1	5.455	Chloroform
14.912	1737405	VV	0.063	1	5.425	1,2 DCEthene (EDC)
15.071	1961839	VV	0.077	1	5.236	1,1,1 TCEthene
15.753	2081444	VV	0.075	1	5.385	Carbon Tetrachloride
17.021	1541128	VV	0.062	1	4.086	1,2 DCPropane
17.109	2200447	VV	0.062	1	8.468	TCEthene (TCE)
17.205	1565255	VV	0.075	1	5.046	BDCM
18.505	1443990	VV	0.068	1	5.036	cis 1,3 DCPropene
19.393	1304894	VV	0.064	1	4.993	trans 1,3 DCPropene
19.671	1481708	VV	0.074	1	4.923	1,1,2 TCEthene
20.667	904399	VV	0.079	1	4.731	DBCM
21.173	558429	VV	0.081	1	4.639	1,2 DBrEthene (EDB)
21.546	2159986	VV	0.068	1	5.174	Tetrachloroethene (PCE)
22.965	901394	VV	0.063	1	5.060	Chlorobenzene
23.994	537784	VV	0.080	1	4.723	Bromoform
24.678	968112	VV	0.073	1	4.779	1,1,2,2 TCEthene
25.574	2615276	VV	0.077	1-IR	100.000	BFB (I.S.)
28.335	1594293	BV	0.052	1	5.383	1,3 DCB
28.464	1606220	VV	0.054	1	5.279	1,4 DCB
29.063	1620758	VV	0.051	1	5.846	1,2 DCB
3.606	8132	PV	0.044		8131.884	* uncalibrated *
12.699	4817	VV	0.324		4817.173	* uncalibrated *
14.474	7900	VV	0.112		7900.148	* uncalibrated *
14.691	5594	VV	0.102		5593.804	* uncalibrated *
17.652	170831	VV	0.134		170830.6	* uncalibrated *
22.564	3453	VV	0.141		3452.751	* uncalibrated *
22.823	4327	VV	0.086		4327.094	* uncalibrated *
23.254	7240	VV	0.116		7239.697	* uncalibrated *
23.473	4640	VV	0.143		4640.307	* uncalibrated *
24.218	22081	VV	0.088		22081.03	* uncalibrated *

24.485	8264 VV	0.047	8263.626	* uncalibrated *
26.300	17053 VV	0.060	17053.38	* uncalibrated *
26.483	3900 VV	0.112	3899.683	* uncalibrated *
26.593	3767 VV	0.125	3767.365	* uncalibrated *
27.319	15319 VV	0.087	15318.88	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.591	13.557	-0.034
29	25.574	25.574	0.000

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\007R0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 7
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 5.0PPB VOA	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 06:54 PM	Analysis Method	: 0727ELCD.MTH
Report Created on	: 30 Jul 94 09:34 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 09:34 AM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name   : C:\HPCHEM\3\DATA\29JUL94\008F0101.D
Operator        : C. FROEHLICH & J.EPLEY
Instrument       : GC#3 5890
Sample Name     : 10.0PPB VOA
Run Time Bar Code:
Acquired on     : 29 Jul 94  07:37 PM
Report Created on: 30 Jul 94  11:32 AM
Last Recalib on : 30 Jul 94  11:31 AM
Multiplier     : 1
Page Number     : 1
Vial Number     : 8
Injection Number: 1
Sequence Line   : 1
Instrument Method: 0727PID.MTH
Analysis Method : 0727PID.MTH
Sample Amount   : 0
ISTD Amount     : 100
  
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Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\008F0101.D

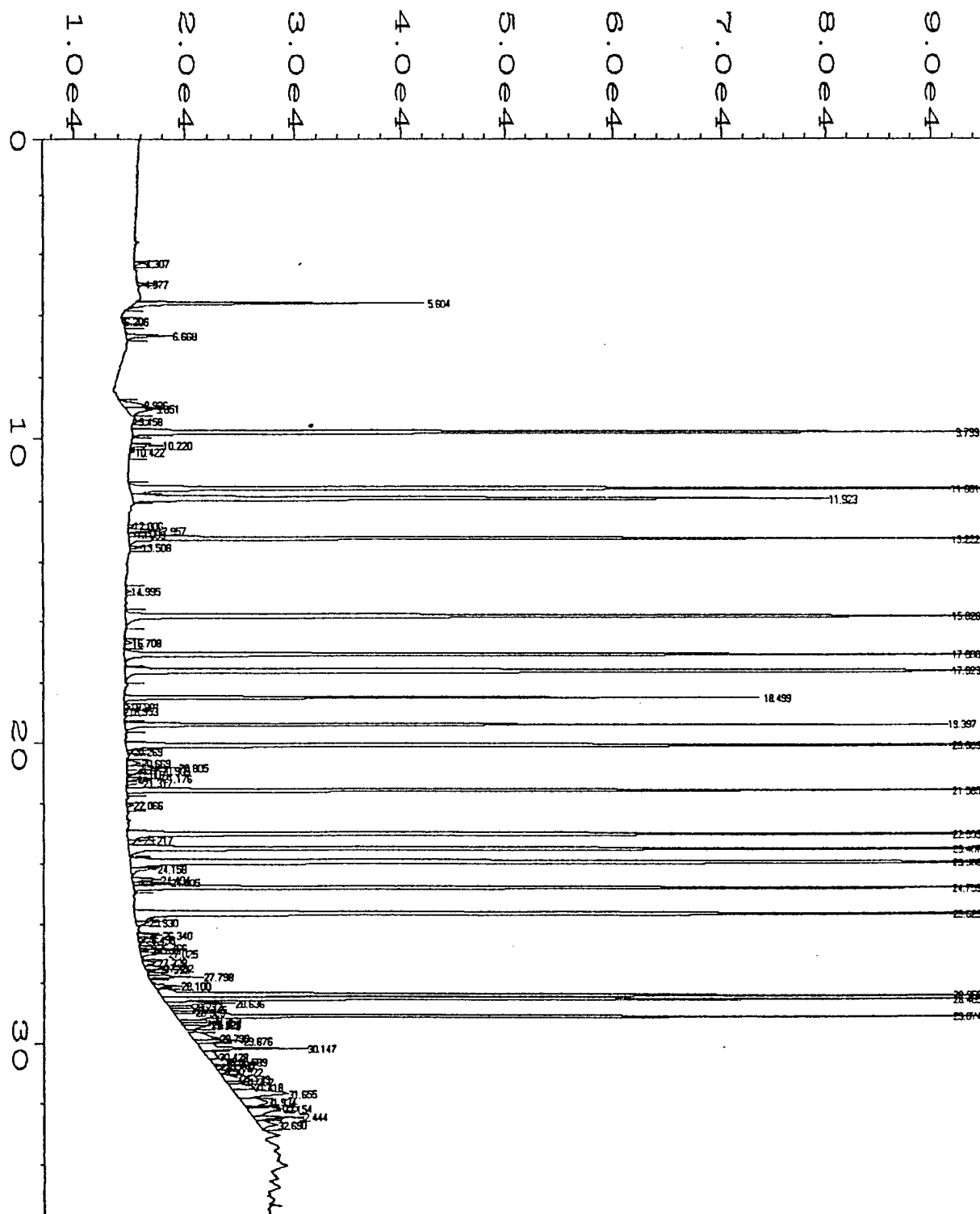
Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.604	27168	BV	0.053	1	9.472	VinylChloride
9.799	94166	PV	0.061	1	9.299	1,1DCEthene
11.601	255588	BV	0.051	1	9.531	trans 1,2-DCEthene
11.923	65043	VV	0.075	1	9.738	Methyl-tert-ButylEther
13.222	137216	VV	0.053	1	9.562	cis 1,2-DCEthene
15.820	269132	PV	0.057	1	9.551	Benzene
17.088	156223	PV	0.056	1	9.461	TCEthene (TCE)
17.623	276817	BV	0.061	1-R	100.000	Trifluorotoluene (Surr.)
18.499	59522	PV	0.054	1	9.619	cis 1,3DCPropene
19.397	77053	PV	0.052	1	9.680	trans-1,3-DCPropene
20.069	273226	BV	0.055	1	9.573	Toluene
21.565	122500	PV	0.057	1	9.481	Tetrachloroethene (PCE)
22.995	288596	PV	0.054	1	9.571	Chlorobenzene
23.467	247380	VV	0.055	1	9.551	Ethylbenzene
23.906	472340	VV	0.067	1	19.188	M & P Xylene
24.759	240340	VV	0.055	1	9.561	O-Xylene
25.623	670246	BV	0.053	1-IR	100.000	Bromofluorobenzene (I.S.)
28.358	322489	VV	0.044	1	9.714	1,3 DCB
28.485	321070	VV	0.041	1	1404.724	1,4 DCB
29.074	264515	VV	0.042	1	-336.597	1,2 DCB
4.307	1068	PV	0.044		1067.619	* uncalibrated *
4.977	692	PV	0.048		692.486	* uncalibrated *
6.206	236	BV	0.109		236.186	* uncalibrated *
6.668	4255	BV	0.060		4254.670	* uncalibrated *
8.926	1834	PV	0.098		1833.805	* uncalibrated *
9.051	2629	VV	0.113		2628.845	* uncalibrated *
9.458	552	VV	0.055		552.091	* uncalibrated *
10.220	2936	BV	0.061		2935.562	* uncalibrated *
10.422	450	VV	0.062		449.592	* uncalibrated *
12.806	496	PV	0.073		495.799	* uncalibrated *
12.957	2565	VV	0.064		2564.727	* uncalibrated *
13.089	658	VV	0.061		657.520	* uncalibrated *
13.508	1070	VV	0.048		1070.371	* uncalibrated *
14.995	484	BV	0.070		483.790	* uncalibrated *
16.708	731	BV	0.067		731.044	* uncalibrated *
18.801	579	VV	0.078		578.756	* uncalibrated *
18.953	394	VV	0.070		394.266	* uncalibrated *
20.269	548	VV	0.064		547.649	* uncalibrated *
20.669	1319	BV	0.073		1318.907	* uncalibrated *
20.805	4681	VV	0.076		4681.240	* uncalibrated *
20.909	3091	VV	0.059		3090.933	* uncalibrated *
21.007	924	VV	0.051		924.065	* uncalibrated *

21.176	3242 VV	0.053	3242.231	* uncalibrated *
21.317	1494 VV	0.063	1494.377	* uncalibrated *
22.066	624 BV	0.063	624.099	* uncalibrated *
23.217	1367 VV	0.082	1366.533	* uncalibrated *
24.158	2429 VV	0.080	2429.182	* uncalibrated *
24.494	2627 PV	0.057	2626.780	* uncalibrated *
24.605	3482 VV	0.053	3482.133	* uncalibrated *
25.930	1155 VV	0.074	1154.978	* uncalibrated *
26.340	2360 VV	0.064	2360.008	* uncalibrated *
26.496	745 VV	0.051	744.534	* uncalibrated *
26.766	1693 VV	0.075	1693.170	* uncalibrated *
26.895	1031 VV	0.053	1031.210	* uncalibrated *
27.025	2551 PV	0.068	2550.566	* uncalibrated *
27.328	1324 PV	0.062	1324.356	* uncalibrated *
27.482	1749 VV	0.063	1748.947	* uncalibrated *
27.552	1228 VV	0.063	1227.600	* uncalibrated *
27.798	5054 BV	0.047	5054.472	* uncalibrated *
28.100	2470 PV	0.053	2469.947	* uncalibrated *
28.636	6159 VV	0.064	6159.479	* uncalibrated *
28.777	2080 VV	0.060	2080.305	* uncalibrated *
28.845	2382 VV	0.063	2382.313	* uncalibrated *
28.929	1997 VV	0.057	1996.798	* uncalibrated *
29.252	2780 VV	0.075	2779.707	* uncalibrated *
29.323	2671 VV	0.062	2671.297	* uncalibrated *
29.393	2450 VV	0.077	2449.552	* uncalibrated *
29.790	2441 VV	0.113	2440.981	* uncalibrated *
29.876	4355 VV	0.065	4354.930	* uncalibrated *
30.147	9759 VV	0.064	9759.140	* uncalibrated *
30.428	1047 VV	0.164	1047.353	* uncalibrated *
30.589	2377 VV	0.084	2377.131	* uncalibrated *
30.680	1053 VV	0.053	1052.857	* uncalibrated *
30.776	771 VV	0.064	770.989	* uncalibrated *
30.922	1326 VV	0.056	1326.474	* uncalibrated *
31.173	1448 VV	0.110	1447.843	* uncalibrated *
31.262	1553 VV	0.063	1553.046	* uncalibrated *
31.418	2115 VV	0.097	2114.815	* uncalibrated *
31.655	4803 VV	0.142	4802.537	* uncalibrated *
31.934	2311 VV	0.151	2311.403	* uncalibrated *
32.095	2127 VV	0.053	2127.151	* uncalibrated *
32.154	3247 VV	0.127	3246.763	* uncalibrated *
32.444	4241 VV	0.058	4241.417	* uncalibrated *
32.690	1665 VV	0.114	1664.691	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.623	17.623	0.000
17	25.623	25.623	0.000

Calibration table contains at least one peak with amt = 0

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\008F0101.D		
Operator	: C. FROEHLICH & J.EPLEY	Page Number	: 1
Instrument	: GC#3 5890	Vial Number	: 8
Sample Name	: 10.0PPB VOA	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 29 Jul 94 07:37 PM	Instrument Method	: 0727PID.MTH
Report Created on:	: 30 Jul 94 11:32 AM	Analysis Method	: 0727PID.MTH
Last Recalib on	: 30 Jul 94 11:31 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	: 100

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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\008R0101.D
 Operator : C. FROELICH & J.EPLEY Page Number : 1
 Instrument : GC#3 5890 Vial Number : 8
 Sample Name : 10.0PPB VOA Injection Number : 1
 Run Time Bar Code: Sequence Line : 1
 Acquired on : 29 Jul 94 07:37 PM Instrument Method: 0727PID.MTH
 Report Created on: 30 Jul 94 09:39 AM Analysis Method : 0727ELCD.MTH
 Last Recalib on : 30 Jul 94 09:39 AM Sample Amount : 0
 Multiplier : 1 ISTD Amount : 100

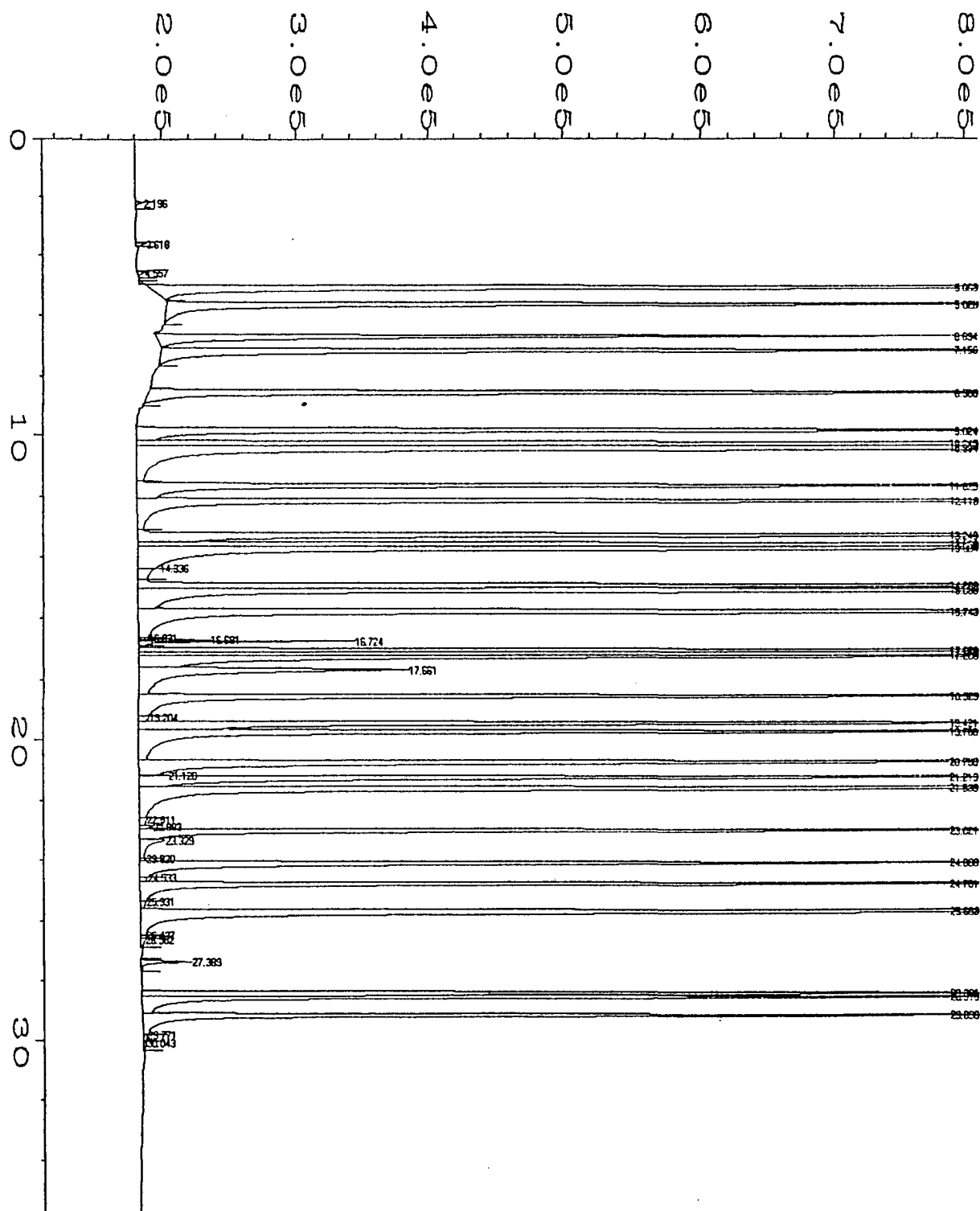
Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\008R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.063	1853854	BB	0.072	1	59.527	Chloromethane
5.628	1446294	BB	0.066	1	9.701	Vinylchloride
6.694	646249	BB	0.077	1	9.540	Bromomethane
7.156	1184359	BB	0.075	1	11.998	Chloroethane
8.586	1548186	BB	0.077	1	11.626	TCFM
9.824	2896738	PV	0.071	1	10.910	1,1 DCEthene
10.245	3956882	VV	0.068	1	10.142	Methylene chloride
10.394	4037199	VV	0.099	1	263.868	unknown
11.625	3506152	VV	0.060	1	10.487	trans 1,2 DCEthene
12.118	3203758	VV	0.072	1	10.291	1,1 DCEthene
13.246	3543092	VV	0.062	1	10.391	cis 1,2 DCEthene
13.536	4936601	VV	0.063	1-R	100.741	BCM (surrogate)
13.664	4387344	VV	0.073	1	10.585	Chloroform
14.892	3061033	VV	0.064	1	10.273	1,2 DCEthene (EDC)
15.056	3402078	VV	0.082	1	10.067	1,1,1 TCethane
15.743	3771105	VV	0.079	1	10.370	Carbon Tetrachloride
17.022	2839232	VV	0.060	1	7.969	1,2 DCP propane
17.112	3914110	VV	0.060	1	12.783	TCethene (TCE)
17.205	2913667	VV	0.073	1	9.936	BDCM
18.525	2567964	VV	0.064	1	9.526	cis 1,3 DCPpropene
19.421	2399137	VV	0.060	1	9.664	trans 1,3 DCPpropene
19.706	2672757	VV	0.070	1	9.473	1,1,2 TCethane
20.706	1816951	VV	0.076	1	9.767	DBCM
21.213	1067015	VV	0.079	1	8.958	1,2 DBrEthane (EDB)
21.589	3969553	VV	0.069	1	10.139	Tetrachloroethene (PCE)
23.021	1777393	VV	0.064	1	10.345	Chlorobenzene
24.068	1012970	VV	0.081	1	8.954	Bromoform
24.761	1859431	VV	0.066	1	9.760	1,1,2,2 TCethane
25.653	2572173	VV	0.076	1-IR	100.000	BFB (I.S.)
28.381	2850256	VV	0.050	1	10.365	1,3 DCB
28.510	3041952	VV	0.052	1	10.689	1,4 DCB
29.098	2873016	VV	0.051	1	11.103	1,2 DCB
2.196	6250	VV	0.058		6249.734	* uncalibrated *
3.618	7638	PV	0.050		7638.143	* uncalibrated *
4.557	5749	BB	0.068		5749.217	* uncalibrated *
14.336	16675	VV	0.164		16675.42	* uncalibrated *
16.621	8337	VV	0.038		8337.409	* uncalibrated *
16.681	54350	VV	0.029		54349.92	* uncalibrated *
16.724	161753	VV	0.033		161753.4	* uncalibrated *
17.661	203602	VV	0.145		203601.5	* uncalibrated *
19.204	8112	VV	0.111		8112.234	* uncalibrated *
21.120	22135	VV	0.028		22135.17	* uncalibrated *

22.611	6208 VV	0.160	6207.719	* uncalibrated *
22.883	10203 VV	0.081	10203.44	* uncalibrated *
23.329	19493 VV	0.178	19493.03	* uncalibrated *
23.920	5311 VV	0.068	5311.402	* uncalibrated *
24.533	6387 VV	0.087	6387.473	* uncalibrated *
25.331	4898 VV	0.128	4898.371	* uncalibrated *
26.437	4393 VV	0.073	4392.837	* uncalibrated *
26.562	4290 VV	0.154	4289.692	* uncalibrated *
27.389	39065 VV	0.072	39065.44	* uncalibrated *
29.771	3749 VV	0.122	3748.747	* uncalibrated *
30.043	2248 VV	0.121	2247.670	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.591	13.536	-0.055
29	25.653	25.653	0.000

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\008R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 8
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 10.0PPB VOA	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 07:37 PM	Analysis Method	: 0727ELCD.MTH
Report Created on	: 30 Jul 94 09:39 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 09:39 AM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\009F0101.D	
Operator	: C. FROEHLICH & J.EPLEY	Page Number : 1
Instrument	: GC#3 5890	Vial Number : 9
Sample Name	: 15.0PPB VOA	Injection Number : 1
Run Time Bar Code:		Sequence Line : 1
Acquired on	: 29 Jul 94 08:20 PM	Instrument Method: 0727PID.MTH
Report Created on:	30 Jul 94 11:34 AM	Analysis Method : 0727PID.MTH
Last Recalib on	: 30 Jul 94 11:34 AM	Sample Amount : 0
Multiplier	: 1	ISTD Amount : 100

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\009F0101.D

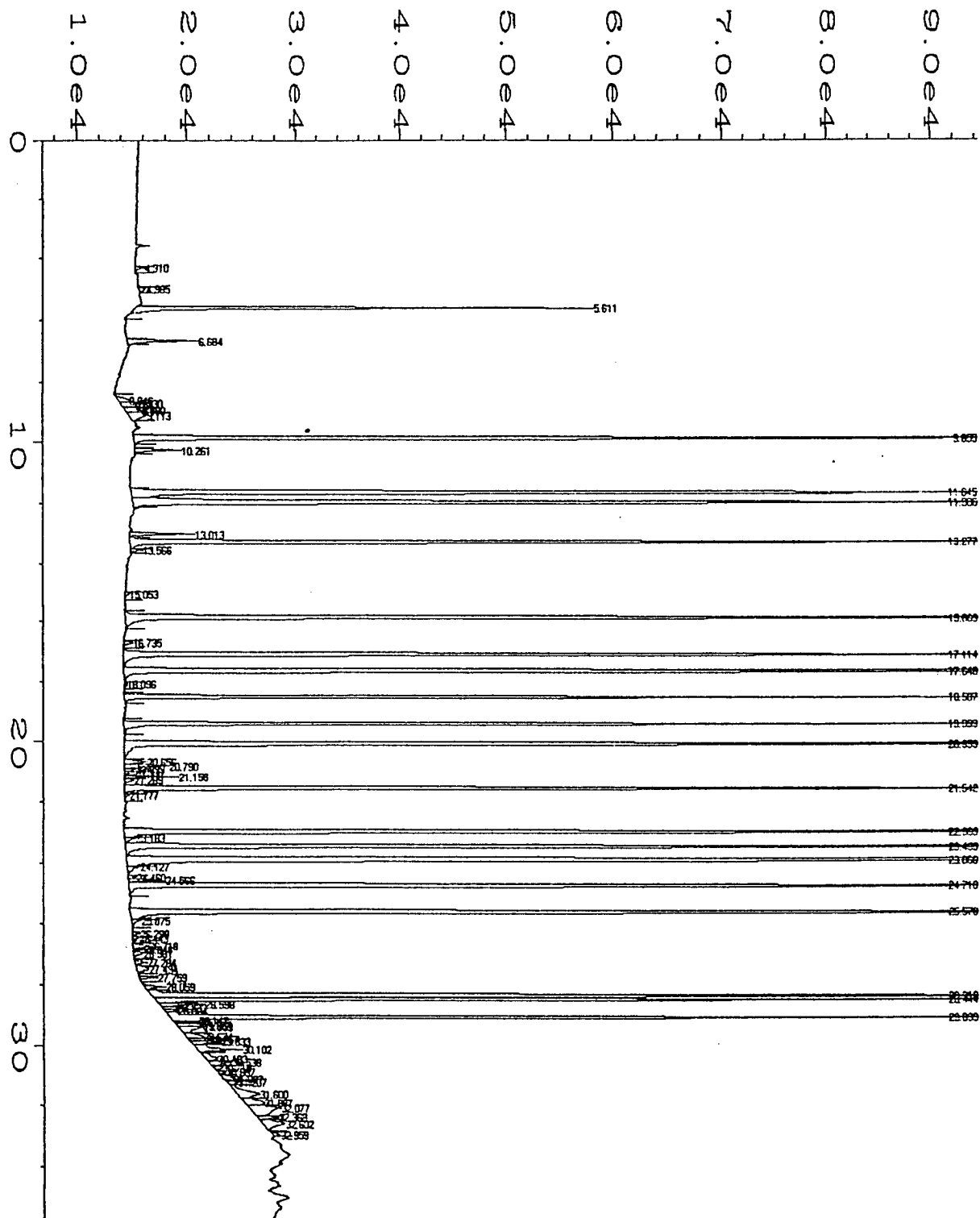
Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.611	43007	VV	0.053	1	15.155	VinylChloride
9.855	157285	PV	0.059	1	15.654	1,1DCEthene
11.645	407958	PV	0.052	1	15.408	trans 1,2-DCEthene
11.966	99266	VV	0.071	1	15.253	Methyl-tert-ButylEther
13.277	217244	VV	0.054	1	15.338	cis 1,2-DCEthene
15.863	427665	PV	0.057	1	15.400	Benzene
17.114	252219	PV	0.056	1	15.483	TCEthene (TCE)
17.640	280935	VV	0.059	1-R	106.255	Trifluorotoluene (Surr.)
18.507	92432	PV	0.053	1	15.173	cis 1,3DCPropene
19.393	117636	PV	0.052	1	15.009	trans-1,3-DCPropene
20.059	427197	VV	0.055	1	15.199	Toluene
21.542	194508	VV	0.056	1	15.218	Tetrachloroethene (PCE)
22.963	450652	BV	0.054	1	15.163	Chlorobenzene
23.433	387442	VV	0.055	1	15.162	Ethylbenzene
23.868	734360	VV	0.066	1	30.317	M & P Xylene
24.718	375054	VV	0.055	1	15.146	O-Xylene
25.579	659070	PV	0.053	1-IR	100.000	Bromofluorobenzene (I.S.)
28.316	497982	VV	0.043	1	15.218	1,3 DCB
28.444	488147	VV	0.042	1	39.801	1,4 DCB
29.033	405049	VV	0.041	1	42.535	1,2 DCB
4.310	927	PV	0.046		927.131	* uncalibrated *
4.985	651	PV	0.063		651.359	* uncalibrated *
6.684	6590	VV	0.055		6590.451	* uncalibrated *
8.646	998	BV	0.082		998.327	* uncalibrated *
8.730	1670	VV	0.088		1669.627	* uncalibrated *
8.841	1190	VV	0.034		1189.649	* uncalibrated *
8.980	1456	VV	0.100		1455.697	* uncalibrated *
9.113	1710	VV	0.132		1709.703	* uncalibrated *
10.261	4355	BV	0.054		4354.986	* uncalibrated *
13.013	6007	VV	0.062		6006.817	* uncalibrated *
13.566	1140	VV	0.053		1140.239	* uncalibrated *
15.053	405	VV	0.081		404.568	* uncalibrated *
16.735	882	PV	0.069		881.648	* uncalibrated *
18.096	297	VB	0.105		297.339	* uncalibrated *
20.656	2154	VV	0.067		2153.738	* uncalibrated *
20.790	4166	VV	0.077		4165.799	* uncalibrated *
20.899	1058	VV	0.063		1058.138	* uncalibrated *
20.988	911	VV	0.062		910.773	* uncalibrated *
21.156	5087	VV	0.054		5086.987	* uncalibrated *
21.289	900	VV	0.072		900.420	* uncalibrated *
21.777	483	VV	0.066		482.550	* uncalibrated *
23.183	1033	VV	0.079		1033.288	* uncalibrated *

24.127	1180	VV	0.097	1180.350	*	uncalibrated	*
24.460	749	PV	0.048	748.671	*	uncalibrated	*
24.566	3460	VV	0.051	3460.372	*	uncalibrated	*
25.875	928	VV	0.090	928.068	*	uncalibrated	*
26.299	765	BV	0.058	765.036	*	uncalibrated	*
26.443	630	VV	0.052	629.611	*	uncalibrated	*
26.718	1542	VV	0.071	1541.964	*	uncalibrated	*
26.846	1016	VV	0.056	1015.728	*	uncalibrated	*
26.981	990	PV	0.070	989.535	*	uncalibrated	*
27.284	1123	BV	0.062	1123.225	*	uncalibrated	*
27.494	1126	VV	0.103	1125.551	*	uncalibrated	*
27.759	1773	PV	0.048	1773.417	*	uncalibrated	*
28.059	1890	PV	0.051	1890.420	*	uncalibrated	*
28.598	4199	VV	0.062	4198.910	*	uncalibrated	*
28.733	1374	VV	0.067	1374.236	*	uncalibrated	*
28.804	1302	VV	0.052	1301.987	*	uncalibrated	*
29.147	2366	VV	0.042	2365.537	*	uncalibrated	*
29.213	2262	VV	0.058	2262.369	*	uncalibrated	*
29.284	2358	VV	0.054	2357.909	*	uncalibrated	*
29.353	2262	VV	0.107	2262.080	*	uncalibrated	*
29.674	1445	VV	0.090	1445.113	*	uncalibrated	*
29.757	1892	VV	0.064	1892.446	*	uncalibrated	*
29.833	2752	VV	0.070	2751.715	*	uncalibrated	*
30.102	4064	VV	0.080	4064.458	*	uncalibrated	*
30.403	1047	VV	0.142	1047.239	*	uncalibrated	*
30.538	2032	VV	0.077	2032.077	*	uncalibrated	*
30.719	746	VV	0.095	745.545	*	uncalibrated	*
30.867	669	VV	0.047	668.947	*	uncalibrated	*
31.087	987	VV	0.113	986.533	*	uncalibrated	*
31.207	974	VV	0.073	974.168	*	uncalibrated	*
31.600	2065	VV	0.160	2065.240	*	uncalibrated	*
31.887	1776	VV	0.130	1775.510	*	uncalibrated	*
32.077	2915	VV	0.169	2915.376	*	uncalibrated	*
32.368	2008	VV	0.062	2008.374	*	uncalibrated	*
32.602	2077	VV	0.143	2076.930	*	uncalibrated	*
32.959	650	VBA	0.085	650.064	*	uncalibrated	*

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.623	17.640	0.017
17	25.579	25.579	0.000

Calibration table contains at least one peak with amt = 0

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Internal Standard Report

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Data File Name   : C:\HPCHEM\3\DATA\29JUL94\009R0101.D
Operator        : C. FROEHLICH & J.EPLEY
Instrument       : GC#3 5890
Sample Name     : 15.0PPB VOA
Run Time Bar Code:
Acquired on    : 29 Jul 94  08:20 PM
Report Created on: 30 Jul 94  10:31 AM
Last Recalib on : 30 Jul 94  10:30 AM
Multiplier     : 1

Page Number      : 1
Vial Number     : 9
Injection Number : 1
Sequence Line   : 1
Instrument Method: 0727PID.MTH
Analysis Method : 0729ELCD.MTH
Sample Amount   : 0
ISTD Amount     : 100
  
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Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\009R0101.D

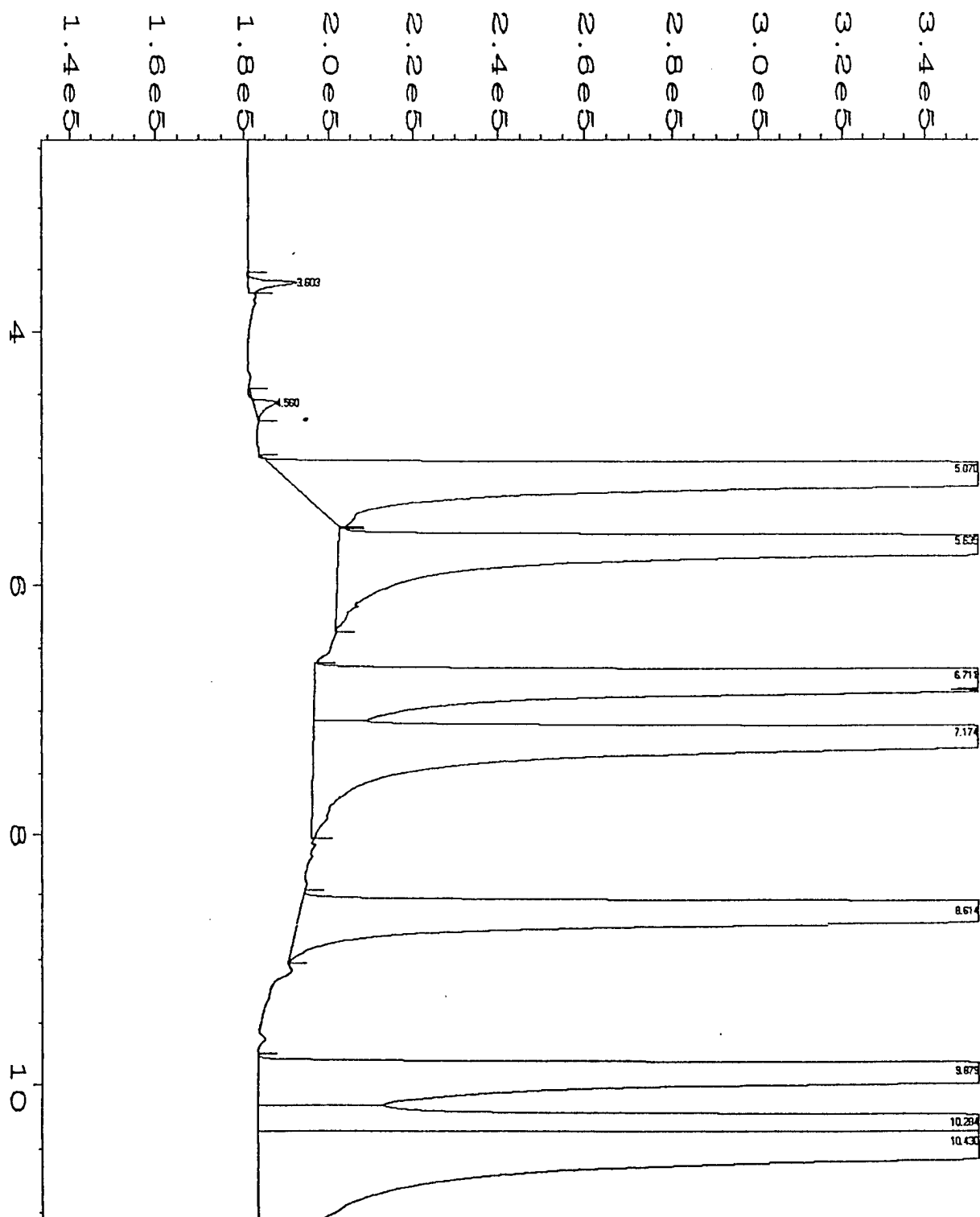
Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.070	2763324	MM T	0.096	1	15.795	Chloromethane
5.635	2208887	MM T	0.076	1	15.770	Vinylchloride
6.711	972760	MF T	0.100	1	15.125	Bromomethane
7.174	1780509	FM T	0.095	1	15.428	Chloroethane
8.614	2441385	BB	0.083	1	16.742	TCFM
9.879	4524900	PV	0.067	1	16.451	1,1 DCEthene
10.284	5653951	VV	0.068	1	16.302	Methylene chloride
10.430	4537098	VV	0.100	1	310.635	unknown
11.668	5155684	VV	0.062	1	15.891	trans 1,2 DCEthene
12.165	4767860	VV	0.072	1	15.982	1,1 DCEthane
13.300	5168117	VV	0.063	1	15.788	cis 1,2 DCEthene
13.591	4824972	VV	0.064	1-R	103.142	BCM (surrogate)
13.719	6253180	VV	0.072	1	15.901	Chloroform
14.942	4382532	VV	0.063	1	15.804	1,2 DCEthane (EDC)
15.105	5020092	VV	0.077	1	16.175	1,1,1 TCETHANE
15.786	5513129	VV	0.077	1	15.916	Carbon Tetrachloride
17.048	4140870	VV	0.062	1	15.733	1,2 DCPROPANE
17.137	5707685	VV	0.062	1	15.954	TCETHENE (TCE)
17.227	4335769	VV	0.072	1	15.782	BDCM
18.531	3894001	VV	0.067	1	15.743	cis 1,3 DCPROPENE
19.418	3478165	VV	0.060	1	15.633	trans 1,3 DCPROPENE
19.698	3893942	VV	0.071	1	15.696	1,1,2 TCETHANE
20.689	2623951	VV	0.076	1	15.489	DBCM
21.190	1583133	VV	0.079	1	15.282	1,2 DBRETHANE (EDB)
21.566	5677349	VV	0.069	1	15.678	Tetrachloroethene (PCE)
22.987	2562536	VV	0.064	1	15.481	Chlorobenzene
24.026	1558598	VV	0.081	1	15.285	Bromoform
24.719	2546531	VV	0.067	1	15.273	1,1,2,2 TCETHANE
25.609	2455471	VV	0.077	1-IR	100.000	BFB (I.S.)
28.340	4176765	VV	0.050	1	15.512	1,3 DCB
28.468	4367674	VV	0.053	1	15.522	1,4 DCB
29.057	4116380	VV	0.050	1	15.612	1,2 DCB
3.603	11315	PV	0.046		11315.38	* uncalibrated *
4.560	5244	BB	0.057		5243.788	* uncalibrated *
15.415	43371	VV	0.172		43371.49	* uncalibrated *
17.676	229935	VV	0.133		229934.6	* uncalibrated *
18.061	22077	VV	0.197		22076.60	* uncalibrated *
22.584	10106	VV	0.149		10106.43	* uncalibrated *
22.851	18174	VV	0.081		18174.13	* uncalibrated *
23.295	35616	VV	0.175		35615.70	* uncalibrated *
25.385	6868	VV	0.083		6868.212	* uncalibrated *
26.522	4545	VV	0.145		4544.901	* uncalibrated *

27.341	58665	VV	0.071	58664.75	*	Uncalibrated	*
29.996	5784	VV	0.132	5784.045	*	uncalibrated	*
30.179	3418	VV	0.162	3418.254	*	uncalibrated	*
30.427	2339	VV	0.107	2338.863	*	uncalibrated	*
32.687	8562	VBA	0.197	8561.750	*	uncalibrated	*

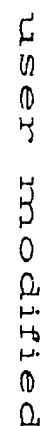
Time Reference Peak	Expected RT	Actual RT	Difference
12	13.537	13.591	0.054
29	25.609	25.609	0.000

User Modified

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\009R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 9
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 15.0PPB VOA	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 08:20 PM	Analysis Method	: 0729ELCD.MTH
Report Created on	: 30 Jul 94 10:31 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 10:30 AM	ISTD Amount	: 100
Multiplier	: 1		



Released to Imaging: 9/22/2026 3:02:24 PM

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\010F0101.D		
Operator	: C. FROELICH & J.EPLEY	Page Number	: 1
Instrument	: GC#3 5890	Vial Number	: 10
Sample Name	: 20.0PPB VOA	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 29 Jul 94 09:03 PM	Instrument Method	: 0727PID.MTH
Report Created on	: 30 Jul 94 11:37 AM	Analysis Method	: 0727PID.MTH
Last Recalib on	: 30 Jul 94 11:37 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	: 100

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\010F0101.D

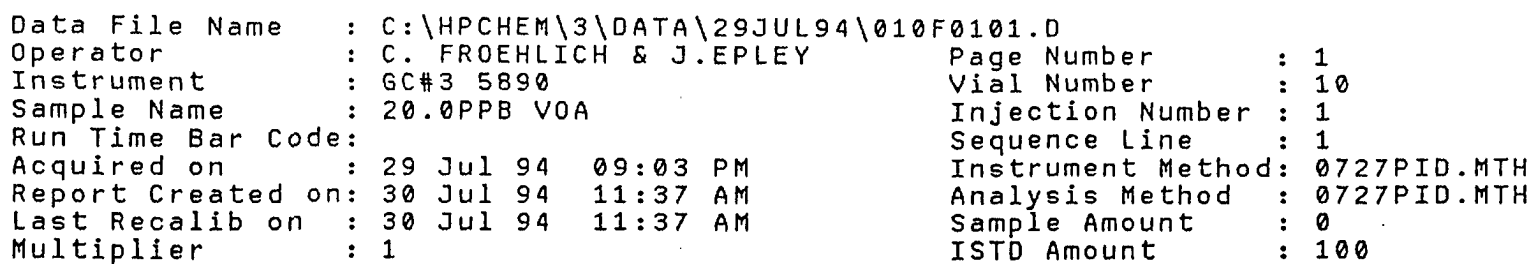
Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.594	57059	VV	0.053	1	20.174	VinylChloride
9.778	199194	VV	0.059	1	19.886	1,1DCEthene
11.590	526453	PV	0.052	1	19.970	trans 1,2-DCEthene
11.920	128049	VV	0.076	1	19.867	Methyl-tert-ButylEther
13.223	282229	VV	0.054	1	20.014	cis 1,2-DCEthene
15.806	551766	VV	0.056	1	19.970	Benzene
17.057	323498	VV	0.055	1	19.953	TCEthene (TCE)
17.586	264269	BV	0.060	1-R	95.432	Trifluorotoluene (Surr.)
18.449	121734	PV	0.053	1	20.091	cis 1,3DCPropene
19.328	157357	BV	0.051	1	20.183	trans-1,3-DCPropene
19.986	562491	BV	0.054	1	20.118	Toluene
21.461	256763	PV	0.055	1	20.158	Tetrachloroethene (PCE)
22.889	595513	PV	0.054	1	20.135	Chlorobenzene
23.363	512496	VV	0.055	1	20.145	Ethylbenzene
23.804	968798	VV	0.067	1	40.219	M & P Xylene
24.664	496325	VV	0.056	1	20.147	O-Xylene
25.536	655214	BV	0.054	1-IR	100.000	Bromofluorobenzene (I.S.)
28.307	659044	VV	0.044	1	20.139	1,3 DCB
28.437	650784	VV	0.042	1	20.150	1,4 DCB
29.030	543246	VV	0.042	1	20.232	1,2 DCB
4.299	999.8	BV	0.047		999.844	* uncalibrated *
4.973	752	PV	0.048		752.281	* uncalibrated *
6.657	8970	BV	0.062		8970.298	* uncalibrated *
8.921	1693	VV	0.053		1692.894	* uncalibrated *
9.042	4291	VV	0.106		4291.118	* uncalibrated *
9.237	704	VV	0.048		703.874	* uncalibrated *
9.334	724	VV	0.070		724.140	* uncalibrated *
9.437	671	VV	0.055		671.038	* uncalibrated *
10.199	5353	VV	0.060		5353.224	* uncalibrated *
12.087	816	VV	0.051		816.013	* uncalibrated *
12.814	493	BV	0.061		492.736	* uncalibrated *
12.957	2930	VV	0.059		2930.282	* uncalibrated *
13.086	1397	VV	0.061		1396.814	* uncalibrated *
13.511	1062	VV	0.056		1062.214	* uncalibrated *
14.997	562	VV	0.069		562.023	* uncalibrated *
16.676	1620	PV	0.069		1620.357	* uncalibrated *
18.752	1152	VV	0.067		1152.164	* uncalibrated *
18.884	526	VV	0.077		525.972	* uncalibrated *
19.064	493	VV	0.060		492.816	* uncalibrated *
20.183	930	VV	0.061		929.819	* uncalibrated *
20.292	707	VV	0.091		706.857	* uncalibrated *
20.576	2996	VV	0.074		2996.279	* uncalibrated *

20.707	6045 VV	0.077	6045.272	*	uncalibrated	*
20.816	3849 VV	0.059	3849.159	*	uncalibrated	*
20.911	3148 VV	0.067	3148.409	*	uncalibrated	*
21.075	6980 VV	0.054	6979.623	*	uncalibrated	*
21.223	1122 VV	0.075	1122.398	*	uncalibrated	*
21.965	688 BV	0.074	688.465	*	uncalibrated	*
23.114	2644 VV	0.091	2644.319	*	uncalibrated	*
24.063	2802 VV	0.076	2801.656	*	uncalibrated	*
24.401	2533 PV	0.056	2532.893	*	uncalibrated	*
24.510	3397 VV	0.054	3397.100	*	uncalibrated	*
25.844	965 VV	0.083	965.109	*	uncalibrated	*
25.944	444 VV	0.071	444.184	*	uncalibrated	*
26.264	2526 VV	0.069	2526.110	*	uncalibrated	*
26.408	738 VV	0.057	738.497	*	uncalibrated	*
26.512	905 VV	0.061	905.351	*	uncalibrated	*
26.694	1703 VV	0.075	1703.106	*	uncalibrated	*
26.817	1974 VV	0.059	1973.573	*	uncalibrated	*
26.945	3403 VV	0.071	3402.910	*	uncalibrated	*
27.260	2007 PV	0.064	2006.719	*	uncalibrated	*
27.421	2065 VV	0.053	2064.907	*	uncalibrated	*
27.497	2812 VV	0.065	2811.967	*	uncalibrated	*
27.745	5091 PV	0.048	5090.698	*	uncalibrated	*
28.048	3981 PV	0.050	3981.359	*	uncalibrated	*
28.181	1482 VV	0.058	1481.703	*	uncalibrated	*
28.591	22799 VV	0.050	22798.72	*	uncalibrated	*
28.731	2799 VV	0.066	2799.466	*	uncalibrated	*
28.802	3127 VV	0.059	3126.840	*	uncalibrated	*
29.149	5671 VV	0.051	5671.457	*	uncalibrated	*
29.210	4921 VV	0.047	4921.390	*	uncalibrated	*
29.280	4913 VV	0.057	4913.120	*	uncalibrated	*
29.351	3979 VV	0.074	3978.682	*	uncalibrated	*
29.511	3984 VV	0.080	3984.006	*	uncalibrated	*
29.623	4321 VV	0.091	4321.062	*	uncalibrated	*
29.669	4339 VV	0.054	4338.708	*	uncalibrated	*
29.751	4581 VV	0.056	4580.889	*	uncalibrated	*
29.835	11169 VV	0.066	11168.91	*	uncalibrated	*
29.960	3640 VV	0.075	3640.452	*	uncalibrated	*
30.108	12828 VV	0.072	12828.28	*	uncalibrated	*
30.288	3970 VV	0.091	3970.157	*	uncalibrated	*
30.409	4576 VV	0.098	4576.252	*	uncalibrated	*
30.526	4705 VV	0.120	4705.020	*	uncalibrated	*
30.750	2917 VV	0.091	2916.705	*	uncalibrated	*
30.878	3682 VV	0.080	3682.309	*	uncalibrated	*
31.006	1985 VV	0.058	1984.514	*	uncalibrated	*
31.108	2040 VV	0.097	2040.216	*	uncalibrated	*
31.230	2599 VV	0.107	2599.104	*	uncalibrated	*
31.391	2004 VV	0.049	2003.916	*	uncalibrated	*
31.459	2095 VV	0.065	2094.848	*	uncalibrated	*
31.626	4144 VV	0.151	4144.468	*	uncalibrated	*
31.790	2648 VV	0.043	2648.267	*	uncalibrated	*
31.939	2697 VV	0.113	2697.161	*	uncalibrated	*
32.051	4975 VV	0.057	4974.949	*	uncalibrated	*
32.103	3490 VV	0.056	3490.112	*	uncalibrated	*
32.224	1617 VV	0.097	1617.229	*	uncalibrated	*
32.407	4435 VV	0.057	4434.876	*	uncalibrated	*
32.649	1911 VV	0.116	1910.584	*	uncalibrated	*

8	17.623	17.586	-0.037
17	25.536	25.536	0.000

Calibration table contains at least one peak with amt = 0

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Internal Standard Report

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\010R0101.D		
Operator	: C. FROEHLICH & J.EPLEY	Page Number	: 1
Instrument	: GC#3 5890	Vial Number	: 10
Sample Name	: 20.0PPB VOA	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 29 Jul 94 09:03 PM	Instrument Method	: 0727PID.MTH
Report Created on:	: 30 Jul 94 10:06 AM	Analysis Method	: 0729ELCD.MTH
Last Recalib on	: 30 Jul 94 10:06 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	: 100

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\010R0101.D

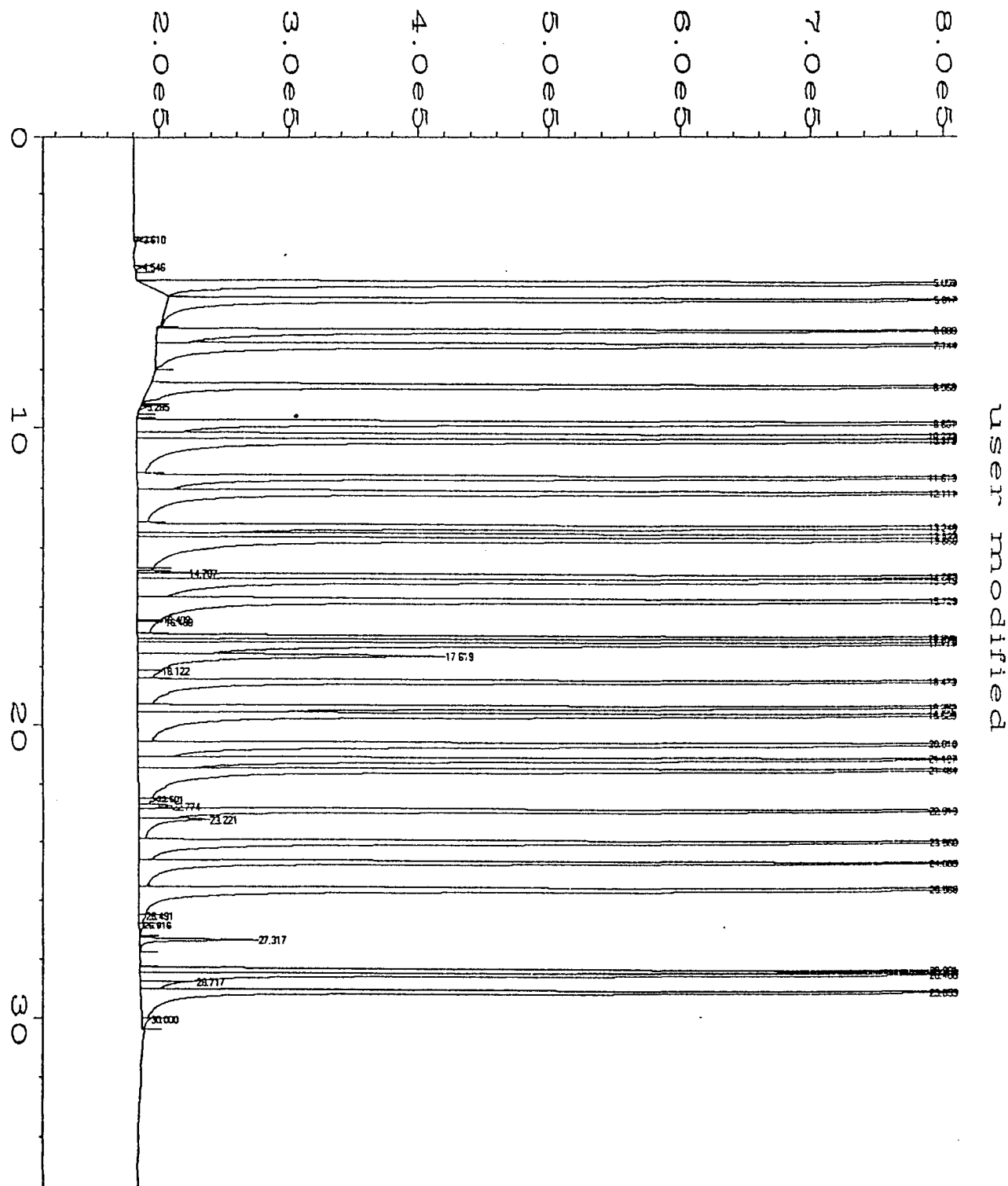
Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.053	3485826	MM T	0.088	1	18.167	Chloromethane
5.617	2776960	MM T	0.091	1	18.088	Vinylchloride
6.683	1329761	MF T	0.102	1	18.364	Bromomethane
7.144	2339802	FM T	0.096	1	18.202	Chloroethane
8.568	2791390	MM T	0.093	1	18.016	TCFM
9.801	5305561	PV	0.072	1	18.000	1,1 DCEthene
10.222	6550541	VV	0.070	1	17.842	Methylene chloride
10.372	4186323	VV	0.102	1	279.953	unknown
11.613	6344704	VV	0.062	1	17.996	trans 1,2 DCEthene
12.111	5826053	VV	0.073	1	18.014	1,1 DCEthane
13.246	6416978	VV	0.064	1	17.999	cis 1,2 DCEthene
13.537	4642336	VV	0.062	1-R	96.931	BCM (surrogate)
13.666	7590838	VV	0.073	1	17.917	Chloroform
14.887	5390042	VV	0.062	1	17.948	1,2 DCEthane (EDC)
15.049	5974235	VV	0.081	1	17.960	1,1,1 TCethane
15.729	6747350	VV	0.079	1	17.972	Carbon Tetrachloride
16.991	5179160	VV	0.061	1	18.023	1,2 DCP propane
17.079	6943788	VV	0.062	1	17.954	TCethene (TCE)
17.171	5426756	VV	0.072	1	18.074	BDCM
18.473	4910777	VV	0.065	1	18.125	cis 1,3 DCPpropene
19.352	4392746	VV	0.060	1	18.029	trans 1,3 DCPpropene
19.629	4883046	VV	0.069	1	18.029	1,1,2 TCethane
20.610	3385189	VV	0.076	1	18.079	DBCM
21.107	2105483	VV	0.078	1	18.191	1,2 DBrEthane (EDB)
21.484	7101820	VV	0.069	1	17.981	Tetrachloroethene (PCE)
22.913	3303459	VV	0.063	1	18.079	Chlorobenzene
23.960	2092642	VV	0.080	1	18.276	Bromoform
24.665	3304437	VV	0.069	1	17.982	1,1,2,2 TCethane
25.566	2513931	VV	0.078	1-IR	100.000	BFB (I.S.)
28.331	5357174	PV	0.052	1	18.098	1,3 DCB
28.460	5580575	VV	0.052	1	18.047	1,4 DCB
29.053	5179699	VV	0.052	1	17.990	1,2 DCB
3.610	7119	BV	0.050		7118.750	* uncalibrated *
4.546	6450	BB	0.065		6450.019	* uncalibrated *
9.285	5192	BV	0.066		5192.424	* uncalibrated *
14.787	40357	VV	0.037		40356.69	* uncalibrated *
16.402	19994	VV	0.065		19993.51	* uncalibrated *
16.489	21694	VV	0.157		21694.48	* uncalibrated *
17.619	237735	VV	0.143		237735.5	* uncalibrated *
18.122	19200	VV	0.152		19199.52	* uncalibrated *
22.501	13898	VV	0.151		13897.99	* uncalibrated *
22.774	26028	VV	0.079		26028.34	* uncalibrated *

23.221	54655	VV	0.166	54654.81	*	uncalibrated	*
26.491	5515	VV	0.158	5515.017	*	uncalibrated	*
26.816	3896	VV	0.186	3896.267	*	uncalibrated	*
27.317	91695	VV	0.072	91695.48	*	uncalibrated	*
28.717	43722	VV	0.121	43721.98	*	uncalibrated	*
30.000	7017	VV	0.155	7017.112	*	uncalibrated	*

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.537	13.537	0.000
29	25.566	25.566	0.000

User Modified

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Data File Name	: C:\HPCHEM\3\DATA\29JUL94\010R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 10
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: 20.0PPB VOA	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 09:03 PM	Analysis Method	: 0729ELCD.MTH
Report Created on:	: 30 Jul 94 10:06 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 10:06 AM	ISTD Amount	: 100
Multiplier	: 1		

LABORATORY CONTROL SAMPLE /
CONTINUING CALIBRATIONS

DSTD0729.XLS

EPA - 8010
Continuing Calibration

ATI ID: 011R0101.D
DATE OF ANALYSIS : JULY 29, 1994
TIME OF ANALYSIS: 09:46

COMPOUNDS	Result	True Value	% Recovery	Acceptance Range
CHLOROMETHANE	9.799	10	98	6.0-14.1
VINYLCHLORIDE	9.843	10	98	6.9-13.2
BROMOMETHANE	10.382	10	104	5.9-14.2
CHLOROETHANE	10.717	10	107	7.7-12.3
TCFM	11.504	10	115	6.7-13.4
1,1 DICHLOROETHENE	10.246	10	102	6.3-13.7
METHYLENE CHLORIDE	10.747	10	107	7.8-12.3
t 1,2 DICHLOROETHENE	10.355	10	104	6.4-13.6
1,1 DICHLOROETHENE	10.408	10	104	6.3-13.7
c 1,2 DICHLOROETHENE	10.476	10	105	8.5-11.5*
CHLOROFORM	10.744	10	107	7.5-12.5
1,2 DICHLOROETHANE	10.559	10	106	7.2-12.9
1,1,1 TRICHLOROETHANE	10.422	10	104	7.1-12.9
CARBON TETRACHLORIDE	10.501	10	105	6.9-13.2
1,2 DICHLOROPROPANE	10.731	10	107	7.4-12.6
TRICHLORETHENE	10.856	10	109	7.7-12.3
BROMODICHLOROMETHANE	10.699	10	107	7.6-12.4
c 1,3 DICHLOROPROPENE	11.263	10	113	6.4-13.6
t 1,3 DICHLOROPROPENE	10.141	10	101	6.4-13.6
1,1,2 TRICHLOROETHANE	10.686	10	107	7.9-12.2
DIBROMOCHLOROMETHANE	10.417	10	104	6.6-13.5
1,2 DIBROMOETHANE	10.542	10	105	8.5-11.5*
TETRACHLOROETHENE	10.63	10	106	7.0-13.0
CHLOROBENZENE	10.518	10	105	7.2-12.8
BROMOFORM	10.115	10	101	7.4-12.7
1,1,2,2, TETRACHLOROETHANE	10.625	10	106	4.9-15.1
1,3 DICHLOROBENZENE	10.102	10	101	5.0-15.1
1,4 DICHLOROBENZENE	10.237	10	102	7.0-13.1
1,2 DICHLOROBENZENE	10.199	10	102	7.0-13.0

* DEFAULT CRITERIA, NO CRITERIA ESTABLISHED BY EPA IN SW-846 METHOD 8010

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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\011F0101.D

Operator : C. FROELICH & J.EPLEY Page Number : 1

Instrument : GC#3 5890 Vial Number : 11

Sample Name : GC3-34-01 VOALCS Injection Number : 1

Run Time Bar Code: Sequence Line : 1

Acquired on : 29 Jul 94 09:46 PM Instrument Method: 0727PID.MTH

Report Created on: 30 Jul 94 11:51 AM Analysis Method : 0727PID.MTH

Last Recalib on : 30 Jul 94 11:37 AM Sample Amount : 0

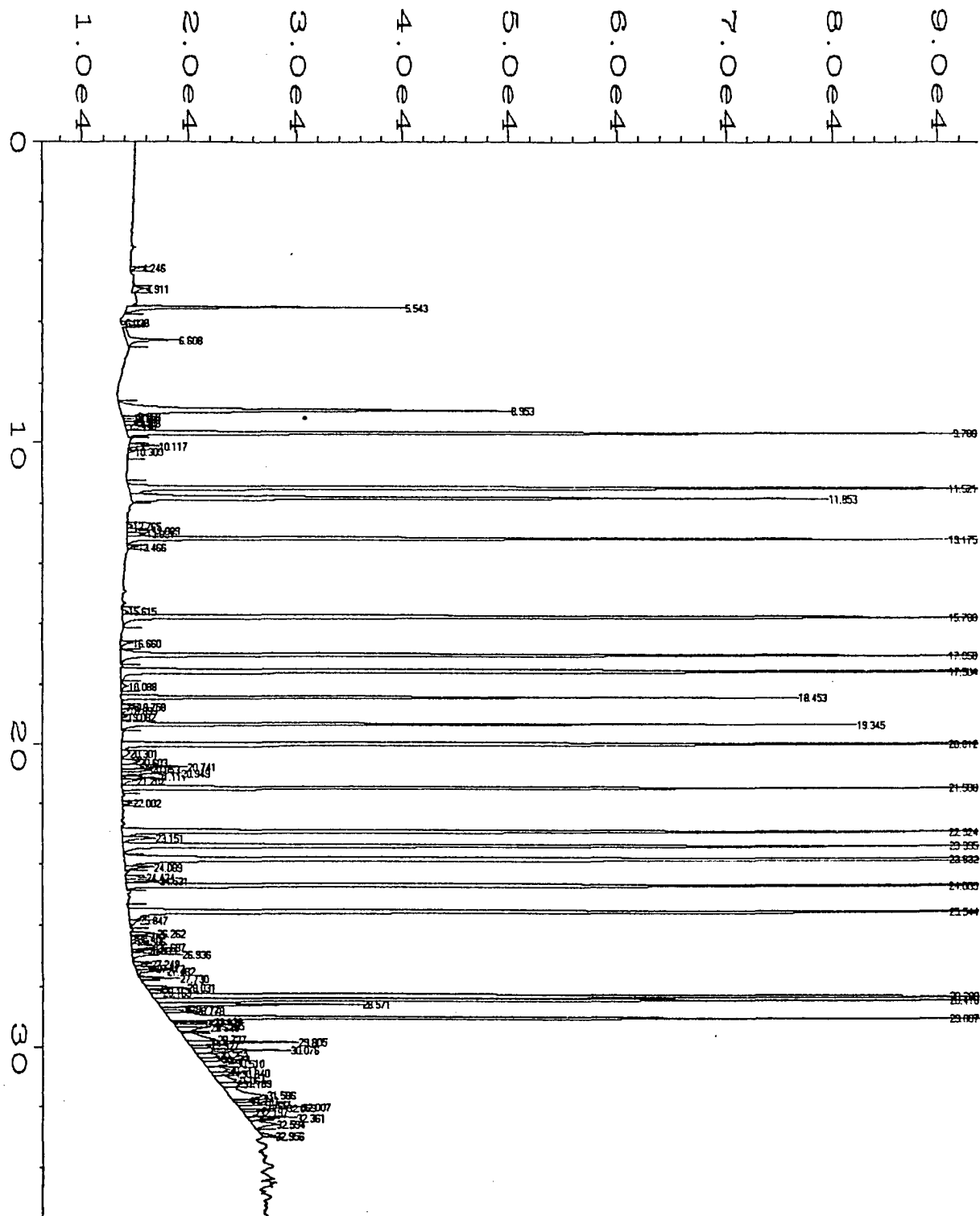
Multiplier : 1 ISTD Amount : 100

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\011F0101.D

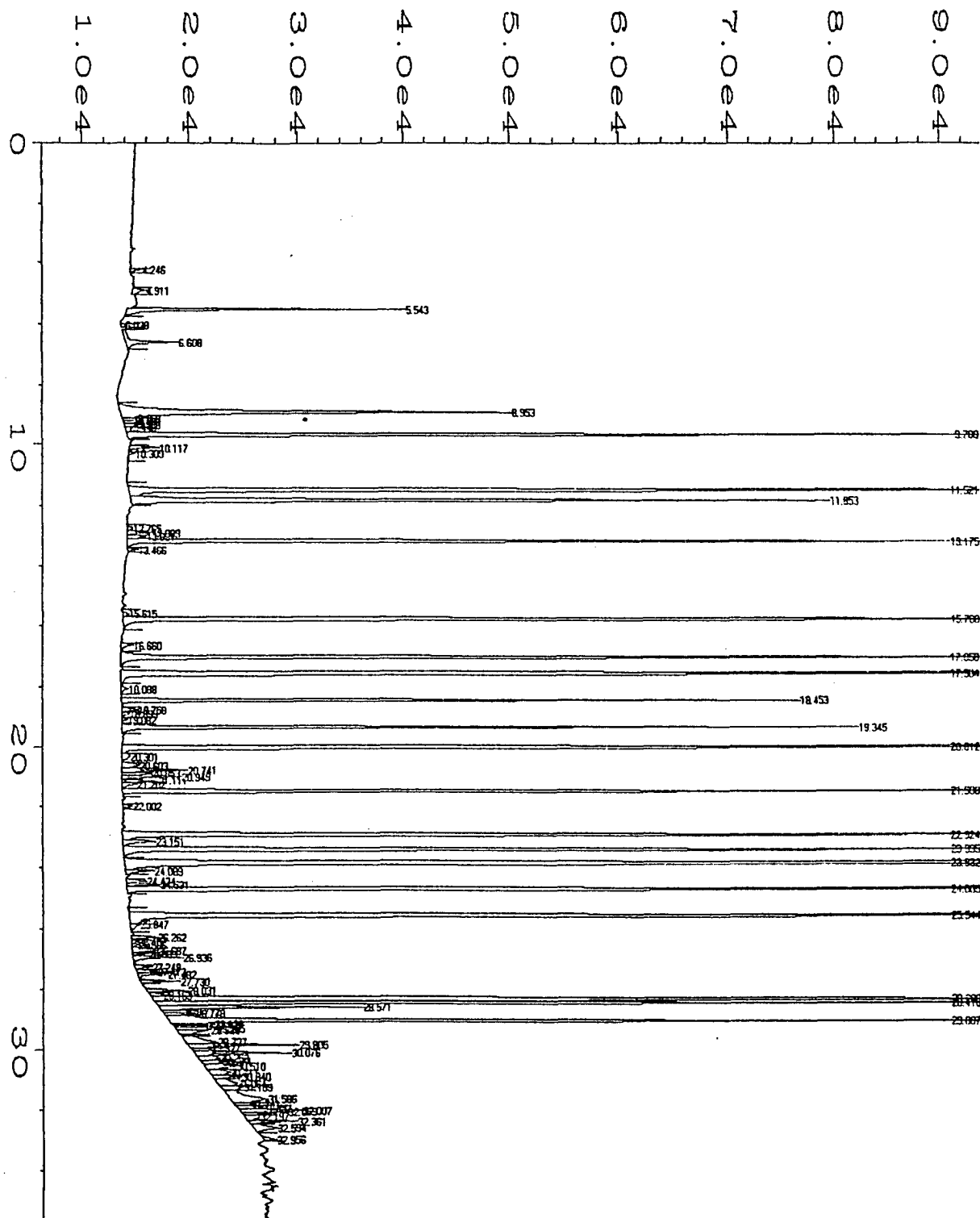
Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.543	26310	VV	0.054	1	9.937	VinylChloride
9.700	87287	VV	0.060	1	9.344	1,1DCEthene
11.521	243831	BV	0.052	1	9.854	trans 1,2-DCEthene
11.853	65111	VV	0.077	1	10.589	Methyl-tert-ButylEther
13.175	130714	VV	0.054	1	9.872	cis 1,2-DCEthene
15.788	264195	VV	0.057	1	10.161	Benzene
17.050	155439	VV	0.056	1	10.199	TCEthene (TCE)
17.584	260131	VV	0.061	1-R	101.879	Trifluorotoluene (Surr.)
18.453	63247	VV	0.054	1	11.076	cis 1,3DCPropene
19.345	68965	PV	0.052	1	9.394	trans-1,3-DCPropene
20.012	270265	BV	0.055	1	10.263	Toluene
21.500	119861	VV	0.056	1	10.048	Tetrachloroethene (PCE)
22.924	281926	PV	0.054	1	10.133	Chlorobenzene
23.395	239520	VV	0.056	1	10.021	Ethylbenzene
23.832	477987	VV	0.067	1	21.048	M & P Xylene
24.683	242854	VV	0.055	1	10.469	O-Xylene
25.544	618227	BV	0.053	1-IR	100.000	Bromofluorobenzene (I.S.)
28.289	304861	VV	0.044	1	9.843	1,3 DCB
28.418	299682	VV	0.043	1	9.845	1,4 DCB
29.007	250316	VV	0.043	1	9.842	1,2 DCB
4.246	1110	BV	0.044		1110.224	* uncalibrated *
4.911	1278	BV	0.074		1278.310	* uncalibrated *
6.038	399	PV	0.091		399.485	* uncalibrated *
6.608	5026	VV	0.084		5025.778	* uncalibrated *
8.953	36683	BV	0.086		36682.89	* uncalibrated *
9.150	1406	VV	0.060		1405.788	* uncalibrated *
9.251	1440	VV	0.074		1439.878	* uncalibrated *
9.368	1235	VV	0.077		1234.597	* uncalibrated *
9.448	819	VV	0.111		819.290	* uncalibrated *
10.117	2827	BV	0.062		2826.918	* uncalibrated *
10.309	665	VV	0.062		665.260	* uncalibrated *
12.765	612	BV	0.060		612.134	* uncalibrated *
12.909	2352	VV	0.064		2352.251	* uncalibrated *
13.031	1818	VV	0.066		1817.655	* uncalibrated *
13.466	1035	VV	0.058		1035.287	* uncalibrated *
15.615	586	PV	0.073		586.468	* uncalibrated *
16.660	1210	PV	0.076		1209.790	* uncalibrated *
18.088	676	VV	0.086		675.594	* uncalibrated *
18.758	1618	VV	0.068		1618.350	* uncalibrated *
18.899	811	VV	0.075		811.393	* uncalibrated *
19.082	624	VV	0.062		623.616	* uncalibrated *
			0.140		772.840	* uncalibrated *

20.603	1728 VV	0.084	1727.999	* uncalibrated *
20.741	6227 VV	0.076	6227.333	* uncalibrated *
20.853	2822 VV	0.056	2822.485	* uncalibrated *
20.949	5697 VV	0.069	5697.104	* uncalibrated *
21.111	3442 VV	0.054	3442.028	* uncalibrated *
21.262	1449 VV	0.086	1448.502	* uncalibrated *
22.002	1035 BV	0.069	1035.244	* uncalibrated *
23.151	3171 VV	0.083	3170.525	* uncalibrated *
24.089	2801 VV	0.071	2800.674	* uncalibrated *
24.424	1975 PV	0.058	1975.471	* uncalibrated *
24.531	3240 VV	0.053	3239.990	* uncalibrated *
25.847	958 VV	0.111	957.797	* uncalibrated *
26.262	2602 VV	0.064	2602.132	* uncalibrated *
26.407	685 VV	0.065	684.794	* uncalibrated *
26.506	640 VV	0.064	640.243	* uncalibrated *
26.687	2489 VV	0.087	2488.756	* uncalibrated *
26.809	1504 VV	0.059	1504.037	* uncalibrated *
26.936	4704 PV	0.069	4703.985	* uncalibrated *
27.249	1695 PV	0.065	1694.785	* uncalibrated *
27.413	1976 VV	0.064	1975.875	* uncalibrated *
27.482	2882 VV	0.072	2882.280	* uncalibrated *
27.730	3794 PV	0.049	3793.866	* uncalibrated *
28.031	3944 PV	0.046	3944.437	* uncalibrated *
28.163	1284 VV	0.055	1284.317	* uncalibrated *
28.571	19249 VV	0.049	19249.24	* uncalibrated *
28.712	2709 VV	0.067	2708.845	* uncalibrated *
28.778	3015 VV	0.057	3015.102	* uncalibrated *
29.129	3983 VV	0.050	3983.090	* uncalibrated *
29.193	3615 VV	0.049	3614.645	* uncalibrated *
29.255	3810 VV	0.056	3809.777	* uncalibrated *
29.326	3239 VV	0.083	3238.769	* uncalibrated *
29.727	2998 VV	0.112	2997.521	* uncalibrated *
29.805	10351 VV	0.058	10350.64	* uncalibrated *
29.927	1863 VV	0.079	1863.051	* uncalibrated *
30.076	9069 VV	0.058	9069.348	* uncalibrated *
30.253	1943 VV	0.102	1943.041	* uncalibrated *
30.374	1857 VV	0.088	1857.142	* uncalibrated *
30.510	2970 VV	0.097	2969.682	* uncalibrated *
30.711	1840 VV	0.110	1840.380	* uncalibrated *
30.840	2731 VV	0.075	2731.035	* uncalibrated *
31.064	1796 VV	0.126	1796.337	* uncalibrated *
31.189	2099 VV	0.108	2099.293	* uncalibrated *
31.586	3491 VV	0.170	3491.302	* uncalibrated *
31.741	1665 VV	0.055	1665.467	* uncalibrated *
31.897	2294 VV	0.105	2294.386	* uncalibrated *
32.007	5906 VV	0.060	5905.525	* uncalibrated *
32.059	4299 VV	0.060	4299.164	* uncalibrated *
32.197	1409 VV	0.111	1408.990	* uncalibrated *
32.361	4538 VV	0.057	4537.622	* uncalibrated *
32.594	2225 VV	0.122	2224.573	* uncalibrated *
32.956	1179 PBA	0.075	1178.785	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
8	17.623	17.584	-0.039
17	25.536	25.544	0.008



Data File Name	: C:\HPCHEM\3\DATA\29JUL94\011F0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 11
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: GC3-34-01 VOALCS	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 09:46 PM	Analysis Method	: 0727PID.MTH
Report Created on:	: 30 Jul 94 11:51 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 11:37 AM	ISTD Amount	: 100
Multiplier	: 1		



Data File Name	: C:\HPCHEM\3\DATA\29JUL94\011F0101.D	Page Number	: 1
Operator	: C. FROELICH & J.EPLEY	Vial Number	: 11
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: GC3-34-01 VOALCS	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 09:46 PM	Analysis Method	: 0727PID.MTH
Report Created on:	30 Jul 94 11:51 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 11:37 AM	ISTD Amount	: 100
Multiplier	: 1		

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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\011R0101.D

Operator : C. FROELICH & J.EPLEY Page Number : 1

Instrument : GC#3 5890 Vial Number : 11

Sample Name : GC3-34-01 VOALCS Injection Number : 1

Run Time Bar Code: Sequence Line : 1

Acquired on : 29 Jul 94 09:46 PM Instrument Method: 0727PID.MTH

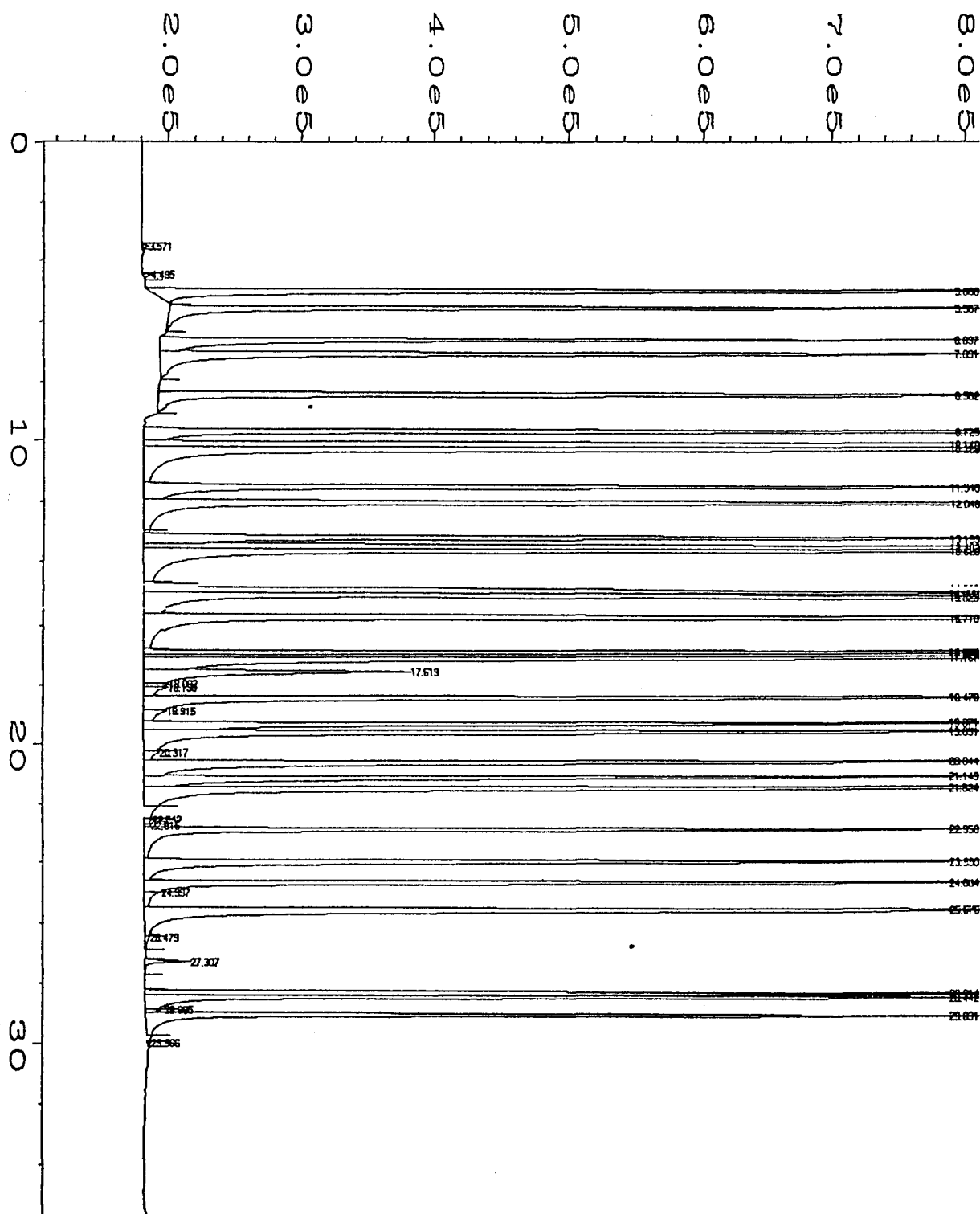
Report Created on: 30 Jul 94 10:57 AM Analysis Method : 0729ELCD.MTH

Last Recalib on : 30 Jul 94 10:30 AM Sample Amount : 0

Multiplier : 1 ISTD Amount : 100

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\011R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
5.000	1690238	MM T	0.088	1	9.799	Chloromethane
5.567	1352762	MM T	0.075	1	9.843	Vinylchloride
6.637	653581	MF T	0.100	1	10.382	Bromomethane
7.091	1200731	FM T	0.094	1	10.717	Chloroethane
8.502	1570498	MM T	0.090	1	11.504	TCFM
9.725	2662145	PV	0.067	1	10.246	1,1 DCEthene
10.288	3758571	VV	0.096	1	10.747	Methylene chloride
10.378	* not found *			1		unknown
11.546	3323600	VV	0.062	1	10.355	trans 1,2 DCEthene
12.049	3076312	VV	0.073	1	10.408	1,1 DCEthane
13.199	3398212	VV	0.063	1	10.476	cis 1,2 DCEthene
13.492	4560889	VV	0.064	1-R	100.442	BCM (surrogate)
13.623	4265757	VV	0.072	1	10.744	Chloroform
14.860	2939879	VV	0.063	1	10.559	1,2 DCEthane (EDC)
15.023	3277760	VV	0.079	1	10.422	1,1,1 TCEthane
15.710	3614514	VV	0.078	1	10.501	Carbon Tetrachloride
16.985	2791293	VV	0.061	1	10.731	1,2 DCP propane
17.074	3864840	VV	0.061	1	10.856	TCEthene (TCE)
17.167	2897030	VV	0.072	1	10.699	BDCM
18.479	2807903	VV	0.064	1	11.263	cis 1,3 DCPpropene
19.371	2236180	VV	0.061	1	10.141	trans 1,3 DCPpropene
19.651	2631513	VV	0.069	1	10.686	1,1,2 TCEthane
20.644	1724424	VV	0.076	1	10.417	DBCM
21.149	1062667	VV	0.078	1	10.542	1,2 DBrEthane (EDB)
21.524	3822625	VV	0.068	1	10.630	Tetrachloroethene (PCE)
22.950	1708748	VV	0.066	1	10.518	Chlorobenzene
23.990	996623	VV	0.079	1	10.115	Bromoform
24.684	1757854	VV	0.068	1	10.625	1,1,2,2 TCEthane
25.575	2383487	VV	0.076	1-IR	100.000	BFB (I.S.)
28.314	2708328	BV	0.051	1	10.102	1,3 DCB
28.442	2852932	VV	0.053	1	10.237	1,4 DCB
29.031	2686001	VV	0.050	1	10.199	1,2 DCB
3.571	5166	PV	0.056		5166.426	* uncalibrated *
4.495	6296	BB	0.065		6295.733	* uncalibrated *
10.140	3743190	VV	0.065		3743190.	* uncalibrated *
17.619	200044	VV	0.126		200044.0	* uncalibrated *
18.002	18450	VV	0.079		18450.46	* uncalibrated *
18.130	18098	VV	0.157		18097.67	* uncalibrated *
18.915	17279	VV	0.186		17279.30	* uncalibrated *
20.317	11685	VV	0.155		11684.82	* uncalibrated *
22.543	6243	VV	0.154		6243.288	* uncalibrated *
22.815	5498	VV	0.086		5497.881	* uncalibrated *



user modified

Data File Name	: C:\HPCHEM\3\DATA\29JUL94\011R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 11
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: GC3-34-01 VOALCS	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: 0727PID.MTH
Acquired on	: 29 Jul 94 09:46 PM	Analysis Method	: 0729ELCD.MTH
Report Created on:	: 30 Jul 94 10:58 AM	Sample Amount	: 0
Last Recalib on	: 30 Jul 94 10:30 AM	ISTD Amount	: 100
Multiplier	: 1		

EPA - 8020
Continuing CalibrationATI ID: 021F0101.D
DATE OF ANALYSIS : JULY 30, 1994
TIME OF ANALYSIS: 04:54

COMPOUNDS	Result	True Value	% Recovery	Acceptance Range
VINYL CHLORIDE	10.322	10	103	6.9-13.2**
1,1 DICHLOROETHENE	9.713	10	97	6.3-13.7**
t 1,2 DICHLOROETHENE	10.28	10	102	6.4-13.6**
METHYL-t-BUTYL ETHER	9.393	10	94	8.5-11.5*
c 1,2 DICHLOROETHENE	10.218	10	102	6.4-13.6**
BENZENE	10.537	10	105	7.7-12.3
TRICHLOROETHENE	10.319	10	103	7.7-12.3**
c 1,3 DICHLOROPROPENE	10.898	10	109	6.4-13.6**
t 1,3 DICHLOROPROPENE	8.619	10	86	6.4-13.6**
TOLUENE	10.465	10	105	7.75-12.25
TETRACHLOROETHENE	10.377	10	107	7.0-13.0**
CHLOROBENZENE	10.408	10	104	8.05-11.95
ETHYLBENZENE	10.398	10	104	6.3-13.7
M & P XYLENE	21.865	20	109	17-23*
O XYLENE	10.829	10	108	8.5-11.5*
1,3 DICHLOROBENZENE	10.104	10	101	7.25-12.8
1,4 DICHLOROBENZENE	10.165	10	102	6.95-13.7
1,2 DICHLOROBENZENE	10.103	10	101	6.8-13.2

* DEFAULT CRITERIA, NO CRITERIA ESTABLISHED BY EPA IN SW-846 METHOD 8020

** REFER TO SW-846 METHOD 8010

EPA - 8010
Continuing Calibration

ATI ID: 011R0101.D
DATE OF ANALYSIS : JULY 29, 1994
TIME OF ANALYSIS: 09:46

COMPOUNDS	Result	True Value	% Recovery	Acceptance Range	
CHLOROMETHANE	9.81	10	98	6.0-14.1	
VINYLCHLORIDE	9.719	10	97	6.9-13.2	
BROMOMETHANE	9.973	10	100	5.9-14.2	
CHLOROETHANE	10.958	10	110	7.7-12.3	
TCFM	17.883	10	179	6.7-13.4	A
1,1 DICHLOROETHENE	10.362	10	104	6.3-13.7	
METHYLENE CHLORIDE	10.984	10	110	7.8-12.3	
t 1,2 DICHLOROETHENE	11.014	10	110	6.4-13.6	
1,1 DICHLOROETHENE	11.04	10	110	6.3-13.7	
c 1,2 DICHLOROETHENE	11.192	10	112	8.5-11.5*	
CHLOROFORM	11.597	10	116	7.5-12.5	
1,2 DICHLOROETHANE	10.483	10	105	7.2-12.9	
1,1,1 TRICHLOROETHANE	11.216	10	112	7.1-12.9	
CARBON TETRACHLORIDE	11.295	10	113	6.9-13.2	
1,2 DICHLOROPROPANE	7.912	10	79	7.4-12.6	
TRICHLORETHENE	15.703	10	157	7.7-12.3	A
BROMODICHLOROMETHANE	10.675	10	107	7.6-12.4	
c 1,3 DICHLOROPROPENE	11.726	10	117	6.4-13.6	
t 1,3 DICHLOROPROPENE	9.854	10	99	6.4-13.6	
1,1,2 TRICHLOROETHANE	10.652	10	107	7.9-12.2	
DIBROMOCHLOROMETHANE	10.296	10	103	6.6-13.5	
1,2 DIBROMOETHANE	9.807	10	98	8.5-11.5*	
TETRACHLOROETHENE	11.398	10	114	7.0-13.0	
CHLOROBENZENE	11.307	10	113	7.2-12.8	
BROMOFORM	9.214	10	92	7.4-12.7	
1,1,2,2, TETRACHLOROETHANE	9.907	10	99	4.9-15.1	
1,3 DICHLOROBENZENE	10.684	10	107	5.0-15.1	
1,4 DICHLOROBENZENE	10.843	10	108	7.0-13.1	
1,2 DICHLOROBENZENE	10.732	10	107	7.0-13.0	

* DEFAULT CRITERIA, NO CRITERIA ESTABLISHED BY EPA IN SW-846 METHOD 8010

A: OUTSIDE ACCEPTANCE CRITERIA

EPA - 8010
Continuing Calibration

ATI ID: 011R0101.D
DATE OF ANALYSIS : JULY 29, 1994
TIME OF ANALYSIS: 09:46

COMPOUNDS	Result	True Value	% Recovery	Acceptance Range	
CHLOROMETHANE	9.81	10	98	6.0-14.1	
VINYLCHLORIDE	9.719	10	97	6.9-13.2	
BROMOMETHANE	9.973	10	100	5.9-14.2	
CHLOROETHANE	10.958	10	110	7.7-12.3	
TCFM	17.883	10	179	6.7-13.4	A
1,1 DICHLOROETHENE	10.362	10	104	6.3-13.7	
METHYLENE CHLORIDE	10.984	10	110	7.8-12.3	
t 1,2 DICHLOROETHENE	11.014	10	110	6.4-13.6	
1,1 DICHLOROETHENE	11.04	10	110	6.3-13.7	
c 1,2 DICHLOROETHENE	11.192	10	112	8.5-11.5*	
CHLOROFORM	11.597	10	116	7.5-12.5	
1,2 DICHLOROETHANE	10.483	10	105	7.2-12.9	
1,1,1 TRICHLOROETHANE	11.216	10	112	7.1-12.9	
CARBON TETRACHLORIDE	11.295	10	113	6.9-13.2	
1,2 DICHLOROPROPANE	7.912	10	79	7.4-12.6	
TRICHLORETHENE	15.703	10	157	7.7-12.3	A
BROMODICHLOROMETHANE	10.675	10	107	7.6-12.4	
c 1,3 DICHLOROPROPENE	11.726	10	117	6.4-13.6	
t 1,3 DICHLOROPROPENE	9.854	10	99	6.4-13.6	
1,1,2 TRICHLOROETHANE	10.652	10	107	7.9-12.2	
DIBROMOCHLOROMETHANE	10.296	10	103	6.6-13.5	
1,2 DIBROMOETHANE	9.807	10	98	8.5-11.5*	
TETRACHLOROETHENE	11.398	10	114	7.0-13.0	
CHLOROBENZENE	11.307	10	113	7.2-12.8	
BROMOFORM	9.214	10	92	7.4-12.7	
1,1,2,2, TETRACHLOROETHANE	9.907	10	99	4.9-15.1	
1,3 DICHLOROBENZENE	10.684	10	107	5.0-15.1	
1,4 DICHLOROBENZENE	10.843	10	108	7.0-13.1	
1,2 DICHLOROBENZENE	10.732	10	107	7.0-13.0	

* DEFAULT CRITERIA, NO CRITERIA ESTABLISHED BY EPA IN SW-846 METHOD 8010

A: OUTSIDE ACCEPTANCE CRITERIA

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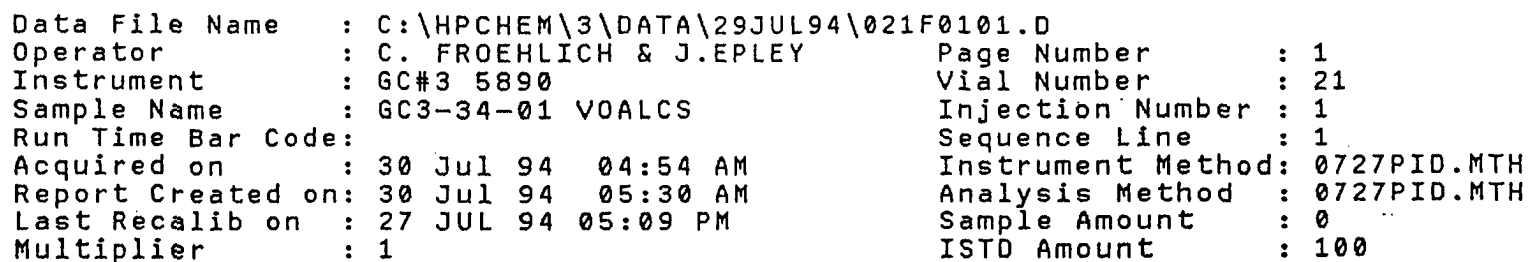
Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\021F0101.D
 Operator : C. FROEHLICH & J.EPLEY Page Number : 1
 Instrument : GC#3 5890 Vial Number : 21
 Sample Name : GC3-34-01 VOALCS Injection Number : 1
 Run Time Bar Code: Sequence Line : 1
 Acquired on : 30 Jul 94 04:54 AM Instrument Method: 0727PID.MTH
 Report Created on: 02 Aug 94 05:36 PM Analysis Method : 0729PID.MTH
 Last Recalib on : 30 JUL 94 11:37 AM Sample Amount : 0
 Multiplier : 1 ISTD Amount : 100

Sig. 1 in C:\HPCHEM\3\DATA\29JUL94\021F0101.D

Ret Time	Height	Type	Width	Ref#	ug/l	Name
5.443	24984	BV	0.051	1	10.322	VinylChloride
9.632	82966	VV	0.059	1	9.713	1,1DCEthene
11.420	232502	PV	0.052	1	10.280	trans 1,2-DCEthene
11.740	52924	VV	2.074	1	9.393	Methyl-tert-ButylEther
13.052	123549	PV	0.053	1	10.218	cis 1,2-DCEthene
15.639	250355	PV	0.057	1	10.537	Benzene
16.893	143690	BV	0.055	1	10.319	TCEthene (TCE)
17.434	230297	PB	3.060	1-R	102.151	Trifluorotoluene (Surr.)
18.299	56854	PV	0.053	1	10.898	cis 1,3DCPropene
19.190	57794	BV	0.052	1	8.619	trans-1,3-DCPropene
19.853	251796	PV	0.055	1	10.465	Toluene
21.335	113145	VV	0.056	1	10.377	Tetrachloroethene (PCE)
22.758	264609	BV	0.054	1	10.408	Chlorobenzene
23.231	227133	VV	0.055	1	10.398	Ethylbenzene
23.668	453693	PV	0.056	1	21.865	M & P Xylene
24.519	229538	VV	0.055	1	10.829	O-Xylene
25.380	564832	BV	0.053	1-IR	100.000	Bromofluorobenzene (I.S.)
28.159	235857	VV	0.044	1	10.104	1,3 DCB
28.291	282703	VV	0.043	1	10.165	1,4 DCB
28.892	234704	VV	0.041	1	10.103	1,2 DCB
4.819	954	PV	0.052		954.331	* uncalibrated *
6.505	5023	VV	0.060		5023.031	* uncalibrated *
8.342	1271	PV	0.128		1271.264	* uncalibrated *
8.862	38996	VV	0.098		38996.35	* uncalibrated *
9.379	1054	VV	0.104		1054.110	* uncalibrated *
10.036	2533	BV	0.049		2533.423	* uncalibrated *
12.791	843	BV	0.066		842.950	* uncalibrated *
13.338	843	PV	0.050		843.041	* uncalibrated *
17.947	428	BV	0.074		428.185	* uncalibrated *
18.738	336	BB	0.078		335.615	* uncalibrated *
20.067	558	VB	0.103		557.983	* uncalibrated *
20.441	1328	BV	0.069		1327.782	* uncalibrated *
20.594	5027	VV	0.073		5026.801	* uncalibrated *
20.945	3019	VV	0.054		3019.114	* uncalibrated *
21.103	693	VV	0.064		692.572	* uncalibrated *
24.367	2596	BV	0.051		2595.719	* uncalibrated *
26.237	535	BB	0.071		534.900	* uncalibrated *
26.535	1797	BV	0.085		1796.645	* uncalibrated *
27.304	1020	PV	0.077		1020.322	* uncalibrated *
28.498	720	VV	0.066		720.464	* uncalibrated *
28.691	1461	VV	0.132		1461.087	* uncalibrated *
					2515.522	* uncalibrated *



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Internal Standard Report

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Data File Name : C:\HPCHEM\3\DATA\29JUL94\021R0101.D
 Operator : C. FROEHLICH & J.EPLEY Page Number : 1
 Instrument : GC#3 5890 Vial Number : 21
 Sample Name : GC3-34-01 VOALCS Injection Number : 1
 Run Time Bar Code: Sequence Line : 1
 Acquired on : 30 Jul 94 04:54 AM Instrument Method: 0727PID.MTH
 Report Created on: 02 Aug 94 06:20 PM Analysis Method : 0729ELCD.MTH
 Last Recalib on : 30 JUL 94 10:30 AM Sample Amount : 0
 Multiplier : 1 ISTD Amount : 100

Sig. 2 in C:\HPCHEM\3\DATA\29JUL94\021R0101.D

Ret Time	Height	Type	Width	Ref#	ug/L	Name
4.905	1519099	BB	0.065	1		9.810 Chloromethane
5.468	1201064	BB	0.065	1		9.719 Vinylchloride
6.532	565138	BB	0.075	1		9.973 Bromomethane
6.989	1106757	BB	0.075	1		10.958 Chloroethane
8.414	2278916	BB	0.076	1		17.883 TCFM ↑
9.655	2516899	PV	0.069	1		10.362 1,1 DCEthane
10.061	3504567	VV	0.066	1		10.984 Methylene chloride
10.213	992554	VV	0.098	1		77.658 unknown
11.444	3163979	VV	0.061	1		11.014 trans 1,2 DCEthane
11.941	2919208	VV	0.073	1		11.040 1,1 DCEthane
13.076	3246003	VV	0.064	1		11.192 cis 1,2 DCEthane
13.364	4028453	VV	0.062	1-R		98.411 BCM (surrogate)
13.493	4083777	VV	0.072	1		11.597 Chloroform ↑
14.717	2610227	VV	0.062	1		10.483 1,2 DCEthane (EDC)
14.879	3126586	VV	0.081	1		11.216 1,1,1 TCEthane
15.561	3471742	VV	0.079	1		11.295 Carbon Tetrachloride
16.831	2578472	VV	0.061	1		7.912 TCEthane (TCE) ↓
16.921	3616925	VV	0.062	1		15.703 1,2 DCP propane ↑
17.011	2595953	VV	0.074	1		10.675 BCM
18.323	2560809	VV	0.065	1		11.726 cis 1,3 DCP Propene ↑
19.214	1950497	VV	0.061	1		9.854 trans 1,3 DCP Propene
19.492	2351683	VV	0.069	1		10.652 1,1,2 TCEthane
20.479	1534125	VV	0.078	1		10.296 BCM
20.979	890966	VV	0.081	1		9.807 1,2 DBrEthane (EDB)
21.357	3660581	VV	0.069	1		11.398 Tetrachloroethene (PCE)
22.782	1648368	VV	0.066	1		11.307 Chlorobenzene
23.819	818714	VV	0.082	1		9.214 Bromoform
24.519	1474499	VV	0.068	1		9.907 1,1,2,2 TCEthane
25.410	2148681	VV	0.078	1-IR	100.000	BFB (I.S.)
28.183	2557276	PV	0.052	1		10.684 1,3 DCB
28.314	2703336	VV	0.054	1		10.843 1,4 DCB
28.915	2521293	VV	0.051	1		10.732 1,2 DCB
16.477	17111	VV	0.121		17110.91	* uncalibrated *
17.466	165726	VV	0.124		165726.1	* uncalibrated *
17.842	16813	VV	0.093		16812.59	* uncalibrated *
17.989	14459	VV	0.158		14459.08	* uncalibrated *
18.779	14058	VV	0.191		14058.09	* uncalibrated *
20.158	11383	VV	0.155		11382.97	* uncalibrated *
22.376	6102	VV	0.160		6101.841	* uncalibrated *
22.644	5396	VV	0.088		5395.619	* uncalibrated *
24.835	12072	VV	0.179		12072.44	* uncalibrated *
			0.265		5452.389	* uncalibrated *

24.997	12493	VV	0.226	12492.85	* uncalibrated *
26.479	3900	VV	0.193	3900.068	* uncalibrated *
27.307	34373	VV	0.072	34373.04	* uncalibrated *
28.885	14286	VV	0.051	14286.17	* uncalibrated *
29.966	2909	VV	0.095	2909.221	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.537	13.492	-0.045
29	25.609	25.575	-0.034

Not all calibrated peaks were found

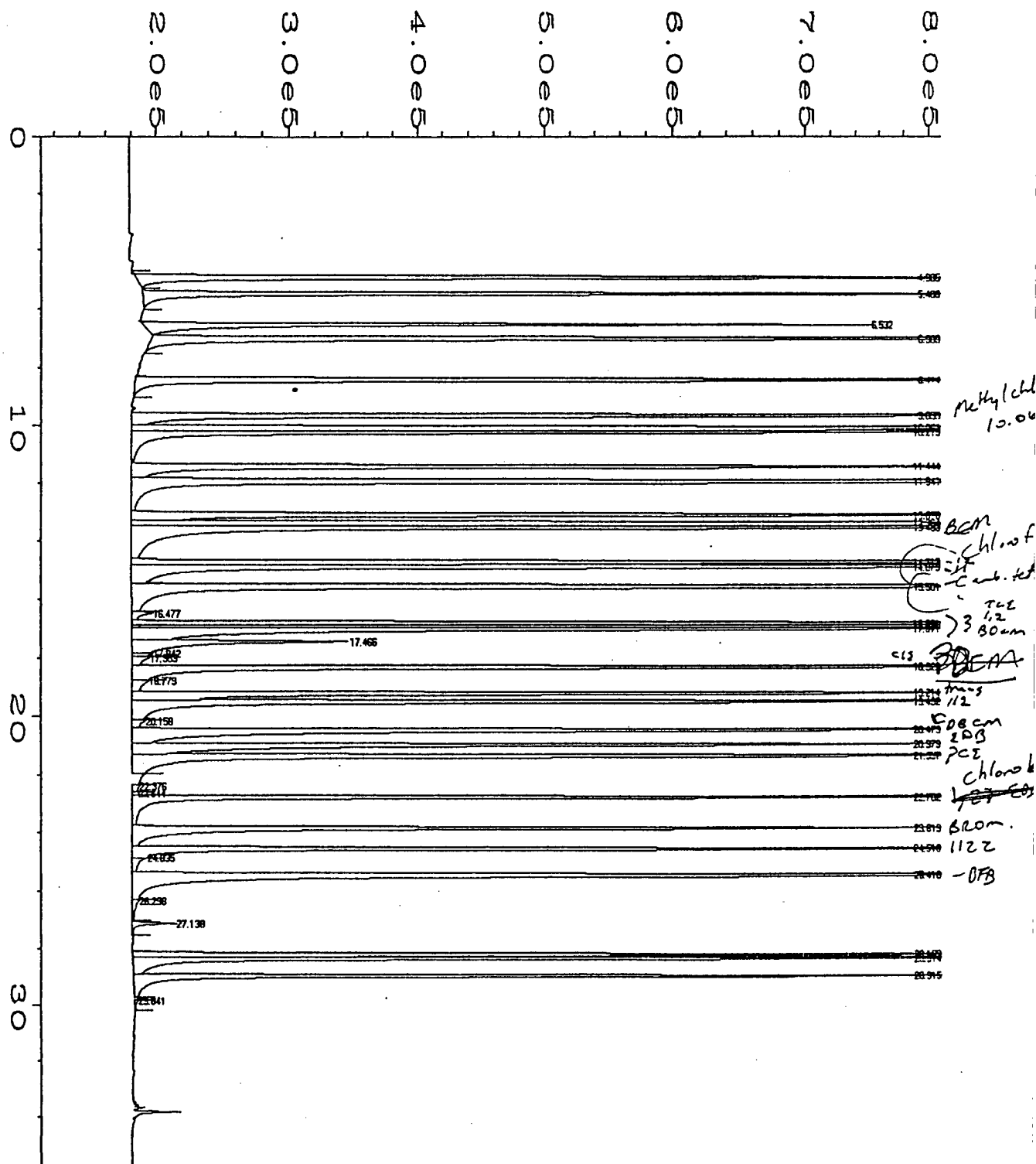
User Modified

=====

27.138	35064 VV	0.081	35063.68	* uncalibrated *
29.841	2981 VV	0.118	2981.183	* uncalibrated *

Time Reference Peak	Expected RT	Actual RT	Difference
12	13.364	13.364	0.000
29	25.410	25.410	0.000

=====



Data File Name	: C:\HPCHEM\3\DATA\29JUL94\021R0101.D	Page Number	: 1
Operator	: C. FROEHLICH & J.EPLEY	Vial Number	: 21
Instrument	: GC#3 5890	Injection Number	: 1
Sample Name	: GC3-34-01 VOALCS	Sequence Line	: 1
Run Time Bar Code:		Instrument Method:	: 0727PID.MTH
Acquired on	: 30 Jul 94 04:54 AM	Analysis Method	: 0727ELCD.MTH
Report Created on	: 30 Jul 94 05:32 AM	Sample Amount	: 0
Last Recalib on	: 27 JUL 94 06:11 PM	ISTD Amount	: 100
Multiplier	: 1		

INJECTION LOGS

INSTRUMENT:

9203

GC INJECTION LOG

DATE	ANALYST	SPARG #	TEST	SAMPLE ID #	D.F.	CLIENT ID	COMPUTER ID	INJ VOL	SURR %	DIL C/O	SURR OC	HND	COMMENTS
7/29/91	JS/CR	1	WTA	GC-3-34-01	-		001 E/R0101	5.1					
		2			-		002						
		3			-		004						
		1		1.0 PRB VOTM STD	-		005						
		2		2.0	-		006						
		3		5.0	-		007						
		4		10.0	-		008						
		5		15.0	-		009						
		6		20.0	-		010						
		7		10.0 PRB LAS	-		011						
		8		WRG 7/29/91	-		012						
		9		407414-01	-		013					0	PH=1
		10		418-08	-	FP-R-01	014					~	=2
		11		-09	-	GBR-10	015					-	=2
		12		-09 MS	-		016						
		13		-09 MSD	-		017						
		14		415-01	-		018						
		15		8-02	-		019						

COMMENTS:

125

REVIEWED:

INSTRUMENT:

GC3

GC INJECTION LOG

ANALYST	SPARG #	TEST	SAMPLE ID #	D.F.	CLIENT ID	COMPUTER ID	INJ VOL	SURR %	REINJECTS			COMMENTS
↓	16	VOA	407915-03	-		020 F/B10	5.1					kgdc
↓	17	↓	GC3-34-01	-		021 ↓	↓					

COMMENTS:

126

REVIEWED:

[Signature]
9/29/24

CHAINS OF CUSTODY



**BURLINGTON
ENVIRONMENTAL**
A Philip Environmental Company

Chain-of Custody Record
4000 Monroe Road
Farmington, NM 87401

(505) 326-2262 Phone
(505) 326-2388 FAX

COC Serial No. C 1877

Ass # 407412

Project Name <u>Giant</u>		Project Number <u>18241</u>		Phase, Task <u>0077.77</u>	
Samplers <u>S. Pope</u>					
Laboratory	Name <u>Analytical Technologies Inc.</u>				
Location					
Sample Number (and depth)	Date	Time	Matrix	Total Number of Bottles	Type of Analysis and Bottle
FP-C-01-12	7/26/94	1415	Soil	2	X
FP-NW-01-12	7/26/94	1350	Soil	2	X
FP-SW-02-36	7/26/94	1125	Soil	2	X
FP-SW-02-36	7/26/94	1125	Soil	2	X
FP-NE-01-12	7/26/94	1325	Soil	2	X
FP-SE-01-12	7/26/94	1150	Soil	2	X
FP-SW-01-12	7/26/94	1050	Soil	2	X
FP-R-01	7/26/94	1430	Water	2	X
HR-18	7/27/94	0930	Water	2	X

Relinquished by:

Received By:

Signature <u>[Signature]</u>	Date <u>7/27/94</u>	Time <u>1045</u>
Signature <u>[Signature]</u>	Date <u>7/28/94</u>	Time <u>0900</u>

Samples Iced: ☒ Yes ☐ No

Carrier: FedEx

Airbill No. 8809273713

Preservatives (ONLY for Water Samples)

Shipping and Lab Notes:

- ☐ Cyanide Sodium hydroxide (NaOH)
☒ Volatile Organic Analyte Hydrochloric acid (HCl)
☐ Metals Nitric acid (HNO₃)
☐ TPH (418.1) Sulfuric acid (H₂SO₄)
☐ Other (Specify) _____
☐ Other (Specify) _____

Level 4 QA/QC

Bill Giant Direct for Analytical Costs.

(Giant Refining, Farmington NM, Attn: Tim Kinney)

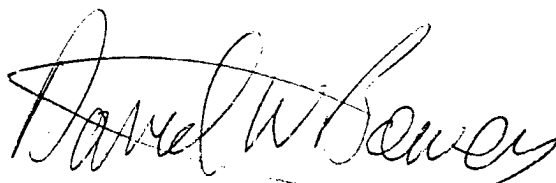
VOLATILES CASE NARRATIVE

LABORATORY NAME: ANALYTICAL TECHNOLOGIES, INC.
CASE NUMBER: ATI
SDG#: 9099
PROJECT NAME: BE

RECEIVED AUG 31, 1994
ATI BATCH 94-BS-006

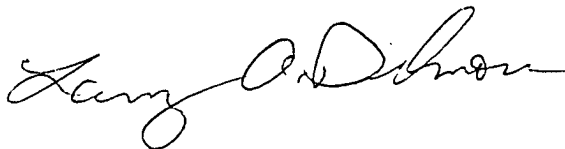
CLIENT ID#	PREVIOUS ATI #	ATI #
FP2-SW-01-12	408420-01	409099-1
FP2-SW-02-36	408420-02	409099-2
FP2-SE-01-12	408420-03	409099-3
FP2-NE-01-12	408420-04	409099-4
FP2-NW-01-12	408420-05	409099-5
FP2-C-01-12	408420-06	409099-6
FP2-C-51-12	408420-07	409099-7
FP2-R-01	408420-08	409099-8

The samples were received in good condition. No problems were noted in the analysis of the samples.



David Bowers
GC/MS TECHNICIAN
09-19-94

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or her designee, as verified by the following signature.



Larry Dilmore
GC/MS SUPERVISOR
09-19-94



**BURLINGTON
ENVIRONMENTAL**
A Philip Environmental Company

4000 Monroe Road
Farmington, NM 87401

Chain-of Custody Record

(505) 326-2262 Phone
(505) 326-2388 FAX

COC Serial No. C 1888

Project Name <u>Giant Refinery</u>		Project Number <u>12641</u> Phase Task <u>2000.77</u>		Total Number of Bottles		Type of Analysis and Bottle		Comments
Samplers <u>S. Pope</u>	Laboratory <u>Analytical Technologies Inc</u>	Sample Number (and depth)	Date	Time	Matrix			
01		FP2-SW-01-12	8/29/94	1045	Soil	1	1	
02		FP2-SW-02-36	8/29/94	1100	Soil	1	1	
03		FP2-SE-01-12	8/29/94	1120	Soil	1	1	
04		FP2-NE-01-12	8/29/94	1140	Soil	1	1	
05		FP2-NW-01-12	8/29/94	1200	Soil	1	1	
06		FP2-C-01-12	8/29/94	1225	Soil	1	1	
07		FP2-C-51-12	8/29/94	1230	Soil	1	1	
08		FP2-R-01	8/29/94	1245	Water	2	1	

Relinquished by:

Signature

Date

Time

Received By:

Signature

Date

Time

Samples Iced: ☒ Yes ☐ No

Preservatives (ONLY for Water Samples)

☐ Cyanide Sodium hydroxide (NaOH)

☒ Volatile Organic Analysis Hydrochloric acid (HCl)

☐ Metals Nitric acid (HNO₃)

☐ TPH (418.1) Sulfuric acid (H₂SO₄)

☐ Other (Specify) _____

☐ Other (Specify) _____

Carrier: Fed Ex

Shipping and Lab Notes:

Level 4 QA/QC

Bill Giant Refinery Direct

Airbill No. 1389025665

US EPA CONTRACT LAB PROGRAM

LAB NAME <u>ANALYTICAL TECHNOLOGIES, INC.</u>		LOG-IN DATE <u>31-AUG-94</u>
RECEIVED BY (PRINT) <u>DAVID R. BARR II</u>		DATE/TIME <u>8/31/94 / 0920</u>
LOGBOOK NO. <u>94-2</u>		PAGE NO. <u>7</u>
CASE NUMBER	SAMPLE DELIVERY GROUP NO.	
SAS #		

Circle The Correct Response: (if an * item is circled, contact SMO and attach record of resolution)

1.	Custody Seals:	☒ present ☐ intact	☐ absent* ☐ broken	2.	Custody seal numbers: <u>N/S</u>
3.	Chain of Custody records	☒ present	☐ absent*	4.	Traffic report or packing list ☒ present ☐ absent*
5.	Airbill	☒ airbill present	☐ sticker absent*	6.	Airbill No. <u>4588762371</u>
7.	Sample Tags	☒ present	☐ absent*	8.	Sample condition ☒ intact ☐ broken* ☐ leaking
	Sample Tags #s	☒ listed on COC	☐ not listed on COC		
9.	Does information on custody records, traffic reports and sample tags agree?	☒ yes	☐ no*	10.	Date received at lab <u>31-AUG-94</u> Time received at lab <u>0920</u>

EPA SAMPLE NUMBER	SAMPLE TAG NUMBER	ASSIGNED LAB NUMBER	REMARKS, COMMENTS
408420-1	FP2-SW-01-12	409099-1	INTACT
408420-2	FP2-SW-02-36	409099-2	INTACT
408420-3	FP2-SE-01-12	409099-3	INTACT
408420-4	FP2-NE-01-12	409099-4	INTACT
408420-5	FP2-NW-01-12	409099-5	INTACT
408420-6	FP2-C-01-12	409099-6	INTACT
408420-7	FP2-C-51-12	409099-7	INTACT
408420-8	FP2-R-01	409099-8	INTACT

SAMPLES TRANSFERRED TO:

LAB AREA	BY	DATE/TIME	RECEIVED BY	DATE/TIME
GC/MS	David R. Barr II	8/31/94 / 1340	David R. Barr II	8/31/94 1340

16 002

PROJECT SAMPLE INSPECTION FORM

Accession #: 409099Date received: 31-AUG-94

- | | | | | | | | |
|---|--------------------------------------|----|---|--|--------------------------------------|-------------------------------------|--------------------------------------|
| 1. Was there a Chain of Custody? | ☒ YES | NO | 7. Are samples correctly preserved for analysis required? | ☒ YES | NO | N/A | |
| 2. Was Chain of Custody properly relinquished? | ☒ YES | NO | 8. Is there sufficient volume for analysis requested? | ☒ YES | NO | | |
| 3. Were samples received cold? (At 4° or on ice) | ☒ YES | NO | N/A | 9. Were samples received within holding time? | ☒ YES | NO | |
| 4. Were all containers properly labeled and identified? | ☒ YES | NO | | 10. Was there headspace greater than 1/4" in diameter in volatile bottles? | YES | ☒ NO | N/A |
| 5. Were samples received in proper containers for analysis requested? | ☒ YES | NO | | 11. If sent, were matrix spike bottles returned? | YES | NO | ☒ N/A |
| 6. Were all sample containers received intact? | ☒ YES | NO | | | | | |

Tracking Number: 458 876 2371Shipped By: ABXCooler Number: NK

Out of Control Events and Inspection Comments:

Inspected By: ARBDate: 8-31-94Logged By: ARBDate: 8-31-94

VOLATILE ORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

40842001

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-1

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90991

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 6

Date Analyzed: 09/01/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	total 1,2-Dichloroethene	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	XYLENE (total)	5	U

FORM I VOA

1/87 Rev. 004

E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

40842001

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-1

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90991

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 6

Date Analyzed: 09/01/94

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

40842002

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-2

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90992

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 11

Date Analyzed: 09/01/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
540-59-0	total 1,2-Dichloroethene	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	6	U
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	XYLENE (total)	6	U

FORM I VOA

1/87 Rev. 11/88

006

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

40842002

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-2

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90992

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 11

Date Analyzed: 09/01/94

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

40842003

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-3

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90993

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 3

Date Analyzed: 09/02/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	total 1,2-Dichloroethene	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	XYLENE (total)	5	U

FORM I VOA

1/87 Rev. 008

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

40842003

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-3

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90993

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 3

Date Analyzed: 09/02/94

Column (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:

Number TICs found: 0

(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

40842004

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-4

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90994

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 7

Date Analyzed: 09/02/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	total 1,2-Dichloroethene	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	XYLENE (total)	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

40842004

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-4

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90994

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 7

Date Analyzed: 09/02/94

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

40842005

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-5

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90995

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 6

Date Analyzed: 09/02/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	total 1,2-Dichloroethene	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	XYLENE (total)	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

40842005

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-5

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90995

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 6

Date Analyzed: 09/02/94

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

40842006

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-6

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90996

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 6

Date Analyzed: 09/02/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

74-87-3-----	Chloromethane	11	U
74-83-9-----	Bromomethane	11	U
75-01-4-----	Vinyl Chloride	11	U
75-00-3-----	Chloroethane	11	U
75-09-2-----	Methylene Chloride	5	U
67-64-1-----	Acetone	11	U
75-15-0-----	Carbon Disulfide	5	U
75-35-4-----	1,1-Dichloroethene	5	U
75-34-3-----	1,1-Dichloroethane	5	U
540-59-0-----	total 1,2-Dichloroethene	5	U
67-66-3-----	Chloroform	5	U
107-06-2-----	1,2-Dichloroethane	5	U
78-93-3-----	2-Butanone	11	U
71-55-6-----	1,1,1-Trichloroethane	5	U
56-23-5-----	Carbon Tetrachloride	5	U
108-05-4-----	Vinyl Acetate	11	U
75-27-4-----	Bromodichloromethane	5	U
78-87-5-----	1,2-Dichloropropane	5	U
10061-01-5-----	cis-1,3-Dichloropropene	5	U
79-01-6-----	Trichloroethene	5	U
124-48-1-----	Dibromochloromethane	5	U
79-00-5-----	1,1,2-Trichloroethane	5	U
71-43-2-----	Benzene	5	U
10061-02-6-----	trans-1,3-Dichloropropene	5	U
75-25-2-----	Bromoform	5	U
108-10-1-----	4-Methyl-2-Pentanone	11	U
591-78-6-----	2-Hexanone	11	U
127-18-4-----	Tetrachloroethene	5	U
79-34-5-----	1,1,2,2-Tetrachloroethane	5	U
108-88-3-----	Toluene	5	U
108-90-7-----	Chlorobenzene	5	U
100-41-4-----	Ethylbenzene	5	U
100-42-5-----	Styrene	5	U
1330-20-7-----	XYLENE (total)	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

40842006

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-6

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90996

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 6

Date Analyzed: 09/02/94

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

40842007

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-7

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90997

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 5

Date Analyzed: 09/02/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	total 1,2-Dichloroethene	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	XYLENE (total)	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

40842007

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: 409099-7

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: 90997

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec. 5

Date Analyzed: 09/02/94

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

40842008

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) WATER

Lab Sample ID: 409099-8

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: 90998

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec.

Date Analyzed: 09/02/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	7	J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	total 1,2-Dichloroethene	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	1	J
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	XYLENE (total)	5	U

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E
VOLATILE ORGANIC ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

40842008

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix: (soil/water) WATER

Lab Sample ID: 409099-8

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: 90998

Level: (low/med) LOW

Date Received: 08/31/94

% Moisture: not dec.

Date Analyzed: 09/02/94

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

2A
WATER VOLATILE SURROGATE RECOVERY

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

	EPA SAMPLE NO.	S1 (TOL) #	S2 (BFB) #	S3 (DCE) #	OTHER	TOT OUT
01	40842008	93	104	94	0	0

QC LIMITS
S1 (TOL) = Toluene-d8 (88-110)
S2 (BFB) = Bromofluorobenzene (86-115)
S3 (DCE) = 1,2-Dichloroethane-d4 (76-114)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

2B
SOIL VOLATILE SURROGATE RECOVERY

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Level: (low/med) LOW

	EPA SAMPLE NO.	S1 (TOL) #	S2 (BFB) #	S3 (DCE) #	OTHER	TOT OUT
01	40842001	92	98	93	0	0
02	40842002	94	96	93	0	0
03	40842003	94	99	93	0	0
04	40842004	89	102	92	0	0
05	40842005	91	98	93	0	0
06	40842006	93	101	95	0	0
07	40842007	91	98	93	0	0
08	40842003MS	94	98	92	0	0
09	40842003MSD	101	90	96	0	0
10	VBLKBA	94	101	97	0	0

QC LIMITS

S1 (TOL) = Toluene-d8 (81-117)

S2 (BFB) = Bromofluorobenzene (74-121)

S3 (DCE) = 1,2-Dichloroethane-d4 (70-121)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

SOIL VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Matrix Spike - EPA Sample No.: 40842003

Level:(low/med) LOW

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	51.5	0	44.3	86	59-172
Trichloroethene	51.5	0	48.9	95	62-137
Benzene	51.5	0	50.6	98	66-142
Toluene	51.5	0	48.9	95	59-139
Chlorobenzene	51.5	0	51.3	100	60-133

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	REC.
1,1-Dichloroethene	51.5	44.4	86	0	22	59-172
Trichloroethene	51.5	50.1	97	-2	24	62-137
Benzene	51.5	52.5	102	-4	21	66-142
Toluene	51.5	51.9	101	-6	21	59-139
Chlorobenzene	51.5	51.6	100	0	21	60-133

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits

COMMENTS: EPA SAMPLE # 40842003, (409099-3), 5.0 GRAMS
12 MINUTE HEATED PURGE / GC-MS INS ID=BUBBA

4A
VOLATILE METHOD BLANK SUMMARY

Lab Name: A.T.I. Contract: NA
Lab Code: NA Case No.: ATI SAS No.: NA SDG No.: 9099
Lab File ID: BS006ABK Lab Sample ID: BS006ABK
Date Analyzed: 09/01/94 Time Analyzed: 2032
Matrix: (soil/water) SOIL Level: (low/med) LOW
Instrument ID: BUBBA

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	40842001	409099-1	90991	2250
02	40842002	409099-2	90992	2336
03	40842003	409099-3	90993	0022
04	40842004	409099-4	90994	0108
05	40842005	409099-5	90995	0154
06	40842006	409099-6	90996	0241
07	40842007	409099-7	90997	0327
08	40842008	409099-8	90998	0413
09	40842003MS	409099-3MS	BS006MS	0459
10	40842003MSD	409099-3MSD	BS006MSD	0545

COMMENTS: VBLKBA SOIL
12 MINUTE HEATED PURGE / GC-MS INS ID=BUBBA

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKBA

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.:

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: BS006ABK

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: BS006ABK

Level: (low/med) LOW

Date Received:

% Moisture: not dec.

Date Analyzed: 09/01/94

Column: (pack/cap) CAP

Dilution Factor: 1.0

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

74-87-3-----	Chloromethane	10	U
74-83-9-----	Bromomethane	10	U
75-01-4-----	Vinyl Chloride	10	U
75-00-3-----	Chloroethane	10	U
75-09-2-----	Methylene Chloride	5	U
67-64-1-----	Acetone	10	U
75-15-0-----	Carbon Disulfide	5	U
75-35-4-----	1,1-Dichloroethene	5	U
75-34-3-----	1,1-Dichloroethane	5	U
540-59-0-----	total 1,2-Dichloroethene	5	U
67-66-3-----	Chloroform	5	U
107-06-2-----	1,2-Dichloroethane	5	U
78-93-3-----	2-Butanone	10	U
71-55-6-----	1,1,1-Trichloroethane	5	U
56-23-5-----	Carbon Tetrachloride	5	U
108-05-4-----	Vinyl Acetate	10	U
75-27-4-----	Bromodichloromethane	5	U
78-87-5-----	1,2-Dichloropropane	5	U
10061-01-5-----	cis-1,3-Dichloropropene	5	U
79-01-6-----	Trichloroethene	5	U
124-48-1-----	Dibromochloromethane	5	U
79-00-5-----	1,1,2-Trichloroethane	5	U
71-43-2-----	Benzene	5	U
10061-02-6-----	trans-1,3-Dichloropropene	5	U
75-25-2-----	Bromoform	5	U
108-10-1-----	4-Methyl-2-Pentanone	10	U
591-78-6-----	2-Hexanone	10	U
127-18-4-----	Tetrachloroethene	5	U
79-34-5-----	1,1,2,2-Tetrachloroethane	5	U
108-88-3-----	Toluene	5	U
108-90-7-----	Chlorobenzene	5	U
100-41-4-----	Ethylbenzene	5	U
100-42-5-----	Styrene	5	U
1330-20-7-----	XYLENE (total)	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKBA

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.:

SDG No.: 9099

Matrix: (soil/water) SOIL

Lab Sample ID: BS006ABK

Sample wt/vol: 5.0 (g/mL) G

Lab File ID: BS006ABK

Level: (low/med) LOW

Date Received:

% Moisture: not dec.

Date Analyzed: 09/01/94

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Lab File ID (Standard): CPB901

Date Analyzed: 09/01/94

Instrument ID: BUBBA

Time Analyzed: 1938

Matrix: (soil/water) SOIL Level: (low/med) LOW

Column: (pack/cap) CAP

	IS1 (BCM) AREA #	RT	IS2 (DFB) AREA #	RT	IS3 (CBZ) AREA #	RT
12 HOUR STD	56400	8.70	185000	10.65	154000	18.19
UPPER LIMIT	112800	9.20	370000	11.15	308000	18.69
LOWER LIMIT	28200	8.20	92500	10.15	77000	17.69
EPA SAMPLE NO.						
01 40842001	42600	8.64	139000	10.59	124000	18.12
02 40842002	41600	8.64	134000	10.59	119000	18.12
03 40842003	42400	8.64	137000	10.59	119000	18.14
04 40842004	43300	8.62	139000	10.59	125000	18.12
05 40842005	42200	8.62	134000	10.59	121000	18.12
06 40842006	42000	8.62	135000	10.59	119000	18.12
07 40842007	41700	8.62	133000	10.57	123000	18.12
08 40842008	42400	8.62	135000	10.57	121000	18.12
09 40842003MS	42800	8.64	134000	10.59	118000	18.12
10 40842003MSD	41600	8.62	128000	10.57	104000	18.09
11 VBLKBA	48100	8.64	151000	10.59	134000	18.14

IS1 (BCM) = Bromochloromethane
 IS2 (DFB) = 1,4-Difluorobenzene
 IS3 (CBZ) = Chlorobenzene

UPPER LIMIT = + 100%
 of internal standard area.
 LOWER LIMIT = - 50%
 of internal standard area.

Column used to flag internal standard area values with an asterisk

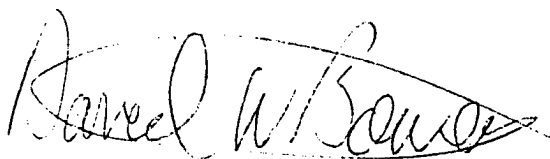
VOLATILES CASE NARRATIVE

LABORATORY NAME: ANALYTICAL TECHNOLOGIES, INC.
CASE NUMBER: ATI
SDG#: 9099
PROJECT NAME: BE

RECEIVED AUG 31, 1994
ATI BATCH 94-BS-006

CLIENT ID#	PREVIOUS ATI #	ATI #
FP2-SW-01-12	408420-01	409099-1
FP2-SW-02-36	408420-02	409099-2
FP2-SE-01-12	408420-03	409099-3
FP2-NE-01-12	408420-04	409099-4
FP2-NW-01-12	408420-05	409099-5
FP2-C-01-12	408420-06	409099-6
FP2-C-51-12	408420-07	409099-7
FP2-R-01	408420-08	409099-8

The samples were received in good condition. No problems were noted in the analysis of the samples.



David Bowers
GC/MS TECHNICIAN
09-19-94

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or her designee, as verified by the following signature.



Larry Dilmore
GC/MS SUPERVISOR
09-19-94

2A

WATER VOLATILE SURROGATE RECOVERY

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

	EPA SAMPLE NO.	S1 (TOL) #	S2 (BFB) #	S3 (DCE) #	OTHER	TOT OUT
01	40842008	93	104	94	0	0

QC LIMITS

S1 (TOL) = Toluene-d8 (88-110)

S2 (BFB) = Bromofluorobenzene (86-115)

S3 (DCE) = 1,2-Dichloroethane-d4 (76-114)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

2B

SOIL VOLATILE SURROGATE RECOVERY

Lab Name: A.T.I.

Contract: NA

Lab Code: NA

Case No.: ATI

SAS No.: NA

SDG No.: 9099

Level:(low/med) LOW

	EPA SAMPLE NO.	S1 (TOL) #	S2 (BFB) #	S3 (DCE) #	OTHER	TOT OUT
01	40842001	92	98	93	0	0
02	40842002	94	96	93	0	0
03	40842003	94	99	93	0	0
04	40842004	89	102	92	0	0
05	40842005	91	98	93	0	0
06	40842006	93	101	95	0	0
07	40842007	91	98	93	0	0
08	40842003MS	94	98	92	0	0
09	40842003MSD	101	90	96	0	0
10	VBLKBA	94	101	97	0	0

QC LIMITS

S1 (TOL) = Toluene-d8 (81-117)

S2 (BFB) = Bromofluorobenzene (74-121)

S3 (DCE) = 1,2-Dichloroethane-d4 (70-121)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3B

SOIL VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: A.T.I.

Contract: NA

Y 1 6-7 11 2000 M- 1000 210 M- 1000 220 M- 1000

GW - 40

MONITORING REPORTS

DATE:

1994



Crude Gathering Operations

5764 US Highway 64
Farmington, New Mexico
87401

505
632-8024
632-8006

February 7, 1995

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

RECEIVED

FEB 13 1995

Environmental Bureau
Oil Conservation Division

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the fourth quarter of 1994.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Tim Kinney".

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Carl Shook-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Valda Terauds-H+GCL
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FOURTH QUARTER, 1994

RECEIVED

FEB 13 1995

Environmental Bureau
Oil Conservation Division

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505)632-8006
FAX (505)632-4025

TABLE OF CONTENTS

Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Analytical Results/Bioremediation Wells	Section 5

INTRODUCTION AND SUMMARY QUARTERLY REPORT FOURTH QUARTER, 1994

INTRODUCTION

No significant changes were made in the fourth quarter.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Section 5 contains a summary of the quarterly analytical results for the Bioremediation Project. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	Unit of <u>Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 QUARTERLY ANALYTICAL DATA SUMMARY
 FOURTH QUARTER, 1994

STRIPPER INFLUENT

October November December

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	6.8
Lab Conductivity, umhos/cm	3420.00
Total Dissolved Solids (180)	2600.00
Total Dissolved Solids (calc.)	2552.00
Total Alkalinity as CaCO ₃	270.00
Total Hardness as CaCO ₃	NA
Bicarbonate as HCO ₃	329.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	383.00
Sulfate	1170.00
Calcium	369.00
Magnesium	35.00
Potassium	3.10
Sodium	432.00

Cation/Anion Balance	0.50%
----------------------	-------

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND

STRIPPER INFLUENT (contined)

OCTOBER NOVEMBER December

Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	3.9
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	7.9
Toluene	ND
Xylenes	11
Trichlorotrifluoroethane	--

STRIPPER EFFLUENT

October November December

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.1		
Lab Conductivity, umhos/cm	3380.00		
Total Dissolved Solids (180)	2570.00		
Total Dissolved Solids (calc.)	2524.00		
Total Alkalinity as CaCO ₃	248.00		
Total Hardness as CaCO ₃	NA		
Bicarbonate as HCO ₃	303.00		
Carbonate as CO ₃	0.00		
Hydroxide as OH	0.00		
Chloride	382.00		
Sulfate	1180.00		
Calcium	375.00		
Magnesium	35.00		
Potassium	3.10		
Sodium	398.00		
Cation/Anion Balance	1.82%		

PAH

Naphthalene	ND
Acenaphthylene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(A)Anthracene	ND
Chrysene	ND
Benzo(B)Fluoranthene	ND
Benzo(K)Fluoranthene	ND
Benzo(A)Pyrene	ND
Dibenzo(a,h)Anthracene	ND
Benzo(g,h,i)Perylene	ND
Indeno(1,2,3-CD)Pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND

STRIPPER EFFLUENT (continued)

HALOCARBONS	October	November	December
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	--		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	--		

GBR-17

OCTOBER NOVEMBER

GENERAL WATER CHEMISTRY

Lab pH (S.U.)	7.2
Lab Conductivity, umhos/cm	2620.00
Total Dissolved Solids (180)	2220.00
Total Dissolved Solids (calc.)	2006.00
Total Alkalinity as CaCO ₃	212.00
Total Hardness as CaCO ₃	988.00
Dissolved Oxygen	NA
Bicarbonate as HCO ₃	258.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	62.00
Sulfate	1180.00
Calcium	353.00
Magnesium	26.00
Potassium	0.80
Sodium	257.00
Cation/Anion Balance	0.68%

HALOCARBONS

Bromodichloromethane
Bromoform
Bromomethane
Carbon tetrachloride
Chloroethane
Chloroethane
2-Chloroethylvinylether
Chloroform
Chloromethane
Dibromochloromethane
1,2-Dibromoethane (EDB)
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,1-Dichloroethane
1,2-Dichloroethane
1,2-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Methylene chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
Vinyl chloride

GBR-31

October November December

HALOCARBONS

Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon tetrachloride	ND	
Chloroethane	ND	
Chloroethane	ND	
2-Chloroethylvinylether	---	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane	ND	
1,2-Dichloroethane	ND	
cis-1,2-Dichloroethene	1.6	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachloroethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl chloride	ND	

AROMATICS

Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Toluene	ND	
Xylenes	ND	
Trichlorotrifluoroethane	---	

OFFSITE WELLS

SHS-10

October November December

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	--		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	1.4		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	--		

SHS-12

October November December

HALOCARBONS

Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon tetrachloride	ND	
Chloroethane	ND	
2-Chloroethylvinylether	--	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane	ND	
1,2-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachloroethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl chloride	ND	

AROMATICS

Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Toluene	ND	
Xylenes	ND	
Trichlorotrifluoroethane	--	

SHS-13

October November December

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.4
1,2-Dichloroethane	7.4
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-16

October November December

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-17

October November

December

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

*ND - Not detected at specified detection limit

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

October, 1994

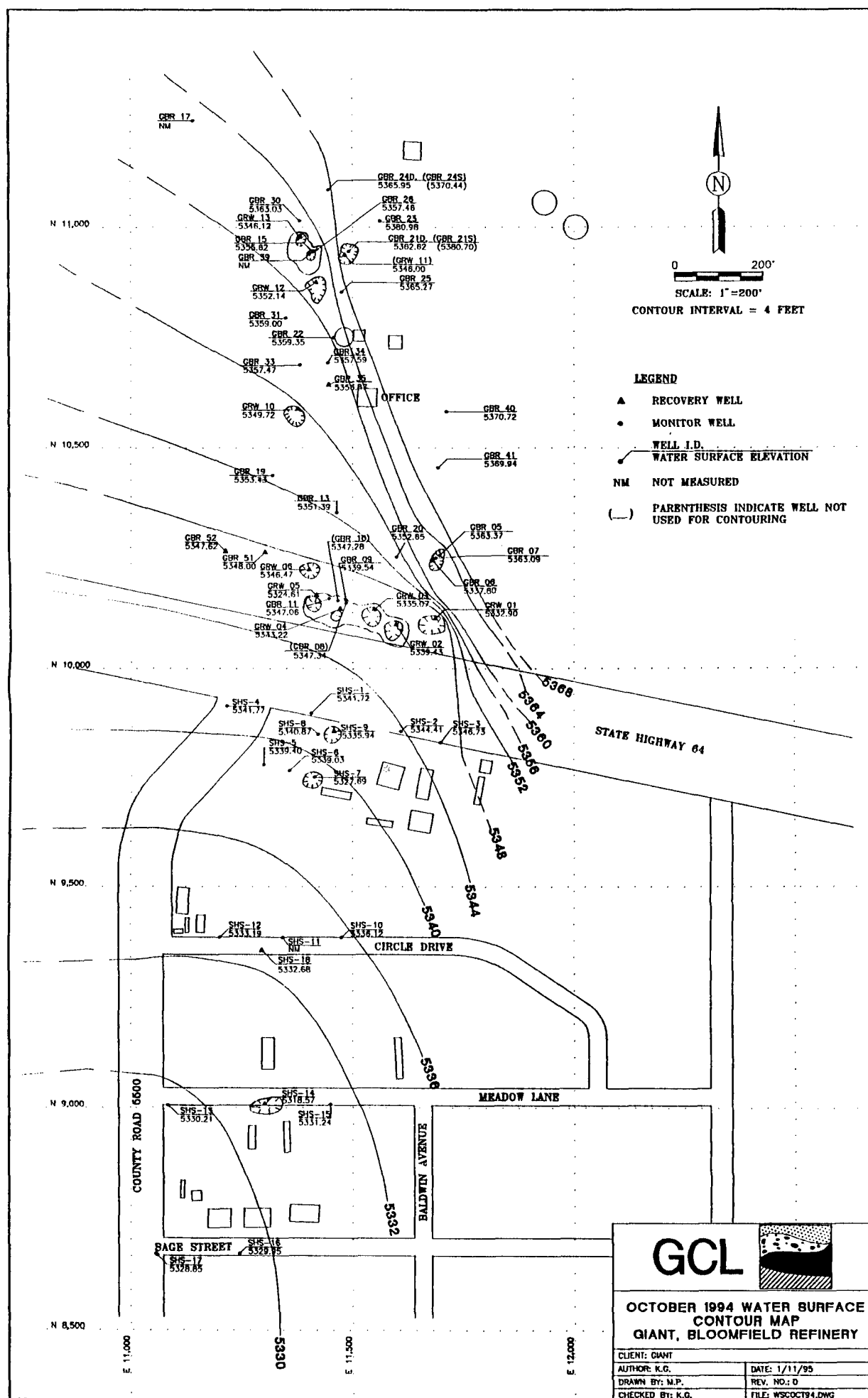
WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.40	61.40	0.00	5332.90
GRW-2	5391.28	51.85	51.85	0.00	5339.43
GRW-3	5388.77	53.70	53.70	0.00	5335.07
GRW-4	5390.02	56.80	56.80	0.00	5333.22
GRW-5	5390.56	65.95	65.95	0.00	5324.61
GRW-6	5390.81	44.34	44.34	0.00	5346.47
GRW-10	5395.02	45.30	45.30	0.00	5349.72
GRW-11	5397.85	51.85	51.85	0.00	5346.00
GRW-12	5397.24	45.10	45.10	0.00	5352.14
GRW-13	5396.90	50.78	50.78	0.00	5346.12
GBR-5	5395.07	32.30	31.55	0.75	5363.37
GBR-6	5395.70	57.90	57.90	0.00	5337.80
GBR-7	5395.85	33.30	32.63	0.67	5363.09
GBR-8	5390.50	43.20	43.15	0.05	5347.34
GBR-9	5389.92	50.38	50.38	0.00	5339.54
GBR-10	5390.57	43.29	43.29	0.00	5347.28
GBR-11	5389.43	42.39	42.36	0.03	5347.06
GBR-13	5393.04	41.65	41.65	0.00	5351.39
GBR-15	5397.99	42.37	42.37	0.00	5355.62
GBR-17	5402.69	0.00	0.00	0.00	5402.69
GBR-18	5421.68	30.61	30.61	0.00	5391.07
GBR-19	5393.83	41.05	40.24	0.81	5353.43
GBR-20	5393.47	40.91	40.80	0.11	5352.65
GBR-21S	5400.65	19.97	19.94	0.03	5380.70
GBR-21D	5400.19	37.57	37.57	0.00	5362.62
GBR-22	5395.91	37.20	36.40	0.80	5359.35
GBR-23	5403.72	22.74	22.74	0.00	5380.98
GBR-24S	5396.08	25.64	25.64	0.00	5370.44
GBR-24D	5396.77	30.82	30.82	0.00	5365.95
GBR-25	5396.72	31.45	31.45	0.00	5365.27
GBR-26	5395.59	38.13	38.13	0.00	5357.46
GBR-30	5396.58	33.53	33.53	0.00	5363.05
GBR-31	5394.86	35.86	35.86	0.00	5359.00
GBR-33	5396.28	38.81	38.81	0.00	5357.47
GBR-34	5394.00	37.57	36.12	1.45	5357.59
GBR-35	5393.66	37.78	36.54	1.24	5356.87
GBR-39	5397.55	0.00	0.00	0.00	5397.55
GBR-40	5400.76	30.04	30.04	0.00	5370.72
GBR-41	5396.35	26.41	26.41	0.00	5369.94
GBR-51	5389.68	41.68	41.68	0.00	5348.00
GBR-52	5387.74	40.12	40.12	0.00	5347.62

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

October, 1994

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.92	41.80	0.12	5341.72
SHS-2	5381.66	37.25	37.25	0.00	5344.41
SHS-3	5383.33	36.60	36.60	0.00	5346.73
SHS-4	5383.62	41.85	41.85	0.00	5341.77
SHS-5	5378.36	38.96	38.96	0.00	5339.40
SHS-6	5378.17	39.14	39.14	0.00	5339.03
SHS-7	5375.89	48.20	48.20	0.00	5327.69
SHS-8	5380.25	39.38	39.38	0.00	5340.87
SHS-9	5380.79	44.85	44.85	0.00	5335.94
SHS-10	5373.80	37.68	37.68	0.00	5336.12
SHS-12	5373.94	40.75	40.75	0.00	5333.19
SHS-13	5367.81	37.60	37.60	0.00	5330.21
SHS-14	5367.07	48.50	48.50	0.00	5318.57
SHS-15	5366.21	34.97	34.97	0.00	5331.24
SHS-16	5362.58	32.63	32.63	0.00	5329.95
SHS-17	5364.35	35.50	35.50	0.00	5328.85
SHS-18	5373.64	41.20	40.90	0.30	5332.68



Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Fourth Quarter, 1994

Tank Number	Beginning Volume	Ending Volume	Net Change
102	17,609	16,339	1,270
106	8,010	8,010	0
21	68,635	54,707	13,928
22	72,623	71,773	850
Total Net Volume Change			16,048

4.0

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Fourth Quarter, 1994

Well	Month #1	Month #2	Month #3	Total
GRW-1	8,010	9,260	6,600	23,870
GRW-2	15,700	21,100	6,960	43,760
GRW-3	12,160	16,000	12,250	40,410
GRW-4	22,820	26,430	19,830	69,080
GRW-5	30,050	72,200	49,200	151,450
GRW-6	49,590	43,630	54,650	147,870
GRW-9	7,800	5,340	3,410	16,550
GRW-10	256,200	367,030	253,540	876,770
GRW-11	32,260	77,160	36,090	145,510
GRW-12	9,040	22,730	10,010	41,780
GRW-13	16,780	20,740	17,470	54,990
SHS-7	182	149	24	355
SHS-9	7,662	1,399	389	9,450
SHS-14	158,845	173,809	227,635	560,289
SHS-18	2,606	9,270	6,388	18,264
Total Volume Pumped In Gallons				2,200,398

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Fourth Quarter, 1994

=====

Total Volume Of Water Recovered	2,200,398
Net Change In Storage Volume	<u>16,048</u>
Total Water Treated	2,216,446
Less Air Stripper	<u>11,074</u>
Evaporative Loss (1/2%)	
Total Water Pumped to the	<u>2,205,372</u>
Infiltration Gallery	

SECTION 5

ANALYTICAL RESULTS/BIOREMEDIATION WELLS

GRW-9

OCTOBER NOVEMBER DECEMBER

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	6.9
Lab Conductivity, umhos/cm	3520.00
Total Dissolved Solids (180)	2580.00
Total Dissolved Solids (calc.)	2832.00
Total Alkalinity as CaCO3	610.00
Total Hardness as CaCO3	NA
Dissolved Oxygen	2.45
Bicarbonate as HCO3	744.00
Carbonate as CO3	0.00
Hydroxide as OH	0.00
Chloride	345.00
Sulfate	1270.00
Calcium	297.00
Magnesium	25.00
Potassium	46.00
Sodium	522.00
Cation/Anion Balance	0.51%

GBR-20

	OCTOBER	NOVEMBER	DECEMBER
GENERAL WATER CHEMISTRY			
Lab pH (a.u.)		7.1	
Lab Conductivity, umhos/cm		2900.00	
Total Dissolved Solids (180)		1710.00	
Total Dissolved Solids (calc.)		1622.00	
Total Alkalinity as CaCO3		748.00	
Total Hardness as CaCO3		NA	
Dissolved Oxygen		3.63	
Bicarbonate as HCO3		913.00	
Carbonate as CO3		0.00	
Hydroxide as OH		0.00	
Chloride		479.00	
Sulfate		43.00	
Calcium		71.00	
Magnesium		13.00	
Potassium		1.20	
Sodium		566.00	
Cation/Anion Balance		0.22%	

GBR-41

OCTOBER NOVEMBER DECEMBER

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.0
Lab Conductivity, umhos/cm	3120.00
Total Dissolved Solids (180)	1880.00
Total Dissolved Solids (calc.)	1879.00
Total Alkalinity as CaCO3	1120.00
Total Hardness as CaCO3	NA
Dissolved Oxygen	1.81
Bicarbonate as HCO3	1370.00
Carbonate as CO3	0.00
Hydroxide as OH	0.00
Chloride	447.00
Sulfate	47.00
Calcium	170.00
Magnesium	54.00
Potassium	1.10
Sodium	485.00
Cation/Anion Balance	0.16%



Crude Gathering Operations

5764 US Highway 64
Farmington, New Mexico
87401

505
632-8024
632-8006

November 21, 1994

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the third quarter of 1994.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Tim Kinney", written over a horizontal line.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Carl Shook-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Valda Terauds-H + GCL
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

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NOV 28 1994

**OIL CONSERVATION DIV.
SANTA FE**

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
THIRD QUARTER, 1994

RECEIVED

NOV 28 1994

OIL CONSERVATION DIV.
SANTA FE

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505)632-8006
FAX (505)632-4025

TABLE OF CONTENTS

Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Analytical Results/Bioremediation Wells . . .	Section 5

INTRODUCTION AND SUMMARY QUARTERLY REPORT THIRD QUARTER, 1994

INTRODUCTION

No significant changes were made in the third quarter.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Section 5 contains a summary of the quarterly analytical results for the Bioremediation Project. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
THIRD QUARTER, 1994**

SYSTEM INFLUENT

HALOCARBONS	July	August	September
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	--		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	0.5		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	6.0
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	0.8
Toluene	ND
Xylenes	0.6
Trichlorotrifluoroethane	--

SYSTEM EFFLUENT

	July	August	September
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	--		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dic anthracene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND	ND	ND
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	--		

SYSTEM EFFLUENT (continued)

PAH	July	August	September
Naphthalene	ND		
Acenaphthylene	ND		
Acenaphthene	ND		
Fluorene	ND		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-24D

July

August

September

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	12
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	1.6
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	3.6
Toluene	ND
Xylenes	1.3
Trichlorotrifluoroethane	--

GBR-24D	July	August	September
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PAH

Naphthalene	ND		
Acenaphthylene	ND		
Acenaphthene	ND		
Fluorene	0.96		
Phenanthrene	0.34		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	0.044		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-31

July	August	September
------	--------	-----------

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	--		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

GBR-31 (continued)

	July	August	September
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	--		

GBR-30

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

GBR-15

July August September

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	--		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	11		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	0.9		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	1.2		
Trichlorotrifluoroethane	--		

OFFSITE WELLS

SHS-3

	July	August	September
HALOCARBONS	ND		
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	--		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	--		

SHS-4

July

HALOCARBONS	ND
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-10

July

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.4
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	3.0
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-12

HALOCARBONS	July	August	September
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	--		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	0.5		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	--		

SHS-13

July

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.5
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-15 July*

HALOCARBONS	ND
Bromodichloromethane	0.92
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	-
Chloroform	14
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	-
*DILUTION FACTOR OF 2X	

SHS-16

July

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	-
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	-

SHS-17

July

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	-
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	-

*ND - Not detected at specified detection limit

Giant Bloomfield: July 5 1994 Water Levels

Well	Wellhead Elevation ft. AMSL	Depth to Water feet	Depth to Product feet	Product thickness feet	Adjusted WSEL* ft. AMSL
GRW-1	5394.30	61.23			5333.07
GRW-2	5391.28	52.35			5338.93
GRW-3	5388.77	54.80			5333.97
GRW-4	5390.02	56.70			5333.32
GRW-5	5390.56	63.35			5327.21
GRW-6	5390.81	48.70			5342.11
GRW-9	5395.70	47.25			5348.45
GRW-10	5395.02	47.78	47.10	0.68	5347.79
GRW-11	5397.85	63.10			5334.75
GRW-12	5397.24	48.55			5348.69
GRW-13	5396.90	51.50			5345.40
GBR-5	5395.07	30.75	29.54	1.21	5365.29
GBR-7	5395.85	32.35	31.72	0.63	5364.01
GBR-8	5390.50	44.28	43.35	0.93	5346.97
GBR-9	5389.92	50.41			5339.51
GBR-10	5390.57	42.45			5348.12
GBR-11	5389.43	42.84	42.50	0.34	5346.86
GBR-13	5393.04	NM			NM
GBR-15	5397.99	42.81			5355.18
GBR-17	5402.69	NM			NM
GBR-18	5421.68	29.30			5392.38
GBR-19	5393.83	40.84	40.07	0.77	5353.61
GBR-20	5393.47	40.44			5353.03
GBR-21S	5400.65	20.15			5380.50
GBR-21D	5400.19	38.15			5362.04
GBR-22	5395.91	36.21			5359.70
GBR-23	5403.72	22.70			5381.02
GBR-24S	5396.08	28.90			5367.18
GBR-24D	5396.77	31.28			5365.49
GBR-25	5396.72	31.06			5365.66
GBR-26	5395.59	38.65			5356.94
GBR-30	5396.58	34.58			5362.00
GBR-31	5394.86	35.90			5358.96
GBR-33	5396.28	38.78	38.77	0.01	5357.51
GBR-34	5394.00	37.77	36.14	1.63	5357.54
GBR-35	5393.66	38.15	36.24	1.91	5357.04
GBR-39	5397.55	Dry			Dry
GBR-40	5400.76	30.71			5370.05
GBR-41	5396.35	21.27			5375.08
GBR-51	5389.68	41.55			5348.13
GBR-52	5387.74	39.99			5347.75

G:\54027\7-94WL.WQ2

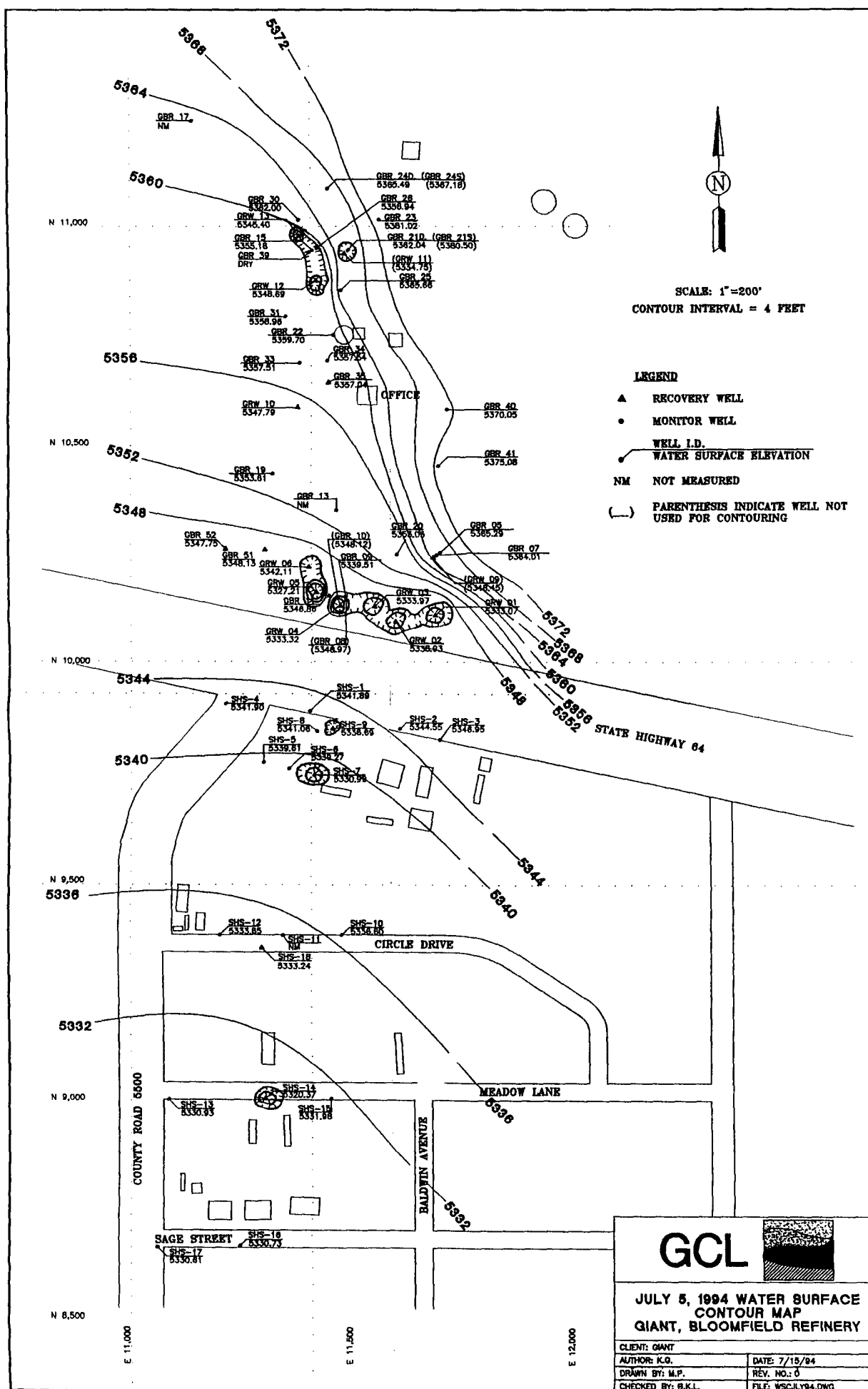
Giant Bloomfield: July 5 1994 Water Levels

Well	Wellhead Elevation ft. AMSL	Depth to Water feet	Depth to Product feet	Product thickness feet	Adjusted WSEL* ft. AMSL
SHS-1	5383.54	41.77	41.62	0.15	5341.89
SHS-2	5381.66	37.11			5344.55
SHS-3	5383.33	36.38			5346.95
SHS-4	5383.62	41.72			5341.90
SHS-5	5378.36	38.75			5339.61
SHS-6	5378.17	38.90			5339.27
SHS-7	5375.89	44.90			5330.99
SHS-8	5380.25	39.19			5341.06
SHS-9	5380.79	44.10			5336.69
SHS-10	5373.80	37.20			5336.60
SHS-12	5373.94	40.09			5333.85
SHS-13	5367.81	36.88			5330.93
SHS-14	5367.07	46.70			5320.37
SHS-15	5366.21	34.23			5331.98
SHS-16	5362.58	31.85			5330.73
SHS-17	5364.35	33.74			5330.61
SHS-18	5373.64	40.40			5333.24

*WSEL = Water Surface Elevation Adjusted for Product Depth.

NM = not measured

Note: 0.803 = the specific gravity used for adjusted product depth calculation



Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Third Quarter, 1994

Tank Number	Beginning Volume	Ending Volume	Net Change
102	9,438	17,609	(8,171)
106	8,010	8,010	0
21	68,676	68,635	41
22	74,439	72,623	1,816
Total Net Volume Change			(6,314)

4.0

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Third Quarter, 1994

Well	Month #1	Month #2	Month #3	Total
GRW-1	8,110	12,830	10,010	30,950
GRW-2	12,130	14,170	14,100	40,400
GRW-3	11,290	13,740	12,220	37,250
GRW-4	25,930	49,940	77,970	153,840
GRW-5	45,680	40,110	36,850	122,640
GRW-6	91,400	34,860	74,670	200,930
GRW-9	10,610	12,330	9,630	32,570
GRW-10	589,120	802,140	224,350	1,615,610
GRW-11	27,290	55,400	85,800	168,490
GRW-12	54,850	5,780	14,160	74,790
GRW-13	14,960	13,850	17,200	46,010
SHS-7	51	80	30	161
SHS-9	7,850	27	65	7,942
SHS-14	176,478	167,687	162,830	506,995
SHS-18	15,011	0	0	15,011
Total Volume Pumped In Gallons				3,053,589

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Third Quarter, 1994

=====

Total Volume Of Water Recovered	3,053,589
Net Change In Storage Volume	(6,314)

Total Water Pumped To The Infiltration Gallery	3,053,589
---	-----------

=====

Difference	6,314
------------	-------

Comments: The approximately .2% difference
is due to meter inaccuracy.

SECTION 5

BIOREMEDIATION WELLS
ANALYTICAL RESULTS

RW-9

1994

	July 13	July 21	August 3	August 24	September 7
Laboratory Conductivity, umoh/cm	NA	NA	NA	3250	3060
Laboratory pH (s.u.)	7.3	6.8	7.1	7.1	7.2
Ammonia	0.12	0.15	ND	0.09	0.06
Nitrate Nitrogen	ND	0.12	ND	0.02	0.07
Ortho-Phosphate	ND	ND	ND	ND	ND
Dissolved Oxygen	3.5	3.5	1.8	2.56	1.22
Potassium	NA	NA	NA	NA	NA
Total Organic Carbon (TOC)	8	12.8	7.2	7.8	6.8
Total Iron	0.30	1.06	0.77	0.76	0.7
Total Manganese	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons	ND	ND	ND	ND	ND
Total Phosphorus	ND	0.07	ND	0.06	0.03

BTEX

Benzene	0.4	18	16	22.6	19
Toluene	2.9	1.5	2.3	2.2	3.1
Ethylbenzene	1.7	25	17	10.8	5
m,p-Xylenes	0.7	11	7.7	3.8	3.5
o-Xylene	0.4	0.3	ND	ND	ND

Results of Bacteria Enumeration	1.2 x 10(4)	3.1 x 10(3)	8.0 x 10(3)	6.2 x 10(3)	6.4 x 10(3)
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5.0

GBR-41

1994

	July 13	July 21	August 3	August 24	September 7
Laboratory Conductivity, umoh/cm	NA	NA	NA	2890	2670
Laboratory pH (s.u.)	7	6.9	7	7.1	7.2
Ammonia	0.2	0.07	0.76	0.15	0.07
Nitrate Nitrogen	ND	0.22	0.15	0.05	0.1
Ortho-Phosphate	ND	0.89	ND	0.26	ND
Dissolved Oxygen	1.5	0.89	0.13	0.54	0.68
Potassium	NA	NA	NA	NA	NA
Total Organic Carbon (TOC)	55.6	52.4	23.4	45.7	37.4
Total Iron	9.00	0.81	10.5	13.2	12.44
Total Manganese	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons	4.5	3.7	4	1.8	4.7
Total Phosphorus	0.33	0.13	0.22	0.35	0.17

BTEX

Benzene	583	460	420	380	400
Toluene	ND	ND	ND	ND	26.5
Ethylbenzene	1140	1170	510	1200	1270
m,p-Xylenes	1450	1560	1220	1300	1210
o-Xylene	22.7	20	ND	ND	ND

Results of Bacteria Enumeration	3.2 x 10(5)	3.4 x 10(4)	3.7 x 10(4)	7.5 x 10(4)	4.4 x 10(4)
---------------------------------	-------------	-------------	-------------	-------------	-------------

5.1

GBR-20

1994

	July 13	July 21	August 3	August 24	September 7
Laboratory Conductivity, umoh/cm	NA	NA	NA	2790	2560
Laboratory pH (s.u.)	7.3	6.9	7	7.1	7.3
Ammonia	0.13	ND	0.14	0.08	0.05
Nitrate Nitrogen	ND	0.11	0.16	0.03	0.09
Ortho-Phosphate	ND	ND	ND	ND	ND
Dissolved Oxygen	2	2.9	1.5	2.18	2.56
Potassium	NA	NA	NA	NA	NA
Total Organic Carbon (TOC)	15.7	18.8	13.5	14.3	10.9
Total Iron	19.90	0.98	15.7	19.1	12.97
Total Manganese	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons	2.8	13	21	1.8	4.01
Total Phosphorus	0.07	ND	ND	0.27	0.03

BTEX

Benzene	313	300	420	340	420
Toluene	ND	7.6	ND	ND	20
Ethylbenzene	413	500	510	410	430
m,p-Xylenes	982	1070	1220	1100	1350
o-Xylene	ND	ND	ND	ND	12

Results of Bacteria Enumeration	6.6 x 10(3)	1.4 x 10(3)	1.1 x 10(4)	1.1 x 10(3)	7.5 x 10(2)
---------------------------------	-------------	-------------	-------------	-------------	-------------

5.2



Crude Gathering Operations

5764 US Highway 64
Farmington, New Mexico
87401

505
632-8024
632-8006

August 16, 1994

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

RECEIVED

AUG 18 1994

**OIL CONSERVATION DIV.
SANTA FE**

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the second quarter of 1994.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Tim Kinney". The signature is fluid and cursive, with a long horizontal stroke extending from the end.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Carl Shook-Giant
Kim Bullerdick-Giant
Debbie Smith-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Valda Terauds-H+GCL
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
SECOND QUARTER, 1994

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505)632-3306
FAX (505)632-2487

TABLE OF CONTENTS

Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Analytical Results/Bioremediation Wells . . .	Section 5

INTRODUCTION AND SUMMARY QUARTERLY REPORT SECOND QUARTER, 1994

INTRODUCTION

No significant changes were made in the second quarter.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Section 5 contains a summary of the quarterly analytical results for the Bioremediation Project. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 QUARTERLY ANALYTICAL DATA SUMMARY
 SECOND QUARTER, 1994

STRIPPER INFLUENT

April May June

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.40
Lab conductivity, umhos/cm	3440.00
Total alkalinity as CaCO ₃	2660.00
Total hardness as CaCO ₃	990.00
Carbonate as CO ₃	261.00
Sulfate	1270.00
Calcium	305.00
Magnesium	55.00
Potassium	2.60
Sodium	478.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	\
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	0.4
1,1-Dichloroethene	ND
1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	0.9
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND

STRIPPER INFLUENT (Continued)

	April	May	June
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	0.3		
Vinyl chloride	ND		
AROMATICS			
Benzene	2.1		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	1.2		
Toluene	ND		
Xylenes	2.1		
Trichlorotrifluoroethane	\		

STRIPPER EFFLUENT

April

May

June

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃Bicarbonate as HCO₃Carbonate as CO₃

Hydroxide as OH

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

\

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,1-Dichloroethene

ND

1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

STRIPPER EFFLUENT (continued)

	April	May	June
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	ND		ND
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		ND
Toluene	ND		ND
Xylenes	ND		ND
Trichlorotrifluoroethane	\		

PAH

Naphthalene	ND		
Acenaphthylene	ND		
Acenaphthene	ND		
Fluorene	ND		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-31

April

May

June

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	\
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-31 (Continued)

	April	May	June
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		

SHS-10

April

May

June

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	\
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-10 (Continued)

April

May

June

AROMATICS

Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		

SHS-12

	April	May	June
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

SHS-12 (Continued)

	April	May	June
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		

SHS-13

	April	May	June
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	0.8		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

SHS-13 (Continued)

	April	May	June
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		

SHS-16

April May June

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	\
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-16 (Continued)

	April	May	June
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		

SHS-17

	April	May	June
--	-------	-----	------

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

SHS-17 (Continued)

	April	May	June
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		

Giant, Bloomfield: April 7, 1994 Water Levels

Well #	Wellhead Elevation (ft. AMSL)	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Adjusted WSEL* (ft. AMSL)
GRW-1	5394.30	61.65			5332.65
GRW-2	5391.28	50.95			5340.33
GRW-3	5388.77	52.45			5336.32
GRW-4	5390.02	42.96			5347.06
GRW-5	5390.56	62.30			5328.26
GRW-6	5390.81	43.95			5346.86
GRW-9	5395.70	59.51			5336.19
GRW-10	5395.02	55.20	52.76	2.44	5341.78
GRW-11	5397.85	61.31			5336.54
GRW-12	5397.24	43.64			5353.60
GRW-13	5396.90	56.90			5340.00
GBR-5	5395.07	33.60	32.20	1.40	5362.59
GBR-7	5395.85	34.34	33.68	0.66	5362.04
GBR-8	5390.50	43.64	42.75	0.89	5347.57
GBR-9	5389.92	42.96			5346.96
GBR-10	5390.57	42.23			5348.34
GBR-11	5389.43	42.39	42.09	0.30	5347.28
GBR-13	5393.04	41.58			5351.46
GBR-15	5397.99	42.50			5355.49
GBR-17	5402.69	NM			NM
GBR-18	5421.68	27.88			5393.80
GBR-19	5393.83	40.51	39.93	0.58	5353.79
GBR-20	5393.47	42.20	41.73	0.47	5351.65
GBR-21S	5400.65	19.54			5381.11
GBR-21D	5400.19	37.78			5362.41
GBR-22	5395.91	36.65	36.00	0.65	5359.78
GBR-23	5403.72	21.95			5381.77
GBR-24S	5396.08	24.49			5371.59
GBR-24D	5396.77	30.51			5366.26
GBR-25	5396.72	31.01			5365.71
GBR-26	5395.59	35.85			5359.74
GBR-30	5396.58	31.40			5365.18
GBR-31	5394.86	37.87			5356.99
GBR-33	5396.28	38.42			5357.86
GBR-34	5394.00	36.55	35.74	0.81	5358.10
GBR-35	5393.66	35.94	35.86	0.08	5357.78
GBR-39	5397.55	Dry			Dry
GBR-40	5400.76	31.50			5369.26
GBR-41	5396.35	27.87			5368.48
GBR-51	5389.68	41.25			5348.43
GBR-52	5387.74	39.62			5348.12

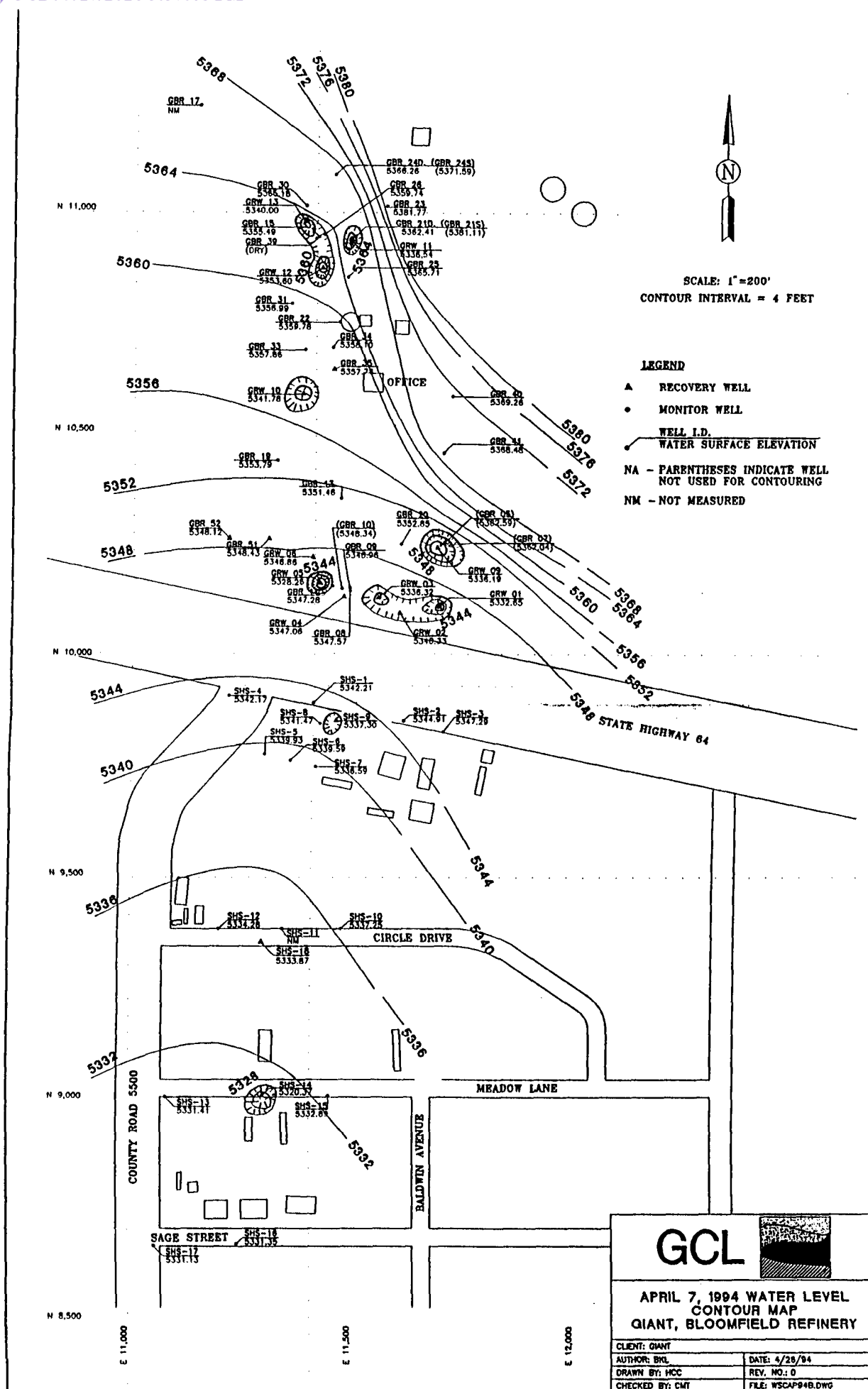
Giant, Bloomfield: April 7, 1994 Water Levels

Well #	Wellhead Elevation (ft. AMSL)	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Adjusted WSEL* (ft. AMSL)
SHS-1	5383.54	41.34	41.33	0.01	5342.21
SHS-2	5381.66	36.75			5344.91
SHS-3	5383.33	36.04			5347.29
SHS-4	5383.62	41.45			5342.17
SHS-5	5378.36	38.43			5339.93
SHS-6	5378.17	38.58			5339.59
SHS-7	5375.89	39.30			5336.59
SHS-8	5380.25	38.78			5341.47
SHS-9	5380.79	43.49			5337.30
SHS-10	5373.80	36.55			5337.25
SHS-12	5373.94	39.66			5334.28
SHS-13	5367.81	36.40			5331.41
SHS-14	5367.07	46.70			5320.37
SHS-15	5366.21	33.32			5332.89
SHS-16	5362.58	31.23			5331.35
SHS-17	5364.35	33.22			5331.13
SHS-18	5373.64	39.77			5333.87

NM = Not Measured

*WSEL = Water Surface Elevation adjusted for product depth.

Note: 0.803 = the specific gravity used for adjusted product depth.



Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Second Quarter, 1994

Tank Number	Beginning Volume	Ending Volume	Net Change
102	12,678	9,438	3,240
106	8,010	8,010	0
21	54,064	68,676	(14,612)
22	74,439	74,439	0
Total Net Volume Change			(11,372)

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Second Quarter, 1994

Well	Month #1	Month #2	Month #3	Total
GRW-1	7,050	6,580	8,100	21,730
GRW-2	9,760	12,050	13,530	35,340
GRW-3	11,990	11,580	14,210	37,780
GRW-4	30	7,770	30,210	38,010
GRW-5	49,240	47,010	41,080	137,330
GRW-6	39,250	46,960	77,990	164,200
GRW-9	5,500	5,190	8,320	19,010
GRW-10	301,190	294,990	341,750	937,930
GRW-11	26,330	29,190	34,830	90,350
GRW-12	28,550	42,540	45,940	117,030
GRW-13	24,910	25,040	24,380	74,330
SHS-7	0	5	129	134
SHS-9	14,303	10,823	12,312	37,438
SHS-14	176,623	168,673	219,802	565,098
SHS-18	14,600	17,654	9,821	42,075
Total Volume Pumped In Gallons				2,317,785

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Second Quarter, 1994

=====

Total Volume Of Water Recovered	2,317,785
Net Change In Storage Volume	(11,372)

Total Water Pumped To The Infiltration Gallery	1,680,919
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=====

Difference	(625,494)
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Comments: The approximately 37% difference
is due to meter failure.

SECTION 5

RW-9

1994

	3-Apr	15-Apr	31-May	10-Jun	21-Jun
Laboratory Conductivity, umoh/cm	3520	3620	3640		
Laboratory pH (s.u.)	6.8	7.2	6.9	7.1	7.3
Ammonia		0.8	<.1	0.08	<.05
Nitrate Nitrogen		<.01	0.09	0.06	<.05
Nitrite Nitrogen			<.1		
Dissolved Oxygen	4.4	6.7	7.1	4.3	3.5
Potassium			0.1		
Total Organic Carbon (TOC)		4.9	3.6	1	6.9
Total Iron		0.47	1	0.97	1
Total Manganese		0.85	0.94		
Total Petroleum Hydrocarbons		ND	ND	ND	ND
Ortho-Phosphate		<.01	<.01	<.01	<.01

BTEX

Benzene	ND	ND	1	2
Toluene	0.8	ND	1.4	ND
Ethylbenzene	ND	ND	ND	3
m,p-Xylenes	0.5	ND	1.1	2.6
o-Xylene	1.6	ND	ND	ND

GBR-20

1994

	3-Apr	31-May	10-Jun	21-Jun
Laboratory Conductivity, umoh/cm		2950		
Laboratory pH (s.u.)		7.0	7.3	7.4
Ammonia		<.1	<.01	<.05
Nitrate Nitrogen		0.15	<.05	<.05
Nitrite Nitrogen		<.01		
Dissolved Oxygen		7.1	5.3	3.4
Potassium		0.03		
Total Organic Carbon (TOC)		9.7	2.5	16.9
Total Iron		13.2	13.2	14
Total Manganese		1.58		
Total Petroleum Hydrocarbons		52	42	37
Ortho-Phosphate		<.01	<.01	<.01
BTEX				
Benzene		117	170	170
Toluene		5.8	ND	ND
Ethylbenzene		541	480	380
m,p-Xylenes		886	980	790
o-Xylene		ND	ND	ND

GBR-41

1994

	3-Apr	15-Apr	31-May	10-Jun	21-Jun
Laboratory Conductivity, umoh/cm	3080	3300	3520		
Laboratory pH (s.u.)	7.3	7.1	7.1	7.2	7.3
Ammonia		0.9	<.1	0.35	<.05
Nitrate Nitrogen		0.09	0.12	<.05	<.05
Nitrite Nitrogen			<.1		
Dissolved Oxygen	2.7	1.5	7.1	0.7	2.9
Potassium			<.01		
Total Organic Carbon (TOC)		20	11.3	6.4	15.1
Total Iron		16.1	15.8	49.9	8.1
Total Manganese		0.55	0.56		
Total Petroleum Hydrocarbons		3	3	4	3
Ortho-Phosphate		0.03	<.01	0.02	<.01

BTEX

Benzene		590	322	337	410
Toluene		24	ND	27.4	18.3
Ethylbenzene		410	718	948	950
m,p-Xylenes		1070	273	227	1040
o-Xylene		47	14.6	16	21.2



P.O. Box 256
Farmington, New Mexico
87499

505
632-3306

May 9, 1994

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the first quarter of 1994.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Tim Kinney", with a stylized flourish at the end.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Carl Shook-Giant
Kim Bullerdick-Giant
Debbie Smith-Giant
Stephanie Odell-BLM
Dale Doremus-EID
Chris Shuey-SWRIC
Valda Terauds-H+GCL
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

RECEIVED

MAY 1³ 1994

OIL CONSERVATION DIV.
SANTA FE

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FIRST QUARTER, 1994

RECEIVED

MAY 13 1994

**OIL CONSERVATION DIV.
SANTA FE**

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87499
(505)632-3306
FAX (505)632-2487

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Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4
Specific Conductance Tracking	Section 5
Analytical Results/Bioremediation Wells . . .	Section 6

INTRODUCTION AND SUMMARY QUARTERLY REPORT FIRST QUARTER, 1994

INTRODUCTION

No significant changes were made in the first quarter.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

Section 6

Section 6 contains a summary of the quarterly analytical results for the Bioremediation Project. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FIRST QUARTER, 1994

GENERAL WATER CHEMISTRY

STRIPPER INFLUENT

	January	February	March
Lab pH (s.u.)		6.7	
Lab Conductivity, umhos/cm		3580	
Total Dissolved Solids (180)		2590	
Total Dissolved Solids (calc.)		2550	
Total Alkalinity as CaCO ₃		227	
Total Hardness as CaCO ₃		1010	
Bicarbonate as HCO ₃		277	
Carbonate as CO ₃		0	
Hydroxide as OH		0	
Chloride		437	
Sulfate		1140	
Calcium		287	
Magnesium		72	
Potassium		4.8	
Sodium		472	
Cation/Anion Balance		0.24%	

2.0

STRIPPER EFFLUENT**GENERAL WATER CHEMISTRY**

	January	February	March
Lab pH (s.u.)	6.9		
Lab Conductivity, umhos/cm	3600		
Total Dissolved Solids (180)	2610		
Total Dissolved Solids (calc.)	2550		
Total Alkalinity as CaCO ₃	193		
Total Hardness as CaCO ₃	1030		
Bicarbonate as HCO ₃	235		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	458		
Sulfate	1150		
Calcium	290		
Magnesium	74		
Potassium	5.4		
Sodium	464		
Cation/Anion Balance	0.29%		

GBR-15

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	7.4		
Lab Conductivity, umhos/cm	4390		
Total Dissolved Solids (180)	3130		
Total Dissolved Solids (calc.)	3080		
Total Alkalinity as CaCO ₃	341		
Total Hardness as CaCO ₃	1150		
Bicarbonate as HCO ₃	415		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	639		
Sulfate	1200		
Calcium	334		
Magnesium	77		
Potassium	6.6		
Sodium	614		
Cation/Anion Balance	0.09%		

GBR-24D

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	8.0		
Lab Conductivity, umhos/cm	4650		
Total Dissolved Solids (180)	3580		
Total Dissolved Solids (calc.)	3370		
Total Alkalinity as CaCO ₃	216		
Total Hardness as CaCO ₃	1750		
Bicarbonate as HCO ₃	263		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	725		
Sulfate	1420		
Calcium	523		
Magnesium	108		
Potassium	5.9		
Sodium	460		
Cation/Anion Balance	0.72%		

GBR-30

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	6.8		
Lab Conductivity, umhos/cm	3810		
Total Dissolved Solids (180)	2740		
Total Dissolved Solids (calc.)	2680		
Total Alkalinity as CaCO ₃	227		
Total Hardness as CaCO ₃	1100		
Bicarbonate as HCO ₃	277		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	514		
Sulfate	1160		
Calcium	316		
Magnesium	76		
Potassium	6		
Sodium	475		
Cation/Anion Balance	0.36%		

GBR-31

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	7.4		
Lab Conductivity, umhos/cm	3850		
Total Dissolved Solids (180)	3050		
Total Dissolved Solids (calc.)	2910		
Total Alkalinity as CaCO ₃	278		
Total Hardness as CaCO ₃	1230		
Bicarbonate as HCO ₃	339		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	270		
Sulfate	1560		
Calcium	347		
Magnesium	90		
Potassium	4.8		
Sodium	465		
Cation/Anion Balance	0.78%		

GBR-51

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	7.3		
Lab Conductivity, umhos/cm	2860		
Total Dissolved Solids (180)	2350		
Total Dissolved Solids (calc.)	2270		
Total Alkalinity as CaCO3	238		
Total Hardness as CaCO3	1060		
Bicarbonate as HCO3	291		
Carbonate as CO3	0		
Hydroxide as OH	0		
Chloride	71		
Sulfate	1360		
Calcium	309		
Magnesium	70		
Potassium	2.8		
Sodium	316		
Cation/Anion Balance	0.05%		

2.5

GBR-52

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	7.3		
Lab Conductivity, umhos/cm	3090		
Total Dissolved Solids (180)	2700		
Total Dissolved Solids (calc.)	2630		
Total Alkalinity as CaCO ₃	216		
Total Hardness as CaCO ₃	1340		
Bicarbonate as HCO ₃	263		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	41		
Sulfate	1660		
Calcium	403		
Magnesium	82		
Potassium	2.7		
Sodium	314		
Cation/Anion Balance	0.81%		

GIANT REFINING COMPANY
 ONSITE REMEDIATION PROJECT
 QUARTERLY ANALYTICAL DATA SUMMARY
 FIRST QUARTER, 1994

STRIPPER INFLUENT

	January	February	March
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene		0.3	
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene		4.3	
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene		3.3	
Toluene	ND		
Xylenes		4.8	
Trichlorotrifluoroethane	\		

2.7

SYSTEM EFFLUENT

January February March

METALS

Silver	ND		
Arsenic	ND		
Beryllium	ND		
Cadmium	ND		
Chromium	ND		
Copper	ND		
Mercury	ND		
Nickel	0.058		
Lead	ND		
Antimony	ND		
Selenium	ND		
Thallium	ND		
Zinc	ND		

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

2.8

STRIPPER EFFLUENT (continued)

	January	February	March
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenaphthene	ND		
Fluorene	ND		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		
Benzene	ND		ND
Toluene	ND		ND
Ethylbenzene	ND		ND
Xylenes	ND		ND

GBR-15

	January	February	March
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane		12	
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene		1.9	
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes		2.2	
Trichlorotrifluoroethane	\		

GBR-24D

January February March

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane		23	
1,2-Dichloroethene	ND		
cis-1,2-Dic anthracene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene		3.9	
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene		3.3	
Toluene	ND		
Xylenes		1.7	
Trichlorotrifluoroethane	\		

GBR-24D (Continued)

	January	February	March
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenaphthene	ND		
Fluorene		1.4	
Phenanthrene		0.1	
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-30

	January	February	March
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dic anthracene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes		0.9	
Trichlorotrifluoroethane	\		

GBR-30 (Continued)

	January	February	March
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenaphthene	ND		
Fluorene	ND		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-31

January February March

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane		0.7	
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene		41	
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene		2.4	
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene		1.7	
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		

GBR-31 (Continued)

	January	February	March
PAH			
Naphthalene	ND		
Acenaphthylene	ND		
Acenaphthene	ND		
Fluorene	ND		
Phenanthrene	ND		
Anthracene	ND		
Fluoranthene	ND		
Pyrene	ND		
Benzo(A)Anthracene	ND		
Chrysene	ND		
Benzo(B)Fluoranthene	ND		
Benzo(K)Fluoranthene	ND		
Benzo(A)Pyrene	ND		
Dibenzo(a,h)Anthracene	ND		
Benzo(g,h,i)Perylene	ND		
Indeno(1,2,3-CD)Pyrene	ND		
1-Methylnaphthalene	ND		
2-Methylnaphthalene	ND		

GBR-51

January February March

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	\
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	\

GBR-52

	January	February	March
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
Chloroethane	ND		
2-Chloroethylvinylether	\		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	\		

OFFSITE WELLS
ANALYTICAL RESULTS

GENERAL WATER CHEMISTRY

SHS-3

	January	February	March
Lab pH (s.u.)	6.9		
Lab Conductivity, umhos/cm	4560		
Total Dissolved Solids (180)	3900		
Total Dissolved Solids (calc.)	3680		
Total Alkalinity as CaCO ₃	204		
Total Hardness as CaCO ₃	1910		
Bicarbonate as HCO ₃	249		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	365		
Sulfate	2070		
Calcium	546		
Magnesium	133		
Potassium	8.4		
Sodium	435		
Cation/Anion Balance	0.10%		

SHS-4

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	7.5		
Lab Conductivity, umhos/cm	3110		
Total Dissolved Solids (180)	2600		
Total Dissolved Solids (calc.)	2650		
Total Alkalinity as CaCO ₃	214		
Total Hardness as CaCO ₃	1340		
Bicarbonate as HCO ₃	261		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	41		
Sulfate	1680		
Calcium	392		
Magnesium	88		
Potassium	4.6		
Sodium	312		
Cation/Anion Balance	0.09%		

SHS-6

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	7.1		
Lab Conductivity, umhos/cm	2910		
Total Dissolved Solids (180)	2360		
Total Dissolved Solids (calc.)	2240		
Total Alkalinity as CaCO ₃	272		
Total Hardness as CaCO ₃	1030		
Bicarbonate as HCO ₃	332		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	70		
Sulfate	1320		
Calcium	288		
Magnesium	75		
Potassium	4		
Sodium	325		
Cation/Anion Balance	0.08%		

SHS-7

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)		7.3	
Lab Conductivity, umhos/cm		3530	
Total Dissolved Solids (180)		2300	
Total Dissolved Solids (calc.)		2270	
Total Alkalinity as CaCO ₃		874	
Total Hardness as CaCO ₃		741	
Bicarbonate as HCO ₃		1070	
Carbonate as CO ₃		0	
Hydroxide as OH		0	
Chloride		428	
Sulfate		467	
Calcium		215	
Magnesium		50	
Potassium		3.3	
Sodium		578	
Cation/Anion Balance		0.95%	

SHS-9

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	7.3		
Lab Conductivity, umhos/cm	3210		
Total Dissolved Solids (180)	1840		
Total Dissolved Solids (calc.)	1880		
Total Alkalinity as CaCO ₃	1000		
Total Hardness as CaCO ₃	622		
Bicarbonate as HCO ₃	1230		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	493		
Sulfate	40		
Calcium	179		
Magnesium	42		
Potassium	3.4		
Sodium	517		
Cation/Anion Balance	0.29%		

SHS-10

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)	7.1		
Lab Conductivity, umhos/cm	2660		
Total Dissolved Solids (180)	2060		
Total Dissolved Solids (calc.)	1940		
Total Alkalinity as CaCO ₃	295		
Total Hardness as CaCO ₃	886		
Bicarbonate as HCO ₃	360		
Carbonate as CO ₃	0		
Hydroxide as OH	0		
Chloride	85		
Sulfate	1070		
Calcium	226		
Magnesium	79		
Potassium	9.8		
Sodium	289		
Cation/Anion Balance	0.07%		

SHS-12

GENERAL WATER CHEMISTRY

	January	February	March
Lab pH (s.u.)		7.3	
Lab Conductivity, umhos/cm		3600	
Total Dissolved Solids (180)		2470	
Total Dissolved Solids (calc.)		2400	
Total Alkalinity as CaCO ₃		573	
Total Hardness as CaCO ₃		859	
Bicarbonate as HCO ₃		699	
Carbonate as CO ₃		0	
Hydroxide as OH		0	

GW - 40

MONITORING REPORTS

DATE:

1997-1995

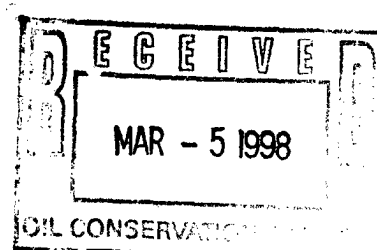


111 Road 4990
Bloomfield, New Mexico 87413

505
632.8006

February 5, 1998

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088



Dear Mr. Olson:

Enclosed you will find the annual report for Giant Refining Company's Bloomfield Refinery for 1997.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Tim Kinney".

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Mike Hardy-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

ANNUAL DATA REPORT
GIANT BLOOMFIELD REFINERY
1997

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505) 632-8006
FAX (505) 632-4021

TABLE OF CONTENTS

Introduction and Summary	Section 1
Annual Analytical Results	Section 2
Potentiometric Surface Maps.....	Section 3
Total Volume History	Section 4

INTRODUCTION AND SUMMARY ANNUAL REPORT 1997

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the annual analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevation and product thickness for each well, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the year. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the annual analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT INDUSTRIES, INC.
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
1997

SYSTEM EFFLUENT							
	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Lab pH	7.1	7		7.1		7	
Lab Conductivity @25 C	3450	3350		3240		3250	
Total Dissolved Solids @ 180 C	2760	2784		2710		2580	
Total Dissolved Solids (Calc)	2726	---		---		---	
Total Alkalinity as CaCO ₃	364	349		397		411	
Total Hardness as CaCO ₃	1130	1142		1030		1250	
Bicarbonate as HCO ₃	444	426		484		501	
Carbonate as CO ₃	ND	ND		ND		ND	
Hydroxide	ND	ND		ND		ND	
Chloride	174	153		189		147	
Sulfate	1432	1490		1290		1310	
Calcium	392	400		358		443	
Magnesium	36.8	34.9		33.4		34.4	
Potassium	4.3	4.27		2.74		2.3	
Sodium	469	422		402		315	
HALOCARBONS							
Bromodichloromethane	ND	ND				ND	
Bromoform	ND	ND				ND	
Bromomethane	ND	ND				ND	
Carbon Tetrachloride	ND	ND				ND	
Chloroethane	ND	ND				ND	
Chloroform	ND	ND				ND	
Chloromethane	ND	ND				ND	
Dibromochloromethane	ND	ND				ND	
1,2-Dibromoethane (EDB)	ND	ND				ND	
1,2-Dichlorobenzene	ND	ND				ND	
1,3-Dichlorobenzene	ND	ND				ND	
1,4-Dichlorobenzene	ND	ND				ND	
1,1-Dichloroethane	ND	ND				ND	
1,2-Dichloroethane (EDC)	ND	0.5				ND	
1,1-Dichloroethene	ND	ND				ND	
cis-1,2-Dichloroethene	0.6	0.7				ND	
trans-1,2-Dichloroethene	ND	ND				ND	
1,2-Dichloropropane	ND	ND				ND	
cis-1,3-Dichloropropene	ND	ND				ND	
trans-1,3-Dichloropropene	ND	ND				ND	
Methylene Chloride	ND	ND				ND	
1,1,2,2-Tetrachloroethane	ND	ND				ND	
Tetrachlorethene	ND	ND				ND	
1,1,1-Trichloroethane	ND	ND				ND	
1,1,2-Trichloroethane	ND	ND				ND	

	JAN	APR	JUN	JUL	AUG	OCT	DEC
Trichloroethene	ND	ND				ND	
Trichlorofluoromethane	ND	ND				ND	
Vinyl Chloride	ND	ND				ND	
AROMATICS							
Benzene	2.3	4.5				ND	
Chlorobenzene	ND	ND				ND	
1,2-Dichlorobenzene	ND	ND				ND	
1,3-Dichlorobenzene	ND	ND				ND	
1,4-Dichlorobenzene	ND	ND				ND	
Ethylbenzene	ND	1.9				ND	
Methyl-t-Butyl Ether	ND	ND				ND	
Toluene	ND	ND				ND	
Total Xylenes	ND	5.7				ND	
SYSTEM INFLUENT							
Lab pH	7.2	7.2		7.1		6.9	
Lab Conductivity @25 C	3430	3220		3260		3270	
Total Dissolved Solids @ 180 C	2800	2814		2730		2600	
Total Dissolved Solids (Calc)	2737	---		---		---	
Total Alkalinity as CaCO3	382	374		403		407	
Total Hardness as CaCO3	1105	1132		987		1240	
Bicarbonate as HCO3	465	456		492		496	
Carbonate as CO3	ND	ND		ND		ND	
Hydroxide	ND	ND		ND		ND	
Chloride	174	157		148		159	
Sulfate	1432	1494		1330		1330	
Calcium	383	396		340		441	
Magnesium	36.2	34.7		33.7		33.9	
Potassium	3.52	4.21		2.8		4.6	
Sodium	479	422		407		334	
HALOCARBONS							
Bromodichloromethane	ND	ND				ND	
Bromoform	ND	ND				ND	
Bromomethane	ND	ND				ND	
Carbon Tetrachloride	ND	ND				ND	
Chloroethane	ND	ND				ND	
Chloroform	ND	ND				ND	
Chloromethane	ND	ND				ND	
Dibromochloromethane	ND	ND				ND	
1,2-Dibromoethane (EDB)	ND	ND				ND	
1,2-Dichlorobenzene	ND	ND				ND	
1,3-Dichlorobenzene	ND	ND				ND	
1,4-Dichlorobenzene	ND	ND				ND	
1,1-Dichloroethane	ND	ND				ND	
1,2-Dichloroethane (EDC)	ND	0.5				ND	
1,1-Dichloroethene	ND	ND				ND	

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
cis-1,2-Dichloroethene	1.4	1.1				0.2	
trans-1,2-Dichloroethene	ND	ND				ND	
1,2-Dichloropropane	ND	ND				ND	
cis-1,3-Dichloropropene	ND	ND				ND	
trans-1,3-Dichloropropene	ND	ND				ND	
Methylene Chloride	ND	ND				ND	
1,1,2,2-Tetrachloroethane	ND	ND				ND	
Tetrachlorethene	ND	ND				ND	
1,1,1-Trichloroethane	ND	ND				ND	
1,1,2-Trichloroethane	ND	ND				ND	
Trichloroethene	ND	ND				ND	
Trichlorofluoromethane	ND	ND				ND	
Vinyl Chloride	ND	ND				ND	
AROMATICS							
Benzene	6.8	4.1				1.7	
Chlorobenzene	ND	ND				ND	
1,2-Dichlorobenzene	ND	ND				ND	
1,3-Dichlorobenzene	ND	ND				ND	
1,4-Dichlorobenzene	ND	ND				ND	
Ethylbenzene	15	4.3				ND	
Methyl-t-Butyl Ether	ND	ND				ND	
Toluene	ND	ND				ND	
Total Xylenes	17	6				ND	
GRW-3							
Lab pH	6.9						
Lab Conductivity @25 C	3260						
Total Dissolved Solids @ 180 C	2070						
Total Dissolved Solids (Calc)	2207						
Total Alkalinity as CaCO3	848						
Total Hardness as CaCO3	584						
Bicarbonate as HCO3	1035						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	313						
Sulfate	556						
Calcium	193						
Magnesium	24.7						
Potassium	2.35						
Sodium	610						
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	1						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	1.1						
Methyl-t-Butyl Ether	ND						
Toluene	0.5						
Total Xylenes	5.5						
GRW-6							
Lab pH	6.9						
Lab Conductivity @25 C	3850						
Total Dissolved Solids @ 180 C	2830						
Total Dissolved Solids (Calc)	2886						
Total Alkalinity as CaCO3	633						
Total Hardness as CaCO3	1020						
Bicarbonate as HCO3	772						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	304						
Sulfate	1181						
Calcium	340						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Magnesium	41.4						
Potassium	3.52						
Sodium	635						
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	0.3						
1,2-Dichloroethane (EDC)	2						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	0.3						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
<u>GRW-13</u>							
Lab pH	7						
Lab Conductivity @25 C	4160						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Total Dissolved Solids @ 180 C	3330						
Total Dissolved Solids (Calc)	3264						
Total Alkalinity as CaCO3	223						
Total Hardness as CaCO3	1120						
Bicarbonate as HCO3	273						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	336						
Sulfate	1732						
Calcium	403						
Magnesium	27.7						
Potassium	6.26						
Sodium	625						
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachloroethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						

	JAN	APR	JUN	JUL	AUG	OCT	DEC
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
GBR-15							
Lab pH	7.1						
Lab Conductivity @25 C	3890						
Total Dissolved Solids @ 180 C	2960						
Total Dissolved Solids (Calc)	2892						
Total Alkalinity as CaCO3	349						
Total Hardness as CaCO3	1087						
Bicarbonate as HCO3	426						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	383						
Sulfate	1313						
Calcium	388						
Magnesium	29.2						
Potassium	5.08						
Sodium	565						
HALOCARBONS							
Bromodichloromethane	ND			ND			
Bromoform	ND			ND			
Bromomethane	ND			ND			
Carbon Tetrachloride	ND			ND			
Chloroethane	ND			ND			
Chloroform	ND			ND			
Chloromethane	ND			ND			
Dibromochloromethane	ND			ND			
1,2-Dibromoethane (EDB)	ND			ND			
1,2-Dichlorobenzene	0.5			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
1,1-Dichloroethane	ND			ND			
1,2-Dichloroethane (EDC)	5.8			6.6			
1,1-Dichloroethene	ND			ND			
cis-1,2-Dichloroethene	ND			ND			
trans-1,2-Dichloroethene	ND			ND			
1,2-Dichloropropane	ND			ND			
cis-1,3-Dichloropropene	ND			ND			
trans-1,3-Dichloropropene	ND			ND			
Methylene Chloride	ND			ND			
1,1,2,2-Tetrachloroethane	ND			ND			
Tetrachlorethene	ND			ND			

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
1,1,1-Trichloroethane	ND			ND			
1,1,2-Trichloroethane	ND			ND			
Trichloroethene	ND			ND			
Trichlorofluoromethane	ND			ND			
Vinyl Chloride	ND			ND			
AROMATICS							
Benzene	ND			ND			
Chlorobenzene	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
Ethylbenzene	ND			ND			
Methyl-t-Butyl Ether	ND			ND			
Toluene	ND			ND			
Total Xylenes	0.8			ND			
GBR-17							
Lab pH			7.1				7.1
Lab Conductivity @25 C			2640				2390
Total Dissolved Solids @ 180 C			2272				2060
Total Dissolved Solids (Calc)			2056				---
Total Alkalinity as CaCO3			199				217
Total Hardness as CaCO3			866				921
Bicarbonate as HCO3			242				265
Carbonate as CO3			ND				ND
Hydroxide			ND				ND
Chloride			51.7				48
Sulfate			3.52				5.48
Nitrate as Nitrogen			1259				1220
Calcium			307				334
Magnesium			24.2				21.1
Potassium			ND				ND
Sodium			291				297
HALOCARBONS							
Bromodichloromethane			ND				ND
Bromoform			ND				ND
Bromomethane			ND				ND
Carbon Tetrachloride			ND				ND
Chloroethane			ND				ND
Chloroform			ND				ND
Chloromethane			ND				ND
Dibromochloromethane			ND				ND
1,2-Dibromoethane (EDB)			ND				ND
1,2-Dichlorobenzene			ND				ND
1,3-Dichlorobenzene			ND				ND
1,4-Dichlorobenzene			ND				ND

	JAN	APR	JUN	JUL	AUG	OCT	DEC
1,1-Dichloroethane			ND				ND
1,2-Dichloroethane (EDC)			0.6				ND
1,1-Dichloroethene			ND				ND
cis-1,2-Dichloroethene			ND				ND
trans-1,2-Dichloroethene			ND				ND
1,2-Dichloropropane			ND				ND
cis-1,3-Dichloropropene			ND				ND
trans-1,3-Dichloropropene			ND				ND
Methylene Chloride			ND				ND
1,1,2,2-Tetrachloroethane			ND				ND
Tetrachlorethene			ND				ND
1,1,1-Trichloroethane			ND				ND
1,1,2-Trichloroethane			ND				ND
Trichloroethene			ND				ND
Trichlorofluoromethane			ND				ND
Vinyl Chloride			ND				ND
AROMATIC							
Benzene			1.1				ND
Chlorobenzene			ND				ND
1,2-Dichlorobenzene			ND				ND
1,3-Dichlorobenzene			ND				ND
1,4-Dichlorobenzene			ND				ND
Ethylbenzene			0.7				ND
Methyl-t-Butyl Ether			ND				ND
Toluene			ND				ND
Total Xylenes			1.3				ND
GBR-24D							
Lab pH	7.7						
Lab Conductivity @25 C	4010						
Total Dissolved Solids @ 180 C	3280						
Total Dissolved Solids (Calc)	3226						
Total Alkalinity as CaCO3	301						
Total Hardness as CaCO3	1543						
Bicarbonate as HCO3	367						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	392						
Sulfate	1625						
Calcium	504						
Magnesium	69.5						
Potassium	3.52						
Sodium	451						
HALOCARBONS							
Bromodichloromethane	ND						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	9.8						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
<u>GBR-30</u>							
Lab pH	7						
Lab Conductivity @25 C	3440						
Total Dissolved Solids @ 180 C	2770						
Total Dissolved Solids (Calc)	2814						
Total Alkalinity as CaCO3	442						
Total Hardness as CaCO3	1106						
Bicarbonate as HCO3	539						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	189						
Sulfate	1448						
Calcium	382						
Magnesium	37.3						
Potassium	3.52						
Sodium	489						
HALOCARBONS							
Bromodichloromethane	ND			ND			
Bromoform	ND			ND			
Bromomethane	ND			ND			
Carbon Tetrachloride	ND			ND			
Chloroethane	ND			ND			
Chloroform	ND			ND			
Chloromethane	ND			ND			
Dibromochloromethane	ND			ND			
1,2-Dibromoethane (EDB)	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
1,1-Dichloroethane	ND			ND			
1,2-Dichloroethane (EDC)	ND			ND			
1,1-Dichloroethene	ND			ND			
cis-1,2-Dichloroethene	ND			ND			
trans-1,2-Dichloroethene	ND			ND			
1,2-Dichloropropane	ND			ND			
cis-1,3-Dichloropropene	ND			ND			
trans-1,3-Dichloropropene	ND			ND			
Methylene Chloride	ND			ND			
1,1,2,2-Tetrachloroethane	ND			ND			
Tetrachlorethene	ND			ND			
1,1,1-Trichloroethane	ND			ND			
1,1,2-Trichloroethane	ND			ND			
Trichloroethene	ND			ND			
Trichlorofluoromethane	ND			ND			
Vinyl Chloride	ND			ND			
AROMATICS							
Benzene	ND			ND			
Chlorobenzene	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
Ethylbenzene	ND			ND			
Methyl-t-Butyl Ether	ND			ND			
Toluene	ND			ND			
Total Xylenes	ND			ND			

	JAN	APR	JUN	JUL	AUG	OCT	DEC
GBR-31							
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		ND	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	0.3	1.5		ND		ND	
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	ND	0.6		ND		ND	
Chlorobenzene	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
Ethylbenzene	ND	ND		ND		ND	
Methyl-t-Butyl Ether	ND	ND		ND		ND	
Toluene	ND	ND		ND		ND	
Total Xylenes	ND	0.5		ND		ND	
GBR-32							
Lab pH			6.9			7.1	
Lab Conductivity @25 C			6350			5400	
Total Dissolved Solids @ 180 C			4984			4390	
Total Dissolved Solids (Calc)			4685			---	

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Total Alkalinity as CaCO ₃			247			300	
Total Hardness as CaCO ₃			1789			1720	
Bicarbonate as HCO ₃			301			365	
Carbonate as CO ₃			ND			ND	
Hydroxide			ND			ND	
Chloride			912			673	
Nitrogen-Nitrate			14.1			9.36	
Sulfate			2037			1900	
Calcium			615			603	
Magnesium			61.8			52.3	
Potassium			3.78			ND	
Sodium			893			797	
HALOCARBONS							
Bromodichloromethane							ND
Bromoform							ND
Bromomethane							ND
Carbon Tetrachloride							ND
Chloroethane							2.9
Chloroform							ND
Chloromethane							ND
Dibromochloromethane							ND
1,2-Dibromoethane (EDB)							ND
1,2-Dichlorobenzene							ND
1,3-Dichlorobenzene							ND
1,4-Dichlorobenzene							ND
1,1-Dichloroethane							0.4
1,2-Dichloroethane (EDC)							ND
1,1-Dichloroethene							ND
cis-1,2-Dichloroethene							32 (D5)
trans-1,2-Dichloroethene							ND
1,2-Dichloropropane							ND
cis-1,3-Dichloropropene							ND
trans-1,3-Dichloropropene							ND
Methylene Chloride							ND
1,1,2,2-Tetrachloroethane							ND
Tetrachloroethene							5.4
1,1,1-Trichloroethane							ND
1,1,2-Trichloroethane							ND
Trichloroethene							2.8
Trichlorofluoromethane							ND
Vinyl Chloride							ND
AROMATICS							
Benzene							ND
Chlorobenzene							ND
1,2-Dichlorobenzene							ND
1,3-Dichlorobenzene							ND
1,4-Dichlorobenzene							ND
Ethylbenzene							ND

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Methyl-t-Butyl Ether							ND
Toluene							ND
Total Xylenes							ND
<u>GBR-42</u>							
HALOCARBONS							
Bromodichloromethane			ND				
Bromoform			ND				
Bromomethane			ND				
Carbon Tetrachloride			ND				
Chloroethane			ND				
Chloroform			1.5				
Chloromethane			ND				
Dibromochloromethane			ND				
1,2-Dibromoethane (EDB)			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
1,1-Dichloroethane			ND				
1,2-Dichloroethane (EDC)			ND				
1,1-Dichloroethene			ND				
cis-1,2-Dichloroethene			19				
trans-1,2-Dichloroethene			ND				
1,2-Dichloropropane			ND				
cis-1,3-Dichloropropene			ND				
trans-1,3-Dichloropropene			ND				
Methylene Chloride			ND				
1,1,2,2-Tetrachloroethane			ND				
Tetrachlorethene			1.3				
1,1,1-Trichloroethane			ND				
1,1,2-Trichloroethane			ND				
Trichloroethene			0.7				
Trichlorofluoromethane			ND				
Vinyl Chloride			ND				
AROMATICS							
Benzene			ND				
Chlorobenzene			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
Ethylbenzene			ND				
Methyl-t-Butyl Ether			ND				
Toluene			ND				
Total Xylenes			ND				
<u>GBR-48</u>							

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Lab pH			7				7.1
Lab Conductivity @25 C			5390				3000
Total Dissolved Solids @ 180 C			4514				2500
Total Dissolved Solids (Calc)			4078				---
Total Alkalinity as CaCO3			189				230
Total Hardness as CaCO3			1450				873
Bicarbonate as HCO3			230				281
Carbonate as CO3			ND				ND
Hydroxide			ND				ND
Chloride			570				246
Nitrogen - Nitrate			23.1				13.3
Sulfate			2095				1260
Calcium			499				308
Magnesium			50.1				25.5
Potassium			2.34				0.5
Sodium			727				514
HALOCARBONS							
Bromodichloromethane			ND				ND
Bromoform			ND				ND
Bromomethane			ND				ND
Carbon Tetrachloride			ND				ND
Chloroethane			ND				ND
Chloroform			0.5				ND
Chloromethane			ND				ND
Dibromochloromethane			ND				ND
1,2-Dibromoethane (EDB)			ND				ND
1,2-Dichlorobenzene			ND				ND
1,3-Dichlorobenzene			ND				ND
1,4-Dichlorobenzene			ND				ND
1,1-Dichloroethane			ND				0.3
1,2-Dichloroethane (EDC)			ND				ND
1,1-Dichloroethene			ND				ND
cis-1,2-Dichloroethene			18				8.3
trans-1,2-Dichloroethene			ND				ND
1,2-Dichloropropane			ND				ND
cis-1,3-Dichloropropene			ND				ND
trans-1,3-Dichloropropene			ND				ND
Methylene Chloride			ND				ND
1,1,2,2-Tetrachloroethane			ND				ND
Tetrachlorethene			3.1				4.3
1,1,1-Trichloroethane			ND				ND
1,1,2-Trichloroethane			ND				ND
Trichloroethene			1.6				2.1
Trichlorofluoromethane			ND				ND
Vinyl Chloride			ND				ND
AROMATICS							

	JAN	APR	JUN	JUL	AUG	OCT	DEC
Benzene			ND				ND
Chlorobenzene			ND				ND
1,2-Dichlorobenzene			ND				ND
1,3-Dichlorobenzene			ND				ND
1,4-Dichlorobenzene			ND				ND
Ethylbenzene			ND				ND
Methyl-t-Butyl Ether			ND				ND
Toluene			ND				ND
Total Xylenes			ND				ND
GBR-49							
Lab pH			7.4				7.5
Lab Conductivity @25 C			4530				3960
Total Dissolved Solids @ 180 C			3781				3360
Total Dissolved Solids (Calc)			3469				---
Total Alkalinity as CaCO3			221				268
Total Hardness as CaCO3			1389				1370
Bicarbonate as HCO3			270				326
Carbonate as CO3			ND				ND
Hydroxide			ND				ND
Chloride			407				290
Nitrogen - Nitrate			3.57				1.18
Sulfate			1790				1800
Calcium			484				486
Magnesium			44.1				38.5
Potassium			5.11				0.5
Sodium			603				634
HALOCARBONS							
Bromodichloromethane			ND				ND
Bromoform			ND				ND
Bromomethane			ND				ND
Carbon Tetrachloride			ND				ND
Chloroethane			ND				ND
Chloroform			1.2				2.1
Chloromethane			ND				ND
Dibromochloromethane			ND				ND
1,2-Dibromoethane (EDB)			ND				ND
1,2-Dichlorobenzene			ND				ND
1,3-Dichlorobenzene			ND				ND
1,4-Dichlorobenzene			ND				ND
1,1-Dichloroethane			ND				0.4
1,2-Dichloroethane (EDC)			ND				ND
1,1-Dichloroethene			ND				ND
cis-1,2-Dichloroethene			33 (D5)				41 (D5)
trans-1,2-Dichloroethene			ND				ND
1,2-Dichloropropane			ND				ND

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
cis-1,3-Dichloropropene			ND				1.1
trans-1,3-Dichloropropene			ND				ND
Methylene Chloride			ND				ND
1,1,2,2-Tetrachloroethane			ND				ND
Tetrachlorethene			1.1				5.2
1,1,1-Trichloroethane			ND				ND
1,1,2-Trichloroethane			ND				ND
Trichloroethene			0.9				2.7
Trichlorofluoromethane			ND				ND
Vinyl Chloride			ND				ND
AROMATICS							
Benzene			ND				ND
Chlorobenzene			ND				ND
1,2-Dichlorobenzene			ND				ND
1,3-Dichlorobenzene			ND				ND
1,4-Dichlorobenzene			ND				ND
Ethylbenzene			ND				ND
Methyl-t-Butyl Ether			ND				ND
Toluene			ND				ND
Total Xylenes			ND				ND
GBR-50							
Lab pH			7.1				7.1
Lab Conductivity @25 C			3220				3350
Total Dissolved Solids @ 180 C			2870				2990
Total Dissolved Solids (Calc)			2628				---
Total Alkalinity as CaCO3			195				212
Total Hardness as CaCO3			1039				1290
Bicarbonate as HCO3			237				259
Carbonate as CO3			ND				ND
Hydroxide			ND				ND
Chloride			45.4				162
Nitrogen - Nitrate			0.94				5.25
Sulfate			1675				1690
Calcium			369				468
Magnesium			28.6				30.3
Potassium			1.11				ND
Sodium			391				449
HALOCARBONS							
Bromodichloromethane			ND				ND
Bromoform			ND				ND
Bromomethane			ND				ND
Carbon Tetrachloride			ND				ND
Chloroethane			ND				ND
Chloroform			ND				ND

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Chloromethane			ND				ND
Dibromochloromethane			ND				ND
1,2-Dibromoethane (EDB)			ND				ND
1,2-Dichlorobenzene			ND				ND
1,3-Dichlorobenzene			ND				ND
1,4-Dichlorobenzene			ND				ND
1,1-Dichloroethane			ND				ND
1,2-Dichloroethane (EDC)			0.5				ND
1,1-Dichloroethene			ND				ND
cis-1,2-Dichloroethene			4.2				1
trans-1,2-Dichloroethene			ND				ND
1,2-Dichloropropane			ND				ND
cis-1,3-Dichloropropene			ND				ND
trans-1,3-Dichloropropene			ND				ND
Methylene Chloride			ND				ND
1,1,2,2-Tetrachloroethane			ND				ND
Tetrachlorethene			1.5				0.8
1,1,1-Trichloroethane			ND				ND
1,1,2-Trichloroethane			ND				ND
Trichloroethene			ND				ND
Trichlorofluoromethane			ND				ND
Vinyl Chloride			ND				ND
AROMATICS							
Benzene			ND				ND
Chlorobenzene			ND				ND
1,2-Dichlorobenzene			ND				ND
1,3-Dichlorobenzene			ND				ND
1,4-Dichlorobenzene			ND				ND
Ethylbenzene			ND				ND
Methyl-t-Butyl Ether			ND				ND
Toluene			ND				ND
Total Xylenes			ND				ND
<u>GBR-51</u>							
Lab pH	7.2						
Lab Conductivity @25 C	2820						
Total Dissolved Solids @ 180 C	2450						
Total Dissolved Solids (Calc)	2376						
Total Alkalinity as CaCO3	251						
Total Hardness as CaCO3	1087						
Bicarbonate as HCO3	306						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	57.6						
Sulfate	1420						
Calcium	381						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Magnesium	32.8						
Potassium	1.17						
Sodium	333						
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
GBR-52							
Lab pH	7						
Lab Conductivity @25 C	3090						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Total Dissolved Solids @ 180 C	2750						
Total Dissolved Solids (Calc)	2619						
Total Alkalinity as CaCO3	201						
Total Hardness as CaCO3	1263						
Bicarbonate as HCO3	245						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	48.8						
Sulfate	1650						
Calcium	447						
Magnesium	36.1						
Potassium	1.56						
Sodium	315						
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
<u>SHS-3</u>							
Lab pH	6.5						
Lab Conductivity @25 C	4310						
Total Dissolved Solids @ 180 C	3850						
Total Dissolved Solids (Calc)	3725						
Total Alkalinity as CaCO3	208						
Total Hardness as CaCO3	1774						
Bicarbonate as HCO3	254						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	320						
Sulfate	2144						
Calcium	586						
Magnesium	76.1						
Potassium	8.6						
Sodium	465						
HALOCARBONS							
Bromodichloromethane	ND				ND		
Bromoform	ND				ND		
Bromomethane	ND				ND		
Carbon Tetrachloride	ND				ND		
Chloroethane	ND				ND		
Chloroform	ND				ND		
Chloromethane	ND				ND		
Dibromochloromethane	ND				ND		
1,2-Dibromoethane (EDB)	ND				ND		
1,2-Dichlorobenzene	ND				ND		
1,3-Dichlorobenzene	ND				ND		
1,4-Dichlorobenzene	ND				ND		
1,1-Dichloroethane	ND				ND		
1,2-Dichloroethane (EDC)	ND				ND		
1,1-Dichloroethene	ND				ND		
cis-1,2-Dichloroethene	ND				ND		
trans-1,2-Dichloroethene	ND				ND		
1,2-Dichloropropane	ND				ND		
cis-1,3-Dichloropropene	ND				ND		
trans-1,3-Dichloropropene	ND				ND		
Methylene Chloride	ND				ND		
1,1,2,2-Tetrachloroethane	ND				ND		
Tetrachlorethene	ND				ND		

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
1,1,1-Trichloroethane	ND				ND		
1,1,2-Trichloroethane	ND				ND		
Trichloroethene	ND				ND		
Trichlorofluoromethane	ND				ND		
Vinyl Chloride	ND				ND		
AROMATICS							
Benzene	ND				ND		
Chlorobenzene	ND				ND		
1,2-Dichlorobenzene	ND				ND		
1,3-Dichlorobenzene	ND				ND		
1,4-Dichlorobenzene	ND				ND		
Ethylbenzene	ND				ND		
Methyl-t-Butyl Ether	ND				ND		
Toluene	ND				ND		
Total Xylenes	ND				ND		
<u>SHS-4</u>							
Lab pH	7						
Lab Conductivity @25 C	3160						
Total Dissolved Solids @ 180 C	2890						
Total Dissolved Solids (Calc)	2734						
Total Alkalinity as CaCO3	251						
Total Hardness as CaCO3	1312						
Bicarbonate as HCO3	306						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	43.2						
Sulfate	1728						
Calcium	463						
Magnesium	38.3						
Potassium	0.78						
Sodium	310						
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
<u>SHS-6</u>							
Lab pH	7						
Lab Conductivity @25 C	2940						
Total Dissolved Solids @ 180 C	2440						
Total Dissolved Solids (Calc)	2422						
Total Alkalinity as CaCO3	238						
Total Hardness as CaCO3	1101						
Bicarbonate as HCO3	291						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	61.9						
Sulfate	1457						
Calcium	391						
Magnesium	30.4						
Potassium	2.74						
Sodium	336						
HALOCARBONS							
Bromodichloromethane	ND						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
<u>SHS-10</u>							
Lab pH	7						
Lab Conductivity @25 C	3260						
Total Dissolved Solids @ 180 C	2650						
Total Dissolved Solids (Calc)	2646						
Total Alkalinity as CaCO3	331						
Total Hardness as CaCO3	1146						
Bicarbonate as HCO3	404						
Carbonate as CO3	ND						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Hydroxide	ND						
Chloride	172						
Sulfate	1416						
Calcium	357						
Magnesium	62						
Potassium	9.78						
Sodium	431						
HALOCARBONS							
Bromodichloromethane	ND	ND			ND	ND	
Bromoform	ND	ND			ND	ND	
Bromomethane	ND	ND			ND	ND	
Carbon Tetrachloride	ND	ND			ND	ND	
Chloroethane	ND	ND			ND	ND	
Chloroform	ND	ND			ND	ND	
Chloromethane	ND	ND			ND	ND	
Dibromochloromethane	0.3	ND			ND	ND	
1,2-Dibromoethane (EDB)	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
1,1-Dichloroethane	ND	ND			ND	ND	
1,2-Dichloroethane (EDC)	ND	ND			ND	ND	
1,1-Dichloroethene	ND	ND			ND	ND	
cis-1,2-Dichloroethene	ND	ND			ND	ND	
trans-1,2-Dichloroethene	ND	ND			ND	ND	
1,2-Dichloropropane	ND	ND			ND	ND	
cis-1,3-Dichloropropene	ND	ND			ND	ND	
trans-1,3-Dichloropropene	ND	ND			ND	ND	
Methylene Chloride	ND	ND			ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND			ND	ND	
Tetrachlorethene	ND	ND			ND	ND	
1,1,1-Trichloroethane	ND	ND			ND	ND	
1,1,2-Trichloroethane	0.2	ND			ND	ND	
Trichloroethene	0.5	ND			ND	ND	
Trichlorofluoromethane	ND	ND			ND	ND	
Vinyl Chloride	ND	ND			ND	ND	
AROMATICS							
Benzene	ND	1.6			ND	ND	
Chlorobenzene	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
Ethylbenzene	ND	ND			ND	ND	
Methyl-t-Butyl Ether	ND	ND			ND	ND	
Toluene	ND	1			ND	ND	
Total Xylenes	0.5	1.2			ND	ND	

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
<u>SHS-12</u>							
Lab pH	7.1						
Lab Conductivity @25 C	3550						
Total Dissolved Solids @ 180 C	2730						
Total Dissolved Solids (Calc)	2805						
Total Alkalinity as CaCO3	349						
Total Hardness as CaCO3	966						
Bicarbonate as HCO3	426						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	248						
Sulfate	1407						
Calcium	340						
Magnesium	28.3						
Potassium	1.96						
Sodium	570						
HALOCARBONS							
Bromodichloromethane	ND	ND			ND	ND	
Bromoform	ND	ND			ND	ND	
Bromomethane	ND	ND			ND	ND	
Carbon Tetrachloride	ND	ND			ND	ND	
Chloroethane	ND	ND			ND	ND	
Chloroform	ND	ND			ND	ND	
Chloromethane	ND	ND			ND	ND	
Dibromochloromethane	0.3	ND			ND	ND	
1,2-Dibromoethane (EDB)	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
1,1-Dichloroethane	ND	ND			ND	ND	
1,2-Dichloroethane (EDC)	ND	ND			ND	ND	
1,1-Dichloroethene	ND	ND			ND	ND	
cis-1,2-Dichloroethene	1.3	0.9			ND	ND	
trans-1,2-Dichloroethene	ND	ND			ND	ND	
1,2-Dichloropropane	ND	ND			ND	ND	
cis-1,3-Dichloropropene	ND	ND			ND	ND	
trans-1,3-Dichloropropene	ND	ND			ND	ND	
Methylene Chloride	ND	ND			ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND			ND	ND	
Tetrachloroethene	ND	ND			ND	ND	
1,1,1-Trichloroethane	ND	ND			ND	ND	
1,1,2-Trichloroethane	0.2	ND			ND	ND	
Trichloroethene	0.8	ND			ND	ND	
Trichlorofluoromethane	ND	ND			ND	ND	
Vinyl Chloride	ND	ND			ND	ND	
AROMATICS							

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Benzene	ND	ND			ND	ND	
Chlorobenzene	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
Ethylbenzene	ND	ND			ND	ND	
Methyl-t-Butyl Ether	ND	ND			ND	ND	
Toluene	ND	ND			ND	ND	
Total Xylenes	ND	ND			ND	ND	
<u>SHS-13</u>							
Lab pH	7						
Lab Conductivity @25 C	4290						
Total Dissolved Solids @ 180 C	3510						
Total Dissolved Solids (Calc)	3612						
Total Alkalinity as CaCO3	633						
Total Hardness as CaCO3	1666						
Bicarbonate as HCO3	772						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	275						
Sulfate	1765						
Calcium	568						
Magnesium	60.5						
Potassium	2.74						
Sodium	561						
HALOCARBONS							
Bromodichloromethane	ND	ND			ND	ND	
Bromoform	0.9	ND			ND	ND	
Bromomethane	ND	ND			ND	ND	
Carbon Tetrachloride	ND	ND			ND	ND	
Chloroethane	ND	ND			ND	ND	
Chloroform	ND	ND			ND	ND	
Chloromethane	ND	ND			ND	ND	
Dibromochloromethane	0.5	ND			ND	ND	
1,2-Dibromoethane (EDB)	0.7	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
1,1-Dichloroethane	ND	ND			ND	ND	
1,2-Dichloroethane (EDC)	4.8	3.7			2.1	2.8	
1,1-Dichloroethene	ND	ND			ND	ND	
cis-1,2-Dichloroethene	ND	ND			ND	ND	
trans-1,2-Dichloroethene	ND	ND			ND	ND	
1,2-Dichloropropane	ND	ND			ND	ND	
cis-1,3-Dichloropropene	ND	ND			ND	ND	
trans-1,3-Dichloropropene	ND	ND			ND	ND	

	JAN	APR	JUN	JUL	AUG	OCT	DEC
Methylene Chloride	ND	ND			ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND			ND	ND	
Tetrachlorethene	ND	ND			ND	ND	
1,1,1-Trichloroethane	ND	ND			ND	ND	
1,1,2-Trichloroethane	0.5	ND			ND	ND	
Trichloroethene	0.6	ND			ND	ND	
Trichlorofluoromethane	ND	ND			ND	ND	
Vinyl Chloride	ND	ND			ND	ND	
AROMATICS							
Benzene	ND	ND			ND	ND	
Chlorobenzene	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
Ethylbenzene	ND	ND			ND	ND	
Methyl-t-Butyl Ether	ND	ND			ND	ND	
Toluene	ND	ND			ND	ND	
Total Xylenes	ND	ND			ND	ND	
SHS-15							
Lab pH	6.9						
Lab Conductivity @25 C	2610						
Total Dissolved Solids @ 180 C	2180						
Total Dissolved Solids (Calc)	2081						
Total Alkalinity as CaCO3	289						
Total Hardness as CaCO3	1142						
Bicarbonate as HCO3	352						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	76.7						
Sulfate	1193						
Calcium	396						
Magnesium	37.5						
Potassium	1.56						
Sodium	203						
HALOCARBONS							
Bromodichloromethane	ND				ND		
Bromoform	ND				ND		
Bromomethane	ND				ND		
Carbon Tetrachloride	ND				ND		
Chloroethane	ND				ND		
Chloroform	1.2				2.7		
Chloromethane	ND				ND		
Dibromochloromethane	ND				ND		
1,2-Dibromoethane (EDB)	ND				ND		

	JAN	APR	JUN	JUL	AUG	OCT	DEC
1,2-Dichlorobenzene	ND				ND		
1,3-Dichlorobenzene	ND				ND		
1,4-Dichlorobenzene	ND				ND		
1,1-Dichloroethane	ND				ND		
1,2-Dichloroethane (EDC)	ND				ND		
1,1-Dichloroethene	ND				ND		
cis-1,2-Dichloroethene	ND				ND		
trans-1,2-Dichloroethene	ND				ND		
1,2-Dichloropropane	ND				ND		
cis-1,3-Dichloropropene	ND				ND		
trans-1,3-Dichloropropene	ND				ND		
Methylene Chloride	ND				ND		
1,1,2,2-Tetrachloroethane	ND				ND		
Tetrachlorethene	ND				ND		
1,1,1-Trichloroethane	ND				ND		
1,1,2-Trichloroethane	ND				ND		
Trichloroethene	ND				ND		
Trichlorofluoromethane	ND				ND		
Vinyl Chloride	ND				ND		
AROMATICS							
Benzene	ND				ND		
Chlorobenzene	ND				ND		
1,2-Dichlorobenzene	ND				ND		
1,3-Dichlorobenzene	ND				ND		
1,4-Dichlorobenzene	ND				ND		
Ethylbenzene	ND				ND		
Methyl-t-Butyl Ether	ND				ND		
Toluene	ND				ND		
Total Xylenes	ND				ND		
SHS-16							
Lab pH	6.9						
Lab Conductivity @25 C	2820						
Total Dissolved Solids @ 180 C	2430						
Total Dissolved Solids (Calc)	2330						
Total Alkalinity as CaCO3	289						
Total Hardness as CaCO3	1244						
Bicarbonate as HCO3	352						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	43.6						
Sulfate	1395						
Calcium	423						
Magnesium	45.9						
Potassium	1.56						
Sodium	248						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
HALOCARBONS							
Bromodichloromethane	ND	ND			ND	ND	
Bromoform	ND	ND			ND	ND	
Bromomethane	ND	ND			ND	ND	
Carbon Tetrachloride	ND	ND			ND	ND	
Chloroethane	ND	ND			ND	ND	
Chloroform	ND	ND			ND	ND	
Chloromethane	ND	ND			ND	ND	
Dibromochloromethane	ND	ND			ND	ND	
1,2-Dibromoethane (EDB)	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
1,1-Dichloroethane	ND	ND			ND	ND	
1,2-Dichloroethane (EDC)	ND	ND			ND	ND	
1,1-Dichloroethene	ND	ND			ND	ND	
cis-1,2-Dichloroethene	ND	ND			ND	ND	
trans-1,2-Dichloroethene	ND	ND			ND	ND	
1,2-Dichloropropane	ND	ND			ND	ND	
cis-1,3-Dichloropropene	ND	ND			ND	ND	
trans-1,3-Dichloropropene	ND	ND			ND	ND	
Methylene Chloride	ND	ND			ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND			ND	ND	
Tetrachlorethene	ND	ND			ND	ND	
1,1,1-Trichloroethane	ND	ND			ND	ND	
1,1,2-Trichloroethane	ND	ND			ND	ND	
Trichloroethene	ND	ND			ND	ND	
Trichlorofluoromethane	ND	ND			ND	ND	
Vinyl Chloride	ND	ND			ND	ND	
AROMATICS							
Benzene	ND	ND			ND	ND	
Chlorobenzene	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
Ethylbenzene	ND	ND			ND	ND	
Methyl-t-Butyl Ether	ND	ND			ND	ND	
Toluene	ND	ND			ND	ND	
Total Xylenes	ND	ND			ND	ND	
<u>SHS-17</u>							
Lab pH	7.1						
Lab Conductivity @25 C	3750						
Total Dissolved Solids @ 180 C	3160						
Total Dissolved Solids (Calc)	2850						
Total Alkalinity as CaCO3	276						
Total Hardness as CaCO3	1205						

	<u>JAN</u>	<u>APR</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>OCT</u>	<u>DEC</u>
Bicarbonate as HCO ₃	337						
Carbonate as CO ₃	ND						
Hydroxide	ND						
Chloride	191						
Sulfate	1576						
Calcium	402						
Magnesium	48.8						
Potassium	2.35						
Sodium	464						
HALOCARBONS							
Bromodichloromethane	ND	ND			ND	ND	
Bromoform	ND	ND			ND	ND	
Bromomethane	ND	ND			ND	ND	
Carbon Tetrachloride	ND	ND			ND	ND	
Chloroethane	ND	ND			ND	ND	
Chloroform	ND	ND			ND	ND	
Chloromethane	ND	ND			ND	ND	
Dibromochloromethane	ND	ND			ND	ND	
1,2-Dibromoethane (EDB)	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
1,1-Dichloroethane	ND	ND			ND	ND	
1,2-Dichloroethane (EDC)	ND	ND			ND	ND	
1,1-Dichloroethene	ND	ND			ND	ND	
cis-1,2-Dichloroethene	ND	ND			ND	ND	
trans-1,2-Dichloroethene	ND	ND			ND	ND	
1,2-Dichloropropane	ND	ND			ND	ND	
cis-1,3-Dichloropropene	ND	ND			ND	ND	
trans-1,3-Dichloropropene	ND	ND			ND	ND	
Methylene Chloride	ND	ND			ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND			ND	ND	
Tetrachlorethene	ND	ND			ND	ND	
1,1,1-Trichloroethane	ND	ND			ND	ND	
1,1,2-Trichloroethane	ND	ND			ND	ND	
Trichloroethene	ND	ND			ND	ND	
Trichlorofluoromethane	ND	ND			ND	ND	
Vinyl Chloride	ND	ND			ND	ND	
AROMATICS							
Benzene	ND	ND			ND	ND	
Chlorobenzene	ND	ND			ND	ND	
1,2-Dichlorobenzene	ND	ND			ND	ND	
1,3-Dichlorobenzene	ND	ND			ND	ND	
1,4-Dichlorobenzene	ND	ND			ND	ND	
Ethylbenzene	ND	ND			ND	ND	
Methyl-t-Butyl Ether	ND	ND			ND	ND	
Toluene	ND	ND			ND	ND	
Total Xylenes	ND	ND			ND	ND	

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JANUARY, 1997

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.07	62.07	0.00	5332.23
GRW-2	5391.28	48.49	48.49	0.00	5342.79
GRW-3	5388.77	51.32	51.32	0.00	5337.45
GRW-4	5390.02	50.65	50.65	0.00	5339.37
GRW-5	5390.56	51.10	51.10	0.00	5339.46
GRW-6	5390.81	51.10	51.10	0.00	5339.71
GRW-10	5395.02	57.85	57.85	0.00	5337.17
GRW-11	5397.85	52.57	52.57	0.00	5345.28
GRW-12	5397.24	43.40	43.40	0.00	5353.84
GRW-13	5396.90	56.80	56.80	0.00	5340.10
GBR-5	5395.07	38.70	38.28	0.42	5356.71
GBR-6	5395.70	61.50	61.50	0.00	5334.20
GBR-7	5395.85	31.19	31.18	0.01	5364.67
GBR-8	5390.50	43.52	43.52	0.00	5346.98
GBR-9	5389.92	47.85	47.85	0.00	5342.07
GBR-10	5390.57	42.44	42.44	0.00	5348.13
GBR-11	5389.43	42.85	42.83	0.02	5346.60
GBR-13	5393.04	41.72	41.72	0.00	5351.32
GBR-15	5397.99	42.20	42.20	0.00	5355.79
GBR-18	5421.68	31.02	31.02	0.00	5390.66
GBR-19	5393.83	42.43	41.27	1.16	5352.33
GBR-20	5393.47	39.89	39.80	0.09	5353.65
GBR-21S	5400.65	19.86	19.86	0.00	5380.79
GBR-21D	5400.19	32.70	32.70	0.00	5367.49
GBR-22	5395.91	38.11	38.10	0.01	5357.81
GBR-23	5403.72	22.76	22.75	0.01	5378.99
GBR-24S	5396.08	24.74	24.74	0.00	5364.72
GBR-24D	5396.77	31.36	31.36	0.00	5365.41
GBR-25	5396.72	32.07	32.07	0.00	5364.65
GBR-26	5395.59	38.24	38.24	0.00	5357.35
GBR-30	5396.58	34.73	34.73	0.00	5361.85
GBR-31	5394.86	37.20	37.20	0.00	5357.66
GBR-33	5396.28	40.25	40.25	0.00	5356.03
GBR-34	5394.00	38.45	37.60	0.85	5356.23
GBR-35	5393.66	37.90	37.57	0.33	5356.02
GBR-39	5397.55	0.00	0.00	0.00	5397.55
GBR-40	5400.76	29.26	29.26	0.00	5371.50
GBR-41	5396.35	22.88	22.88	0.00	5373.47
GBR-51	5389.68	42.75	42.75	0.00	5346.93
GBR-52	5387.74	41.30	41.30	0.00	5346.44

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JANUARY, 1997
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	42.57	42.45	0.12	5341.07
SHS-2	5381.66	36.70	36.70	0.00	5344.96
SHS-3	5383.33	36.50	36.50	0.00	5346.83
SHS-4	5383.62	42.40	42.40	0.00	5341.22
SHS-5	5378.36	39.34	39.34	0.00	5339.02
SHS-6	5378.17	39.60	39.60	0.00	5338.57
SHS-7	5375.89	48.45	48.45	0.00	5327.44
SHS-8	5380.25	39.99	39.99	0.00	5340.26
SHS-9	5380.79	40.91	40.85	0.06	5339.93
SHS-10	5373.80	37.15	37.15	0.00	5336.65
SHS-12	5373.94	40.65	40.65	0.00	5333.29
SHS-13	5367.81	37.53	37.53	0.00	5330.28
SHS-14	5367.07	45.36	45.36	0.00	5321.71
SHS-15	5366.21	34.20	34.20	0.00	5332.01
SHS-16	5362.58	32.10	32.10	0.00	5330.48
SHS-17	5364.35	34.16	34.16	0.00	5330.19
SHS-18	5373.64	40.90	40.76	0.14	5332.85

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

APRIL, 1997

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.53	62.53	0.00	5331.77
GRW-2	5391.28	47.65	47.65	0.00	5343.63
GRW-3	5388.77	50.00	50.00	0.00	5338.77
GRW-4	5390.02	54.45	54.45	0.00	5335.57
GRW-5	5390.56	47.26	47.26	0.00	5343.30
GRW-6	5390.81	58.10	58.10	0.00	5332.71
GRW-10	5395.02	53.26	53.26	0.00	5341.76
GRW-11	5397.85	63.00	63.00	0.00	5334.85
GRW-12	5397.24	44.48	44.48	0.00	5352.76
GRW-13	5396.90	53.73	53.73	0.00	5343.17
GBR-5	5395.07	29.02	28.74	0.28	5366.27
GBR-6	5395.70	58.10	58.10	0.00	5337.60
GBR-7	5395.85	32.28	31.65	0.63	5364.07
GBR-8	5390.50	44.15	43.82	0.33	5346.61
GBR-9	5389.92	49.18	49.18	0.00	5340.74
GBR-10	5390.57	42.45	42.45	0.00	5348.12
GBR-11	5389.43	43.60	43.07	0.53	5346.25
GBR-13	5393.04	42.06	42.06	0.00	5350.98
GBR-15	5397.99	42.05	42.05	0.00	5355.94
GBR-18	5421.68	31.26	31.26	0.00	5390.42
GBR-19	5393.83	43.50	41.45	2.05	5351.97
GBR-20	5393.47	41.10	40.29	0.81	5353.02
GBR-21S	5400.65	19.92	19.90	0.02	5380.75
GBR-21D	5400.19	36.38	36.38	0.00	5363.81
GBR-22	5395.91	38.84	38.74	0.10	5357.15
GBR-23	5403.72	23.07	23.07	0.00	5378.53
GBR-24S	5396.08	25.19	25.19	0.00	5364.52
GBR-24D	5396.77	31.56	31.56	0.00	5365.21
GBR-25	5396.72	32.67	32.67	0.00	5364.05
GBR-26	5395.59	38.02	38.02	0.00	5357.57
GBR-30	5396.58	34.45	34.45	0.00	5362.13
GBR-31	5394.86	37.27	37.27	0.00	5357.59
GBR-33	5396.28	39.13	39.13	0.00	5357.15
GBR-34	5394.00	38.54	37.65	0.89	5356.17
GBR-35	5393.66	39.74	37.70	2.04	5355.55
GBR-39	5397.55	0.00	0.00	0.00	5397.55
GBR-40	5400.76	30.10	30.10	0.00	5370.66
GBR-41	5396.35	22.59	22.59	0.00	5373.76
GBR-51	5389.68	42.90	42.90	0.00	5346.78
GBR-52	5387.74	41.45	41.45	0.00	5346.29

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 APRIL, 1997
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	42.35	42.35	0.00	5341.19
SHS-2	5381.66	36.49	36.49	0.00	5345.17
SHS-3	5383.33	38.23	38.23	0.00	5345.10
SHS-4	5383.62	42.33	42.33	0.00	5341.29
SHS-5	5378.36	39.14	39.14	0.00	5339.22
SHS-6	5378.17	39.42	39.42	0.00	5338.75
SHS-7	5375.89	38.91	38.91	0.00	5336.98
SHS-8	5380.25	38.92	38.92	0.00	5341.33
SHS-9	5380.79	45.14	45.14	0.00	5335.65
SHS-10	5373.80	36.53	36.53	0.00	5337.27
SHS-12	5373.94	40.20	40.20	0.00	5333.74
SHS-13	5367.81	38.81	38.81	0.00	5329.00
SHS-14	5367.07	44.17	44.17	0.00	5322.90
SHS-15	5366.21	33.70	33.70	0.00	5332.51
SHS-16	5362.58	31.62	31.62	0.00	5330.96
SHS-17	5364.35	33.57	33.57	0.00	5330.78
SHS-18	5373.64	40.18	40.18	0.00	5333.46

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JULY, 1997

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.46	61.46	0.00	5332.84
GRW-2	5391.28	46.34	46.34	0.00	5344.94
GRW-3	5388.77	45.46	45.42	0.04	5343.34
GRW-4	5390.02	55.20	55.20	0.00	5334.82
GRW-5	5390.56	66.40	66.40	0.00	5324.16
GRW-6	5390.81	49.13	49.13	0.00	5341.68
GRW-10	5395.02	53.36	53.36	0.00	5341.66
GRW-11	5397.85	49.57	49.57	0.00	5348.28
GRW-12	5397.24	39.73	39.73	0.00	5357.51
GRW-13	5396.90	40.40	40.40	0.00	5356.50
GBR-5	5395.07	27.70	27.70	0.00	5367.37
GBR-6	5395.70	58.15	58.15	0.00	5337.55
GBR-7	5395.85	31.30	30.66	0.64	5365.06
GBR-8	5390.50	43.10	43.10	0.00	5347.40
GBR-9	5389.92	48.16	48.16	0.00	5341.76
GBR-10	5390.57	42.45	42.45	0.00	5348.12
GBR-11	5389.43	42.89	42.49	0.40	5346.86
GBR-13	5393.04	41.15	41.15	0.00	5351.89
GBR-15	5397.99	39.57	39.57	0.00	5358.42
GBR-18	5421.68	32.25	32.25	0.00	5389.43
GBR-19	5393.83	42.53	40.79	1.74	5352.69
GBR-20	5393.47	40.50	39.74	0.76	5353.58
GBR-21S	5400.65	20.09	20.09	0.00	5380.56
GBR-21D	5400.19	34.53	34.53	0.00	5365.66
GBR-22	5395.91	38.11	38.05	0.06	5357.85
GBR-23	5403.72	23.23	23.23	0.00	5379.02
GBR-24S	5396.08	24.70	24.70	0.00	5365.70
GBR-24D	5396.77	30.38	30.38	0.00	5366.39
GBR-25	5396.72	32.62	32.62	0.00	5364.10
GBR-26	5395.59	36.33	36.33	0.00	5359.26
GBR-30	5396.58	34.24	34.24	0.00	5362.34
GBR-31	5394.86	36.68	36.68	0.00	5358.18
GBR-33	5396.28	39.72	39.72	0.00	5356.56
GBR-34	5394.00	37.20	37.18	0.02	5356.82
GBR-35	5393.66	37.45	37.43	0.02	5356.23
GBR-39	5397.55	38.65	38.65	0.00	5358.90
GBR-40	5400.76	28.96	28.96	0.00	5371.80
GBR-41	5396.35	22.20	22.20	0.00	5374.15
GBR-51	5389.68	42.31	42.31	0.00	5347.37
GBR-52	5387.74	40.83	40.83	0.00	5346.91

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 1997
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	42.25	42.10	0.15	5341.41
SHS-2	5381.66	37.70	37.70	0.00	5343.96
SHS-3	5383.33	35.85	35.85	0.00	5347.48
SHS-4	5383.62	42.04	42.04	0.00	5341.58
SHS-5	5378.36	39.00	39.00	0.00	5339.36
SHS-6	5378.17	39.26	39.26	0.00	5338.91
SHS-7	5375.89	45.90	45.90	0.00	5329.99
SHS-8	5380.25	42.15	39.10	3.05	5340.54
SHS-9	5380.79	44.20	44.20	0.00	5336.59
SHS-10	5373.80	37.09	37.09	0.00	5336.71
SHS-12	5373.94	40.20	40.20	0.00	5333.74
SHS-13	5367.81	36.81	36.81	0.00	5331.00
SHS-14	5367.07	45.84	45.84	0.00	5321.23
SHS-15	5366.21	33.96	33.96	0.00	5332.25
SHS-16	5362.58	31.73	31.73	0.00	5330.85
SHS-17	5364.35	33.65	33.65	0.00	5330.70
SHS-18	5373.64	40.30	40.25	0.05	5333.38

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

OCTOBER, 1997

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.14	61.14	0.00	5333.16
GRW-2	5391.28	44.90	44.90	0.00	5346.38
GRW-3	5388.77	53.74	53.74	0.00	5335.03
GRW-4	5390.02	55.82	55.82	0.00	5334.20
GRW-5	5390.56	60.25	60.25	0.00	5330.31
GRW-6	5390.81	51.78	51.78	0.00	5339.03
GRW-10	5395.02	54.42	54.42	0.00	5340.60
GRW-11	5397.85	51.15	51.15	0.00	5346.70
GRW-12	5397.24	44.93	44.93	0.00	5352.31
GRW-13	5396.90	50.76	50.76	0.00	5346.14
GBR-5	5395.07	27.87	27.85	0.02	5367.22
GBR-6	5395.70	59.90	59.90	0.00	5335.80
GBR-7	5395.85	31.58	30.90	0.68	5364.81
GBR-8	5390.50	42.53	42.53	0.00	5347.97
GBR-9	5389.92	48.35	48.35	0.00	5341.57
GBR-10	5390.57	42.45	42.45	0.00	5348.12
GBR-11	5389.43	42.90	42.00	0.90	5347.25
GBR-13	5393.04	40.61	40.61	0.00	5352.43
GBR-15	5397.99	39.98	39.98	0.00	5358.01
GBR-18	5421.68	32.30	32.30	0.00	5389.38
GBR-19	5393.83	41.41	40.41	1.00	5353.22
GBR-20	5393.47	39.77	39.77	0.00	5353.70
GBR-21S	5400.65	21.25	21.25	0.00	5379.40
GBR-21D	5400.19	30.27	30.27	0.00	5369.92
GBR-22	5395.91	37.51	37.47	0.04	5358.43
GBR-23	5403.72	23.62	23.62	0.00	5377.04
GBR-24S	5396.08	26.68	26.68	0.00	5365.74
GBR-24D	5396.77	30.34	30.34	0.00	5366.43
GBR-25	5396.72	32.45	32.45	0.00	5364.27
GBR-26	5395.59	35.90	35.90	0.00	5359.69
GBR-30	5396.58	34.17	34.17	0.00	5362.41
GBR-31	5394.86	36.35	36.35	0.00	5358.51
GBR-33	5396.28	33.27	33.27	0.00	5363.01
GBR-34	5394.00	36.83	36.81	0.02	5357.19
GBR-35	5393.66	36.79	36.79	0.00	5356.87
GBR-39	5397.55	38.13	38.13	0.00	5359.42
GBR-40	5400.76	30.01	30.01	0.00	5370.75
GBR-41	5396.35	23.44	23.44	0.00	5372.91
GBR-51	5389.68	41.83	41.83	0.00	5347.85
GBR-52	5387.74	40.35	40.35	0.00	5347.39

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 1997
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.93	41.80	0.13	5341.71
SHS-2	5381.66	40.02	40.02	0.00	5341.64
SHS-3	5383.33	36.07	36.07	0.00	5347.26
SHS-4	5383.62	41.90	41.90	0.00	5341.72
SHS-5	5378.36	38.85	38.85	0.00	5339.51
SHS-6	5378.17	39.05	39.05	0.00	5339.12
SHS-7	5375.89	48.50	48.50	0.00	5327.39
SHS-8	5380.25	41.60	38.95	2.65	5340.77
SHS-9	5380.79	42.80	42.80	0.00	5337.99
SHS-10	5373.80	37.15	37.15	0.00	5336.65
SHS-12	5373.94	40.26	40.26	0.00	5333.68
SHS-13	5367.81	36.95	36.95	0.00	5330.86
SHS-14	5367.07	45.40	45.40	0.00	5321.67
SHS-15	5366.21	33.00	33.00	0.00	5333.21
SHS-16	5362.58	31.80	31.80	0.00	5330.78
SHS-17	5364.35	33.77	33.77	0.00	5330.58
SHS-18	5373.64	40.53	40.53	0.00	5333.11

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
VOLUME CHANGE**

1997

Tank Number	Beginning Volume	Ending Volume	Net Change
102	12,221	9,508	(2,713)
106	8,010	8,010	0
21	229,768	230,133	365
22	228,204	246,237	18,033
Total Net Volume Change			15,685

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
RECOVERY WELL
VOLUME TABULATION**

1997

Well	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
GRW-1	20,430	27,920	40,030	38,704	127,084
GRW-2	12,360	8,730	20,930	7,162	49,182
GRW-3	23,240	18,820	31,560	36,680	110,300
GRW-4	73,420	96,180	104,850	93,646	368,096
GRW-5	80,690	75,430	125,130	124,800	406,050
GRW-6	29,850	51,190	85,200	86,760	253,000
GRW-9	20,620	30,020	34,690	17,010	102,340
GRW-10	367,360	611,000	589,280	637,830	2,205,470
GRW-11	88,690	127,260	95,600	92,120	403,670
GRW-12	7,150	4,500	740	13,530	25,920
GRW-13	23,160	20,780	19,260	17,990	81,190
SHS-7	32,389	20,684	67,352	61,471	181,896
SHS-9	6,928	4,177	11,231	10,879	33,215
SHS-14	241,407	418,401	467,378	436,650	1,563,836
SHS-18	599	650	665	619	2,533
TOTAL VOLUME PUMPED IN GALLONS					5,913,782

4.1

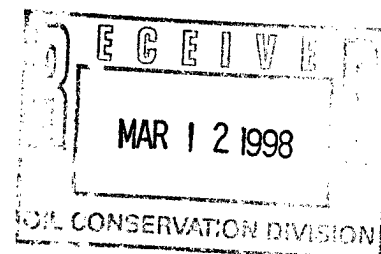


111 Road 4990
Bloomfield, New Mexico 87413

505
632.8006

February 5, 1998

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
2040 South Pacheco Street
Santa Fe, NM 87505



Dear Mr. Olson:

Enclosed you will find four potentiometric surface maps for 1997 which I failed to enclose in the Annual Report for Bloomfield Refinery. I apologize for this error.

Sincerely,

A handwritten signature in cursive script that reads "Deanna Miller".

Deanna Miller
Administrative Manager
Giant Transportation

/dm

Enclosures

cc w/enc.: Mike Hardy-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

GW - 40

MONITORING REPORTS

DATE:

1997-1995

GW - 40

MONITORING REPORTS

DATE:

1997-1995

GW - 40

MONITORING REPORTS

DATE:

1997-1995

GW - 40

MONITORING REPORTS

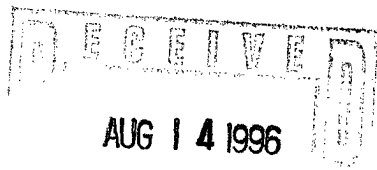
DATE:

1997-1995

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

1997

Total Volume Of Water Recovered	5,913,782
Net Change In Storage Volume	<u>15,685</u>
Total Water Treated And Pumped To The Infiltration Gallery	<u><u>5,898,097</u></u>



5764 US Highway 64
Farmington, New Mexico
87401

505-632-8006

August 1, 1996

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

I have enclosed additions to Section 2 of Giant Refinery's first quarter of 1996 report showing the analytical results for the offsite wells. These results were inadvertently left out of the original report.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Deanna Miller". The signature is written in dark ink and is positioned above the printed name and title.

Deanna Miller
Administrative Manager

/dm

Enclosure

cc w/enc.: Mike Hardy-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

SHS-10**HALOCARBONS**

April

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-12**HALOCARBONS**

April

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	0.6
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-13**HALOCARBONS**

April

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.3
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	5.2
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-16**HALOCARBONS**

April

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-17

HALOCARBONS

April

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FIRST QUARTER, 1996

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505) 632-8006
FAX (505) 632-4025

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INTRODUCTION AND SUMMARY QUARTERLY REPORT FIRST QUARTER, 1996

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT INDUSTRIES
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FIRST QUARTER, 1996**

SYSTEM EFFLUENT**HALOCARBONS**

	January	March
Bromodichloromethane	ND	ND
Bromoform	ND	ND
Bromomethane	ND	ND
Carbon Tetrachloride	ND	ND
Chloroethane	ND	ND
Chloroform	ND	ND
Chloromethane	ND	ND
Dibromochloromethane	ND	ND
1,2-Dibromoethane (EDB)	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
1,1-Dichloroethane	ND	ND
1,2-Dichloroethane (EDC)	ND	ND
1,1-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	ND	ND
trans-1,2-Dichloroethene	ND	ND
1,2-Dichloropropane	ND	ND
cis-1,3-Dichloropropene	ND	ND
trans-1,3-Dichloropropene	ND	ND
Methylene Chloride	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachlorethene	ND	ND
1,1,1-Trichloroethane	ND	ND
1,1,2-Trichloroethane	ND	ND
Trichloroethene	ND	ND
Trichlorofluoromethane	ND	ND
Vinyl Chloride	ND	ND

AROMATICS

Benzene	8.8	3.0
Chlorobenzene	ND	ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene	9.9	0.9
Methyl-t-Butyl Ether	ND	ND
Toluene	ND	ND
Total Xylenes	18	0.5

SYSTEM EFFLUENT (C'T'D)**POLYNUCLEAR AROMATIC HYDROCARBONS**

	January	March
Naphthalene	1.4	ND
Acenaphthylene	ND	ND
1-Methylnaphthalene	3	ND
2-Methylnaphthalene	1.5	ND
Acenaphthene	ND	ND
Fluorene	0.15	ND
Phenanthrene	0.17	ND
Anthracene	ND	ND
Fluoranthene	ND	ND
Pyrene	ND	ND
Benzo(a)anthracene	ND	ND
Chrysene	ND	ND
Benzo(b)fluoranthrene	ND	ND
Benzo(k)fluoranthrene	ND	ND
Benzo(a)pyrene	ND	ND
Dibenzo(a,h)anthracene	ND	ND
Benzo(g,h,i)perylene	ND	ND
Indeno(1,2,3-c,d)pyrene	ND	ND

SYSTEM INFLUENT**HALOCARBONS**

	January	February	March
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon Tetrachloride	ND		
Chloroethane	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane (EDC)	ND		
1,1-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene Chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachlorethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl Chloride	ND		

AROMATICS

Benzene	33
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	64
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	120

SYSTEM INFLUENT (C'T'D)**POLYNUCLEAR AROMATIC HYDROCARBONS**

	January
Naphthalene	17
Acenaphthylene	ND
1-Methylnaphthalene	33
2-Methylnaphthalene	26
Acenaphthene	ND
Fluorene	3.2
Phenanthrene	3.8
Anthracene	ND
Fluoranthene	1.4
Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthrene	ND
Benzo(k)fluoranthrene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

RW-3**HALOCARBONS**

January

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

RW-3

POLYNUCLEAR AROMATIC HYDROCARBONS

January

Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	0.74 J
Acenaphthene	ND
Fluorene	0.26
Phenanthrene	0.15
Anthracene	ND
Fluoranthene	0.077 J
Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthrene	ND
Benzo(k)fluoranthrene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

RW-6

HALOCARBONS

January

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.3
1,2-Dichloroethane (EDC)	2.4
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	0.6
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	<0.2 D(1)
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

RW-6 (C'T'D')

POLYNUCLEAR AROMATIC HYDROCARBONS

January

Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	3.1
Acenaphthene	ND
Fluorene	0.26
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	0.12
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthrene	ND
Benzo(k)fluoranthrene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

RW-13**HALOCARBONS**

January

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	6.0
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	0.4
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

RW-13 (C'T'D)

POLYNUCLEAR AROMATIC HYDROCARBONS

January

Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthrene	ND
Benzo(k)fluoranthrene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

GBR-15

HALOCARBONS

January

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	0.7
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	6.4
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	0.7
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	0.7

GBR-24D**HALOCARBONS**

January

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	0.6
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	2.6
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GBR-24D (C'T'D)

POLYNUCLEAR AROMATIC HYDROCARBONS

January

Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Acenaphthene	ND
Fluorene	0.85
Phenanthrene	0.33
Anthracene	ND
Fluoranthene	0.18
Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	0.040 J
Benzo(b)fluoranthrene	ND
Benzo(k)fluoranthrene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

GBR-31

HALOCARBONS

January

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GBR-31 (C'T'D')

POLYNUCLEAR AROMATIC HYDROCARBONS

January

Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthrene	ND
Benzo(k)fluoranthrene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

GBR-30

POLYNUCLEAR AROMATIC HYDROCARBONS

January

Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthrene	ND
Benzo(k)fluoranthrene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

GBR-51

HALOCARBONS

January

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GBR-52

HALOCARBONS

January

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GBR 52 (C'T'D')

POLYNUCLEAR AROMATIC HYDROCARBONS

	January
Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthrene	ND
Benzo(k)fluoranthrene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

GW - 40

MONITORING REPORTS

DATE:

1997-1995

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

DECEMBER, 1995

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.88	61.88	0.00	5332.42
GRW-2	5391.28	51.51	51.51	0.00	5339.77
GRW-3	5388.77	54.49	54.49	0.00	5334.28
GRW-4	5390.02	55.91	55.91	0.00	5334.11
GRW-5	5390.56	50.44	50.44	0.00	5340.12
GRW-6	5390.81	51.29	51.29	0.00	5339.52
GRW-10	5395.02	54.40	49.00	5.40	5344.94
GRW-11	5397.85	63.00	63.00	0.00	5334.85
GRW-12	5397.24	45.70	45.70	0.00	5351.54
GRW-13	5396.90	55.55	55.55	0.00	5341.35
GBR-5	5395.07	43.50	41.44	2.06	5353.22
GBR-6	5395.70	58.33	58.33	0.00	5337.37
GBR-7	5395.85	36.80	35.93	0.87	5359.75
GBR-8	5390.50	44.01	44.00	0.01	5346.50
GBR-9	5389.92	49.82	49.82	0.00	5340.10
GBR-10	5390.57	42.39	42.39	0.00	5348.18
GBR-11	5389.43	42.25	42.25	0.00	5347.18
GBR-13	5393.04	42.87	42.87	0.00	5350.17
GBR-15	5397.99	41.82	41.82	0.00	5356.17
GBR-18	5421.68	30.59	30.59	0.00	5391.09
GBR-19	5393.83	42.60	40.73	1.87	5352.73
GBR-20	5393.47	42.68	42.68	0.00	5350.79
GBR-21S	5400.65	19.60	19.60	0.00	5381.05
GBR-21D	5400.19	31.30	31.30	0.00	5368.89
GBR-22	5395.91	36.90	36.60	0.30	5359.25
GBR-23	5403.72	22.28	22.26	0.02	5381.14
GBR-24S	5396.08	22.63	22.60	0.03	5366.80
GBR-24D	5396.77	29.30	29.30	0.00	5367.47
GBR-25	5396.72	30.75	30.75	0.00	5365.97
GBR-26	5395.59	37.93	37.93	0.00	5357.66
GBR-30	5396.58	34.35	34.35	0.00	5362.23
GBR-31	5394.86	36.10	36.10	0.00	5358.76
GBR-33	5396.28	39.10	39.10	0.00	5357.18
GBR-34	5394.00	37.95	36.45	1.50	5357.25
GBR-35	5393.66	38.50	36.60	1.90	5356.68
GBR-39	5397.55	40.75	40.75	0.00	5356.80
GBR-40	5400.76	32.60	32.60	0.00	5368.16
GBR-41	5396.35	29.59	29.59	0.00	5366.76
GBR-51	5389.68	42.43	42.43	0.00	5347.25
GBR-52	5387.74	40.85	40.85	0.00	5346.89

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 DECEMBER, 1995
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	42.40	42.26	0.14	5341.25
SHS-2	5381.66	37.44	37.44	0.00	5344.22
SHS-3	5383.33	36.67	36.67	0.00	5346.66
SHS-4	5383.62	32.26	32.26	0.00	5351.36
SHS-5	5378.36	39.24	39.24	0.00	5339.12
SHS-6	5378.17	39.50	39.50	0.00	5338.67
SHS-7	5375.89	44.50	44.45	0.05	5331.43
SHS-8	5380.25	39.82	39.82	0.00	5340.43
SHS-9	5380.79	41.50	41.50	0.00	5339.29
SHS-10	5373.80	37.26	37.26	0.00	5336.54
SHS-12	5373.94	41.71	41.71	0.00	5332.23
SHS-13	5367.81	37.39	37.39	0.00	5330.42
SHS-14	5367.07	44.11	44.11	0.00	5322.96
SHS-15	5366.21	34.39	34.39	0.00	5331.82
SHS-16	5362.58	32.23	32.23	0.00	5330.35
SHS-17	5364.35	34.21	34.21	0.00	5330.14
SHS-18	5373.64	40.79	40.79	0.00	5332.85

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY VOLUME CHANGE**

FIRST QUARTER, 1996

Tank Number	Beginning Volume	Ending Volume	Net Change
102	13,733	11,691	(2,042)
106	8,010	8,010	0
21	67,472	67,472	0
22	265,008	212,927	(52,081)
Total Net Volume Change			(54,123)

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY RECOVERY WELL
VOLUME TABULATION**

FIRST QUARTER, 1996

Well	Month #1	Month #2	Month #3	Total
GRW-1	6,740	6,890	5,090	18,720
GRW-2	11,320	12,340	2,810	26,470
GRW-3	8,260	5,770	9,170	23,200
GRW-4	10,090	13,510	12,190	35,790
GRW-5	10	13,630	25,030	38,670
GRW-6	5,480	14,530	10,930	30,940
GRW-9	1,020	960	1,440	3,420
GRW-10	277,830	268,270	252,490	798,590
GRW-11	62,760	67,510	37,640	167,910
GRW-12	4,230	7,620	6,500	18,350
GRW-13	8,680	9,640	7,500	25,820
SHS-7	7,027	3,347	121	10,495
SHS-9	6,522	6,893	5,355	18,770
SHS-14	154,451	183,648	146,617	484,716
SHS-18	722	399	286	1,407
TOTAL VOLUME PUMPED IN GALLONS				1,703,268

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

FIRST QUARTER, 1996

Total Volume Of Water Recovered	1,703,268
Net Change In Storage Volume	<u>(54,123)</u>
Total Water Treated And Pumped To The Infiltration Gallery	<u>1,757,391</u>



5764 US Highway 64
Farmington, New Mexico
87401

505-632-8006

October 31, 1996

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the third quarter of 1996.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Tim Kinney". The signature is fluid and cursive, with a long horizontal stroke extending from the end of the name.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Mike Hardy-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
THIRD QUARTER, 1996

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505) 632-8006
FAX (505) 632-4025

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Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps.....	Section 3
Total Volume History	Section 4

INTRODUCTION AND SUMMARY QUARTERLY REPORT THIRD QUARTER, 1996

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT INDUSTRIES
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
THIRD QUARTER, 1996**

SYSTEM EFFLUENT

JULY

Lab pH	7.1
Lab Conductivity @25 C	3150
Total Dissolved Solids @ 180 C	2700
Total Dissolved Solids (Calc)	2576
Total Alkalinity as CaCO ₃	392
Total Hardness as CaCO ₃	1082
Bicarbonate as HCO ₃	478
Carbonate as CO ₃	ND
Hydroxide	ND
Chloride	178
Sulfate	1350
Calcium	379
Magnesium	32.8
Potassium	2.74
Sodium	403

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	0.3
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND

Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	2.3
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SYSTEM INFLUENT

JULY

Lab pH	7.2
Lab Conductivity @25 C	3170
Total Dissolved Solids @ 180 C	2650
Total Dissolved Solids (Calc)	2616
Total Alkalinity as CaCO ₃	390
Total Hardness as CaCO ₃	1099
Bicarbonate as HCO ₃	476
Carbonate as CO ₃	ND
Hydroxide	ND
Chloride	180
Sulfate	1360
Calcium	385
Magnesium	33.9
Potassium	3.13
Sodium	419

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND

1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	0.5
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	0.8
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	34
Methyl-t-Butyl Ether	ND
Toluene	0.5
Total Xylenes	25

GBR-15**HALOCARBONS**

JULY

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	7.7
1,1-Dichloroethene	ND

cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	0.8
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	0.5
Total Xylenes	2

GBR-17

JULY

Lab pH	ND
Lab Conductivity @25 C	ND
Total Dissolved Solids @ 180 C	ND
Total Dissolved Solids (Calc)	ND
Total Alkalinity as CaCO3	ND
Total Hardness as CaCO3	ND
Bicarbonate as HCO3	ND
Carbonate as CO3	ND
Hydroxide	ND
Chloride	ND
Sulfate	ND
Calcium	ND
Magnesium	ND
Potassium	ND
Sodium	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND

Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GBR-24D**HALOCARBONS**

	JULY
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND

1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	1.5
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	2.4
Methyl-t-Butyl Ether	ND
Toluene	0.6
Total Xylenes	0.7

GBR-30**HALOCARBONS**

JULY

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND

1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GBR-31**HALOCARBONS**

	JULY
Bromodichloromethane	ND
Bromoform	ND

Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

GBR-32

JULY

Lab pH	ND
Lab Conductivity @25 C	ND
Total Dissolved Solids @ 180 C	ND
Total Dissolved Solids (Calc)	ND
Total Alkalinity as CaCO3	ND
Total Hardness as CaCO3	ND
Bicarbonate as HCO3	ND
Carbonate as CO3	ND
Hydroxide	ND
Chloride	ND
Sulfate	ND
Calcium	ND
Magnesium	ND
Potassium	ND
Sodium	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND

Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GBR-48

JULY

Lab pH	ND
Lab Conductivity @25 C	ND
Total Dissolved Solids @ 180 C	ND
Total Dissolved Solids (Calc)	ND
Total Alkalinity as CaCO3	ND
Total Hardness as CaCO3	ND
Bicarbonate as HCO3	ND

Carbonate as CO ₃	ND
Hydroxide	ND
Chloride	ND
Sulfate	ND
Calcium	ND
Magnesium	ND
Potassium	ND
Sodium	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND

Toluene	ND
Total Xylenes	ND

GBR-49

JULY

Lab pH	ND
Lab Conductivity @25 C	ND
Total Dissolved Solids @ 180 C	ND
Total Dissolved Solids (Calc)	ND
Total Alkalinity as CaCO ₃	ND
Total Hardness as CaCO ₃	ND
Bicarbonate as HCO ₃	ND
Carbonate as CO ₃	ND
Hydroxide	ND
Chloride	ND
Sulfate	ND
Calcium	ND
Magnesium	ND
Potassium	ND
Sodium	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND

Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GBR-50

JULY

Lab pH	ND
Lab Conductivity @25 C	ND
Total Dissolved Solids @ 180 C	ND
Total Dissolved Solids (Calc)	ND
Total Alkalinity as CaCO3	ND
Total Hardness as CaCO3	ND
Bicarbonate as HCO3	ND
Carbonate as CO3	ND
Hydroxide	ND
Chloride	ND
Sulfate	ND
Calcium	ND
Magnesium	ND
Potassium	ND
Sodium	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND

cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-10**HALOCARBONS****JULY**

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND

cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-12**HALOCARBONS**

	JULY
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-15**HALOCARBONS**

JULY

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-16**HALOCARBONS**

JULY

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND

Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-17**HALOCARBONS**

	JULY
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND

Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

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MONITORING REPORTS

DATE:

1997-1995

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JULY, 1996

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.30	62.30	0.00	5332.00
GRW-2	5391.28	49.86	49.86	0.00	5341.42
GRW-3	5388.77	52.53	52.53	0.00	5336.24
GRW-4	5390.02	57.58	57.53	0.05	5332.48
GRW-5	5390.56	64.87	64.87	0.00	5325.69
GRW-6	5390.81	51.90	51.90	0.00	5338.91
GRW-10	5395.02	47.60	47.60	0.00	5347.42
GRW-11	5397.85	45.60	45.60	0.00	5352.25
GRW-12	5397.24	46.20	46.20	0.00	5351.04
GRW-13	5396.90	48.92	48.92	0.00	5347.98
GBR-5	5395.07	45.55	45.45	0.10	5349.60
GBR-6	5395.70	59.95	59.95	0.00	5335.75
GBR-7	5395.85	42.48	42.00	0.48	5353.75
GBR-8	5390.50	46.00	44.60	1.40	5345.62
GBR-9	5389.92	49.49	49.49	0.00	5340.43
GBR-10	5390.57	42.42	42.42	0.00	5348.15
GBR-11	5389.43	44.62	43.78	0.84	5345.48
GBR-13	5393.04	43.87	43.37	0.50	5349.57
GBR-15	5397.99	39.51	39.51	0.00	5358.48
GBR-18	5421.68	31.12	31.12	0.00	5390.56
GBR-19	5393.83	42.77	41.22	1.55	5352.30
GBR-20	5393.47	43.70	43.70	0.00	5349.77
GBR-21S	5400.65	19.83	19.78	0.05	5380.86
GBR-21D	5400.19	29.53	29.53	0.00	5370.66
GBR-22	5395.91	38.75	36.90	1.85	5358.64
GBR-23	5403.72	22.44	22.44	0.00	5380.67
GBR-24S	5396.08	23.05	23.05	0.00	5366.36
GBR-24D	5396.77	29.72	29.72	0.00	5367.05
GBR-25	5396.72	31.10	31.10	0.00	5365.62
GBR-26	5395.59	36.85	36.85	0.00	5358.74
GBR-30	5396.58	34.28	34.28	0.00	5362.30
GBR-31	5394.86	36.42	36.42	0.00	5358.44
GBR-33	5396.28	34.44	34.44	0.00	5361.84
GBR-34	5394.00	38.60	36.88	1.72	5356.78
GBR-35	5393.66	38.98	37.02	1.96	5356.25
GBR-39	5397.55	39.74	39.74	0.00	5357.81
GBR-40	5400.76	32.95	32.95	0.00	5367.81
GBR-41	5396.35	27.67	27.67	0.00	5368.68
GBR-51	5389.68	42.84	42.84	0.00	5346.84
GBR-52	5387.74	41.30	41.30	0.00	5346.44

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 1996
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	42.73	42.55	0.18	5340.95
SHS-2	5381.66	37.38	36.99	0.39	5344.59
SHS-3	5383.33	37.19	37.19	0.00	5346.14
SHS-4	5383.62	42.48	42.48	0.00	5341.14
SHS-5	5378.36	39.45	39.45	0.00	5338.91
SHS-6	5378.17	39.70	39.70	0.00	5338.47
SHS-7	5375.89	41.80	41.80	0.00	5334.09
SHS-8	5380.25	40.10	40.10	0.00	5340.15
SHS-9	5380.79	44.93	44.86	0.07	5335.92
SHS-10	5373.80	37.63	37.63	0.00	5336.17
SHS-12	5373.94	40.85	40.85	0.00	5333.09
SHS-13	5367.81	37.52	37.52	0.00	5330.29
SHS-14	5367.07	46.00	46.00	0.00	5321.07
SHS-15	5366.21	34.59	34.59	0.00	5331.62
SHS-16	5362.58	32.33	32.33	0.00	5330.25
SHS-17	5364.35	34.25	34.25	0.00	5330.10
SHS-18	5373.64	40.80	40.80	0.00	5332.84

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY VOLUME CHANGE**

THIRD QUARTER, 1996

Tank Number	Beginning Volume	Ending Volume	Net Change
102	12,916	9,944	2,972
106	8,010	8,010	0
21	230,133	230,133	0
22	252,739	254,334	(1,595)
Total Net Volume Change			1,377

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY RECOVERY WELL
VOLUME TABULATION**

THIRD QUARTER, 1996

Well	Month #1	Month #2	Month #3	Total
GRW-1	4,580	6,330	6,060	16,970
GRW-2	5,124	6,550	5,600	17,274
GRW-3	7,920	10,160	8,490	26,570
GRW-4	14,410	19,960	21,060	55,430
GRW-5	20,210	29,080	15,520	64,810
GRW-6	10,440	13,620	6,960	31,020
GRW-9	1,770	4,250	4,050	10,070
GRW-10	241,090	246,350	155,860	643,300
GRW-11	20,000	22,000	8,180	50,180
GRW-12	3,730	3,860	4,010	11,600
GRW-13	4,910	6,380	530	11,820
SHS-7	1,629	7,873	12,265	21,767
SHS-9	3,928	4,665	3,570	12,163
SHS-14	118,860	167,187	135,454	421,501
SHS-18	283	376	250	909
TOTAL VOLUME PUMPED IN GALLONS				1,395,384

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

THIRD QUARTER, 1996

Total Volume Of Water Recovered	1,395,384
Net Change In Storage Volume	<u>1,377</u>
Total Water Treated And Pumped To The Infiltration Gallery	<u><u>1,394,007</u></u>

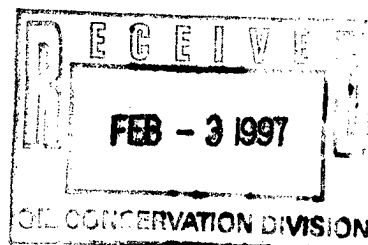


5764 US Highway 64
Farmington, New Mexico
87401

505-632-8006

January 27, 1997

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088



Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the fourth quarter of 1996. As we agreed, Giant will begin submitting reports on an annual, rather than quarterly, basis effective in 1997.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Tim Kinney", with a long horizontal stroke extending to the right.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Mike Hardy-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FOURTH QUARTER, 1996

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505) 632-8006
FAX (505) 632-4025

TABLE OF CONTENTS

Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps.....	Section 3
Total Volume History	Section 4

INTRODUCTION AND SUMMARY QUARTERLY REPORT FOURTH QUARTER, 1996

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT INDUSTRIES
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FOURTH QUARTER, 1996**

SYSTEM EFFLUENT

	OCT
Lab pH	7.1
Lab Conductivity @25 C	3380
Total Dissolved Solids @ 180 C	2790
Total Dissolved Solids (Calc)	2645
Total Alkalinity as CaCO ₃	385
Total Hardness as CaCO ₃	1038
Bicarbonate as HCO ₃	469
Carbonate as CO ₃	ND
Hydroxide	ND
Chloride	177
Sulfate	1420
Calcium	361
Magnesium	33.5
Potassium	2.74
Sodium	421

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	0.4
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND

1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	1.6
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SYSTEM INFLUENT

Lab pH	7.2
Lab Conductivity @25 C	3400
Total Dissolved Solids @ 180 C	2790
Total Dissolved Solids (Calc)	2704
Total Alkalinity as CaCO ₃	372
Total Hardness as CaCO ₃	1015
Bicarbonate as HCO ₃	454
Carbonate as CO ₃	ND
Hydroxide	ND
Chloride	187
Sulfate	1490
Calcium	352
Magnesium	33.2
Potassium	2.35
Sodium	416

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND

cis-1,2-Dichloroethene	0.7
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	5.6
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	6
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	1.5

GBR-17

Lab pH	7.1
Lab Conductivity @25 C	2610
Total Dissolved Solids @ 180 C	2200
Total Dissolved Solids (Calc)	2166
Total Alkalinity as CaCO ₃	210
Total Hardness as CaCO ₃	942
Bicarbonate as HCO ₃	257
Carbonate as CO ₃	ND
Hydroxide	ND
Chloride	55.5
Sulfate	1300
Nitrate as Nitrogen	4.13
Calcium	334
Magnesium	26.1
Potassium	0.78
Sodium	319

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND

Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	6.5
Toluene	ND
Total Xylenes	ND

GBR-31**HALOCARBONS**

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	1.9
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

GBR-32

Lab pH	6.9
Lab Conductivity @25 C	3170
Total Dissolved Solids @ 180 C	4760
Total Dissolved Solids (Calc)	4655
Total Alkalinity as CaCO3	255
Total Hardness as CaCO3	1712
Bicarbonate as HCO3	311
Carbonate as CO3	ND
Hydroxide	ND
Chloride	870
Sulfate	2081
Nitrate as Nitrogen	15.4
Calcium	589

Magnesium	58.9
Potassium	3.52
Sodium	885

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	2.1
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.6
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	41 D(5)
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	0.2
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	5.8
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	3.6
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	8.1
Toluene	ND
Total Xylenes	ND

GBR-45

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	1.1
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.5
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	45 D(5)
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	0.5
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	3.2
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	2
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	10
Toluene	ND
Total Xylenes	ND

GBR-48

Lab pH	6.8
Lab Conductivity @25 C	5880
Total Dissolved Solids @ 180 C	4590
Total Dissolved Solids (Calc)	4543
Total Alkalinity as CaCO ₃	195
Total Hardness as CaCO ₃	1585
Bicarbonate as HCO ₃	238
Carbonate as CO ₃	ND
Hydroxide	ND
Chloride	732
Sulfate	2242
Nitrate as Nitrogen	20.1
Calcium	543
Magnesium	55.8
Potassium	4.3
Sodium	829

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	1
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.4
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	24 D(5)
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	3.9
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	2.4
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	3.8
Toluene	ND
Total Xylenes	ND

GBR-49

Lab pH	7.2
Lab Conductivity @25 C	4280
Total Dissolved Solids @ 180 C	3500
Total Dissolved Solids (Calc)	3474
Total Alkalinity as CaCO3	317
Total Hardness as CaCO3	1329
Bicarbonate as HCO3	386
Carbonate as CO3	ND
Hydroxide	ND
Chloride	347
Sulfate	1844
Nitrate as Nitrogen	2.79
Calcium	462
Magnesium	42.9
Potassium	3.13
Sodium	582

GBR-50

Lab pH	7.1
Lab Conductivity @25 C	3210
Total Dissolved Solids @ 180 C	2760
Total Dissolved Solids (Calc)	2793
Total Alkalinity as CaCO3	261
Total Hardness as CaCO3	1075
Bicarbonate as HCO3	318
Carbonate as CO3	ND
Hydroxide	ND
Chloride	53.5
Sulfate	1746
Nitrate as Nitrogen	1.12
Calcium	382
Magnesium	29.9
Potassium	1.56
Sodium	422

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	5.5
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	2.1
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.3
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	2.9
Toluene	ND
Total Xylenes	ND

SHS-10**HALOCARBONS**

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	0.7

SHS-12**HALOCARBONS**

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	1.7
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-13**HALOCARBONS**

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	0.2
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	4.4
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-16**HALOCARBONS**

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

SHS-17**HALOCARBONS**

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon Tetrachloride	ND
Chloroethane	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene Chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachlorethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl Chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Methyl-t-Butyl Ether	ND
Toluene	ND
Total Xylenes	ND

GW - 40

MONITORING REPORTS

DATE:

1997-1995

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

OCTOBER, 1996

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.60	62.60	0.00	5331.70
GRW-2	5391.28	48.90	48.90	0.00	5342.38
GRW-3	5388.77	42.15	42.15	0.00	5346.62
GRW-4	5390.02	48.80	48.80	0.00	5341.22
GRW-5	5390.56	65.40	65.40	0.00	5325.16
GRW-6	5390.81	50.90	50.90	0.00	5339.91
GRW-10	5395.02	55.05	55.05	0.00	5339.97
GRW-11	5397.85	62.30	62.30	0.00	5335.55
GRW-12	5397.24	45.25	45.25	0.00	5351.99
GRW-13	5396.90	49.62	49.62	0.00	5347.28
GBR-5	5395.07	28.58	28.80	-0.22	5366.31
GBR-6	5395.70	58.30	58.30	0.00	5337.40
GBR-7	5395.85	31.20	31.20	0.00	5364.65
GBR-8	5390.50	44.10	44.10	0.00	5346.40
GBR-9	5389.92	48.48	48.48	0.00	5341.44
GBR-10	5390.57	42.43	42.43	0.00	5348.14
GBR-11	5389.43	43.99	42.49	1.50	5346.64
GBR-13	5393.04	41.66	41.66	0.00	5351.38
GBR-15	5397.99	41.18	41.18	0.00	5356.81
GBR-18	5421.68	31.43	31.43	0.00	5390.25
GBR-19	5393.83	43.95	41.23	2.72	5352.06
GBR-20	5393.47	39.94	39.94	0.00	5353.53
GBR-21S	5400.65	20.01	20.00	0.01	5380.65
GBR-21D	5400.19	30.60	30.60	0.00	5369.59
GBR-22	5395.91	38.45	37.55	0.90	5358.18
GBR-23	5403.72	23.01	23.01	0.00	5379.53
GBR-24S	5396.08	24.19	24.19	0.00	5365.25
GBR-24D	5396.77	30.83	30.83	0.00	5365.94
GBR-25	5396.72	31.70	31.70	0.00	5365.02
GBR-26	5395.59	37.40	37.40	0.00	5358.19
GBR-30	5396.58	34.61	34.61	0.00	5361.97
GBR-31	5394.86	37.15	37.15	0.00	5357.71
GBR-33	5396.28	40.14	40.14	0.00	5356.14
GBR-34	5394.00	38.45	37.50	0.95	5356.31
GBR-35	5393.66	39.61	37.47	2.14	5355.76
GBR-39	5397.55	33.53	33.53	0.00	5364.02
GBR-40	5400.76	29.11	29.11	0.00	5371.65
GBR-41	5396.35	22.75	22.75	0.00	5373.60
GBR-51	5389.68	42.78	42.78	0.00	5346.90
GBR-52	5387.74	41.33	41.33	0.00	5346.41

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 1996
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	42.80	42.62	0.18	5340.88
SHS-2	5381.66	41.60	41.10	0.50	5340.46
SHS-3	5383.33	37.48	37.48	0.00	5345.85
SHS-4	5383.62	42.53	42.53	0.00	5341.09
SHS-5	5378.36	39.56	39.56	0.00	5338.80
SHS-6	5378.17	39.80	39.80	0.00	5338.37
SHS-7	5375.89	39.90	39.90	0.00	5335.99
SHS-8	5380.25	40.19	40.19	0.00	5340.06
SHS-9	5380.79	44.88	44.88	0.00	5335.91
SHS-10	5373.80	37.80	37.80	0.00	5336.00
SHS-12	5373.94	41.09	41.09	0.00	5332.85
SHS-13	5367.81	37.80	37.80	0.00	5330.01
SHS-14	5367.07	45.66	45.66	0.00	5321.41
SHS-15	5366.21	34.82	34.82	0.00	5331.39
SHS-16	5362.58	32.65	32.65	0.00	5329.93
SHS-17	5364.35	34.60	34.60	0.00	5329.75
SHS-18	5373.64	41.31	41.30	0.01	5332.34

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY VOLUME CHANGE**

FOURTH QUARTER, 1996

Tank Number	Beginning Volume	Ending Volume	Net Change
102	9,944	12,221	2,277
106	8,010	8,010	0
21	230,133	229,768	(365)
22	254,334	228,204	(26,130)
Total Net Volume Change			(24,218)

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY RECOVERY WELL
VOLUME TABULATION**

FOURTH QUARTER, 1996

Well	Month #1	Month #2	Month #3	Total
GRW-1	9,280	7,360	8,720	25,360
GRW-2	7,410	6,010	7,160	20,580
GRW-3	10,630	8,450	9,810	28,890
GRW-4	26,890	20,070	24,460	71,420
GRW-5	28,940	35,620	34,020	98,580
GRW-6	11,500	10,300	12,780	34,580
GRW-9	5,380	5,310	6,290	16,980
GRW-10	198,720	155,940	209,110	563,770
GRW-11	27,490	23,200	25,420	76,110
GRW-12	4,680	3,190	3,710	11,580
GRW-13	0	5,420	10,560	15,980
SHS-7	11,321	15,534	13,890	40,745
SHS-9	4,226	2,806	2,987	10,019
SHS-14	142,363	112,678	144,811	399,852
SHS-18	279	190	222	691
TOTAL VOLUME PUMPED IN GALLONS				1,415,137

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

FOURTH QUARTER, 1996

Total Volume Of Water Recovered	1,415,137
Net Change In Storage Volume	<u>(24,218)</u>
Total Water Treated And Pumped To The Infiltration Gallery	<u><u>1,439,355</u></u>



OIL CONSERVATION DIVISION
RECEIVED

FEB 14 1996

5764 US Highway 64
Farmington, New Mexico
87401

505
632-8024
632-8006

February 12, 1996

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the fourth quarter of 1995.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Tim Kinney", written over a horizontal line.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Mike Hardy-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Valda Terauds-H+GCL
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FOURTH QUARTER, 1995

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505) 632-8006
FAX (505) 632-4025

TABLE OF CONTENTS

Introduction and Summary	Section 1
Quarterly Analytical Results	Section 2
Potentiometric Surface Maps.....	Section 3
Total Volume History	Section 4

INTRODUCTION AND SUMMARY QUARTERLY REPORT FOURTH QUARTER, 1995

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FOURTH QUARTER, 1995**

October November December

SYSTEM INFLUENT

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.3
Lab Conductivity, umhos/cm	3330.00
Total Dissolved Solids (180)	2620.00
Total Dissolved Solids (calc.)	2840.00
Total Alkalinity as CaCO ₃	735.00
Total Hardness as CaCO ₃	1126.00
Bicarbonate as HCO ₃	897.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	204.00
Sulfate	1300.00
Calcium	385.00
Magnesium	40.00
Potassium	3.50
Sodium	464.00

Cation/Anion Balance	5.35
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HALOCARBONS

Bromodichloromethane	ND	ND
Bromoform	2.8	ND
Bromomethane	ND	ND
Carbon tetrachloride	2.2	ND
Chloroethane	38	ND
2-Chloroethylvinyl ether		
Chloroform	ND	ND
Chloromethane	71	ND
Dibromochloromethane	ND	ND
1,2-Dibromoethane (EDB)	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
1,1-Dichloroethane	ND	ND
1,2-Dichloroethane (EDC)	ND	ND
1,1-Dichloroethene	ND	ND
CIS-1,2-Dichloroethene	ND	ND
trans-1,2-Dichloroethene	ND	ND
1,2-Dichloropropane	ND	ND
cis-1,3-Dichloropropene	ND	ND
trans-1,3-Dichloropropene	ND	ND
Methylene chloride	ND	ND
1,1,2,2-Tetrachloroethane	2.0	ND
Tetrachloroethene	ND	ND
1,1,1-Trichloroethane	ND	ND
1,1,2-Trichloroethane	ND	ND
Trichloroethene	ND	ND
Trichlorofluoromethane	ND	ND
Vinyl Chloride	ND	ND

SYSTEM INFLUENT (Continued)	October	November	December
AROMATICS			
Benzene	52		3.2
Chlorobenzene	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
Ethylbenzene	43		6.5
Toluene	ND		5.2
Xylenes	85		120
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		ND
PAH			
Napthalene			15
Acenaphthylene			ND
1-Methylnaphthalene			51
2-Methylnaphthalene			42
Acenaphthene			ND
Fluorene			5.0
Phenanthrene			7.3
Anthracene			ND
Fluoranthene			ND
Pyrene			ND
Benzo(a)anthracene			ND
Chrysene			ND
Benzo(b)fluoranthene			ND
Benzo(k)fluoranthene			ND
Benzo(a)pyrene			ND
Dibenzo(a,h)anthracene			ND
Benzo(g,h,i)perylene			ND
Indeno(1,2,3-c,d)pyrene			ND

SYSTEM EFFLUENT

GENERAL WATER CHEMISTRY October November December

Lab pH (s.u.)	7.0		
Lab Conductivity, umhos/cm	3350.00		
Total Dissolved Solids (180)	2600.00		
Total Dissolved Solids (calc.)	2770.00		
Total Alkalinity as CaCO ₃	735.00		
Total Hardness as CaCO ₃	1141.00		
Bicarbonate as HCO ₃	897.00		
Carbonate as CO ₃	0.00		
Hydroxide as OH	0.00		
Chloride	200.00		
Sulfate	1240.00		
Calcium	392.00		
Magnesium	39.00		
Potassium	3.50		
Sodium	454.00		
Cation/Anion Balance	3.99 %		

HALOCARBONS

Bromodichloromethane	ND	ND
Bromoform	ND	ND
Bromomethane	ND	ND
Carbon tetrachloride	ND	ND
Chloroethane	ND	ND
2-Chloroethylvinyl ether		
Chloroform	ND	ND
Chloromethane	ND	ND
Dibromochloromethane	ND	ND
1,2-Dibromoethane (EDB)	ND	ND
1,2-Dichlorobenzene	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	ND	ND
1,1-Dichloroethane	ND	ND
1,2-Dichloroethane (EDC)	ND	ND
1,1-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	ND	ND
trans-1,2-Dichloroethene	ND	ND
1,2-Dichloropropane	ND	ND
cis-1,3-Dichloropropene	ND	ND
trans-1,3-Dichloropropene	ND	ND
Methylene chloride	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND
Tetrachloroethene	ND	ND
1,1,1-Trichloroethane	ND	ND
1,1,2-Trichloroethane	ND	ND
Trichloroethene	ND	ND
Trichlorofluoromethane	ND	ND
Vinyl Chloride	ND	ND

SYSTEM EFFLUENT (Continued)

	October	November	December
AROMATICS			
Benzene	ND		1.9
Chlorobenzene	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
Ethylbenzene	ND		ND
Toluene	ND		ND
Xylenes	1.7		2.8
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		ND
PAH			
Napthalene			ND
Acenaphthylene			ND
1-Methylnaphthalene			ND
2-Methylnaphthalene			ND
Acenaphthene			ND
Fluorene			ND
Phenanthrene			ND
Anthracene			ND
Fluoranthene			ND
Pyrene			ND
Benzo(a)anthracene			ND
Chrysene			ND
Benzo(b)fluoranthene			ND
Benzo(k)fluoranthene			ND
Benzo(a)pyrene			ND
Dibenzo(a,h)anthracene			ND
Benzo(g,h,i)perylene			ND
Indeno(1,2,3-c,d)pyrene			ND
GBR-17			
HALOCARBONS			ND
Bromodichloromethane			ND
Bromoform			ND
Bromomethane			ND
Carbon tetrachloride			ND
Chloroethane			ND
2-Chloroethylvinyl ether			ND
Chloroform			ND
Chloromethane			ND
Dibromochloromethane			ND
1,2-Dibromoethane (EDB)			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
1,1-Dichloroethane			ND
1,2-Dichloroethane (EDC)			ND
1,1-Dichloroethene			ND
cis-1,2-Dichloroethene			ND
trans-1,2-Dichloroethene			ND

GBR-17 (Continued)

October November December

1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	

Methyl-t-Butyl Ether	ND
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GBR-32

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinyl ether	
Chloroform	3.3
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromomethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.1
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	98
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	9.9
1,1,1-Trichloroethane	ND

GBR-32 (Continued)

October November December

1,1,2-Trichloroethane		ND
Trichloroethene		6.2
Trichlorofluoromethane		ND
Vinyl chloride		ND

AROMATICS

Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Xylenes		ND
Trichlorotrifluoroethane		

Methyl-t-Butyl Ether		ND
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GBR-48

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinyl ether	
Chloroform	1.4
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	40
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	4.9
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	2.0
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	

Methyl-t-Butyl Ether	ND
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GBR-49

October November December

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	1.6
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.4
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	69
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	0.2
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	6.1
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	3.5
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

GBR-50

October November December

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	4.4
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.4
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.3
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

OFFSITE WELLS

SHS-3	October	November	December
HALOCARBONS			
Bromodichloromethane			ND
Bromoform			ND
Bromomethane			ND
Carbon tetrachloride			ND
Chloroethane			ND
2-Chloroethylvinylether			
Chloroform			ND
Chloromethane			ND
Dibromochloromethane			ND
1,2-Dibromoethane (EDB)			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
1,1-Dichloroethane			ND
1,2-Dichloroethane (EDC)			ND
1,1-Dichloroethene			ND
cis-1,2-Dichloroethene			ND
trans-1,2-Dichloroethene			ND
1,2-Dichloropropane			ND
cis-1,3-Dichloropropene			ND
trans-1,3-Dichloropropene			ND
Methylene chloride			ND
1,1,2,2-Tetrachloroethane			0.2
Tetrachloroethene			ND
1,1,1-Trichloroethane			ND
1,1,2-Trichloroethane			ND
Trichloroethene			ND
Trichlorofluoromethane			ND
Vinyl chloride			ND
AROMATICS			
Benzene			ND
Chlorobenzene			ND
1,2-Dichlorobenzene			ND
1,3-Dichlorobenzene			ND
1,4-Dichlorobenzene			ND
Ethylbenzene			ND
Toluene			ND
Xylenes			ND
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether			ND

SHS-4

October November December

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane (EDC)	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

SHS-6

October November December

HALOCARBONS

Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon tetrachloride		ND
Chloroethane		ND
2-Chloroethylvinyl ether		
Chloroform		ND
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		0.2
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		ND
Trichlorofluoromethane		ND
Vinyl chloride		ND

AROMATICS

Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Xylenes		ND
Trichlorotrifluoroethane		

Methyl-t-Butyl Ether		ND
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SHS-10

	October	November	December
HALOCARBONS			
Bromodichloromethane	ND		ND
Bromoform	ND		ND
Bromomethane	ND		ND
Carbon tetrachloride	ND		ND
Chloroethane	ND		ND
2-Chloroethylvinyl ether			
Chloroform	ND		ND
Chloromethane	ND		ND
Dibromochloromethane	ND		ND
1,2-Dibromoethane (EDB)	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
1,1-Dichloroethane	ND		ND
1,2-Dichloroethane (EDC)	ND		ND
1,1-Dichloroethene	ND		ND
cis-1,2-Dichloroethene	ND		ND
trans-1,2-Dichloroethene	ND		ND
1,2-Dichloropropane	ND		ND
cis-1,3-Dichloropropene	ND		ND
trans-1,3-Dichloropropene	ND		ND
Methylene chloride	ND		ND
1,1,2,2-Tetrachloroethane	ND		ND
Tetrachloroethene	ND		ND
1,1,1-Trichloroethane	ND		ND
1,1,2-Trichloroethane	ND		ND
Trichloroethene	ND		ND
Trichlorofluoromethane	ND		ND
Vinyl chloride	ND		ND
AROMATICS			
Benzene	ND		ND
Chlorobenzene	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
Ethylbenzene	ND		ND
Toluene	ND		ND
Xylenes	1,1		ND
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		ND

SHS-12

	October	November	December
HALOCARBONS			
Bromodichloromethane	ND		ND
Bromoform	ND		ND
Bromomethane	ND		ND
Carbon tetrachloride	ND		ND
Chloroethane	ND		ND
2-Chloroethylvinylether			
Chloroform	ND		ND
Chloromethane	ND		ND
Dibromochloromethane	ND		ND
1,2-Dibromoethane (EDB)	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
1,1-Dichloroethane	ND		ND
1,2-Dichloroethane (EDC)	ND		ND
1,1-Dichloroethene	ND		ND
cis-1,2-Dichloroethene	ND		0.2
trans-1,2-Dichloroethene	ND		ND
1,2-Dichloropropane	ND		ND
cis-1,3-Dichloropropene	ND		ND
trans-1,3-Dichloropropene	ND		ND
Methylene chloride	ND		ND
1,1,2,2-Tetrachloroethane	ND		ND
Tetrachloroethene	ND		ND
1,1,1-Trichloroethane	ND		ND
1,1,2-Trichloroethane	ND		ND
Trichloroethene	ND		ND
Trichlorofluoromethane	ND		ND
Vinyl chloride	ND		ND
AROMATICS			
Benzene	ND		ND
Chlorobenzene	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
Ethylbenzene	ND		ND
Toluene	ND		ND
Xylenes	ND		ND
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		ND

SHS-13

	October	November	December
HALOCARBONS			
Bromodichloromethane	ND		ND
Bromoform	ND		ND
Bromomethane	ND		ND
Carbon tetrachloride	ND		ND
Chloroethane	ND		ND
2-Chloroethylvinyl ether			
Chloroform	ND		ND
Chloromethane	ND		ND
Dibromochloromethane	ND		ND
1,2-Dibromoethane (EDB)	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
1,1-Dichloroethane	ND		ND
1,2-Dichloroethane (EDC)	4.1		6.6
1,1-Dichloroethene	ND		ND
cis-1,2-Dichloroethene	ND		ND
trans-1,2-Dichloroethene	ND		ND
1,2-Dichloropropane	ND		ND
cis-1,3-Dichloropropene	ND		ND
trans-1,3-Dichloropropene	ND		ND
Methylene chloride	ND		ND
1,1,2,2-Tetrachloroethane	ND		ND
Tetrachloroethene	ND		ND
1,1,1-Trichloroethane	ND		ND
1,1,2-Trichloroethane	ND		ND
Trichloroethene	ND		ND
Trichlorofluoromethane	ND		ND
Vinyl chloride	ND		ND
AROMATICS			
Benzene	ND		ND
Chlorobenzene	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
Ethylbenzene	ND		ND
Toluene	ND		ND
Xylenes	ND		ND
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		ND

SHS-15

October November December

HALOCARBONS

Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon tetrachloride		ND
Chloroethane		ND
2-Chloroethylvinyl ether		
Chloroform		3.4
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		ND
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		ND
Trichlorofluoromethane		ND
Vinyl chloride		ND

AROMATICS

Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Xylenes		ND
Trichlorotrifluoroethane		

Methyl-t-Butyl Ether		ND
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SHS-15

October November December

HALOCARBONS

Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon tetrachloride		ND
Chloroethane		ND
2-Chloroethylvinyl ether		
Chloroform		3,4
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		ND
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachloroethene		ND
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		ND
Trichlorofluoromethane		ND
Vinyl chloride		ND

AROMATICS

Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Toluene		ND
Xylenes		ND
Trichlorotrifluoroethane		

Methyl-t-Butyl Ether		ND
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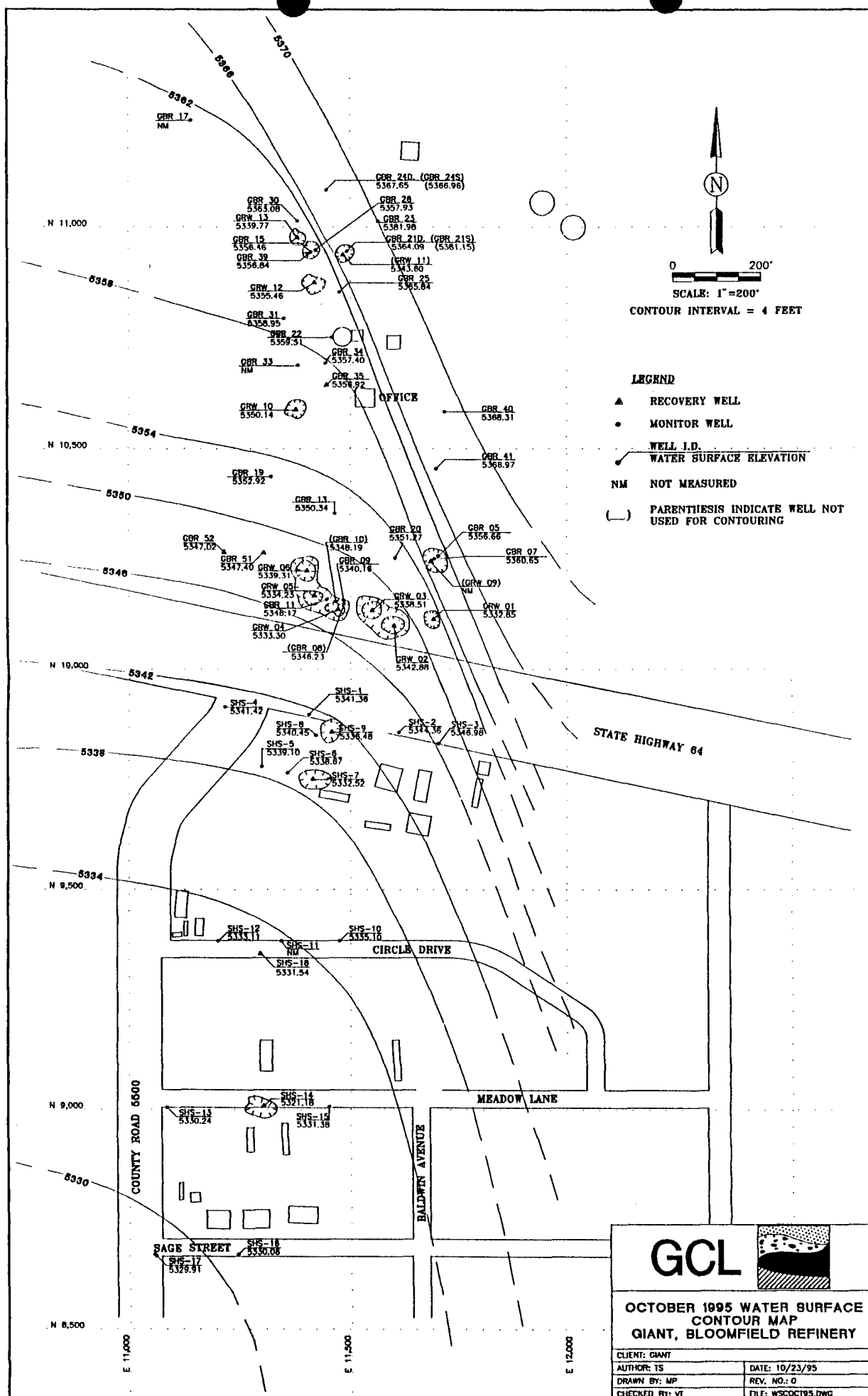
SHS-16

	October	November	December
HALOCARBONS			
Bromodichloromethane	ND		ND
Bromoform	ND		ND
Bromomethane	ND		ND
Carbon tetrachloride	ND		ND
Chloroethane	ND		ND
2-Chloroethylvinylether			
Chloroform	ND		ND
Chloromethane	ND		ND
Dibromochloromethane	ND		ND
1,2-Dibromoethane (EDB)	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
1,1-Dichloroethane	ND		ND
1,2-Dichloroethane (EDC)	ND		ND
1,1-Dichloroethene	ND		ND
cis-1,2-Dichloroethene	ND		ND
trans-1,2-Dichloroethene	ND		ND
1,2-Dichloropropane	ND		ND
cis-1,3-Dichloropropene	ND		ND
trans-1,3-Dichloropropene	ND		ND
Methylene chloride	ND		ND
1,1,2,2-Tetrachloroethane	ND		ND
Tetrachloroethene	ND		ND
1,1,1-Trichloroethane	ND		ND
1,1,2-Trichloroethane	ND		ND
Trichloroethene	ND		ND
Trichlorofluoromethane	ND		ND
Vinyl chloride	ND		ND
AROMATICICS			
Benzene	ND		ND
Chlorobenzene	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
Ethylbenzene	ND		ND
Toluene	ND		ND
Xylenes	ND		ND
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		ND

SHS-17

	October	November	December
HALOCARBONS			
Bromodichloromethane	ND		ND
Bromoform	ND		ND
Bromomethane	ND		ND
Carbon tetrachloride	ND		ND
Chloroethane	ND		ND
2-Chloroethylvinylether			
Chloroform	ND		ND
Chloromethane	ND		ND
Dibromochloromethane	ND		ND
1,2-Dibromoethane (EDB)	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
1,1-Dichloroethane	ND		ND
1,2-Dichloroethane (EDC)	ND		ND
1,1-Dichloroethene	ND		ND
cis-1,2-Dichloroethene	ND		ND
trans-1,2-Dichloroethene	ND		ND
1,2-Dichloropropane	ND		ND
cis-1,3-Dichloropropene	ND		ND
trans-1,3-Dichloropropene	ND		ND
Methylene chloride	ND		ND
1,1,2,2-Tetrachloroethane	ND		ND
Tetrachloroethene	ND		ND
1,1,1-Trichloroethane	ND		ND
1,1,2-Trichloroethane	ND		ND
Trichloroethene	ND		ND
Trichlorofluoromethane	ND		ND
Vinyl chloride	ND		ND
AROMATICS			
Benzene	ND		ND
Chlorobenzene	ND		ND
1,2-Dichlorobenzene	ND		ND
1,3-Dichlorobenzene	ND		ND
1,4-Dichlorobenzene	ND		ND
Ethylbenzene	ND		ND
Toluene	ND		ND
Xylenes	ND		ND
Trichlorotrifluoroethane			
Methylt-Butyl Ether	ND		ND

*ND - Not detected at specified detection limit



**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

OCTOBER, 1995

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.45	61.45	0.00	5332.85
GRW-2	5391.28	48.40	48.40	0.00	5342.88
GRW-3	5388.77	50.26	50.26	0.00	5338.51
GRW-4	5390.02	56.80	56.70	0.10	5333.30
GRW-5	5390.56	56.33	56.33	0.00	5334.23
GRW-6	5390.81	51.50	51.50	0.00	5339.31
GRW-10	5395.02	48.68	43.93	4.75	5350.14
GRW-11	5397.85	54.25	54.25	0.00	5343.60
GRW-12	5397.24	41.78	41.78	0.00	5355.46
GRW-13	5396.90	57.13	57.13	0.00	5339.77
GBR-5	5395.07	40.95	37.77	3.18	5356.66
GBR-6	5395.70	63.96	63.96	0.00	5331.74
GBR-7	5395.85	35.92	35.02	0.90	5360.65
GBR-8	5390.50	45.25	44.02	1.23	5346.23
GBR-9	5389.92	49.76	49.76	0.00	5340.16
GBR-10	5390.57	42.38	42.38	0.00	5348.19
GBR-11	5389.43	43.70	43.15	0.55	5346.17
GBR-13	5393.04	42.72	42.70	0.02	5350.34
GBR-15	5397.99	41.53	41.53	0.00	5356.46
GBR-18	5421.68	30.75	30.75	0.00	5390.93
GBR-19	5393.83	41.60	40.74	0.86	5352.92
GBR-20	5393.47	42.20	42.20	0.00	5351.27
GBR-21S	5400.65	19.52	19.50	0.02	5381.15
GBR-21D	5400.19	36.10	36.10	0.00	5364.09
GBR-22	5395.91	39.00	36.00	3.00	5359.31
GBR-23	5403.72	22.14	22.14	0.00	5381.98
GBR-24S	5396.08	21.74	21.74	0.00	5366.96
GBR-24D	5396.77	29.12	29.12	0.00	5367.65
GBR-25	5396.72	30.88	30.88	0.00	5365.84
GBR-26	5395.59	37.66	37.66	0.00	5357.93
GBR-30	5396.58	33.50	33.50	0.00	5363.08
GBR-31	5394.86	35.91	35.91	0.00	5358.95
GBR-33	5396.28			0.00	5396.28
GBR-34	5394.00	37.68	36.33	1.35	5357.40
GBR-35	5393.66	38.00	36.43	1.57	5356.92
GBR-39	5397.55	40.71	40.71	0.00	5356.84
GBR-40	5400.76	32.45	32.45	0.00	5368.31
GBR-41	5396.35	29.38	29.38	0.00	5366.97
GBR-51	5389.68	42.28	42.28	0.00	5347.40
GBR-52	5387.74	40.72	40.72	0.00	5347.02

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 1995
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	42.20	42.18	0.02	5341.36
SHS-2	5381.66	37.30	37.30	0.00	5344.36
SHS-3	5383.33	36.35	36.35	0.00	5346.98
SHS-4	5383.62	42.20	42.20	0.00	5341.42
SHS-5	5378.36	39.26	39.26	0.00	5339.10
SHS-6	5378.17	39.50	39.50	0.00	5338.67
SHS-7	5375.89	43.37	43.37	0.00	5332.52
SHS-8	5380.25	39.80	39.80	0.00	5340.45
SHS-9	5380.79	44.34	44.30	0.04	5336.48
SHS-10	5373.80	38.70	38.70	0.00	5335.10
SHS-12	5373.94	40.83	40.83	0.00	5333.11
SHS-13	5367.81	37.57	37.57	0.00	5330.24
SHS-14	5367.07	45.89	45.89	0.00	5321.18
SHS-15	5366.21	34.83	34.83	0.00	5331.38
SHS-16	5362.58	32.52	32.52	0.00	5330.06
SHS-17	5364.35	34.44	34.44	0.00	5329.91
SHS-18	5373.64	42.10	42.10	0.00	5331.54

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY VOLUME CHANGE**

FOURTH QUARTER, 1995

Tank Number	Beginning Volume	Ending Volume	Net Change
102	16,198	13,733	(2,465)
106	8,010	8,010	0
21	67,472	67,472	0
22	71,773	265,008	193,235
Total Net Volume Change			190,770

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY RECOVERY WELL
VOLUME TABULATION**

FOURTH QUARTER, 1995

Well	Month #1	Month #2	Month #3	Total
GRW-1	6,500	7,890	4,550	18,940
GRW-2	9,330	13,500	7,800	30,630
GRW-3	7,540	14,150	8,750	30,440
GRW-4	12,470	17,080	10,290	39,840
GRW-5	34,510	51,100	19,280	104,890
GRW-6	27,584	16,286	4,890	48,760
GRW-9	660	620	500	1,780
GRW-10	301,070	453,080	249,750	1,003,900
GRW-11	39,480	58,700	32,880	131,060
GRW-12	5,620	8,660	4,570	18,850
GRW-13	7,240	9,030	4,000	20,270
SHS-7	3,900	1,563	693	6,156
SHS-9	6,492	6,834	3,787	17,113
SHS-14	137,551	157,278	80,509	375,338
SHS-18	9,192	11,974	7,133	28,299
TOTAL VOLUME PUMPED IN GALLONS				1,876,266

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

FOURTH QUARTER, 1995

Total Volume Of Water Recovered	1,876,266
Net Change In Storage Volume	<u>190,770</u>
Total Water Treated And Pumped To The Infiltration Gallery	<u><u>1,685,496</u></u>



OIL CONSERVATION DIVISION
RECEIVED

'95 NOV 15 AM 8 52

November 8, 1995

Crude Gathering Operations

5764 US Highway 64
Farmington, New Mexico
87401

505
632-8024
632-8006

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the third quarter of 1995.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Tim Kinney", with a long, sweeping horizontal stroke at the end.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Carl Shook-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Valda Terauds-H + GCL
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
THIRD QUARTER, 1995

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505) 632-8006
FAX (505) 632-4025

TABLE OF CONTENTS

Introduction and Summary Section 1

Quarterly Analytical Results Section 2

Potentiometric Surface Maps..... Section 3

Total Volume History Section 4

INTRODUCTION AND SUMMARY QUARTERLY REPORT THIRD QUARTER, 1995

INTRODUCTION

The air stripper operations were discontinued in the second quarter. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
THIRD QUARTER 1995**

	JULY	AUG	SEP
SYSTEM INFLUENT			

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.0
Lab Conductivity, umhos/cm	3620.00
Total Dissolved Solids (180)	2590.00
Total Dissolved Solids (calc.)	2537.00
Total Alkalinity as CaCO ₃	424.00
Total Hardness as CaCO ₃	1149.00
Bicarbonate as HCO ₃	517.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	221.00
Sulfate	1190.00
Calcium	397.00
Magnesium	39.00
Potassium	3.10
Sodium	431.00
Cation/Anion Balance	2.70

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND

1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	1.0
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	19
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	13
Toluene	ND
Xylenes	49
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

SYSTEM EFFLUENT

GENERAL WATER CHEMISTRY JULY AUG SEPT

Lab pH (s.u.)	6.8
Lab Conductivity, umhos/cm	3650.00
Total Dissolved Solids (180)	2550.00
Total Dissolved Solids (calc.)	2526.00
Total Alkalinity as CaCO ₃	420.00
Total Hardness as CaCO ₃	1155.00
Bicarbonate as HCO ₃	512.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	218.00
Sulfate	1180.00
Calcium	399.00
Magnesium	39.00
Potassium	2.30
Sodium	440.00

Cation/Anion Balance	3.97
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND

1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND	ND
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	ND
Toluene	ND	ND
Xylenes	ND	ND
Trichlorotrifluoroethane		

Methyl-t-Butyl Ether	ND
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POLYNUCLEAR AROMATIC HYDROCARBONS

Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND

Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthene	ND
Benzo(k)fluoranthene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

GBR-15	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	1.2
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	10
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND

1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	1.2
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	3.1
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

GBR-17

JULY

AUG

SEP

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND

1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	

Methyl-t-Butyl Ether	ND
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GBR-24D	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND

1,2-Dichlorobenzene	0.7
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	22
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	3.0
Chlorobenzene	ND
1,2-Dichlorobenzene	0.7
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	2.3
Toluene	ND
Xylenes	3.1
Trichlorotrifluoroethane	

Methyl-t-Butyl Ether	ND
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POLYNUCLEAR AROMATIC HYDROCARBONS

Naphthalene	ND
Acenaphthylene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND

Acenaphthene	ND
Fluorene	0.67
Phenanthrene	0.17
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(a)anthracene	ND
Chrysene	ND
Benzo(b)fluoranthene	ND
Benzo(k)fluoranthene	ND
Benzo(a)pyrene	ND
Dibenzo(a,h)anthracene	ND
Benzo(g,h,i)perylene	ND
Indeno(1,2,3-c,d)pyrene	ND

GBR-30	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND

trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	

Methyl-t-Butyl Ether	ND
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GBR-31	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND

1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

GBR-32

JULY AUG SEP

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	2.4
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.6
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	99
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	9.4
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	5.9
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND

Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

GBR-48	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	2.0
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.4
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	51
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	6.7
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	4.2
Trichlorofluoromethane	ND

Vinyl chloride ND

AROMATICS

Benzene ND

Chlorobenzene ND

1,2-Dichlorobenzene ND

1,3-Dichlorobenzene ND

1,4-Dichlorobenzene ND

Ethylbenzene ND

Toluene ND

Xylenes ND

Trichlorotrifluoroethane

Methyl-t-Butyl Ether ND

GBR-49

JULY AUG SEP

HALOCARBONS

Bromodichloromethane ND

Bromoform ND

Bromomethane ND

Carbon tetrachloride ND

Chloroethane ND

2-Chloroethylvinylether

Chloroform 0.9

Chloromethane ND

Dibromochloromethane ND

1,2-Dibromoethane (EDB) ND

1,2-Dichlorobenzene ND

1,3-Dichlorobenzene ND

1,4-Dichlorobenzene ND

1,1-Dichloroethane 0.4

1,2-Dichloroethane ND

1,1-Dichloroethene ND

cis-1,2-Dichloroethene 58

trans-1,2-Dichloroethene ND

1,2-Dichloropropane ND

cis-1,3-Dichloropropene ND

trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	8.6
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	3.8
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	

Methyl-t-Butyl Ether	ND
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GBR-50	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND

1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	3.1
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.1
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.2
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

OFFSITE WELLS

SHS-3

JULY AUG SEP

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	

Methyl-y-Butyl Ether	ND
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SHS-4

JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND

1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

SHS-10

JULY

AUG

SEP

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND

1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	1.3
Toluene	ND
Xylenes	2.3
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

SHS-12

	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND

Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	0.3
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	

Methyl-t-Butyl Ether	ND
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SHS-13

JULY AUG SEP

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.2
1,2-Dichloroethane	4.8
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND

Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

SHS-15

	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	0.3		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether			
Chloroform	9.6		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

SHS-16

	JULY	AUG	SEP
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HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND

1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

SHS-17

	JULY	AUG	SEP
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HALOCARBONS

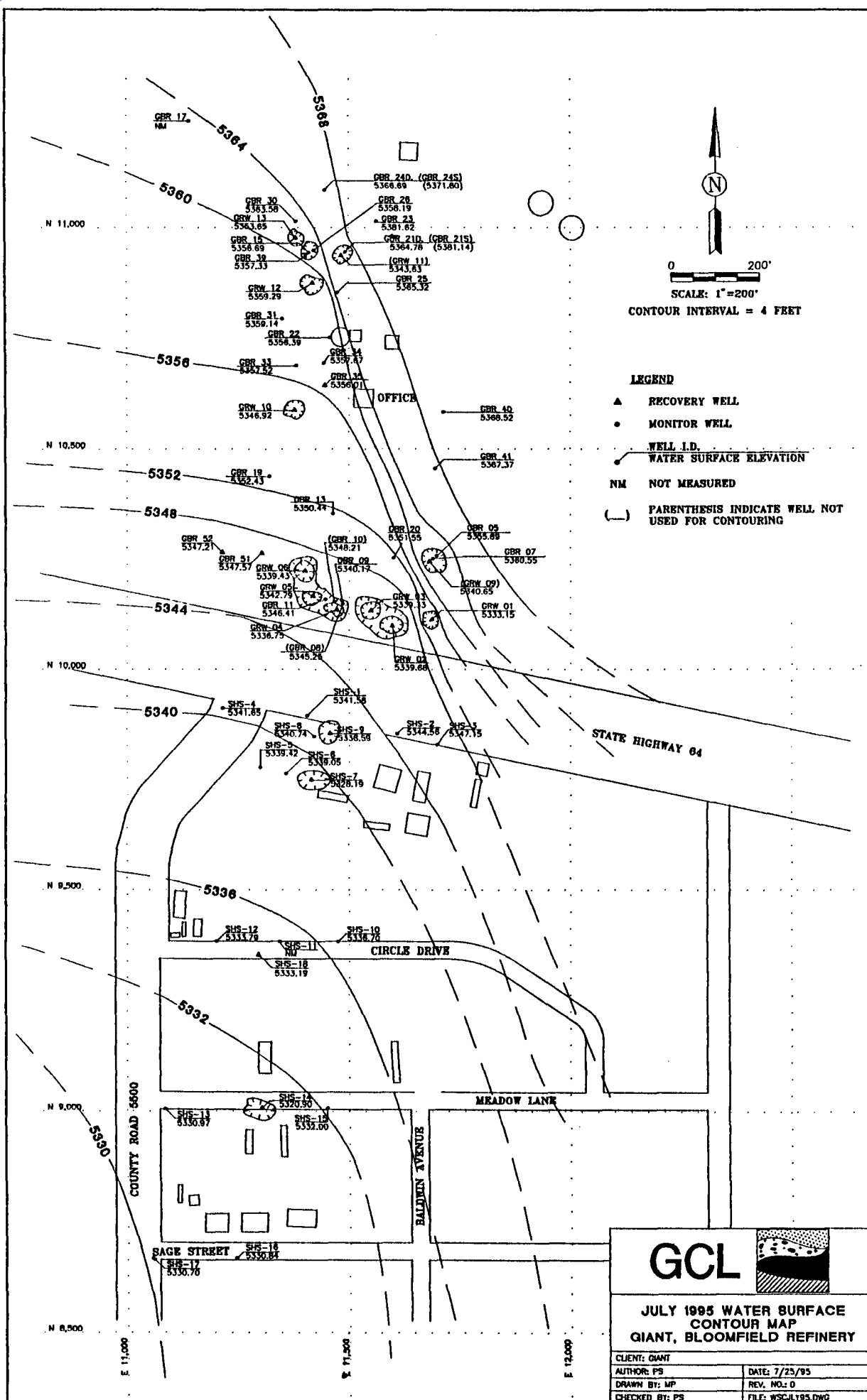
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether			
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	
Methyl-t-Butyl Ether	ND

*ND - Not detected at specified detection limit



**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JULY, 1995

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.15	61.15	0.00	5333.15
GRW-2	5391.28	51.60	51.60	0.00	5339.68
GRW-3	5388.77	49.44	49.44	0.00	5339.33
GRW-4	5390.02	53.27	53.25	0.02	5336.77
GRW-5	5390.56	47.77	47.77	0.00	5342.79
GRW-6	5390.81	51.38	51.38	0.00	5339.43
GRW-10	5395.02	48.10	43.95	4.15	5350.24
GRW-11	5397.85	54.22	54.22	0.00	5343.63
GRW-12	5397.24	37.95	37.95	0.00	5359.29
GRW-13	5396.90	43.25	43.25	0.00	5353.65
GBR-5	5395.07	39.48	36.15	3.33	5358.25
GBR-6	5395.70	59.64	59.64	0.00	5336.06
GBR-7	5395.85	35.30	34.40	0.90	5361.27
GBR-8	5390.50	45.25	43.90	1.35	5346.33
GBR-9	5389.92	49.75	49.75	0.00	5340.17
GBR-10	5390.57	42.36	42.36	0.00	5348.21
GBR-11	5389.43	43.02	43.00	0.02	5346.43
GBR-13	5393.04	42.60	42.54	0.06	5350.49
GBR-15	5397.99	41.30	41.30	0.00	5356.69
GBR-18	5421.68	30.20	30.20	0.00	5391.48
GBR-19	5393.83	41.40	40.56	0.84	5353.10
GBR-20	5393.47	41.92	41.90	0.02	5351.57
GBR-21S	5400.65	19.51	19.49	0.02	5381.16
GBR-21D	5400.19	35.41	35.41	0.00	5364.78
GBR-22	5395.91	39.52	37.16	2.36	5358.28
GBR-23	5403.72	22.10	22.10	0.00	5379.44
GBR-24S	5396.08	24.28	24.28	0.00	5366.00
GBR-24D	5396.77	30.08	30.08	0.00	5366.69
GBR-25	5396.72	31.40	31.40	0.00	5365.32
GBR-26	5395.59	37.40	37.40	0.00	5358.19
GBR-30	5396.58	33.00	33.00	0.00	5363.58
GBR-31	5394.86	35.72	35.72	0.00	5359.14
GBR-33	5396.28	38.76	38.76	0.00	5357.52
GBR-34	5394.00	36.33	36.23	0.10	5357.75
GBR-35	5393.66	37.65	36.33	1.32	5357.07
GBR-39	5397.55	40.22	40.22	0.00	5357.33
GBR-40	5400.76	32.24	32.24	0.00	5368.52
GBR-41	5396.35	28.98	28.98	0.00	5367.37
GBR-51	5389.68	42.11	42.11	0.00	5347.57
GBR-52	5387.74	40.53	40.53	0.00	5347.21

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 1995
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.96	41.94	0.02	5341.60
SHS-2	5381.66	37.10	37.10	0.00	5344.56
SHS-3	5383.33	36.18	36.18	0.00	5347.15
SHS-4	5383.62	41.97	41.97	0.00	5341.65
SHS-5	5378.36	38.94	38.94	0.00	5339.42
SHS-6	5378.17	39.12	39.12	0.00	5339.05
SHS-7	5375.89	47.70	47.70	0.00	5328.19
SHS-8	5380.25	39.51	39.51	0.00	5340.74
SHS-9	5380.79	42.20	42.20	0.00	5338.59
SHS-10	5373.80	37.10	37.10	0.00	5336.70
SHS-12	5373.94	40.15	40.15	0.00	5333.79
SHS-13	5367.81	36.84	36.84	0.00	5330.97
SHS-14	5367.07	46.17	46.17	0.00	5320.90
SHS-15	5366.21	34.21	34.21	0.00	5332.00
SHS-16	5362.58	31.74	31.74	0.00	5330.84
SHS-17	5364.35	33.65	33.65	0.00	5330.70
SHS-18	5373.64	40.45	40.45	0.00	5333.19

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY VOLUME CHANGE**

THIRD QUARTER, 1995

Tank Number	Beginning Volume	Ending Volume	Net Change
102	13,142	16,198	3,056
106	8,010	8,010	0
21	67,472	67,472	0
22	70,808	71,773	965
Total Net Volume Change			4,021

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY RECOVERY WELL
VOLUME TABULATION**

THIRD QUARTER, 1995

Well	Month #1	Month #2	Month #3	Total
GRW-1	8,200	9,080	6,960	24,240
GRW-2	12,750	15,490	12,410	40,650
GRW-3	7,880	10,240	9,920	28,040
GRW-4	40,560	33,490	320	74,370
GRW-5	28,240	35,100	28,320	91,660
GRW-6	27,780	34,350	27,270	89,400
GRW-9	5,800	3,490	1,120	10,410
GRW-10	248,640	302,060	252,180	802,880
GRW-11	29,430	54,520	51,680	135,630
GRW-12	2,130	10,300	7,000	19,430
GRW-13	9,050	3,340	4,680	17,070
SHS-7	1,851	1,749	376	3,976
SHS-9	6,194	7,039	6120	19,353
SHS-14	153,937	178,098	118,701	450,736
SHS-18	12,176	13,395	9,327	34,898
TOTAL VOLUME PUMPED IN GALLONS				1,842,743

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

THIRD QUARTER, 1995

Total Volume Of Water Recovered	1,842,743
Net Change In Storage Volume	<u>4,021</u>
Total Water Treated And Pumped To The Infiltration Gallery	<u><u>1,846,764</u></u>



OIL CONSERVATION DIVISION
RECEIVED

AUG 17 1995 8 52

August 11, 1995

5764 US Highway 64
Farmington, New Mexico
87401

505
632-8024
632-8006

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. Olson:

Enclosed you will find the quarterly report for Giant Refining Company's Bloomfield Refinery for the second quarter of 1995.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Tim Kinney", with a long, sweeping horizontal stroke extending to the right.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Carl Shook-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Valda Terauds-H+GCL
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
SECOND QUARTER, 1995

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505) 632-8006
FAX (505) 632-4025

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**INTRODUCTION AND SUMMARY
QUARTERLY REPORT
SECOND QUARTER, 1995**

INTRODUCTION

The air stripper operations were discontinued in the second quarter. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT REFINING COMPANY
ON-SITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
SECOND QUARTER, 1995**

<i>STRIPPER INFLUENT</i>	April	May	June
--------------------------	-------	-----	------

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	6.5	7
Lab conductivity, umhos/cm	3540	3620
Total dissolved solids (180)	2560	2590
Total dissolved solids (calc)	2537	2537
Total alkalinity as CaCO ₃	268	424
Total hardness as CaCO ₃	1060	1149
Bicarbonate as HCO ₃	327	517
Carbonate as CO ₃	0	0
Hydroxide as OH	0	0
Chloride	348	221
Sulfate	1190	1190
Calcium	364	397
Magnesium	37	39
Potassium	4.3	3
Sodium	434	431

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
1,2-Dichloroethene	

STRIPPER INFLUENT (cont.)	April	May	June
trans-1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	0.3		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	13		
Toluene	3.5		
Xylenes	78		
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		

SYSTEM EFFLUENT

	April	May	June
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	6.7		7
Lab conductivity, umhos/cm	3430		3650
Total dissolved solids (180)	2500		2550
Total dissolved solids (calc)	2431		2526
Total alkalinity as CaCO ₃	139		420
Total hardness as CaCO ₃	1040		1155
Bicarbonate as HCO ₃	170		512
Carbonate as CO ₃	0		0
Hydroxide as OH	0		0
Chloride	333		218
Sulfate	1190		1180
Calcium	357		399
Magnesium	36		39
Potassium	3.1		2
Sodium	432		440

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
1,2-Dichloroethene	
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND

SYSTEM EFFLUENT (cont.)	April	May	June
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		

GBR-31

	April	May	June
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether			
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene			
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Total Xylenes	ND		
Methyl-t-butyl Ether	ND		

SHS-10

	April	May	June
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether			
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene			
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	1		
Toluene	ND		
Total Xylenes	0.6		
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		

SHS-12

	April	May	June
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether			
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene			
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Total Xylenes	ND		
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		

SHS-13

	April	May	June
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether			
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane (EDB)	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene			
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Total Xylenes	ND		
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		

SHS-16	April	May	June
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether			
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene			
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane			
Methyl-t-Butyl-Ether	ND		

SHS-17

	April	May	June
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether			
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dibromoethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
1,2-Dichloroethene			
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane			
Methyl-t-Butyl Ether	ND		

*ND - Not detected at specified detection limit

Giant, Bloomfield: April 5, 1995 Water Levels

Well #	Wellhead Elevation (ft. AMSL)	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Adjusted WSEL * (ft. AMSL)
GRW-1	5394.30	39.66			5354.64
GRW-2	5391.28	51.74			5339.54
GRW-3	5388.77	53.85			5334.92
GRW-4	5390.02	59.85			5330.17
GRW-5	5390.56	66.60			5323.96
GRW-6	5390.81	49.38			5341.43
GRW-9	5395.70	55.05			5340.65
GRW-10	5395.02	47.30	42.90	4.40	5351.25
GRW-11	5397.85	49.57			5348.28
GRW-12	5397.24	44.30			5352.94
GRW-13	5396.90	36.76			5360.14
GBR-5	5395.07	33.80	32.13	1.67	5362.61
GBR-7	5395.85	34.10	33.57	0.53	5362.18
GBR-8	5390.50	44.94	43.80	1.14	5346.48
GBR-9	5389.92	50.09			5339.83
GBR-10	5390.57	42.32			5348.25
GBR-11	5389.43	43.43	42.95	0.48	5346.39
GBR-13	5393.04	42.64	42.40	0.24	5350.59
GBR-15	5397.99	40.10			5357.89
GBR-17	5402.69	NM			NM
GBR-18	5421.68	29.31			5392.37
GBR-19	5393.83	40.90	40.63	0.27	5353.15
GBR-20	5393.47	41.10			5352.37
GBR-21S	5400.65	19.58			5381.07
GBR-21D	5400.19	37.39			5362.80
GBR-22	5395.91	36.84			5359.07
GBR-23	5403.72	22.34			5381.38
GBR-24S	5396.08	24.86			5371.22
GBR-24D	5396.77	29.50			5367.27
GBR-25	5396.72	31.41			5365.31
GBR-26	5395.59	36.75			5358.84
GBR-30	5396.58	33.45			5363.13
GBR-31	5394.86	36.07			5358.79
GBR-33	5396.28	39.04			5357.24
GBR-34	5394.00	36.44	36.43	0.01	5357.57
GBR-35	5393.66	36.45	36.42	0.03	5357.23
GBR-39	5397.55	39.18			5358.37
GBR-40	5400.76	32.25			5368.51
GBR-41	5396.35	27.60			5368.75
GBR-51	5389.68	42.09			5347.59
GBR-52	5387.74	40.53			5347.21

NM = Not Measured

*WSEL = Water Surface Elevation adjusted for product depth.

Note: 0.803 = the specific gravity used for adjusted product depth.

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3.0

Giant, Bloomfield: April 5, 1995 Water Levels

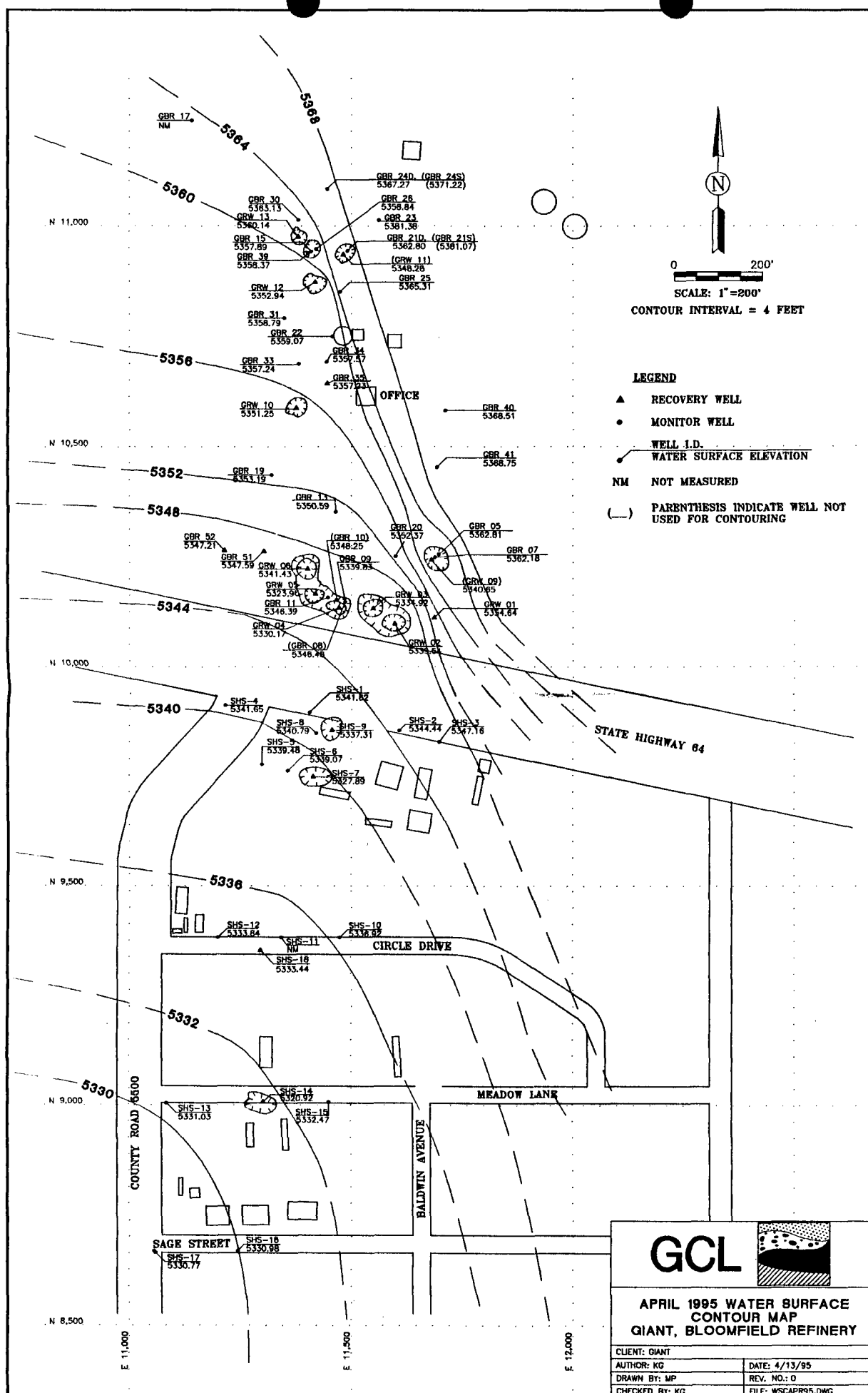
Well #	Wellhead Elevation (ft. AMSL)	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Adjusted WSEL* (ft. AMSL)
SHS-1	5383.54	41.99	41.90	0.09	5341.62
SHS-2	5381.66	37.22			5344.44
SHS-3	5383.33	36.17			5347.16
SHS-4	5383.62	41.97			5341.65
SHS-5	5378.36	38.88			5339.48
SHS-6	5378.17	39.10			5339.07
SHS-7	5375.89	48.00			5327.89
SHS-8	5380.25	39.46			5340.79
SHS-9	5380.79	43.48			5337.31
SHS-10	5373.80	36.88			5336.92
SHS-12	5373.94	40.10			5333.84
SHS-13	5367.81	36.78			5331.03
SHS-14	5367.07	46.15			5320.92
SHS-15	5366.21	33.74			5332.47
SHS-16	5362.58	31.60			5330.98
SHS-17	5364.35	33.58			5330.77
SHS-18	5373.64	40.20			5333.44

NM = Not Measured

*WSEL = Water Surface Elevation adjusted for product depth.

Note: 0.803 = the specific gravity used for adjusted product depth.

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**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY VOLUME CHANGE**

SECOND QUARTER, 1995

Tank Number	Beginning Volume	Ending Volume	Net Change
102	16,790	13,142	(3,648)
106	8,010	8,010	0
21	54,218	54,218	0
22	70,808	70,808	0
Total Net Volume Change			(3,648)

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY RECOVERY WELL
VOLUME TABULATION**

SECOND QUARTER, 1995

Well	Month #1	Month #2	Month #3	Total
GRW-1	530	1,250	1,600	3,380
GRW-2	9,080	11,350	14,500	34,930
GRW-3	9,360	11,220	12,700	33,280
GRW-4	16,690	21,230	31,730	69,650
GRW-5	25,710	34,540	35,820	96,070
GRW-6	20,450	28,040	34,860	83,350
GRW-9	4,530	5,130	7,420	17,080
GRW-10	181,740	197,000	291,900	670,640
GRW-11	15,790	30,840	35,310	81,940
GRW-12	7,340	8,730	9,830	25,900
GRW-13	8,510	8,840	3,390	20,740
SHS-7	18	72	2,174	2,264
SHS-9	6,580	5,747	716	13,043
SHS-14	133,080	149,549	187,811	470,440
SHS-18	10,971	15,968	17,975	44,914
TOTAL VOLUME PUMPED IN GALLONS				1,667,621

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

SECOND QUARTER, 1995

Total Volume Of Water Recovered	1,667,621
Net Change In Storage Volume	<u>3,648</u>
Total Water Treated	1,671,269
Less Air Stripper	<u>8,356</u>
Evaporative Loss (1/2%)	
Total Water Pumped to the Infiltration Gallery	<u><u>1,662,913</u></u>

RECEIVED
MAY 10 1995
Environmental Bureau
Oil Conservation Division

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FIRST QUARTER, 1995

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
Farmington, NM 87401
(505) 632-8006
FAX (505) 632-4025

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INTRODUCTION AND SUMMARY QUARTERLY REPORT FIRST QUARTER, 1995

INTRODUCTION

No significant changes were made in the first quarter.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

A quarterly potentiometric surface map, as well as the adjusted water surface elevation and product thickness for each well, is included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

NOTE: Section 5 formerly contained a summary of the quarterly analytical results for the Bioremediation Project; however, the project has been completed.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

**GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FIRST QUARTER, 1995**

STRIPPER INFLUENT**JANUARY****GENERAL WATER CHEMISTRY**

Lab pH (s.u.)	2.20
Lab Conductivity, umhos/cm	10700.00
Total Dissolved Solids (180)	2610.00
Total Dissolved Solids (calc.)	3433.00
Total Alkalinity as CaCO ₃	ND
Total Hardness as CaCO ₃	1033.00
Bicarbonate as HCO ₃	ND
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	1360.00
Sulfate	1240.00
Calcium	359.00
Magnesium	34.00
Potassium	2.70
Sodium	439.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	4.30
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	1.10
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND

STRIPPER INFLUENT (continued)

JANUARY

Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	14.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	45.00
Trichlorotrifluoroethane	ND

STRIPPER EFFLUENT

JANUARY

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.00
Lab Conductivity, umhos/cm	3210.00
Total Dissolved Solids (180)	2580.00
Total Dissolved Solids (calc.)	2563.00
Total Alkalinity as CaCO ₃	249.00
Total Hardness as CaCO ₃	1109.00
Bicarbonate as HCO ₃	304.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	296.00
Sulfate	1250.00
Calcium	391.00
Magnesium	32.00
Potassium	2.30
Sodium	444.00

PAH

Naphthalene	ND
Acenaphthylene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(A)Anthracene	ND
Chrysene	ND
Benzo(B)Fluoranthene	ND
Benzo(K)Fluoranthene	ND
Benzo(A)Pyrene	ND
Dibenzo(a,h)Anthracene	ND
Benzo(g,h,i)Perylene	ND
Indeno(1,2,3-CD)Pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND

HALOCARBONS

JANUARY

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND

STRIPPER EFFLUENT (continued)

JANUARY

Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

METALS

Silver	ND
Arsenic	ND
Beryllium	ND
Cadmium	ND
Copper	0.012
Mercury	ND
Nickel	0.198
Lead	0.003
Antimony	ND
Selenium	ND

GRW-13	JANUARY
PAH	ND
Naphthalene	ND
Acenaphthylene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(A)Anthracene	ND
Chrysene	ND
Benzo(B)Fluoranthene	ND
Benzo(K)Fluoranthene	ND
Benzo(A)Pyrene	ND
Dibenzo(a,h)Anthracene	ND
Benzo(g,h,i)Perylene	ND
Indeno(1,2,3-CD)Pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	0.7
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	5.4
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND

GRW-13 (continued)

JANUARY

cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

*ND - Not detected at specified detection limit

GBR-15

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	0.7
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	9.8
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	1.2
Trichlorotrifluoroethane	---

GBR-17

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

GBR-24D

JANUARY

PAH	ND
Naphthalene	ND
Acenaphthylene	ND
Acenaphthene	ND
Fluorene	1.2
Phenanthrene	0.34
Anthracene	ND
Fluoranthene	ND
Pyrene	0.073
Benzo(A)Anthracene	ND
Chrysene	0.064
Benzo(B)Fluoranthene	ND
Benzo(K)Fluoranthene	ND
Benzo(A)Pyrene	ND
Dibenzo(a,h)Anthracene	ND
Benzo(g,h,i)Perylene	ND
Indeno(1,2,3-CD)Pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND

GBR-24D

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	11
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	0.6
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	2.3
Toluene	ND
Xylenes	0.8
Trichlorotrifluoroethane	--

GBR-30

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	---

GBR-30	JANUARY
PAH	ND
Naphthalene	ND
Acenaphthylene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	0.031
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(A)Anthracene	ND
Chrysene	0.11
Benzo(B)Fluoranthene	0.035
Benzo(K)Fluoranthene	ND
Benzo(A)Pyrene	ND
Dibenzo(a,h)Anthracene	ND
Benzo(g,h,i)Perylene	ND
Indeno(1,2,3-CD)Pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND

GBR-31

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	0.7
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

GBR-31

JANUARY

PAH

Naphthalene	ND
Acenaphthylene	ND
Acenaphthene	ND
Fluorene	ND
Phenanthrene	ND
Anthracene	ND
Fluoranthene	ND
Pyrene	ND
Benzo(A)Anthracene	ND
Chrysene	ND
Benzo(B)Fluoranthene	ND
Benzo(K)Fluoranthene	ND
Benzo(A)Pyrene	ND
Dibenzo(a,h)Anthracene	ND
Benzo(g,h,i)Perylene	ND
Indeno(1,2,3-CD)Pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND

GBR-32

GENERAL WATER CHEMISTRY JANUARY

Lab pH (s.u.)	7.1
Lab Conductivity, umhos/cm	5210.00
Total Dissolved Solids (180)	4180.00
Total Dissolved Solids (calc.)	3830.00
Total Alkalinity as CaCO ₃	318.00
Total Hardness as CaCO ₃	1504.00
Dissolved Oxygen	NA
Bicarbonate as HCO ₃	388.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	569.00
Sulfate	1770.00
Calcium	517.00
Magnesium	52.00
Potassium	3.50
Sodium	731.00
Cation/Anion Balance	2.27%

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	1.4
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.8
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	120 D(10)
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND

GBR-32 (continued)

JANUARY

Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	11
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	6.4
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	0.8
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

D(10)=DILUTED 10X

GBR-48

JANUARY

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.2
Lab Conductivity, umhos/cm	5870.00
Total Dissolved Solids (180)	4740.00
Total Dissolved Solids (calc.)	4288.00
Total Alkalinity as CaCO ₃	256.00
Total Hardness as CaCO ₃	1705.00
Dissolved Oxygen	NA
Bicarbonate as HCO ₃	312.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	708.00
Sulfate	1940.00
Calcium	589.00
Magnesium	57.00
Potassium	4.70
Sodium	832.00
Cation/Anion Balance	3.57%

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	1.4
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.3
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	54
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND

GBR-48 (continued)

JANUARY

Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	6.1
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	3.6
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

GBR-49

JANUARY

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.2
Lab Conductivity, umhos/cm	3760.00
Total Dissolved Solids (180)	3100.00
Total Dissolved Solids (calc.)	2885.00
Total Alkalinity as CaCO ₃	307.00
Total Hardness as CaCO ₃	1197.00
Dissolved Oxygen	NA
Bicarbonate as HCO ₃	374.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	225.00
Sulfate	1530.00
Calcium	413.00
Magnesium	40.00
Potassium	3.50
Sodium	492.00
Cation/Anion Balance	1.24%

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	1.2
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.4
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	79
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND

GBR-49 (continued)

JANUARY

1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	4.2
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

GBR-50

JANUARY

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.1
Lab Conductivity, umhos/cm	3090.00
Total Dissolved Solids (180)	2690.00
Total Dissolved Solids (calc.)	3025.00
Total Alkalinity as CaCO ₃	200.00
Total Hardness as CaCO ₃	1322.00
Dissolved Oxygen	NA
Bicarbonate as HCO ₃	244.00
Carbonate as CO ₃	0.00
Hydroxide as OH	0.00
Chloride	39.00
Sulfate	1940.00
Calcium	485.00
Magnesium	30.00
Potassium	2.30
Sodium	405.00
Cation/Anion Balance	1.47%

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	2.3
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND

GBR-50 (continued)

JANUARY

trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

GBR-51

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

GBR-52

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	---

OFFSITE WELLS

SHS-3

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-4

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-6

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-9

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	0.6
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	60
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	41
Toluene	ND
Xylenes	7.1
Trichlorotrifluoroethane	--

SHS-10

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	0.7
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-12

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-13

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	13
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-14

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	4.6
Toluene	ND
Xylenes	7.9
Trichlorotrifluoroethane	--

SHS-15

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	0.5
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	1.9
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-16

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-17

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	--

SHS-18

JANUARY

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	--
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dibromoethane (EDB)	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	5.6
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	260
Toluene	ND
Xylenes	460
Trichlorotrifluoroethane	--

*DILUTED 10X

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

JANUARY, 1995

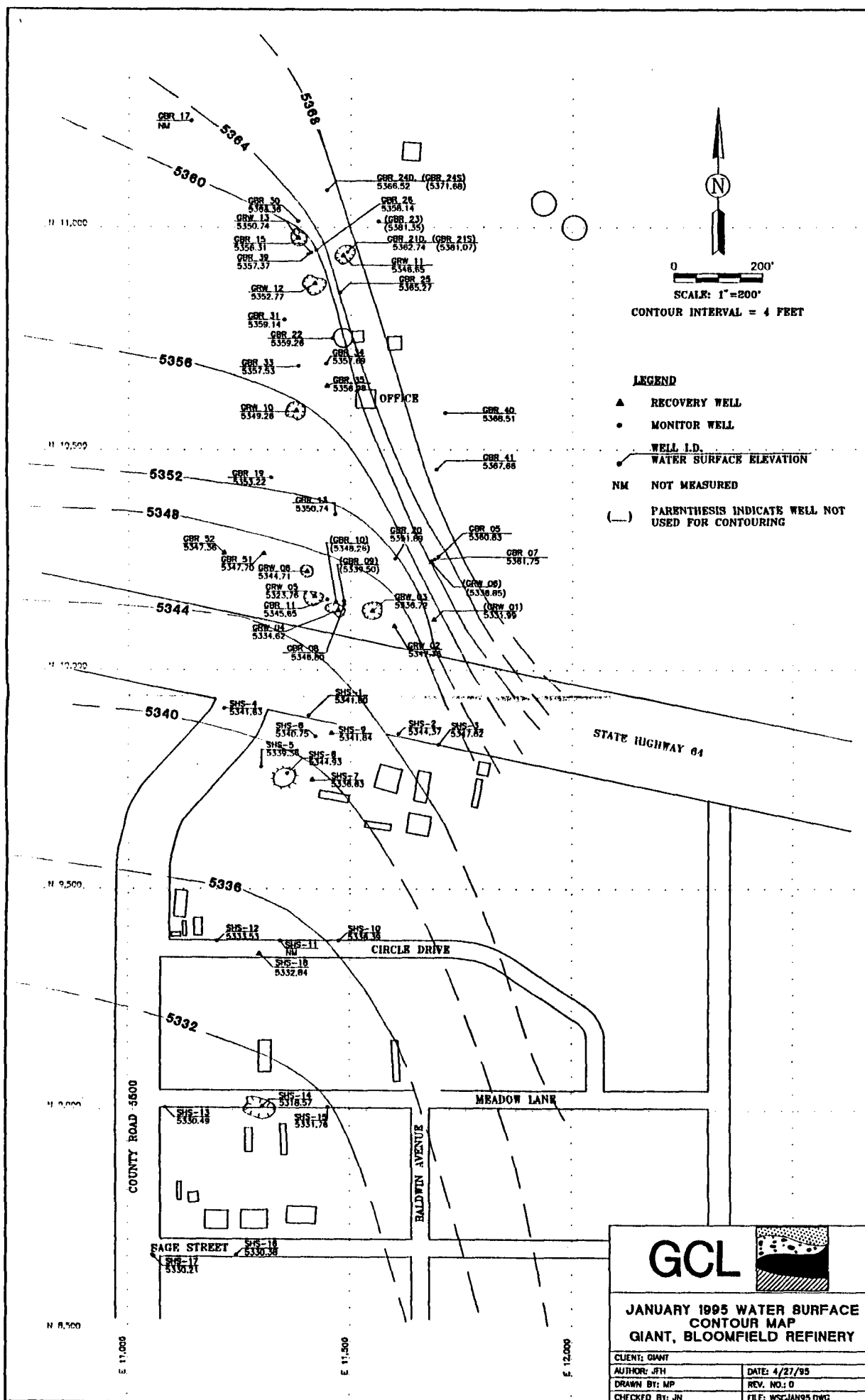
WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.31	62.31	0.00	5331.99
GRW-2	5391.28	43.92	43.92	0.00	5347.36
GRW-3	5388.77	52.05	52.05	0.00	5336.72
GRW-4	5390.02	55.40	55.40	0.00	5334.62
GRW-5	5390.56	66.80	66.80	0.00	5323.76
GRW-6	5390.81	46.10	46.10	0.00	5344.71
GRW-10	5395.02	47.94	45.22	2.72	5349.26
GRW-11	5397.85	52.20	52.20	0.00	5345.65
GRW-12	5397.24	44.47	44.47	0.00	5352.77
GRW-13	5396.90	53.64	53.64	0.00	5343.26
GBR-5	5395.07	35.84	33.85	1.99	5360.82
GBR-6	5395.70	58.85	58.85	0.00	5336.85
GBR-7	5395.85	34.65	33.97	0.68	5361.74
GBR-8	5390.50	43.72	43.70	0.02	5346.80
GBR-9	5389.92	50.42	50.42	0.00	5339.50
GBR-10	5390.57	42.31	42.31	0.00	5348.26
GBR-11	5389.43	42.89	42.88	0.01	5346.55
GBR-13	5393.04	42.31	42.30	0.01	5350.74
GBR-15	5397.99	41.68	41.68	0.00	5356.31
GBR-18	5421.68	29.64	29.64	0.00	5392.04
GBR-19	5393.83	41.20	40.46	0.74	5353.22
GBR-20	5393.47	41.58	41.58	0.00	5351.89
GBR-21S	5400.65	19.95	19.90	0.05	5380.74
GBR-21D	5400.19	37.45	37.45	0.00	5362.74
GBR-22	5395.91	36.65	36.64	0.01	5359.27
GBR-23	5403.72	22.37	22.37	0.00	5379.32
GBR-24S	5396.08	24.41	24.40	0.01	5365.84
GBR-24D	5396.77	30.25	30.25	0.00	5366.52
GBR-25	5396.72	31.45	31.45	0.00	5365.27
GBR-26	5395.59	37.45	37.45	0.00	5358.14
GBR-30	5396.58	33.22	33.22	0.00	5363.36
GBR-31	5394.86	35.72	35.72	0.00	5359.14
GBR-33	5396.28	38.75	38.75	0.00	5357.53
GBR-34	5394.00	36.77	36.20	0.57	5357.69
GBR-35	5393.66	38.00	36.35	1.65	5356.98
GBR-39	5397.55	40.18	40.18	0.00	5357.37
GBR-40	5400.76	32.25	32.25	0.00	5368.51
GBR-41	5396.35	28.69	28.69	0.00	5367.66
GBR-51	5389.68	41.98	41.98	0.00	5347.70
GBR-52	5387.74	40.38	40.38	0.00	5347.36

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JANUARY, 1995
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.94	41.94	0.00	5341.60
SHS-2	5381.66	37.29	37.29	0.00	5344.37
SHS-3	5383.33	35.51	35.51	0.00	5347.82
SHS-4	5383.62	41.99	41.99	0.00	5341.63
SHS-5	5378.36	39.00	39.00	0.00	5339.36
SHS-6	5378.17	33.24	33.24	0.00	5344.93
SHS-7	5375.89	39.30	39.25	0.05	5336.63
SHS-8	5380.25	39.50	39.50	0.00	5340.75
SHS-9	5380.79	38.95	38.95	0.00	5341.84
SHS-10	5373.80	37.27	37.27	0.00	5336.53
SHS-12	5373.94	40.55	40.55	0.00	5333.39
SHS-13	5367.81	37.32	37.32	0.00	5330.49
SHS-14	5367.07	48.50	48.50	0.00	5318.57
SHS-15	5366.21	34.45	34.45	0.00	5331.76
SHS-16	5362.58	32.20	32.20	0.00	5330.38
SHS-17	5364.35	34.14	34.14	0.00	5330.21
SHS-18	5373.64	40.80	40.80	0.00	5332.84

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY VOLUME CHANGE**

FIRST QUARTER, 1995

Tank Number	Beginning Volume	Ending Volume	Net Change
102	16,339	16,790	451
106	8,010	8,010	0
21	54,707	54,218	(489)
22	71,773	70,808	(965)
Total Net Volume Change			(1,003)

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
QUARTERLY RECOVERY WELL
VOLUME TABULATION**

FIRST QUARTER, 1995

Well	Month #1	Month #2	Month #3	Total
GRW-1	6,070	3,990	640	10,700
GRW-2	9,340	10,090	13,110	32,540
GRW-3	12,060	11,950	14,870	38,880
GRW-4	19,020	19,960	26,320	65,300
GRW-5	55,050	41,200	43,680	139,930
GRW-6	61,210	24,510	130	85,850
GRW-9	2,530	4,110	6,910	13,550
GRW-10	226,260	197,980	284,350	708,590
GRW-11	39,410	21,100	26,920	87,430
GRW-12	9,960	9,260	10,800	30,020
GRW-13	14,590	14,250	15,110	43,950
SHS-7	11	44	33	88
SHS-9	622	598	1151	2,371
SHS-14	161,942	164,087	78,814	404,843
SHS-18	8,510	9,907	14,160	32,577
TOTAL VOLUME PUMPED IN GALLONS				1,696,619

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

FIRST QUARTER, 1995

Total Volume Of Water Recovered	1,696,619
Net Change In Storage Volume	<u>1,003</u>
Total Water Treated	1,697,622
Less Air Stripper	<u>8,488</u>
Evaporative Loss (1/2%)	
Total Water Pumped to the Infiltration Gallery	<u><u>1,689,134</u></u>

GW - 40

MONITORING REPORTS

DATE:
2001-1998

ANNUAL DATA REPORT
GIANT BLOOMFIELD REFINERY
2001

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ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Prepared By:

GIANT REFINING COMPANY
111 County Road 4990
Bloomfield, NM 87413
(505) 632-8006
FAX (505) 632-4021

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Annual Analytical Results Section 2

Potentiometric Surface Maps..... Section 3

Total Volume History Section 4

INTRODUCTION AND SUMMARY ANNUAL REPORT 2001

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the annual analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the annual report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevation and product thickness for each well, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the year. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the annual analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT INDUSTRIES, INC.
ONSITE REMEDIATION PROJECT
ANNUAL ANALYTICAL DATA SUMMARY
2001

	JAN	APR	JUL	AUG	OCT	DEC
<u>SYSTEM EFFLUENT</u>						
Lab pH	7.1	7.1	6.95		7.1	
Lab Conductivity @25 C	2910	2900	2800		2910	
Total Dissolved Solids (Calc)	2130	4500	2240		2250	
Total Alkalinity as CaCO3	520	500	504		510	
Total Hardness as CaCO3	827	890	732		817	
Bicarbonate as HCO3	634	610	615		622	
Carbonate as CO3	ND	ND	ND		ND	
Hydroxide	ND	ND	ND		ND	
Chloride	116	119	127		107	
Sulfate	979	961	897		1100	
Calcium	276	307	252		282	
Magnesium	33.7	30.2	25.3		27.7	
Potassium	2.9	2.2	2.3		2.3	
Sodium	378	404	409		427	
<u>HALOCARBONS</u>						
Bromodichloromethane	ND	ND	ND		ND	
Bromoform	ND	ND	ND		ND	
Bromomethane	ND	ND	ND		ND	
Carbon Tetrachloride	ND	ND	ND		ND	
Chloroethane	ND	ND	ND		ND	
Chloroform	ND	ND	ND		ND	
Chloromethane	ND	ND	ND		ND	
Dibromochloromethane	ND	ND	ND		ND	
1,2-Dibromoethane (EDB)	ND	ND	ND		ND	
1,2-Dichlorobenzene	ND	ND	ND		ND	
1,3-Dichlorobenzene	ND	ND	ND		ND	
1,4-Dichlorobenzene	ND	ND	ND		ND	
1,1-Dichloroethane	ND	ND	ND		ND	
1,2-Dichloroethane (EDC)	ND	ND	ND		ND	
1,1-Dichloroethene	ND	ND	ND		ND	
cis-1,2-Dichloroethene	ND	ND	ND		ND	
trans-1,2-Dichloroethene	ND	ND	ND		ND	
1,2-Dichloropropane	ND	ND	ND		ND	
cis-1,3-Dichloropropene	ND	ND	ND		ND	
trans-1,3-Dichloropropene	ND	ND	ND		ND	
Methylene Chloride	ND	ND	ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND	ND		ND	
Tetrachlorethene	ND	ND	ND		ND	
1,1,1-Trichloroethane	ND	ND	ND		ND	
1,1,2-Trichloroethane	ND	ND	ND		ND	
Trichloroethene	ND	ND	ND		ND	

	JAN	APR	JUL	AUG	OCT	DEC
Trichlorofluoromethane	ND	ND	ND		ND	
Vinyl Chloride	ND	ND	ND		ND	
AROMATICS						
Benzene	ND	ND	ND		ND	
Chlorobenzene	ND	ND	ND		ND	
1,2-Dichlorobenzene	ND	ND	ND		ND	
1,3-Dichlorobenzene	ND	ND	ND		ND	
1,4-Dichlorobenzene	ND	ND	ND		ND	
Ethylbenzene	ND	ND	ND		ND	
Methyl-t-Butyl Ether	ND	ND	ND		ND	
Toluene	ND	ND	ND		ND	
Total Xylenes	ND	ND	ND		ND	
PAH						
1-Methylnaphthalene	ND	ND	ND		ND	
2-Methylnaphthalene	ND	ND	ND		ND	
Benzo(a)pyrene	ND	ND	ND		ND	
Naphthalene	ND	ND	ND		ND	
<u>SYSTEM INFLUENT</u>						
Lab pH	7.2	7.1	7.1		7.2	
Lab Conductivity @25 C	2910	2890	2830		2890	
Total Dissolved Solids (Calc)	2130	2260	2240		2250	
Total Alkalinity as CaCO3	468	490	495		500	
Total Hardness as CaCO3	779	886	654		819	
Bicarbonate as HCO3	570	598	604		610	
Carbonate as CO3	ND	ND	ND		ND	
Hydroxide	ND	ND	ND		ND	
Chloride	116	117	127		107	
Sulfate	992	962	906		1110	
Calcium	258	305	220		283	
Magnesium	32.9	30.3	25.6		27.6	
Potassium	3.7	2.6	2.1		2.3	
Sodium	437	404	413		431	
HALOCARBONS						
Bromodichloromethane	ND	ND	ND		ND	
Bromoform	ND	ND	ND		ND	
Bromomethane	ND	ND	ND		ND	
Carbon Tetrachloride	ND	ND	ND		ND	
Chloroethane	ND	ND	ND		ND	
Chloroform	ND	ND	ND		ND	
Chloromethane	ND	ND	ND		ND	
Dibromochloromethane	ND	ND	ND		ND	
1,2-Dibromoethane (EDB)	ND	ND	ND		ND	
1,2-Dichlorobenzene	ND	ND	ND		ND	

	JAN	APR	JUL	AUG	OCT	DEC
1,3-Dichlorobenzene	ND	ND	ND		ND	
1,4-Dichlorobenzene	ND	ND	ND		ND	
1,1-Dichloroethane	ND	ND	ND		ND	
1,2-Dichloroethane (EDC)	ND	ND	ND		0.3	
1,1-Dichloroethene	ND	ND	ND		ND	
cis-1,2-Dichloroethene	ND	ND	ND		ND	
trans-1,2-Dichloroethene	ND	ND	ND		ND	
1,2-Dichloropropane	ND	ND	ND		ND	
cis-1,3-Dichloropropene	ND	ND	ND		ND	
trans-1,3-Dichloropropene	ND	ND	ND		ND	
Methylene Chloride	ND	ND	ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND	ND		ND	
Tetrachlorethene	ND	ND	ND		ND	
1,1,1-Trichloroethane	ND	ND	ND		ND	
1,1,2-Trichloroethane	ND	ND	ND		ND	
Trichloroethene	ND	ND	ND		ND	
Trichlorofluoromethane	ND	ND	ND		ND	
Vinyl Chloride	ND	ND	ND		ND	
AROMATICS						
Benzene	ND	ND	0.6		0.2	
Chlorobenzene	ND	ND	ND		ND	
1,2-Dichlorobenzene	ND	ND	ND		ND	
1,3-Dichlorobenzene	ND	ND	ND		ND	
1,4-Dichlorobenzene	ND	ND	ND		ND	
Ethylbenzene	ND	ND	ND		ND	
Methyl-t-Butyl Ether	ND	ND	ND		ND	
Toluene	ND	ND	ND		ND	
Total Xylenes	ND	ND	ND		ND	
GRW-3						
Lab pH	7.1					
Lab Conductivity @25 C	2310					
Total Dissolved Solids @ 180 C	1410					
Total Alkalinity as CaCO3	1030					
Total Hardness as CaCO3	339					
Bicarbonate as HCO3	1250					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	137					
Sulfate	82					
Calcium	107					
Magnesium	17.4					
Potassium	2.1					
Sodium	446					
HALOCARBONS						
Bromodichloromethane	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	17					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GRW-6						
Lab pH	7.2					
Lab Conductivity @25 C	2560					
Total Dissolved Solids @ 180 C	1640					

	JAN	APR	JUL	AUG	OCT	DEC
Total Alkalinity as CaCO ₃	748					
Total Hardness as CaCO ₃	504					
Bicarbonate as HCO ₃	913					
Carbonate as CO ₃	ND					
Hydroxide	ND					
Chloride	142					
Sulfate	440					
Calcium	158					
Magnesium	26.9					
Potassium	2.7					
Sodium	443					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GRW-13						
Lab pH	7					
Lab Conductivity @25 C	4110					
Total Dissolved Solids @ 180 C	3210					
Total Alkalinity as CaCO3	197					
Total Hardness as CaCO3	1030					
Bicarbonate as HCO3	240					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	255					
Sulfate	1760					
Calcium	363					
Magnesium	29.1					
Potassium	7.8					
Sodium	565					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GBR-15						
Lab pH	7.2					
Lab Conductivity @25 C	3700					
Total Dissolved Solids @ 180 C	2780					
Total Alkalinity as CaCO3	337					
Total Hardness as CaCO3	950					
Bicarbonate as HCO3	411					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	312					
Sulfate	1340					
Calcium	336					
Magnesium	27					
Potassium	7.3					
Sodium	523					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATIC						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GBR-17						
Lab pH						7.1
Lab Conductivity @25 C						2480
Total Dissolved Solids (Calc)						2090
Total Alkalinity as CaCO3						183
Total Hardness as CaCO3						868
Bicarbonate as HCO3						223
Carbonate as CO3						ND
Hydroxide						ND
Chloride						55.0
Sulfate						1200
Calcium						308
Magnesium						24.1

	JAN	APR	JUL	AUG	OCT	DEC
Potassium						0.8
Sodium						312
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						ND
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						ND
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						ND
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						ND
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						ND
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						ND
Trichlorofluoromethane						ND
Vinyl Chloride						ND
AROMATICS						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						ND

	JAN	APR	JUL	AUG	OCT	DEC
GBR-24D						
Lab pH	7.9					
Lab Conductivity @25 C	4450					
Total Dissolved Solids @ 180 C	3530					
Total Alkalinity as CaCO3	243					
Total Hardness as CaCO3	1500					
Bicarbonate as HCO3	297					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	589					
Sulfate	1540					
Calcium	482					
Magnesium	71.2					
Potassium	7.3					
Sodium	577					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					

	JAN	APR	JUL	AUG	OCT	DEC
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GBR-30						
Lab pH	6.9					
Lab Conductivity @25 C	4220					
Total Dissolved Solids @ 180 C	3360					
Total Alkalinity as CaCO3	262					
Total Hardness as CaCO3	1220					
Bicarbonate as HCO3	320					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	411					
Sulfate	1650					
Calcium	404					
Magnesium	50.6					
Potassium	5.4					
Sodium	622					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					

	JAN	APR	JUL	AUG	OCT	DEC
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GBR-31						
Lab pH	7.2					
Lab Conductivity @25 C	3420					
Total Dissolved Solids @ 180 C	2850					
Total Alkalinity as CaCO3	215					
Total Hardness as CaCO3	1120					
Bicarbonate as HCO3	262					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	127					
Sulfate	1650					
Calcium	380					
Magnesium	40.6					
Potassium	3.7					
Sodium	404					

	JAN	APR	JUL	AUG	OCT	DEC
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
GBR-32						
Lab pH						6.9
Lab Conductivity @25 C						5630
Total Dissolved Solids (Calc)						4670
Total Alkalinity as CaCO3						256
Total Hardness as CaCO3						1610
Bicarbonate as HCO3						312
Carbonate as CO3						ND
Hydroxide						ND
Chloride						602
Sulfate						2400
Calcium						554
Magnesium						55.8
Potassium						5.9
Sodium						855
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						1.0
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						0.6
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						4.5
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						ND
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						2.0
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						1.4
Trichlorofluoromethane						ND
Vinyl Chloride						ND

	JAN	APR	JUL	AUG	OCT	DEC
AROMATICS						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						ND
GBR-48						
Lab pH						6.7
Lab Conductivity @25 C						6580
Total Dissolved Solids (Calc)						5320
Total Alkalinity as CaCO3						202
Total Hardness as CaCO3						1900
Bicarbonate as HCO3						246
Carbonate as CO3						ND
Hydroxide						ND
Chloride						1000
Sulfate						2380
Calcium						648
Magnesium						68.3
Potassium						5.6
Sodium						938
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						2.7
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						0.5
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						7.3
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						0.2

	JAN	APR	JUL	AUG	OCT	DEC
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						3.0
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						2.0
Trichlorofluoromethane						ND
Vinyl Chloride						ND
AROMATIC						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						ND
GBR-49						
Lab pH						7.0
Lab Conductivity @25 C						4210
Total Dissolved Solids (Calc)						4530
Total Alkalinity as CaCO3						247
Total Hardness as CaCO3						1310
Bicarbonate as HCO3						301
Carbonate as CO3						ND
Hydroxide						ND
Chloride						297
Sulfate						1940
Calcium						458
Magnesium						41.9
Potassium						3.7
Sodium						627
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						0.8
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND

	JAN	APR	JUL	AUG	OCT	DEC
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						0.7
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						6.1
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						ND
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						1.9
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						1.2
Trichlorofluoromethane						ND
Vinyl Chloride						ND
AROMATICS						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						0.5
GBR-50						
Lab pH						6.9
Lab Conductivity @25 C						3100
Total Dissolved Solids (Calc)						2730
Total Alkalinity as CaCO3						174
Total Hardness as CaCO3						1000
Bicarbonate as HCO3						212
Carbonate as CO3						ND
Hydroxide						ND
Chloride						53
Sulfate						1690
Calcium						356
Magnesium						27.6
Potassium						2.5
Sodium						406

	JAN	APR	JUL	AUG	OCT	DEC
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						ND
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						ND
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						ND
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						ND
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						0.6
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						ND
Trichlorofluoromethane						ND
Vinyl Chloride						ND
AROMATICS						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						ND

	JAN	APR	JUL	AUG	OCT	DEC
GBR-51						
Lab pH	7.2					
Lab Conductivity @25 C	2760					
Total Dissolved Solids @ 180 C	2220					
Total Alkalinity as CaCO3	206					
Total Hardness as CaCO3	1020					
Bicarbonate as HCO3	251					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	56					
Sulfate	1310					
Calcium	360					
Magnesium	29.3					
Potassium	1.7					
Sodium	302					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					

	JAN	APR	JUL	AUG	OCT	DEC
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GBR-52						
Lab pH	7.2					
Lab Conductivity @25 C	2940					
Total Dissolved Solids @ 180 C	2580					
Total Alkalinity as CaCO3	206					
Total Hardness as CaCO3	1230					
Bicarbonate as HCO3	251					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	57					
Sulfate	1530					
Calcium	436					
Magnesium	34.3					
Potassium	2.6					
Sodium	313					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS	ND					
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
SHS-3						
Lab pH	6.7					
Lab Conductivity @25 C	4640					
Total Dissolved Solids @ 180 C	4390					
Total Alkalinity as CaCO3	231					
Total Hardness as CaCO3	1800					
Bicarbonate as HCO3	281					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	262					
Sulfate	2160					
Calcium	580					
Magnesium	85.1					
Potassium	7.6					
Sodium	464					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					

	JAN	APR	JUL	AUG	OCT	DEC
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
SHS-4						
Lab pH	7.2					
Lab Conductivity @25 C	3230					
Total Dissolved Solids (Calc)	2680					
Total Alkalinity as CaCO3	211					
Total Hardness as CaCO3	1340					
Bicarbonate as HCO3	257					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	76					
Sulfate	1670					
Calcium	475					
Magnesium	37.5					
Potassium	1.7					
Sodium	322					

	JAN	APR	JUL	AUG	OCT	DEC
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
SHS-6						
Lab pH	7.1					
Lab Conductivity @25 C	2750					
Total Dissolved Solids @ 180 C	2100					
Total Alkalinity as CaCO3	240					
Total Hardness as CaCO3	924					
Bicarbonate as HCO3	293					

	JAN	APR	JUL	AUG	OCT	DEC
Carbonate as CO ₃	ND					
Hydroxide	ND					
Chloride	76					
Sulfate	1170					
Calcium	326					
Magnesium	26.5					
Potassium	1.4					
Sodium	319					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					

	JAN	APR	JUL	AUG	OCT	DEC
SHS-8						
Lab pH				6.5		
Lab Conductivity @25 C				2470		
Total Dissolved Solids @ 180 C				1380		
Total Alkalinity as CaCO3				836		
Total Hardness as CaCO3				436		
Bicarbonate as HCO3				1020		
Carbonate as CO3				ND		
Hydroxide				ND		
Chloride				272		
Sulfate				155		
Calcium				145		
Magnesium				17.9		
Potassium				2.8		
Sodium				434		
SHS-10						
Lab pH	7.3					
Lab Conductivity @25 C	2980					
Total Dissolved Solids (Calc)	2170					
Total Alkalinity as CaCO3	461					
Total Hardness as CaCO3	852					
Bicarbonate as HCO3	562					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	117					
Sulfate	985					
Calcium	262					
Magnesium	48.3					
Potassium	8.5					
Sodium	411					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
Naphthalene	4.4					
SHS-12						
Lab pH	7.2					
Lab Conductivity @25 C	2700					
Total Dissolved Solids @ 180 C	1860					
Total Alkalinity as CaCO3	653					
Total Hardness as CaCO3	606					
Bicarbonate as HCO3	797					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	146					
Sulfate	552					
Calcium	214					
Magnesium	17.8					
Potassium	1.2					
Sodium	427					

	JAN	APR	JUL	AUG	OCT	DEC
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
Naphthalene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
SHS-13						
Lab pH	6.9					
Lab Conductivity @25 C	3300					
Total Dissolved Solids @ 180 C	2450					
Total Alkalinity as CaCO3	595					
Total Hardness as CaCO3	1020					
Bicarbonate as HCO3	726					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	227					
Sulfate	878					
Calcium	348					
Magnesium	37.9					
Potassium	2.2					
Sodium	400					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	0.92					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					

	JAN	APR	JUL	AUG	OCT	DEC
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
Naphthalene	ND					
SHS-14						
Lab pH				7.3		
Lab Conductivity @25 C				2440		
Total Dissolved Solids @ 180 C				2150		
Total Alkalinity as CaCO3				156		
Total Hardness as CaCO3				972		
Bicarbonate as HCO3				190		
Carbonate as CO3				ND		
Hydroxide				ND		
Chloride				75		
Sulfate				1050		
Calcium				333		
Magnesium				34.5		
Potassium				2.3		
Sodium				207		
HALOCARBONS						
Bromodichloromethane				ND		
Bromoform				ND		
Bromomethane				ND		
Carbon Tetrachloride				ND		
Chloroethane				ND		
Chloroform				ND		
Chloromethane				ND		
Dibromochloromethane				ND		
1,2-Dibromoethane (EDB)				ND		
1,2-Dichlorobenzene				ND		
1,3-Dichlorobenzene				ND		
1,4-Dichlorobenzene				ND		
1,1-Dichloroethane				ND		
1,2-Dichloroethane (EDC)				ND		
1,1-Dichloroethene				ND		
cis-1,2-Dichloroethene				ND		

	JAN	APR	JUL	AUG	OCT	DEC
trans-1,2-Dichloroethene				ND		
1,2-Dichloropropane				ND		
cis-1,3-Dichloropropene				ND		
trans-1,3-Dichloropropene				ND		
Methylene Chloride				ND		
1,1,2,2-Tetrachloroethane				ND		
Tetrachlorethene				ND		
1,1,1-Trichloroethane				ND		
1,1,2-Trichloroethane				ND		
Trichloroethene				ND		
Trichlorofluoromethane				ND		
Vinyl Chloride				ND		
AROMATICS						
Benzene				ND		
Chlorobenzene				ND		
1,2-Dichlorobenzene				ND		
1,3-Dichlorobenzene				ND		
1,4-Dichlorobenzene				ND		
Ethylbenzene				0.6		
Methyl-t-Butyl Ether				ND		
Toluene				ND		
Total Xylenes				ND		
PAH						
Naphthalene				ND		
SHS-15						
Lab pH	7.2					
Lab Conductivity @25 C	2510					
Total Dissolved Solids (Calc)	2050					
Total Alkalinity as CaCO3	269					
Total Hardness as CaCO3	1110					
Bicarbonate as HCO3	328					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	75					
Sulfate	1080					
Calcium	377					
Magnesium	40.8					
Potassium	2.7					
Sodium	240					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	0.92					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
Naphthalene	ND					
SHS-16						
Lab pH	7.3					
Lab Conductivity @25 C	2910					
Total Dissolved Solids (Calc)	2470					
Total Alkalinity as CaCO3	279					
Total Hardness as CaCO3	1300					
Bicarbonate as HCO3	340					
Carbonate as CO3	ND					
Hydroxide	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Chloride	66					
Sulfate	1420					
Calcium	445					
Magnesium	45.3					
Potassium	2.9					
Sodium	247					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					

	JAN	APR	JUL	AUG	OCT	DEC
SHS-17						
Lab pH	7.2					
Lab Conductivity @25 C	3420					
Total Dissolved Solids (Calc)	2540					
Total Alkalinity as CaCO3	298					
Total Hardness as CaCO3	921					
Bicarbonate as HCO3	363					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	179					
Sulfate	1120					
Calcium	292					
Magnesium	46.8					
Potassium	2.8					
Sodium	426					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					

SHS-18						
Lab pH				7.1		
Lab Conductivity @25 C				2290		
Total Dissolved Solids (Calc)				1600		
Total Alkalinity as CaCO3				626		
Total Hardness as CaCO3				210		
Bicarbonate as HCO3				763		
Carbonate as CO3				ND		
Hydroxide				ND		
Chloride				139		
Sulfate				252		
Calcium				60.1		
Magnesium				14.5		
Potassium				0.9		
Sodium				403		
HALOCARBONS						
Bromodichloromethane				ND		
Bromoform				ND		
Bromomethane				ND		
Carbon Tetrachloride				ND		
Chloroethane				ND		
Chloroform				ND		
Chloromethane				ND		
Dibromochloromethane				ND		
1,2-Dibromoethane (EDB)				ND		
1,2-Dichlorobenzene				ND		
1,3-Dichlorobenzene				ND		
1,4-Dichlorobenzene				ND		
1,1-Dichloroethane				ND		
1,2-Dichloroethane (EDC)				ND		
1,1-Dichloroethene				ND		
cis-1,2-Dichloroethene				ND		
trans-1,2-Dichloroethene				ND		
1,2-Dichloropropane				ND		
cis-1,3-Dichloropropene				ND		
trans-1,3-Dichloropropene				ND		
Methylene Chloride				ND		
1,1,2,2-Tetrachloroethane				ND		
Tetrachlorethene				ND		

	JAN	APR	JUL	AUG	OCT	DEC
1,1,1-Trichloroethane				ND		
1,1,2-Trichloroethane				ND		
Trichloroethene				ND		
Trichlorofluoromethane				ND		
Vinyl Chloride				ND		
AROMATICS						
Benzene				ND		
Chlorobenzene				ND		
1,2-Dichlorobenzene				ND		
1,3-Dichlorobenzene				ND		
1,4-Dichlorobenzene				ND		
Ethylbenzene				0.6		
Methyl-t-Butyl Ether				ND		
Toluene				ND		
Total Xylenes				ND		
PAH						
Naphthalene				ND		

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JANUARY, 2001

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.33	61.33	0.00	5332.97
GRW-2	5391.28	42.50	42.50	0.00	5348.78
GRW-3	5388.77	53.78	53.78	0.00	5334.99
GRW-4	5390.02	53.62	53.62	0.00	5336.40
GRW-5	5390.56	49.38	49.38	0.00	5341.18
GRW-6	5390.81	50.25	50.25	0.00	5340.56
GRW-10	5395.02	49.84	48.85	0.99	5345.97
GRW-11	5397.85	62.20	62.20	0.00	5335.65
GRW-12	5397.24	41.91	41.91	0.00	5355.33
GRW-13	5396.90	45.80	45.80	0.00	5351.10
GBR-5	5395.07	26.12	26.12	0.00	5368.95
GBR-6	5395.70	53.45	53.45	0.00	5342.25
GBR-7	5395.85	30.55	28.76	1.79	5366.73
GBR-8	5390.50	41.30	41.14	0.16	5349.33
GBR-9	5389.92	47.36	47.36	0.00	5342.56
GBR-10	5390.57	42.20	42.20	0.00	5348.37
GBR-11	5389.43	41.43	41.43	0.00	5348.00
GBR-13	5393.04	40.90	40.90	0.00	5352.14
GBR-15	5397.99	41.15	41.15	0.00	5356.84
GBR-18	5421.68	34.01	34.01	0.00	5387.67
GBR-19	5393.83	41.98	41.11	0.87	5352.55
GBR-20	5393.47	36.51	36.40	0.11	5357.05
GBR-21S	5400.65	27.12	25.74	1.38	5374.63
GBR-21D	5400.19	39.85	39.85	0.00	5360.34
GBR-22	5395.91	40.35	39.76	0.59	5356.03
GBR-23	5403.72	30.03	28.00	2.03	5375.38
GBR-24S	5396.08	29.96	29.96	0.00	5363.77
GBR-24D	5396.77	32.31	32.31	0.00	5364.46
GBR-25	5396.72	35.03	35.03	0.00	5361.69
GBR-26	5395.59	36.20	36.20	0.00	5359.39
GBR-30	5396.58	35.85	35.85	0.00	5360.73
GBR-31	5394.86	37.32	37.32	0.00	5357.54
GBR-33	5396.28	40.41	40.41	0.00	5355.87
GBR-34	5394.00	38.84	37.35	1.49	5356.35
GBR-35	5393.66	38.21	37.74	0.47	5355.83
GBR-39	5397.55	40.40	40.40	0.00	5357.15
GBR-40	5400.76	32.55	32.55	0.00	5368.21
GBR-41	5396.35	27.57	27.57	0.00	5368.78
GBR-51	5389.68	42.25	42.25	0.00	5347.43
GBR-52	5387.74	40.85	40.85	0.00	5346.89

3.0

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JANUARY, 2001
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	38.59	38.50	0.09	5345.02
SHS-2	5381.66	38.98	38.98	0.00	5342.68
SHS-3	5383.33	35.75	35.75	0.00	5347.58
SHS-4	5383.62	42.00	42.00	0.00	5341.62
SHS-5	5378.36	38.98	38.98	0.00	5339.38
SHS-6	5378.17	39.20	39.20	0.00	5338.97
SHS-7	5375.89	43.97	43.97	0.00	5331.92
SHS-8	5380.25	40.82	39.28	1.54	5340.66
SHS-9	5380.79	44.00	44.00	0.00	5336.79
SHS-10	5373.80	37.04	37.04	0.00	5336.76
SHS-12	5373.94	40.22	40.22	0.00	5333.72
SHS-13	5367.81	36.83	36.83	0.00	5330.98
SHS-14	5367.07	45.75	45.75	0.00	5321.32
SHS-15	5366.21	33.85	33.85	0.00	5332.36
SHS-16	5362.58	31.62	31.62	0.00	5330.96
SHS-17	5364.35	33.60	33.60	0.00	5330.75
SHS-18	5373.64	42.42	42.42	0.00	5331.22

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

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MONITORING REPORTS

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**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

APRIL, 2001

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.95	61.95	0.00	5332.35
GRW-2	5391.28	40.86	40.86	0.00	5350.42
GRW-3	5388.77	52.22	52.22	0.00	5336.55
GRW-4	5390.02	45.70	45.70	0.00	5344.32
GRW-5	5390.56	66.52	66.52	0.00	5324.04
GRW-6	5390.81	51.80	51.80	0.00	5339.01
GRW-10	5395.02	47.75	47.75	0.00	5347.27
GRW-11	5397.85	62.35	62.35	0.00	5335.50
GRW-12	5397.24	41.15	41.15	0.00	5356.09
GRW-13	5396.90	55.30	55.30	0.00	5341.60
GBR-5	5395.07	25.53	25.53	0.00	5369.54
GBR-6	5395.70	53.40	53.40	0.00	5342.30
GBR-7	5395.85	29.20	27.42	1.78	5368.07
GBR-8	5390.50	40.85	40.82	0.03	5349.67
GBR-9	5389.92	46.99	46.99	0.00	5342.93
GBR-10	5390.57	42.02	42.02	0.00	5348.55
GBR-11	5389.43	41.34	41.32	0.02	5348.11
GBR-13	5393.04	40.65	40.65	0.00	5352.39
GBR-15	5397.99	40.95	40.95	0.00	5357.04
GBR-18	5421.68	33.58	33.58	0.00	5388.10
GBR-19	5393.83	41.95	41.10	0.85	5352.56
GBR-20	5393.47	38.95	38.91	0.04	5354.55
GBR-21S	5400.65	27.84	26.35	1.49	5374.00
GBR-21D	5400.19	40.22	40.22	0.00	5359.97
GBR-22	5395.91	40.38	39.80	0.58	5355.99
GBR-23	5403.72	30.74	28.60	2.14	5374.59
GBR-24S	5396.08	31.56	30.84	0.72	5363.08
GBR-24D	5396.77	33.58	33.58	0.00	5363.19
GBR-25	5396.72	34.77	35.28	-0.51	5361.03
GBR-26	5395.59	37.85	37.85	0.00	5357.74
GBR-30	5396.58	35.95	35.95	0.00	5360.63
GBR-31	5394.86	37.39	37.39	0.00	5357.47
GBR-33	5396.28	37.44	37.38	0.06	5358.89
GBR-34	5394.00	38.52	37.65	0.87	5356.18
GBR-35	5393.66	40.19	40.19	0.00	5353.47
GBR-39	5397.55	40.30	40.30	0.00	5357.25
GBR-40	5400.76	31.62	31.62	0.00	5369.14
GBR-41	5396.35	26.60	26.60	0.00	5369.75
GBR-51	5389.68	42.15	42.15	0.00	5347.53
GBR-52	5387.74	40.72	40.72	0.00	5347.02

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 APRIL, 2001
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.73	39.63	0.10	5343.89
SHS-2	5381.66	35.91	35.91	0.00	5345.75
SHS-3	5383.33	35.64	35.64	0.00	5347.69
SHS-4	5383.62	41.90	41.90	0.00	5341.72
SHS-5	5378.36	38.78	38.78	0.00	5339.58
SHS-6	5378.17	39.03	39.03	0.00	5339.14
SHS-7	5375.89	*	*	0.00	5375.89
SHS-8	5380.25	40.67	39.06	1.61	5340.87
SHS-9	5380.79	45.75	45.75	0.00	5335.04
SHS-10	5373.80	36.75	36.75	0.00	5337.05
SHS-12	5373.94	39.89	39.89	0.00	5334.05
SHS-13	5367.81	36.48	36.48	0.00	5331.33
SHS-14	5367.07	44.64	44.64	0.00	5322.43
SHS-15	5366.21	33.44	33.44	0.00	5332.77
SHS-16	5362.58	31.25	31.25	0.00	5331.33
SHS-17	5364.35	33.21	33.21	0.00	5331.14
SHS-18	5373.64	42.50	42.50	0.00	5331.14

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

*SHS-7 HAS BEEN ABANDONED.

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MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JULY, 2001

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.92	60.92	0.00	5333.38
GRW-2	5391.28	43.04	43.04	0.00	5348.24
GRW-3	5388.77	52.55	52.55	0.00	5336.22
GRW-4	5390.02	53.82	53.82	0.00	5336.20
GRW-5	5390.56	42.65	42.65	0.00	5347.91
GRW-6	5390.81	41.76	41.76	0.00	5349.05
GRW-10	5395.02	48.90	48.90	0.00	5346.12
GRW-11	5397.85	59.72	59.72	0.00	5338.13
GRW-12	5397.24	44.85	44.85	0.00	5352.39
GRW-13	5396.90	54.80	54.80	0.00	5342.10
GBR-5	5395.07	26.50	26.50	0.00	5368.57
GBR-6	5395.70	47.32	47.32	0.00	5348.38
GBR-7	5395.85	29.43	27.63	1.80	5367.86
GBR-8	5390.50	41.21	40.97	0.24	5349.48
GBR-9	5389.92	47.32	47.32	0.00	5342.60
GBR-10	5390.57	41.96	41.96	0.00	5348.61
GBR-11	5389.43	41.20	41.18	0.02	5348.25
GBR-13	5393.04	40.76	40.76	0.00	5352.28
GBR-15	5397.99	40.99	40.99	0.00	5357.00
GBR-18	5421.68	34.30	34.30	0.00	5387.38
GBR-19	5393.83	42.20	41.30	0.90	5352.35
GBR-20	5393.47	36.00	35.96	0.04	5357.50
GBR-21S	5400.65	26.57	26.57	0.00	5374.08
GBR-21D	5400.19	40.45	40.45	0.00	5359.74
GBR-22	5395.91	40.05	40.05	0.00	5355.86
GBR-23	5403.72	28.57	28.53	0.04	5372.70
GBR-24S	5396.08	31.08	31.05	0.03	5362.44
GBR-24D	5396.77	33.66	33.66	0.00	5363.11
GBR-25	5396.72	35.56	35.56	0.00	5361.16
GBR-26	5395.59	38.00	38.00	0.00	5357.59
GBR-30	5396.58	36.01	36.01	0.00	5360.57
GBR-31	5394.86	37.61	37.61	0.00	5357.25
GBR-33	5396.28	40.40	40.40	0.00	5355.88
GBR-34	5394.00	37.58	37.55	0.03	5356.44
GBR-35	5393.66	37.75	37.70	0.05	5355.95
GBR-39	5397.55	40.43	40.43	0.00	5357.12
GBR-40	5400.76	32.55	32.55	0.00	5368.21
GBR-41	5396.35	27.23	27.23	0.00	5369.12
GBR-51	5389.68	42.35	42.35	0.00	5347.33
GBR-52	5387.74	40.94	40.94	0.00	5346.80

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 2001
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.85	39.83	0.02	5343.71
SHS-2	5381.66	38.90	38.90	0.00	5342.76
SHS-3	5383.33	35.50	35.50	0.00	5347.83
SHS-4	5383.62	42.09	42.09	0.00	5341.53
SHS-5	5378.36	39.11	39.11	0.00	5339.25
SHS-6	5378.17	39.30	39.30	0.00	5338.87
SHS-7	5375.89	*	*	0.00	5375.89
SHS-8	5380.25	40.92	39.40	1.52	5340.55
SHS-9	5380.79	44.75	44.75	0.00	5336.04
SHS-10	5373.80	37.42	37.42	0.00	5336.38
SHS-12	5373.94	40.24	40.24	0.00	5333.70
SHS-13	5367.81	36.83	36.83	0.00	5330.98
SHS-14	5367.07	45.63	45.63	0.00	5321.44
SHS-15	5366.21	34.27	34.27	0.00	5331.94
SHS-16	5362.58	31.82	31.82	0.00	5330.76
SHS-17	5364.35	33.69	33.69	0.00	5330.66
SHS-18	5373.64	41.72	41.72	0.00	5331.92
SHS-19	5378.89	41.25	41.25	0.00	5337.64

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

*SHS-7 HAS BEEN ABANDONED AND REPLACED WITH SHS-19.

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MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

OCTOBER, 2001

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.56	61.56	0.00	5332.74
GRW-2	5391.28	44.52	44.52	0.00	5346.76
GRW-3	5388.77	53.74	53.74	0.00	5335.03
GRW-4	5390.02	56.50	56.50	0.00	5333.52
GRW-5	5390.56	56.14	56.14	0.00	5334.42
GRW-6	5390.81	49.82	49.82	0.00	5340.99
GRW-10	5395.02	48.41	47.62	0.79	5347.24
GRW-11	5397.85	58.20	58.20	0.00	5339.65
GRW-12	5397.24	45.68	45.68	0.00	5351.56
GRW-13	5396.90	56.32	56.32	0.00	5340.58
GBR-5	5395.07	27.76	27.76	0.00	5367.31
GBR-6	5395.70	52.98	52.98	0.00	5342.72
GBR-7	5395.85	29.82	29.75	0.07	5366.09
GBR-8	5390.50	41.90	41.89	0.01	5348.61
GBR-9	5389.92	47.13	47.13	0.00	5342.79
GBR-10	5390.57	41.17	41.17	0.00	5349.40
GBR-11	5389.43	42.06	42.01	0.05	5347.41
GBR-13	5393.04	41.70	41.70	0.00	5351.34
GBR-15	5397.99	40.63	40.63	0.00	5357.36
GBR-18	5421.68	34.83	34.83	0.00	5386.85
GBR-19	5393.83	42.75	41.74	1.01	5351.89
GBR-20	5393.47	38.50	38.40	0.10	5355.05
GBR-21S	5400.65	26.61	26.61	0.00	5374.04
GBR-21D	5400.19	40.37	40.37	0.00	5359.82
GBR-22	5395.91	Dry	Dry	0.00	5395.91
GBR-23	5403.72	28.58	28.56	0.02	5372.74
GBR-24S	5396.08	31.02	31.00	0.02	5362.60
GBR-24D	5396.77	33.50	33.50	0.00	5363.27
GBR-25	5396.72	35.90	35.90	0.00	5360.82
GBR-26	5395.59	37.77	37.77	0.00	5357.82
GBR-30	5396.58	36.13	36.13	0.00	5360.45
GBR-31	5394.86	37.86	37.86	0.00	5357.00
GBR-33	5396.28	39.55	38.20	1.35	5357.81
GBR-34	5394.00	40.30	38.21	2.09	5355.37
GBR-35	5393.66	40.73	40.73	0.00	5352.93
GBR-39	5397.55	39.97	39.97	0.00	5357.58
GBR-40	5400.76	32.26	32.26	0.00	5368.50
GBR-41	5396.35	27.53	27.53	0.00	5368.82
GBR-51	5389.68	42.87	42.87	0.00	5346.81
GBR-52	5387.74	41.45	41.45	0.00	5346.29

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 2001
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.10	40.10	0.00	5343.44
SHS-2	5381.66	35.23	35.23	0.00	5346.43
SHS-3	5383.33	35.85	35.85	0.00	5347.48
SHS-4	5383.62	42.46	42.46	0.00	5341.16
SHS-5	5378.36	38.12	38.12	0.00	5340.24
SHS-6	5378.17	39.69	39.69	0.00	5338.48
SHS-7	5375.89	*	*	0.00	5375.89
SHS-8	5380.25	39.85	39.85	0.00	5340.40
SHS-9	5380.79	42.50	42.50	0.00	5338.29
SHS-10	5373.80	36.60	36.60	0.00	5337.20
SHS-12	5373.94	40.85	40.85	0.00	5333.09
SHS-13	5367.81	37.43	37.43	0.00	5330.38
SHS-14	5367.07	40.40	40.40	0.00	5326.67
SHS-15	5366.21	34.89	34.89	0.00	5331.32
SHS-16	5362.58	32.40	32.40	0.00	5330.18
SHS-17	5364.35	34.29	34.29	0.00	5330.06
SHS-18	5373.64	44.91	44.91	0.00	5328.73
SHS-19	5378.89	42.30	42.30	0.00	5336.59

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

*SHS-7 HAS BEEN ABANDONED AND REPLACED WITH SHS-19.

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MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
VOLUME CHANGE**

2001

Tank Number	Beginning Volume	Ending Volume	Net Change
102	14,086	15,025	939
106	8,010	8,010	0
21	230,133	230,133	0
22	260,714	249,979	(10,735)
Total Net Volume Change			(9,796)

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
RECOVERY WELL
VOLUME TABULATION**

2001

Well	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
GRW-1	45,760	42,590	36,760	29,350	154,460
GRW-2	37,970	38,690	42,930	33,280	152,870
GRW-3	61,060	66,560	50,890	30,960	209,470
GRW-4	43,980	47,250	44,120	35,110	170,460
GRW-5	99,010	58,260	101,160	84,690	343,120
GRW-6	109,620	169,640	106,810	80,840	466,910
GRW-9	72,150	57,120	38,830	35,330	203,430
GRW-10	600,730	564,520	593,170	634,880	2,393,300
GRW-11	47,020	43,410	59,260	53,070	202,760
GRW-12	7,690	6,480	8,260	7,210	29,640
GRW-13	8,180	10,860	8,160	6,730	33,930
SHS-7	40,302	0	0	0	40,302
SHS-9	11,319	6,906	8,901	8,675	35,801
SHS-14	397,859	239,630	90,898	188,511	916,898
SHS-18	170,480	166,368	97,028	62,536	496,412
SHS-19	0	83,787	132,462	128,763	345,012
TOTAL VOLUME PUMPED IN GALLONS					6,194,775

4.1

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

2001

Total Volume Of Water Recovered	6,194,775
Net Change In Storage Volume	(9,796)
Total Water Treated And Pumped To The Infiltration Gallery	6,204,571

4.2

ANNUAL DATA REPORT
GIANT BLOOMFIELD REFINERY
2000

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MAR 12 2001
ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Prepared By:

GIANT REFINING COMPANY
111 County Road 4990
Bloomfield, NM 87413
(505) 632-8006
FAX (505) 632-4021

TABLE OF CONTENTS

Introduction and Summary	Section 1
Annual Analytical Results	Section 2
Potentiometric Surface Maps.....	Section 3
Total Volume History	Section 4

INTRODUCTION AND SUMMARY ANNUAL REPORT 2000

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively. Inadvertently, influent and effluent samples were not collected for the last three quarters.

SUMMARY

Section 2

Section 2 contains a summary of the annual analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the annual report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevation and product thickness for each well, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the year. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the annual analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

2.0

GIANT INDUSTRIES, INC.
ONSITE REMEDIATION PROJECT
ANNUAL ANALYTICAL DATA SUMMARY
2000

	JAN	DEC
SYSTEM EFFLUENT		
Lab pH	7.4	
Lab Conductivity @25 C	3540	
Total Dissolved Solids (Calc)	2430	
Total Alkalinity as CaCO ₃	421	
Total Hardness as CaCO ₃	864	
Bicarbonate as HCO ₃	514	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	149	
Sulfate	1030	
Calcium	298	
Magnesium	29.3	
Potassium	2.4	
Sodium	443	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
SYSTEM INFLUENT		
Lab pH	7.5	
Lab Conductivity @25 C	3490	
Total Dissolved Solids (Calc)	2430	
Total Alkalinity as CaCO3	449	
Total Hardness as CaCO3	888	
Bicarbonate as HCO3	548	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	153	
Sulfate	1040	
Calcium	307	
Magnesium	29.5	
Potassium	2.8	
Sodium	443	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	0.2	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	

	JAN	DEC
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
GRW-3		
Lab pH	7.4	
Lab Conductivity @25 C	2620	
Total Dissolved Solids @ 180 C	1540	
Total Alkalinity as CaCO3	973	
Total Hardness as CaCO3	341	
Bicarbonate as HCO3	1190	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	148	
Sulfate	145	
Calcium	102	
Magnesium	21	
Potassium	1	
Sodium	472	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	0.5	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	3.8	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	16	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	

	JAN	DEC
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	45	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	0.6	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
GRW-6		
Lab pH	7.4	
Lab Conductivity @25 C	2880	
Total Dissolved Solids @ 180 C	1680	
Total Alkalinity as CaCO3	739	
Total Hardness as CaCO3	438	
Bicarbonate as HCO3	901	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	162	
Sulfate	395	
Calcium	139	
Magnesium	22	
Potassium	1.9	
Sodium	440	

	JAN	DEC
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	0.5	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	

	JAN	DEC
GRW-13		
Lab pH	7.4	
Lab Conductivity @25 C	4590	
Total Dissolved Solids @ 180 C	510	
Total Alkalinity as CaCO3	187	
Total Hardness as CaCO3	1080	
Bicarbonate as HCO3	228	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	264	
Sulfate	1640	
Calcium	392	
Magnesium	25.2	
Potassium	2.9	
Sodium	604	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	3.0	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	

	JAN	DEC
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
GBR-15		
Lab pH	7.4	
Lab Conductivity @25 C	4100	
Total Dissolved Solids @ 180 C	2910	
Total Alkalinity as CaCO3	309	
Total Hardness as CaCO3	987	
Bicarbonate as HCO3	376	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	313	
Sulfate	1210	
Calcium	357	
Magnesium	23.3	
Potassium	5.2	
Sodium	554	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	1.0	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	3.1	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	0.7	
Methyl-t-Butyl Ether	ND	
Toluene	ND	

	JAN	DEC
Total Xylenes	ND	
GBR-17		
Lab pH		7.3
Lab Conductivity @25 C		2430
Total Dissolved Solids (Calc)		1930
Total Alkalinity as CaCO3		220
Total Hardness as CaCO3		798
Bicarbonate as HCO3		268
Carbonate as CO3		ND
Hydroxide		ND
Chloride		4.0
Sulfate		1060
Calcium		282
Magnesium		22.8
Potassium		3.7
Sodium		289
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		ND
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		ND
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		ND
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		ND
Trichlorofluoromethane		ND
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND

	JAN	DEC
GBR-24D		
Lab pH	7.9	
Lab Conductivity @25 C	4820	
Total Dissolved Solids @ 180 C	3550	
Total Alkalinity as CaCO3	234	
Total Hardness as CaCO3	1690	
Bicarbonate as HCO3	286	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	610	
Sulfate	1380	
Calcium	567	
Magnesium	67.3	
Potassium	4.7	
Sodium	463	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	19	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	6.6	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		

	JAN	DEC
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
GBR-30		
Lab pH	7.0	
Lab Conductivity @25 C	4220	
Total Dissolved Solids @ 180 C	3140	
Total Alkalinity as CaCO3	243	
Total Hardness as CaCO3	1290	
Bicarbonate as HCO3	297	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	310	
Sulfate	1460	
Calcium	449	
Magnesium	40.4	
Potassium	3.3	
Sodium	491	

	JAN	DEC
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	0.6	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
GBR-31		
Lab pH	7.4	
Lab Conductivity @25 C	3940	
Total Dissolved Solids @ 180 C	3030	
Total Alkalinity as CaCO3	197	
Total Hardness as CaCO3	1200	
Bicarbonate as HCO3	240	

	JAN	DEC
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	181	
Sulfate	1560	
Calcium	420	
Magnesium	36.7	
Potassium	2.4	
Sodium	456	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	2.1	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	1.4	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	0.6	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	

	JAN	DEC
GBR-32		
Lab pH		7.1
Lab Conductivity @25 C		6030
Total Dissolved Solids (Calc)		4840
Total Alkalinity as CaCO ₃		300
Total Hardness as CaCO ₃		1760
Bicarbonate as HCO ₃		366
Carbonate as CO ₃		ND
Hydroxide		ND
Chloride		735
Sulfate		2190
Calcium		807
Magnesium		60.1
Potassium		6.8
Sodium		882
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		1.6
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		1.1
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		10
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		0.3
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		2.9
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		2.1
Trichlorofluoromethane		ND
Vinyl Chloride		ND
		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND

	JAN	DEC
GBR-48		
Lab pH		7.0
Lab Conductivity @25 C		7080
Total Dissolved Solids (Calc)		5340
Total Alkalinity as CaCO3		234
Total Hardness as CaCO3		2050
Bicarbonate as HCO3		286
Carbonate as CO3		ND
Hydroxide		ND
Chloride		1200
Sulfate		1990
Calcium		700
Magnesium		73.5
Potassium		7.0
Sodium		942
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		3.2
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		0.5
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		15
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		3.3
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		2.6
Trichlorofluoromethane		0.4
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND

	JAN	DEC
GBR-49		
Lab pH		7.3
Lab Conductivity @25 C		4750
Total Dissolved Solids (Calc)		3800
Total Alkalinity as CaCO ₃		320
Total Hardness as CaCO ₃		1480
Bicarbonate as HCO ₃		390
Carbonate as CO ₃		ND
Hydroxide		ND
Chloride		426
Sulfate		1910
Calcium		512
Magnesium		48.5
Potassium		7.5
Sodium		664
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		1.2
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		1.0
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		13
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		0.4
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		4
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		2.3
Trichlorofluoromethane		ND
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND
GBR-50		

	JAN	DEC
Lab pH		7.2
Lab Conductivity @25 C		3090
Total Dissolved Solids (Calc)		2580
Total Alkalinity as CaCO ₃		210
Total Hardness as CaCO ₃		1050
Bicarbonate as HCO ₃		256
Carbonate as CO ₃		ND
Hydroxide		ND
Chloride		4
Sulfate		1540
Calcium		72
Magnesium		29
Potassium		3.8
Sodium		397
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		ND
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		0.2
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		ND
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		ND
Trichlorofluoromethane		ND
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND
GBR-51		

	JAN	DEC
Lab pH	7.4	
Lab Conductivity @25 C	3140	
Total Dissolved Solids @ 180 C	2410	
Total Alkalinity as CaCO3	197	
Total Hardness as CaCO3	1060	
Bicarbonate as HCO3	240	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	95	
Sulfate	1290	
Calcium	377	
Magnesium	30.1	
Potassium	0.5	
Sodium	306	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachloroethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
GBR-52		
Lab pH	7.5	

	JAN	DEC
Lab Conductivity @25 C	3440	
Total Dissolved Solids @ 180 C	2700	
Total Alkalinity as CaCO3	187	
Total Hardness as CaCO3	1240	
Bicarbonate as HCO3	228	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	96	
Sulfate	1500	
Calcium	439	
Magnesium	34.1	
Potassium	1.8	
Sodium	309	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachloroethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS	ND	
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
SHS-3		
Lab pH	6.8	
Lab Conductivity @25 C	4870	

	JAN	DEC
Total Dissolved Solids @ 180 C	4040	
Total Alkalinity as CaCO ₃	197	
Total Hardness as CaCO ₃	1970	
Bicarbonate as HCO ₃	240	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	317	
Sulfate	2060	
Calcium	665	
Magnesium	76.6	
Potassium	8.1	
Sodium	345	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
SHS-4		
Lab pH	7.4	
Lab Conductivity @25 C	3360	
Total Dissolved Solids (Calc)	2770	

	JAN	DEC
Total Alkalinity as CaCO ₃	141	
Total Hardness as CaCO ₃	1480	
Bicarbonate as HCO ₃	171	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	91	
Sulfate	1530	
Calcium	532	
Magnesium	36.7	
Potassium	1.2	
Sodium	251	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
SHS-6		
Lab pH	7.3	
Lab Conductivity @25 C	3020	
Total Dissolved Solids @ 180 C	2310	
Total Alkalinity as CaCO ₃	215	

	JAN	DEC
Total Hardness as CaCO ₃	1050	
Bicarbonate as HCO ₃	262	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	94	
Sulfate	1190	
Calcium	379	
Magnesium	26.1	
Potassium	1.2	
Sodium	237	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
SHS-10		
Lab pH	7.3	
Lab Conductivity @25 C	3600	
Total Dissolved Solids (Calc)	2600	
Total Alkalinity as CaCO ₃	421	
Total Hardness as CaCO ₃	1140	

	JAN	DEC
Bicarbonate as HCO ₃	514	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	149	
Sulfate	1170	
Calcium	365	
Magnesium	56.2	
Potassium	10.3	
Sodium	368	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	3.2	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

JAN

DEC

SHS-12		
Lab pH	7.3	
Lab Conductivity @25 C	2940	
Total Dissolved Solids @ 180 C	1880	
Total Alkalinity as CaCO3	673	
Total Hardness as CaCO3	683	
Bicarbonate as HCO3	821	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	167	
Sulfate	537	
Calcium	243	
Magnesium	18.6	
Potassium	0.3	
Sodium	339	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
SHS-13		
Lab pH	7.1	
Lab Conductivity @25 C	2650	
Total Dissolved Solids @ 180 C	1350	
Total Alkalinity as CaCO3	664	
Total Hardness as CaCO3	618	
Bicarbonate as HCO3	810	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	244	
Sulfate	174	
Calcium	205	
Magnesium	25.7	
Potassium	7	
Sodium	210	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
SHS-15		
Lab pH	7.5	
Lab Conductivity @25 C	2730	
Total Dissolved Solids (Calc)	1920	
Total Alkalinity as CaCO3	238	
Total Hardness as CaCO3	953	
Bicarbonate as HCO3	290	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	45	
Sulfate	905	
Calcium	313	
Magnesium	41.7	
Potassium	2.9	
Sodium	152	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	0.7	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
SHS-16		
Lab pH	7.5	
Lab Conductivity @25 C	4040	
Total Dissolved Solids (Calc)	2740	
Total Alkalinity as CaCO ₃	692	
Total Hardness as CaCO ₃	1320	
Bicarbonate as HCO ₃	844	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	287	
Sulfate	1020	
Calcium	457	
Magnesium	43.2	
Potassium	1.7	
Sodium	355	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
SHS-17		
Lab pH	7.4	
Lab Conductivity @25 C	4260	
Total Dissolved Solids (Calc)	2780	
Total Alkalinity as CaCO3	303	
Total Hardness as CaCO3	1200	
Bicarbonate as HCO3	370	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	218	
Sulfate	1210	
Calcium	404	
Magnesium	46.2	
Potassium	1.8	
Sodium	338	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

NOTE: SHS-7 AND SHS-9 were not sampled due to free-floating product.

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JANUARY, 2000

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.60	61.60	0.00	5332.70
GRW-2	5391.28	40.71	40.71	0.00	5350.57
GRW-3	5388.77	44.57	44.57	0.00	5344.20
GRW-4	5390.02	52.65	52.65	0.00	5337.37
GRW-5	5390.56	62.27	62.27	0.00	5328.29
GRW-6	5390.81	50.95	50.95	0.00	5339.86
GRW-10	5395.02	45.20	44.00	1.20	5350.78
GRW-11	5397.85	46.80	46.80	0.00	5351.05
GRW-12	5397.24	43.15	43.15	0.00	5354.09
GRW-13	5396.90	53.76	53.76	0.00	5343.14
GBR-5	5395.07	24.95	24.95	0.00	5370.12
GBR-6	5395.70	53.97	53.97	0.00	5341.73
GBR-7	5395.85	29.03	27.21	1.82	5368.28
GBR-8	5390.50	41.18	41.05	0.13	5349.42
GBR-9	5389.92	47.15	47.15	0.00	5342.77
GBR-10	5390.57	42.02	42.02	0.00	5348.55
GBR-11	5389.43	41.26	41.26	0.00	5348.17
GBR-13	5393.04	40.56	40.56	0.00	5352.48
GBR-15	5397.99	40.94	40.94	0.00	5357.05
GBR-18	5421.68	33.26	33.26	0.00	5388.42
GBR-19	5393.83	41.59	40.75	0.84	5352.91
GBR-20	5393.47	35.31	35.26	0.05	5358.20
GBR-21S	5400.65	24.00	23.80	0.20	5376.81
GBR-21D	5400.19	39.13	39.13	0.00	5361.06
GBR-22	5395.91	40.30	39.44	0.86	5356.30
GBR-23	5403.72	26.58	26.58	0.00	5374.70
GBR-24S	5396.08	29.02	29.02	0.00	5364.00
GBR-24D	5396.77	32.08	32.08	0.00	5364.69
GBR-25	5396.72	34.32	34.32	0.00	5362.40
GBR-26	5395.59	39.96	39.96	0.00	5355.63
GBR-30	5396.58	35.65	35.65	0.00	5360.93
GBR-31	5394.86	36.98	36.98	0.00	5357.88
GBR-33	5396.28	39.76	39.76	0.00	5356.52
GBR-34	5394.00	38.22	37.32	0.90	5356.50
GBR-35	5393.66	39.15	37.28	1.87	5356.01
GBR-39	5397.55	37.55	37.55	0.00	5360.00
GBR-40	5400.76	31.56	31.56	0.00	5369.20
GBR-41	5396.35	26.38	26.38	0.00	5369.97
GBR-51	5389.68	40.41	40.41	0.00	5349.27
GBR-52	5387.74	41.85	41.85	0.00	5345.89

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE
JANUARY, 2000

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.39	39.37	0.02	5344.17
SHS-2	5381.66	38.77	38.77	0.00	5342.89
SHS-3	5383.33	35.41	35.41	0.00	5347.92
SHS-4	5383.62	41.45	41.45	0.00	5342.17
SHS-5	5378.36	38.53	38.53	0.00	5339.83
SHS-6	5378.17	38.76	38.76	0.00	5339.41
SHS-7	5375.89	37.91	37.91	0.00	5337.98
SHS-8	5380.25	40.36	38.85	1.51	5341.10
SHS-9	5380.79	42.55	42.55	0.00	5338.24
SHS-10	5373.80	36.50	36.50	0.00	5337.30
SHS-12	5373.94	39.53	39.53	0.00	5334.41
SHS-13	5367.81	36.14	36.14	0.00	5331.67
SHS-14	5367.07	46.05	46.05	0.00	5321.02
SHS-15	5366.21	30.08	30.08	0.00	5336.13
SHS-16	5362.58	30.95	30.95	0.00	5331.63
SHS-17	5364.35	32.91	32.91	0.00	5331.44
SHS-18	5373.64	43.25	43.25	0.00	5330.39

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GW - 40

MONITORING REPORTS

DATE:
2001-1998

GW - 40

MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

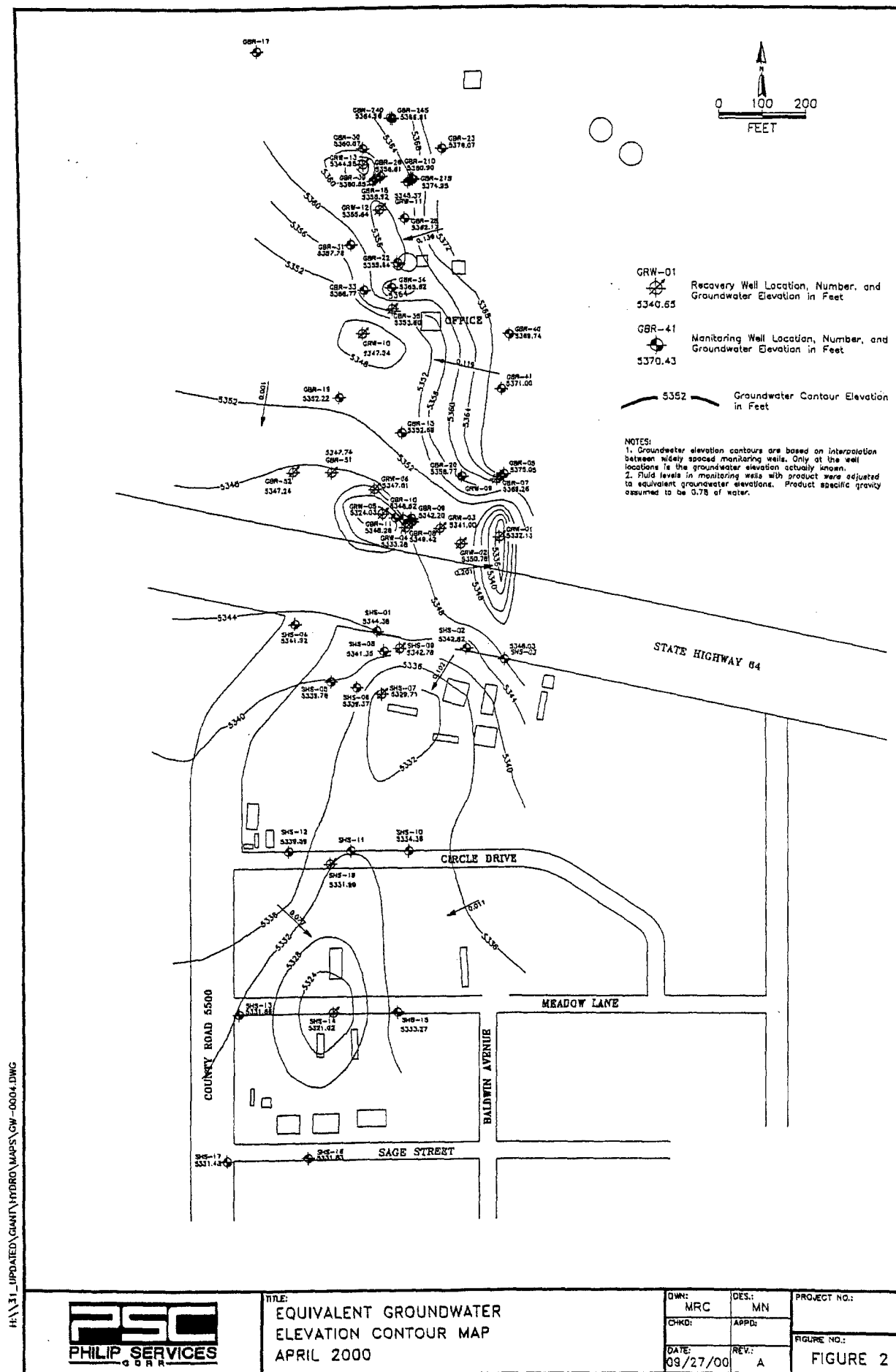
APRIL, 2000

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.17	62.17	0.00	5332.13
GRW-2	5391.28	40.50	40.50	0.00	5350.78
GRW-3	5388.77	47.77	47.77	0.00	5341.00
GRW-4	5390.02	56.74	56.74	0.00	5333.28
GRW-5	5390.56	66.53	66.53	0.00	5324.03
GRW-6	5390.81	43.00	43.00	0.00	5347.81
GRW-10	5395.02	47.56	46.50	1.06	5348.31
GRW-11	5397.85	52.48	52.48	0.00	5345.37
GRW-12	5397.24	41.60	41.60	0.00	5355.64
GRW-13	5396.90	51.95	51.95	0.00	5344.95
GBR-5	5395.07	20.02	20.02	0.00	5375.05
GBR-6	5395.70	51.60	51.60	0.00	5344.10
GBR-7	5395.85	26.73	24.93	1.80	5370.56
GBR-8	5390.50	41.10	40.83	0.27	5349.62
GBR-9	5389.92	47.72	47.72	0.00	5342.20
GBR-10	5390.57	41.95	41.95	0.00	5348.62
GBR-11	5389.43	41.15	41.15	0.00	5348.28
GBR-13	5393.04	40.35	40.35	0.00	5352.69
GBR-15	5397.99	39.07	39.07	0.00	5358.92
GBR-18	5421.68	33.13	33.13	0.00	5388.55
GBR-19	5393.83	41.68	40.81	0.87	5352.85
GBR-20	5393.47	34.70	34.64	0.06	5358.82
GBR-21S	5400.65	25.81	24.38	1.43	5375.98
GBR-21D	5400.19	39.29	39.29	0.00	5360.90
GBR-22	5395.91	40.33	39.55	0.78	5356.20
GBR-23	5403.72	28.71	27.35	1.36	5375.54
GBR-24S	5396.08	29.29	29.27	0.02	5364.29
GBR-24D	5396.77	31.81	31.81	0.00	5364.96
GBR-25	5396.72	34.55	34.55	0.00	5362.17
GBR-26	5395.59	38.78	38.78	0.00	5356.81
GBR-30	5396.58	35.71	35.71	0.00	5360.87
GBR-31	5394.86	37.10	37.10	0.00	5357.76
GBR-33	5396.28	28.43	27.25	1.18	5368.79
GBR-34	5394.00	28.47	27.34	1.13	5366.43
GBR-35	5393.66	39.86	39.86	0.00	5353.80
GBR-39	5397.55	36.90	36.90	0.00	5360.65
GBR-40	5400.76	31.02	31.02	0.00	5369.74
GBR-41	5396.35	25.35	25.35	0.00	5371.00
GBR-51	5389.68	41.94	41.94	0.00	5347.74
GBR-52	5387.74	40.50	40.50	0.00	5347.24

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 APRIL, 2000
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.16	39.16	0.00	5344.38
SHS-2	5381.66	38.84	38.84	0.00	5342.82
SHS-3	5383.33	35.30	35.30	0.00	5348.03
SHS-4	5383.62	41.70	41.70	0.00	5341.92
SHS-5	5378.36	38.58	38.58	0.00	5339.78
SHS-6	5378.17	38.80	38.80	0.00	5339.37
SHS-7	5375.89	46.18	46.18	0.00	5329.71
SHS-8	5380.25	38.90	38.90	0.00	5341.35
SHS-9	5380.79	38.01	38.01	0.00	5342.78
SHS-10	5373.80	39.44	39.44	0.00	5334.36
SHS-12	5373.94	34.35	34.35	0.00	5339.59
SHS-13	5367.81	35.95	35.95	0.00	5331.86
SHS-14	5367.07	46.05	46.05	0.00	5321.02
SHS-15	5366.21	32.94	32.94	0.00	5333.27
SHS-16	5362.58	30.75	30.75	0.00	5331.83
SHS-17	5364.35	32.92	32.92	0.00	5331.43
SHS-18	5373.64	41.65	41.65	0.00	5331.99

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



H:\11_UPDATED\GUNT\HYDRO\MAPS\GW-0004.DWG



TITLE:
EQUIVALENT GROUNDWATER
ELEVATION CONTOUR MAP
APRIL 2000

OWN: MRC	DES: MN	PROJECT NO.:
CHKD:	APPD:	FIGURE NO.:
DATE: 09/27/00	REV: A	FIGURE 2

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JULY, 2000

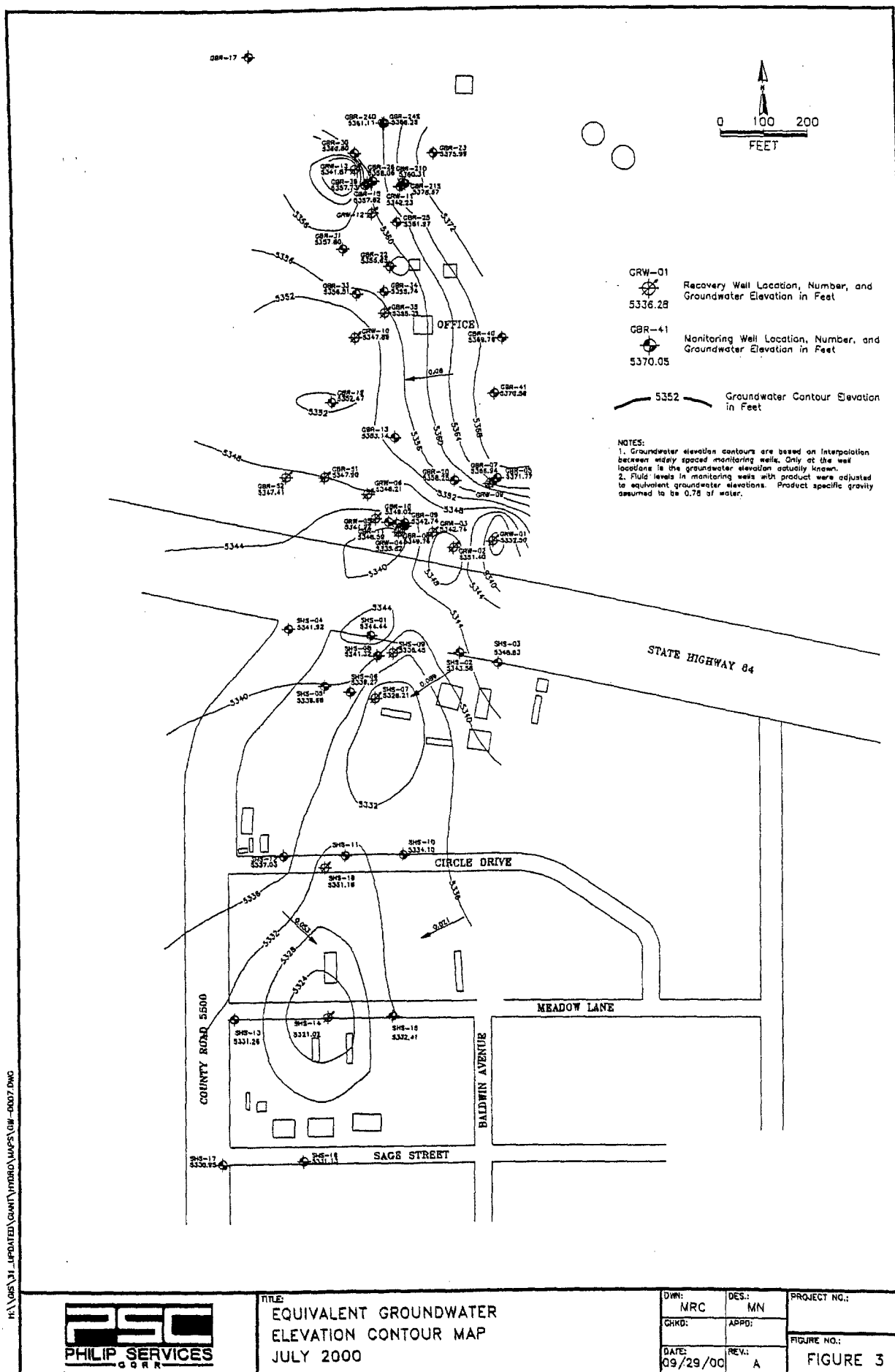
WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.80	61.80	0.00	5332.50
GRW-2	5391.28	39.88	39.88	0.00	5351.40
GRW-3	5388.77	46.03	46.03	0.00	5342.74
GRW-4	5390.02	54.40	54.40	0.00	5335.62
GRW-5	5390.56	48.64	48.64	0.00	5341.92
GRW-6	5390.81	42.60	42.60	0.00	5348.21
GRW-10	5395.02	47.22	46.13	1.09	5348.67
GRW-11	5397.85	55.62	55.62	0.00	5342.23
GRW-12	5397.24	41.55	41.55	0.00	5355.69
GRW-13	5396.90	55.03	55.03	0.00	5341.87
GBR-5	5395.07	23.30	23.30	0.00	5371.77
GBR-6	5395.70	52.50	52.50	0.00	5343.20
GBR-7	5395.85	29.13	26.35	2.78	5368.94
GBR-8	5390.50	40.77	40.35	0.42	5350.07
GBR-9	5389.92	47.18	47.18	0.00	5342.74
GBR-10	5390.57	41.55	41.55	0.00	5349.02
GBR-11	5389.43	40.84	40.84	0.00	5348.59
GBR-13	5393.04	39.90	39.90	0.00	5353.14
GBR-15	5397.99	40.37	40.37	0.00	5357.62
GBR-18	5421.68	33.68	33.68	0.00	5388.00
GBR-19	5393.83	41.42	40.64	0.78	5353.03
GBR-20	5393.47	35.22	35.16	0.06	5358.30
GBR-21S	5400.65	25.02	25.02	0.00	5375.63
GBR-21D	5400.19	39.88	39.88	0.00	5360.31
GBR-22	5395.91	40.33	39.43	0.90	5356.30
GBR-23	5403.72	27.73	27.73	0.00	5373.89
GBR-24S	5396.08	29.83	29.83	0.00	5360.42
GBR-24D	5396.77	35.66	35.66	0.00	5361.11
GBR-25	5396.72	34.75	34.75	0.00	5361.97
GBR-26	5395.59	37.53	37.53	0.00	5358.06
GBR-30	5396.58	35.78	35.78	0.00	5360.80
GBR-31	5394.86	37.06	37.06	0.00	5357.80
GBR-33	5396.28	39.77	39.77	0.00	5356.51
GBR-34	5394.00	38.34	37.30	1.04	5356.49
GBR-35	5393.66	38.35	37.28	1.07	5356.17
GBR-39	5397.55	39.82	39.82	0.00	5357.73
GBR-40	5400.76	31.00	31.00	0.00	5369.76
GBR-41	5396.35	25.77	25.77	0.00	5370.58
GBR-51	5389.68	41.78	41.78	0.00	5347.90
GBR-52	5387.74	40.33	40.33	0.00	5347.41

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 2000

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.10	39.10	0.00	5344.44
SHS-2	5381.66	38.08	38.08	0.00	5343.58
SHS-3	5383.33	34.50	34.50	0.00	5348.83
SHS-4	5383.62	41.70	41.70	0.00	5341.92
SHS-5	5378.36	38.68	38.68	0.00	5339.68
SHS-6	5378.17	38.90	38.90	0.00	5339.27
SHS-7	5375.89	47.68	47.68	0.00	5328.21
SHS-8	5380.25	38.93	38.93	0.00	5341.32
SHS-9	5380.79	44.34	44.34	0.00	5336.45
SHS-10	5373.80	39.70	39.70	0.00	5334.10
SHS-12	5373.94	36.91	36.91	0.00	5337.03
SHS-13	5367.81	36.55	36.55	0.00	5331.26
SHS-14	5367.07	46.05	46.05	0.00	5321.02
SHS-15	5366.21	33.80	33.80	0.00	5332.41
SHS-16	5362.58	31.45	31.45	0.00	5331.13
SHS-17	5364.35	33.40	33.40	0.00	5330.95
SHS-18	5373.64	42.46	42.46	0.00	5331.18

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

OCTOBER, 2000

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	43.68	43.68	0.00	5350.62
GRW-2	5391.28	52.70	52.70	0.00	5338.58
GRW-3	5388.77	49.68	49.68	0.00	5339.09
GRW-4	5390.02	50.78	50.78	0.00	5339.24
GRW-5	5390.56	49.34	49.34	0.00	5341.22
GRW-6	5390.81	43.80	43.80	0.00	5347.01
GRW-10	5395.02	46.90	46.60	0.30	5348.36
GRW-11	5397.85	58.40	58.40	0.00	5339.45
GRW-12	5397.24	45.82	45.82	0.00	5351.42
GRW-13	5396.90	46.15	46.15	0.00	5350.75
GBR-5	5395.07	23.50	23.50	0.00	5371.57
GBR-6	5395.70	52.20	52.20	0.00	5343.50
GBR-7	5395.85	29.30	27.50	1.80	5367.99
GBR-8	5390.50	41.50	40.98	0.52	5349.42
GBR-9	5389.92	46.90	46.90	0.00	5343.02
GBR-10	5390.57	42.15	42.15	0.00	5348.42
GBR-11	5389.43	41.42	41.40	0.02	5348.03
GBR-13	5393.04	40.60	40.60	0.00	5352.44
GBR-15	5397.99	40.85	40.85	0.00	5357.14
GBR-18	5421.68	34.20	34.20	0.00	5387.48
GBR-19	5393.83	41.91	41.39	0.52	5352.34
GBR-20	5393.47	34.95	34.95	0.00	5358.52
GBR-21S	5400.65	25.12	25.12	0.00	5375.53
GBR-21D	5400.19	39.98	39.98	0.00	5360.21
GBR-22	5395.91	39.84	39.84	0.00	5356.07
GBR-23	5403.72	27.88	27.84	0.04	5374.50
GBR-24S	5396.08	29.25	29.25	0.00	5362.92
GBR-24D	5396.77	33.16	33.16	0.00	5363.61
GBR-25	5396.72	34.98	34.98	0.00	5361.74
GBR-26	5395.59	40.21	40.21	0.00	5355.38
GBR-30	5396.58	35.95	35.95	0.00	5360.63
GBR-31	5394.86	37.40	37.40	0.00	5357.46
GBR-33	5396.28	40.13	40.13	0.00	5356.15
GBR-34	5394.00	37.40	37.40	0.00	5356.60
GBR-35	5393.66	38.10	37.75	0.35	5355.84
GBR-39	5397.55	37.83	37.83	0.00	5359.72
GBR-40	5400.76	31.65	31.65	0.00	5369.11
GBR-41	5396.35	26.63	26.63	0.00	5369.72
GBR-51	5389.68	42.24	42.24	0.00	5347.44
GBR-52	5387.74	40.52	40.52	0.00	5347.22

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 2000

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.62	39.50	0.12	5344.02
SHS-2	5381.66	38.22	38.22	0.00	5343.44
SHS-3	5383.33	35.13	35.13	0.00	5348.20
SHS-4	5383.62	42.04	42.04	0.00	5341.58
SHS-5	5378.36	39.08	39.08	0.00	5339.28
SHS-6	5378.17	39.30	39.30	0.00	5338.87
SHS-7	5375.89	48.40	48.40	0.00	5327.49
SHS-8	5380.25	39.34	39.32	0.02	5340.93
SHS-9	5380.79	43.51	43.51	0.00	5337.28
SHS-10	5373.80	40.50	40.50	0.00	5333.30
SHS-12	5373.94	37.55	37.55	0.00	5336.39
SHS-13	5367.81	37.18	37.18	0.00	5330.63
SHS-14	5367.07	45.95	45.95	0.00	5321.12
SHS-15	5366.21	34.38	34.38	0.00	5331.83
SHS-16	5362.58	32.05	32.05	0.00	5330.53
SHS-17	5364.35	34.00	34.00	0.00	5330.35
SHS-18	5373.64	44.00	44.00	0.00	5329.64

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GW - 40

MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
VOLUME CHANGE**

2000

Tank Number	Beginning Volume	Ending Volume	Net Change
102	4,343	14,086	9,743
106	8,010	8,010	0
21	230,133	230,133	0
22	273,750	260,714	(13,036)
Total Net Volume Change			(3,293)

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
RECOVERY WELL
VOLUME TABULATION**

2000

Well	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
GRW-1	62,070	73,810	67,170	51,280	254,330
GRW-2	34,470	33,300	43,660	74,260	185,690
GRW-3	12,150	39,200	64,030	59,160	174,540
GRW-4	47,720	54,010	45,850	45,810	193,390
GRW-5	120,110	206,960	115,760	84,200	527,030
GRW-6	115,040	60,050	88,160	138,110	401,360
GRW-9	54,260	66,530	29,130	50,850	200,770
GRW-10	572,490	529,640	536,490	500,190	2,138,810
GRW-11	123,740	102,960	81,360	44,750	352,810
GRW-12	10,020	7,240	5,000	10,150	32,410
GRW-13	9,710	15,850	19,950	15,490	61,000
SHS-7	21,617	136,771	208,946	198,355	565,689
SHS-9	4,319	8,289	11,789	11,386	35,783
SHS-14	332,327	443,913	351,056	365,950	1,493,246
SHS-18	139,886	202,137	101,102	126,601	569,726
TOTAL VOLUME PUMPED IN GALLONS					7,186,584

4.1

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

2000

Total Volume Of Water Recovered	7,186,584
Net Change In Storage Volume	(3,293)
Total Water Treated And Pumped To The Infiltration Gallery	7,189,877

4.2



February 15, 2000

Mr. William Olson
Hydrogeologist
New Mexico Oil Conservation Division
Environmental Bureau
2040 S. Pacheco Street
Santa Fe, NM 87505

Dear Mr. Olson:

Enclosed you will find the annual report for Giant Refining Company's Bloomfield Refinery for 1999.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Tim Kinney". The signature is fluid and cursive, with the first name "Tim" and last name "Kinney" clearly distinguishable.

Tim Kinney
Remediation Project Manager

/dm

Enclosure

cc w/enc.: Mike Hardy-Giant
Kim Bullerdick-Giant
Jacque Cumbie-Giant
Stephanie Odell-BLM
Maura Hanning-EID
Chris Shuey-SWRIC
Jim Durrett-SJC
Herbert Gorrod-EPA
Denny Foust-OCD

PHONE
505-632-8006
FAX
505-632-4021

III COUNTY
ROAD 4990
BLOOMFIELD
NEW MEXICO
87413

ANNUAL DATA REPORT
GIANT BLOOMFIELD REFINERY

1999

RECEIVED
FEB 18 2000
ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Prepared By:

GIANT REFINING COMPANY
111 County Road 4990
Bloomfield, NM 87413
(505) 632-8006
FAX (505) 632-4021

TABLE OF CONTENTS

Introduction and Summary	Section 1
Annual Analytical Results	Section 2
Potentiometric Surface Maps	Section 3
Total Volume History	Section 4

INTRODUCTION AND SUMMARY ANNUAL REPORT 1999

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively. The carbon was replaced in August of 1999.

SUMMARY

Section 2

Section 2 contains a summary of the annual analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the annual report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevation and product thickness for each well, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the year. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the annual analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT INDUSTRIES, INC.
ONSITE REMEDIATION PROJECT
ANNUAL ANALYTICAL DATA SUMMARY
1999

	JAN	APR	JUN	JUL	OCT	DEC
SYSTEM EFFLUENT						
Lab pH	7.1	7.1		7.1	7.1	
Lab Conductivity @25 C	3190	3130		3220	3090	
Total Dissolved Solids (Calc)	2430	2490		2370	2430	
Total Alkalinity as CaCO3	481	480		428	456	
Total Hardness as CaCO3	1080	922		917	967	
Bicarbonate as HCO3	586	ND		522	556	
Carbonate as CO3	ND	204		ND	ND	
Hydroxide	ND	48		ND	ND	
Chloride	122	155		151	140	
Sulfate	1180	1130		1160	1140	
Calcium	384	318		316	330	
Magnesium	30.4	31.3		31.1	34.8	
Potassium	2.6	3		2.4	2.7	
Sodium	399	394		394	431	
HALOCARBONS						
Bromodichloromethane	ND	ND		ND		
Bromoform	ND	ND		ND		
Bromomethane	ND	ND		ND		
Carbon Tetrachloride	ND	ND		ND		
Chloroethane	ND	ND		ND		
Chloroform	ND	ND		ND		
Chloromethane	ND	ND		ND		
Dibromochloromethane	ND	ND		ND		
1,2-Dibromoethane (EDB)	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
1,1-Dichloroethane	ND	ND		ND		
1,2-Dichloroethane (EDC)	ND	ND		ND		
1,1-Dichloroethene	ND	ND		ND		
cis-1,2-Dichloroethene	ND	0.43		0.8		
trans-1,2-Dichloroethene	ND	ND		ND		
1,2-Dichloropropane	ND	ND		ND		
cis-1,3-Dichloropropene	ND	ND		ND		
trans-1,3-Dichloropropene	ND	ND		ND		
Methylene Chloride	ND	ND		ND		
1,1,2,2-Tetrachloroethane	ND	ND		ND		
Tetrachlorethene	ND	ND		ND		
1,1,1-Trichloroethane	ND	ND		ND		
1,1,2-Trichloroethane	ND	ND		ND		
Trichloroethene	ND	ND		ND		
Trichlorofluoromethane	ND	ND		ND		
Vinyl Chloride	ND	ND		ND		

	JAN	APR	JUN	JUL	OCT	DEC
AROMATICS						
Benzene	ND	ND		0.6		
Chlorobenzene	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
Ethylbenzene	ND	ND		ND		
Methyl-t-Butyl Ether	ND	ND		ND		
Toluene	ND	ND		ND		
Total Xylenes	ND	ND		ND		
SYSTEM INFLUENT						
Lab pH	7.2	7.0		7.2	7.0	
Lab Conductivity @25 C	3190	3080		3210	3110	
Total Dissolved Solids (Calc)	2420	2480		2430	2420	
Total Alkalinity as CaCO3	469	500		451	449	
Total Hardness as CaCO3	984	917		1040	911	
Bicarbonate as HCO3	572	ND		550	547	
Carbonate as CO3	ND	228		ND	ND	
Hydroxide	ND	41		ND	ND	
Chloride	122	155		121	140	
Sulfate	1190	1130		1430	1140	
Calcium	344	316		357	312	
Magnesium	30.2	31.2		35.3	32.3	
Potassium	2.7	2.8		2.9	3.1	
Sodium	392	394		447	389	
HALOCARBONS						
Bromodichloromethane	ND	ND		ND		
Bromoform	ND	ND		ND		
Bromomethane	ND	ND		ND		
Carbon Tetrachloride	ND	ND		ND		
Chloroethane	ND	ND		ND		
Chloroform	ND	ND		ND		
Chloromethane	ND	ND		ND		
Dibromochloromethane	ND	ND		ND		
1,2-Dibromoethane (EDB)	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
1,1-Dichloroethane	ND	ND		ND		
1,2-Dichloroethane (EDC)	ND	ND		ND		
1,1-Dichloroethene	ND	ND		ND		
cis-1,2-Dichloroethene	ND	2.7		0.54		
trans-1,2-Dichloroethene	ND	ND		ND		
1,2-Dichloropropane	ND	ND		ND		
cis-1,3-Dichloropropene	ND	ND		ND		
trans-1,3-Dichloropropene	ND	ND		ND		
Methylene Chloride	ND	ND		ND		
1,1,2,2-Tetrachloroethane	ND	ND		ND		
Tetrachlorethene	ND	1.5		ND		
1,1,1-Trichloroethane	ND	ND		ND		

	JAN	APR	JUN	JUL	OCT	DEC
1,1,2-Trichloroethane	ND	ND		ND		
Trichloroethene	ND	0.6		ND		
Trichlorofluoromethane	ND	ND		ND		
Vinyl Chloride	ND	ND		ND		
AROMATICS						
Benzene	ND	ND		0.84		
Chlorobenzene	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
Ethylbenzene	ND	ND		ND		
Methyl-t-Butyl Ether	ND	ND		ND		
Toluene	ND	ND		ND		
Total Xylenes	ND	ND		ND		
GRW-3						
Lab pH	7					
Lab Conductivity @25 C	2810					
Total Dissolved Solids @ 180 C	1840					
Total Alkalinity as CaCO3	1100					
Total Hardness as CaCO3	470					
Bicarbonate as HCO3	1340					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	128					
Sulfate	310					
Calcium	132					
Magnesium	34					
Potassium	1.2					
Sodium	570					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					

	JAN	APR	JUN	JUL	OCT	DEC
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	24(D5)					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	130(D5)					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GRW-6						
Lab pH	7.1					
Lab Conductivity @25 C	2820					
Total Dissolved Solids @ 180 C	1870					
Total Alkalinity as CaCO3	876					
Total Hardness as CaCO3	497					
Bicarbonate as HCO3	1070					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	143					
Sulfate	448					
Calcium	169					
Magnesium	18.2					
Potassium	2.3					
Sodium	420					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					

	JAN	APR	JUN	JUL	OCT	DEC
1,2-Dichloroethane (EDC)	0.7					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	0.9					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GRW-13						
Lab pH	7.1					
Lab Conductivity @25 C	4030					
Total Dissolved Solids @ 180 C	3190					
Total Alkalinity as CaCO3	290					
Total Hardness as CaCO3	1230					
Bicarbonate as HCO3	353					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	249					
Sulfate	1760					
Calcium	452					
Magnesium	25.1					
Potassium	6.4					
Sodium	579					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					

	JAN	APR	JUN	JUL	OCT	DEC
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	4.8					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GBR-15						
Lab pH	7.1					
Lab Conductivity @25 C	3400					
Total Dissolved Solids @ 180 C	2520					
Total Alkalinity as CaCO3	199					
Total Hardness as CaCO3	578					
Bicarbonate as HCO3	243					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	240					
Sulfate	1100					
Calcium	210					
Magnesium	13					
Potassium	2					
Sodium	470					
HALOCARBONS						
Bromodichloromethane	ND			ND		

	JAN	APR	JUN	JUL	OCT	DEC
Bromoform	ND			ND		
Bromomethane	ND			ND		
Carbon Tetrachloride	ND			ND		
Chloroethane	ND			ND		
Chloroform	ND			ND		
Chloromethane	ND			ND		
Dibromochloromethane	ND			ND		
1,2-Dibromoethane (EDB)	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
1,1-Dichloroethane	ND			ND		
1,2-Dichloroethane (EDC)	ND			3.9		
1,1-Dichloroethene	ND			ND		
cis-1,2-Dichloroethene	ND			ND		
trans-1,2-Dichloroethene	ND			ND		
1,2-Dichloropropane	ND			ND		
cis-1,3-Dichloropropene	ND			ND		
trans-1,3-Dichloropropene	ND			ND		
Methylene Chloride	ND			ND		
1,1,2,2-Tetrachloroethane	ND			ND		
Tetrachlorethene	ND			ND		
1,1,1-Trichloroethane	ND			ND		
1,1,2-Trichloroethane	ND			ND		
Trichloroethene	ND			ND		
Trichlorofluoromethane	ND			ND		
Vinyl Chloride	ND			ND		
AROMATICS						
Benzene	ND			ND		
Chlorobenzene	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
Ethylbenzene	ND			ND		
Methyl-t-Butyl Ether	ND			ND		
Toluene	ND			ND		
Total Xylenes	ND			ND		
GBR-17						
Lab pH				7.2		7.1
Lab Conductivity @25 C				2360		2550
Total Dissolved Solids (Calc)				1830		2010
Nitrogen - Nitrate/Nitrite				7.78		--
Total Alkalinity as CaCO3				224		162
Total Hardness as CaCO3				696		799
Bicarbonate as HCO3				273		197
Carbonate as CO3				ND		ND
Hydroxide				ND		ND
Chloride				86		93
Sulfate				887		1150
Calcium				247		284

	JAN	APR	JUN	JUL	OCT	DEC
Magnesium				19.4		21.9
Potassium				0.6		1
Sodium				264		282
HALOCARBONS						
Bromodichloromethane			ND			ND
Bromoform			ND			ND
Bromomethane			ND			ND
Carbon Tetrachloride			ND			ND
Chloroethane			ND			ND
Chloroform			ND			ND
Chloromethane			ND			ND
Dibromochloromethane			ND			ND
1,2-Dibromoethane (EDB)			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
1,1-Dichloroethane			ND			ND
1,2-Dichloroethane (EDC)			ND			ND
1,1-Dichloroethene			ND			ND
cis-1,2-Dichloroethene			ND			ND
trans-1,2-Dichloroethene			ND			ND
1,2-Dichloropropane			ND			ND
cis-1,3-Dichloropropene			ND			ND
trans-1,3-Dichloropropene			ND			ND
Methylene Chloride			ND			ND
1,1,2,2-Tetrachloroethane			ND			ND
Tetrachlorethene			ND			ND
1,1,1-Trichloroethane			ND			ND
1,1,2-Trichloroethane			ND			ND
Trichloroethene			ND			ND
Trichlorofluoromethane			ND			ND
Vinyl Chloride			ND			ND
AROMATICS						
Benzene			ND			ND
Chlorobenzene			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
Ethylbenzene			ND			ND
Methyl-t-Butyl Ether			ND			ND
Toluene			ND			ND
Total Xylenes			ND			ND
GBR-24D						
Lab pH	7.8					
Lab Conductivity @25 C	4070					
Total Dissolved Solids @ 180 C	3340					
Total Alkalinity as CaCO3	289					
Total Hardness as CaCO3	1700					
Bicarbonate as HCO3	352					

	JAN	APR	JUN	JUL	OCT	DEC
Carbonate as CO ₃	ND					
Hydroxide	ND					
Chloride	401					
Sulfate	1560					
Calcium	557					
Magnesium	76.6					
Potassium	4.4					
Sodium	353					
HALOCARBONS						
Bromodichloromethane	ND			ND		
Bromoform	ND			ND		
Bromomethane	ND			ND		
Carbon Tetrachloride	ND			ND		
Chloroethane	ND			ND		
Chloroform	ND			ND		
Chloromethane	ND			ND		
Dibromochloromethane	ND			ND		
1,2-Dibromoethane (EDB)	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
1,1-Dichloroethane	ND			ND		
1,2-Dichloroethane (EDC)	12			14		
1,1-Dichloroethene	ND			ND		
cis-1,2-Dichloroethene	ND			ND		
trans-1,2-Dichloroethene	ND			ND		
1,2-Dichloropropane	ND			ND		
cis-1,3-Dichloropropene	ND			ND		
trans-1,3-Dichloropropene	ND			ND		
Methylene Chloride	ND			ND		
1,1,2,2-Tetrachloroethane	ND			ND		
Tetrachlorethene	ND			ND		
1,1,1-Trichloroethane	ND			ND		
1,1,2-Trichloroethane	ND			ND		
Trichloroethene	ND			ND		
Trichlorofluoromethane	ND			ND		
Vinyl Chloride	ND			ND		
AROMATICS						
Benzene	15			10		
Chlorobenzene	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
Ethylbenzene	ND			ND		
Methyl-t-Butyl Ether	ND			ND		
Toluene	ND			ND		
Total Xylenes	0.9			ND		
GBR-30						

	JAN	APR	JUN	JUL	OCT	DEC
Lab pH	6.8					
Lab Conductivity @25 C	2680					
Total Dissolved Solids @ 180 C	2120					
Total Alkalinity as CaCO3	344					
Total Hardness as CaCO3	1020					
Bicarbonate as HCO3	419					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	107					
Sulfate	1000					
Calcium	357					
Magnesium	32.2					
Potassium	3.4					
Sodium	274					
HALOCARBONS						
Bromodichloromethane	ND			ND		
Bromoform	ND			ND		
Bromomethane	ND			ND		
Carbon Tetrachloride	ND			ND		
Chloroethane	ND			ND		
Chloroform	ND			ND		
Chloromethane	ND			ND		
Dibromochloromethane	ND			ND		
1,2-Dibromoethane (EDB)	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
1,1-Dichloroethane	ND			ND		
1,2-Dichloroethane (EDC)	ND			ND		
1,1-Dichloroethene	ND			ND		
cis-1,2-Dichloroethene	ND			0.8		
trans-1,2-Dichloroethene	ND			ND		
1,2-Dichloropropane	ND			ND		
cis-1,3-Dichloropropene	ND			ND		
trans-1,3-Dichloropropene	ND			ND		
Methylene Chloride	ND			ND		
1,1,2,2-Tetrachloroethane	ND			ND		
Tetrachlorethene	ND			0.54		
1,1,1-Trichloroethane	ND			ND		
1,1,2-Trichloroethane	ND			ND		
Trichloroethene	ND			ND		
Trichlorofluoromethane	ND			ND		
Vinyl Chloride	ND			ND		
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					

	JAN	APR	JUN	JUL	OCT	DEC
Toluene	ND					
Total Xylenes	ND					
GBR-31						
Lab pH	7.1					
Lab Conductivity @25 C	3500					
Total Dissolved Solids @ 180 C	2870					
Total Alkalinity as CaCO3	250					
Total Hardness as CaCO3	1090					
Bicarbonate as HCO3	304					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	123					
Sulfate	1670					
Calcium	381					
Magnesium	34.3					
Potassium	2.6					
Sodium	444					
HALOCARBONS						
Bromodichloromethane	ND	ND		ND		
Bromoform	ND	ND		ND		
Bromomethane	ND	ND		ND		
Carbon Tetrachloride	ND	ND		ND		
Chloroethane	ND	ND		ND		
Chloroform	ND	ND		ND		
Chloromethane	ND	ND		ND		
Dibromochloromethane	ND	ND		ND		
1,2-Dibromoethane (EDB)	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
1,1-Dichloroethane	ND	ND		ND		
1,2-Dichloroethane (EDC)	ND	ND		ND		
1,1-Dichloroethene	ND	ND		ND		
cis-1,2-Dichloroethene	4.4	0.25		3.8		
trans-1,2-Dichloroethene	ND	ND		ND		
1,2-Dichloropropane	ND	ND		ND		
cis-1,3-Dichloropropene	ND	ND		ND		
trans-1,3-Dichloropropene	ND	ND		ND		
Methylene Chloride	ND	ND		ND		
1,1,2,2-Tetrachloroethane	ND	ND		ND		
Tetrachlorethene	2.3	ND		2.7		
1,1,1-Trichloroethane	ND	ND		ND		
1,1,2-Trichloroethane	ND	ND		ND		
Trichloroethene	0.6	ND		0.92		
Trichlorofluoromethane	ND	ND		ND		
Vinyl Chloride	ND	ND		ND		
AROMATICS						
Benzene	ND	ND		ND		
Chlorobenzene	ND	ND		ND		

	JAN	APR	JUN	JUL	OCT	DEC
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
Ethylbenzene	ND	ND		ND		
Methyl-t-Butyl Ether	ND	ND		ND		
Toluene	ND	ND		ND		
Total Xylenes	ND	ND		ND		
GBR-32						
Lab pH				7.1		6.6
Lab Conductivity @25 C				6260		6300
Total Dissolved Solids (Calc)				2380		5050
Nitrogen-Nitrate				11.5		--
Total Alkalinity as CaCO3				300		276
Total Hardness as CaCO3				1960		1760
Bicarbonate as HCO3				366		336
Carbonate as CO3				ND		ND
Hydroxide				ND		ND
Chloride				838		839
Sulfate				2000		2340
Calcium				694		606
Magnesium				54.9		60.1
Potassium				4		4.6
Sodium				772		816
HALOCARBONS						
Bromodichloromethane			ND			ND
Bromoform			ND			ND
Bromomethane			ND			ND
Carbon Tetrachloride			ND			ND
Chloroethane			ND			ND
Chloroform			2.2			2.1
Chloromethane			ND			ND
Dibromochloromethane			ND			ND
1,2-Dibromoethane (EDB)			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
1,1-Dichloroethane			1.4			1.1
1,2-Dichloroethane (EDC)			ND			ND
1,1-Dichloroethene			ND			ND
cis-1,2-Dichloroethene			26.0			23
trans-1,2-Dichloroethene			ND			ND
1,2-Dichloropropane			ND			ND
cis-1,3-Dichloropropene			ND			ND
trans-1,3-Dichloropropene			ND			ND
Methylene Chloride			ND			ND
1,1,2,2-Tetrachloroethane			ND			ND
Tetrachlorethene			6.3			4.7
1,1,1-Trichloroethane			ND			ND
1,1,2-Trichloroethane			ND			ND
Trichloroethene			3.0			2.4

	JAN	APR	JUN	JUL	OCT	DEC
Trichlorofluoromethane			ND			ND
Vinyl Chloride			ND			ND
AROMATICS						
Benzene			ND			ND
Chlorobenzene			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
Ethylbenzene			ND			ND
Methyl-t-Butyl Ether			ND			ND
Toluene			ND			ND
Total Xylenes			ND			ND
GBR-48						
Lab pH				6.8		6.8
Lab Conductivity @25 C				5650		6450
Total Dissolved Solids (Calc)				4240		4890
Nitrogen - Nitrate/Nitrite				18.7		--
Total Alkalinity as CaCO3				190		200
Total Hardness as CaCO3				1510		1850
Bicarbonate as HCO3				232		243
Carbonate as CO3				ND		ND
Hydroxide				ND		ND
Chloride				814		1130
Sulfate				1700		1910
Calcium				520		646
Magnesium				51.1		58.4
Potassium				4.3		7
Sodium				694		803
HALOCARBONS						
Bromodichloromethane			ND			ND
Bromoform			ND			ND
Bromomethane			ND			ND
Carbon Tetrachloride			ND			ND
Chloroethane			ND			ND
Chloroform			1.6			2.7
Chloromethane			ND			ND
Dibromochloromethane			ND			ND
1,2-Dibromoethane (EDB)			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
1,1-Dichloroethane			0.3			0.3
1,2-Dichloroethane (EDC)			ND			ND
1,1-Dichloroethene			ND			ND
cis-1,2-Dichloroethene			7.8			14
trans-1,2-Dichloroethene			ND			ND
1,2-Dichloropropane			ND			ND
cis-1,3-Dichloropropene			ND			ND

	JAN	APR	JUN	JUL	OCT	DEC
trans-1,3-Dichloropropene			ND			ND
Methylene Chloride			ND			ND
1,1,2,2-Tetrachloroethane			ND			ND
Tetrachlorethene			2.7			2.7
1,1,1-Trichloroethane			ND			ND
1,1,2-Trichloroethane			ND			ND
Trichloroethene			1.2			1.4
Trichlorofluoromethane			ND			ND
Vinyl Chloride			ND			ND
AROMATICS						
Benzene			ND			ND
Chlorobenzene			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
Ethylbenzene			ND			ND
Methyl-t-Butyl Ether			ND			ND
Toluene			ND			ND
Total Xylenes			ND			ND
GBR-49						
Lab pH				7.1		6.8
Lab Conductivity @25 C				4650		5090
Total Dissolved Solids (Calc)				3630		4170
Nitrogen - Nitrate/Nitrite				4.7		--
Total Alkalinity as CaCO3				190		266
Total Hardness as CaCO3				1360		1650
Bicarbonate as HCO3				232		325
Carbonate as CO3				ND		ND
Hydroxide				ND		ND
Chloride				438		540
Sulfate				1690		2060
Calcium				472		571
Magnesium				43		54.1
Potassium				3.1		3.8
Sodium				605		645
HALOCARBONS						
Bromodichloromethane			ND			ND
Bromoform			ND			ND
Bromomethane			ND			ND
Carbon Tetrachloride			ND			ND
Chloroethane			ND			ND
Chloroform			0.9			1.2
Chloromethane			ND			ND
Dibromochloromethane			ND			ND
1,2-Dibromoethane (EDB)			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND

	JAN	APR	JUN	JUL	OCT	DEC
1,1-Dichloroethane			1.2			1.1
1,2-Dichloroethane (EDC)			ND			ND
1,1-Dichloroethene			ND			ND
cis-1,2-Dichloroethene			30			29
trans-1,2-Dichloroethene			ND			ND
1,2-Dichloropropane			ND			ND
cis-1,3-Dichloropropene			ND			ND
trans-1,3-Dichloropropene			ND			ND
Methylene Chloride			ND			ND
1,1,2,2-Tetrachloroethane			ND			ND
Tetrachlorethene			3.9			5.5
1,1,1-Trichloroethane			ND			ND
1,1,2-Trichloroethane			ND			ND
Trichloroethene			2			2.4
Trichlorofluoromethane			ND			ND
Vinyl Chloride			ND			ND
AROMATICS						
Benzene			ND			ND
Chlorobenzene			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
Ethylbenzene			ND			ND
Methyl-t-Butyl Ether			ND			ND
Toluene			ND			ND
Total Xylenes			ND			ND
GBR-50						
Lab pH				7.1		7.2
Lab Conductivity @25 C				3530		3330
Total Dissolved Solids (Calc)				2900		2750
Nitrogen - Nitrate/Nitrite				6.98		--
Total Alkalinity as CaCO3				200		190
Total Hardness as CaCO3				1120		1040
Bicarbonate as HCO3				243		232
Carbonate as CO3				ND		ND
Hydroxide				ND		ND
Chloride				161		112
Sulfate				1580		1690
Calcium				399		369
Magnesium				31.1		28.7
Potassium				2		2.4
Sodium				427		420
HALOCARBONS						
Bromodichloromethane			ND			ND
Bromoform			ND			ND
Bromomethane			ND			ND
Carbon Tetrachloride			ND			ND
Chloroethane			ND			ND

	JAN	APR	JUN	JUL	OCT	DEC
Chloroform			ND			ND
Chloromethane			ND			ND
Dibromochloromethane			ND			ND
1,2-Dibromoethane (EDB)			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
1,1-Dichloroethane			ND			ND
1,2-Dichloroethane (EDC)			ND			ND
1,1-Dichloroethene			ND			ND
cis-1,2-Dichloroethene			0.5			0.2
trans-1,2-Dichloroethene			ND			ND
1,2-Dichloropropane			ND			ND
cis-1,3-Dichloropropene			ND			ND
trans-1,3-Dichloropropene			ND			ND
Methylene Chloride			ND			ND
1,1,2,2-Tetrachloroethane			ND			ND
Tetrachlorethene			1.0			ND
1,1,1-Trichloroethane			ND			ND
1,1,2-Trichloroethane			ND			ND
Trichloroethene			ND			ND
Trichlorofluoromethane			ND			ND
Vinyl Chloride						
AROMATICS						
Benzene			ND			ND
Chlorobenzene			ND			ND
1,2-Dichlorobenzene			ND			ND
1,3-Dichlorobenzene			ND			ND
1,4-Dichlorobenzene			ND			ND
Ethylbenzene			ND			ND
Methyl-t-Butyl Ether			ND			ND
Toluene			ND			ND
Total Xylenes			ND			ND
GBR-51						
Lab pH	7.1					
Lab Conductivity @25 C	2870					
Total Dissolved Solids @ 180 C	2390					
Total Alkalinity as CaCO3	229					
Total Hardness as CaCO3	1200					
Bicarbonate as HCO3	279					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	58					
Sulfate	1410					
Calcium	431					
Magnesium	31.2					
Potassium	2					
Sodium	324					

	JAN	APR	JUN	JUL	OCT	DEC
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GBR-52						
Lab pH	7.1					
Lab Conductivity @25 C	3070					
Total Dissolved Solids @ 180 C	2660					
Total Alkalinity as CaCO3	199					
Total Hardness as CaCO3	1220					
Bicarbonate as HCO3	ND					
Carbonate as CO3	ND					
Hydroxide	68					
Chloride	54					
Sulfate	1640					

	JAN	APR	JUN	JUL	OCT	DEC
Calcium	431					
Magnesium	35.2					
Potassium	2.1					
Sodium	303					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
SHS-3						
Lab pH	6.6					
Lab Conductivity @25 C	4480					
Total Dissolved Solids @ 180 C	3970					
Total Alkalinity as CaCO3	223					
Total Hardness as CaCO3	1720					

	JAN	APR	JUN	JUL	OCT	DEC
Bicarbonate as HCO ₃	272					
Carbonate as CO ₃	ND					
Hydroxide	ND					
Chloride	303					
Sulfate	2160					
Calcium	560					
Magnesium	78.5					
Potassium	8.8					
Sodium	460					
HALOCARBONS						
Bromodichloromethane	ND			ND		
Bromoform	ND			ND		
Bromomethane	ND			ND		
Carbon Tetrachloride	ND			ND		
Chloroethane	ND			ND		
Chloroform	ND			ND		
Chloromethane	ND			ND		
Dibromochloromethane	ND			ND		
1,2-Dibromoethane (EDB)	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
1,1-Dichloroethane	ND			ND		
1,2-Dichloroethane (EDC)	ND			ND		
1,1-Dichloroethene	ND			ND		
cis-1,2-Dichloroethene	ND			ND		
trans-1,2-Dichloroethene	ND			ND		
1,2-Dichloropropane	ND			ND		
cis-1,3-Dichloropropene	ND			ND		
trans-1,3-Dichloropropene	ND			ND		
Methylene Chloride	ND			ND		
1,1,2,2-Tetrachloroethane	ND			ND		
Tetrachlorethene	ND			ND		
1,1,1-Trichloroethane	ND			ND		
1,1,2-Trichloroethane	ND			ND		
Trichloroethene	ND			ND		
Trichlorofluoromethane	ND			ND		
Vinyl Chloride	ND			ND		
AROMATICS						
Benzene	ND			ND		
Chlorobenzene	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
Ethylbenzene	ND			ND		
Methyl-t-Butyl Ether	ND			ND		
Toluene	ND			ND		
Total Xylenes	ND			ND		
SHS-4						

	JAN	APR	JUN	JUL	OCT	DEC
Lab pH	7.1					
Lab Conductivity @25 C	3090					
Total Dissolved Solids (Calc)	2710					
Total Alkalinity as CaCO3	170					
Total Hardness as CaCO3	1480					
Bicarbonate as HCO3	207					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	45					
Sulfate	1830					
Calcium	532					
Magnesium	38.1					
Potassium	1.8					
Sodium	321					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					

	JAN	APR	JUN	JUL	OCT	DEC
Toluene	ND					
Total Xylenes	ND					
SHS-6						
Lab pH	7.1					
Lab Conductivity @25 C	2820					
Total Dissolved Solids @ 180 C	2340					
Total Alkalinity as CaCO3	230					
Total Hardness as CaCO3	860					
Bicarbonate as HCO3	281					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	59					
Sulfate	1310					
Calcium	300					
Magnesium	27					
Potassium	2.5					
Sodium	358					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					

	JAN	APR	JUN	JUL	OCT	DEC
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
SHS-10						
Lab pH	7.1					
Lab Conductivity @25 C	3200					
Total Dissolved Solids (Calc)	2570					
Total Alkalinity as CaCO3	373					
Total Hardness as CaCO3	1100					
Bicarbonate as HCO3	455					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	93					
Sulfate	1350					
Calcium	341					
Magnesium	59.9					
Potassium	9.6					
Sodium	343					
HALOCARBONS						
Bromodichloromethane	ND	ND		ND		
Bromoform	ND	ND		ND		
Bromomethane	ND	ND		ND		
Carbon Tetrachloride	ND	ND		ND		
Chloroethane	ND	ND		ND		
Chloroform	ND	ND		ND		
Chloromethane	ND	ND		ND		
Dibromochloromethane	ND	ND		ND		
1,2-Dibromoethane (EDB)	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
1,1-Dichloroethane	ND	ND		ND		
1,2-Dichloroethane (EDC)	ND	ND		ND		
1,1-Dichloroethene	ND	ND		ND		
cis-1,2-Dichloroethene	ND	ND		ND		
trans-1,2-Dichloroethene	ND	ND		ND		
1,2-Dichloropropane	ND	ND		ND		
cis-1,3-Dichloropropene	ND	ND		ND		
trans-1,3-Dichloropropene	ND	ND		ND		
Methylene Chloride	ND	ND		ND		
1,1,2,2-Tetrachloroethane	ND	ND		ND		
Tetrachlorethene	ND	ND		ND		
1,1,1-Trichloroethane	ND	ND		ND		
1,1,2-Trichloroethane	ND	ND		ND		

	JAN	APR	JUN	JUL	OCT	DEC
Trichloroethene	ND	ND		ND		
Trichlorofluoromethane	ND	ND		ND		
Vinyl Chloride	ND	ND		ND		
AROMATICS						
Benzene	ND	ND		ND		
Chlorobenzene	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
Ethylbenzene	ND	ND		ND		
Methyl-t-Butyl Ether	ND	ND		ND		
Toluene	ND	ND		ND		
Total Xylenes	0.6	ND		ND		
SHS-12						
Lab pH	7.1					
Lab Conductivity @25 C	3000					
Total Dissolved Solids @ 180 C	2210					
Total Alkalinity as CaCO3	582					
Total Hardness as CaCO3	787					
Bicarbonate as HCO3	710					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	130					
Sulfate	860					
Calcium	281					
Magnesium	20.8					
Potassium	1.3					
Sodium	456					
HALOCARBONS						
Bromodichloromethane	ND	ND		ND		
Bromoform	ND	ND		ND		
Bromomethane	ND	ND		ND		
Carbon Tetrachloride	ND	ND		ND		
Chloroethane	ND	ND		ND		
Chloroform	ND	ND		ND		
Chloromethane	ND	ND		ND		
Dibromochloromethane	ND	ND		ND		
1,2-Dibromoethane (EDB)	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
1,1-Dichloroethane	ND	ND		ND		
1,2-Dichloroethane (EDC)	ND	ND		ND		
1,1-Dichloroethene	ND	ND		ND		
cis-1,2-Dichloroethene	ND	ND		ND		
trans-1,2-Dichloroethene	ND	ND		ND		
1,2-Dichloropropane	ND	ND		ND		
cis-1,3-Dichloropropene	ND	ND		ND		

	JAN	APR	JUN	JUL	OCT	DEC
trans-1,3-Dichloropropene	ND	ND		ND		
Methylene Chloride	ND	ND		ND		
1,1,2,2-Tetrachloroethane	ND	ND		ND		
Tetrachlorethene	ND	ND		ND		
1,1,1-Trichloroethane	ND	ND		ND		
1,1,2-Trichloroethane	ND	ND		ND		
Trichloroethene	ND	ND		ND		
Trichlorofluoromethane	ND	ND		ND		
Vinyl Chloride	ND	ND		ND		
AROMATICS						
Benzene	ND	ND		ND		
Chlorobenzene	ND	ND		ND		
1,2-Dichlorobenzene	ND	ND		ND		
1,3-Dichlorobenzene	ND	ND		ND		
1,4-Dichlorobenzene	ND	ND		ND		
Ethylbenzene	ND	ND		ND		
Methyl-t-Butyl Ether	ND	ND		ND		
Toluene	ND	ND		ND		
Total Xylenes	ND	ND		ND		
SHS-13						
Lab pH	7					
Lab Conductivity @25 C	1720					
Total Dissolved Solids @ 180 C	1050					
Total Alkalinity as CaCO3	706					
Total Hardness as CaCO3	230					
Bicarbonate as HCO3	861					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	90					
Sulfate	87					
Calcium	65.3					
Magnesium	16.1					
Potassium	1.4					
Sodium	304					
HALOCARBONS						
Bromodichloromethane	ND	ND		ND	ND	
Bromoform	ND	ND		ND	ND	
Bromomethane	ND	ND		ND	ND	
Carbon Tetrachloride	ND	ND		ND	ND	
Chloroethane	ND	ND		ND	ND	
Chloroform	ND	ND		ND	ND	
Chloromethane	ND	ND		ND	ND	
Dibromochloromethane	ND	ND		ND	ND	
1,2-Dibromoethane (EDB)	ND	ND		ND	ND	
1,2-Dichlorobenzene	ND	ND		ND	ND	
1,3-Dichlorobenzene	ND	ND		ND	ND	
1,4-Dichlorobenzene	ND	ND		ND	ND	
1,1-Dichloroethane	ND	ND		ND	ND	
1,2-Dichloroethane (EDC)	ND	ND		ND	ND	

	JAN	APR	JUN	JUL	OCT	DEC
1,1-Dichloroethene	ND	ND		ND	ND	
cis-1,2-Dichloroethene	ND	ND		ND	ND	
trans-1,2-Dichloroethene	ND	ND		ND	ND	
1,2-Dichloropropane	ND	ND		ND	ND	
cis-1,3-Dichloropropene	ND	ND		ND	ND	
trans-1,3-Dichloropropene	ND	ND		ND	ND	
Methylene Chloride	ND	ND		ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND	ND	
Tetrachlorethene	ND	ND		ND	ND	
1,1,1-Trichloroethane	ND	ND		ND	ND	
1,1,2-Trichloroethane	ND	ND		ND	ND	
Trichloroethene	ND	ND		ND	ND	
Trichlorofluoromethane	ND	ND		ND	ND	
Vinyl Chloride	ND	ND		ND	ND	
AROMATICS						
Benzene	ND	ND		ND	ND	
Chlorobenzene	ND	ND		ND	ND	
1,2-Dichlorobenzene	ND	ND		ND	ND	
1,3-Dichlorobenzene	ND	ND		ND	ND	
1,4-Dichlorobenzene	ND	ND		ND	ND	
Ethylbenzene	ND	ND		ND	ND	
Methyl-t-Butyl Ether	ND	ND		ND	ND	
Toluene	ND	ND		ND	ND	
Total Xylenes	ND	ND		ND	ND	
SHS-15						
Lab pH	7.1					
Lab Conductivity @25 C	2650					
Total Dissolved Solids (Calc)	2250					
Total Alkalinity as CaCO3	319					
Total Hardness as CaCO3	1280					
Bicarbonate as HCO3	389					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	57					
Sulfate	1410					
Calcium	446					
Magnesium	40.9					
Potassium	2.3					
Sodium	222					
HALOCARBONS						
Bromodichloromethane	ND			ND		
Bromoform	ND			ND		
Bromomethane	ND			ND		
Carbon Tetrachloride	ND			ND		
Chloroethane	ND			ND		
Chloroform	ND			2.2		
Chloromethane	ND			ND		
Dibromochloromethane	ND			ND		

	JAN	APR	JUN	JUL	OCT	DEC
1,2-Dibromoethane (EDB)	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
1,1-Dichloroethane	ND			ND		
1,2-Dichloroethane (EDC)	ND			ND		
1,1-Dichloroethene	ND			ND		
cis-1,2-Dichloroethene	ND			ND		
trans-1,2-Dichloroethene	ND			ND		
1,2-Dichloropropane	ND			ND		
cis-1,3-Dichloropropene	ND			ND		
trans-1,3-Dichloropropene	ND			ND		
Methylene Chloride	ND			ND		
1,1,2,2-Tetrachloroethane	ND			ND		
Tetrachlorethene	ND			ND		
1,1,1-Trichloroethane	ND			ND		
1,1,2-Trichloroethane	ND			ND		
Trichloroethene	ND			ND		
Trichlorofluoromethane	ND			ND		
Vinyl Chloride	ND			ND		
AROMATICS						
Benzene	ND			ND		
Chlorobenzene	ND			ND		
1,2-Dichlorobenzene	ND			ND		
1,3-Dichlorobenzene	ND			ND		
1,4-Dichlorobenzene	ND			ND		
Ethylbenzene	ND			ND		
Methyl-t-Butyl Ether	ND			ND		
Toluene	ND			ND		
Total Xylenes	ND			ND		
SHS-16						
Lab pH	7.2					
Lab Conductivity @25 C	2940					
Total Dissolved Solids (Calc)	2500					
Total Alkalinity as CaCO3	289					
Total Hardness as CaCO3	1410					
Bicarbonate as HCO3	352					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	76					
Sulfate	1510					
Calcium	487					
Magnesium	47					
Potassium	3					
Sodium	286					
HALOCARBONS						
Bromodichloromethane	ND	ND		ND	ND	
Bromoform	ND	ND		ND	ND	

	JAN	APR	JUN	JUL	OCT	DEC
Bromomethane	ND	ND		ND	ND	
Carbon Tetrachloride	ND	ND		ND	ND	
Chloroethane	ND	ND		ND	ND	
Chloroform	ND	ND		ND	ND	
Chloromethane	ND	ND		ND	ND	
Dibromochloromethane	ND	ND		ND	ND	
1,2-Dibromoethane (EDB)	ND	ND		ND	ND	
1,2-Dichlorobenzene	ND	ND		ND	ND	
1,3-Dichlorobenzene	ND	ND		ND	ND	
1,4-Dichlorobenzene	ND	ND		ND	ND	
1,1-Dichloroethane	ND	ND		ND	ND	
1,2-Dichloroethane (EDC)	ND	ND		ND	ND	
1,1-Dichloroethene	ND	ND		ND	ND	
cis-1,2-Dichloroethene	ND	ND		ND	ND	
trans-1,2-Dichloroethene	ND	ND		ND	ND	
1,2-Dichloropropane	ND	ND		ND	ND	
cis-1,3-Dichloropropene	ND	ND		ND	ND	
trans-1,3-Dichloropropene	ND	ND		ND	ND	
Methylene Chloride	ND	ND		ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND	ND	
Tetrachlorethene	ND	ND		ND	ND	
1,1,1-Trichloroethane	ND	ND		ND	ND	
1,1,2-Trichloroethane	ND	ND		ND	ND	
Trichloroethene	ND	ND		ND	ND	
Trichlorofluoromethane	ND	ND		ND	ND	
Vinyl Chloride	ND	ND		ND	ND	
AROMATICS						
Benzene	ND	ND		ND	ND	
Chlorobenzene	ND	ND		ND	ND	
1,2-Dichlorobenzene	ND	ND		ND	ND	
1,3-Dichlorobenzene	ND	ND		ND	ND	
1,4-Dichlorobenzene	ND	ND		ND	ND	
Ethylbenzene	ND	ND		ND	ND	
Methyl-t-Butyl Ether	ND	ND		ND	ND	
Toluene	ND	ND		ND	ND	
Total Xylenes	ND	ND		ND	ND	
SHS-17						
Lab pH	7.2					
Lab Conductivity @25 C	3720					
Total Dissolved Solids (Calc)	3070					
Total Alkalinity as CaCO3	241					
Total Hardness as CaCO3	1380					
Bicarbonate as HCO3	294					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	163					
Sulfate	1730					
Calcium	463					
Magnesium	54.7					
Potassium	2.8					

	JAN	APR	JUN	JUL	OCT	DEC
Sodium	492					
HALOCARBONS						
Bromodichloromethane	ND	ND		ND	ND	
Bromoform	ND	ND		ND	ND	
Bromomethane	ND	ND		ND	ND	
Carbon Tetrachloride	ND	ND		ND	ND	
Chloroethane	ND	ND		ND	ND	
Chloroform	ND	ND		ND	ND	
Chloromethane	ND	ND		ND	ND	
Dibromochloromethane	ND	ND		ND	ND	
1,2-Dibromoethane (EDB)	ND	ND		ND	ND	
1,2-Dichlorobenzene	ND	ND		ND	ND	
1,3-Dichlorobenzene	ND	ND		ND	ND	
1,4-Dichlorobenzene	ND	ND		ND	ND	
1,1-Dichloroethane	ND	ND		ND	ND	
1,2-Dichloroethane (EDC)	ND	ND		ND	ND	
1,1-Dichloroethene	ND	ND		ND	ND	
cis-1,2-Dichloroethene	ND	ND		ND	ND	
trans-1,2-Dichloroethene	ND	ND		ND	ND	
1,2-Dichloropropane	ND	ND		ND	ND	
cis-1,3-Dichloropropene	ND	ND		ND	ND	
trans-1,3-Dichloropropene	ND	ND		ND	ND	
Methylene Chloride	ND	ND		ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND	ND	
Tetrachlorethene	ND	ND		ND	ND	
1,1,1-Trichloroethane	ND	ND		ND	ND	
1,1,2-Trichloroethane	ND	ND		ND	ND	
Trichloroethene	ND	ND		ND	ND	
Trichlorofluoromethane	ND	ND		ND	ND	
Vinyl Chloride	ND	ND		ND	ND	
AROMATICS						
Benzene	ND	ND		ND	ND	
Chlorobenzene	ND	ND		ND	ND	
1,2-Dichlorobenzene	ND	ND		ND	ND	
1,3-Dichlorobenzene	ND	ND		ND	ND	
1,4-Dichlorobenzene	ND	ND		ND	ND	
Ethylbenzene	ND	ND		ND	ND	
Methyl-t-Butyl Ether	ND	ND		ND	ND	
Toluene	ND	ND		ND	ND	
Total Xylenes	ND	ND		ND	ND	

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JANUARY, 1999

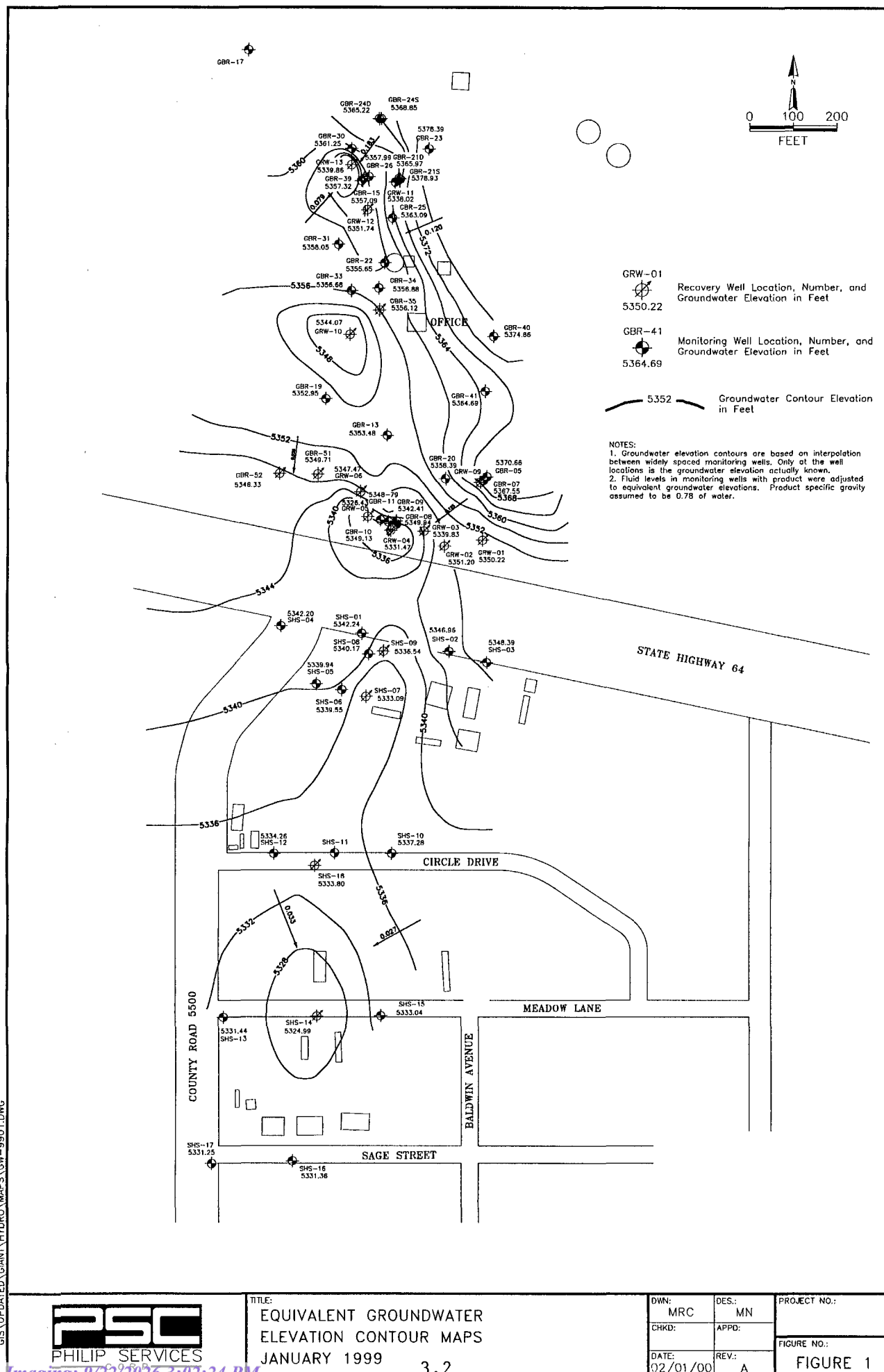
WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	44.08	44.08	0.00	5350.22
GRW-2	5391.28	40.08	40.08	0.00	5351.20
GRW-3	5388.77	48.94	48.94	0.00	5339.83
GRW-4	5390.02	58.55	58.55	0.00	5331.47
GRW-5	5390.56	64.13	64.13	0.00	5326.43
GRW-6	5390.81	43.34	43.34	0.00	5347.47
GRW-10	5395.02	51.03	50.04	0.99	5344.78
GRW-11	5397.85	59.83	59.83	0.00	5338.02
GRW-12	5397.24	45.50	45.50	0.00	5351.74
GRW-13	5396.90	57.04	57.04	0.00	5339.86
GBR-5	5395.07	24.41	24.40	0.01	5370.67
GBR-6	5395.70	57.50	57.50	0.00	5338.20
GBR-7	5395.85	28.36	27.61	0.75	5368.09
GBR-8	5390.50	40.56	40.45	0.11	5350.03
GBR-9	5389.92	47.51	47.51	0.00	5342.41
GBR-10	5390.57	41.44	41.44	0.00	5349.13
GBR-11	5389.43	40.64	40.64	0.00	5348.79
GBR-13	5393.04	39.56	39.56	0.00	5353.48
GBR-15	5397.99	40.90	40.90	0.00	5357.09
GBR-18	5421.68	34.85	34.85	0.00	5386.83
GBR-19	5393.83	40.92	40.36	0.56	5353.36
GBR-20	5393.47	35.08	35.06	0.02	5358.41
GBR-21S	5400.65	21.73	21.65	0.08	5378.98
GBR-21D	5400.19	34.22	34.22	0.00	5365.97
GBR-22	5395.91	40.34	39.33	1.01	5356.38
GBR-23	5403.72	25.34	25.20	0.14	5376.60
GBR-24S	5396.08	27.23	27.23	0.00	5364.53
GBR-24D	5396.77	31.55	31.55	0.00	5365.22
GBR-25	5396.72	33.63	33.63	0.00	5363.09
GBR-26	5395.59	37.60	37.60	0.00	5357.99
GBR-30	5396.58	35.33	35.33	0.00	5361.25
GBR-31	5394.86	36.81	36.81	0.00	5358.05
GBR-33	5396.28	39.60	39.60	0.00	5356.68
GBR-34	5394.00	37.12	37.10	0.02	5356.90
GBR-35	5393.66	37.57	37.15	0.42	5356.43
GBR-39	5397.55	40.23	40.23	0.00	5357.32
GBR-40	5400.76	26.10	26.10	0.00	5374.66
GBR-41	5396.35	31.66	31.66	0.00	5364.69
GBR-51	5389.68	39.97	39.97	0.00	5349.71
GBR-52	5387.74	41.41	41.41	0.00	5346.33

3.0

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JANUARY, 1999
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.30	41.30	0.00	5342.24
SHS-2	5381.66	34.70	34.70	0.00	5346.96
SHS-3	5383.33	34.94	34.94	0.00	5348.39
SHS-4	5383.62	41.42	41.42	0.00	5342.20
SHS-5	5378.36	38.42	38.42	0.00	5339.94
SHS-6	5378.17	38.62	38.62	0.00	5339.55
SHS-7	5375.89	42.80	42.80	0.00	5333.09
SHS-8	5380.25	40.20	38.66	1.54	5341.28
SHS-9	5380.79	44.25	44.25	0.00	5336.54
SHS-10	5373.80	36.52	36.52	0.00	5337.28
SHS-12	5373.94	39.68	39.68	0.00	5334.26
SHS-13	5367.81	36.37	36.37	0.00	5331.44
SHS-14	5367.07	42.08	42.08	0.00	5324.99
SHS-15	5366.21	33.17	33.17	0.00	5333.04
SHS-16	5362.58	31.22	31.22	0.00	5331.36
SHS-17	5364.35	33.10	33.10	0.00	5331.25
SHS-18	5373.64	39.84	39.84	0.00	5333.80

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

APRIL, 1999

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	53.65	53.65	0.00	5340.65
GRW-2	5391.28	42.53	42.53	0.00	5348.75
GRW-3	5388.77	46.13	46.13	0.00	5342.64
GRW-4	5390.02	57.38	57.38	0.00	5332.64
GRW-5	5390.56	62.20	62.20	0.00	5328.36
GRW-6	5390.81	45.13	45.13	0.00	5345.68
GRW-10	5395.02	50.65	50.03	0.62	5344.87
GRW-11	5397.85	61.66	61.66	0.00	5336.19
GRW-12	5397.24	43.96	43.96	0.00	5353.28
GRW-13	5396.90	36.22	36.22	0.00	5360.68
GBR-5	5395.07	23.90	23.90	0.00	5371.17
GBR-6	5395.70	57.80	57.80	0.00	5337.90
GBR-7	5395.85	28.91	27.40	1.51	5368.15
GBR-8	5390.50	49.40	46.75	2.65	5343.22
GBR-9	5389.92	40.53	40.53	0.00	5349.39
GBR-10	5390.57	41.74	41.74	0.00	5348.83
GBR-11	5389.43	40.96	40.96	0.00	5348.47
GBR-13	5393.04	40.06	40.06	0.00	5352.98
GBR-15	5397.99	39.35	39.35	0.00	5358.64
GBR-18	5421.68	32.67	32.67	0.00	5389.01
GBR-19	5393.83	41.46	40.62	0.84	5353.04
GBR-20	5393.47	34.50	34.50	0.00	5358.97
GBR-21S	5400.65	21.97	21.97	0.00	5378.68
GBR-21D	5400.19	34.53	34.53	0.00	5365.66
GBR-22	5395.91	40.33	39.35	0.98	5356.36
GBR-23	5403.72	35.36	35.36	0.00	5376.06
GBR-24S	5396.08	27.66	27.66	0.00	5365.09
GBR-24D	5396.77	30.99	30.99	0.00	5365.78
GBR-25	5396.72	33.91	33.91	0.00	5362.81
GBR-26	5395.59	36.90	36.90	0.00	5358.69
GBR-30	5396.58	36.08	36.08	0.00	5360.50
GBR-31	5394.86	36.99	36.99	0.00	5357.87
GBR-33	5396.28	39.79	39.79	0.00	5356.49
GBR-34	5394.00	38.18	37.28	0.90	5356.54
GBR-35	5393.66	38.05	37.34	0.71	5356.18
GBR-39	5397.55	38.72	38.72	0.00	5358.83
GBR-40	5400.76	31.05	31.05	0.00	5369.71
GBR-41	5396.35	25.92	25.92	0.00	5370.43
GBR-51	5389.68	41.68	41.68	0.00	5348.00
GBR-52	5387.74	40.23	40.23	0.00	5347.51

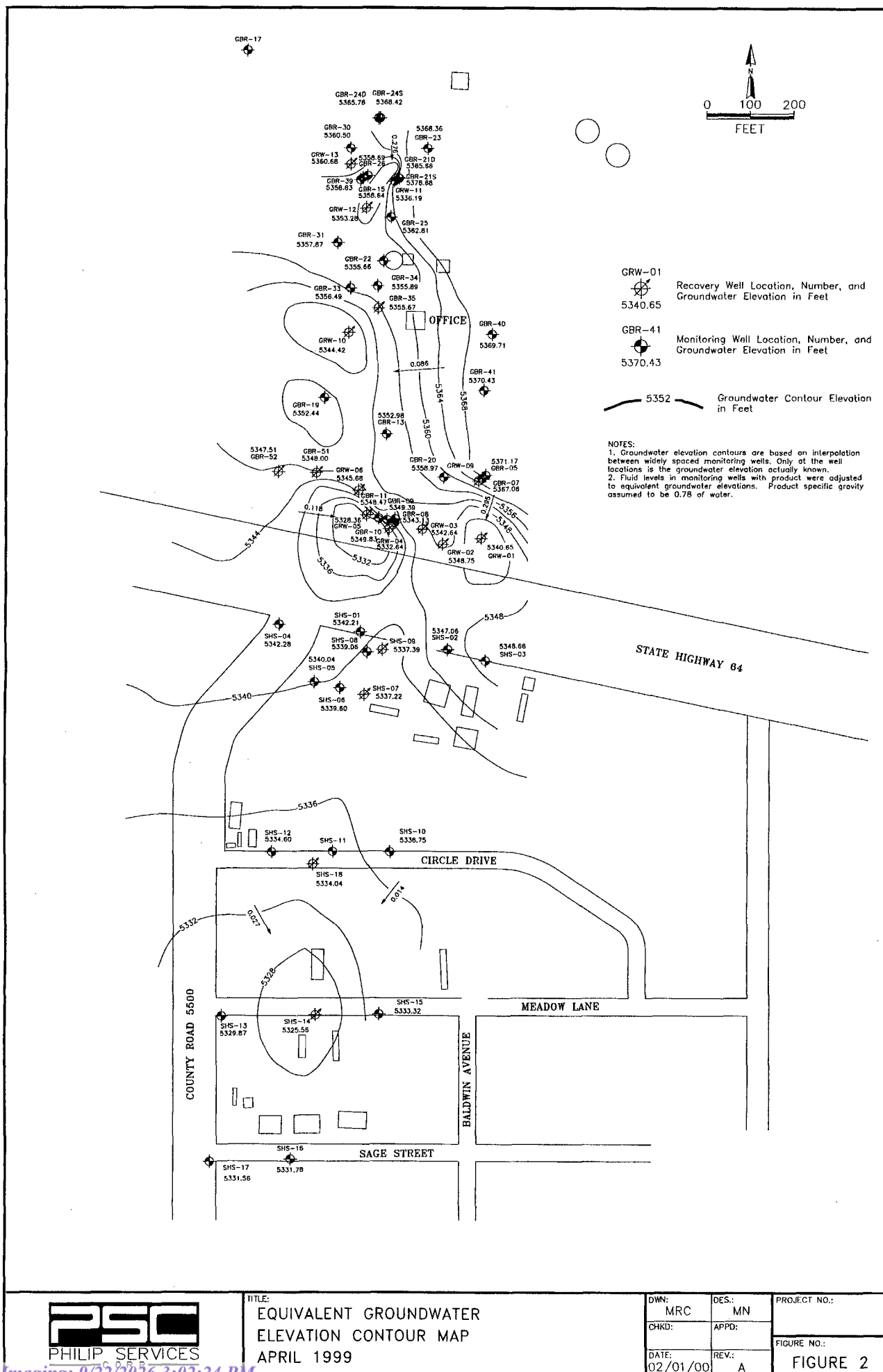
GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE

APRIL, 1999

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.33	41.33	0.00	5342.21
SHS-2	5381.66	34.60	34.60	0.00	5347.06
SHS-3	5383.33	34.67	34.67	0.00	5348.66
SHS-4	5383.62	41.34	41.34	0.00	5342.28
SHS-5	5378.36	38.32	38.32	0.00	5340.04
SHS-6	5378.17	38.57	38.57	0.00	5339.60
SHS-7	5375.89	38.67	38.67	0.00	5337.22
SHS-8	5380.25	41.40	38.65	2.75	5341.05
SHS-9	5380.79	43.40	43.40	0.00	5337.39
SHS-10	5373.80	37.05	37.05	0.00	5336.75
SHS-12	5373.94	39.34	39.34	0.00	5334.60
SHS-13	5367.81	37.94	37.94	0.00	5329.87
SHS-14	5367.07	41.51	41.51	0.00	5325.56
SHS-15	5366.21	32.89	32.89	0.00	5333.32
SHS-16	5362.58	30.80	30.80	0.00	5331.78
SHS-17	5364.35	32.79	32.79	0.00	5331.56
SHS-18	5373.64	39.60	39.60	0.00	5334.04

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

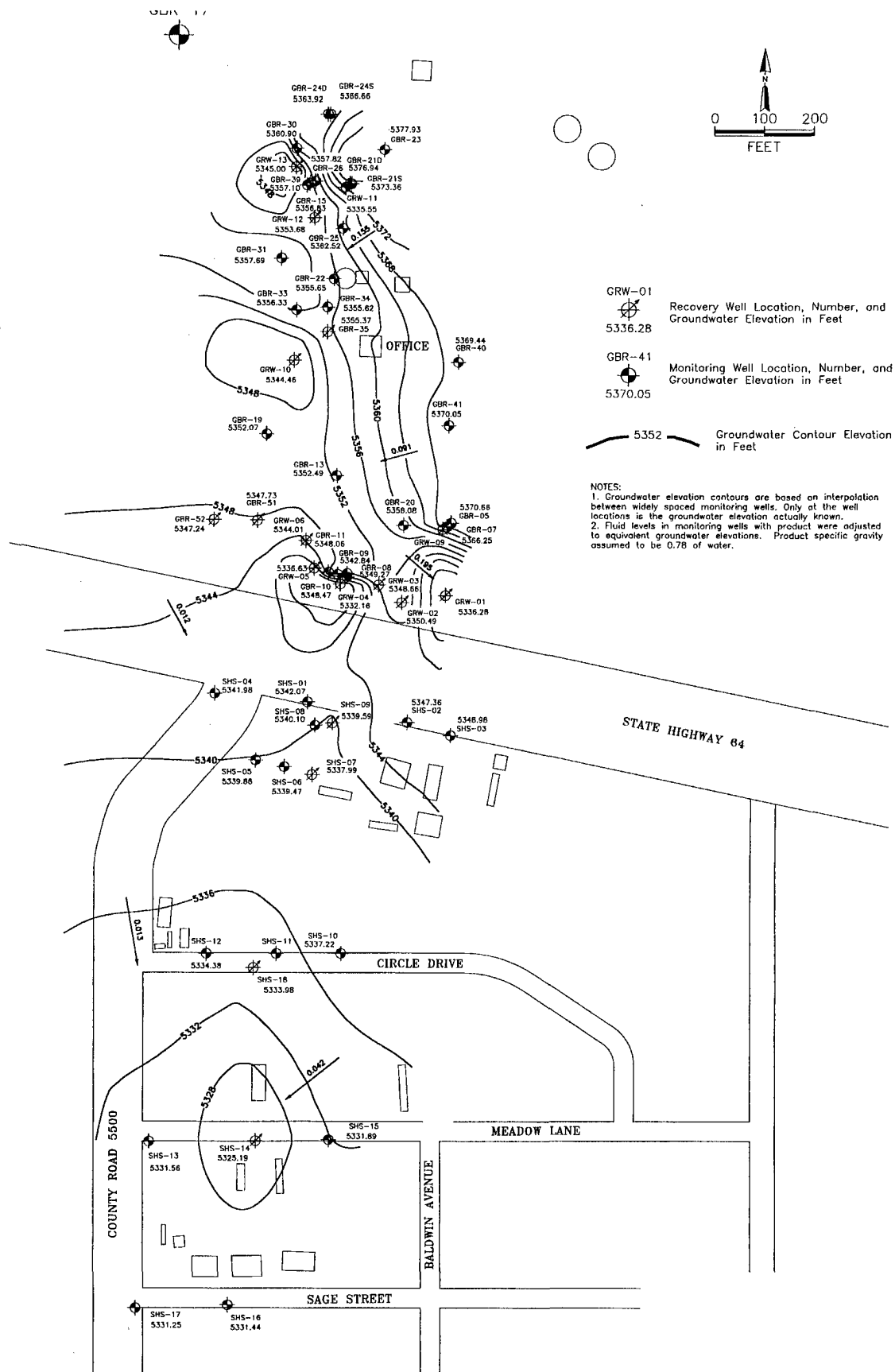
JULY, 1999

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	58.02	58.02	0.00	5336.28
GRW-2	5391.28	40.79	40.79	0.00	5350.49
GRW-3	5388.77	40.11	40.11	0.00	5348.66
GRW-4	5390.02	57.86	57.86	0.00	5332.16
GRW-5	5390.56	53.93	53.93	0.00	5336.63
GRW-6	5390.81	46.80	46.80	0.00	5344.01
GRW-10	5395.02	50.64	49.58	1.06	5345.23
GRW-11	5397.85	62.30	62.30	0.00	5335.55
GRW-12	5397.24	43.56	43.56	0.00	5353.68
GRW-13	5396.90	51.90	51.90	0.00	5345.00
GBR-5	5395.07	24.41	24.41	0.00	5370.66
GBR-6	5395.70	57.06	57.06	0.00	5338.64
GBR-7	5395.85	29.74	27.93	1.81	5367.56
GBR-8	5390.50	41.24	41.14	0.10	5349.34
GBR-9	5389.92	47.08	47.08	0.00	5342.84
GBR-10	5390.57	42.10	42.10	0.00	5348.47
GBR-11	5389.43	41.37	41.35	0.02	5348.08
GBR-13	5393.04	40.55	40.55	0.00	5352.49
GBR-15	5397.99	41.16	41.16	0.00	5356.83
GBR-18	5421.68	33.23	33.23	0.00	5388.45
GBR-19	5393.83	41.83	40.90	0.93	5352.74
GBR-20	5393.47	35.39	35.34	0.05	5358.12
GBR-21S	5400.65	27.29	27.29	0.00	5373.36
GBR-21D	5400.19	23.28	22.90	0.38	5377.21
GBR-22	5395.91	40.31	39.70	0.61	5356.09
GBR-23	5403.72	25.79	25.73	0.06	5374.35
GBR-24S	5396.08	29.42	29.42	0.00	5363.23
GBR-24D	5396.77	32.85	32.85	0.00	5363.92
GBR-25	5396.72	34.20	34.20	0.00	5362.52
GBR-26	5395.59	37.77	37.77	0.00	5357.82
GBR-30	5396.58	35.68	35.68	0.00	5360.90
GBR-31	5394.86	37.17	37.17	0.00	5357.69
GBR-33	5396.28	39.95	39.95	0.00	5356.33
GBR-34	5394.00	38.45	37.50	0.95	5356.31
GBR-35	5393.66	38.36	37.50	0.86	5355.99
GBR-39	5397.55	40.45	40.45	0.00	5357.10
GBR-40	5400.76	31.32	31.32	0.00	5369.44
GBR-41	5396.35	26.30	26.30	0.00	5370.05
GBR-51	5389.68	41.95	41.95	0.00	5347.73
GBR-52	5387.74	40.50	40.50	0.00	5347.24

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 1999
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.47	41.47	0.00	5342.07
SHS-2	5381.66	34.30	34.30	0.00	5347.36
SHS-3	5383.33	34.35	34.35	0.00	5348.98
SHS-4	5383.62	41.64	41.64	0.00	5341.98
SHS-5	5378.36	38.48	38.48	0.00	5339.88
SHS-6	5378.17	38.70	38.70	0.00	5339.47
SHS-7	5375.89	37.90	37.90	0.00	5337.99
SHS-8	5380.25	40.26	38.80	1.46	5341.16
SHS-9	5380.79	41.20	41.20	0.00	5339.59
SHS-10	5373.80	36.58	36.58	0.00	5337.22
SHS-12	5373.94	39.56	39.56	0.00	5334.38
SHS-13	5367.81	36.25	36.25	0.00	5331.56
SHS-14	5367.07	41.88	41.88	0.00	5325.19
SHS-15	5366.21	34.32	34.32	0.00	5331.89
SHS-16	5362.58	31.14	31.14	0.00	5331.44
SHS-17	5364.35	33.10	33.10	0.00	5331.25
SHS-18	5373.64	39.66	39.66	0.00	5333.98

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



PSC
PHILIP SERVICES
CORP.

TITLE:
EQUIVALENT GROUNDWATER
ELEVATION CONTOUR MAP
JULY 1999

DWN: MRC
DES.: MN
CHKD:
APPD:
DATE: 02/01/00
REV.: A

PROJECT NO.:
FIGURE NO.: FIGURE 3

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

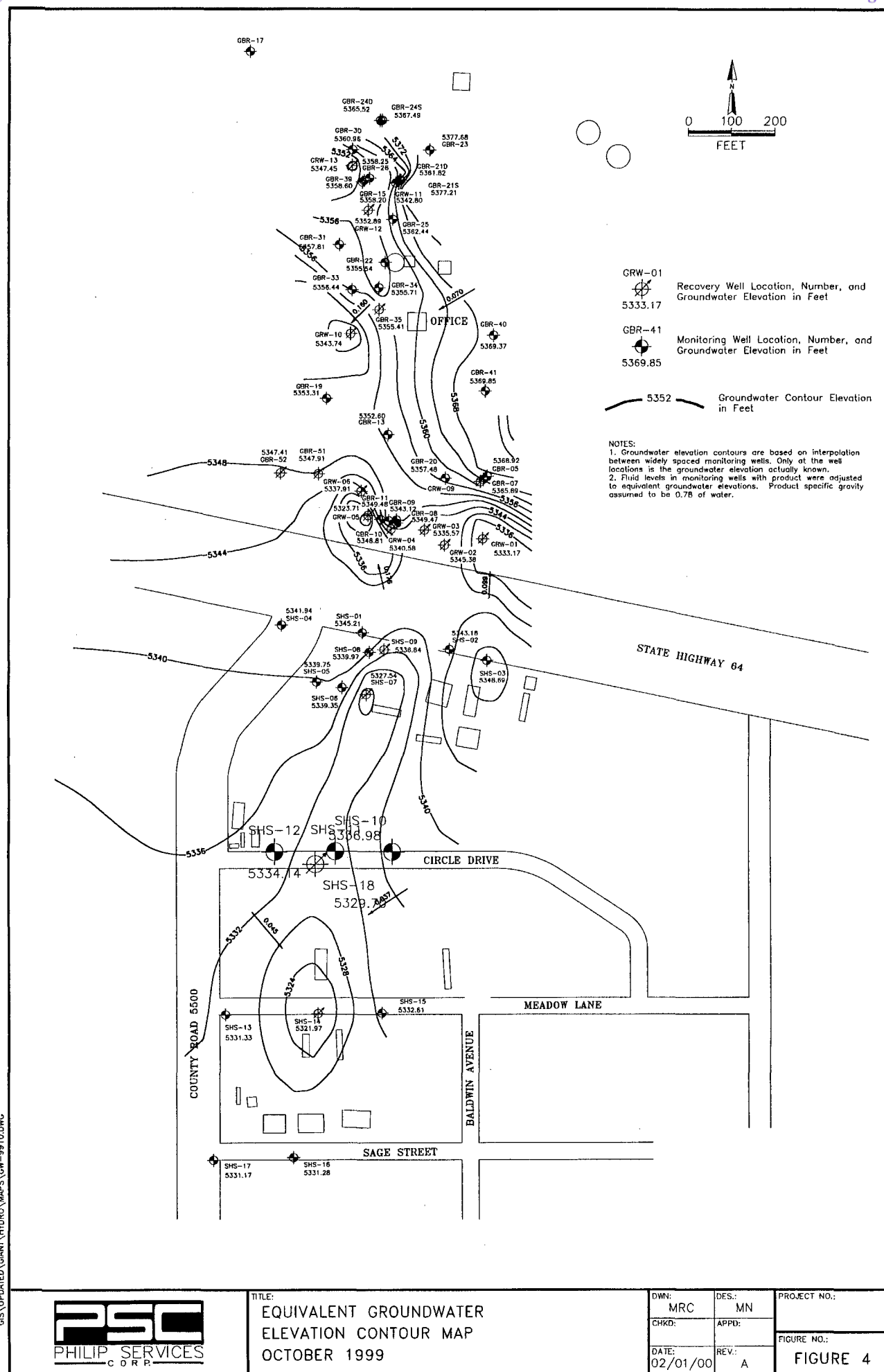
OCTOBER, 1999

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.13	61.13	0.00	5333.17
GRW-2	5391.28	45.90	45.90	0.00	5345.38
GRW-3	5388.77	53.20	53.20	0.00	5335.57
GRW-4	5390.02	49.44	49.44	0.00	5340.58
GRW-5	5390.56	66.85	66.85	0.00	5323.71
GRW-6	5390.81	52.90	52.90	0.00	5337.91
GRW-10	5395.02	51.36	50.30	1.06	5344.51
GRW-11	5397.85	55.05	55.05	0.00	5342.80
GRW-12	5397.24	44.35	44.35	0.00	5352.89
GRW-13	5396.90	49.45	49.45	0.00	5347.45
GBR-5	5395.07	26.15	26.15	0.00	5368.92
GBR-6	5395.70	55.25	55.25	0.00	5340.45
GBR-7	5395.85	30.10	28.28	1.82	5367.21
GBR-8	5390.50	41.05	40.85	0.20	5349.61
GBR-9	5389.92	46.80	46.80	0.00	5343.12
GBR-10	5390.57	41.76	41.76	0.00	5348.81
GBR-11	5389.43	39.95	39.95	0.00	5349.48
GBR-13	5393.04	40.44	40.44	0.00	5352.60
GBR-15	5397.99	39.79	39.79	0.00	5358.20
GBR-18	5421.68	33.66	33.66	0.00	5388.02
GBR-19	5393.83	40.56	40.07	0.49	5353.66
GBR-20	5393.47	36.00	35.87	0.13	5357.57
GBR-21S	5400.65	23.45	23.33	0.12	5377.30
GBR-21D	5400.19	38.37	38.37	0.00	5361.82
GBR-22	5395.91	40.45	39.37	1.08	5356.32
GBR-23	5403.72	26.04	26.04	0.00	5375.13
GBR-24S	5396.08	28.59	28.59	0.00	5364.83
GBR-24D	5396.77	31.25	31.25	0.00	5365.52
GBR-25	5396.72	34.28	34.28	0.00	5362.44
GBR-26	5395.59	37.34	37.34	0.00	5358.25
GBR-30	5396.58	35.62	35.62	0.00	5360.96
GBR-31	5394.86	37.05	37.05	0.00	5357.81
GBR-33	5396.28	39.84	39.84	0.00	5356.44
GBR-34	5394.00	38.37	37.30	1.07	5356.49
GBR-35	5393.66	38.32	37.38	0.94	5356.09
GBR-39	5397.55	38.95	38.95	0.00	5358.60
GBR-40	5400.76	31.39	31.39	0.00	5369.37
GBR-41	5396.35	26.50	26.50	0.00	5369.85
GBR-51	5389.68	41.77	41.77	0.00	5347.91
GBR-52	5387.74	40.33	40.33	0.00	5347.41

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 1999
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	38.34	38.25	0.09	5345.27
SHS-2	5381.66	38.48	38.48	0.00	5343.18
SHS-3	5383.33	34.64	34.64	0.00	5348.69
SHS-4	5383.62	41.68	41.68	0.00	5341.94
SHS-5	5378.36	38.61	38.61	0.00	5339.75
SHS-6	5378.17	38.82	38.82	0.00	5339.35
SHS-7	5375.89	48.35	48.35	0.00	5327.54
SHS-8	5380.25	40.40	38.89	1.51	5341.06
SHS-9	5380.79	43.95	43.95	0.00	5336.84
SHS-10	5373.80	36.82	36.82	0.00	5336.98
SHS-12	5373.94	39.80	39.80	0.00	5334.14
SHS-13	5367.81	36.48	36.48	0.00	5331.33
SHS-14	5367.07	45.10	45.10	0.00	5321.97
SHS-15	5366.21	33.60	33.60	0.00	5332.61
SHS-16	5362.58	31.30	31.30	0.00	5331.28
SHS-17	5364.35	33.18	33.18	0.00	5331.17
SHS-18	5373.64	43.94	43.94	0.00	5329.70

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH



**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
VOLUME CHANGE**

1999

Tank Number	Beginning Volume	Ending Volume	Net Change
102	9,508	4,343	(5,165)
106	8,010	8,010	0
21	230,133	230,133	0
22	246,237	273,750	27,513
Total Net Volume Change			22,348

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
RECOVERY WELL
VOLUME TABULATION**

1999

Well	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
GRW-1	64,930	56,460	67,490	71,100	259,980
GRW-2	34,080	133,830	100,050	37,100	305,060
GRW-3	60,380	22,240	42,130	42,270	167,020
GRW-4	49,400	45,250	41,540	34,330	170,520
GRW-5	179,600	147,750	34,170	92,450	453,970
GRW-6	77,690	80,840	41,400	81,610	281,540
GRW-9	65,609	58,121	56,540	53,870	234,140
GRW-10	609,340	651,820	617,670	620,790	2,499,620
GRW-11	64,220	106,440	108,770	68,890	348,320
GRW-12	6,350	5,980	9,570	12,090	33,990
GRW-13	13,120	8,190	29,120	15,910	66,340
SHS-7	73,255	63,320	1,644	65,966	204,185
SHS-9	9,398	10,061	1,215	8,363	29,037
SHS-14	216,954	331,153	393,035	255,875	1,197,017
SHS-18	737	1,530	58,695	115,194	176,156
TOTAL VOLUME PUMPED IN GALLONS					6,426,895

4.1

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

1999

Total Volume Of Water Recovered	6,426,895
Net Change In Storage Volume	22,348
Total Water Treated And Pumped To The Infiltration Gallery	6,404,547

ANNUAL DATA REPORT
GIANT BLOOMFIELD REFINERY
1998

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ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Prepared By:

GIANT REFINING COMPANY
111 County Road 4990
Bloomfield, NM 87413
(505) 632-8006
FAX (505) 632-4021

INTRODUCTION AND SUMMARY ANNUAL REPORT 1998

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the annual analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the annual report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevation and product thickness for each well, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the year. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the annual analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT INDUSTRIES, INC.
ONSITE REMEDIATION PROJECT
ANNUAL ANALYTICAL DATA SUMMARY
1998

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
<u>SYSTEM EFFLUENT</u>							
Lab pH		7.0		7.1	7.1		
Lab Conductivity @25 C		3550		2980	3170		
Total Dissolved Solids (Calc)		2630		2570	2520		
Total Alkalinity as CaCO3		376		417	403		
Total Hardness as CaCO3		970		1000	1010		
Bicarbonate as HCO3		459		509	492		
Carbonate as CO3		ND		ND	ND		
Hydroxide		ND		ND	ND		
Chloride		130		137	167		
Sulfate		1110		1260	1140		
Calcium		334		345	351		
Magnesium		33.2		34.9	32.8		
Potassium		4.9		3.8	3		
Sodium		385		415	354		
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		ND	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	ND	0.3		ND		ND	
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	ND	ND		ND		ND	
Chlorobenzene	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
Ethylbenzene	ND	ND		ND		ND	
Methyl-t-Butyl Ether	ND	ND		ND		ND	
Toluene	ND	ND		ND		ND	
Total Xylenes	ND	ND		ND		ND	
SYSTEM INFLUENT							
Lab pH		7.1		7.2	7.1		
Lab Conductivity @25 C		3690		2990	3150		
Total Dissolved Solids (Calc)		2660		2530	2510		
Total Alkalinity as CaCO3		361		410	388		
Total Hardness as CaCO3		973		938	1040		
Bicarbonate as HCO3		440		500	473		
Carbonate as CO3		ND		ND	ND		
Hydroxide		ND		ND	ND		
Chloride		128		138	166		
Sulfate		1120		1260	1150		
Calcium		335		320	358		
Magnesium		33.3		33.8	35		
Potassium		10.2		2.6	3		
Sodium		388		329	358		
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		ND	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	ND	0.6		ND		ND	

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	1.6	0.8		1.3		ND	
Chlorobenzene	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
Ethylbenzene	ND	ND		ND		ND	
Methyl-t-Butyl Ether	ND	ND		ND		ND	
Toluene	ND	ND		ND		ND	
Total Xylenes	ND	ND		ND		ND	
GRW-3							
Lab pH							
Lab Conductivity @25 C							
Total Dissolved Solids @ 180 C							
Total Dissolved Solids (Calc)							
Total Alkalinity as CaCO3							
Total Hardness as CaCO3							
Bicarbonate as HCO3							
Carbonate as CO3							
Hydroxide							
Chloride							
Sulfate							
Calcium							
Magnesium							
Potassium							
Sodium							
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	1.7						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
GRW-6							
Lab pH							
Lab Conductivity @25 C							
Total Dissolved Solids @ 180 C							
Total Dissolved Solids (Calc)							
Total Alkalinity as CaCO3							
Total Hardness as CaCO3							
Bicarbonate as HCO3							
Carbonate as CO3							
Hydroxide							
Chloride							
Sulfate							
Calcium							

JAN APR JUNE JULY OCT NOV DEC

Magnesium							
Potassium							
Sodium							
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	1						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene							
Chlorobenzene							
1,2-Dichlorobenzene							
1,3-Dichlorobenzene							
1,4-Dichlorobenzene							
Ethylbenzene							
Methyl-t-Butyl Ether							
Toluene							
Total Xylenes							
GRW-13							
Lab pH							
Lab Conductivity @25 C							

JAN APR JUNE JULY OCT NOV DEC

Total Dissolved Solids @ 180 C							
Total Dissolved Solids (Calc)							
Total Alkalinity as CaCO3							
Total Hardness as CaCO3							
Bicarbonate as HCO3							
Carbonate as CO3							
Hydroxide							
Chloride							
Sulfate							
Calcium							
Magnesium							
Potassium							
Sodium							
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	2.5						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
GBR-15							
Lab pH							
Lab Conductivity @25 C							
Total Dissolved Solids @ 180 C							
Total Dissolved Solids (Calc)							
Total Alkalinity as CaCO3							
Total Hardness as CaCO3							
Bicarbonate as HCO3							
Carbonate as CO3							
Hydroxide							
Chloride							
Sulfate							
Calcium							
Magnesium							
Potassium							
Sodium							
HALOCARBONS							
Bromodichloromethane	ND			ND			
Bromoform	ND			ND			
Bromomethane	ND			ND			
Carbon Tetrachloride	ND			ND			
Chloroethane	ND			ND			
Chloroform	ND			ND			
Chloromethane	ND			ND			
Dibromochloromethane	ND			ND			
1,2-Dibromoethane (EDB)	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
1,1-Dichloroethane	ND			ND			
1,2-Dichloroethane (EDC)	5.3			4.7			
1,1-Dichloroethene	ND			ND			
cis-1,2-Dichloroethene	ND			ND			
trans-1,2-Dichloroethene	ND			ND			
1,2-Dichloropropane	ND			ND			
cis-1,3-Dichloropropene	ND			ND			
trans-1,3-Dichloropropene	ND			ND			
Methylene Chloride	ND			ND			
1,1,2,2-Tetrachloroethane	ND			ND			
Tetrachlorethene	ND			ND			

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
1,1,1-Trichloroethane	ND			ND			
1,1,2-Trichloroethane	ND			ND			
Trichloroethene	ND			ND			
Trichlorofluoromethane	ND			ND			
Vinyl Chloride	ND			ND			
AROMATICS							
Benzene	0.6			0.6			
Chlorobenzene	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
Ethylbenzene	ND			ND			
Methyl-t-Butyl Ether	ND			ND			
Toluene	ND			ND			
Total Xylenes	0.9			1.3			
GBR-17							
Lab pH			7.2				7.2
Lab Conductivity @25 C			3050				2380
Total Dissolved Solids @ 180 C			2140				3410
Total Dissolved Solids (Calc)			1860				--
Total Alkalinity as CaCO3			205				207
Total Hardness as CaCO3			744				989
Bicarbonate as HCO3			250				253
Carbonate as CO3			ND				ND
Hydroxide			ND				ND
Chloride			78				70
Sulfate			1040				1060
Nitrogen - Nitrate			5.95				3.5
Calcium			264				359
Magnesium			21				22.6
Potassium			ND				0.6
Sodium			335				234
HALOCARBONS							
Bromodichloromethane			ND				
Bromoform			ND				
Bromomethane			ND				
Carbon Tetrachloride			ND				
Chloroethane			ND				
Chloroform			ND				
Chloromethane			ND				
Dibromochloromethane			ND				
1,2-Dibromoethane (EDB)			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
1,1-Dichloroethane			ND				
1,2-Dichloroethane (EDC)			ND				
1,1-Dichloroethene			ND				
cis-1,2-Dichloroethene			ND				
trans-1,2-Dichloroethene			ND				
1,2-Dichloropropane			ND				
cis-1,3-Dichloropropene			ND				
trans-1,3-Dichloropropene			ND				
Methylene Chloride			ND				
1,1,2,2-Tetrachloroethane			ND				
Tetrachlorethene			ND				
1,1,1-Trichloroethane			ND				
1,1,2-Trichloroethane			ND				
Trichloroethene			ND				
Trichlorofluoromethane			ND				
Vinyl Chloride			ND				
AROMATICS							
Benzene			ND				
Chlorobenzene			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
Ethylbenzene			ND				
Methyl-t-Butyl Ether			ND				
Toluene			ND				
Total Xylenes			ND				
GBR-24D							
Lab pH							
Lab Conductivity @25 C							
Total Dissolved Solids @ 180 C							
Total Dissolved Solids (Calc)							
Total Alkalinity as CaCO3							
Total Hardness as CaCO3							
Bicarbonate as HCO3							
Carbonate as CO3							
Hydroxide							
Chloride							
Sulfate							
Calcium							
Magnesium							
Potassium							
Sodium							
HALOCARBONS							
Bromodichloromethane	ND			ND			

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Bromoform	ND			ND			
Bromomethane	ND			ND			
Carbon Tetrachloride	ND			ND			
Chloroethane	ND			ND			
Chloroform	ND			ND			
Chloromethane	ND			ND			
Dibromochloromethane	ND			ND			
1,2-Dibromoethane (EDB)	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
1,1-Dichloroethane	ND			ND			
1,2-Dichloroethane (EDC)	7.7			11.0			
1,1-Dichloroethene	ND			ND			
cis-1,2-Dichloroethene	ND			ND			
trans-1,2-Dichloroethene	ND			ND			
1,2-Dichloropropane	ND			ND			
cis-1,3-Dichloropropene	ND			ND			
trans-1,3-Dichloropropene	ND			ND			
Methylene Chloride	ND			ND			
1,1,2,2-Tetrachloroethane	ND			ND			
Tetrachlorethene	ND			ND			
1,1,1-Trichloroethane	ND			ND			
1,1,2-Trichloroethane	ND			ND			
Trichloroethene	ND			ND			
Trichlorofluoromethane	ND			ND			
Vinyl Chloride	ND			ND			
AROMATICS							
Benzene	1.6			8.3			
Chlorobenzene	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
Ethylbenzene	0.6			ND			
Methyl-t-Butyl Ether	ND			ND			
Toluene	ND			ND			
Total Xylenes	1.1			1.2			
GBR-30							
Lab pH							
Lab Conductivity @25 C							
Total Dissolved Solids @ 180 C							
Total Dissolved Solids (Calc)							
Total Alkalinity as CaCO3							
Total Hardness as CaCO3							
Bicarbonate as HCO3							

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Carbonate as CO ₃							
Hydroxide							
Chloride							
Sulfate							
Calcium							
Magnesium							
Potassium							
Sodium							
HALOCARBONS							
Bromodichloromethane	ND			ND			
Bromoform	ND			ND			
Bromomethane	ND			ND			
Carbon Tetrachloride	ND			ND			
Chloroethane	ND			ND			
Chloroform	ND			ND			
Chloromethane	ND			ND			
Dibromochloromethane	ND			ND			
1,2-Dibromoethane (EDB)	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
1,1-Dichloroethane	ND			ND			
1,2-Dichloroethane (EDC)	ND			ND			
1,1-Dichloroethene	ND			ND			
cis-1,2-Dichloroethene	ND			ND			
trans-1,2-Dichloroethene	ND			ND			
1,2-Dichloropropane	ND			ND			
cis-1,3-Dichloropropene	ND			ND			
trans-1,3-Dichloropropene	ND			ND			
Methylene Chloride	ND			ND			
1,1,2,2-Tetrachloroethane	ND			ND			
Tetrachlorethene	ND			ND			
1,1,1-Trichloroethane	ND			ND			
1,1,2-Trichloroethane	ND			ND			
Trichloroethene	ND			ND			
Trichlorofluoromethane	ND			ND			
Vinyl Chloride	ND			ND			
AROMATICS							
Benzene	ND			ND			
Chlorobenzene	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
Ethylbenzene	ND			ND			
Methyl-t-Butyl Ether	ND			ND			
Toluene	ND			ND			
Total Xylenes	ND			ND			

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
GBR-31							
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		ND	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	ND	0.7		8.7		4.6	
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		3.7		2.1	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	ND	ND		ND			
Chlorobenzene	ND	ND		ND			
1,2-Dichlorobenzene	ND	ND		ND			
1,3-Dichlorobenzene	ND	ND		ND			
1,4-Dichlorobenzene	ND	ND		ND			
Ethylbenzene	ND	ND		ND			
Methyl-t-Butyl Ether	ND	ND		ND			
Toluene	ND	ND		ND			
Total Xylenes	ND	ND		ND			
GBR-32							
Lab pH			7.1				7.1
Lab Conductivity @25 C			6980				5520
Total Dissolved Solids @ 180 C			4720				4540
Total Dissolved Solids (Calc)			4180				--

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Total Alkalinity as CaCO ₃			300				279
Total Hardness as CaCO ₃			1400				1780
Bicarbonate as HCO ₃			365				340
Carbonate as CO ₃			ND				ND
Hydroxide			ND				ND
Chloride			964				713
Nitrogen-Nitrate			8.27				4.1
Sulfate			1650				1980
Calcium			484				621
Magnesium			48				56.8
Potassium			5				3.7
Sodium			838				714
HALOCARBONS							
Bromodichloromethane			ND				
Bromoform			ND				
Bromomethane			ND				
Carbon Tetrachloride			ND				
Chloroethane			ND				
Chloroform			3.2				
Chloromethane			ND				
Dibromochloromethane			ND				
1,2-Dibromoethane (EDB)			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
1,1-Dichloroethane			0.9				
1,2-Dichloroethane (EDC)			ND				
1,1-Dichloroethene			ND				
cis-1,2-Dichloroethene			39.0				
trans-1,2-Dichloroethene			ND				
1,2-Dichloropropane			ND				
cis-1,3-Dichloropropene			ND				
trans-1,3-Dichloropropene			ND				
Methylene Chloride			ND				
1,1,2,2-Tetrachloroethane			ND				
Tetrachlorethene			7.3				
1,1,1-Trichloroethane			ND				
1,1,2-Trichloroethane			ND				
Trichloroethene			4.4				
Trichlorofluoromethane			0.5				
Vinyl Chloride			ND				
AROMATICS							
Benzene			ND				
Chlorobenzene			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Ethylbenzene			ND				
Methyl-t-Butyl Ether			ND				
Toluene			ND				
Total Xylenes			ND				
GBR-42							
HALOCARBONS							
Bromodichloromethane							
Bromoform							
Bromomethane							
Carbon Tetrachloride							
Chloroethane							
Chloroform							
Chloromethane							
Dibromochloromethane							
1,2-Dibromoethane (EDB)							
1,2-Dichlorobenzene							
1,3-Dichlorobenzene							
1,4-Dichlorobenzene							
1,1-Dichloroethane							
1,2-Dichloroethane (EDC)							
1,1-Dichloroethene							
cis-1,2-Dichloroethene							
trans-1,2-Dichloroethene							
1,2-Dichloropropane							
cis-1,3-Dichloropropene							
trans-1,3-Dichloropropene							
Methylene Chloride							
1,1,2,2-Tetrachloroethane							
Tetrachlorethene							
1,1,1-Trichloroethane							
1,1,2-Trichloroethane							
Trichloroethene							
Trichlorofluoromethane							
Vinyl Chloride							
AROMATICS							
Benzene							
Chlorobenzene							
1,2-Dichlorobenzene							
1,3-Dichlorobenzene							
1,4-Dichlorobenzene							
Ethylbenzene							
Methyl-t-Butyl Ether							
Toluene							
Total Xylenes							

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
GBR-48							
Lab pH			7.1				7.2
Lab Conductivity @25 C			5880				5800
Total Dissolved Solids @ 180 C			4040				4500
Total Dissolved Solids (Calc)			3250				--
Total Alkalinity as CaCO3			201				239
Total Hardness as CaCO3			1170				1760
Bicarbonate as HCO3			245				292
Carbonate as CO3			ND				ND
Hydroxide			ND				ND
Chloride			651				867
Nitrogen - Nitrate			22.2				20.1
Sulfate			1410				1770
Calcium			403				612
Magnesium			41				55.4
Potassium			4.0				5.2
Sodium			601				725
HALOCARBONS							
Bromodichloromethane			ND				
Bromoform			ND				
Bromomethane			ND				
Carbon Tetrachloride			ND				
Chloroethane			ND				
Chloroform			1.3				
Chloromethane			ND				
Dibromochloromethane			ND				
1,2-Dibromoethane (EDB)			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
1,1-Dichloroethane			ND				
1,2-Dichloroethane (EDC)			ND				
1,1-Dichloroethene			ND				
cis-1,2-Dichloroethene			11.0				
trans-1,2-Dichloroethene			ND				
1,2-Dichloropropane			ND				
cis-1,3-Dichloropropene			ND				
trans-1,3-Dichloropropene			ND				
Methylene Chloride			ND				
1,1,2,2-Tetrachloroethane			ND				
Tetrachlorethene			4.3				
1,1,1-Trichloroethane			ND				
1,1,2-Trichloroethane			ND				
Trichloroethene			2.0				
Trichlorofluoromethane			ND				
Vinyl Chloride			ND				

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
AROMATICS							
Benzene			ND				
Chlorobenzene			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
Ethylbenzene			ND				
Methyl-t-Butyl Ether			ND				
Toluene			ND				
Total Xylenes			ND				
GBR-49							
Lab pH			7.2				7.3
Lab Conductivity @25 C			4880				3870
Total Dissolved Solids @ 180 C			3390				3180
Total Dissolved Solids (Calc)			3080				--
Total Alkalinity as CaCO3			292				279
Total Hardness as CaCO3			1030				1300
Bicarbonate as HCO3			356				340
Carbonate as CO3			ND				ND
Hydroxide			ND				ND
Chloride			387				215
Nitrogen - Nitrate			4.19				2.1
Sulfate			1490				1650
Calcium			361				462
Magnesium			32				36.3
Potassium			5				2.8
Sodium			654				442
HALOCARBONS							
Bromodichloromethane			ND				
Bromoform			ND				
Bromomethane			ND				
Carbon Tetrachloride			ND				
Chloroethane			ND				
Chloroform			ND				
Chloromethane			ND				
Dibromochloromethane			ND				
1,2-Dibromoethane (EDB)			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
1,1-Dichloroethane			ND				
1,2-Dichloroethane (EDC)			ND				
1,1-Dichloroethene			ND				
cis-1,2-Dichloroethene			47.0				
trans-1,2-Dichloroethene			ND				

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
1,2-Dichloropropane			ND				
cis-1,3-Dichloropropene			ND				
trans-1,3-Dichloropropene			ND				
Methylene Chloride			ND				
1,1,2,2-Tetrachloroethane			ND				
Tetrachlorethene			4.5				
1,1,1-Trichloroethane			ND				
1,1,2-Trichloroethane			ND				
Trichloroethene			ND				
Trichlorofluoromethane			ND				
Vinyl Chloride			ND				
AROMATICS							
Benzene			ND				
Chlorobenzene			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
Ethylbenzene			ND				
Methyl-t-Butyl Ether			ND				
Toluene			ND				
Total Xylenes			ND				
GBR-50							
Lab pH			7.4				7.0
Lab Conductivity @25 C			4020				3450
Total Dissolved Solids @ 180 C			2970				2930
Total Dissolved Solids (Calc)			2460				--
Total Alkalinity as CaCO3			207				199
Total Hardness as CaCO3			897				1270
Bicarbonate as HCO3			253				243
Carbonate as CO3			ND				ND
Hydroxide			ND				ND
Chloride			140				89
Nitrogen - Nitrate			4.97				4.2
Sulfate			1420				1710
Calcium			317				461
Magnesium			26				28.9
Potassium			2				2.4
Sodium			425				401
HALOCARBONS							
Bromodichloromethane			ND				
Bromoform			ND				
Bromomethane			ND				
Carbon Tetrachloride			ND				
Chloroethane			ND				

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Chloroform			ND				
Chloromethane			ND				
Dibromochloromethane			ND				
1,2-Dibromoethane (EDB)			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
1,1-Dichloroethane			ND				
1,2-Dichloroethane (EDC)			ND				
1,1-Dichloroethene			ND				
cis-1,2-Dichloroethene			2.1				
trans-1,2-Dichloroethene			ND				
1,2-Dichloropropane			ND				
cis-1,3-Dichloropropene			ND				
trans-1,3-Dichloropropene			ND				
Methylene Chloride			ND				
1,1,2,2-Tetrachloroethane			ND				
Tetrachlorethene			1.5				
1,1,1-Trichloroethane			ND				
1,1,2-Trichloroethane			ND				
Trichloroethene			ND				
Trichlorofluoromethane			ND				
Vinyl Chloride							
AROMATICS							
Benzene			ND				
Chlorobenzene			ND				
1,2-Dichlorobenzene			ND				
1,3-Dichlorobenzene			ND				
1,4-Dichlorobenzene			ND				
Ethylbenzene			ND				
Methyl-t-Butyl Ether			ND				
Toluene			ND				
Total Xylenes			ND				
GBR-51							
Lab pH							
Lab Conductivity @25 C							
Total Dissolved Solids @ 180 C							
Total Dissolved Solids (Calc)							
Total Alkalinity as CaCO3							
Total Hardness as CaCO3							
Bicarbonate as HCO3							
Carbonate as CO3							
Hydroxide							
Chloride							
Sulfate							

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Calcium						
Magnesium						
Potassium						
Sodium						
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GBR-52						
Lab pH						

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Lab Conductivity @25 C						
Total Dissolved Solids @ 180 C						
Total Dissolved Solids (Calc)						
Total Alkalinity as CaCO3						
Total Hardness as CaCO3						
Bicarbonate as HCO3						
Carbonate as CO3						
Hydroxide						
Chloride						
Sulfate						
Calcium						
Magnesium						
Potassium						
Sodium						
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
SHS-3							
Lab pH	6.6						
Lab Conductivity @25 C	6500						
Total Dissolved Solids @ 180 C	4060						
Total Dissolved Solids (Calc)	---						
Total Alkalinity as CaCO3	207						
Total Hardness as CaCO3	1940						
Bicarbonate as HCO3	252						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	337						
Sulfate	1860						
Calcium	633						
Magnesium	87						
Potassium	7.8						
Sodium	386						
HALOCARBONS							
Bromodichloromethane	ND			ND			
Bromoform	ND			ND			
Bromomethane	ND			ND			
Carbon Tetrachloride	ND			ND			
Chloroethane	ND			ND			
Chloroform	ND			ND			
Chloromethane	ND			ND			
Dibromochloromethane	ND			ND			
1,2-Dibromoethane (EDB)	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
1,1-Dichloroethane	ND			ND			
1,2-Dichloroethane (EDC)	ND			ND			
1,1-Dichloroethene	ND			ND			
cis-1,2-Dichloroethene	ND			ND			
trans-1,2-Dichloroethene	ND			ND			
1,2-Dichloropropane	ND			ND			
cis-1,3-Dichloropropene	ND			ND			
trans-1,3-Dichloropropene	ND			ND			
Methylene Chloride	ND			ND			
1,1,2,2-Tetrachloroethane	ND			ND			

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Tetrachlorethene	ND			ND			
1,1,1-Trichloroethane	ND			ND			
1,1,2-Trichloroethane	ND			ND			
Trichloroethene	ND			ND			
Trichlorofluoromethane	ND			ND			
Vinyl Chloride	ND			ND			
AROMATICS							
Benzene	ND			ND			
Chlorobenzene	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
Ethylbenzene	ND			ND			
Methyl-t-Butyl Ether	ND			ND			
Toluene	ND			ND			
Total Xylenes	ND			ND			
SHS-4							
Lab pH	7.2						
Lab Conductivity @25 C	4590						
Total Dissolved Solids (Calc)	2720						
Total Alkalinity as CaCO3	203						
Total Hardness as CaCO3	1240						
Bicarbonate as HCO3	248						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	81						
Sulfate	1500						
Calcium	438						
Magnesium	36						
Potassium	1.4						
Sodium	331						
HALOCARBONS							
Bromodichloromethane	ND						
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
SHS-6							
Lab pH	7.2						
Lab Conductivity @25 C	4110						
Total Dissolved Solids @ 180 C	2440						
Total Dissolved Solids (Calc)	---						
Total Alkalinity as CaCO3	212						
Total Hardness as CaCO3	1080						
Bicarbonate as HCO3	259						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	35						
Sulfate	1410						
Calcium	385						
Magnesium	28.9						
Potassium	1.6						
Sodium	227						
HALOCARBONS							
Bromodichloromethane	ND						

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Bromoform	ND						
Bromomethane	ND						
Carbon Tetrachloride	ND						
Chloroethane	ND						
Chloroform	ND						
Chloromethane	ND						
Dibromochloromethane	ND						
1,2-Dibromoethane (EDB)	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
1,1-Dichloroethane	ND						
1,2-Dichloroethane (EDC)	ND						
1,1-Dichloroethene	ND						
cis-1,2-Dichloroethene	ND						
trans-1,2-Dichloroethene	ND						
1,2-Dichloropropane	ND						
cis-1,3-Dichloropropene	ND						
trans-1,3-Dichloropropene	ND						
Methylene Chloride	ND						
1,1,2,2-Tetrachloroethane	ND						
Tetrachlorethene	ND						
1,1,1-Trichloroethane	ND						
1,1,2-Trichloroethane	ND						
Trichloroethene	ND						
Trichlorofluoromethane	ND						
Vinyl Chloride	ND						
AROMATICS							
Benzene	ND						
Chlorobenzene	ND						
1,2-Dichlorobenzene	ND						
1,3-Dichlorobenzene	ND						
1,4-Dichlorobenzene	ND						
Ethylbenzene	ND						
Methyl-t-Butyl Ether	ND						
Toluene	ND						
Total Xylenes	ND						
<u>SHS-10</u>							
Lab pH	7.1						
Lab Conductivity @25 C	4250						
Total Dissolved Solids (Calc)	2570						
Total Alkalinity as CaCO3	310						
Total Hardness as CaCO3	1100						
Bicarbonate as HCO3	378						
Carbonate as CO3	ND						
Hydroxide	ND						

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Chloride	20						
Sulfate	1320						
Calcium	345						
Magnesium	58.1						
Potassium	7.5						
Sodium	322						
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		ND	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	ND	ND		ND		ND	
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	ND	ND		ND		ND	
Chlorobenzene	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
Ethylbenzene	ND	ND		ND		ND	
Methyl-t-Butyl Ether	ND	ND		ND		ND	
Toluene	ND	ND		ND		ND	
Total Xylenes	ND	0.7		ND		ND	
SHS-12							

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Lab pH	7.2						
Lab Conductivity @25 C	4250						
Total Dissolved Solids @ 180 C	2530						
Total Dissolved Solids (Calc)	---						
Total Alkalinity as CaCO3	347						
Total Hardness as CaCO3	992						
Bicarbonate as HCO3	423						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	174						
Sulfate	1110						
Calcium	353						
Magnesium	26.9						
Potassium	2.2						
Sodium	398						
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		ND	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	ND	ND		ND		ND	
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	ND	ND		ND		ND	

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Chlorobenzene	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
Ethylbenzene	ND	ND		ND		ND	
Methyl-t-Butyl Ether	ND	2.9		ND		ND	
Toluene	ND	ND		ND		ND	
Total Xylenes	ND	ND		ND		ND	
<u>SHS-13</u>							
Lab pH	7.2						
Lab Conductivity @25 C	1620						
Total Dissolved Solids @ 180 C	1070						
Total Dissolved Solids (Calc)	---						
Total Alkalinity as CaCO3	583						
Total Hardness as CaCO3	278						
Bicarbonate as HCO3	711						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	91						
Sulfate	86						
Calcium	92.2						
Magnesium	11.6						
Potassium	0.8						
Sodium	206						
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		1.7	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	ND	ND		ND		ND	
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	ND	ND		ND		ND	
Chlorobenzene	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
Ethylbenzene	ND	ND		ND		ND	
Methyl-t-Butyl Ether	ND	ND		ND		ND	
Toluene	ND	ND		ND		ND	
Total Xylenes	ND	ND		ND		ND	
SHS-15							
Lab pH	7.2						
Lab Conductivity @25 C	3690						
Total Dissolved Solids (Calc)	2180						
Total Alkalinity as CaCO3	295						
Total Hardness as CaCO3	1050						
Bicarbonate as HCO3	359						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	141						
Sulfate	1070						
Calcium	359						
Magnesium	38						
Potassium	2.5						
Sodium	293						
HALOCARBONS							
Bromodichloromethane	ND			ND			
Bromoform	ND			ND			
Bromomethane	ND			ND			
Carbon Tetrachloride	ND			ND			
Chloroethane	ND			ND			
Chloroform	1			ND			
Chloromethane	ND			ND			
Dibromochloromethane	ND			ND			
1,2-Dibromoethane (EDB)	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
1,4-Dichlorobenzene	ND			ND			
1,1-Dichloroethane	ND			ND			
1,2-Dichloroethane (EDC)	ND			ND			
1,1-Dichloroethene	ND			ND			
cis-1,2-Dichloroethene	ND			ND			
trans-1,2-Dichloroethene	ND			ND			
1,2-Dichloropropane	ND			ND			
cis-1,3-Dichloropropene	ND			ND			
trans-1,3-Dichloropropene	ND			ND			
Methylene Chloride	ND			ND			
1,1,2,2-Tetrachloroethane	ND			ND			
Tetrachlorethene	ND			ND			
1,1,1-Trichloroethane	ND			ND			
1,1,2-Trichloroethane	ND			ND			
Trichloroethene	ND			ND			
Trichlorofluoromethane	ND			ND			
Vinyl Chloride	ND			ND			
AROMATICS							
Benzene	ND			ND			
Chlorobenzene	ND			ND			
1,2-Dichlorobenzene	ND			ND			
1,3-Dichlorobenzene	ND			ND			
1,4-Dichlorobenzene	ND			ND			
Ethylbenzene	ND			ND			
Methyl-t-Butyl Ether	ND			ND			
Toluene	ND			ND			
Total Xylenes	ND			ND			
SHS-16							
Lab pH	7.3						
Lab Conductivity @25 C	4380						
Total Dissolved Solids (Calc)	2600						
Total Alkalinity as CaCO3	287						
Total Hardness as CaCO3	1280						
Bicarbonate as HCO3	350						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	125						
Sulfate	1330						
Calcium	430						
Magnesium	51						
Potassium	4						
Sodium	276						
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		ND	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	ND	ND		ND		ND	
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	ND	ND		ND		ND	
Chlorobenzene	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
Ethylbenzene	ND	ND		ND		ND	
Methyl-t-Butyl Ether	ND	ND		ND		ND	
Toluene	ND	ND		ND		ND	
Total Xylenes	ND	ND		ND		ND	
SHS-17							
Lab pH	7.2						
Lab Conductivity @25 C	5530						
Total Dissolved Solids (Calc)	3290						
Total Alkalinity as CaCO3	291						
Total Hardness as CaCO3	1350						
Bicarbonate as HCO3	354						
Carbonate as CO3	ND						
Hydroxide	ND						
Chloride	192						

	JAN	APR	JUNE	JULY	OCT	NOV	DEC
Sulfate	1570						
Calcium	446						
Magnesium	56.9						
Potassium	2.4						
Sodium	420						
HALOCARBONS							
Bromodichloromethane	ND	ND		ND		ND	
Bromoform	ND	ND		ND		ND	
Bromomethane	ND	ND		ND		ND	
Carbon Tetrachloride	ND	ND		ND		ND	
Chloroethane	ND	ND		ND		ND	
Chloroform	ND	ND		ND		ND	
Chloromethane	ND	ND		ND		ND	
Dibromochloromethane	ND	ND		ND		ND	
1,2-Dibromoethane (EDB)	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
1,1-Dichloroethane	ND	ND		ND		ND	
1,2-Dichloroethane (EDC)	ND	ND		ND		ND	
1,1-Dichloroethene	ND	ND		ND		ND	
cis-1,2-Dichloroethene	ND	ND		ND		ND	
trans-1,2-Dichloroethene	ND	ND		ND		ND	
1,2-Dichloropropane	ND	ND		ND		ND	
cis-1,3-Dichloropropene	ND	ND		ND		ND	
trans-1,3-Dichloropropene	ND	ND		ND		ND	
Methylene Chloride	ND	ND		ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND		ND	
Tetrachlorethene	ND	ND		ND		ND	
1,1,1-Trichloroethane	ND	ND		ND		ND	
1,1,2-Trichloroethane	ND	ND		ND		ND	
Trichloroethene	ND	ND		ND		ND	
Trichlorofluoromethane	ND	ND		ND		ND	
Vinyl Chloride	ND	ND		ND		ND	
AROMATICS							
Benzene	ND	ND		ND		ND	
Chlorobenzene	ND	ND		ND		ND	
1,2-Dichlorobenzene	ND	ND		ND		ND	
1,3-Dichlorobenzene	ND	ND		ND		ND	
1,4-Dichlorobenzene	ND	ND		ND		ND	
Ethylbenzene	ND	ND		ND		ND	
Methyl-t-Butyl Ether	ND	ND		ND		ND	
Toluene	ND	ND		ND		ND	
Total Xylenes	ND	ND		ND		ND	

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**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JANUARY, 1998

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.00	62.00	0.00	5332.30
GRW-2	5391.28	49.05	49.05	0.00	5342.23
GRW-3	5388.77	54.74	54.74	0.00	5334.03
GRW-4	5390.02	52.45	52.45	0.00	5337.57
GRW-5	5390.56	47.60	47.60	0.00	5342.96
GRW-6	5390.81	44.86	44.86	0.00	5345.95
GRW-10	5395.02	53.45	53.27	0.18	5341.71
GRW-11	5397.85	52.89	52.89	0.00	5344.96
GRW-12	5397.24	45.07	45.07	0.00	5352.17
GRW-13	5396.90	54.49	54.49	0.00	5342.41
GBR-5	5395.07	28.62	28.58	0.04	5366.48
GBR-6	5395.70	58.20	58.20	0.00	5337.50
GBR-7	5395.85	31.81	31.15	0.66	5364.57
GBR-8	5390.50	42.55	42.55	0.00	5347.95
GBR-9	5389.92	47.75	47.75	0.00	5342.17
GBR-10	5390.57	42.45	42.45	0.00	5348.12
GBR-11	5389.43	42.00	41.83	0.17	5347.57
GBR-13	5393.04	40.95	40.95	0.00	5352.09
GBR-15	5397.99	40.32	40.32	0.00	5357.67
GBR-18	5421.68	32.17	32.17	0.00	5389.51
GBR-19	5393.83	41.44	40.50	0.94	5353.14
GBR-20	5393.47	40.77	39.86	0.91	5353.43
GBR-21S	5400.65	19.96	19.96	0.00	5380.69
GBR-21D	5400.19	30.72	30.72	0.00	5369.47
GBR-22	5395.91	38.53	37.47	1.06	5358.23
GBR-23	5403.72	22.37	22.37	0.00	5378.43
GBR-24S	5396.08	25.29	25.29	0.00	5366.11
GBR-24D	5396.77	29.97	29.97	0.00	5366.80
GBR-25	5396.72	32.35	32.35	0.00	5364.37
GBR-26	5395.59	36.69	36.69	0.00	5358.90
GBR-30	5396.58	34.05	34.05	0.00	5362.53
GBR-31	5394.86	36.28	36.28	0.00	5358.58
GBR-33	5396.28	33.24	33.24	0.00	5363.04
GBR-34	5394.00	37.20	36.71	0.49	5357.19
GBR-35	5393.66	37.29	36.82	0.47	5356.75
GBR-39	5397.55	39.55	39.55	0.00	5358.00
GBR-40	5400.76	30.50	30.50	0.00	5370.26
GBR-41	5396.35	24.44	24.44	0.00	5371.91
GBR-51	5389.68	41.85	41.85	0.00	5347.83
GBR-52	5387.74	40.38	40.38	0.00	5347.36

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE
JANUARY, 1998
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WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.68	41.68	0.00	5341.86
SHS-2	5381.66	35.70	35.70	0.00	5345.96
SHS-3	5383.33	35.68	35.68	0.00	5347.65
SHS-4	5383.62	41.74	41.74	0.00	5341.88
SHS-5	5378.36	38.64	38.64	0.00	5339.72
SHS-6	5378.17	38.88	38.88	0.00	5339.29
SHS-7	5375.89	49.75	49.75	0.00	5326.14
SHS-8	5380.25	40.95	38.90	2.05	5340.94
SHS-9	5380.79	43.96	43.96	0.00	5336.83
SHS-10	5373.80	36.51	36.51	0.00	5337.29
SHS-12	5373.94	39.76	39.76	0.00	5334.18
SHS-13	5367.81	36.44	36.44	0.00	5331.37
SHS-14	5367.07	45.15	45.15	0.00	5321.92
SHS-15	5366.21	33.30	33.30	0.00	5332.91
SHS-16	5362.58	31.20	31.20	0.00	5331.38
SHS-17	5364.35	33.18	33.18	0.00	5331.17
SHS-18	5373.64	39.77	39.77	0.00	5333.87

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

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**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

APRIL, 1998

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.30	62.30	0.00	5332.00
GRW-2	5391.28	50.08	50.08	0.00	5341.20
GRW-3	5388.77	54.60	54.60	0.00	5334.17
GRW-4	5390.02	53.63	53.63	0.00	5336.39
GRW-5	5390.56	48.98	48.98	0.00	5341.58
GRW-6	5390.81	45.47	45.47	0.00	5345.34
GRW-10	5395.02	53.20	52.00	1.20	5342.78
GRW-11	5397.85	63.20	63.20	0.00	5334.65
GRW-12	5397.24	44.80	44.80	0.00	5352.44
GRW-13	5396.90	48.45	48.45	0.00	5348.45
GBR-5	5395.07	28.74	28.70	0.04	5366.36
GBR-6	5395.70	60.45	60.45	0.00	5335.25
GBR-7	5395.85	31.80	31.20	0.60	5364.53
GBR-8	5390.50	42.81	42.81	0.00	5347.69
GBR-9	5389.92	47.66	47.66	0.00	5342.26
GBR-10	5390.57	42.46	42.46	0.00	5348.11
GBR-11	5389.43	42.35	42.10	0.25	5347.28
GBR-13	5393.04	41.98	41.98	0.00	5351.06
GBR-15	5397.99	40.45	40.45	0.00	5357.54
GBR-18	5421.68	31.84	31.84	0.00	5389.84
GBR-19	5393.83	41.48	40.54	0.94	5353.10
GBR-20	5393.47	40.55	39.80	0.75	5353.52
GBR-21S	5400.65	19.89	19.89	0.00	5380.76
GBR-21D	5400.19	29.32	29.32	0.00	5370.87
GBR-22	5395.91	37.64	37.64	0.00	5358.27
GBR-23	5403.72	37.57	37.57	0.00	5378.79
GBR-24S	5396.08	24.93	24.93	0.00	5366.28
GBR-24D	5396.77	29.80	29.80	0.00	5366.97
GBR-25	5396.72	32.40	32.40	0.00	5364.32
GBR-26	5395.59	36.35	36.35	0.00	5359.24
GBR-30	5396.58	34.12	34.12	0.00	5362.46
GBR-31	5394.86	36.15	36.15	0.00	5358.71
GBR-33	5396.28	39.16	39.16	0.00	5357.12
GBR-34	5394.00	37.15	36.61	0.54	5357.28
GBR-35	5393.66	33.80	33.78	0.02	5359.88
GBR-39	5397.55	36.37	36.37	0.00	5361.18
GBR-40	5400.76	29.86	29.86	0.00	5370.90
GBR-41	5396.35	24.75	24.75	0.00	5371.60
GBR-51	5389.68	41.90	41.90	0.00	5347.78
GBR-52	5387.74	40.42	40.42	0.00	5347.32

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 APRIL, 1998
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.74	41.63	0.11	5341.89
SHS-2	5381.66	35.81	35.81	0.00	5345.85
SHS-3	5383.33	35.70	35.70	0.00	5347.63
SHS-4	5383.62	41.69	41.69	0.00	5341.93
SHS-5	5378.36	36.54	36.54	0.00	5341.82
SHS-6	5378.17	38.80	38.80	0.00	5339.37
SHS-7	5375.89	45.37	45.37	0.00	5330.52
SHS-8	5380.25	40.65	38.88	1.77	5341.02
SHS-9	5380.79	44.14	44.14	0.00	5336.65
SHS-10	5373.80	36.23	36.23	0.00	5337.57
SHS-12	5373.94	39.45	39.45	0.00	5334.49
SHS-13	5367.81	36.04	36.04	0.00	5331.77
SHS-14	5367.07	45.06	45.06	0.00	5322.01
SHS-15	5366.21	32.88	32.88	0.00	5333.33
SHS-16	5362.58	30.80	30.80	0.00	5331.78
SHS-17	5364.35	32.80	32.80	0.00	5331.55
SHS-18	5373.64	39.45	39.45	0.00	5334.19

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

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MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JULY, 1998

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	62.50	62.50	0.00	5331.80
GRW-2	5391.28	52.65	52.65	0.00	5338.63
GRW-3	5388.77	53.90	53.90	0.00	5334.87
GRW-4	5390.02	49.00	49.00	0.00	5341.02
GRW-5	5390.56	67.32	67.32	0.00	5323.24
GRW-6	5390.81	44.30	44.30	0.00	5346.51
GRW-10	5395.02	52.70	52.61	0.09	5342.39
GRW-11	5397.85	53.89	53.89	0.00	5343.96
GRW-12	5397.24	41.51	41.51	0.00	5355.73
GRW-13	5396.90	57.05	57.05	0.00	5339.85
GBR-5	5395.07	25.02	25.01	0.01	5370.06
GBR-6	5395.70	55.90	55.90	0.00	5339.80
GBR-7	5395.85	28.82	28.20	0.62	5367.53
GBR-8	5390.50	41.05	41.05	0.00	5349.45
GBR-9	5389.92	47.93	47.93	0.00	5341.99
GBR-10	5390.57	41.98	41.98	0.00	5348.59
GBR-11	5389.43	41.20	41.15	0.05	5348.27
GBR-13	5393.04	39.95	39.95	0.00	5353.09
GBR-15	5397.99	40.88	40.88	0.00	5357.11
GBR-18	5421.68	32.68	32.68	0.00	5389.00
GBR-19	5393.83	41.71	40.70	1.01	5352.93
GBR-20	5393.47	34.10	33.95	0.15	5359.49
GBR-21S	5400.65	20.82	20.82	0.00	5379.83
GBR-21D	5400.19	31.41	31.41	0.00	5368.78
GBR-22	5395.91	38.32	38.30	0.02	5357.61
GBR-23	5403.72	24.20	24.20	0.00	5377.19
GBR-24S	5396.08	26.53	26.53	0.00	5365.12
GBR-24D	5396.77	30.96	30.96	0.00	5365.81
GBR-25	5396.72	33.10	33.10	0.00	5363.62
GBR-26	5395.59	37.43	37.43	0.00	5358.16
GBR-30	5396.58	35.63	35.63	0.00	5360.95
GBR-31	5394.86	37.08	37.08	0.00	5357.78
GBR-33	5396.28	39.25	39.25	0.00	5357.03
GBR-34	5394.00	37.29	37.25	0.04	5356.74
GBR-35	5393.66	37.38	37.38	0.00	5356.28
GBR-39	5397.55	39.98	39.98	0.00	5357.57
GBR-40	5400.76	31.45	31.45	0.00	5369.31
GBR-41	5396.35	25.62	25.62	0.00	5370.73
GBR-51	5389.68	41.84	41.84	0.00	5347.84
GBR-52	5387.74	40.40	40.40	0.00	5347.34

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 1998
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.70	41.66	0.04	5341.87
SHS-2	5381.66	36.62	36.62	0.00	5345.04
SHS-3	5383.33	35.60	35.60	0.00	5347.73
SHS-4	5383.62	41.70	41.70	0.00	5341.92
SHS-5	5378.36	38.67	38.67	0.00	5339.69
SHS-6	5378.17	38.90	38.90	0.00	5339.27
SHS-7	5375.89	44.84	44.84	0.00	5331.05
SHS-8	5380.25	40.66	38.95	1.71	5340.96
SHS-9	5380.79	44.30	44.30	0.00	5336.49
SHS-10	5373.80	36.93	36.93	0.00	5336.87
SHS-12	5373.94	39.84	39.84	0.00	5334.10
SHS-13	5367.81	36.52	36.52	0.00	5331.29
SHS-14	5367.07	44.68	44.68	0.00	5322.39
SHS-15	5366.21	33.66	33.66	0.00	5332.55
SHS-16	5362.58	31.40	31.40	0.00	5331.18
SHS-17	5364.35	33.34	33.34	0.00	5331.01
SHS-18	5373.64	40.10	40.10	0.00	5333.54

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

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MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

OCTOBER, 1998

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.43	61.43	0.00	5332.87
GRW-2	5391.28	51.78	51.78	0.00	5339.50
GRW-3	5388.77	53.13	53.13	0.00	5335.64
GRW-4	5390.02	64.74	64.74	0.00	5325.28
GRW-5	5390.56	54.63	54.63	0.00	5335.93
GRW-6	5390.81	44.61	44.61	0.00	5346.20
GRW-10	5395.02	52.25	52.25	0.00	5342.77
GRW-11	5397.85	45.94	45.94	0.00	5351.91
GRW-12	5397.24	45.20	45.20	0.00	5352.04
GRW-13	5396.90	53.78	53.78	0.00	5343.12
GBR-5	5395.07	24.49	24.47	0.02	5370.60
GBR-6	5395.70	57.62	57.62	0.00	5338.08
GBR-7	5395.85	28.15	27.49	0.66	5368.23
GBR-8	5390.50	40.97	40.97	0.00	5349.53
GBR-9	5389.92	47.76	47.76	0.00	5342.16
GBR-10	5390.57	41.17	41.17	0.00	5349.40
GBR-11	5389.43	41.20	41.16	0.04	5348.26
GBR-13	5393.04	39.94	39.93	0.01	5353.11
GBR-15	5397.99	41.50	41.50	0.00	5356.49
GBR-18	5421.68	33.22	33.22	0.00	5388.46
GBR-19	5393.83	41.85	40.80	1.05	5352.82
GBR-20	5393.47	34.20	34.00	0.20	5359.43
GBR-21S	5400.65	21.19	21.19	0.00	5379.46
GBR-21D	5400.19	32.64	32.64	0.00	5367.55
GBR-22	5395.91	33.86	33.84	0.02	5362.07
GBR-23	5403.72	24.79	24.79	0.00	5376.46
GBR-24S	5396.08	27.26	27.26	0.00	5364.28
GBR-24D	5396.77	31.80	31.80	0.00	5364.97
GBR-25	5396.72	33.65	33.65	0.00	5363.07
GBR-26	5395.59	37.80	37.80	0.00	5357.79
GBR-30	5396.58	35.16	35.16	0.00	5361.42
GBR-31	5394.86	37.13	37.13	0.00	5357.73
GBR-33	5396.28	39.97	39.97	0.00	5356.31
GBR-34	5394.00	37.50	37.44	0.06	5356.55
GBR-35	5393.66	38.45	37.60	0.85	5355.89
GBR-39	5397.55	40.77	40.77	0.00	5356.78
GBR-40	5400.76	30.97	30.97	0.00	5369.79
GBR-41	5396.35	25.70	25.70	0.00	5370.65
GBR-51	5389.68	41.93	41.93	0.00	5347.75
GBR-52	5387.74	40.50	40.50	0.00	5347.24

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 1998
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.93	41.83	0.10	5341.69
SHS-2	5381.66	35.20	35.20	0.00	5346.46
SHS-3	5383.33	36.60	36.60	0.00	5346.73
SHS-4	5383.62	41.86	41.86	0.00	5341.76
SHS-5	5378.36	38.93	38.93	0.00	5339.43
SHS-6	5378.17	39.13	39.13	0.00	5339.04
SHS-7	5375.89	40.45	40.45	0.00	5335.44
SHS-8	5380.25	40.85	39.16	1.69	5340.75
SHS-9	5380.79	43.50	43.50	0.00	5337.29
SHS-10	5373.80	37.38	37.38	0.00	5336.42
SHS-12	5373.94	40.37	40.37	0.00	5333.57
SHS-13	5367.81	37.13	37.13	0.00	5330.68
SHS-14	5367.07	42.98	42.98	0.00	5324.09
SHS-15	5366.21	34.20	34.20	0.00	5332.01
SHS-16	5362.58	31.84	31.84	0.00	5330.74
SHS-17	5364.35	32.98	32.98	0.00	5331.37
SHS-18	5373.64	40.86	40.86	0.00	5332.78

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
VOLUME CHANGE**

1998

Tank Number	Beginning Volume	Ending Volume	Net Change
102	9,508	9,508	0
106	8,010	8,010	0
21	230,133	230,133	0
22	246,237	246,237	0
Total Net Volume Change			0

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
RECOVERY WELL
VOLUME TABULATION**

1998

Well	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
GRW-1	27,356	41,890	52,520	63,840	185,606
GRW-2	22,748	45,740	95,130	21,450	185,068
GRW-3	46,760	66,950	74,740	93,770	282,220
GRW-4	32,474	38,350	45,290	50,510	166,624
GRW-5	101,180	139,300	159,350	208,040	607,870
GRW-6	66,780	79,480	50,200	43,080	239,540
GRW-9	15,110	31,800	27,730	48,860	123,500
GRW-10	621,050	637,720	684,310	664,330	2,607,410
GRW-11	82,870	115,130	34,160	52,000	284,160
GRW-12	15,600	14,220	7,590	10,510	47,920
GRW-13	16,400	15,860	16,390	17,840	66,490
SHS-7	49,132	52,560	49,077	79,851	230,620
SHS-9	9,213	10,289	8,523	8,930	36,955
SHS-14	410,710	453,801	406,152	338,172	1,608,835
SHS-18	640	5,527	708	713	7,588
TOTAL VOLUME PUMPED IN GALLONS					6,680,406

4.1

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

1998

Total Volume Of Water Recovered	6,680,406
Net Change In Storage Volume	<u>0</u>
Total Water Treated And Pumped To The Infiltration Gallery	<u><u>6,680,406</u></u>

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MONITORING REPORTS

DATE:
2001-1998

ANNUAL DATA REPORT
GIANT BLOOMFIELD REFINERY
2001

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ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Prepared By:

GIANT REFINING COMPANY
111 County Road 4990
Bloomfield, NM 87413
(505) 632-8006
FAX (505) 632-4021

TABLE OF CONTENTS

Introduction and Summary	Section 1
Annual Analytical Results	Section 2
Potentiometric Surface Maps.....	Section 3
Total Volume History	Section 4

INTRODUCTION AND SUMMARY ANNUAL REPORT 2001

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively.

SUMMARY

Section 2

Section 2 contains a summary of the annual analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the annual report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevation and product thickness for each well, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the year. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the annual analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT INDUSTRIES, INC.
ONSITE REMEDIATION PROJECT
ANNUAL ANALYTICAL DATA SUMMARY
2001

	JAN	APR	JUL	AUG	OCT	DEC
<u>SYSTEM EFFLUENT</u>						
Lab pH	7.1	7.1	6.95		7.1	
Lab Conductivity @25 C	2910	2900	2800		2910	
Total Dissolved Solids (Calc)	2130	4500	2240		2250	
Total Alkalinity as CaCO3	520	500	504		510	
Total Hardness as CaCO3	827	890	732		817	
Bicarbonate as HCO3	634	610	615		622	
Carbonate as CO3	ND	ND	ND		ND	
Hydroxide	ND	ND	ND		ND	
Chloride	116	119	127		107	
Sulfate	979	961	897		1100	
Calcium	276	307	252		282	
Magnesium	33.7	30.2	25.3		27.7	
Potassium	2.9	2.2	2.3		2.3	
Sodium	378	404	409		427	
<u>HALOCARBONS</u>						
Bromodichloromethane	ND	ND	ND		ND	
Bromoform	ND	ND	ND		ND	
Bromomethane	ND	ND	ND		ND	
Carbon Tetrachloride	ND	ND	ND		ND	
Chloroethane	ND	ND	ND		ND	
Chloroform	ND	ND	ND		ND	
Chloromethane	ND	ND	ND		ND	
Dibromochloromethane	ND	ND	ND		ND	
1,2-Dibromoethane (EDB)	ND	ND	ND		ND	
1,2-Dichlorobenzene	ND	ND	ND		ND	
1,3-Dichlorobenzene	ND	ND	ND		ND	
1,4-Dichlorobenzene	ND	ND	ND		ND	
1,1-Dichloroethane	ND	ND	ND		ND	
1,2-Dichloroethane (EDC)	ND	ND	ND		ND	
1,1-Dichloroethene	ND	ND	ND		ND	
cis-1,2-Dichloroethene	ND	ND	ND		ND	
trans-1,2-Dichloroethene	ND	ND	ND		ND	
1,2-Dichloropropane	ND	ND	ND		ND	
cis-1,3-Dichloropropene	ND	ND	ND		ND	
trans-1,3-Dichloropropene	ND	ND	ND		ND	
Methylene Chloride	ND	ND	ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND	ND		ND	
Tetrachlorethene	ND	ND	ND		ND	
1,1,1-Trichloroethane	ND	ND	ND		ND	
1,1,2-Trichloroethane	ND	ND	ND		ND	
Trichloroethene	ND	ND	ND		ND	

	JAN	APR	JUL	AUG	OCT	DEC
Trichlorofluoromethane	ND	ND	ND		ND	
Vinyl Chloride	ND	ND	ND		ND	
AROMATICS						
Benzene	ND	ND	ND		ND	
Chlorobenzene	ND	ND	ND		ND	
1,2-Dichlorobenzene	ND	ND	ND		ND	
1,3-Dichlorobenzene	ND	ND	ND		ND	
1,4-Dichlorobenzene	ND	ND	ND		ND	
Ethylbenzene	ND	ND	ND		ND	
Methyl-t-Butyl Ether	ND	ND	ND		ND	
Toluene	ND	ND	ND		ND	
Total Xylenes	ND	ND	ND		ND	
PAH						
1-Methylnaphthalene	ND	ND	ND		ND	
2-Methylnaphthalene	ND	ND	ND		ND	
Benzo(a)pyrene	ND	ND	ND		ND	
Naphthalene	ND	ND	ND		ND	
<u>SYSTEM INFLUENT</u>						
Lab pH	7.2	7.1	7.1		7.2	
Lab Conductivity @25 C	2910	2890	2830		2890	
Total Dissolved Solids (Calc)	2130	2260	2240		2250	
Total Alkalinity as CaCO3	468	490	495		500	
Total Hardness as CaCO3	779	886	654		819	
Bicarbonate as HCO3	570	598	604		610	
Carbonate as CO3	ND	ND	ND		ND	
Hydroxide	ND	ND	ND		ND	
Chloride	116	117	127		107	
Sulfate	992	962	906		1110	
Calcium	258	305	220		283	
Magnesium	32.9	30.3	25.6		27.6	
Potassium	3.7	2.6	2.1		2.3	
Sodium	437	404	413		431	
HALOCARBONS						
Bromodichloromethane	ND	ND	ND		ND	
Bromoform	ND	ND	ND		ND	
Bromomethane	ND	ND	ND		ND	
Carbon Tetrachloride	ND	ND	ND		ND	
Chloroethane	ND	ND	ND		ND	
Chloroform	ND	ND	ND		ND	
Chloromethane	ND	ND	ND		ND	
Dibromochloromethane	ND	ND	ND		ND	
1,2-Dibromoethane (EDB)	ND	ND	ND		ND	
1,2-Dichlorobenzene	ND	ND	ND		ND	

	JAN	APR	JUL	AUG	OCT	DEC
1,3-Dichlorobenzene	ND	ND	ND		ND	
1,4-Dichlorobenzene	ND	ND	ND		ND	
1,1-Dichloroethane	ND	ND	ND		ND	
1,2-Dichloroethane (EDC)	ND	ND	ND		0.3	
1,1-Dichloroethene	ND	ND	ND		ND	
cis-1,2-Dichloroethene	ND	ND	ND		ND	
trans-1,2-Dichloroethene	ND	ND	ND		ND	
1,2-Dichloropropane	ND	ND	ND		ND	
cis-1,3-Dichloropropene	ND	ND	ND		ND	
trans-1,3-Dichloropropene	ND	ND	ND		ND	
Methylene Chloride	ND	ND	ND		ND	
1,1,2,2-Tetrachloroethane	ND	ND	ND		ND	
Tetrachlorethene	ND	ND	ND		ND	
1,1,1-Trichloroethane	ND	ND	ND		ND	
1,1,2-Trichloroethane	ND	ND	ND		ND	
Trichloroethene	ND	ND	ND		ND	
Trichlorofluoromethane	ND	ND	ND		ND	
Vinyl Chloride	ND	ND	ND		ND	
AROMATICS						
Benzene	ND	ND	0.6		0.2	
Chlorobenzene	ND	ND	ND		ND	
1,2-Dichlorobenzene	ND	ND	ND		ND	
1,3-Dichlorobenzene	ND	ND	ND		ND	
1,4-Dichlorobenzene	ND	ND	ND		ND	
Ethylbenzene	ND	ND	ND		ND	
Methyl-t-Butyl Ether	ND	ND	ND		ND	
Toluene	ND	ND	ND		ND	
Total Xylenes	ND	ND	ND		ND	
GRW-3						
Lab pH	7.1					
Lab Conductivity @25 C	2310					
Total Dissolved Solids @ 180 C	1410					
Total Alkalinity as CaCO3	1030					
Total Hardness as CaCO3	339					
Bicarbonate as HCO3	1250					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	137					
Sulfate	82					
Calcium	107					
Magnesium	17.4					
Potassium	2.1					
Sodium	446					
HALOCARBONS						
Bromodichloromethane	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	17					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GRW-6						
Lab pH	7.2					
Lab Conductivity @25 C	2560					
Total Dissolved Solids @ 180 C	1640					

	JAN	APR	JUL	AUG	OCT	DEC
Total Alkalinity as CaCO ₃	748					
Total Hardness as CaCO ₃	504					
Bicarbonate as HCO ₃	913					
Carbonate as CO ₃	ND					
Hydroxide	ND					
Chloride	142					
Sulfate	440					
Calcium	158					
Magnesium	26.9					
Potassium	2.7					
Sodium	443					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GRW-13						
Lab pH	7					
Lab Conductivity @25 C	4110					
Total Dissolved Solids @ 180 C	3210					
Total Alkalinity as CaCO3	197					
Total Hardness as CaCO3	1030					
Bicarbonate as HCO3	240					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	255					
Sulfate	1760					
Calcium	363					
Magnesium	29.1					
Potassium	7.8					
Sodium	565					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GBR-15						
Lab pH	7.2					
Lab Conductivity @25 C	3700					
Total Dissolved Solids @ 180 C	2780					
Total Alkalinity as CaCO3	337					
Total Hardness as CaCO3	950					
Bicarbonate as HCO3	411					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	312					
Sulfate	1340					
Calcium	336					
Magnesium	27					
Potassium	7.3					
Sodium	523					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATIC						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GBR-17						
Lab pH						7.1
Lab Conductivity @25 C						2480
Total Dissolved Solids (Calc)						2090
Total Alkalinity as CaCO3						183
Total Hardness as CaCO3						868
Bicarbonate as HCO3						223
Carbonate as CO3						ND
Hydroxide						ND
Chloride						55.0
Sulfate						1200
Calcium						308
Magnesium						24.1

	JAN	APR	JUL	AUG	OCT	DEC
Potassium						0.8
Sodium						312
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						ND
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						ND
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						ND
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						ND
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						ND
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						ND
Trichlorofluoromethane						ND
Vinyl Chloride						ND
AROMATICS						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						ND

	JAN	APR	JUL	AUG	OCT	DEC
GBR-24D						
Lab pH	7.9					
Lab Conductivity @25 C	4450					
Total Dissolved Solids @ 180 C	3530					
Total Alkalinity as CaCO3	243					
Total Hardness as CaCO3	1500					
Bicarbonate as HCO3	297					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	589					
Sulfate	1540					
Calcium	482					
Magnesium	71.2					
Potassium	7.3					
Sodium	577					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					

	JAN	APR	JUL	AUG	OCT	DEC
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GBR-30						
Lab pH	6.9					
Lab Conductivity @25 C	4220					
Total Dissolved Solids @ 180 C	3360					
Total Alkalinity as CaCO3	262					
Total Hardness as CaCO3	1220					
Bicarbonate as HCO3	320					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	411					
Sulfate	1650					
Calcium	404					
Magnesium	50.6					
Potassium	5.4					
Sodium	622					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					

	JAN	APR	JUL	AUG	OCT	DEC
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					
GBR-31						
Lab pH	7.2					
Lab Conductivity @25 C	3420					
Total Dissolved Solids @ 180 C	2850					
Total Alkalinity as CaCO3	215					
Total Hardness as CaCO3	1120					
Bicarbonate as HCO3	262					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	127					
Sulfate	1650					
Calcium	380					
Magnesium	40.6					
Potassium	3.7					
Sodium	404					

	JAN	APR	JUL	AUG	OCT	DEC
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
1-Methylnaphthalene	ND					
2-Methylnaphthalene	ND					
Benzo(a)pyrene	ND					
Naphthalene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
GBR-32						
Lab pH						6.9
Lab Conductivity @25 C						5630
Total Dissolved Solids (Calc)						4670
Total Alkalinity as CaCO3						256
Total Hardness as CaCO3						1610
Bicarbonate as HCO3						312
Carbonate as CO3						ND
Hydroxide						ND
Chloride						602
Sulfate						2400
Calcium						554
Magnesium						55.8
Potassium						5.9
Sodium						855
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						1.0
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						0.6
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						4.5
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						ND
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						2.0
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						1.4
Trichlorofluoromethane						ND
Vinyl Chloride						ND

	JAN	APR	JUL	AUG	OCT	DEC
AROMATICS						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						ND
GBR-48						
Lab pH						6.7
Lab Conductivity @25 C						6580
Total Dissolved Solids (Calc)						5320
Total Alkalinity as CaCO3						202
Total Hardness as CaCO3						1900
Bicarbonate as HCO3						246
Carbonate as CO3						ND
Hydroxide						ND
Chloride						1000
Sulfate						2380
Calcium						648
Magnesium						68.3
Potassium						5.6
Sodium						938
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						2.7
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						0.5
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						7.3
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						0.2

	JAN	APR	JUL	AUG	OCT	DEC
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						3.0
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						2.0
Trichlorofluoromethane						ND
Vinyl Chloride						ND
AROMATIC						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						ND
GBR-49						
Lab pH						7.0
Lab Conductivity @25 C						4210
Total Dissolved Solids (Calc)						4530
Total Alkalinity as CaCO3						247
Total Hardness as CaCO3						1310
Bicarbonate as HCO3						301
Carbonate as CO3						ND
Hydroxide						ND
Chloride						297
Sulfate						1940
Calcium						458
Magnesium						41.9
Potassium						3.7
Sodium						627
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						0.8
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND

	JAN	APR	JUL	AUG	OCT	DEC
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						0.7
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						6.1
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						ND
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						1.9
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						1.2
Trichlorofluoromethane						ND
Vinyl Chloride						ND
AROMATICS						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						0.5
GBR-50						
Lab pH						6.9
Lab Conductivity @25 C						3100
Total Dissolved Solids (Calc)						2730
Total Alkalinity as CaCO3						174
Total Hardness as CaCO3						1000
Bicarbonate as HCO3						212
Carbonate as CO3						ND
Hydroxide						ND
Chloride						53
Sulfate						1690
Calcium						356
Magnesium						27.6
Potassium						2.5
Sodium						406

	JAN	APR	JUL	AUG	OCT	DEC
HALOCARBONS						
Bromodichloromethane						ND
Bromoform						ND
Bromomethane						ND
Carbon Tetrachloride						ND
Chloroethane						ND
Chloroform						ND
Chloromethane						ND
Dibromochloromethane						ND
1,2-Dibromoethane (EDB)						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
1,1-Dichloroethane						ND
1,2-Dichloroethane (EDC)						ND
1,1-Dichloroethene						ND
cis-1,2-Dichloroethene						ND
trans-1,2-Dichloroethene						ND
1,2-Dichloropropane						ND
cis-1,3-Dichloropropene						ND
trans-1,3-Dichloropropene						ND
Methylene Chloride						ND
1,1,2,2-Tetrachloroethane						ND
Tetrachlorethene						0.6
1,1,1-Trichloroethane						ND
1,1,2-Trichloroethane						ND
Trichloroethene						ND
Trichlorofluoromethane						ND
Vinyl Chloride						ND
AROMATICS						
Benzene						ND
Chlorobenzene						ND
1,2-Dichlorobenzene						ND
1,3-Dichlorobenzene						ND
1,4-Dichlorobenzene						ND
Ethylbenzene						ND
Methyl-t-Butyl Ether						ND
Toluene						ND
Total Xylenes						ND

	JAN	APR	JUL	AUG	OCT	DEC
GBR-51						
Lab pH	7.2					
Lab Conductivity @25 C	2760					
Total Dissolved Solids @ 180 C	2220					
Total Alkalinity as CaCO3	206					
Total Hardness as CaCO3	1020					
Bicarbonate as HCO3	251					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	56					
Sulfate	1310					
Calcium	360					
Magnesium	29.3					
Potassium	1.7					
Sodium	302					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					

	JAN	APR	JUL	AUG	OCT	DEC
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
GBR-52						
Lab pH	7.2					
Lab Conductivity @25 C	2940					
Total Dissolved Solids @ 180 C	2580					
Total Alkalinity as CaCO3	206					
Total Hardness as CaCO3	1230					
Bicarbonate as HCO3	251					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	57					
Sulfate	1530					
Calcium	436					
Magnesium	34.3					
Potassium	2.6					
Sodium	313					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS	ND					
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
SHS-3						
Lab pH	6.7					
Lab Conductivity @25 C	4640					
Total Dissolved Solids @ 180 C	4390					
Total Alkalinity as CaCO3	231					
Total Hardness as CaCO3	1800					
Bicarbonate as HCO3	281					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	262					
Sulfate	2160					
Calcium	580					
Magnesium	85.1					
Potassium	7.6					
Sodium	464					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					

	JAN	APR	JUL	AUG	OCT	DEC
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
SHS-4						
Lab pH	7.2					
Lab Conductivity @25 C	3230					
Total Dissolved Solids (Calc)	2680					
Total Alkalinity as CaCO3	211					
Total Hardness as CaCO3	1340					
Bicarbonate as HCO3	257					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	76					
Sulfate	1670					
Calcium	475					
Magnesium	37.5					
Potassium	1.7					
Sodium	322					

	JAN	APR	JUL	AUG	OCT	DEC
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
SHS-6						
Lab pH	7.1					
Lab Conductivity @25 C	2750					
Total Dissolved Solids @ 180 C	2100					
Total Alkalinity as CaCO3	240					
Total Hardness as CaCO3	924					
Bicarbonate as HCO3	293					

	JAN	APR	JUL	AUG	OCT	DEC
Carbonate as CO ₃	ND					
Hydroxide	ND					
Chloride	76					
Sulfate	1170					
Calcium	326					
Magnesium	26.5					
Potassium	1.4					
Sodium	319					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					

	JAN	APR	JUL	AUG	OCT	DEC
SHS-8						
Lab pH				6.5		
Lab Conductivity @25 C				2470		
Total Dissolved Solids @ 180 C				1380		
Total Alkalinity as CaCO3				836		
Total Hardness as CaCO3				436		
Bicarbonate as HCO3				1020		
Carbonate as CO3				ND		
Hydroxide				ND		
Chloride				272		
Sulfate				155		
Calcium				145		
Magnesium				17.9		
Potassium				2.8		
Sodium				434		
SHS-10						
Lab pH	7.3					
Lab Conductivity @25 C	2980					
Total Dissolved Solids (Calc)	2170					
Total Alkalinity as CaCO3	461					
Total Hardness as CaCO3	852					
Bicarbonate as HCO3	562					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	117					
Sulfate	985					
Calcium	262					
Magnesium	48.3					
Potassium	8.5					
Sodium	411					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
Naphthalene	4.4					
SHS-12						
Lab pH	7.2					
Lab Conductivity @25 C	2700					
Total Dissolved Solids @ 180 C	1860					
Total Alkalinity as CaCO3	653					
Total Hardness as CaCO3	606					
Bicarbonate as HCO3	797					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	146					
Sulfate	552					
Calcium	214					
Magnesium	17.8					
Potassium	1.2					
Sodium	427					

	JAN	APR	JUL	AUG	OCT	DEC
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
Naphthalene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
SHS-13						
Lab pH	6.9					
Lab Conductivity @25 C	3300					
Total Dissolved Solids @ 180 C	2450					
Total Alkalinity as CaCO3	595					
Total Hardness as CaCO3	1020					
Bicarbonate as HCO3	726					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	227					
Sulfate	878					
Calcium	348					
Magnesium	37.9					
Potassium	2.2					
Sodium	400					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	0.92					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					

	JAN	APR	JUL	AUG	OCT	DEC
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
Naphthalene	ND					
SHS-14						
Lab pH				7.3		
Lab Conductivity @25 C				2440		
Total Dissolved Solids @ 180 C				2150		
Total Alkalinity as CaCO3				156		
Total Hardness as CaCO3				972		
Bicarbonate as HCO3				190		
Carbonate as CO3				ND		
Hydroxide				ND		
Chloride				75		
Sulfate				1050		
Calcium				333		
Magnesium				34.5		
Potassium				2.3		
Sodium				207		
HALOCARBONS						
Bromodichloromethane				ND		
Bromoform				ND		
Bromomethane				ND		
Carbon Tetrachloride				ND		
Chloroethane				ND		
Chloroform				ND		
Chloromethane				ND		
Dibromochloromethane				ND		
1,2-Dibromoethane (EDB)				ND		
1,2-Dichlorobenzene				ND		
1,3-Dichlorobenzene				ND		
1,4-Dichlorobenzene				ND		
1,1-Dichloroethane				ND		
1,2-Dichloroethane (EDC)				ND		
1,1-Dichloroethene				ND		
cis-1,2-Dichloroethene				ND		

	JAN	APR	JUL	AUG	OCT	DEC
trans-1,2-Dichloroethene				ND		
1,2-Dichloropropane				ND		
cis-1,3-Dichloropropene				ND		
trans-1,3-Dichloropropene				ND		
Methylene Chloride				ND		
1,1,2,2-Tetrachloroethane				ND		
Tetrachlorethene				ND		
1,1,1-Trichloroethane				ND		
1,1,2-Trichloroethane				ND		
Trichloroethene				ND		
Trichlorofluoromethane				ND		
Vinyl Chloride				ND		
AROMATICS						
Benzene				ND		
Chlorobenzene				ND		
1,2-Dichlorobenzene				ND		
1,3-Dichlorobenzene				ND		
1,4-Dichlorobenzene				ND		
Ethylbenzene				0.6		
Methyl-t-Butyl Ether				ND		
Toluene				ND		
Total Xylenes				ND		
PAH						
Naphthalene				ND		
SHS-15						
Lab pH	7.2					
Lab Conductivity @25 C	2510					
Total Dissolved Solids (Calc)	2050					
Total Alkalinity as CaCO3	269					
Total Hardness as CaCO3	1110					
Bicarbonate as HCO3	328					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	75					
Sulfate	1080					
Calcium	377					
Magnesium	40.8					
Potassium	2.7					
Sodium	240					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	0.92					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					
PAH						
Naphthalene	ND					
SHS-16						
Lab pH	7.3					
Lab Conductivity @25 C	2910					
Total Dissolved Solids (Calc)	2470					
Total Alkalinity as CaCO3	279					
Total Hardness as CaCO3	1300					
Bicarbonate as HCO3	340					
Carbonate as CO3	ND					
Hydroxide	ND					

	JAN	APR	JUL	AUG	OCT	DEC
Chloride	66					
Sulfate	1420					
Calcium	445					
Magnesium	45.3					
Potassium	2.9					
Sodium	247					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					

	JAN	APR	JUL	AUG	OCT	DEC
SHS-17						
Lab pH	7.2					
Lab Conductivity @25 C	3420					
Total Dissolved Solids (Calc)	2540					
Total Alkalinity as CaCO3	298					
Total Hardness as CaCO3	921					
Bicarbonate as HCO3	363					
Carbonate as CO3	ND					
Hydroxide	ND					
Chloride	179					
Sulfate	1120					
Calcium	292					
Magnesium	46.8					
Potassium	2.8					
Sodium	426					
HALOCARBONS						
Bromodichloromethane	ND					
Bromoform	ND					
Bromomethane	ND					
Carbon Tetrachloride	ND					
Chloroethane	ND					
Chloroform	ND					
Chloromethane	ND					
Dibromochloromethane	ND					
1,2-Dibromoethane (EDB)	ND					
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
1,1-Dichloroethane	ND					
1,2-Dichloroethane (EDC)	ND					
1,1-Dichloroethene	ND					
cis-1,2-Dichloroethene	ND					
trans-1,2-Dichloroethene	ND					
1,2-Dichloropropane	ND					
cis-1,3-Dichloropropene	ND					
trans-1,3-Dichloropropene	ND					
Methylene Chloride	ND					
1,1,2,2-Tetrachloroethane	ND					
Tetrachlorethene	ND					
1,1,1-Trichloroethane	ND					
1,1,2-Trichloroethane	ND					
Trichloroethene	ND					
Trichlorofluoromethane	ND					
Vinyl Chloride	ND					
AROMATICS						
Benzene	ND					
Chlorobenzene	ND					

	JAN	APR	JUL	AUG	OCT	DEC
1,2-Dichlorobenzene	ND					
1,3-Dichlorobenzene	ND					
1,4-Dichlorobenzene	ND					
Ethylbenzene	ND					
Methyl-t-Butyl Ether	ND					
Toluene	ND					
Total Xylenes	ND					

SHS-18						
Lab pH				7.1		
Lab Conductivity @25 C				2290		
Total Dissolved Solids (Calc)				1600		
Total Alkalinity as CaCO3				626		
Total Hardness as CaCO3				210		
Bicarbonate as HCO3				763		
Carbonate as CO3				ND		
Hydroxide				ND		
Chloride				139		
Sulfate				252		
Calcium				60.1		
Magnesium				14.5		
Potassium				0.9		
Sodium				403		
HALOCARBONS						
Bromodichloromethane				ND		
Bromoform				ND		
Bromomethane				ND		
Carbon Tetrachloride				ND		
Chloroethane				ND		
Chloroform				ND		
Chloromethane				ND		
Dibromochloromethane				ND		
1,2-Dibromoethane (EDB)				ND		
1,2-Dichlorobenzene				ND		
1,3-Dichlorobenzene				ND		
1,4-Dichlorobenzene				ND		
1,1-Dichloroethane				ND		
1,2-Dichloroethane (EDC)				ND		
1,1-Dichloroethene				ND		
cis-1,2-Dichloroethene				ND		
trans-1,2-Dichloroethene				ND		
1,2-Dichloropropane				ND		
cis-1,3-Dichloropropene				ND		
trans-1,3-Dichloropropene				ND		
Methylene Chloride				ND		
1,1,2,2-Tetrachloroethane				ND		
Tetrachlorethene				ND		

	JAN	APR	JUL	AUG	OCT	DEC
1,1,1-Trichloroethane				ND		
1,1,2-Trichloroethane				ND		
Trichloroethene				ND		
Trichlorofluoromethane				ND		
Vinyl Chloride				ND		
AROMATICS						
Benzene				ND		
Chlorobenzene				ND		
1,2-Dichlorobenzene				ND		
1,3-Dichlorobenzene				ND		
1,4-Dichlorobenzene				ND		
Ethylbenzene				0.6		
Methyl-t-Butyl Ether				ND		
Toluene				ND		
Total Xylenes				ND		
PAH						
Naphthalene				ND		

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JANUARY, 2001

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.33	61.33	0.00	5332.97
GRW-2	5391.28	42.50	42.50	0.00	5348.78
GRW-3	5388.77	53.78	53.78	0.00	5334.99
GRW-4	5390.02	53.62	53.62	0.00	5336.40
GRW-5	5390.56	49.38	49.38	0.00	5341.18
GRW-6	5390.81	50.25	50.25	0.00	5340.56
GRW-10	5395.02	49.84	48.85	0.99	5345.97
GRW-11	5397.85	62.20	62.20	0.00	5335.65
GRW-12	5397.24	41.91	41.91	0.00	5355.33
GRW-13	5396.90	45.80	45.80	0.00	5351.10
GBR-5	5395.07	26.12	26.12	0.00	5368.95
GBR-6	5395.70	53.45	53.45	0.00	5342.25
GBR-7	5395.85	30.55	28.76	1.79	5366.73
GBR-8	5390.50	41.30	41.14	0.16	5349.33
GBR-9	5389.92	47.36	47.36	0.00	5342.56
GBR-10	5390.57	42.20	42.20	0.00	5348.37
GBR-11	5389.43	41.43	41.43	0.00	5348.00
GBR-13	5393.04	40.90	40.90	0.00	5352.14
GBR-15	5397.99	41.15	41.15	0.00	5356.84
GBR-18	5421.68	34.01	34.01	0.00	5387.67
GBR-19	5393.83	41.98	41.11	0.87	5352.55
GBR-20	5393.47	36.51	36.40	0.11	5357.05
GBR-21S	5400.65	27.12	25.74	1.38	5374.63
GBR-21D	5400.19	39.85	39.85	0.00	5360.34
GBR-22	5395.91	40.35	39.76	0.59	5356.03
GBR-23	5403.72	30.03	28.00	2.03	5375.38
GBR-24S	5396.08	29.96	29.96	0.00	5363.77
GBR-24D	5396.77	32.31	32.31	0.00	5364.46
GBR-25	5396.72	35.03	35.03	0.00	5361.69
GBR-26	5395.59	36.20	36.20	0.00	5359.39
GBR-30	5396.58	35.85	35.85	0.00	5360.73
GBR-31	5394.86	37.32	37.32	0.00	5357.54
GBR-33	5396.28	40.41	40.41	0.00	5355.87
GBR-34	5394.00	38.84	37.35	1.49	5356.35
GBR-35	5393.66	38.21	37.74	0.47	5355.83
GBR-39	5397.55	40.40	40.40	0.00	5357.15
GBR-40	5400.76	32.55	32.55	0.00	5368.21
GBR-41	5396.35	27.57	27.57	0.00	5368.78
GBR-51	5389.68	42.25	42.25	0.00	5347.43
GBR-52	5387.74	40.85	40.85	0.00	5346.89

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GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JANUARY, 2001
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	38.59	38.50	0.09	5345.02
SHS-2	5381.66	38.98	38.98	0.00	5342.68
SHS-3	5383.33	35.75	35.75	0.00	5347.58
SHS-4	5383.62	42.00	42.00	0.00	5341.62
SHS-5	5378.36	38.98	38.98	0.00	5339.38
SHS-6	5378.17	39.20	39.20	0.00	5338.97
SHS-7	5375.89	43.97	43.97	0.00	5331.92
SHS-8	5380.25	40.82	39.28	1.54	5340.66
SHS-9	5380.79	44.00	44.00	0.00	5336.79
SHS-10	5373.80	37.04	37.04	0.00	5336.76
SHS-12	5373.94	40.22	40.22	0.00	5333.72
SHS-13	5367.81	36.83	36.83	0.00	5330.98
SHS-14	5367.07	45.75	45.75	0.00	5321.32
SHS-15	5366.21	33.85	33.85	0.00	5332.36
SHS-16	5362.58	31.62	31.62	0.00	5330.96
SHS-17	5364.35	33.60	33.60	0.00	5330.75
SHS-18	5373.64	42.42	42.42	0.00	5331.22

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

	JAN	DEC
Bicarbonate as HCO ₃	514	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	149	
Sulfate	1170	
Calcium	365	
Magnesium	56.2	
Potassium	10.3	
Sodium	368	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	3.2	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

APRIL, 2001

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.95	61.95	0.00	5332.35
GRW-2	5391.28	40.86	40.86	0.00	5350.42
GRW-3	5388.77	52.22	52.22	0.00	5336.55
GRW-4	5390.02	45.70	45.70	0.00	5344.32
GRW-5	5390.56	66.52	66.52	0.00	5324.04
GRW-6	5390.81	51.80	51.80	0.00	5339.01
GRW-10	5395.02	47.75	47.75	0.00	5347.27
GRW-11	5397.85	62.35	62.35	0.00	5335.50
GRW-12	5397.24	41.15	41.15	0.00	5356.09
GRW-13	5396.90	55.30	55.30	0.00	5341.60
GBR-5	5395.07	25.53	25.53	0.00	5369.54
GBR-6	5395.70	53.40	53.40	0.00	5342.30
GBR-7	5395.85	29.20	27.42	1.78	5368.07
GBR-8	5390.50	40.85	40.82	0.03	5349.67
GBR-9	5389.92	46.99	46.99	0.00	5342.93
GBR-10	5390.57	42.02	42.02	0.00	5348.55
GBR-11	5389.43	41.34	41.32	0.02	5348.11
GBR-13	5393.04	40.65	40.65	0.00	5352.39
GBR-15	5397.99	40.95	40.95	0.00	5357.04
GBR-18	5421.68	33.58	33.58	0.00	5388.10
GBR-19	5393.83	41.95	41.10	0.85	5352.56
GBR-20	5393.47	38.95	38.91	0.04	5354.55
GBR-21S	5400.65	27.84	26.35	1.49	5374.00
GBR-21D	5400.19	40.22	40.22	0.00	5359.97
GBR-22	5395.91	40.38	39.80	0.58	5355.99
GBR-23	5403.72	30.74	28.60	2.14	5374.59
GBR-24S	5396.08	31.56	30.84	0.72	5363.08
GBR-24D	5396.77	33.58	33.58	0.00	5363.19
GBR-25	5396.72	34.77	35.28	-0.51	5361.03
GBR-26	5395.59	37.85	37.85	0.00	5357.74
GBR-30	5396.58	35.95	35.95	0.00	5360.63
GBR-31	5394.86	37.39	37.39	0.00	5357.47
GBR-33	5396.28	37.44	37.38	0.06	5358.89
GBR-34	5394.00	38.52	37.65	0.87	5356.18
GBR-35	5393.66	40.19	40.19	0.00	5353.47
GBR-39	5397.55	40.30	40.30	0.00	5357.25
GBR-40	5400.76	31.62	31.62	0.00	5369.14
GBR-41	5396.35	26.60	26.60	0.00	5369.75
GBR-51	5389.68	42.15	42.15	0.00	5347.53
GBR-52	5387.74	40.72	40.72	0.00	5347.02

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 APRIL, 2001
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.73	39.63	0.10	5343.89
SHS-2	5381.66	35.91	35.91	0.00	5345.75
SHS-3	5383.33	35.64	35.64	0.00	5347.69
SHS-4	5383.62	41.90	41.90	0.00	5341.72
SHS-5	5378.36	38.78	38.78	0.00	5339.58
SHS-6	5378.17	39.03	39.03	0.00	5339.14
SHS-7	5375.89	*	*	0.00	5375.89
SHS-8	5380.25	40.67	39.06	1.61	5340.87
SHS-9	5380.79	45.75	45.75	0.00	5335.04
SHS-10	5373.80	36.75	36.75	0.00	5337.05
SHS-12	5373.94	39.89	39.89	0.00	5334.05
SHS-13	5367.81	36.48	36.48	0.00	5331.33
SHS-14	5367.07	44.64	44.64	0.00	5322.43
SHS-15	5366.21	33.44	33.44	0.00	5332.77
SHS-16	5362.58	31.25	31.25	0.00	5331.33
SHS-17	5364.35	33.21	33.21	0.00	5331.14
SHS-18	5373.64	42.50	42.50	0.00	5331.14

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

*SHS-7 HAS BEEN ABANDONED.

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE
JANUARY, 2000

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.39	39.37	0.02	5344.17
SHS-2	5381.66	38.77	38.77	0.00	5342.89
SHS-3	5383.33	35.41	35.41	0.00	5347.92
SHS-4	5383.62	41.45	41.45	0.00	5342.17
SHS-5	5378.36	38.53	38.53	0.00	5339.83
SHS-6	5378.17	38.76	38.76	0.00	5339.41
SHS-7	5375.89	37.91	37.91	0.00	5337.98
SHS-8	5380.25	40.36	38.85	1.51	5341.10
SHS-9	5380.79	42.55	42.55	0.00	5338.24
SHS-10	5373.80	36.50	36.50	0.00	5337.30
SHS-12	5373.94	39.53	39.53	0.00	5334.41
SHS-13	5367.81	36.14	36.14	0.00	5331.67
SHS-14	5367.07	46.05	46.05	0.00	5321.02
SHS-15	5366.21	30.08	30.08	0.00	5336.13
SHS-16	5362.58	30.95	30.95	0.00	5331.63
SHS-17	5364.35	32.91	32.91	0.00	5331.44
SHS-18	5373.64	43.25	43.25	0.00	5330.39

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JULY, 2001

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.92	60.92	0.00	5333.38
GRW-2	5391.28	43.04	43.04	0.00	5348.24
GRW-3	5388.77	52.55	52.55	0.00	5336.22
GRW-4	5390.02	53.82	53.82	0.00	5336.20
GRW-5	5390.56	42.65	42.65	0.00	5347.91
GRW-6	5390.81	41.76	41.76	0.00	5349.05
GRW-10	5395.02	48.90	48.90	0.00	5346.12
GRW-11	5397.85	59.72	59.72	0.00	5338.13
GRW-12	5397.24	44.85	44.85	0.00	5352.39
GRW-13	5396.90	54.80	54.80	0.00	5342.10
GBR-5	5395.07	26.50	26.50	0.00	5368.57
GBR-6	5395.70	47.32	47.32	0.00	5348.38
GBR-7	5395.85	29.43	27.63	1.80	5367.86
GBR-8	5390.50	41.21	40.97	0.24	5349.48
GBR-9	5389.92	47.32	47.32	0.00	5342.60
GBR-10	5390.57	41.96	41.96	0.00	5348.61
GBR-11	5389.43	41.20	41.18	0.02	5348.25
GBR-13	5393.04	40.76	40.76	0.00	5352.28
GBR-15	5397.99	40.99	40.99	0.00	5357.00
GBR-18	5421.68	34.30	34.30	0.00	5387.38
GBR-19	5393.83	42.20	41.30	0.90	5352.35
GBR-20	5393.47	36.00	35.96	0.04	5357.50
GBR-21S	5400.65	26.57	26.57	0.00	5374.08
GBR-21D	5400.19	40.45	40.45	0.00	5359.74
GBR-22	5395.91	40.05	40.05	0.00	5355.86
GBR-23	5403.72	28.57	28.53	0.04	5372.70
GBR-24S	5396.08	31.08	31.05	0.03	5362.44
GBR-24D	5396.77	33.66	33.66	0.00	5363.11
GBR-25	5396.72	35.56	35.56	0.00	5361.16
GBR-26	5395.59	38.00	38.00	0.00	5357.59
GBR-30	5396.58	36.01	36.01	0.00	5360.57
GBR-31	5394.86	37.61	37.61	0.00	5357.25
GBR-33	5396.28	40.40	40.40	0.00	5355.88
GBR-34	5394.00	37.58	37.55	0.03	5356.44
GBR-35	5393.66	37.75	37.70	0.05	5355.95
GBR-39	5397.55	40.43	40.43	0.00	5357.12
GBR-40	5400.76	32.55	32.55	0.00	5368.21
GBR-41	5396.35	27.23	27.23	0.00	5369.12
GBR-51	5389.68	42.35	42.35	0.00	5347.33
GBR-52	5387.74	40.94	40.94	0.00	5346.80

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 JULY, 2001
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.85	39.83	0.02	5343.71
SHS-2	5381.66	38.90	38.90	0.00	5342.76
SHS-3	5383.33	35.50	35.50	0.00	5347.83
SHS-4	5383.62	42.09	42.09	0.00	5341.53
SHS-5	5378.36	39.11	39.11	0.00	5339.25
SHS-6	5378.17	39.30	39.30	0.00	5338.87
SHS-7	5375.89	*	*	0.00	5375.89
SHS-8	5380.25	40.92	39.40	1.52	5340.55
SHS-9	5380.79	44.75	44.75	0.00	5336.04
SHS-10	5373.80	37.42	37.42	0.00	5336.38
SHS-12	5373.94	40.24	40.24	0.00	5333.70
SHS-13	5367.81	36.83	36.83	0.00	5330.98
SHS-14	5367.07	45.63	45.63	0.00	5321.44
SHS-15	5366.21	34.27	34.27	0.00	5331.94
SHS-16	5362.58	31.82	31.82	0.00	5330.76
SHS-17	5364.35	33.69	33.69	0.00	5330.66
SHS-18	5373.64	41.72	41.72	0.00	5331.92
SHS-19	5378.89	41.25	41.25	0.00	5337.64

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

*SHS-7 HAS BEEN ABANDONED AND REPLACED WITH SHS-19.

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MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

OCTOBER, 2001

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.56	61.56	0.00	5332.74
GRW-2	5391.28	44.52	44.52	0.00	5346.76
GRW-3	5388.77	53.74	53.74	0.00	5335.03
GRW-4	5390.02	56.50	56.50	0.00	5333.52
GRW-5	5390.56	56.14	56.14	0.00	5334.42
GRW-6	5390.81	49.82	49.82	0.00	5340.99
GRW-10	5395.02	48.41	47.62	0.79	5347.24
GRW-11	5397.85	58.20	58.20	0.00	5339.65
GRW-12	5397.24	45.68	45.68	0.00	5351.56
GRW-13	5396.90	56.32	56.32	0.00	5340.58
GBR-5	5395.07	27.76	27.76	0.00	5367.31
GBR-6	5395.70	52.98	52.98	0.00	5342.72
GBR-7	5395.85	29.82	29.75	0.07	5366.09
GBR-8	5390.50	41.90	41.89	0.01	5348.61
GBR-9	5389.92	47.13	47.13	0.00	5342.79
GBR-10	5390.57	41.17	41.17	0.00	5349.40
GBR-11	5389.43	42.06	42.01	0.05	5347.41
GBR-13	5393.04	41.70	41.70	0.00	5351.34
GBR-15	5397.99	40.63	40.63	0.00	5357.36
GBR-18	5421.68	34.83	34.83	0.00	5386.85
GBR-19	5393.83	42.75	41.74	1.01	5351.89
GBR-20	5393.47	38.50	38.40	0.10	5355.05
GBR-21S	5400.65	26.61	26.61	0.00	5374.04
GBR-21D	5400.19	40.37	40.37	0.00	5359.82
GBR-22	5395.91	Dry	Dry	0.00	5395.91
GBR-23	5403.72	28.58	28.56	0.02	5372.74
GBR-24S	5396.08	31.02	31.00	0.02	5362.60
GBR-24D	5396.77	33.50	33.50	0.00	5363.27
GBR-25	5396.72	35.90	35.90	0.00	5360.82
GBR-26	5395.59	37.77	37.77	0.00	5357.82
GBR-30	5396.58	36.13	36.13	0.00	5360.45
GBR-31	5394.86	37.86	37.86	0.00	5357.00
GBR-33	5396.28	39.55	38.20	1.35	5357.81
GBR-34	5394.00	40.30	38.21	2.09	5355.37
GBR-35	5393.66	40.73	40.73	0.00	5352.93
GBR-39	5397.55	39.97	39.97	0.00	5357.58
GBR-40	5400.76	32.26	32.26	0.00	5368.50
GBR-41	5396.35	27.53	27.53	0.00	5368.82
GBR-51	5389.68	42.87	42.87	0.00	5346.81
GBR-52	5387.74	41.45	41.45	0.00	5346.29

GIANT REFINING BLOOMFIELD REFINERY
 QUARTERLY POTENTIOMETRIC SURFACE
 OCTOBER, 2001
 Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.10	40.10	0.00	5343.44
SHS-2	5381.66	35.23	35.23	0.00	5346.43
SHS-3	5383.33	35.85	35.85	0.00	5347.48
SHS-4	5383.62	42.46	42.46	0.00	5341.16
SHS-5	5378.36	38.12	38.12	0.00	5340.24
SHS-6	5378.17	39.69	39.69	0.00	5338.48
SHS-7	5375.89	*	*	0.00	5375.89
SHS-8	5380.25	39.85	39.85	0.00	5340.40
SHS-9	5380.79	42.50	42.50	0.00	5338.29
SHS-10	5373.80	36.60	36.60	0.00	5337.20
SHS-12	5373.94	40.85	40.85	0.00	5333.09
SHS-13	5367.81	37.43	37.43	0.00	5330.38
SHS-14	5367.07	40.40	40.40	0.00	5326.67
SHS-15	5366.21	34.89	34.89	0.00	5331.32
SHS-16	5362.58	32.40	32.40	0.00	5330.18
SHS-17	5364.35	34.29	34.29	0.00	5330.06
SHS-18	5373.64	44.91	44.91	0.00	5328.73
SHS-19	5378.89	42.30	42.30	0.00	5336.59

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

*SHS-7 HAS BEEN ABANDONED AND REPLACED WITH SHS-19.

GW - 40

MONITORING REPORTS

DATE:
2001-1998

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
VOLUME CHANGE**

2001

Tank Number	Beginning Volume	Ending Volume	Net Change
102	14,086	15,025	939
106	8,010	8,010	0
21	230,133	230,133	0
22	260,714	249,979	(10,735)
Total Net Volume Change			(9,796)

4.0

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
RECOVERY WELL
VOLUME TABULATION**

2001

Well	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
GRW-1	45,760	42,590	36,760	29,350	154,460
GRW-2	37,970	38,690	42,930	33,280	152,870
GRW-3	61,060	66,560	50,890	30,960	209,470
GRW-4	43,980	47,250	44,120	35,110	170,460
GRW-5	99,010	58,260	101,160	84,690	343,120
GRW-6	109,620	169,640	106,810	80,840	466,910
GRW-9	72,150	57,120	38,830	35,330	203,430
GRW-10	600,730	564,520	593,170	634,880	2,393,300
GRW-11	47,020	43,410	59,260	53,070	202,760
GRW-12	7,690	6,480	8,260	7,210	29,640
GRW-13	8,180	10,860	8,160	6,730	33,930
SHS-7	40,302	0	0	0	40,302
SHS-9	11,319	6,906	8,901	8,675	35,801
SHS-14	397,859	239,630	90,898	188,511	916,898
SHS-18	170,480	166,368	97,028	62,536	496,412
SHS-19	0	83,787	132,462	128,763	345,012
TOTAL VOLUME PUMPED IN GALLONS					6,194,775

4.1

**GIANT REFINING COMPANY
BLOOMFIELD REFINERY
TOTAL VOLUME SUMMARY**

2001

Total Volume Of Water Recovered	6,194,775
Net Change In Storage Volume	(9,796)
Total Water Treated And Pumped To The Infiltration Gallery	6,204,571

4.2

ANNUAL DATA REPORT
GIANT BLOOMFIELD REFINERY
2000

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MAR 12 2001
ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Prepared By:

GIANT REFINING COMPANY
111 County Road 4990
Bloomfield, NM 87413
(505) 632-8006
FAX (505) 632-4021

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Introduction and Summary	Section 1
Annual Analytical Results	Section 2
Potentiometric Surface Maps.....	Section 3
Total Volume History	Section 4

INTRODUCTION AND SUMMARY ANNUAL REPORT 2000

INTRODUCTION

Tank 22 is being used for intermediate water storage. All water is treated by the carbon filter unit exclusively. Inadvertently, influent and effluent samples were not collected for the last three quarters.

SUMMARY

Section 2

Section 2 contains a summary of the annual analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the annual report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevation and product thickness for each well, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the year. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail, on a weekly basis, is also available if desired.

SECTION 2

The following pages show the annual analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

2.0

GIANT INDUSTRIES, INC.
ONSITE REMEDIATION PROJECT
ANNUAL ANALYTICAL DATA SUMMARY
2000

	JAN	DEC
SYSTEM EFFLUENT		
Lab pH	7.4	
Lab Conductivity @25 C	3540	
Total Dissolved Solids (Calc)	2430	
Total Alkalinity as CaCO ₃	421	
Total Hardness as CaCO ₃	864	
Bicarbonate as HCO ₃	514	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	149	
Sulfate	1030	
Calcium	298	
Magnesium	29.3	
Potassium	2.4	
Sodium	443	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
SYSTEM INFLUENT		
Lab pH	7.5	
Lab Conductivity @25 C	3490	
Total Dissolved Solids (Calc)	2430	
Total Alkalinity as CaCO3	449	
Total Hardness as CaCO3	888	
Bicarbonate as HCO3	548	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	153	
Sulfate	1040	
Calcium	307	
Magnesium	29.5	
Potassium	2.8	
Sodium	443	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	0.2	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	

	JAN	DEC
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
GRW-3		
Lab pH	7.4	
Lab Conductivity @25 C	2620	
Total Dissolved Solids @ 180 C	1540	
Total Alkalinity as CaCO3	973	
Total Hardness as CaCO3	341	
Bicarbonate as HCO3	1190	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	148	
Sulfate	145	
Calcium	102	
Magnesium	21	
Potassium	1	
Sodium	472	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	0.5	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	3.8	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	16	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	

	JAN	DEC
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	45	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	0.6	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
GRW-6		
Lab pH	7.4	
Lab Conductivity @25 C	2880	
Total Dissolved Solids @ 180 C	1680	
Total Alkalinity as CaCO3	739	
Total Hardness as CaCO3	438	
Bicarbonate as HCO3	901	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	162	
Sulfate	395	
Calcium	139	
Magnesium	22	
Potassium	1.9	
Sodium	440	

	JAN	DEC
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	0.5	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	

	JAN	DEC
GRW-13		
Lab pH	7.4	
Lab Conductivity @25 C	4590	
Total Dissolved Solids @ 180 C	510	
Total Alkalinity as CaCO3	187	
Total Hardness as CaCO3	1080	
Bicarbonate as HCO3	228	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	264	
Sulfate	1640	
Calcium	392	
Magnesium	25.2	
Potassium	2.9	
Sodium	604	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	3.0	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	

	JAN	DEC
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
GBR-15		
Lab pH	7.4	
Lab Conductivity @25 C	4100	
Total Dissolved Solids @ 180 C	2910	
Total Alkalinity as CaCO3	309	
Total Hardness as CaCO3	987	
Bicarbonate as HCO3	376	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	313	
Sulfate	1210	
Calcium	357	
Magnesium	23.3	
Potassium	5.2	
Sodium	554	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	1.0	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	3.1	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	0.7	
Methyl-t-Butyl Ether	ND	
Toluene	ND	

	JAN	DEC
Total Xylenes	ND	
GBR-17		
Lab pH		7.3
Lab Conductivity @25 C		2430
Total Dissolved Solids (Calc)		1930
Total Alkalinity as CaCO3		220
Total Hardness as CaCO3		798
Bicarbonate as HCO3		268
Carbonate as CO3		ND
Hydroxide		ND
Chloride		4.0
Sulfate		1060
Calcium		282
Magnesium		22.8
Potassium		3.7
Sodium		289
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		ND
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		ND
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		ND
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		ND
Trichlorofluoromethane		ND
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND

	JAN	DEC
GBR-24D		
Lab pH	7.9	
Lab Conductivity @25 C	4820	
Total Dissolved Solids @ 180 C	3550	
Total Alkalinity as CaCO3	234	
Total Hardness as CaCO3	1690	
Bicarbonate as HCO3	286	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	610	
Sulfate	1380	
Calcium	567	
Magnesium	67.3	
Potassium	4.7	
Sodium	463	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	19	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	6.6	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		

	JAN	DEC
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
GBR-30		
Lab pH	7.0	
Lab Conductivity @25 C	4220	
Total Dissolved Solids @ 180 C	3140	
Total Alkalinity as CaCO3	243	
Total Hardness as CaCO3	1290	
Bicarbonate as HCO3	297	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	310	
Sulfate	1460	
Calcium	449	
Magnesium	40.4	
Potassium	3.3	
Sodium	491	

	JAN	DEC
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	0.6	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	
GBR-31		
Lab pH	7.4	
Lab Conductivity @25 C	3940	
Total Dissolved Solids @ 180 C	3030	
Total Alkalinity as CaCO3	197	
Total Hardness as CaCO3	1200	
Bicarbonate as HCO3	240	

	JAN	DEC
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	181	
Sulfate	1560	
Calcium	420	
Magnesium	36.7	
Potassium	2.4	
Sodium	456	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	2.1	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	1.4	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	0.6	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
PAH		
1-Methylnaphthalene	ND	
2-Methylnaphthalene	ND	
Benzo(a)pyrene	ND	
Naphthalene	ND	

	JAN	DEC
GBR-32		
Lab pH		7.1
Lab Conductivity @25 C		6030
Total Dissolved Solids (Calc)		4840
Total Alkalinity as CaCO3		300
Total Hardness as CaCO3		1760
Bicarbonate as HCO3		366
Carbonate as CO3		ND
Hydroxide		ND
Chloride		735
Sulfate		2190
Calcium		807
Magnesium		60.1
Potassium		6.8
Sodium		882
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		1.6
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		1.1
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		10
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		0.3
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		2.9
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		2.1
Trichlorofluoromethane		ND
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND

	JAN	DEC
GBR-48		
Lab pH		7.0
Lab Conductivity @25 C		7080
Total Dissolved Solids (Calc)		5340
Total Alkalinity as CaCO3		234
Total Hardness as CaCO3		2050
Bicarbonate as HCO3		286
Carbonate as CO3		ND
Hydroxide		ND
Chloride		1200
Sulfate		1990
Calcium		700
Magnesium		73.5
Potassium		7.0
Sodium		942
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		3.2
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		0.5
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		15
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		3.3
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		2.6
Trichlorofluoromethane		0.4
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND

	JAN	DEC
GBR-49		
Lab pH		7.3
Lab Conductivity @25 C		4750
Total Dissolved Solids (Calc)		3800
Total Alkalinity as CaCO ₃		320
Total Hardness as CaCO ₃		1480
Bicarbonate as HCO ₃		390
Carbonate as CO ₃		ND
Hydroxide		ND
Chloride		426
Sulfate		1910
Calcium		512
Magnesium		48.5
Potassium		7.5
Sodium		664
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		1.2
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		1.0
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		13
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		0.4
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		4
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		2.3
Trichlorofluoromethane		ND
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND
GBR-50		

	JAN	DEC
Lab pH		7.2
Lab Conductivity @25 C		3090
Total Dissolved Solids (Calc)		2580
Total Alkalinity as CaCO ₃		210
Total Hardness as CaCO ₃		1050
Bicarbonate as HCO ₃		256
Carbonate as CO ₃		ND
Hydroxide		ND
Chloride		4
Sulfate		1540
Calcium		72
Magnesium		29
Potassium		3.8
Sodium		397
HALOCARBONS		
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND
Carbon Tetrachloride		ND
Chloroethane		ND
Chloroform		ND
Chloromethane		ND
Dibromochloromethane		ND
1,2-Dibromoethane (EDB)		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane (EDC)		ND
1,1-Dichloroethene		ND
cis-1,2-Dichloroethene		0.2
trans-1,2-Dichloroethene		ND
1,2-Dichloropropane		ND
cis-1,3-Dichloropropene		ND
trans-1,3-Dichloropropene		ND
Methylene Chloride		ND
1,1,2,2-Tetrachloroethane		ND
Tetrachlorethene		ND
1,1,1-Trichloroethane		ND
1,1,2-Trichloroethane		ND
Trichloroethene		ND
Trichlorofluoromethane		ND
Vinyl Chloride		ND
AROMATICS		
Benzene		ND
Chlorobenzene		ND
1,2-Dichlorobenzene		ND
1,3-Dichlorobenzene		ND
1,4-Dichlorobenzene		ND
Ethylbenzene		ND
Methyl-t-Butyl Ether		ND
Toluene		ND
Total Xylenes		ND
GBR-51		

	JAN	DEC
Lab pH	7.4	
Lab Conductivity @25 C	3140	
Total Dissolved Solids @ 180 C	2410	
Total Alkalinity as CaCO3	197	
Total Hardness as CaCO3	1060	
Bicarbonate as HCO3	240	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	95	
Sulfate	1290	
Calcium	377	
Magnesium	30.1	
Potassium	0.5	
Sodium	306	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachloroethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
GBR-52		
Lab pH	7.5	

	JAN	DEC
Lab Conductivity @25 C	3440	
Total Dissolved Solids @ 180 C	2700	
Total Alkalinity as CaCO3	187	
Total Hardness as CaCO3	1240	
Bicarbonate as HCO3	228	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	96	
Sulfate	1500	
Calcium	439	
Magnesium	34.1	
Potassium	1.8	
Sodium	309	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachloroethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS	ND	
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
SHS-3		
Lab pH	6.8	
Lab Conductivity @25 C	4870	

	JAN	DEC
Total Dissolved Solids @ 180 C	4040	
Total Alkalinity as CaCO3	197	
Total Hardness as CaCO3	1970	
Bicarbonate as HCO3	240	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	317	
Sulfate	2060	
Calcium	665	
Magnesium	76.6	
Potassium	8.1	
Sodium	345	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
SHS-4		
Lab pH	7.4	
Lab Conductivity @25 C	3360	
Total Dissolved Solids (Calc)	2770	

	JAN	DEC
Total Alkalinity as CaCO ₃	141	
Total Hardness as CaCO ₃	1480	
Bicarbonate as HCO ₃	171	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	91	
Sulfate	1530	
Calcium	532	
Magnesium	36.7	
Potassium	1.2	
Sodium	251	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
SHS-6		
Lab pH	7.3	
Lab Conductivity @25 C	3020	
Total Dissolved Solids @ 180 C	2310	
Total Alkalinity as CaCO ₃	215	

	JAN	DEC
Total Hardness as CaCO ₃	1050	
Bicarbonate as HCO ₃	262	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	94	
Sulfate	1190	
Calcium	379	
Magnesium	26.1	
Potassium	1.2	
Sodium	237	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	
SHS-10		
Lab pH	7.3	
Lab Conductivity @25 C	3600	
Total Dissolved Solids (Calc)	2600	
Total Alkalinity as CaCO ₃	421	
Total Hardness as CaCO ₃	1140	

	JAN	DEC
Bicarbonate as HCO ₃	514	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	149	
Sulfate	1170	
Calcium	365	
Magnesium	56.2	
Potassium	10.3	
Sodium	368	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1,1-Trichloroethane	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	3.2	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

JAN

DEC

SHS-12		
Lab pH	7.3	
Lab Conductivity @25 C	2940	
Total Dissolved Solids @ 180 C	1880	
Total Alkalinity as CaCO3	673	
Total Hardness as CaCO3	683	
Bicarbonate as HCO3	821	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	167	
Sulfate	537	
Calcium	243	
Magnesium	18.6	
Potassium	0.3	
Sodium	339	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
SHS-13		
Lab pH	7.1	
Lab Conductivity @25 C	2650	
Total Dissolved Solids @ 180 C	1350	
Total Alkalinity as CaCO3	664	
Total Hardness as CaCO3	618	
Bicarbonate as HCO3	810	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	244	
Sulfate	174	
Calcium	205	
Magnesium	25.7	
Potassium	7	
Sodium	210	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
SHS-15		
Lab pH	7.5	
Lab Conductivity @25 C	2730	
Total Dissolved Solids (Calc)	1920	
Total Alkalinity as CaCO3	238	
Total Hardness as CaCO3	953	
Bicarbonate as HCO3	290	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	45	
Sulfate	905	
Calcium	313	
Magnesium	41.7	
Potassium	2.9	
Sodium	152	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	0.7	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
SHS-16		
Lab pH	7.5	
Lab Conductivity @25 C	4040	
Total Dissolved Solids (Calc)	2740	
Total Alkalinity as CaCO ₃	692	
Total Hardness as CaCO ₃	1320	
Bicarbonate as HCO ₃	844	
Carbonate as CO ₃	ND	
Hydroxide	ND	
Chloride	287	
Sulfate	1020	
Calcium	457	
Magnesium	43.2	
Potassium	1.7	
Sodium	355	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

	JAN	DEC
SHS-17		
Lab pH	7.4	
Lab Conductivity @25 C	4260	
Total Dissolved Solids (Calc)	2780	
Total Alkalinity as CaCO3	303	
Total Hardness as CaCO3	1200	
Bicarbonate as HCO3	370	
Carbonate as CO3	ND	
Hydroxide	ND	
Chloride	218	
Sulfate	1210	
Calcium	404	
Magnesium	46.2	
Potassium	1.8	
Sodium	338	
HALOCARBONS		
Bromodichloromethane	ND	
Bromoform	ND	
Bromomethane	ND	
Carbon Tetrachloride	ND	
Chloroethane	ND	
Chloroform	ND	
Chloromethane	ND	
Dibromochloromethane	ND	
1,2-Dibromoethane (EDB)	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
1,1-Dichloroethane	ND	
1,2-Dichloroethane (EDC)	ND	
1,1-Dichloroethene	ND	
cis-1,2-Dichloroethene	ND	
trans-1,2-Dichloroethene	ND	
1,2-Dichloropropane	ND	
cis-1,3-Dichloropropene	ND	
trans-1,3-Dichloropropene	ND	
Methylene Chloride	ND	
1,1,2,2-Tetrachloroethane	ND	
Tetrachlorethene	ND	
1,1,1-Trichloroethane	ND	
1,1,2-Trichloroethane	ND	
Trichloroethene	ND	
Trichlorofluoromethane	ND	
Vinyl Chloride	ND	
AROMATICS		
Benzene	ND	
Chlorobenzene	ND	
1,2-Dichlorobenzene	ND	
1,3-Dichlorobenzene	ND	
1,4-Dichlorobenzene	ND	
Ethylbenzene	ND	
Methyl-t-Butyl Ether	ND	
Toluene	ND	
Total Xylenes	ND	

NOTE: SHS-7 AND SHS-9 were not sampled due to free-floating product.

**GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE**

JANUARY, 2000

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.60	61.60	0.00	5332.70
GRW-2	5391.28	40.71	40.71	0.00	5350.57
GRW-3	5388.77	44.57	44.57	0.00	5344.20
GRW-4	5390.02	52.65	52.65	0.00	5337.37
GRW-5	5390.56	62.27	62.27	0.00	5328.29
GRW-6	5390.81	50.95	50.95	0.00	5339.86
GRW-10	5395.02	45.20	44.00	1.20	5350.78
GRW-11	5397.85	46.80	46.80	0.00	5351.05
GRW-12	5397.24	43.15	43.15	0.00	5354.09
GRW-13	5396.90	53.76	53.76	0.00	5343.14
GBR-5	5395.07	24.95	24.95	0.00	5370.12
GBR-6	5395.70	53.97	53.97	0.00	5341.73
GBR-7	5395.85	29.03	27.21	1.82	5368.28
GBR-8	5390.50	41.18	41.05	0.13	5349.42
GBR-9	5389.92	47.15	47.15	0.00	5342.77
GBR-10	5390.57	42.02	42.02	0.00	5348.55
GBR-11	5389.43	41.26	41.26	0.00	5348.17
GBR-13	5393.04	40.56	40.56	0.00	5352.48
GBR-15	5397.99	40.94	40.94	0.00	5357.05
GBR-18	5421.68	33.26	33.26	0.00	5388.42
GBR-19	5393.83	41.59	40.75	0.84	5352.91
GBR-20	5393.47	35.31	35.26	0.05	5358.20
GBR-21S	5400.65	24.00	23.80	0.20	5376.81
GBR-21D	5400.19	39.13	39.13	0.00	5361.06
GBR-22	5395.91	40.30	39.44	0.86	5356.30
GBR-23	5403.72	26.58	26.58	0.00	5374.70
GBR-24S	5396.08	29.02	29.02	0.00	5364.00
GBR-24D	5396.77	32.08	32.08	0.00	5364.69
GBR-25	5396.72	34.32	34.32	0.00	5362.40
GBR-26	5395.59	39.96	39.96	0.00	5355.63
GBR-30	5396.58	35.65	35.65	0.00	5360.93
GBR-31	5394.86	36.98	36.98	0.00	5357.88
GBR-33	5396.28	39.76	39.76	0.00	5356.52
GBR-34	5394.00	38.22	37.32	0.90	5356.50
GBR-35	5393.66	39.15	37.28	1.87	5356.01
GBR-39	5397.55	37.55	37.55	0.00	5360.00
GBR-40	5400.76	31.56	31.56	0.00	5369.20
GBR-41	5396.35	26.38	26.38	0.00	5369.97
GBR-51	5389.68	40.41	40.41	0.00	5349.27
GBR-52	5387.74	41.85	41.85	0.00	5345.89

GIANT REFINING BLOOMFIELD REFINERY
QUARTERLY POTENTIOMETRIC SURFACE
JANUARY, 2000

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	39.39	39.37	0.02	5344.17
SHS-2	5381.66	38.77	38.77	0.00	5342.89
SHS-3	5383.33	35.41	35.41	0.00	5347.92
SHS-4	5383.62	41.45	41.45	0.00	5342.17
SHS-5	5378.36	38.53	38.53	0.00	5339.83
SHS-6	5378.17	38.76	38.76	0.00	5339.41
SHS-7	5375.89	37.91	37.91	0.00	5337.98
SHS-8	5380.25	40.36	38.85	1.51	5341.10
SHS-9	5380.79	42.55	42.55	0.00	5338.24
SHS-10	5373.80	36.50	36.50	0.00	5337.30
SHS-12	5373.94	39.53	39.53	0.00	5334.41
SHS-13	5367.81	36.14	36.14	0.00	5331.67
SHS-14	5367.07	46.05	46.05	0.00	5321.02
SHS-15	5366.21	30.08	30.08	0.00	5336.13
SHS-16	5362.58	30.95	30.95	0.00	5331.63
SHS-17	5364.35	32.91	32.91	0.00	5331.44
SHS-18	5373.64	43.25	43.25	0.00	5330.39

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GW - 40

MONITORING REPORTS

DATE:
2001-1998

GW - 40

MONITORING REPORTS

DATE:
2001-1998

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Revised June 10, 2003
Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to Appropriate
District Office

**DISCHARGE PLAN APPLICATION FOR SERVICE COMPANIES, GAS PLANTS,
REFINERIES, COMPRESSOR, GEOTHERMAL FACILITIES
AND CRUDE OIL PUMP STATIONS**

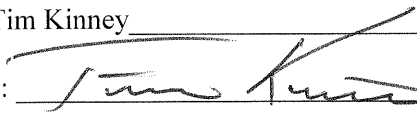
(Refer to the OCD Guidelines for assistance in completing the application)

☐ New ☒ Renewal ☐ Modification

1. Type: REFINERY
2. Operator: Giant Industries, Inc.
Address: 111 County Road 4990, Bloomfield, NM, 87413
Contact Person: Mr. Tim Kinney Phone: 505-632-8006
3. Location: NW/4 SW/4 Section 22 & 27 Township 29N Range 12W
Submit large scale topographic map showing exact location.
4. Attach the name, telephone number and address of the landowner of the facility site. *Section 2.0*
5. Attach the description of the facility with a diagram indicating location of fences, pits, dikes and tanks on the facility. *Sections 3.0 and 4.0, Figure 1 and Plate 1*
6. Attach a description of all materials stored or used at the facility. *Section 7.0.*
7. Attach a description of present sources of effluent and waste solids. Average quality and daily volume of waste water must be included. *Section 7.1.1.*
8. Attach a description of current liquid and solid waste collection/treatment/disposal procedures. *Section 7.0.*
9. Attach a description of proposed modifications to existing collection/treatment/disposal systems. *Section 10.0*
10. Attach a routine inspection and maintenance plan to ensure permit compliance. *Section 8.0.*
11. Attach a contingency plan for reporting and clean-up of spills or releases. *Section 11.0.*
12. Attach geological/hydrological information for the facility. Depth to and quality of ground water must be included. *Section 5.0 and Appendix A.*
13. Attach a facility closure plan, and other information as is necessary to demonstrate compliance with any other OCD rules, regulations and/or orders. *Section 13.0.*
14. CERTIFICATION: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Tim Kinney

Title: Refinery Remediation Project Manager

Signature: 

Date: 10/10/05

E-mail Address: tkinney@giant.com

ANNUAL DATA REPORT
GIANT BLOOMFIELD REFINERY
March 2007

Prepared By:

GIANT REFINING COMPANY
111 County Road 4990
Bloomfield, NM 87413
(505) 632-8006
FAX (505) 632-4021

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INTRODUCTION AND SUMMARY ANNUAL REPORT 2006

1.0 INTRODUCTION AND METHODOLOGY

Introduction

The following annual report describes work completed at Giant Industries, Inc.'s (Giant's) former refinery in Bloomfield, New Mexico since the previous annual report submitted in March 2006. The report contains data collected during that time including:

- Analytical data from groundwater sampling;
- Groundwater elevations;
- Product levels from monitoring wells;
- Tank volume data.

The refinery is located in the NW ¼ of Section 27 and the SW ¼ of Section 22, Township 29 N, Range 12W in San Juan County, New Mexico. It is on the corner of Highway 64 and County Road 5569, approximately 5 miles west of the town of Bloomfield, New Mexico (Figure 1). The facility consists of the former Giant Bloomfield Refinery and associated remedial equipment both within and south of the refinery boundary. The refinery operated from 1974 to 1982 and is presently inactive.

A remedial system was installed in stages beginning in 1988 and gradually has been simplified over time. Remediation was designed to treat groundwater affected by various releases during operation of the former refinery and periodic spills at the truck unloading facility. It consists of a series of groundwater monitoring wells, groundwater recovery wells, water treatment facilities and treated water infiltration trenches (Figure 2). The system processed approximately 4,311,691 gallons of water in 2006.

Methodology

Impacted groundwater is pumped from the aquifer through a series of recovery wells located strategically within the affected area. Recovery wells are utilized to create a hydraulic barrier and prevent migration of affected water beyond the well. A hydraulic barrier is formed as water is pumped through the recovery well, thereby depressing the water table. Figure 3 illustrates the concept. Sufficient recovery wells are placed throughout the site so that the radii of influence from adjacent wells overlap, and a barrier is formed across the plume to prevent migration of affected water.

Impacted groundwater is collected in a storage tank (Tank 102) and subsequently treated. The method of treatment used at the Giant Bloomfield Refinery is carbon adsorption, where recovered water is pumped into a carbon filtration tank. Inside, volatile and non-volatile organic compounds are adsorbed into a carbon matrix lining the tank.

The treated water is discharged into the aquifer through an infiltration trench. The infiltration trench consists of a subsurface distribution system placed within gravel packs. Water infiltrates the surrounding strata and eventually makes its way back to the aquifer. The return of recovered water to the aquifer serves as a recharge mechanism. Figure 4 is a simplified diagram representation of groundwater recovery, treatment and disposal at the former refinery.

Monitoring at the site consists of regular inspections and maintenance of facilities, as well as regular sampling of groundwater on site. Section 2 describes the sampling program at the site. Results are presented in Section 3. Numerous monitoring wells are located within and south of the refinery (Figure 2). Analytical results of groundwater samples collected from monitoring wells help determine the effectiveness and progress of remedial efforts. In addition to sampling, water and product levels in each well are determined quarterly. This information is tabulated and utilized to prepare potentiometric surface maps. Water levels are included in Section 4. Product levels are also shown. Figures 5-8 are potentiometric surface maps for 2006 water levels. The contours on the maps represent the elevation of surface of the groundwater for each quarter. The maps are useful in determining direction of groundwater flow and effectiveness of hydraulic control achieved by the recovery well system. Additionally, oil absorbent socks are installed in all monitoring wells showing free-phase hydrocarbons. These socks are checked quarterly and replaced as necessary.

Regular weekly inspections are performed to assure safe and efficient operation of the remediation system. The Control Panel, located in the Dispatch Office, serves to monitor and control the operation of the treatment system, while providing alarm and shutdown functions to safeguard against spills and other undesirable events. The Control Panel is checked weekly. An inspection is also made in the control building at Tank 102, the southern infiltration gallery and each recovery well. Treated effluent volumes and flow rates are monitored weekly with a water meter that has been installed near the carbon adsorption tank. These values are recorded and compared with previous readings to ensure normal operation. Maintenance of the system includes replacement of filters in well houses, equipment lubrication, air compressor oil changes, adding nutrients as necessary, listening for unusual pump and motor noise, inspecting the carbon pre-filter and repairing all equipment as required. Observations are recorded in a bound field logbook with the date, time and person recording the information noted. All equipment is inspected for leaks and malfunctions. The operator is familiar with the location of underground lines and notes any surface indication of underground leaks. Leaks of any size are noted and repaired.

Modifications to the Treatment System

In 2005, Giant Industries requested approval from the New Mexico Oil Conservation Division (NMOCD) to plug and abandon nine groundwater monitoring wells and one groundwater recovery well located down gradient of the refinery. The NMOCD did not approve of this proposal. Subsequently, Giant submitted a revised sample schedule in Discharge Plan GW040 in 2006 and an amended Discharge Plan GW040 in 2007 to remove the wells listed below from the sampling matrix and discontinue pumping well SHS-14 based on the number of clean reporting quarters, as noted below:

Type of Well	Identification	Years of Monitoring Beneath Standards
Monitoring	SHS-3	7
Monitoring	SHS-4	8
Monitoring	SHS-6	8
Monitoring	SHS-10	8
Monitoring	SHS-12	8
Monitoring	SHS-13	8
Recovery	SHS-14	3
Monitoring	SHS-15	8
Monitoring	SHS-16	8
Monitoring	SHS-17	7

The wells listed above were sampled in the first quarter of 2006. The revised sampling schedule was instituted in October of 2006. They will not be sampled in 2007.

2.0 SAMPLING PROGRAM

Introduction

Table 1 describes water sampling conducted at the Giant Bloomfield Refinery. Influent and effluent water quality is monitored to verify compliance with New Mexico Water Quality Control Commission (NMWQCC) standards. System influent and effluent is sampled and analyzed for general chemistry, halocarbons and aromatics on a quarterly basis throughout the year. Facility effluent is also sampled annually for PAHs and metals. Recovery and monitoring wells are sampled as shown in Table 1.

Methodology

Influent water is collected from a system valve prior to entering storage Tank 102. Samples of effluent water are collected through a sample valve as treated water exits the carbon adsorption tank. Water is collected in appropriate pre-cleaned and/or pre-preserved sample bottles or glass vials. For EPA methods 601 and 602 analyses, vials are filled and capped with no air inside to prevent degradation of the sample. Samples are labeled with the date and time of collection, sample designation, project name, collector's name and parameters to be analyzed. They are immediately sealed and packed on ice. The samples are shipped to Pinnacle Laboratories in Albuquerque, NM in a sealed cooler via UPS before designated holding times expire. Proper chain-of-custody (COC) procedures are followed with logs documenting the date and time sampled, sample number, type of sample, sampler's name, preservative used, analyses required and sampler's signatures.

Prior to sampling monitoring and wells, depth to ground water and total depth of wells is measured with a Keck oil/water interface probe. Presence of any free-phase crude oil is also investigated using the interface probe. The interface probe is decontaminated with Alconox™ soap and rinsed with de-ionized water prior to each measurement. The volume of water in the wells is calculated, and a minimum of three casing volumes of water is purged from each well using a disposable bailer or a permanent decontaminated PVC bailer. As water is extracted, pH, electric conductivity and temperature are monitored. Wells are purged until these properties stabilize or the well bails dry, indicating that the purge water is representative of aquifer conditions. Stabilization is defined as three consecutive stable readings for each water property (± 0.4 units for pH, ± 10 percent for electric conductivity and $\pm 2^\circ$ C for temperature). Once each monitoring well is properly purged, groundwater samples are collected in bottles or vials and shipped to the laboratory as described above. The method for sampling recovery wells is similar, the difference being that pumps installed within the wells are used to purge groundwater.

Table 1. Giant Industries, Inc. Bloomfield Refinery Sample Schedule for 2006

LOCATION	MONTHLY	QUARTERLY	SEMI-ANNUALLY	ANNUALLY
System Influent		601 602 GWC	601 602 GWC	601 602 GWC
System Effluent		601 602 GWC	601 602 GWC	601 602 GWC Metals PAH
GRW-3				601 602 GWC PAH
GRW-6				601 602 GWC PAH
GBR-17				601 602 GWC PAH
GBR-24D				601 602 GWC PAH
GBR-30				601 602 GWC PAH
GBR-31				601 602 GWC PAH
SHS-4*				601 602 GWC
SHS-6*				601 602 GWC
SHS-10*				601 602 GWC
SHS-12*				601 602 GWC
SHS-13*				601 602 GWC

LOCATION	MONTHLY	QUARTERLY	SEMI-ANNUALLY	ANNUALLY
SHS-14*				601 602 GWC
SHS-15*				601 602 GWC
SHS-16*				601 602 GWC
SHS-17*				601 602 GWC
SHS-19				601 602 GWC
SHS-18				601 602 GWC
GBR-51				601 602 GWC
GBR-52				601 602 GWC
GBR-32				601 602 GWC Metals
GBR-48				601 602 GWC Metals
GBR-49				601 602 GWC Metals
GBR-50				601 602 GWC Metals
NOTES: *Wells will be removed from the sampling schedule in 2007 as described in Section 1.0. All wells have water and free product elevations determined on a quarterly basis. Wells exhibiting free product are not sampled. 601 and 602 refer to United States Environmental Protection Agency methods for organic chemical analysis. GWC refers to groundwater characteristics.				

3.0 ANNUAL ANALYTICAL RESULTS

Lab results detailing the quality of groundwater sampled at the Giant Bloomfield Refinery is shown in Table 2. Raw data, as received from the laboratory, is available on request as a supplement to the annual report. Toxic pollutants, as defined by WQCC standards, are absent from influent and effluent water. Results indicate most analytes are not detected. When constituents are present, they show up only in trace amounts.

The analytical results presented in Table 2 are listed in units as described below:

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l
Laboratory Conductivity	umhos/cm

The remainder of the data is measured in ug/l.

Table 2. Giant Industries, Inc. Bloomfield Refinery 2006 Annual Analytical Data

	JAN*	APR	JUL	OCT	DEC
<u>SYSTEM EFFLUENT</u>					
Lab pH	7.4	7.2	7.3	7.1	
Lab Conductivity@25C	3160	3290	2430	3310	
Total Dissolved Solids (Calc)	2450	2420	3140	2620	
Total Alkalinity as CaCO3	336	337	566	300	
Total Hardness as CaCO3	851	730	629	960	
Bicarbonate as HCO3	335	334	566	300	
Carbonate as CO3	1.58	12	nd	nd	
Hydroxide	nd	nd	nd	nd	
Chloride	348	106	67.1	75	
Sulfate	1490	1300	1110	1300	
Calcium	352	292	242	339	
Magnesium	31.9	26.1	23.2	27.3	
Potassium	7.49	5.89	4.39	7.82	
Sodium	456	367	404	375	
HALOCARBONS					
Bromodichloromethane	nd	nd	nd	nd	
Bromoform	nd	nd	nd	nd	
Bromomethane	nd	nd	nd	nd	
Carbon Tetrachloride	nd	nd	nd	nd	
Chloroethane	nd	nd	nd	nd	
Chloroform	nd	nd	nd	nd	
Chloromethane	nd	nd	nd	nd	
Dibromochloromethane	nd	nd	nd	nd	
1,2-Dibromomethane (EDB)	nd	nd	nd	nd	
1,2-Dichlorobenzene	nd	nd	nd	nd	
1,3-Dichlorobenzene	nd	nd	nd	nd	
1,4-Dichlorobenzene	nd	nd	nd	nd	
1,1-Dichloroethane	nd	nd	nd	nd	
1,2-Dichloroethane (EDC)	nd	nd	nd	nd	
1,1-Dichloroethene	nd	nd	nd	nd	
trans-1,2-Dichloroethene	nd	nd	nd	nd	
1,2-Dichloropropane	nd	nd	nd	nd	
cis-1,3-Dichloropropene	nd	nd	nd	nd	
trans-1,3-Dichloropropene	nd	nd	nd	nd	
Methylene Chloride	nd	nd	nd	nd	
1,1,2,2-Tetrachloroethane	nd	nd	nd	nd	
Tetrachloroethane	nd	nd	nd	nd	
1,1,1-Trichloroethane	nd	nd	nd	nd	
1,1,2-Trichloroethane	nd	nd	nd	nd	
Trichloroethene	nd	nd	nd	nd	
Trichlorofluoromethane	nd	nd	nd	nd	
Vinyl Chloride	nd	nd	nd	nd	
AROMATICS					
Benzene	nd	nd	nd	nd	
Chlorobenzene	nd	nd	nd	nd	

	JAN*	APR	JUL	OCT	DEC
1,2-Dichlorobenzene	nd	nd	nd	nd	
1,3-Dichlorobenzene	nd	nd	nd	nd	
1,4-Dichlorobenzene	nd	nd	nd	nd	
Ethylbenzene	nd	nd	nd	nd	
Methyl-t-Butyl Ether	nd	nd	nd	nd	
Toluene	nd	nd	nd	nd	
Total Xylenes	nd	nd	nd	nd	
PAH					
1-Methylnapthalene	0.760				
2-Methylnapthalene	nd				
Benzo(a)pyrene	nd				
Napthalene	nd				
METALS (mg/l)					
Antimony	nd				
Arsenic	nd				
Beryllium	nd				
Cadmium	nd				
Chromium	0.003				
Copper	0.019				
Lead	nd				
Nickel	0.018				
Selenium	nd				
Silver	nd				
Thallium	nd				
Zinc	nd				
Mercury	nd				
<u>SYSTEM INFLUENT</u>					
Lab pH	7.5	7.1	7.3	6.4	
Lab Conductivity@25C	3250	3350	3410	3380	
Total Dissolved Solids (Calc)	2460	2420	2360	2580	
Total Alkalinity as CaCO3	311	359	515	297	
Total Hardness as CaCO3	851	795	669	970	
Bicarbonate as HCO3	309	356	515	297	
Carbonate as CO3	1.88	14.4	nd	nd	
Hydroxide	nd	nd	nd	nd	
Chloride	681	141	59.9	74	
Sulfate	1440	1290	1060	1300	
Calcium	331	318	235	343	
Magnesium	29.9	28.2	24.4	27.7	
Potassium	7.43	4.05	12.7	8.29	
Sodium	428	390	428	374	
HALOCARBONS					
Bromodichloromethane	nd	nd	nd	nd	
Bromoform	nd	nd	nd	nd	
Bromomethane	nd	nd	nd	nd	
Carbon Tetrachloride	nd	nd	nd	nd	

	JAN*	APR	JUL	OCT	DEC
Chloroethane	nd	nd	nd	nd	
Chloroform	nd	nd	nd	nd	
Chloromethane	nd	nd	nd	nd	
Dibromochloromethane	nd	nd	nd	nd	
1,2-Dibromomethane (EDB)	nd	nd	nd	nd	
1,2-Dichlorobenzene	nd	nd	nd	nd	
1,3-Dichlorobenzene	nd	nd	nd	nd	
1,4-Dichlorobenzene	nd	nd	nd	nd	
1,1-Dichloroethane	nd	nd	nd	nd	
1,2-Dichloroethane (EDC)	nd	nd	nd	nd	
1,1-Dichloroethene	nd	nd	nd	nd	
trans-1,2-Dichloroethene	nd	nd	nd	nd	
1,2-Dichloropropane	nd	nd	nd	nd	
cis-1,2-Dichloropropene	nd	nd	nd	nd	
trans-1,2-Dichloropropene	nd	nd	nd	nd	
Methylene Chloride	nd	nd	nd	nd	
1,1,2,2-Tetrachloroethane	nd	nd	nd	nd	
Tetrachloroethane	nd	nd	nd	nd	
1,1,1-Trichloroethane	nd	nd	nd	nd	
1,1,2-Trichloroethane	nd	nd	nd	nd	
Trichloroethene	nd	nd	nd	nd	
Trichlorofluoromethane	nd	nd	nd	nd	
Vinyl Chloride	nd	nd	nd	nd	
AROMATICS					
Benzene	nd	nd	nd	nd	
Chlorobenzene	nd	nd	nd	nd	
1,2-Dichlorobenzene	nd	nd	nd	nd	
1,3-Dichlorobenzene	nd	nd	nd	nd	
1,4-Dichlorobenzene	nd	nd	nd	nd	
Ethylbenzene	nd	nd	nd	nd	
Methyl-t-Butyl Ether	nd	nd	nd	nd	
Toluene	nd	nd	nd	nd	
Total Xylenes	nd	nd	nd	nd	
<u>GRW-3</u>					
Lab pH	7.2				
Lab Conductivity@25C	3150				
Total Dissolved Solids (Calc)	2310				
Total Alkalinity as CaCO3	571				
Total Hardness as CaCO3	614				
Bicarbonate as HCO3	569				
Carbonate as CO3	2.38				
Hydroxide	nd				
Chloride	303				
Sulfate	1270				
Calcium	202				
Magnesium	21.1				
Potassium	3.92				
Sodium	484				

	JAN*	APR	JUL	OCT	DEC
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	2.6				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
PAH					
1-Methylnapthalene	16.5				
2-Methylnapthalene	20.2				
Benzo(a)pyrene	nd				
Napthalene	24.8				
GRW-6					
Lab pH	7.3				
Lab Conductivity@25C	2690				

	JAN*	APR	JUL	OCT	DEC
Total Dissolved Solids (Calc)	960				
Total Alkalinity as CaCO ₃	588				
Total Hardness as CaCO ₃	594				
Bicarbonate as HCO ₃	584				
Carbonate as CO ₃	3.82				
Hydroxide	nd				
Chloride	259				
Sulfate	902				
Calcium	196				
Magnesium	29.9				
Potassium	4.12				
Sodium	447				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	0.7				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	0.6				
Methyl-t-Butyl Ether	nd				

	JAN*	APR	JUL	OCT	DEC
Toluene	nd				
Total Xylenes	nd				
PAH					
1-Methylnapthalene	nd				
2-Methylnapthalene	nd				
Benzo(a)pyrene	nd				
Napthalene	nd				
GBR-17					
Lab pH					7.0
Lab Conductivity@25C					2500
Total Dissolved Solids (Calc)					2000
Total Alkalinity as CaCO3					164
Total Hardness as CaCO3					696
Bicarbonate as HCO3					163
Carbonate as CO3					nd
Hydroxide					nd
Chloride					48
Sulfate					1400
Calcium					273
Magnesium					22.6
Potassium					7.27
Sodium					222
HALOCARBONS					
Bromodichloromethane					nd
Bromoform					nd
Bromomethane					nd
Carbon Tetrachloride					nd
Chloroethane					nd
Chloroform					nd
Chloromethane					nd
Dibromochloromethane					nd
1,2-Dibromomethane (EDB)					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
1,1-Dichloroethane					nd
1,2-Dichloroethane (EDC)					nd
1,1-Dichloroethene					nd
trans-1,2-Dichloroethene					nd
1,2-Dichloropropane					nd
cis-1,2-Dichloropropene					nd
trans-1,2-Dichloropropene					nd
Methylene Chloride					nd
1,1,2,2-Tetrachloroethane					nd
Tetrachloroethane					nd
1,1,1-Trichloroethane					nd
1,1,2-Trichloroethane					nd

	JAN*	APR	JUL	OCT	DEC
Trichloroethene					nd
Trichlorofluoromethane					nd
Vinyl Chloride					nd
AROMATICS					
Benzene					nd
Chlorobenzene					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
Ethylbenzene					nd
Methyl-t-Butyl Ether					nd
Toluene					nd
Total Xylenes					nd
<u>GBR-24D</u>					
Lab pH	7.5				
Lab Conductivity@25C	4090				
Total Dissolved Solids (Calc)	3300				
Total Alkalinity as CaCO3	259				
Total Hardness as CaCO3	1270				
Bicarbonate as HCO3	258				
Carbonate as CO3	1.78				
Hydroxide	nd				
Chloride	374				
Sulfate	1560				
Calcium	144				
Magnesium	46.5				
Potassium	10.4				
Sodium	563				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	0.7				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	0.3				
1,2-Dichloroethane (EDC)	5.6				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				

	JAN*	APR	JUL	OCT	DEC
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	0.7				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
PAH					
1-Methylnapthalene	nd				
2-Methylnapthalene	nd				
Benzo(a)pyrene	nd				
Napthalene	nd				
<u>GBR-30</u>					
Lab pH	6.9				
Lab Conductivity@25C	3790				
Total Dissolved Solids (Calc)	3120				
Total Alkalinity as CaCO3	218				
Total Hardness as CaCO3	1310				
Bicarbonate as HCO3	218				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	322				
Sulfate	1760				
Calcium	469				
Magnesium	45.7				
Potassium	9.22				
Sodium	464				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				

	JAN*	APR	JUL	OCT	DEC
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	0.8				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
PAH					
1-Methylnaphthalene	nd				
2-Methylnaphthalene	nd				
Benzo(a)pyrene	nd				
Napthalene	nd				
<u>GBR-31</u>					
Lab pH	7.1				
Lab Conductivity@25C	3200				
Total Dissolved Solids (Calc)	2760				
Total Alkalinity as CaCO3	177				
Total Hardness as CaCO3	1030				
Bicarbonate as HCO3	176				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	162				
Sulfate	1770				

	JAN*	APR	JUL	OCT	DEC
Calcium	412				
Magnesium	35.4				
Potassium	6.14				
Sodium	423				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
PAH					
1-Methylnapthalene	nd				
2-Methylnapthalene	nd				
Benzo(a)pyrene	nd				
Napthalene	nd				

	JAN*	APR	JUL	OCT	DEC
GBR-32					
Lab pH					7.2
Lab Conductivity@25C					5480
Total Dissolved Solids (Calc)					3880
Total Alkalinity as CaCO3					228
Total Hardness as CaCO3					962
Bicarbonate as HCO3					227
Carbonate as CO3					nd
Hydroxide					nd
Chloride					480
Sulfate					1800
Calcium					363
Magnesium					39.5
Potassium					10.1
Sodium					564
HALOCARBONS					
Bromodichloromethane					nd
Bromoform					nd
Bromomethane					nd
Carbon Tetrachloride					nd
Chloroethane					nd
Chloroform					nd
Chloromethane					nd
Dibromochloromethane					nd
1,2-Dibromomethane (EDB)					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
1,1-Dichloroethane					nd
1,2-Dichloroethane (EDC)					nd
1,1-Dichloroethene					nd
trans-1,2-Dichloroethene					nd
1,2-Dichloropropane					nd
cis-1,2-Dichloropropene					nd
trans-1,2-Dichloropropene					nd
Methylene Chloride					nd
1,1,2,2-Tetrachloroethane					nd
Tetrachloroethane					nd
1,1,1-Trichloroethane					nd
1,1,2-Trichloroethane					nd
Trichloroethene					nd
Trichlorofluoromethane					nd
Vinyl Chloride					nd
AROMATICS					
Benzene					nd
Chlorobenzene					nd
1,2-Dichlorobenzene					nd

	JAN*	APR	JUL	OCT	DEC
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
Ethylbenzene					nd
Methyl-t-Butyl Ether					nd
Toluene					nd
Total Xylenes					nd
METALS					
Calcium					363
Magnesium					39.5
Potassium					10.1
Sodium					564
Iron					1.24
Manganese					1.04
<u>GBR-48</u>					
Lab pH					7.1
Lab Conductivity@25C					2700
Total Dissolved Solids (Calc)					1850
Total Alkalinity as CaCO3					176
Total Hardness as CaCO3					458
Bicarbonate as HCO3					175
Carbonate as CO3					nd
Hydroxide					nd
Chloride					140
Sulfate					820
Calcium					174
Magnesium					18.1
Potassium					7.27
Sodium					293
HALOCARBONS					
Bromodichloromethane					nd
Bromoform					nd
Bromomethane					nd
Carbon Tetrachloride					nd
Chloroethane					nd
Chloroform					nd
Chloromethane					nd
Dibromochloromethane					nd
1,2-Dibromomethane (EDB)					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
1,1-Dichloroethane					nd
1,2-Dichloroethane (EDC)					nd
1,1-Dichloroethene					nd
trans-1,2-Dichloroethene					nd
1,2-Dichloropropane					nd
cis-1,2-Dichloropropene					nd

	JAN*	APR	JUL	OCT	DEC
trans-1,2-Dichloropropene					nd
Methylene Chloride					nd
1,1,2,2-Tetrachloroethane					nd
Tetrachloroethane					nd
1,1,1-Trichloroethane					nd
1,1,2-Trichloroethane					nd
Trichloroethene					nd
Trichlorofluoromethane					nd
Vinyl Chloride					nd
AROMATICS					
Benzene					nd
Chlorobenzene					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
Ethylbenzene					nd
Methyl-t-Butyl Ether					nd
Toluene					nd
Total Xylenes					nd
METALS					
Calcium					174
Magnesium					18.1
Potassium					7.27
Sodium					293
Iron					7.77
Manganese					0.457
<u>GBR-49</u>					
Lab pH					6.4
Lab Conductivity@25C					4520
Total Dissolved Solids (Calc)					3460
Total Alkalinity as CaCO3					112
Total Hardness as CaCO3					1060
Bicarbonate as HCO3					112
Carbonate as CO3					nd
Hydroxide					nd
Chloride					280
Sulfate					2200
Calcium					406
Magnesium					38.8
Potassium					13.5
Sodium					495
HALOCARBONS					
Bromodichloromethane					nd
Bromoform					nd
Bromomethane					nd
Carbon Tetrachloride					nd

	JAN*	APR	JUL	OCT	DEC
Chloroethane					nd
Chloroform					nd
Chloromethane					nd
Dibromochloromethane					nd
1,2-Dibromomethane (EDB)					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
1,1-Dichloroethane					nd
1,2-Dichloroethane (EDC)					nd
1,1-Dichloroethene					nd
trans-1,2-Dichloroethene					nd
1,2-Dichloropropane					nd
cis-1,2-Dichloropropene					nd
trans-1,2-Dichloropropene					nd
Methylene Chloride					nd
1,1,2,2-Tetrachloroethane					nd
Tetrachloroethane					0.6
1,1,1-Trichloroethane					nd
1,1,2-Trichloroethane					nd
Trichloroethene					nd
Trichlorofluoromethane					nd
Vinyl Chloride					nd
AROMATICS					
Benzene					5.4
Chlorobenzene					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
Ethylbenzene					nd
Methyl-t-Butyl Ether					nd
Toluene					nd
Total Xylenes					nd
METALS					
Calcium					406
Magnesium					38.8
Potassium					13.5
Sodium					495
Iron					120
Manganese					5.91
<u>GBR-50</u>					
Lab pH					6.7
Lab Conductivity@25C					3510
Total Dissolved Solids (Calc)					2600
Total Alkalinity as CaCO3					225
Total Hardness as CaCO3					956
Bicarbonate as HCO3					224

	JAN*	APR	JUL	OCT	DEC
Carbonate as CO3					nd
Hydroxide					nd
Chloride					61
Sulfate					1700
Calcium					378
Magnesium					5.73
Potassium					326
Sodium					
HALOCARBONS					nd
Bromodichloromethane					nd
Bromoform					nd
Bromomethane					nd
Carbon Tetrachloride					nd
Chloroethane					nd
Chloroform					nd
Chloromethane					nd
Dibromochloromethane					nd
1,2-Dibromomethane (EDB)					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
1,1-Dichloroethane					nd
1,2-Dichloroethane (EDC)					nd
1,1-Dichloroethene					nd
trans-1,2-Dichloroethene					nd
1,2-Dichloropropane					nd
cis-1,2-Dichloropropene					nd
trans-1,2-Dichloropropene					nd
Methylene Chloride					nd
1,1,2,2-Tetrachloroethane					nd
Tetrachloroethane					nd
1,1,1-Trichloroethane					nd
1,1,2-Trichloroethane					nd
Trichloroethene					nd
Trichlorofluoromethane					nd
Vinyl Chloride					nd
AROMATICS					
Benzene					nd
Chlorobenzene					nd
1,2-Dichlorobenzene					nd
1,3-Dichlorobenzene					nd
1,4-Dichlorobenzene					nd
Ethylbenzene					nd
Methyl-t-Butyl Ether					nd
Toluene					nd
Total Xylenes					nd
METALS					

	JAN*	APR	JUL	OCT	DEC
Calcium					378
Magnesium					28.9
Potassium					9.04
Sodium					326
Iron					5.73
Manganese					0.373
<u>GBR-51</u>					
Lab pH	7.3				
Lab Conductivity@25C	3160				
Total Dissolved Solids (Calc)	2540				
Total Alkalinity as CaCO3	203				
Total Hardness as CaCO3	1130				
Bicarbonate as HCO3	202				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	164				
Sulfate	1580				
Calcium	420				
Magnesium	33.6				
Potassium	4.52				
Sodium	318				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				

	JAN*	APR	JUL	OCT	DEC
Trichlorofluoromethane	5.2				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
<u>GBR-52</u>					
Lab pH	6.8				
Lab Conductivity@25C	3310				
Total Dissolved Solids (Calc)	2780				
Total Alkalinity as CaCO3	159				
Total Hardness as CaCO3	1190				
Bicarbonate as HCO3	158				
Carbonate as CO3	1.23				
Hydroxide	nd				
Chloride	179				
Sulfate	1710				
Calcium	477				
Magnesium	38.6				
Potassium	5.61				
Sodium	335				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				

	JAN*	APR	JUL	OCT	DEC
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
<u>SHS-4</u>					
Lab pH	7.4				
Lab Conductivity@25C	3180				
Total Dissolved Solids (Calc)	2750				
Total Alkalinity as CaCO3	69.5				
Total Hardness as CaCO3	1250				
Bicarbonate as HCO3	69.5				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	71				
Sulfate	1590				
Calcium	433				
Magnesium	36.6				
Potassium	8.9				
Sodium	311				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				

	JAN*	APR	JUL	OCT	DEC
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
SHS-6					
Lab pH	7.3				
Lab Conductivity@25C	3080				
Total Dissolved Solids (Calc)	2490				
Total Alkalinity as CaCO3	52.9				
Total Hardness as CaCO3	1250				
Bicarbonate as HCO3	52.9				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	208				
Sulfate	1470				
Calcium	377				
Magnesium	31.6				
Potassium	7.34				
Sodium	304				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				

	JAN*	APR	JUL	OCT	DEC
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
<u>SHS-19</u>					
Lab pH	7.4				
Lab Conductivity@25C	2600				
Total Dissolved Solids (Calc)	1730				
Total Alkalinity as CaCO3	616				
Total Hardness as CaCO3	634				
Bicarbonate as HCO3	615				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	160				
Sulfate	646				
Calcium	166				
Magnesium	23.1				
Potassium	4.32				
Sodium	361				
HALOCARBONS					
Bromodichloromethane	nd				

	JAN*	APR	JUL	OCT	DEC
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	0.5				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
<u>SHS-10</u>					
Lab pH	7.2				
Lab Conductivity@25C	2920				
Total Dissolved Solids (Calc)	2350				
Total Alkalinity as CaCO3	203				
Total Hardness as CaCO3	921				
Bicarbonate as HCO3	203				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	255				
Sulfate	1260				
Calcium	288				

	JAN*	APR	JUL	OCT	DEC
Magnesium	58.1				
Potassium	11.1				
Sodium	339				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	1.0				
<u>SHS-12</u>					
Lab pH	7.2				
Lab Conductivity@25C	3140				
Total Dissolved Solids (Calc)	2270				
Total Alkalinity as CaCO3	310				
Total Hardness as CaCO3	792				

	JAN*	APR	JUL	OCT	DEC
Bicarbonate as HCO ₃	310				
Carbonate as CO ₃	nd				
Hydroxide	nd				
Chloride	182				
Sulfate	1080				
Calcium	316				
Magnesium	25.7				
Potassium	8.98				
Sodium	440				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				

	JAN*	APR	JUL	OCT	DEC
SHS-13					
Lab pH	7.0				
Lab Conductivity@25C	3800				
Total Dissolved Solids (Calc)	3150				
Total Alkalinity as CaCO3	349				
Total Hardness as CaCO3	1780				
Bicarbonate as HCO3	349				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	275				
Sulfate	1450				
Calcium	518				
Magnesium	50.0				
Potassium	6.98				
Sodium	364				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	1.2				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				

	JAN*	APR	JUL	OCT	DEC
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
<u>SHS-14</u>					
Lab pH	7.5				
Lab Conductivity@25C	2500				
Total Dissolved Solids (Calc)	1970				
Total Alkalinity as CaCO3	235				
Total Hardness as CaCO3	990				
Bicarbonate as HCO3	235				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	183				
Sulfate	1040				
Calcium	330				
Magnesium	36				
Potassium	6.92				
Sodium	229				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				

	JAN*	APR	JUL	OCT	DEC
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
<u>SHS-15</u>					
Lab pH	7.3				
Lab Conductivity@25C	2280				
Total Dissolved Solids (Calc)	1750				
Total Alkalinity as CaCO3	88				
Total Hardness as CaCO3	792				
Bicarbonate as HCO3	88				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	123				
Sulfate	1010				
Calcium	295				
Magnesium	29.4				
Potassium	6.2				
Sodium	196				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				

	JAN*	APR	JUL	OCT	DEC
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
<u>SHS-16</u>					
Lab pH	7.3				
Lab Conductivity@25C	2480				
Total Dissolved Solids (Calc)	2150				
Total Alkalinity as CaCO3	174				
Total Hardness as CaCO3	1270				
Bicarbonate as HCO3	174				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	148				
Sulfate	1130				
Calcium	504				
Magnesium	46.7				
Potassium	12.7				
Sodium	210				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				

	JAN*	APR	JUL	OCT	DEC
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
<u>SHS-17</u>					
Lab pH	7.3				
Lab Conductivity@25C	3270				
Total Dissolved Solids (Calc)	2430				
Total Alkalinity as CaCO3	179				
Total Hardness as CaCO3	1030				
Bicarbonate as HCO3	179				
Carbonate as CO3	nd				
Hydroxide	nd				
Chloride	269				
Sulfate	1020				
Calcium	313				
Magnesium	43.1				
Potassium	7.63				
Sodium	368				
HALOCARBONS					
Bromodichloromethane	nd				
Bromoform	nd				
Bromomethane	nd				
Carbon Tetrachloride	nd				
Chloroethane	nd				
Chloroform	nd				
Chloromethane	nd				
Dibromochloromethane	nd				
1,2-Dibromomethane (EDB)	nd				

	JAN*	APR	JUL	OCT	DEC
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
1,1-Dichloroethane	nd				
1,2-Dichloroethane (EDC)	nd				
1,1-Dichloroethene	nd				
trans-1,2-Dichloroethene	nd				
1,2-Dichloropropane	nd				
cis-1,2-Dichloropropene	nd				
trans-1,2-Dichloropropene	nd				
Methylene Chloride	nd				
1,1,2,2-Tetrachloroethane	nd				
Tetrachloroethane	nd				
1,1,1-Trichloroethane	nd				
1,1,2-Trichloroethane	nd				
Trichloroethene	nd				
Trichlorofluoromethane	nd				
Vinyl Chloride	nd				
AROMATICS					
Benzene	nd				
Chlorobenzene	nd				
1,2-Dichlorobenzene	nd				
1,3-Dichlorobenzene	nd				
1,4-Dichlorobenzene	nd				
Ethylbenzene	nd				
Methyl-t-Butyl Ether	nd				
Toluene	nd				
Total Xylenes	nd				
NOTES: *First quarter sampling was conducted on February 2 nd and February 7 th in 2006. SHS-18 was not sampled in 2006. Groundwater from GBR-17 was not analyzed for PAH.					

4.0 Water and Product Levels

Groundwater monitoring wells have been installed throughout the site of the former refinery to monitor groundwater quality and flow direction (Figure 2). Water and product levels in each well are determined quarterly. These data are presented in tables 3 and 4 and are utilized to prepare the potentiometric surface maps shown in figures 5-8. The contours on the maps represent the groundwater surface elevation. The rate of groundwater flow is, on average, 0.625 ft/ft in a southwest direction, and is consistent throughout the year.

Table 3. Giant Industries, Inc. Bloomfield Refinery Quarterly Water Levels

Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
January 2006					
GRW-1	5394.30	54.58	-	-	5339.72
GRW-2	5391.28	49.60	-	-	5341.68
GRW-3	5388.77	53.15	-	-	5335.62
GRW-4	5390.02	59.25	-	-	5330.77
GRW-5	5390.56	64.75	-	-	5325.81
GRW-6	5390.81	48.08	-	-	5342.73
GRW-9	5395.70	52.66	-	-	5343.04
GRW-10	5395.02	58.85	58.84	0.01	5336.18
GRW-11	5397.85	58.02	-	-	5339.83
GRW-12	5397.24	44.70	-	-	5352.54
GRW-13	5396.90	52.37	-	-	5344.53
GBR-5	5395.07	26.50	-	-	5368.57
GBR-7	5395.85	29.03	-	-	5366.82
GBR-8	5390.50	41.94	-	-	5348.56
GBR-9	5389.92	47.56	-	-	5342.36
GBR-10	5390.57	42.52	-	-	5348.05
GBR-11	5389.43	42.44	-	-	5346.99
GBR-13	5393.04	42.38	-	-	5350.66
GBR-15	5397.99	40.89	-	-	5357.10
GBR-18	5421.68	55.14	-	-	5366.54
GBR-19	5393.83	43.23	42.85	0.38	5350.90
GBR-20	5393.47	35.75	-	-	5357.72
GBR-21S	5400.65	26.15	-	-	5374.50
GBR-21D	5400.19	41.10	-	-	5359.09
GBR-22	5395.91	DRY	-	-	Dry
GBR-23	5403.72	29.77	-	-	5373.95
GBR-24S	5396.08	33.30	-	-	5362.78
GBR-24D	5396.77	34.61	-	-	5362.16
GBR-25	5396.72	38.70	-	-	5358.02
GBR-26	5395.59	38.00	-	-	5357.59

Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
GBR-30	5396.58	36.34	-	-	5360.24
GBR-31	5394.86	37.50	-	-	5357.36
GBR-33†	5396.28	39.65	-	-	5356.63
GBR-34	5394.00	39.82	39.80	0.02	5354.20
GBR-35	5393.66	39.83	39.80	0.03	5353.85
GBR-39	5397.55	40.33	-	-	5357.22
GBR-40	5400.76	32.27	-	-	5368.49
GBR-41	5396.35	27.00	-	-	5369.35
GBR-51	5389.68	44.10	-	-	5345.58
GBR-52	5387.74	41.67	-	-	5346.07
SHS-1	5383.54	40.74	-	-	5342.80
SHS-2	5381.66	31.05	-	-	5350.61
SHS-3	5383.33	NA	-	-	Not Accessible
SHS-4	5383.62	43.05	-	-	5340.57
SHS-5	5378.36	39.78	-	-	5338.58
SHS-6	5378.17	40.05	-	-	5338.12
SHS-8	5380.25	40.39	-	-	5339.86
SHS-9	5380.79	39.65	-	-	5341.14
SHS-10	5373.80	37.88	-	-	5335.92
SHS-12	5373.94	40.68	-	-	5333.26
SHS-13	5367.81	37.14	-	-	5330.67
SHS-14	5367.07	35.40	-	-	5331.67
SHS-15	5366.21	35.22	-	-	5330.99
SHS-16	5362.58	32.90	-	-	5329.68
SHS-17	5364.35	34.50	-	-	5329.85
SHS-18	5373.64	40.84	-	-	5332.80
SHS-19	5378.89	43.52	-	-	5335.37
April 2006					
GRW-1	5394.30	54.50	-	-	5339.80
GRW-2	5391.28	41.50	-	-	5349.78
GRW-3	5388.77	54.21	-	-	5334.56
GRW-4	5390.02	54.55	-	-	5335.47
GRW-5	5390.56	67.04	-	-	5323.52
GRW-6	5390.81	43.48	-	-	5347.33
GRW-9	5395.70	52.50	-	-	5343.20
GRW-10	5395.02	52.78	52.75	0.03	5342.26
GRW-11	5397.85	57.30	-	-	5340.55
GRW-12	5397.24	NA	-	-	Water Below Pump
GRW-13	5396.90	51.86	-	-	5345.04
GBR-5	5395.07	27.30	-	-	5367.77
GBR-7	5395.85	29.76	-	-	5366.09
GBR-8	5390.50	42.34	-	-	5348.16
GBR-9	5389.92	47.70	-	-	5342.22
GBR-10	5390.57	42.54	-	-	5348.03

Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
GBR-11	5389.43	42.62	-	-	5346.81
GBR-13	5393.04	42.92	-	-	5350.12
GBR-15	5397.99	40.76	-	-	5357.23
GBR-18	5421.68	35.94	-	-	5385.74
GBR-19	5393.83	42.04	-	-	5351.79
GBR-20	5393.47	37.26	-	-	5356.21
GBR-21S	5400.65	26.70	-	-	5373.95
GBR-21D	5400.19	40.88	-	-	5359.31
GBR-22	5395.91	DRY	-	-	Dry
GBR-23	5403.72	30.50	-	-	5373.22
GBR-24S	5396.08	33.28	-	-	5362.80
GBR-24D	5396.77	34.60	-	-	5362.17
GBR-25	5396.72	38.07	-	-	5358.65
GBR-26	5395.59	37.85	-	-	5357.74
GBR-30	5396.58	36.25	-	-	5360.33
GBR-31	5394.86	37.38	-	-	5357.48
GBR-33†	5396.28	39.12	-	-	5357.16
GBR-34	5394.00	40.34	-	-	5353.66
GBR-35	5393.66	39.19	-	-	5354.47
GBR-39	5397.55	40.48	-	-	5357.07
GBR-40	5400.76	33.00	-	-	5367.76
GBR-41	5396.35	28.70	-	-	5367.65
GBR-51	5389.68	43.73	-	-	5345.95
GBR-52	5387.74	42.30	-	-	5345.44
SHS-1	5383.54	40.47	-	-	5343.07
SHS-2	5381.66	36.83	-	-	5344.83
SHS-3	5383.33	NA	-	-	Not Accessible
SHS-4	5383.62	42.83	-	-	5340.79
SHS-5	5378.36	39.52	-	-	5338.84
SHS-6	5378.17	39.80	-	-	5338.37
SHS-8	5380.25	40.20	-	-	5340.05
SHS-9	5380.79	39.04	-	-	5341.75
SHS-10	5373.80	36.85	-	-	5336.95
SHS-12	5373.94	40.34	-	-	5333.60
SHS-13	5367.81	36.84	-	-	5330.97
SHS-14	5367.07	35.10	-	-	5331.97
SHS-15	5366.21	33.92	-	-	5332.29
SHS-16	5362.58	31.65	-	-	5330.93
SHS-17	5364.35	32.61	-	-	5331.74
SHS-18	5373.64	40.33	-	-	5333.31
SHS-19	5378.89	43.24	-	-	5335.65
July 2006					
GRW-1	5394.30	55.10	-	-	5339.20
GRW-2	5391.28	NA	-	-	Not Accessible

Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
GRW-3	5388.77	54.65	-	-	5334.12
GRW-4	5390.02	57.53	-	-	5332.49
GRW-5	5390.56	66.48	-	-	5324.08
GRW-6	5390.81	43.34	-	-	5347.47
GRW-9	5395.70	48.80	-	-	5346.90
GRW-10	5395.02	43.20	-	-	5351.82
GRW-11	5397.85	59.95	-	-	5337.90
GRW-12	5397.24	NA	-	-	Water below pump
GRW-13	5396.90	56.36	-	-	5340.54
GBR-5	5395.07	30.35	-	-	5364.72
GBR-7	5395.85	31.70	-	-	5364.15
GBR-8	5390.50	43.25	-	-	5347.25
GBR-9	5389.92	47.72	-	-	5342.20
GBR-10	5390.57	42.53	-	-	5348.04
GBR-11	5389.43	43.00	-	-	5346.43
GBR-13	5393.04	43.74	-	-	5349.30
GBR-15	5397.99	40.24	-	-	5357.75
GBR-18	5421.68	36.53	-	-	5385.15
GBR-19	5393.83	42.26	-	-	5351.57
GBR-20	5393.47	38.90	-	-	5354.57
GBR-21S	5400.65	40.88	-	-	5359.77
GBR-21D	5400.19	27.21	-	-	5372.98
GBR-22	5395.91	DRY	-	-	Dry
GBR-23	5403.72	30.35	-	-	5373.37
GBR-24S	5396.08	33.14	-	-	5362.94
GBR-24D	5396.77	34.35	-	-	5362.42
GBR-25	5396.72	37.75	-	-	5358.97
GBR-26	5395.59	37.50	-	-	5358.09
GBR-30	5396.58	36.08	-	-	5360.50
GBR-31	5394.86	37.00	-	-	5357.86
GBR-33†	5396.28	38.51	-	-	5357.77
GBR-34	5394.00	38.45	-	-	5355.55
GBR-35	5393.66	38.60	-	-	5355.06
GBR-39	5397.55	39.73	-	-	5357.82
GBR-40	5400.76	32.05	-	-	5368.71
GBR-41	5396.35	29.97	-	-	5366.38
GBR-51	5389.68	43.78	-	-	5345.90
GBR-52	5387.74	42.30	-	-	5345.44
SHS-1	5383.54	40.70	-	-	5342.84
SHS-2	5381.66	37.25	-	-	5344.41
SHS-3	5383.33	NA	-	-	Not Accessible
SHS-4	5383.62	42.95	-	-	5340.67
SHS-5	5378.36	39.78	-	-	5338.58
SHS-6	5378.17	40.00	-	-	5338.17
SHS-8	5380.25	40.45	-	-	5339.80

Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
SHS-9	5380.79	NA	-	-	Out of service
SHS-10	5373.80	40.80	-	-	5333.00
SHS-12	5373.94	38.30	-	-	5335.64
SHS-13	5367.81	37.29	-	-	5330.52
SHS-14	5367.07	NA	-	-	Out of service
SHS-15	5366.21	34.50	-	-	5331.71
SHS-16	5362.58	32.15	-	-	5330.43
SHS-17	5364.35	34.10	-	-	5330.25
SHS-18	5373.64	NA	-	-	Out of service
SHS-19	5378.89	43.35	-	-	5335.54
October 2006					
GRW-1	5394.30	39.15	-	-	5355.15
GRW-2	5391.28	42.37	-	-	5348.91
GRW-3	5388.77	44.19	-	-	5344.58
GRW-4	5390.02	55.10	-	-	5334.92
GRW-5	5390.56	55.69	-	-	5334.87
GRW-6	5390.81	49.83	-	-	5340.98
GRW-9	5395.70	49.70	-	-	5346.00
GRW-10	5395.02	60.58	-	-	5334.44
GRW-11	5397.85	61.45	-	-	5336.40
GRW-12	5397.24	NA	-	-	Water below pump
GRW-13	5396.90	48.68	-	-	5348.22
GBR-5	5395.07	21.04	-	-	5374.03
GBR-7	5395.85	29.08	-	-	5366.77
GBR-8	5390.50	43.02	-	-	5347.48
GBR-9	5389.92	47.87	-	-	5342.05
GBR-10	5390.57	42.54	-	-	5348.03
GBR-11	5389.43	43.09	-	-	5346.34
GBR-13	5393.04	43.34	-	-	5349.70
GBR-15	5397.99	40.18	-	-	5357.81
GBR-18	5421.68	36.73	-	-	5384.95
GBR-19	5393.13	41.99	-	-	5351.14
GBR-20	5393.47	36.20	-	-	5357.27
GBR-21S	5400.65	27.18	-	-	5373.47
GBR-21D	5400.19	40.52	-	-	5359.67
GBR-22	5395.91	Dry	-	-	Dry
GBR-23	5403.72	29.89	-	-	5373.83
GBR-24S	5396.08	32.43	-	-	5363.65
GBR-24D	5396.77	33.96	-	-	5362.81
GBR-25	5396.72	37.94	-	-	5358.78
GBR-26	5395.59	35.21	-	-	5360.38
GBR-30	5396.58	34.11	-	-	5362.47
GBR-31	5393.69	37.04	-	-	5356.65
GBR-33†	5396.28	39.03	-	-	5357.25

Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
GBR-34	5394.00	39.15	-	-	5354.85
GBR-35	5393.66	39.25	-	-	5354.41
GBR-39	5397.55	39.34	-	-	5358.21
GBR-40	5400.76	33.34	-	-	5367.42
GBR-41	5396.35	28.27	-	-	5368.08
GBR-51	5389.68	42.20	-	-	5347.48
GBR-52	5387.74	40.98	-	-	5346.76
SHS-1	5383.54	40.73	-	-	5342.81
SHS-2	5381.66	40.49	-	-	5341.17
SHS-3	5383.33	NA	-	-	Not Accessible
SHS-4	5383.62	42.96	-	-	5340.66
SHS-5	5378.36	NA	-	-	Not Accessible
SHS-6	5378.17	39.84	-	-	5338.33
SHS-8	5380.25	40.56	-	-	5339.69
SHS-9	5380.79	NA	-	-	Out of service
SHS-10	5373.80	37.43	-	-	5336.37
SHS-12	5373.94	40.82	-	-	5333.12
SHS-13	5367.81	37.23	-	-	5330.58
SHS-14	5367.07	36.56	-	-	5330.51
SHS-15	5366.21	34.42	-	-	5331.79
SHS-16	5362.58	32.10	-	-	5330.48
SHS-17	5364.35	33.99	-	-	5330.36
SHS-18	5373.64	39.98	-	-	5333.66
SHS-19	5378.89	42.72	-	-	5336.17
*WSEL = Water Surface Elevation Adjusted for Product Depth using 0.8 g/ml.					
† Wellhead elevation has not been corrected after road construction.					

Table 4. Giant Industries, Inc. Bloomfield Refinery Quarterly Product Levels

Well #	Product Thickness (ft) January 2006	Product Thickness (ft) April 2006	Product Thickness (ft) July 2006	Product Thickness (ft) October 2006
GRW-10	0.01	0.03	0	0
GBR-19	0.38	0	0	0
GBR-34	0.02	0	0	0
GBR-35	0.03	0	0	0.01
GBR-23	0	0	0	0.01
SHS-8	0	0	0	0.01

5.0 Total Volume History

Section 5 presents the volume of groundwater managed for the year. Total volume pumped from each well, current tank volumes and the re-injection volume is reported.

**Table 5. Giant Industries, Inc. Bloomfield Refinery
Tank Volume Change 2006**

Tank Number	Beginning Volume (Gallons)	Ending Volume (Gallons)	Change (Gallons)
102	8,832	11,830	2,998
Total Net Volume Change (Gallons):			2,998

**Table 6. Giant Industries, Inc. Bloomfield Refinery
Recovery Well Volume Tabulation 2006**

Well #	Jan-Jul	Jul-Dec	Total
GRW-1	25,000	17,594	42,594
GRW-2	3,900	3,660	7,560
GRW-3	64,590	36,456	101,046
GRW-4	65,850	29,399	95,249
GRW-5	132,210	153,801	286,011
GRW-6	51,220	19,773	70,993
GRW-9	68,010	45,808	113,818
GRW-10	1,817,470	1,039,168	2,856,638
GRW-11	109,180	72,151	181,331
GRW-12	0	18,304	18,304
GRW-13	20,730	12,077	32,807
SHS-9	48	9	57
SHS-14	19,216	42,440	61,656
SHS-18	717	577	1,294
SHS-19	202,648	236,587	439,235
Total Volume Pumped in Gallons:			4,308,593

**Table 7. Giant Industries, Inc. Bloomfield Refinery
Total Volume Summary 2006**

Total Volume of Water Recovered:	4,308,593 gallons
Net Change in Storage Volume:	2,998 gallons
Total Water Treated and Pumped to the Infiltration Gallery:	4,311,591 gallons

6.0 FIGURES

**Annual Data Report
Former Giant Bloomfield Refinery**

March 2008

Prepared For



**Western Refining, Inc.
111 CR 4990
Bloomfield, New Mexico**

 **Lodestar Services, Incorporated**

PO Box 3861 Farmington, NM 87499-3861 Office (970) 946-1093

Annual Report 2007, Former Giant Refinery
Western Refining, Inc.
March 2008

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Lodestar Services, Incorporated

PO Box 3861 Farmington, NM 87499-3861 Office (970) 946-1093

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1.0 INTRODUCTION AND METHODOLOGY

Introduction

The following annual report describes work completed at Western Refining, Inc.'s (Western's) former refinery in Bloomfield, New Mexico since the previous annual report submitted in March 2007. The report contains data collected during 2007 including:

- Analytical data from groundwater sampling;
- Groundwater elevations;
- Product levels from monitoring wells;
- Tank volume data.

The refinery is located in the NW ¼ of Section 27 and the SW ¼ of Section 22, Township 29 N, Range 12W in San Juan County, New Mexico. It is on the corner of Highway 64 and County Road 350, approximately 5 miles west of the town of Bloomfield, New Mexico (Figure 1). The facility consists of the former Giant Bloomfield Refinery and associated remedial equipment both within and south of the refinery boundary. The refinery operated from 1974 to 1982 and is presently inactive.

A remedial system was installed in stages beginning in 1988 and gradually has been simplified over time. Remediation was designed to treat groundwater affected by various releases during operation of the former refinery and periodic spills at the truck unloading facility. It consists of a series of groundwater monitoring wells, groundwater recovery wells, water treatment facilities and treated water infiltration trenches (Figure 2). The system processed approximately 2,599,613 gallons of water in 2007.

Methodology

Impacted groundwater is pumped from the aquifer through a series of recovery wells located strategically within the affected area. Recovery wells are utilized to create a hydraulic barrier and prevent migration of affected water beyond the well. A hydraulic barrier is formed as water is pumped through the recovery well, thereby depressing the water table. Figure 3 illustrates the concept. Sufficient recovery wells are placed



Lodestar Services, Incorporated

PO Box 3861 Farmington, NM 87499-3861 Office (970) 946-1093

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throughout the site so that the radii of influence from adjacent wells overlap, and a barrier is formed across the plume to prevent migration of affected water.

Impacted groundwater is collected in a storage tank (Tank 102) and subsequently treated. The method of treatment used at the former Bloomfield Refinery is carbon adsorption, where recovered water is pumped into a carbon filtration tank. Inside, volatile and non-volatile organic compounds are adsorbed into a carbon matrix lining the tank.

The treated water is discharged into the aquifer through an infiltration trench. The infiltration trench consists of a subsurface distribution system placed within gravel packs. Water infiltrates the surrounding strata and eventually makes its way back to the aquifer. The return of recovered water to the aquifer serves as a recharge mechanism. Figure 4 is a simplified diagram representation of groundwater recovery, treatment and disposal at the former refinery.

Monitoring at the site consists of regular inspections and maintenance of facilities, as well as regular sampling of groundwater on site. Section 2 describes the sampling program. Results are presented in Section 3. Numerous monitoring wells are located within and south of the refinery (Figure 2). Analytical results of groundwater samples collected from monitoring wells help determine the effectiveness and progress of remedial efforts. In addition to sampling, water and product levels in each well are determined quarterly. This information is tabulated and utilized to prepare potentiometric surface maps. Water levels are included in Section 4. Any measured product levels are also shown. Figures 5-8 are potentiometric surface maps for 2007 water levels. The contours on the maps represent the elevation of surface of the groundwater for each quarter. The maps are useful in determining direction of groundwater flow and effectiveness of hydraulic control achieved by the recovery well system. Additionally, oil absorbent socks are installed in all monitoring wells showing free-phase hydrocarbons. These socks are checked quarterly and replaced as necessary.

Regular weekly inspections are performed to assure safe and efficient operation of the remediation system. The Control Panel, located in the Dispatch Office, serves to monitor and control the operation of the treatment system, while providing alarm and shutdown functions to safeguard against spills and other undesirable events. The Control Panel is checked weekly. An inspection is also made in the control building at Tank 102, the southern infiltration gallery and each recovery well. Treated effluent volumes and flow rates are monitored weekly with a water meter that has been installed near the carbon

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adsorption tank. These values are recorded and compared with previous readings to ensure normal operation. Maintenance of the system includes repair and replacement of well pumps, replacement of filters in well houses, equipment lubrication, air compressor oil changes, adding nutrients as necessary, listening for unusual pump and motor noise, inspecting the carbon pre-filter and repairing all equipment as required. Observations are recorded in a bound field logbook with the date, time and person recording the information noted. All equipment is inspected for leaks and malfunctions. The operator is familiar with the location of underground lines and notes any surface indication of underground leaks. Leaks of any size are noted and repaired.

Modifications to the Sampling Schedule

In 2005, Giant Industries (now Western) requested approval from the New Mexico Oil Conservation Division (NMOCD) to change the sampling schedule for groundwater wells located downgradient of the refinery. The proposed changes were based on historical results from sampling conducted at the site and are detailed in the letter dated March 13, 2005. Giant intended to plug and abandon nine groundwater monitoring wells and one groundwater recovery well and initiate closure sampling on additional monitoring wells. The following wells were to be abandoned:

Type of Well	Identification	Years of Monitoring Beneath Standards
Monitoring	SHS-3	7
Monitoring	SHS-4	8
Monitoring	SHS-6	8
Monitoring	SHS-10	8
Monitoring	SHS-12	8
Monitoring	SHS-13	8
Recovery	SHS-14	3
Monitoring	SHS-15	8
Monitoring	SHS-16	8
Monitoring	SHS-17	7

The proposal suggests quarterly sampling at wells SHS-9, SHS-18 and SHS-19 until the analytical results from four consecutive quarters are beneath New Mexico Water Quality Control Commission (NMWQCC) standards, at which time those wells could be abandoned. Wells SHS-1, SHS-2, SHS-5 and SHS-8 had not previously been included on the sampling schedule. Giant proposed annual sampling at these wells until laboratory analyses indicate the groundwater is beneath NMWQCC standards. At that time

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sampling should be conducted quarterly until the analytical results from four consecutive quarters are beneath standards and closure can be pursued.

The NMOCD has not formally responded to this proposal. Subsequently, Giant submitted a revised sample schedule in Discharge Plan GW040 in 2006 and an amended Discharge Plan GW040 in 2007 to remove the wells listed above from the sampling matrix and discontinue pumping well SHS-14 based on the number of clean reporting quarters.

The revised sampling schedule was instituted in October of 2006. The wells listed for abandonment were last sampled in the first quarter of 2006. They were not sampled in 2007. Quarterly sampling of groundwater from SHS-9, SHS-18 and SHS-19 began in November 2007. In order to move forward with site closure, Western intends to continue sampling according to the revised schedule and to begin annual sampling of SHS-1, SHS-2, SHS-5 and SHS-8 beginning in January of 2008.

Table 1 shows the revised schedule followed in 2007, and Table 2 shows the schedule to be carried out in 2008.

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Table 1. Giant Industries, Inc. Bloomfield Refinery Sampling Schedule for 2007

LOCATION	Jan 2007	Feb 2007	Mar 2007	Apr 2007	May 2007	Jun 2007	July 2007	Aug 2007	Sept 2007	Oct 2007	Nov 2007	Dec 2006
System Influent	601 602 GWC			601 602 GWC			601 602 GWC			601 602 GWC		
System Effluent	601 602 GWC Metals PAH			601 602 GWC			601 602 GWC			601 602 GWC		
GRW-3	601 602 GWC PAH											
GRW-6	601 602 GWC PAH											
GBR-17*												601 602 GWC PAH
GBR-24D	601 602 GWC PAH											
GBR-30	601 602 GWC PAH											
GBR-31	601 602 GWC PAH											
GBR-32*												601 602 GWC Metals
GBR-48*												601 602 GWC Metals
GBR-49*												601 602 GWC Metals



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LOCATION	Jan 2007	Feb 2007	Mar 2007	Apr 2007	May 2007	Jun 2007	July 2007	Aug 2007	Sept 2007	Oct 2007	Nov 2007	Dec 2006
GBR-50*												601 602 GWC Metals
GBR-51	601 602 GWC											
GBR-52	601 602 GWC											
SHS-9											601 602	
SHS-18											601 602	
SHS-19											601 602	
NOTES: All wells have water and free product elevations determined on a quarterly basis. Wells exhibiting free product are not sampled. 601 and 602 refer to United States Environmental Protection Agency methods for organic chemical analysis. GWC refers to groundwater characteristics. *First quarter sampling for 2007 was conducted in Dec. 2006.												

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Table 2. Giant Industries, Inc. Bloomfield Refinery Sampling Schedule for 2008

LOCATION	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	Jun 2008	July 2008	Aug 2008	Sept 2008	Oct 2008	Nov 2008	Dec 2008
System Influent	601 602 GWC			601 602 GWC			601 602 GWC			601 602 GWC		
System Effluent	601 602 GWC Metals PAH			601 602 GWC			601 602 GWC			601 602 GWC		
GRW-3	601 602 GWC PAH											
GRW-6	601 602 GWC PAH											
GBR-17	601 602 GWC PAH											
GBR-24D	601 602 GWC PAH											
GBR-30	601 602 GWC PAH											
GBR-31	601 602 GWC PAH											
GBR-32	601 602 GWC Metals											
GBR-48	601 602 GWC Metals											
GBR-49	601 602 GWC Metals											



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LOCATION	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	Jun 2008	July 2008	Aug 2008	Sept 2008	Oct 2008	Nov 2008	Dec 2008
GBR-50	601 602 GWC Metals											
GBR-51	601 602 GWC											
GBR-52	601 602 GWC											
SHS-1*	601 602 GWC											
SHS-2*	601 602 GWC											
SHS-5*	601 602 GWC											
SHS-8*	601 602 GWC											
SHS-9†	601 602 GWC			601 602 GWC			601 602 GWC					
SHS-18†	601 602 GWC			601 602 GWC			601 602 GWC					
SHS-19†	601 602 GWC			601 602 GWC			601 602 GWC					
NOTES: All wells have water and free product elevations determined on a quarterly basis. Wells exhibiting free product are not sampled. 601 and 602 refer to United States Environmental Protection Agency methods for organic chemical analysis. GWC refers to groundwater characteristics. *If results from annual sampling are below NMWQCC standards, quarterly sampling will begin in April. †If four quarters of samples are below NMWQCC standards, wells will be abandoned.												



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2.0 SAMPLING PROGRAM

Introduction

Table 1 describes water sampling conducted at the Giant Bloomfield Refinery during 2007. Influent and effluent water quality is monitored to verify compliance with NMWQCC standards. System influent and effluent is sampled and analyzed for general chemistry, halocarbons and aromatics on a quarterly basis throughout the year. Facility effluent is also sampled annually for PAHs and metals. Recovery and monitoring wells are sampled as shown in Table 1.

Methodology

Influent water is collected from a system valve prior to entering storage Tank 102. Samples of effluent water are collected through a sample valve as treated water exits the carbon adsorption tank. Water is collected in appropriate pre-cleaned and/or pre-preserved sample bottles or glass vials. For EPA methods 601 and 602 analyses, vials are filled and capped with no air inside to prevent degradation of the sample. Samples are labeled with the date and time of collection, sample designation, project name, collector's name and parameters to be analyzed. They are immediately sealed and packed on ice. The samples are shipped to Pinnacle Laboratories in Albuquerque, NM in a sealed cooler via UPS before designated holding times expire. Proper chain-of-custody (COC) procedures are followed with logs documenting the date and time sampled, sample number, type of sample, sampler's name, preservative used, analyses required and sampler's signatures.

Prior to sampling monitoring and wells, depth to ground water and total depth of wells is measured with a Keck oil/water interface probe. Presence of any free-phase crude oil is also investigated using the interface probe. The interface probe is decontaminated with Alconox™ soap and rinsed with de-ionized water prior to each measurement. The volume of water in the wells is calculated, and a minimum of three casing volumes of water is purged from each well using a disposable bailer or a permanent decontaminated PVC bailer. As water is extracted, pH, electric conductivity and temperature are monitored. Wells are purged until these properties stabilize or the well bails dry, indicating that the purge water is representative of aquifer conditions. Stabilization is

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defined as three consecutive stable readings for each water property (± 0.4 units for pH, ± 10 percent for electric conductivity and $\pm 2^\circ$ C for temperature). Once each monitoring well is properly purged, groundwater samples are collected in bottles or vials and shipped to the laboratory as described above. The method for sampling recovery wells is similar, the difference being that pumps installed within the wells are used to purge groundwater.

3.0 ANNUAL ANALYTICAL RESULTS

Lab results detailing the quality of groundwater sampled at the Giant Bloomfield Refinery is shown in Table 2. Raw data, as received from the laboratory, is available on request as a supplement to the annual report. Toxic pollutants, as defined by NMWQCC standards, are absent from influent and effluent water. Results indicate most analytes are not detected. When constituents are present, they are detected only in trace amounts.

The analytical results presented in Table 3 are listed in units as described below:

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l
Laboratory Conductivity	μ mhos/cm

The remainder of the data is measured in μ g/l.



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Table 3. Giant Industries, Inc. Bloomfield Refinery 2007 Annual Analytical Data

	JAN 2007	APR 2007	JUL 2007	OCT 2007	NOV 2007	DEC 2006
<u>SYSTEM EFFLUENT</u>						
Lab pH	8.1	7.2	7.6	8.0		
Lab Conductivity@25C	3160	3400	3330	2940		
Total Dissolved Solids (Calc)	2250	2360	2320	2000		
Total Alkalinity as CaCO3	338	410	480	656		
Total Hardness as CaCO3	727	669	618	548		
Bicarbonate as HCO3	337	409	478	654		
Carbonate as CO3	nd	1.61	1.79	2.09		
Hydroxide	nd	nd	nd	nd		
Chloride	nd	77.9	78.9	91.1		
Sulfate	1270	1360	1000	549		
Calcium	251	229	234	195		
Magnesium	24.6	23.4	25	29.5		
Potassium	9.77	7.94	11.9	2.62		
Sodium	357	356	399	452		
HALOCARBONS						
Bromodichloromethane	nd	nd	nd	nd		
Bromoform	nd	nd	nd	nd		
Bromomethane	nd	nd	nd	nd		
Carbon Tetrachloride	nd	nd	nd	nd		
Chloroethane	nd	nd	nd	nd		
Chloroform	nd	nd	nd	nd		
Chloromethane	nd	nd	nd	nd		
Dibromochloromethane	nd	nd	nd	nd		
1,2-Dibromomethane (EDB)	nd	nd	nd	nd		
1,2-Dichlorobenzene	nd	nd	nd	nd		
1,3-Dichlorobenzene	nd	nd	nd	nd		
1,4-Dichlorobenzene	nd	nd	nd	nd		
1,1-Dichloroethane	nd	nd	nd	nd		
1,2-Dichloroethane (EDC)	nd	nd	nd	nd		
1,1-Dichloroethene	nd	nd	nd	nd		
trans-1,2-Dichloroethene	nd	nd	nd	nd		
1,2-Dichloropropane	nd	nd	nd	nd		
cis-1,3-Dichloropropene	nd	nd	nd	nd		
trans-1,3-Dichloropropene	nd	nd	nd	nd		
Methylene Chloride	nd	nd	nd	nd		
1,1,2,2-Tetrachloroethane	nd	nd	nd	nd		



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	JAN 2007	APR 2007	JUL 2007	OCT 2007	NOV 2007	DEC 2006
Tetrachloroethane	nd	nd	nd	nd		
1,1,1-Trichloroethane	nd	nd	nd	nd		
1,1,2-Trichloroethane	nd	nd	nd	nd		
Trichloroethene	nd	nd	nd	nd		
Trichlorofluoromethane	nd	nd	nd	nd		
Vinyl Chloride	nd	nd	nd	nd		
AROMATICS						
Benzene	nd	nd	nd	nd		
Chlorobenzene	nd	nd	nd	nd		
1,2-Dichlorobenzene	nd	nd	nd	nd		
1,3-Dichlorobenzene	nd	nd	nd	nd		
1,4-Dichlorobenzene	nd	nd	nd	nd		
Ethylbenzene	nd	nd	nd	nd		
Methyl-t-Butyl Ether	nd	nd	nd	nd		
Toluene	nd	nd	nd	nd		
Total Xylenes	nd	nd	nd	nd		
PAH						
1-Methylnapthalene	nd					
2-Methylnapthalene	nd					
Benzo(a)pyrene	nd					
Napthalene	nd					
METALS (mg/l)						
Antimony	nd					
Arsenic	nd					
Beryllium	nd					
Cadmium	nd					
Chromium	0.009					
Copper	0.009					
Lead	nd					
Nickel	0.043					
Selenium	nd					
Silver	0.002					
Thallium	nd					
Zinc	nd					
Mercury	nd					
SYSTEM INFLUENT						
Lab pH	7.9	7.3	7.7	7.4		

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Lab Conductivity@25C	3480	3780	3220	3130		
Total Dissolved Solids (Calc)	2550	2370	2320	1960		
Total Alkalinity as CaCO3	316	422	512	652		
Total Hardness as CaCO3	941	658	642	537		
Bicarbonate as HCO3	315	421	510	650		
Carbonate as CO3	nd	1.59	1.89	2.07		
Hydroxide	nd	nd	nd	nd		
Chloride	nd	77	79	93.2		
Sulfate	1510	1390	1070	566		
Calcium	330	226	245	192		
Magnesium	28.2	22.9	24.6	28.6		
Potassium	10.9	7.43	12.4	2.6		
Sodium	389	350	400	439		
HALOCARBONS						
Bromodichloromethane	nd	nd	nd	nd		
Bromoform	nd	nd	nd	nd		
Bromomethane	nd	nd	nd	nd		
Carbon Tetrachloride	nd	nd	nd	nd		
Chloroethane	nd	nd	nd	nd		
Chloroform	nd	nd	nd	nd		
Chloromethane	nd	nd	nd	nd		
Dibromochloromethane	nd	nd	nd	nd		
1,2-Dibromomethane (EDB)	nd	nd	nd	nd		
1,2-Dichlorobenzene	nd	nd	nd	nd		
1,3-Dichlorobenzene	nd	nd	nd	nd		
1,4-Dichlorobenzene	nd	nd	nd	nd		
1,1-Dichloroethane	nd	nd	nd	nd		
1,2-Dichloroethane (EDC)	nd	nd	nd	nd		
1,1-Dichloroethene	nd	nd	nd	nd		
trans-1,2-Dichloroethene	nd	nd	nd	nd		
1,2-Dichloropropane	nd	nd	nd	nd		
cis-1,2-Dichloropropene	nd	nd	nd	nd		
trans-1,2-Dichloropropene	nd	nd	nd	nd		
Methylene Chloride	nd	nd	nd	nd		
1,1,2,2-Tetrachloroethane	nd	nd	nd	nd		
Tetrachloroethane	nd	nd	nd	nd		
1,1,1-Trichloroethane	nd	nd	nd	nd		
1,1,2-Trichloroethane	nd	nd	nd	nd		
Trichloroethene	nd	nd	nd	nd		
Trichlorofluoromethane	nd	nd	nd	nd		



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	JAN 2007	APR 2007	JUL 2007	OCT 2007	NOV 2007	DEC 2006
Vinyl Chloride	nd	nd	nd	nd		
AROMATICS						
Benzene	nd	nd	nd	nd		
Chlorobenzene	nd	nd	nd	nd		
1,2-Dichlorobenzene	nd	nd	nd	nd		
1,3-Dichlorobenzene	nd	nd	nd	nd		
1,4-Dichlorobenzene	nd	nd	nd	nd		
Ethylbenzene	nd	nd	nd	nd		
Methyl-t-Butyl Ether	nd	nd	nd	nd		
Toluene	nd	nd	nd	nd		
Total Xylenes	nd	nd	nd	nd		
GRW-3						
Lab pH	8					
Lab Conductivity@25C	2620					
Total Dissolved Solids (Calc)	1710					
Total Alkalinity as CaCO3	750					
Total Hardness as CaCO3	499					
Bicarbonate as HCO3	748					
Carbonate as CO3	1.65					
Hydroxide	nd					
Chloride	nd					
Sulfate	580					
Calcium	152					
Magnesium	28.9					
Potassium	6.71					
Sodium	329					
HALOCARBONS						
Bromodichloromethane	nd					
Bromoform	nd					
Bromomethane	nd					
Carbon Tetrachloride	nd					
Chloroethane	nd					
Chloroform	nd					
Chloromethane	nd					
Dibromochloromethane	nd					
1,2-Dibromomethane (EDB)	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					

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	JAN 2007	APR 2007	JUL 2007	OCT 2007	NOV 2007	DEC 2006
1,4-Dichlorobenzene	nd					
1,1-Dichloroethane	nd					
1,2-Dichloroethane (EDC)	nd					
1,1-Dichloroethene	nd					
trans-1,2-Dichloroethene	nd					
1,2-Dichloropropane	nd					
cis-1,2-Dichloropropene	nd					
trans-1,2-Dichloropropene	nd					
Methylene Chloride	nd					
1,1,2,2-Tetrachloroethane	nd					
Tetrachloroethane	nd					
1,1,1-Trichloroethane	nd					
1,1,2-Trichloroethane	nd					
Trichloroethene	nd					
Trichlorofluoromethane	nd					
Vinyl Chloride	nd					
AROMATIC						
Benzene	nd					
Chlorobenzene	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
Ethylbenzene	4.6					
Methyl-t-Butyl Ether	nd					
Toluene	nd					
Total Xylenes	nd					
PAH						
1-Methylnaphthalene	1.87					
2-Methylnaphthalene	0.27					
Benzo(a)pyrene	nd					
Naphthalene	1.09					
GRW-6						
Lab pH	8.3					
Lab Conductivity@25C	2870					
Total Dissolved Solids (Calc)	576					
Total Alkalinity as CaCO3	619					
Total Hardness as CaCO3	576					
Bicarbonate as HCO3	618					

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Carbonate as CO ₃	1.52					
Hydroxide	nd					
Chloride	nd					
Sulfate	926					
Calcium	182					
Magnesium	29.8					
Potassium	6.7					
Sodium	402					
HALOCARBONS						
Bromodichloromethane	nd					
Bromoform	nd					
Bromomethane	nd					
Carbon Tetrachloride	nd					
Chloroethane	nd					
Chloroform	nd					
Chloromethane	nd					
Dibromochloromethane	nd					
1,2-Dibromomethane (EDB)	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
1,1-Dichloroethane	nd					
1,2-Dichloroethane (EDC)	nd					
1,1-Dichloroethene	nd					
trans-1,2-Dichloroethene	nd					
1,2-Dichloropropane	nd					
cis-1,2-Dichloropropene	nd					
trans-1,2-Dichloropropene	nd					
Methylene Chloride	nd					
1,1,2,2-Tetrachloroethane	nd					
Tetrachloroethane	nd					
1,1,1-Trichloroethane	nd					
1,1,2-Trichloroethane	nd					
Trichloroethene	nd					
Trichlorofluoromethane	nd					
Vinyl Chloride	nd					
AROMATICS						
Benzene	nd					
Chlorobenzene	nd					



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	JAN 2007	APR 2007	JUL 2007	OCT 2007	NOV 2007	DEC 2006
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
Ethylbenzene	nd					
Methyl-t-Butyl Ether	nd					
Toluene	nd					
Total Xylenes	nd					
PAH						
1-Methylnapthalene	nd					
2-Methylnapthalene	nd					
Benzo(a)pyrene	nd					
Napthalene	nd					
GBR-17						
Lab pH						7.0
Lab Conductivity@25C						2500
Total Dissolved Solids (Calc)						2000
Total Alkalinity as CaCO3						164
Total Hardness as CaCO3						696
Bicarbonate as HCO3						163
Carbonate as CO3						nd
Hydroxide						nd
Chloride						48
Sulfate						1400
Calcium						273
Magnesium						22.6
Potassium						7.27
Sodium						222
HALOCARBONS						
Bromodichloromethane						nd
Bromoform						nd
Bromomethane						nd
Carbon Tetrachloride						nd
Chloroethane						nd
Chloroform						nd
Chloromethane						nd
Dibromochloromethane						nd
1,2-Dibromomethane (EDB)						nd
1,2-Dichlorobenzene						nd

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	JAN 2007	APR 2007	JUL 2007	OCT 2007	NOV 2007	DEC 2006
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
1,1-Dichloroethane						nd
1,2-Dichloroethane (EDC)						nd
1,1-Dichloroethene						nd
trans-1,2-Dichloroethene						nd
1,2-Dichloropropane						nd
cis-1,2-Dichloropropene						nd
trans-1,2-Dichloropropene						nd
Methylene Chloride						nd
1,1,2,2-Tetrachloroethane						nd
Tetrachloroethane						nd
1,1,1-Trichloroethane						nd
1,1,2-Trichloroethane						nd
Trichloroethene						nd
Trichlorofluoromethane						nd
Vinyl Chloride						nd
AROMATICS						
Benzene						nd
Chlorobenzene						nd
1,2-Dichlorobenzene						nd
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
Ethylbenzene						nd
Methyl-t-Butyl Ether						nd
Toluene						nd
Total Xylenes						nd
<u>GBR-24D</u>						
Lab pH	8					
Lab Conductivity@25C	4500					
Total Dissolved Solids (Calc)	3490					
Total Alkalinity as CaCO3	213					
Total Hardness as CaCO3	1220					
Bicarbonate as HCO3	213					
Carbonate as CO3	nd					
Hydroxide	nd					
Chloride	190					
Sulfate	2000					
Calcium	421					



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Magnesium	40.5					
Potassium	14.7					
Sodium	503					
HALOCARBONS						
Bromodichloromethane	nd					
Bromoform	nd					
Bromomethane	nd					
Carbon Tetrachloride	nd					
Chloroethane	nd					
Chloroform	nd					
Chloromethane	nd					
Dibromochloromethane	nd					
1,2-Dibromomethane (EDB)	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
1,1-Dichloroethane	0.4					
1,2-Dichloroethane (EDC)	2.6					
1,1-Dichloroethene	nd					
trans-1,2-Dichloroethene	nd					
1,2-Dichloropropane	nd					
cis-1,2-Dichloropropene	nd					
trans-1,2-Dichloropropene	nd					
Methylene Chloride	nd					
1,1,2,2-Tetrachloroethane	nd					
Tetrachloroethane	nd					
1,1,1-Trichloroethane	nd					
1,1,2-Trichloroethane	nd					
Trichloroethene	nd					
Trichlorofluoromethane	nd					
Vinyl Chloride	nd					
AROMATICS						
Benzene	nd					
Chlorobenzene	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
Ethylbenzene	nd					
Methyl-t-Butyl Ether	nd					

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	JAN 2007	APR 2007	JUL 2007	OCT 2007	NOV 2007	DEC 2006
Toluene	nd					
Total Xylenes	nd					
PAH						
1-Methylnaphthalene	nd					
2-Methylnaphthalene	nd					
Benzo(a)pyrene	nd					
Napthalene	nd					
GBR-30						
Lab pH	8					
Lab Conductivity@25C	3320					
Total Dissolved Solids (Calc)	2570					
Total Alkalinity as CaCO3	259					
Total Hardness as CaCO3	1070					
Bicarbonate as HCO3	259					
Carbonate as CO3	nd					
Hydroxide	nd					
Chloride	144					
Sulfate	1420					
Calcium	370					
Magnesium	35.2					
Potassium	11.7					
Sodium	284					
HALOCARBONS						
Bromodichloromethane	nd					
Bromoform	nd					
Bromomethane	nd					
Carbon Tetrachloride	nd					
Chloroethane	nd					
Chloroform	nd					
Chloromethane	nd					
Dibromochloromethane	nd					
1,2-Dibromomethane (EDB)	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
1,1-Dichloroethane	nd					
1,2-Dichloroethane (EDC)	nd					
1,1-Dichloroethene	nd					



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trans-1,2-Dichloroethene	nd					
1,2-Dichloropropane	nd					
cis-1,2-Dichloropropene	nd					
trans-1,2-Dichloropropene	nd					
Methylene Chloride	nd					
1,1,2,2-Tetrachloroethane	nd					
Tetrachloroethane	nd					
1,1,1-Trichloroethane	nd					
1,1,2-Trichloroethane	nd					
Trichloroethene	nd					
Trichlorofluoromethane	nd					
Vinyl Chloride	nd					
AROMATICS						
Benzene	nd					
Chlorobenzene	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
Ethylbenzene	nd					
Methyl-t-Butyl Ether	nd					
Toluene	nd					
Total Xylenes	nd					
PAH						
1-Methylnapthalene	nd					
2-Methylnapthalene	nd					
Benzo(a)pyrene	nd					
Napthalene	nd					
GBR-31						
Lab pH	7.9					
Lab Conductivity@25C	3280					
Total Dissolved Solids (Calc)	2590					
Total Alkalinity as CaCO3	228					
Total Hardness as CaCO3	933					
Bicarbonate as HCO3	228					
Carbonate as CO3	nd					
Hydroxide	nd					
Chloride	nd					
Sulfate	1540					



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Calcium	328					
Magnesium	27.9					
Potassium	10.7					
Sodium	351					
HALOCARBONS						
Bromodichloromethane	nd					
Bromoform	nd					
Bromomethane	nd					
Carbon Tetrachloride	nd					
Chloroethane	nd					
Chloroform	nd					
Chloromethane	nd					
Dibromochloromethane	nd					
1,2-Dibromomethane (EDB)	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
1,1-Dichloroethane	nd					
1,2-Dichloroethane (EDC)	nd					
1,1-Dichloroethene	nd					
trans-1,2-Dichloroethene	nd					
1,2-Dichloropropane	nd					
cis-1,2-Dichloropropene	nd					
trans-1,2-Dichloropropene	nd					
Methylene Chloride	nd					
1,1,2,2-Tetrachloroethane	nd					
Tetrachloroethane	0.6					
1,1,1-Trichloroethane	nd					
1,1,2-Trichloroethane	nd					
Trichloroethene	nd					
Trichlorofluoromethane	nd					
Vinyl Chloride	nd					
AROMATICS						
Benzene	nd					
Chlorobenzene	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
Ethylbenzene	nd					



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Methyl-t-Butyl Ether	nd					
Toluene	nd					
Total Xylenes	nd					
PAH						
1-Methylnaphthalene	nd					
2-Methylnaphthalene	nd					
Benzo(a)pyrene	nd					
Napthalene	nd					
GBR-32						
Lab pH						7.2
Lab Conductivity@25C						5480
Total Dissolved Solids (Calc)						3880
Total Alkalinity as CaCO3						228
Total Hardness as CaCO3						962
Bicarbonate as HCO3						227
Carbonate as CO3						nd
Hydroxide						nd
Chloride						480
Sulfate						1800
Calcium						363
Magnesium						39.5
Potassium						10.1
Sodium						564
HALOCARBONS						
Bromodichloromethane						nd
Bromoform						nd
Bromomethane						nd
Carbon Tetrachloride						nd
Chloroethane						nd
Chloroform						nd
Chloromethane						nd
Dibromochloromethane						nd
1,2-Dibromomethane (EDB)						nd
1,2-Dichlorobenzene						nd
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
1,1-Dichloroethane						nd
1,2-Dichloroethane (EDC)						nd



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1,1-Dichloroethene						nd
trans-1,2-Dichloroethene						nd
1,2-Dichloropropane						nd
cis-1,2-Dichloropropene						nd
trans-1,2-Dichloropropene						nd
Methylene Chloride						nd
1,1,2,2-Tetrachloroethane						nd
Tetrachloroethane						nd
1,1,1-Trichloroethane						nd
1,1,2-Trichloroethane						nd
Trichloroethene						nd
Trichlorofluoromethane						nd
Vinyl Chloride						nd
AROMATICS						
Benzene						nd
Chlorobenzene						nd
1,2-Dichlorobenzene						nd
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
Ethylbenzene						nd
Methyl-t-Butyl Ether						nd
Toluene						nd
Total Xylenes						nd
METALS						
Calcium						363
Magnesium						39.5
Potassium						10.1
Sodium						564
Iron						1.24
Manganese						1.04
GBR-48						
Lab pH						7.1
Lab Conductivity@25C						2700
Total Dissolved Solids (Calc)						1850
Total Alkalinity as CaCO3						176
Total Hardness as CaCO3						458
Bicarbonate as HCO3						175
Carbonate as CO3						nd

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Hydroxide						nd
Chloride						140
Sulfate						820
Calcium						174
Magnesium						18.1
Potassium						7.27
Sodium						293
HALOCARBONS						
Bromodichloromethane						nd
Bromoform						nd
Bromomethane						nd
Carbon Tetrachloride						nd
Chloroethane						nd
Chloroform						nd
Chloromethane						nd
Dibromochloromethane						nd
1,2-Dibromomethane (EDB)						nd
1,2-Dichlorobenzene						nd
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
1,1-Dichloroethane						nd
1,2-Dichloroethane (EDC)						nd
1,1-Dichloroethene						nd
trans-1,2-Dichloroethene						nd
1,2-Dichloropropane						nd
cis-1,2-Dichloropropene						nd
trans-1,2-Dichloropropene						nd
Methylene Chloride						nd
1,1,2,2-Tetrachloroethane						nd
Tetrachloroethane						nd
1,1,1-Trichloroethane						nd
1,1,2-Trichloroethane						nd
Trichloroethene						nd
Trichlorofluoromethane						nd
Vinyl Chloride						nd
AROMATICS						
Benzene						nd
Chlorobenzene						nd
1,2-Dichlorobenzene						nd

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1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
Ethylbenzene						nd
Methyl-t-Butyl Ether						nd
Toluene						nd
Total Xylenes						nd
METALS						
Calcium						174
Magnesium						18.1
Potassium						7.27
Sodium						293
Iron						7.77
Manganese						0.457
GBR-49						
Lab pH						6.4
Lab Conductivity@25C						4520
Total Dissolved Solids (Calc)						3460
Total Alkalinity as CaCO3						112
Total Hardness as CaCO3						1060
Bicarbonate as HCO3						112
Carbonate as CO3						nd
Hydroxide						nd
Chloride						280
Sulfate						2200
Calcium						406
Magnesium						38.8
Potassium						13.5
Sodium						495
HALOCARBONS						
Bromodichloromethane						nd
Bromoform						nd
Bromomethane						nd
Carbon Tetrachloride						nd
Chloroethane						nd
Chloroform						nd
Chloromethane						nd
Dibromochloromethane						nd
1,2-Dibromomethane (EDB)						nd

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1,2-Dichlorobenzene						nd
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
1,1-Dichloroethane						nd
1,2-Dichloroethane (EDC)						nd
1,1-Dichloroethene						nd
trans-1,2-Dichloroethene						nd
1,2-Dichloropropane						nd
cis-1,2-Dichloropropene						nd
trans-1,2-Dichloropropene						nd
Methylene Chloride						nd
1,1,2,2-Tetrachloroethane						nd
Tetrachloroethane						0.6
1,1,1-Trichloroethane						nd
1,1,2-Trichloroethane						nd
Trichloroethene						nd
Trichlorofluoromethane						nd
Vinyl Chloride						nd
AROMATICS						
Benzene						5.4
Chlorobenzene						nd
1,2-Dichlorobenzene						nd
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
Ethylbenzene						nd
Methyl-t-Butyl Ether						nd
Toluene						nd
Total Xylenes						nd
METALS						
Calcium						406
Magnesium						38.8
Potassium						13.5
Sodium						495
Iron						120
Manganese						5.91
GBR-50						
Lab pH						6.7
Lab Conductivity@25C						3510

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Total Dissolved Solids (Calc)						2600
Total Alkalinity as CaCO ₃						225
Total Hardness as CaCO ₃						956
Bicarbonate as HCO ₃						224
Carbonate as CO ₃						nd
Hydroxide						nd
Chloride						61
Sulfate						1700
Calcium						378
Magnesium						5.73
Potassium						326
Sodium						
HALOCARBONS						nd
Bromodichloromethane						nd
Bromoform						nd
Bromomethane						nd
Carbon Tetrachloride						nd
Chloroethane						nd
Chloroform						nd
Chloromethane						nd
Dibromochloromethane						nd
1,2-Dibromomethane (EDB)						nd
1,2-Dichlorobenzene						nd
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
1,1-Dichloroethane						nd
1,2-Dichloroethane (EDC)						nd
1,1-Dichloroethene						nd
trans-1,2-Dichloroethene						nd
1,2-Dichloropropane						nd
cis-1,2-Dichloropropene						nd
trans-1,2-Dichloropropene						nd
Methylene Chloride						nd
1,1,2,2-Tetrachloroethane						nd
Tetrachloroethane						nd
1,1,1-Trichloroethane						nd
1,1,2-Trichloroethane						nd
Trichloroethene						nd
Trichlorofluoromethane						nd
Vinyl Chloride						nd



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AROMATICS						
Benzene						nd
Chlorobenzene						nd
1,2-Dichlorobenzene						nd
1,3-Dichlorobenzene						nd
1,4-Dichlorobenzene						nd
Ethylbenzene						nd
Methyl-t-Butyl Ether						nd
Toluene						nd
Total Xylenes						nd
METALS						
Calcium						378
Magnesium						28.9
Potassium						9.04
Sodium						326
Iron						5.73
Manganese						0.373
GBR-51						
Lab pH	8.1					
Lab Conductivity@25C	3290					
Total Dissolved Solids (Calc)	2620					
Total Alkalinity as CaCO3	215					
Total Hardness as CaCO3	1120					
Bicarbonate as HCO3	214					
Carbonate as CO3	nd					
Hydroxide	nd					
Chloride	nd					
Sulfate	1570					
Calcium	398					
Magnesium	30.6					
Potassium	9.53					
Sodium	282					
HALOCARBONS						
Bromodichloromethane	nd					
Bromoform	nd					
Bromomethane	nd					



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Carbon Tetrachloride	nd					
Chloroethane	nd					
Chloroform	nd					
Chloromethane	nd					
Dibromochloromethane	nd					
1,2-Dibromomethane (EDB)	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
1,1-Dichloroethane	nd					
1,2-Dichloroethane (EDC)	nd					
1,1-Dichloroethene	nd					
trans-1,2-Dichloroethene	nd					
1,2-Dichloropropane	nd					
cis-1,2-Dichloropropene	nd					
trans-1,2-Dichloropropene	nd					
Methylene Chloride	nd					
1,1,2,2-Tetrachloroethane	nd					
Tetrachloroethane	nd					
1,1,1-Trichloroethane	nd					
1,1,2-Trichloroethane	nd					
Trichloroethene	nd					
Trichlorofluoromethane	nd					
Vinyl Chloride	nd					
AROMATICIS						
Benzene	nd					
Chlorobenzene	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
Ethylbenzene	nd					
Methyl-t-Butyl Ether	nd					
Toluene	nd					
Total Xylenes	nd					
GBR-52						
Lab pH	8.1					
Lab Conductivity@25C	2920					
Total Dissolved Solids (Calc)	2280					
Total Alkalinity as CaCO3	203					



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Total Hardness as CaCO3	971					
Bicarbonate as HCO3	202					
Carbonate as CO3	nd					
Hydroxide	nd					
Chloride	nd					
Sulfate	1370					
Calcium	344					
Magnesium	27.3					
Potassium	9.70					
Sodium	253					
HALOCARBONS						
Bromodichloromethane	nd					
Bromoform	nd					
Bromomethane	nd					
Carbon Tetrachloride	nd					
Chloroethane	nd					
Chloroform	nd					
Chloromethane	nd					
Dibromochloromethane	nd					
1,2-Dibromomethane (EDB)	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
1,1-Dichloroethane	nd					
1,2-Dichloroethane (EDC)	nd					
1,1-Dichloroethene	nd					
trans-1,2-Dichloroethene	nd					
1,2-Dichloropropane	nd					
cis-1,2-Dichloropropene	nd					
trans-1,2-Dichloropropene	nd					
Methylene Chloride	nd					
1,1,2,2-Tetrachloroethane	nd					
Tetrachloroethane	nd					
1,1,1-Trichloroethane	nd					
1,1,2-Trichloroethane	nd					
Trichloroethene	nd					
Trichlorofluoromethane	nd					
Vinyl Chloride	nd					
AROMATICS						

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Benzene	nd					
Chlorobenzene	nd					
1,2-Dichlorobenzene	nd					
1,3-Dichlorobenzene	nd					
1,4-Dichlorobenzene	nd					
Ethylbenzene	nd					
Methyl-t-Butyl Ether	nd					
Toluene	nd					
Total Xylenes	nd					
SHS-9						
HALOCARBONS						
Bromodichloromethane					nd	
Bromoform					nd	
Bromomethane					nd	
Carbon Tetrachloride					nd	
Chloroethane					nd	
Chloroform					nd	
Chloromethane					nd	
Dibromochloromethane					nd	
1,2-Dibromomethane (EDB)					nd	
1,2-Dichlorobenzene					nd	
1,3-Dichlorobenzene					nd	
1,4-Dichlorobenzene					nd	
1,1-Dichloroethane					nd	
1,2-Dichloroethane (EDC)					nd	
1,1-Dichloroethene					nd	
trans-1,2-Dichloroethene					nd	
1,2-Dichloropropane					nd	
cis-1,2-Dichloropropene					nd	
trans-1,2-Dichloropropene					nd	
Methylene Chloride					nd	
1,1,2,2-Tetrachloroethane					nd	
Tetrachloroethane					nd	
1,1,1-Trichloroethane					nd	
1,1,2-Trichloroethane					nd	
Trichloroethene					nd	
Trichlorofluoromethane					nd	
Vinyl Chloride					nd	
AROMATICS						

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Benzene					nd	
Chlorobenzene					nd	
1,2-Dichlorobenzene					nd	
1,3-Dichlorobenzene					nd	
1,4-Dichlorobenzene					nd	
Ethylbenzene					nd	
Methyl-t-Butyl Ether					nd	
Toluene					nd	
Total Xylenes					nd	
SHS-18						
Lab pH	9					
Lab Conductivity@25C	2500					
Total Dissolved Solids (Calc)	1530					
Total Alkalinity as CaCO3	897					
Total Hardness as CaCO3	385					
Bicarbonate as HCO3	893					
Carbonate as CO3	3.63					
Hydroxide	nd					
Chloride	111					
Sulfate	109					
Calcium	129					
Magnesium	15.4					
Potassium	4.56					
Sodium	354					
HALOCARBONS						
Bromodichloromethane	nd				nd	
Bromoform	nd				nd	
Bromomethane	nd				nd	
Carbon Tetrachloride	nd				nd	
Chloroethane	nd				nd	
Chloroform	nd				nd	
Chloromethane	nd				nd	
Dibromochloromethane	nd				nd	
1,2-Dibromomethane (EDB)	nd				nd	
1,2-Dichlorobenzene	nd				nd	
1,3-Dichlorobenzene	nd				nd	
1,4-Dichlorobenzene	nd				nd	
1,1-Dichloroethane	nd				nd	



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1,2-Dichloroethane (EDC)	nd				nd	
1,1-Dichloroethene	nd				nd	
trans-1,2-Dichloroethene	nd				nd	
1,2-Dichloropropane	nd				nd	
cis-1,2-Dichloropropene	nd				nd	
trans-1,2-Dichloropropene	nd				nd	
Methylene Chloride	nd				nd	
1,1,2,2-Tetrachloroethane	nd				nd	
Tetrachloroethane	nd				nd	
1,1,1-Trichloroethane	nd				nd	
1,1,2-Trichloroethane	nd				nd	
Trichloroethene	nd				nd	
Trichlorofluoromethane	nd				nd	
Vinyl Chloride	nd				nd	
AROMATICS						
Benzene	nd				nd	
Chlorobenzene	nd				nd	
1,2-Dichlorobenzene	nd				nd	
1,3-Dichlorobenzene	nd				nd	
1,4-Dichlorobenzene	nd				nd	
Ethylbenzene	0.5				nd	
Methyl-t-Butyl Ether	nd				nd	
Toluene	nd				nd	
Total Xylenes	nd				nd	
<u>SHS-19</u>						
Lab pH	7.2					
Lab Conductivity@25C	2600					
Total Dissolved Solids (Calc)	1650					
Total Alkalinity as CaCO3	786					
Total Hardness as CaCO3	423					
Bicarbonate as HCO3	785					
Carbonate as CO3	1.80					
Hydroxide	nd					
Chloride	85.6					
Sulfate	460					
Calcium	135					
Magnesium	20.8					
Potassium	7.16					
Sodium	370					



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HALOCARBONS						
Bromodichloromethane	nd				nd	
Bromoform	nd				nd	
Bromomethane	nd				nd	
Carbon Tetrachloride	nd				nd	
Chloroethane	nd				nd	
Chloroform	nd				nd	
Chloromethane	nd				nd	
Dibromochloromethane	nd				nd	
1,2-Dibromomethane (EDB)	nd				nd	
1,2-Dichlorobenzene	nd				nd	
1,3-Dichlorobenzene	nd				nd	
1,4-Dichlorobenzene	nd				nd	
1,1-Dichloroethane	nd				nd	
1,2-Dichloroethane (EDC)	nd				nd	
1,1-Dichloroethene	nd				nd	
trans-1,2-Dichloroethene	nd				nd	
1,2-Dichloropropane	nd				nd	
cis-1,2-Dichloropropene	nd				nd	
trans-1,2-Dichloropropene	nd				nd	
Methylene Chloride	nd				nd	
1,1,2,2-Tetrachloroethane	nd				nd	
Tetrachloroethane	nd				nd	
1,1,1-Trichloroethane	nd				nd	
1,1,2-Trichloroethane	nd				nd	
Trichloroethene	nd				nd	
Trichlorofluoromethane	nd				nd	
Vinyl Chloride	nd				nd	
AROMATICS						
Benzene	nd				nd	
Chlorobenzene	nd				nd	
1,2-Dichlorobenzene	nd				nd	
1,3-Dichlorobenzene	nd				nd	
1,4-Dichlorobenzene	nd				nd	
Ethylbenzene	nd				nd	
Methyl-t-Butyl Ether	nd				nd	
Toluene	nd				nd	
Total Xylenes	nd				nd	

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	JAN 2007	APR 2007	JUL 2007	OCT 2007	NOV 2007	DEC 2006
NOTES: *First quarter sampling was conducted in December 2006.						



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4.0 Water and Product Levels

Groundwater monitoring wells have been installed throughout the site of the former refinery to monitor groundwater quality and flow direction (Figure 2). Water and product levels in each well are determined quarterly. These data are presented in tables 4 and 5 and are utilized to prepare the potentiometric surface maps shown in figures 5-8. The contours on the maps represent the groundwater surface elevation. The rate of groundwater flow is, on average, 0.633 ft/ft in a southwest direction, and is consistent throughout the year. Wells containing measurable product levels are fitted with oil-absorbent socks, which are replaced as necessary. Free-phase product is consistently measured in GBR-23 and GBR-25 (Table 5).

Table 4. Giant Industries, Inc. Bloomfield Refinery 2007 Quarterly Water Levels

Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
January 2007					
GRW-1	5394.30	54.62	-	-	5339.68
GRW-2	5391.28	49.65	-	-	5341.63
GRW-3	5388.77	53.12	-	-	5335.65
GRW-4	5390.02	58.99	-	-	5331.03
GRW-5	5390.56	64.88	-	-	5325.68
GRW-6	5390.81	48.28	-	-	5342.53
GRW-9	5395.70	53.03	-	-	5342.67
GRW-10	5395.02	58.95	58.84	0.01	5336.07
GRW-11	5397.85	57.86	-	-	5339.99
GRW-12	5397.24	water beneath pump	-	-	water beneath pump
GRW-13	5396.90	52.46	-	-	5344.44
GBR-5	5395.07	26.77	-	-	5368.3
GBR-7	5395.85	28.89	-	-	5366.96
GBR-8	5390.50	42.04	-	-	5348.46
GBR-9	5389.92	47.59	-	-	5342.33
GBR-10	5390.57	42.58	-	-	5347.99
GBR-11	5389.43	42.62	-	-	5346.81
GBR-13	5393.04	42.56	-	-	5350.48
GBR-15	5397.99	41.02	-	-	5356.97



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Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
GBR-18	5421.68	55.33	-	-	5366.35
GBR-19	5393.83	43.33	42.85	0.38	5350.5
GBR-20	5393.47	35.94	-	-	5357.53
GBR-21S	5400.65	26.22	-	-	5374.43
GBR-21D	5400.19	41.02	-	-	5359.17
GBR-22	5395.91	dry	-	-	dry
GBR-23	5403.72	29.7	29.68	0.02	5374.036
GBR-24S	5396.08	33.52	-	-	5362.56
GBR-24D	5396.77	34.93	-	-	5361.84
GBR-25	5396.72	38.68	37.83	0.85	5358.72
GBR-26	5395.59	38.09	-	-	5357.5
GBR-30	5396.58	36.44	-	-	5360.14
GBR-31	5394.86	37.53	-	-	5357.33
GBR-33†	5396.28	39.72	-	-	5356.56
GBR-34	5394.00	39.98			5354.02
GBR-35	5393.66	39.86			5353.8
GBR-39	5397.55	40.26	-	-	5357.29
GBR-40	5400.76	32.37	-	-	5368.39
GBR-41	5396.35	27.1	-	-	5369.25
GBR-51	5389.68	44.09	-	-	5345.59
GBR-52	5387.74	41.77	-	-	5345.97
SHS-1	5383.54	40.69	-	-	5342.85
SHS-2	5381.66	31.12	-	-	5350.54
SHS-3	5383.33	dry	-	-	-
SHS-4	5383.62	43.1	-	-	5340.52
SHS-5	5378.36	39.93	-	-	5338.43
SHS-6	5378.17	39.96	-	-	5338.21
SHS-8	5380.25	40.5	-	-	5339.75
SHS-9	5380.79	39.59	-	-	5341.2
SHS-10	5373.80	37.93	-	-	5335.87
SHS-12	5373.94	40.73	-	-	5333.21
SHS-13	5367.81	no access	-	-	no access
SHS-14	5367.07	35.46	-	-	5331.61
SHS-15	5366.21	35.36	-	-	5330.85
SHS-16	5362.58	33.12	-	-	5329.46
SHS-17	5364.35	34.46	-	-	5329.89
SHS-18	5373.64	40.97	-	-	5332.67

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Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
SHS-19	5378.89	43.56	-	-	5335.33
April 2007					
GRW-1	5394.30	53.67	-	-	5340.63
GRW-2	5391.28	42.15	-	-	5349.13
GRW-3	5388.77	54.11	-	-	5334.66
GRW-4	5390.02	58.35	-	-	5331.67
GRW-5	5390.56	64.65	-	-	5325.91
GRW-6	5390.81	48.38	-	-	5342.43
GRW-9	5395.70	48.07	-	-	5347.63
GRW-10	5395.02	53.35			5341.67
GRW-11	5397.85	36.32	-	-	5361.53
GRW-12	5397.24	water beneath pump	-	-	water beneath pump
GRW-13	5396.90	55.33	-	-	5341.57
GBR-5	5395.07	27.7	-	-	5367.37
GBR-7	5395.85	29.47	-	-	5366.38
GBR-8	5390.50	41.76	-	-	5348.74
GBR-9	5389.92	47.45	-	-	5342.47
GBR-10	5390.57	42.54	-	-	5348.03
GBR-11	5389.43	42.05	-	-	5347.38
GBR-13	5393.04	42.16	-	-	5350.88
GBR-15	5397.99	37.76	-	-	5360.23
GBR-18	5421.68	36.53	-	-	5385.15
GBR-19	5393.83	41.65	-	-	5352.18
GBR-20	5393.47	36.83	-	-	5356.64
GBR-21S	5400.65	27.04	-	-	5373.61
GBR-21D	5400.19	38.89	-	-	5361.3
GBR-22	5395.91	dry	-	-	dry
GBR-23	5403.72	30.44	30.36	0.08	5373.344
GBR-24S	5396.08	32.4	-	-	5363.68
GBR-24D	5396.77	33.53	-	-	5363.24
GBR-25	5396.72	38.25	37.74	0.51	5358.878
GBR-26	5395.59	34.84	-	-	5360.75
GBR-30	5396.58	35.7	-	-	5360.88
GBR-31	5394.86	36.54	-	-	5358.32
GBR-33†	5396.28	38.18	-	-	5358.1
GBR-34	5394.00	38.29	-	-	5355.71

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GBR-35	5393.66	38.33	-	-	5355.33
GBR-39	5397.55	37.33	-	-	5360.22
GBR-40	5400.76	32.28	-	-	5368.48
GBR-41	5396.35	37.61	-	-	5358.74
GBR-51	5389.68	42.48	-	-	5347.2
GBR-52	5387.74	40.39	-	-	5347.35
SHS-1	5383.54	39.91	-	-	5343.63
SHS-2	5381.66	39.56	-	-	5342.1
SHS-3	5383.33	dry	-	-	dry
SHS-4	5383.62	42.33	-	-	5341.29
SHS-5	5378.36	39.34	-	-	5339.02
SHS-6	5378.17	37.05	-	-	5341.12
SHS-8	5380.25	39.73	-	-	5340.52
SHS-9	5380.79	38.33	-	-	5342.46
SHS-10	5373.80	36.42	-	-	5337.38
SHS-12	5373.94	39.67	-	-	5334.27
SHS-13	5367.81	no access	-	-	no access
SHS-14	5367.07	34.33	-	-	5332.74
SHS-15	5366.21	33.11	-	-	5333.1
SHS-16	5362.58	30.92	-	-	5331.66
SHS-17	5364.35	32.89	-	-	5331.46
SHS-18	5373.64	39.66	-	-	5333.98
SHS-19	5378.89	40.32	-	-	5338.57
July 2007					
GRW-1	5394.30	41.63	-	-	5352.67
GRW-2	5391.28	42.46	-	-	5348.82
GRW-3	5388.77	44.54	-	-	5344.23
GRW-4	5390.02	54.76	-	-	5335.26
GRW-5	5390.56	48.98	-	-	5341.58
GRW-6	5390.81	50.27	-	-	5340.54
GRW-9	5395.70	49.15	-	-	5346.55
GRW-10	5395.02	43.37	-	-	5351.65
GRW-11	5397.85	34.53	-	-	5363.32
GRW-12	5397.24	41.97	-	-	5355.27
GRW-13	5396.90	46.91	-	-	5349.99
GBR-5	5395.07	29.91	-	-	5365.16
GBR-7	5395.85	31.33	-	-	5364.52

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Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
GBR-8	5390.50	42.7	-	-	5347.8
GBR-9	5389.92	47.29	-	-	5342.63
GBR-10	5390.57	42.51	-	-	5348.06
GBR-11	5389.43	42.6	-	-	5346.83
GBR-13	5393.04	42.89	-	-	5350.15
GBR-15	5397.99	37.42	-	-	5360.57
GBR-18	5421.68	37.02	-	-	5384.66
GBR-19	5393.83	41.44	-	-	5352.39
GBR-20	5393.47	38.28	-	-	5355.19
GBR-21S	5400.65	28.86	-	-	5371.79
GBR-21D	5400.19	38.44	-	-	5361.75
GBR-22	5395.91	38.76	38.46	0.3	5357.39
GBR-23	5403.72	30.57	-	-	5373.15
GBR-24S	5396.08	32.25	-	-	5363.83
GBR-24D	5396.77	33.25	-	-	5363.52
GBR-25	5396.72	38.66	37.72	0.94	5358.812
GBR-26	5395.59	34.57	-	-	5361.02
GBR-30	5396.58	35.63	-	-	5360.95
GBR-31	5394.86	36.12	-	-	5358.74
GBR-33†	5396.28	37.58	-	-	5358.7
GBR-34	5394.00	37.59	-	-	5356.41
GBR-35	5393.66	37.7	-	-	5355.96
GBR-39	5397.55	36.94	-	-	5360.61
GBR-40	5400.76	32.83	-	-	5367.93
GBR-41	5396.35	28.64	-	-	5367.71
GBR-51	5389.68	42.49	-	-	5347.19
GBR-52	5387.74	40.34	-	-	5347.4
SHS-1	5383.54	40.04	-	-	5343.5
SHS-2	5381.66	40.17	-	-	5341.49
SHS-3	5383.33	dry	-	-	dry
SHS-4	5383.62	42.43	-	-	5341.19
SHS-5	5378.36	39.28	-	-	5339.08
SHS-6	5378.17	39.28	-	-	5338.89
SHS-8	5380.25	39.97	-	-	5340.28
SHS-9	5380.79	38.65	-	-	5342.14
SHS-10	5373.80	37.11	-	-	5336.69
SHS-12	5373.94	40.16	-	-	5333.78

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Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
SHS-13	5367.81	no access	-	-	no access
SHS-14	5367.07	35.02	-	-	5332.05
SHS-15	5366.21	33.87	-	-	5332.34
SHS-16	5362.58	31.55	-	-	5331.03
SHS-17	5364.35	33.42	-	-	5330.93
SHS-18	5373.64	40.21	-	-	5333.43
SHS-19	5378.89	39.98	-	-	5338.91
October 2007					
GRW-1	5394.30	61	-	-	5333.3
GRW-2	5391.28	49.92	-	-	5341.36
GRW-3	5388.77	45.24	-	-	5343.53
GRW-4	5390.02	43.53	-	-	5346.49
GRW-5	5390.56	64.3	-	-	5326.26
GRW-6	5390.81	50.67	-	-	5340.14
GRW-9	5395.70	45.11	-	-	5350.59
GRW-10	5395.02	39.38	-	-	5355.64
GRW-11	5397.85	34.12	-	-	5363.73
GRW-12	5397.24	43.68	-	-	5353.56
GRW-13	5396.90	51.27	-	-	5345.63
GBR-5	5395.07	30.13	-	-	5364.94
GBR-7	5395.85	32.48	-	-	5363.37
GBR-8	5390.50	43.41	-	-	5347.09
GBR-9	5389.92	43.7	-	-	5346.22
GBR-10	5390.57	42.57	-	-	5348
GBR-11	5389.43	43.03	-	-	5346.4
GBR-13	5393.04	43.29	-	-	5349.75
GBR-15	5397.99	36.97	-	-	5361.02
GBR-18	5421.68	27.28	-	-	5394.4
GBR-19	5393.13	40.23	-	-	5353.6
GBR-20	5393.47	38.73	-	-	5354.74
GBR-21S	5400.65	26.68	-	-	5373.97
GBR-21D	5400.19	37.93	-	-	5362.26
GBR-22	5395.91	39.95	-	-	5355.96
GBR-23	5403.72	30.01	-	-	5373.71
GBR-24S	5396.08	31.53	-	-	5364.55
GBR-24D	5396.77	32.8	-	-	5363.97
GBR-25	5396.72	36.93	-	-	5359.79

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Well #	Wellhead Elevation (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted WSEL* (ft)
GBR-26	5395.59	35.28	-	-	5360.31
GBR-30	5396.58	36.31	-	-	5360.27
GBR-31	5393.69	35.76	-	-	5359.1
GBR-33†	5396.28	37.22	-	-	5359.06
GBR-34	5394.00	37.23	-	-	5356.77
GBR-35	5393.66	37.44	-	-	5356.22
GBR-39	5397.55	36.47	-	-	5361.08
GBR-40	5400.76	33.73	-	-	5367.03
GBR-41	5396.35	29.63	-	-	5366.72
GBR-51	5389.68	42.46	-	-	5347.22
GBR-52	5387.74	40.3	-	-	5347.44
SHS-1	5383.54	40.27	-	-	5343.27
SHS-2	5381.66	40.63	-	-	5341.03
SHS-3	5383.33	37.07	-	-	5346.26
SHS-4	5383.62	42.57	-	-	5341.05
SHS-5	5378.36	39.77	-	-	5338.59
SHS-6	5378.17	39.55	-	-	5338.62
SHS-8	5380.25	40.18	-	-	5340.07
SHS-9	5380.79	39.03	-	-	5341.76
SHS-10	5373.80	37.41	-	-	5336.39
SHS-12	5373.94	40.67	-	-	5333.27
SHS-13	5367.81	no access	-	-	no access
SHS-14	5367.07	35.52	-	-	5331.55
SHS-15	5366.21	34.45	-	-	5331.76
SHS-16	5362.58	32.02	-	-	5330.56
SHS-17	5364.35	33.9	-	-	5330.45
SHS-18	5373.64	40.7	-	-	5332.94
SHS-19	5378.89	40.62	-	-	5338.27
*WSEL = Water Surface Elevation Adjusted for Product Depth using 0.8 g/ml.					
† Wellhead elevation has not been corrected after road construction.					

Table 5. Giant Industries, Inc. Bloomfield Refinery Quarterly Product Levels



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Well #	Product Thickness (ft) January 2007	Product Thickness (ft) April 2007	Product Thickness (ft) July 2007	Product Thickness (ft) October 2007
GBR-22	0	0	0.3	0
GBR-23	0.02	0.08	0	0
GBR-25	0.85	0.51	0.94	0



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5.0 Total Volume History

Section 5 presents the volume of groundwater managed for the year. Total volume pumped from each well, current tank volumes and the re-injection volume is reported.

**Table 6. Giant Industries, Inc. Bloomfield Refinery
Tank Volume Change 2007**

Tank Number	Beginning Volume (Gallons)	Ending Volume (Gallons)	Change (Gallons)
102	11,830	13,312	1,482
Total Net Volume Change (Gallons):			1,482

**Table 7. Giant Industries, Inc. Bloomfield Refinery
Recovery Well Volume Tabulation 2007**

Well #	Jan-Jul	Jul-Dec	Total
GRW-1	18,273	12,415	30,688
GRW-2	18,584	33,633	52,217
GRW-3	47,011	96,782	143,793
GRW-4	47,982	28,255	76,237
GRW-5	165,163	141,887	307,050
GRW-6	104,794	221,626	326,420
GRW-9	40,819	30,876	71,695
GRW-10	928,548	187,509	1,116,057
GRW-11	22	25	47
GRW-12	8,325	15,394	18,304
GRW-13	91,321	18,217	109,538
SHS-9	0	19	19
SHS-14	24	121	145
SHS-18	0	0	0
SHS-19	143,134	200,336	343,470
Total Volume Pumped in Gallons:			2,601,095



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**Table 8. Giant Industries, Inc. Bloomfield Refinery
Total Volume Summary 2007**

Total Volume of Water Recovered:	2,601,095 gallons
Net Change in Storage Volume:	1,482 gallons
Total Water Treated and Pumped to the Infiltration Gallery:	2,599,613 gallons



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5.0 Recommendations

Regular analyses of influent and effluent water indicate the treated water at the former Bloomfield Refinery is beneath NMWQCC standards. However, quarterly monitoring of groundwater levels indicate free-phase product is present at the site. Modifications to the treatment system are warranted, but more data are required to determine appropriate actions. Recommendations include:

- Institute the proposed changes to the groundwater monitoring well sampling schedule listed in Section 1.0 and proceed with closure for the downgradient monitoring wells.
- During 2008, Western should sample all monitoring wells located north of Hwy 64 to determine existing groundwater quality.
- Once sampling results are reported, a comprehensive analysis of groundwater quality and flow characteristics should be conducted. Results of the detailed study can be used to make recommendations for modifications to the treatment system. Such a study will allow Western to pursue a more efficient approach to groundwater remediation and facilitate closure of the entire project.



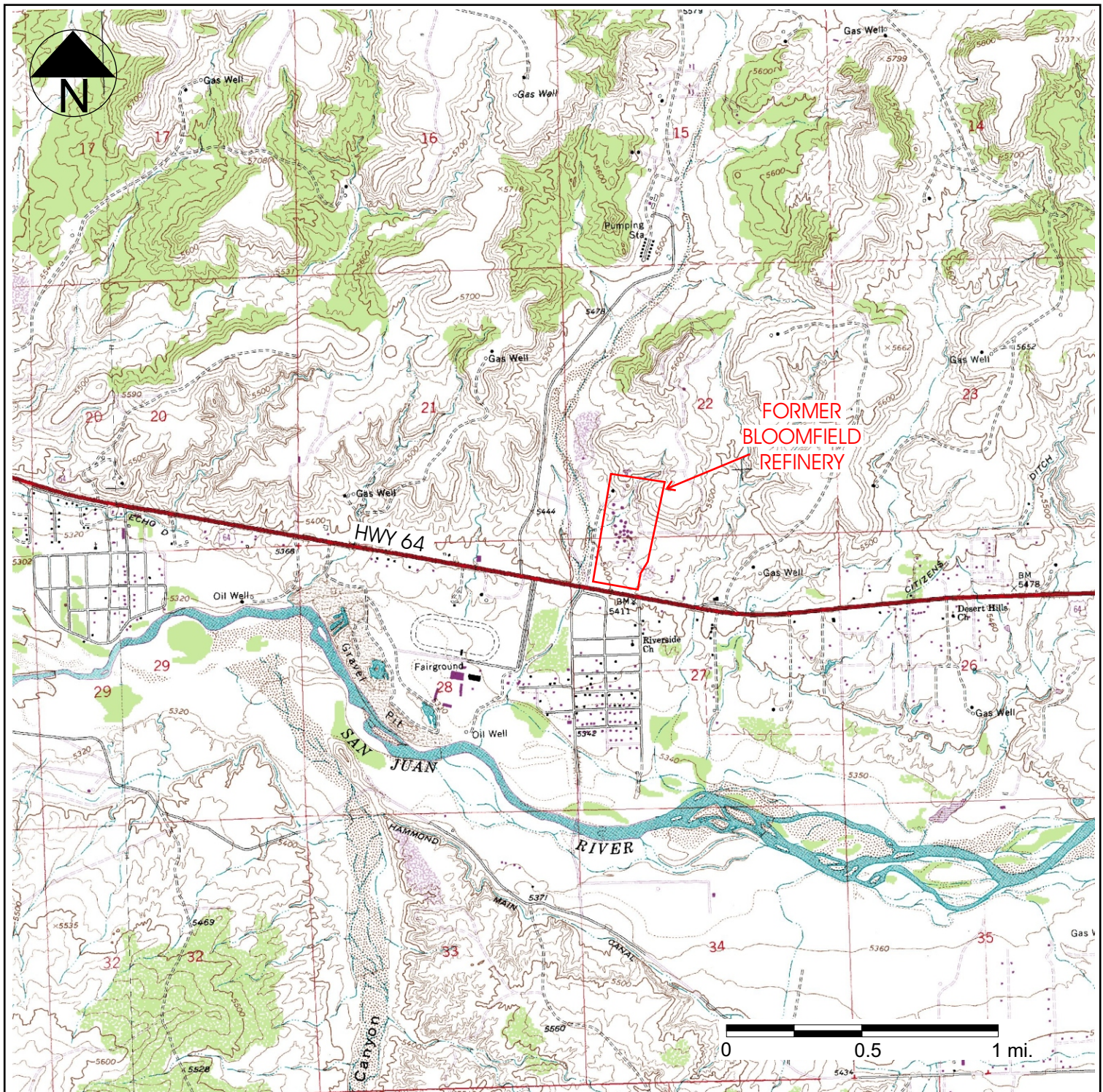
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6.0 FIGURES

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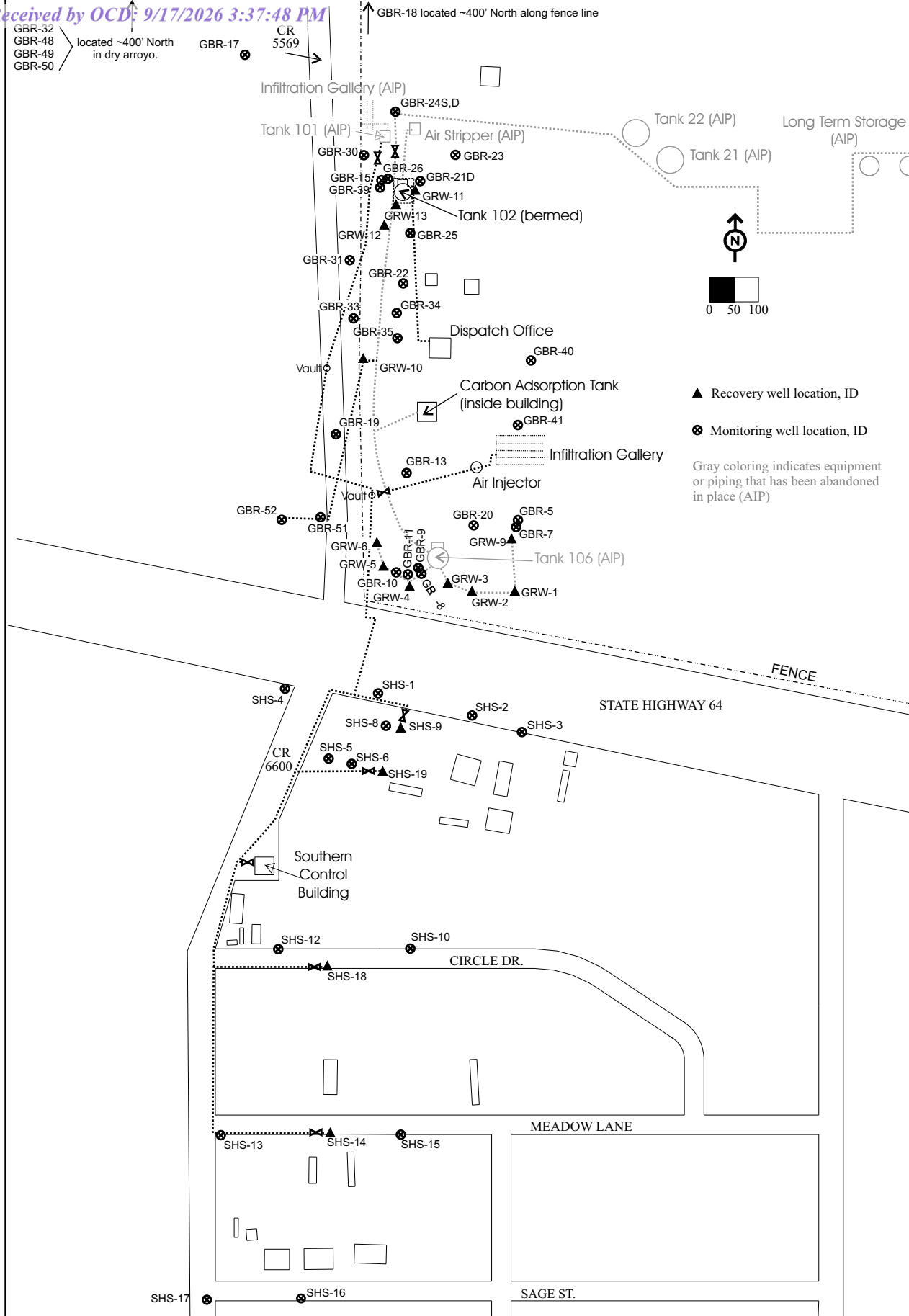



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 Farmington, NM 87499

GIANT BLOOMFIELD FORMER REFINERY
SAN JUAN COUNTY, NEW MEXICO
TOPOGRAPHIC MAP
 (USGS 1:100,000 Scale Horn Canyon, New Mexico
 Topographic Map)

PROJECT: FORMER REFINERY
ANNUAL REPORT
DRAWN BY: ALA
REVISED: 02/13/07

FIGURE 1

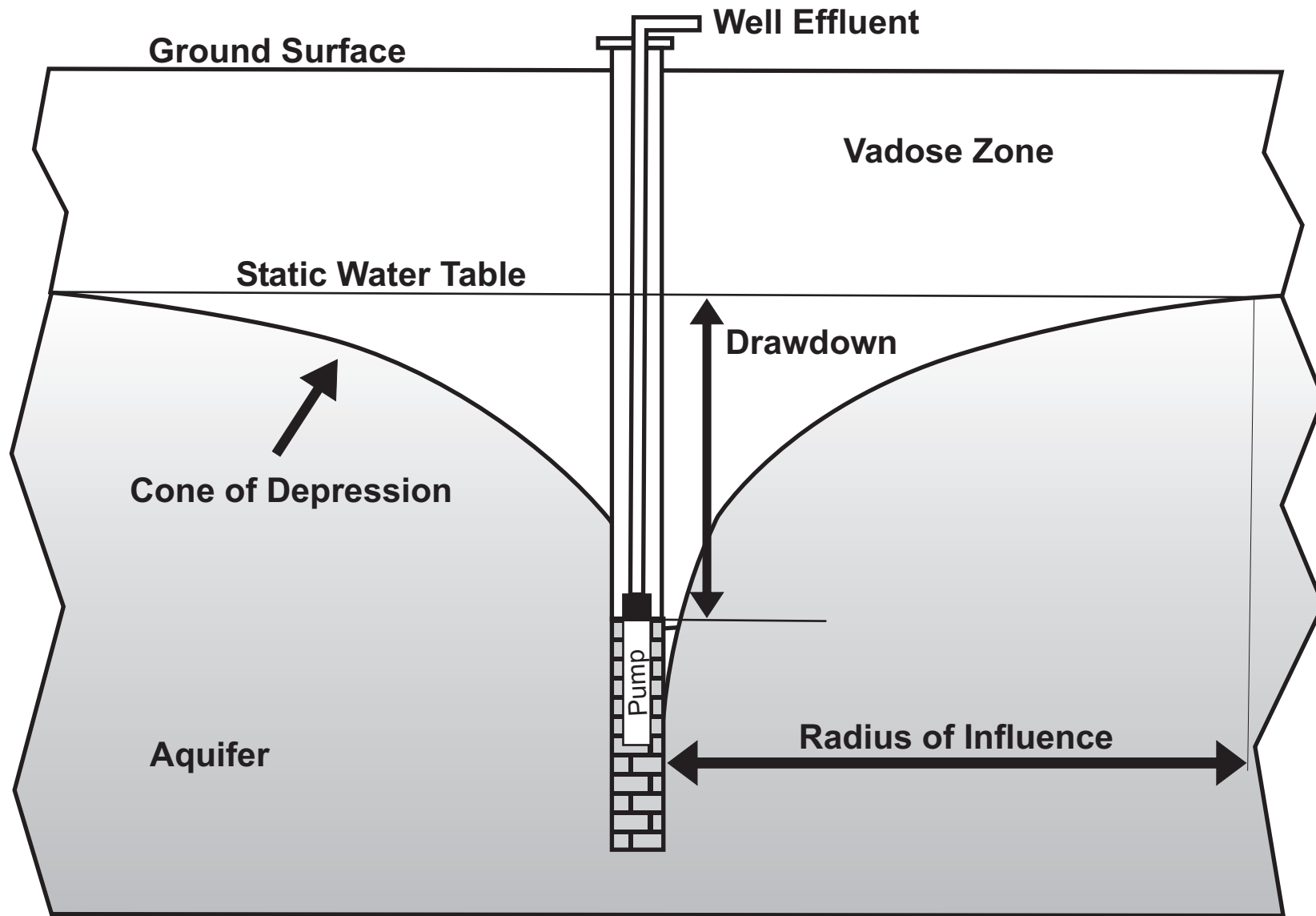


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GIANT BLOOMFIELD
FORMER REFINERY
SITE MAP

PROJECT: FORMER REFINERY
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FIGURE 2

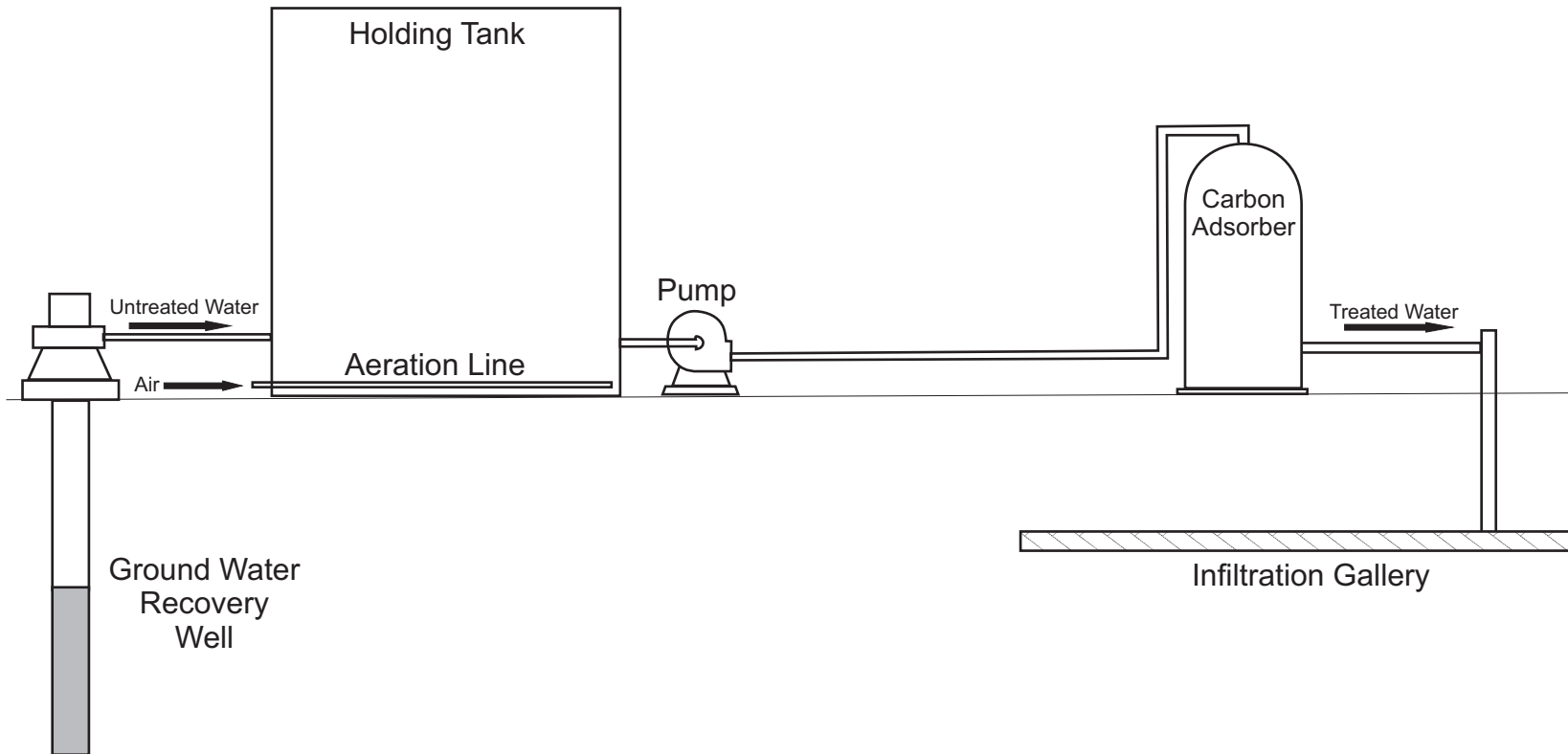


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EFFECT OF PUMPING
ON AN AQUIFER

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FIGURE 3

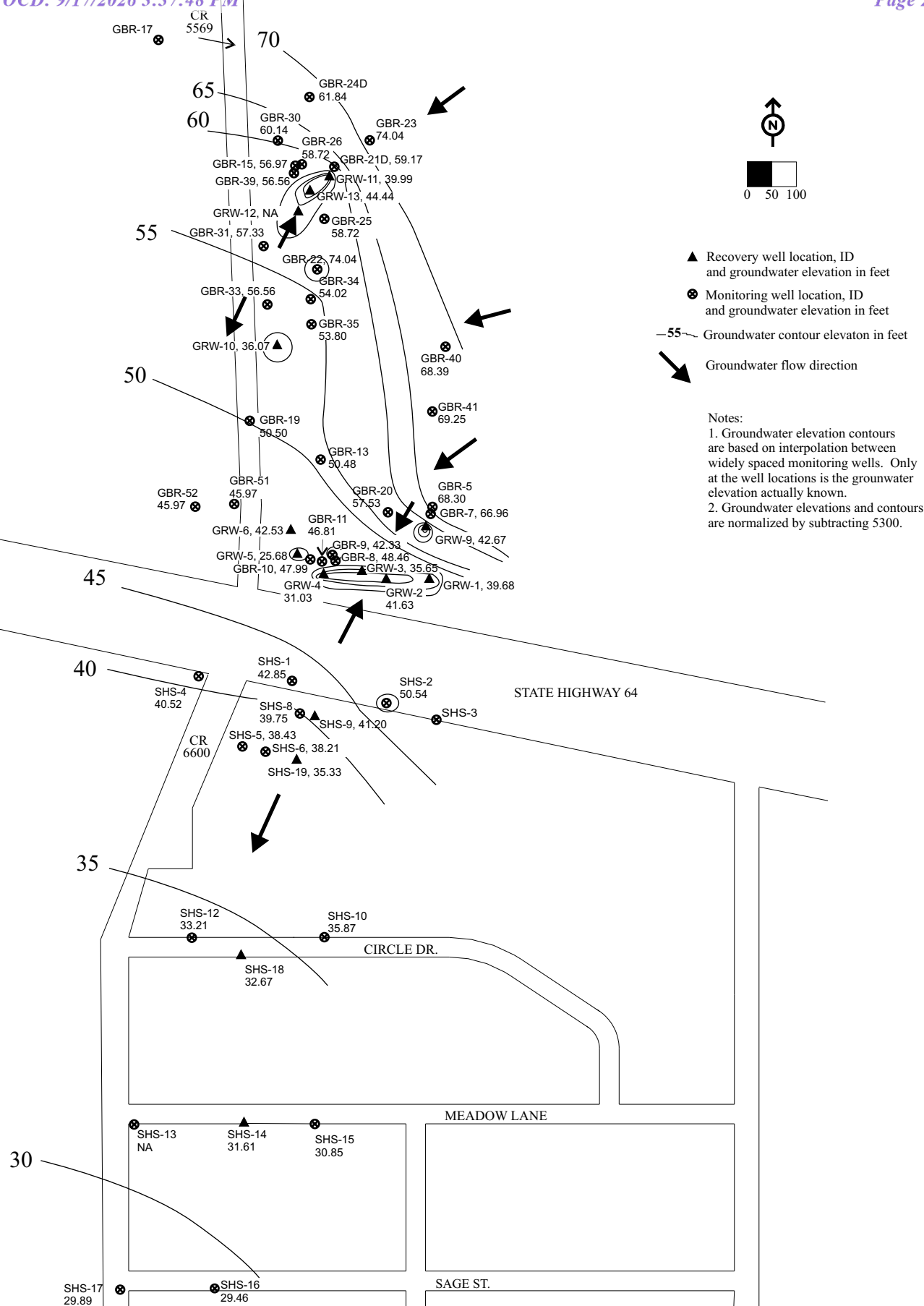


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SIMPLIFIED REPRESENTATION OF
THE GROUNDWATER RECOVERY,
TREATMENT AND DISPOSAL SYSTEM

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FIGURE4

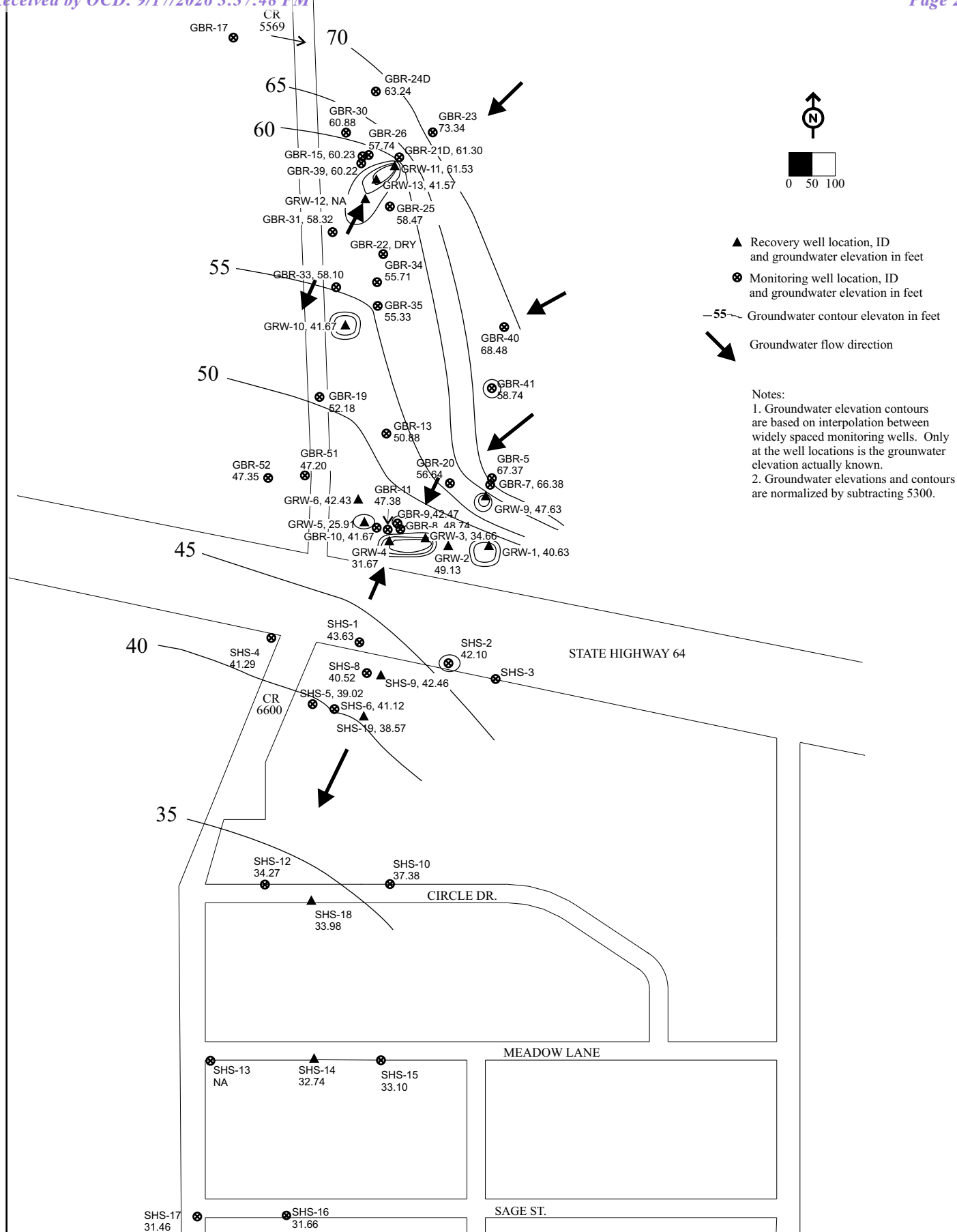


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GROUNDWATER
POTENTIOMETRIC
SURFACE MAP
JANUARY 2007

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FIGURE 5

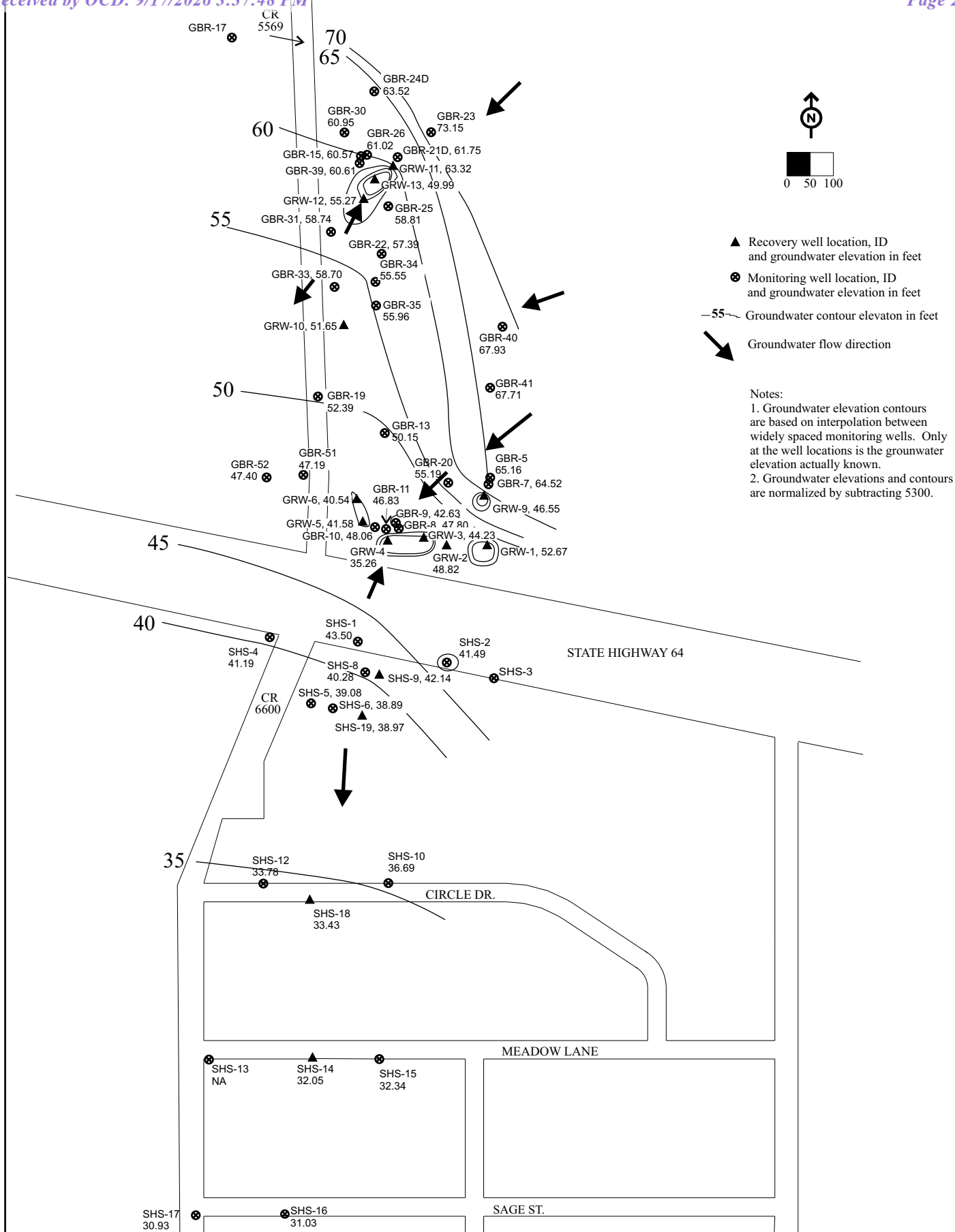


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GROUNDWATER
POTENTIOMETRIC
SURFACE MAP
APRIL 2007

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FIGURE 6

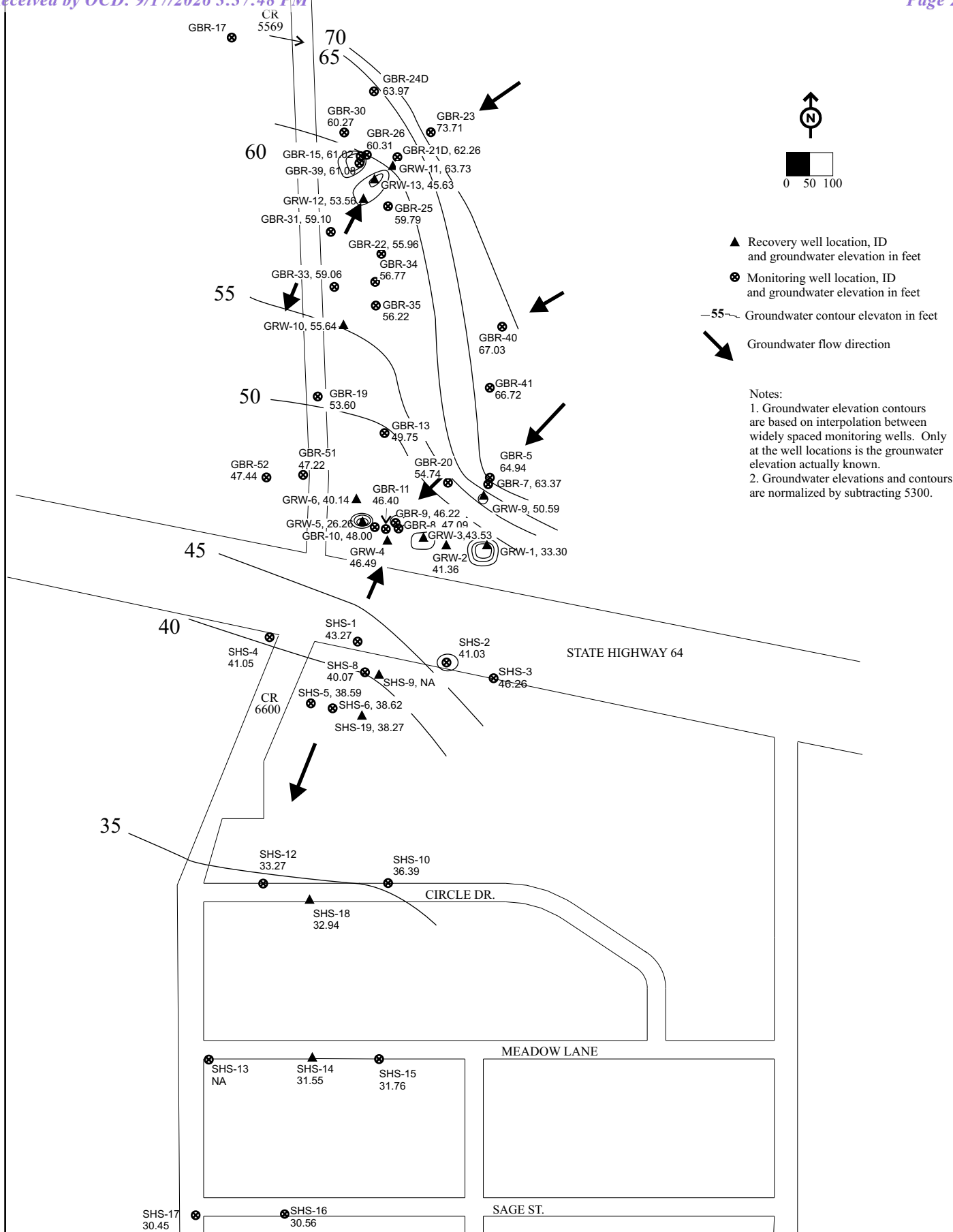


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GROUNDWATER
POTENTIOMETRIC
SURFACE MAP
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FIGURE 7



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GROUNDWATER
POTENTIOMETRIC
SURFACE MAP
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FIGURE 8

**Annual Data Report
Former Giant Bloomfield Refinery**

March 2009

Prepared For



**Western Refining, Inc.
111 CR 4990
Bloomfield, New Mexico**

 **Lodestar Services, Incorporated**
PO Box 4465, Durango, CO 81302 Office (970) 946-1093

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Introduction

The following annual report describes work completed for the groundwater remediation system at the former Giant Bloomfield Refinery, in Bloomfield, New Mexico since the previous annual report submitted in April 2008. The report contains data collected during 2008, including:

- Analytical data obtained from groundwater sampling;
- Groundwater elevations gauged in monitoring wells;
- Free-phase product levels observed in groundwater monitoring wells;
- Tank volume data.

The former refinery, currently owned by Western Refining (Western), is located in the NW $\frac{1}{4}$ of Section 27 and the SW $\frac{1}{4}$ of Section 22, Township 29 N, Range 12W in San Juan County, New Mexico. It is on the corner of Highway 64 and County Road 350, approximately 5 miles west of the town of Bloomfield, New Mexico (Figure 1). The site consists of facilities, tanks and equipment associated with operation of the former Giant Bloomfield Refinery, as well as remedial equipment, groundwater recovery wells and groundwater monitoring wells both within and south of the refinery property boundary. The refinery operated from 1974 to 1982 and is presently inactive. The refinery produced leaded and unleaded gasoline, diesel, kerosene and other refined petroleum products.

Subsequent to closure of the refinery, groundwater contamination was discovered and investigated within the refinery property. The area within the refinery is referred to as the “on-site” area. Details of the investigation and initial remediation efforts are contained in a report entitled *Soil and Groundwater Investigations and Remedial Action Plan, Giant Industries, Inc. Bloomfield Refinery, Bloomfield, New Mexico*. Additionally, evidence of contamination south of the refinery was investigated. This area is referred to as the “off-site” area. The results of the investigation and remedial plans for the off-site area are contained in three volumes of the *Off-Site Hydrogeologic Investigation*. These reports were submitted to the New Mexico Oil and Gas Conservation Division (NMOCD) and are available for review.

A groundwater recovery, treatment and disposal system was installed in stages beginning in 1988 to contain the migration of contamination in the soil and aquifer and to clean the contaminated areas from both the on-site and off-site areas. As groundwater quality improved, the system was gradually simplified.

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The current remediation system consists of a series of groundwater monitoring wells, groundwater recovery wells, water treatment facilities and a treated water infiltration trench (Figure 2). It operates under the conditions of Discharge Permit GW-040. The system processed approximately 2,026,246 gallons of water in 2008.

For several years, the groundwater remediation program has been in an operation and maintenance mode as described in the *Methodology* Section of this report. Constituents of concern (COCs) within the system's influent and effluent have been at non-detect levels. During 2008, Western began a supplemental evaluation of the remedial operations, which included shutting down the remediation system and sampling all groundwater wells under static conditions in an effort to redefine the area of impact and assess the effectiveness of the remediation system. Existing equipment was inspected and repaired to optimize system performance. Results from the sampling event are included in this report to better characterize groundwater at the site. A complete evaluation of the remedial system will be provided in a separate submittal.

Additional Background Information

The Lee Acres Landfill was located up-gradient of the former refinery and operated as a county landfill from 1962 to 1986. The landfill location is shown in Figure 1. Solid wastes were disposed in trenches, and a series of lagoons were used for disposal of a variety of liquid wastes. NMOCD sampled the lagoons in 1985 and showed the liquids in the impoundments contained a variety of chlorinated solvents, petroleum constituents, heavy metals and salts. In April 1985, a breach in the dike of the lagoons released the liquid wastes to an arroyo that flows across the refinery and the down-stream Lee Acres Subdivision (Figure 1). The NMOCD and the New Mexico Environment Department (NMED) identified contaminated water in private wells in the Lee Acres subdivision. The NMOCD required Giant to perform a groundwater investigation related to the refinery activities, and the NMED required the BLM to investigate contaminated water down-gradient of the landfill. The investigations identified two separate plumes of contaminated groundwater that became commingled across the refinery and into the Lee Acres Subdivision.

Groundwater contaminants contained in the refinery plume included free-phase and dissolved phase petroleum products. The dissolved phase constituents included benzene, toluene, ethyl-benzene and total xylenes (BTEX), naphthalene and 1,2 dichloroethane (EDC). The second groundwater contaminant plume originated from the landfill and contained 1,1 dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, tetrachloroethene, 1,1,1-trichloroethane, trichloroethene, total dissolved solids, chloride, sulfate and manganese. More information about landfill groundwater investigations can be found in the references listed at the end of this report.

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Methodology

Groundwater Filtration System

The groundwater remediation system at the former refinery is designed to pump impacted groundwater from the local aquifer through a series of recovery wells, which prevent migration of affected water beyond the influence of the wells. Figure 3 illustrates the concept. The recovered groundwater is collected in a storage tank (Tank 102) and subsequently treated. The method of treatment used at the Former Bloomfield Refinery is carbon adsorption, where recovered water is pumped into a carbon filtration tank. Inside, volatile and non-volatile organic compounds are adsorbed into a carbon matrix lining the tank.

The treated water is discharged into the aquifer through an infiltration trench. The infiltration trench consists of a subsurface distribution system placed within gravel packs. Water infiltrates the surrounding strata and eventually makes its way back to the aquifer. The return of recovered water to the aquifer serves as a recharge mechanism. Figure 4 is a simplified diagram representation of groundwater recovery, treatment and disposal at the former refinery.

Inspections and Maintenance

Regular weekly inspections are performed to assure safe and efficient operation of the remediation system. The Control Panel, located in the Dispatch Office, serves to monitor and control the operation of the treatment system, while providing alarm and shutdown functions to safeguard against overflows and other undesirable events. The Control Panel is checked weekly. An inspection is also made in the control building at Tank 102, the southern infiltration gallery and each recovery well. Treated effluent volumes and flow rates are monitored weekly with a water meter that has been installed near the carbon adsorption tank. These values are recorded and compared with previous readings to ensure normal operation. Maintenance of the system includes repair and replacement of well pumps, replacement of filters in well houses, equipment lubrication, air compressor oil changes, listening for unusual pump and motor noise, inspecting the carbon pre-filter and repairing all equipment as required. Observations are recorded in a bound field logbook with the date, time and person recording the information noted. Meter readings are entered into a spreadsheet to calculate flow volumes and monitor flow rates. All equipment is inspected for leaks and malfunctions. The operator is familiar with the location of underground lines and notes any surface indication of underground leaks. Leaks of any size are noted and repaired.

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Groundwater Monitoring

Monitoring includes regular sampling of groundwater from select groundwater wells located within and south of the refinery (Table 1). An explanation of changes to the groundwater sampling schedule since 2006 is included in Appendix A. In addition to the monitoring schedule defined in the Discharge Permit and shown in Table 1, Western sampled all of the groundwater wells under static conditions during the summer of 2008 to better characterize current groundwater conditions.

Water and product levels in each well are determined quarterly. This information is tabulated and utilized to prepare potentiometric surface maps. Oil absorbent socks are installed in all monitoring wells containing free-phase hydrocarbons. These socks are checked quarterly and replaced as necessary. The amount of product recovered by the socks is noted each time the socks are replaced.

Influent water is collected from a system valve before it enters storage Tank 102. Samples of effluent water are collected through a sample valve as treated water exits the carbon adsorption tank. Water is collected in appropriate pre-cleaned and/or pre-preserved sample bottles or glass vials. For EPA methods 601/602 and 8260B analyses, vials are filled and capped with no air inside to prevent degradation of the sample. Samples are labeled with the date and time of collection, sample designation, project name, collector's name and parameters to be analyzed. They are immediately sealed and packed on ice. The samples are shipped to a laboratory in Albuquerque, NM in a sealed cooler via UPS before designated holding times expire. Proper chain-of-custody procedures are followed with logs documenting the date and time sampled, sample number, type of sample, sampler's name, preservative used, analyses required and sampler's signatures.

For groundwater monitoring wells, depth to groundwater and total depth of wells is measured with a Keck oil/water interface probe prior to sampling. Presence of any free-phase crude oil is also investigated using the interface probe. The interface probe is decontaminated with Alconox™ soap and rinsed with de-ionized water before each measurement. The volume of water in the wells is calculated, and a minimum of three casing volumes of water is purged from each well using a disposable bailer or a permanent decontaminated PVC bailer. As water is extracted, pH, electric conductivity and temperature are monitored. Wells are purged until these properties stabilize or the well bails dry, indicating that the purge water is representative of aquifer conditions. Stabilization is defined as three consecutive stable readings for each water property (± 0.4 units for pH, ± 10 percent for electric conductivity and $\pm 2^\circ$ C for temperature). Once each monitoring well is properly purged, groundwater samples are collected in bottles or vials and shipped to the laboratory as described above. The method for sampling recovery

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wells is similar, the difference being that pumps installed within the wells are used to purge groundwater.

**Table 1: 2008 Sampling and Monitoring Schedule for the former
Giant Bloomfield Refinery (as specified in the Discharge Plan)**

LOCATION	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	Jun 2008	July 2008	Aug 2008	Sept 2008	Oct 2008	Nov 2008	Dec 2008
System Influent	VOC GWC			VOC GWC			VOC GWC			VOC# GWC		
System Effluent	VOC GWC Metals PAH			VOC GWC			VOC GWC			VOC# GWC		
GRW-3	VOC GWC PAH											
GRW-6	VOC GWC PAH											
GBR-17	VOC GWC PAH											
GBR-24D	VOC GWC PAH											
GBR-30	VOC GWC PAH											
GBR-31	VOC GWC PAH											
GBR-32	VOC GWC Metals											
GBR-48	VOC GWC Metals											
GBR-49	VOC GWC Metals											
GBR-50	VOC GWC Metals											
GBR-51	VOC GWC											
GBR-52	VOC GWC											
SHS-1	VOC GWC			VOC GWC			VOC GWC			VOC† GWC		

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LOCATION	Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	Jun 2008	July 2008	Aug 2008	Sept 2008	Oct 2008	Nov 2008	Dec 2008
SHS-2	VOC GWC			VOC GWC			VOC GWC			VOC† GWC		
SHS-5	VOC GWC			VOC GWC			VOC GWC			VOC† GWC		
SHS-8	VOC GWC			VOC GWC			VOC GWC			VOC† GWC		
SHS-9	VOC GWC			VOC GWC			VOC GWC			VOC† GWC		
SHS-18	VOC GWC			VOC GWC			VOC GWC			VOC† GWC		
SHS-19	VOC GWC			VOC GWC			VOC GWC			VOC† GWC		
VOCs refers to volatile organic carbon analyzed by USEPA Method 601/602 or 8260B. In the past, EPA method 601/602 was used to determine concentrations of aromatic and chlorinated carbons. The method is outdated and was replaced in 2008 with EPA method 8260 to analyze for volatile organic compounds. GWC refers to groundwater characteristics: TDS, alkalinity, electric conductivity, pH, cation/anion balance, plus Fe & Mn. PAH refers to polyaromatic hydrocarbons analyzed by USEPA Method 8310 Metals refers to RCRA 8 Metals #Influent and Effluent were not sampled in October because the remediation system was shut down for evaluation. †USEPA Method 8021B was used for analysis of volatile organic carbons in October 2008. GWC were not analyzed.												

System Repairs

During 2008, the remedial system was shut down so that groundwater could be sampled under static conditions. Western used the down time to inspect all equipment and make necessary repairs. Recovery pumps were removed and cleaned. Of the 15 pumps, six required maintenance and four were replaced. Flow meters used to monitor groundwater recovery volumes were cleaned and replaced as necessary. Damaged plumbing and electrical feeds were also repaired. Additionally, the carbon adsorption tank was cleaned out and the sock filters were changed.

Results

Annual Water and Product Levels

Groundwater monitoring wells have been installed throughout the on-site and off-site areas to monitor groundwater quality and flow direction (Figure 2). Water and product levels in each well are determined quarterly. These data are presented in Appendix B and are utilized to prepare the potentiometric surface maps shown in Figures 5-8. The maps are useful in determining direction of groundwater flow and effectiveness of hydraulic control achieved by the recovery well system.

The maps for January and April show groundwater behavior under pumping conditions; July and October maps show static conditions. The pumping system was shut down from July through the rest of the year. The rate of groundwater flow is, on average, 0.019 ft/ft

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in a southwest direction, and is consistent throughout the year. Some draw-down around recovery wells is evident when the remediation system is pumping water.

Free-phase product was observed in wells from the on-site area. During January, April and July, a thin accumulation of free-phase product was measured in wells in the north-central portion of the on-site study area, east of Tank 102 (Figures 9-12). In October a similar accumulation was present, and an additional two wells in the southeastern portion of the on-site area contained measureable free-phase product (Figure 12). The appearance of product in wells GBR-7, GBR-20 and GBR-41 in October 2008 occurred after the pumping system had been shut down for three months and corresponds with a drop in water levels. There was a 5.56' drop at GBR-7, a 3.16' drop at GBR-20 and a 0.74' drop at GBR-41. These wells are located around the infiltration gallery.

The amount of free-phase product removed from wells is shown in Table 2. The amounts are estimations based on saturation of oil absorbent socks when they are replaced. The total amount of product removed from the groundwater is also shown. Insufficient records exist to calculate a cumulative amount of product removed since remediation began.

Table 2: Estimated Volumes of Free-Phase Product Removed from Monitoring Wells during 2008

Well #	Volume Removed (Ounces)				
	Jan	Apr	July	Oct	Total
GBR-22	0.1328	0.1328	0.1328		0.3984
GBR-25		0.1063	0.0996		0.2059
GBR-23			0.0664		0.0664
Total Volume Removed (gallons):					0.6707

Groundwater Sampling Results

Lab results obtained from groundwater sampling at the former refinery during 2008 are presented in Appendix C. Laboratory reports are included in Appendix D. Toxic pollutants, as defined by New Mexico Water Quality Control Commission (NMWQCC) standards, are absent from influent and effluent water and most of the groundwater sampled from monitoring wells. Detected concentrations are shown in bold face in Appendix C, and concentrations over NMWQCC standards are printed in red. The standards are listed in the table for reference. The following list summarizes laboratory detection of COCs:

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- During annual sampling in January 2008, benzene was present in GBR-24D at levels above NMWQCC standards. Benzene was also present in GBR-49, but only at a level of 2.5 µg/L.
- In July 2008, when sampling was conducted under static conditions, benzene concentrations were detected in nineteen wells, but only five wells contained concentrations above NMWQCC standards (GBR-10, GBR-11, GBR-24S, GBR-34 and GBR-35).
- Small concentrations of 1,2 dichloroethane (EDC) were identified in wells in the on-site study area during the July 2008 sampling event. None of the wells contained concentrations above NMWQCC standards.
- Small amounts of poly-aromatic hydrocarbons were identified in the annual sample collected from GBR-24D (Appendix C).
- Sulfate and total dissolved solids (TDS) were over NMWQCC standards in groundwater from most wells. Chloride concentrations were above standards in eleven wells sampled in July. Similar results for these constituents have been reported from groundwater samples collected in the past, and high concentrations are observed throughout the entire study area, including within wells located up-gradient of the refinery (GBR-32, GBR-48, GBR-49, GBR-50).
- Several metals were detected in the effluent sample and within samples collected up-gradient of the refinery (Appendix C). Most of the metal concentrations were below NMWQCC standards; however, chromium levels are above standards in samples from GBR-32, GBR-48 and GBR-49. The NMWQCC standard for chromium is 0.05 mg/L. These three wells are located within the arroyo adjacent to the refinery and are up-gradient wells. They characterize an area affected by the former landfill.
- Several wells from the off-site study area have not shown detectable amounts of BTEX for four quarters and are on progress for closure. The following table shows BTEX results from four consecutive quarters:

Table 3: Quarterly Sampling of Off-Site Groundwater Monitoring Wells

Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
SHS-1 (4 clean quarters)				
01/08	ND	ND	ND	ND
04/08	ND	ND	0.7	ND
07/08	ND	ND	0.7	ND
10/08	ND	ND	ND	ND

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Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
SHS-2 (4 clean quarters)				
01/08	ND	ND	ND	ND
04/08	ND	ND	0.4	ND
07/08	ND	ND	ND	ND
10/08	ND	ND	ND	ND
SHS-5 (4 clean quarters)				
01/08	ND	ND	ND	ND
04/08	ND	ND	ND	ND
07/08	ND	ND	ND	ND
10/08	ND	ND	ND	ND
SHS-8 (4 clean quarters)				
01/08	ND	ND	ND	ND
04/08	2.7	ND	6.6	ND
07/08	2.2	ND	2.8	ND
10/08	ND	ND	ND	ND
SHS-9 (4 clean quarters)				
01/08	ND	ND	ND	ND
04/08	ND	ND	0.7	ND
07/08	ND	ND	2.9	ND
10/08	ND	ND	5.4	3.3
SHS-18 (4 clean quarters)				
01/08	ND	ND	ND	ND
04/08	ND	ND	ND	ND
07/08	ND	ND	ND	ND
10/08	ND	ND	ND	ND

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Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
SHS-19 (4 clean quarters)				
01/08	ND	ND	ND	ND
04/08	ND	ND	ND	ND
07/08	ND	ND	ND	ND
10/08	ND	ND	ND	ND
NMWQCC Standard	10	750	750	620

Distribution of COCs

The discussion of groundwater conditions is based primarily on the July 2008 sampling data, because it is more comprehensive. Reference is made to isopach maps and cross sections presented as Figures 13-21. It should be noted that semi-annual isopach maps and cross sections are not included, because the regularly scheduled quarterly sampling events do not sample wells from the current problem areas. Such a presentation of results would not be indicative of true conditions at the site.

GBR-10 and GBR-11 define an area of concern in the southern portion of the on-site area, while GBR-24S, GBR-34, GBR-35 and GBR-41 represent an area of dissolved phase contamination in the northern on-site area (Figure 13). Benzene is the primary COC, and concentrations are shown in Figure 14. Strike and dip cross sections showing product levels and BTEX levels across the two areas of concern are shown in Figure 15. BTEX concentrations are plotted on the lithologic logs at the top of groundwater elevation. SHS-1, SHS-8 and SHS-9 delineate a small zone of elevated BTEX concentrations located in the off-site study area. These concentrations are below NMWQCC standards (Figure 13).

BTEX concentrations in the northern on-site area correlate to presence of free-phase product near Tank 102, and later in GBR-41. GBR-11 represents the center of the second area of concern within the on-site study area.

An additional petroleum hydrocarbon constituent, 1,2 dichloroethane (EDC), was identified in eight wells near Tank 102 (Figure 16). There is historical documentation of EDC presence in groundwater sampled at the refinery (*Soil and Groundwater*

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Investigations and Remedial Action Plan, Giant Industries, Inc. Bloomfield Refinery). EDC is a common gasoline additive.

Eleven wells contained chloride concentrations above NMWQCC concentrations during July 2008. An isopach map for chloride concentrations is shown in Figure 17. Additionally, chloride concentrations are plotted on strike and dip cross sections in Figure 18. Higher concentrations of chloride appear in three areas of the study area, including one area up-gradient of the refinery and another area far down-gradient. Previous investigations at the landfill reported elevated levels of chloride present in water sampled from liquid waste lagoons (McQuillan, D. and Longmire, P. *Water Quality Investigations at the Lee Acres Landfill and Vicinity, San Juan County, New Mexico*), and the landfill accepted produced water from natural gas well operations in the San Juan Basin.

All of the groundwater wells, except for SHS-8, contained high levels of TDS (Figure 19). Values ranged from 980 to 4500 mg/L. Elevated sulfate concentrations were also common (Figure 20), and 28 of 61 wells contained groundwater with sulfate concentrations above NMWQCC standards. A review of historical annual monitoring reports indicates groundwater sampled at the site generally contained high concentrations of these analytes. Sulfate and TDS were among the contaminants listed as being related to a release at the former landfill. During initial landfill investigations, the up-gradient area within the arroyo near GBR-32, GBR-48, GBR-49 and GBR-50 was identified as the “northern containment slug.” Groundwater representative of this area contained TDS concentrations ranging from 2125-6068 mg/kg, sulfate concentrations ranging from 1920-5830 mg/kg and chloride concentrations ranging from 14.7-2110 mg/kg (Roy F. Weston, Inc., *Remedial Investigation Report for Lee Acres Landfill, Volume 1*).

Chromium concentrations were detected in up-gradient wells during the annual sampling in January 2008 (Figure 21; it should be noted that no other samples collected within the on-site or off-site study areas were analyzed for chromium). Chromium was also detected in the remediation system effluent. Previous studies conducted for the Lee Acres Landfill identified chromium in groundwater sampled up-gradient of the landfill. *Remedial Investigation Report for Lee Acres Landfill, Volume 1* states that the up-gradient background alluvial aquifer contains elevated levels of chromium and suggests an unidentified source that is unrelated to the landfill or the refinery.

Total Volume History

Table 4 presents the volume of groundwater managed for the year. Total volume pumped from each well, current tank volumes and the re-injection volume is reported. It should be noted that the recovery wells pumped water only during the months of January through July during 2008. For the latter half of the year, the system was undergoing evaluation.

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Table 4: Recovery Well Volume Tabulation 2008

Well #	Total Volume Pumped (Gallons)
GRW-1	5,891
GRW-2	586,678
GRW-3	161,431
GRW-4	332
GRW-5	310,409
GRW-6	157,008
GRW-9	25,554
GRW-10	543,426
GRW-11	132,039
GRW-12	10,476
GRW-13	16,895
SHS-9	0
SHS-14	52,562
SHS-18	0
SHS-19	23,545
Total Volume Pumped in Gallons:	2,026,246

Conclusions

Groundwater impacted by operations at the Former Bloomfield Refinery is contained within the on-site study area and is characterized by a thin accumulation of free-phase product and elevated BTEX concentrations. Free-phase product is evident in two areas, one near Tank 102 and another near the infiltration gallery. Presence of free-phase product near Tank 102 appears to be constant. Presence and thickness of free-phase product near the infiltration gallery is controlled by the pumping and discharging of groundwater on the site, as well as groundwater level fluctuations. Elevated BTEX concentrations are restricted to three localized areas, two of which are related to the presence of free-phase product described above. The third area is centered on groundwater monitoring well GBR-11.

Groundwater from the off-site area has exhibited no to very low concentrations of BTEX for some time. During 2008, groundwater monitoring wells SHS-1, -2, -5, -8, -9 -18, and -19 were sampled for four consecutive quarters, and BTEX concentrations were non-detect, or beneath NMWQCC concentrations each quarter. The off-site recovery wells (SHS-9, SHS-14, SHS-18, SHS-19) have successfully remediated the area south of Highway 64.

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High sulfate, chloride and TDS concentrations are historically characteristic of almost all wells in each study area and are related to a release at the Lee Acres Landfill in 1985. These COCs were identified in earlier studies as constituents within the groundwater contaminant plume that originated from the landfill. They are currently evident in up-gradient, as well as down-gradient monitoring well samples. Local variability on site is likely related to various sized screening intervals used in well construction.

Chromium concentrations are elevated in three wells located within the arroyo and up-gradient of the refinery. A trace amount is also evident in a sample of the treatment system effluent. Chromium was identified in wells associated with the landfill investigation; particularly in up-gradient background wells. Chromium concentrations have been attributed to an unknown source up-gradient of the landfill.

Additional sampling parameters (cations, anions, general chemistry, metals and PAHs) have shown consistently low or normal values for many years in almost all groundwater monitoring conducted at the refinery. Continued analysis of these constituents is unnecessary, except in well GBR-24D.

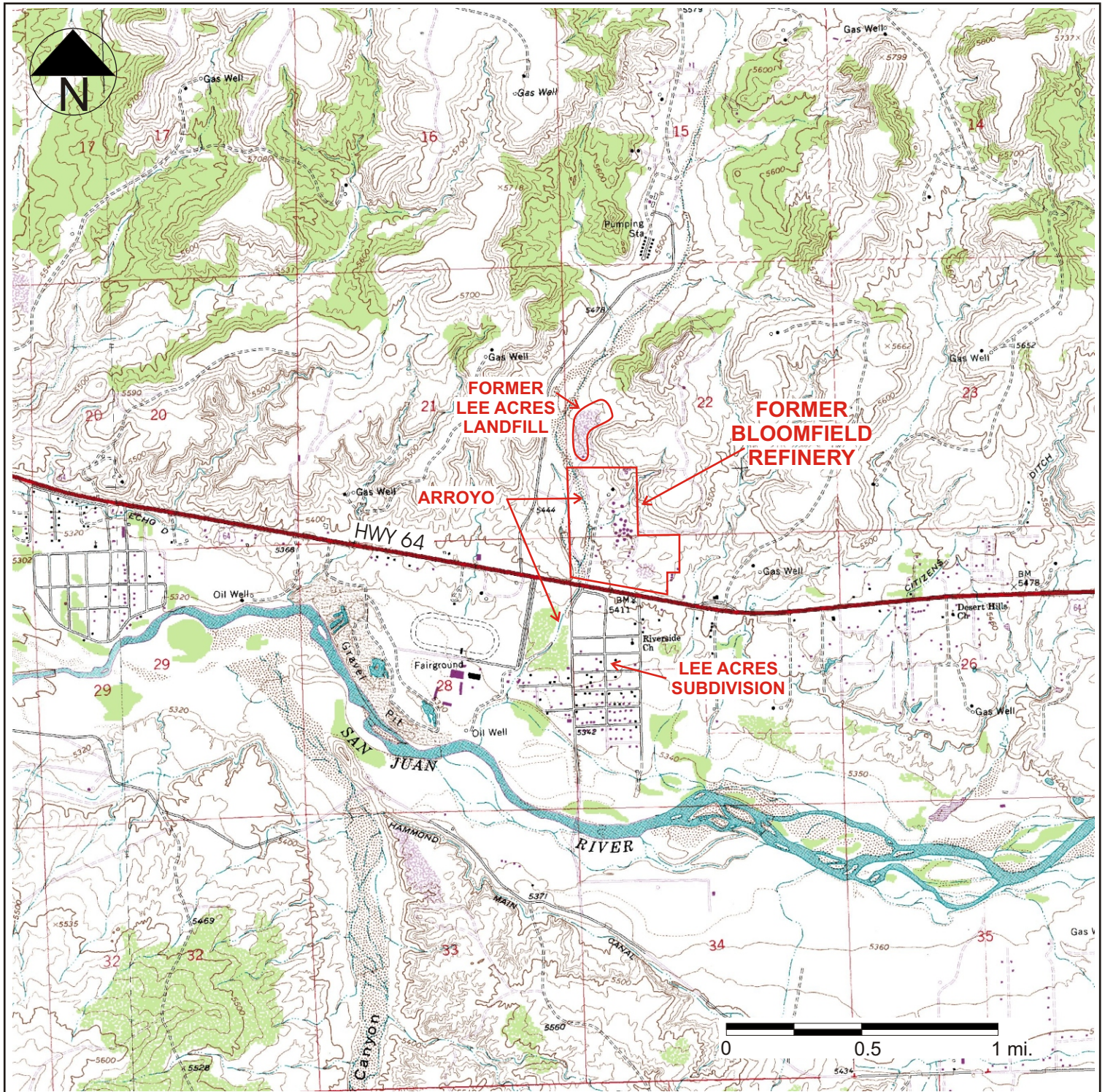
Recommendations

- Discontinue pumping at off-site recovery wells SHS-9, SHS-14, SHS-18, SHS-19.
- Submit a closure request to the NMOCD to remove wells SHS-1, SHS-2, SHS-5, SHS-9, SHS-18 and SHS-19 from the sampling schedule, but continue to monitor their water levels quarterly. Continue to collect groundwater samples from SHS-8 on an annual basis and analyze the samples for BTEX constituents to ensure contaminants are not migrating beneath the highway to the off-site property.
- Eliminate laboratory analysis of groundwater samples for sulfate, chloride, TDS and chromium, since these constituents are sourced up-gradient of the refinery.
- Eliminate laboratory analysis of groundwater samples for COCs that are not and have not been present above standards for years:
 - o Discontinue analysis of anions, cations, general chemistry, metals and PAHs in all monitoring and recovery wells, except GBR-24D;
 - o Discontinue analysis of anions, cations and general chemistry in GBR-24D, but continue to analyze for PAHs.
- Finalize evaluation of the remediation system and enact changes as necessary to address free-phase product and elevated BTEX levels identified on the on-site property.

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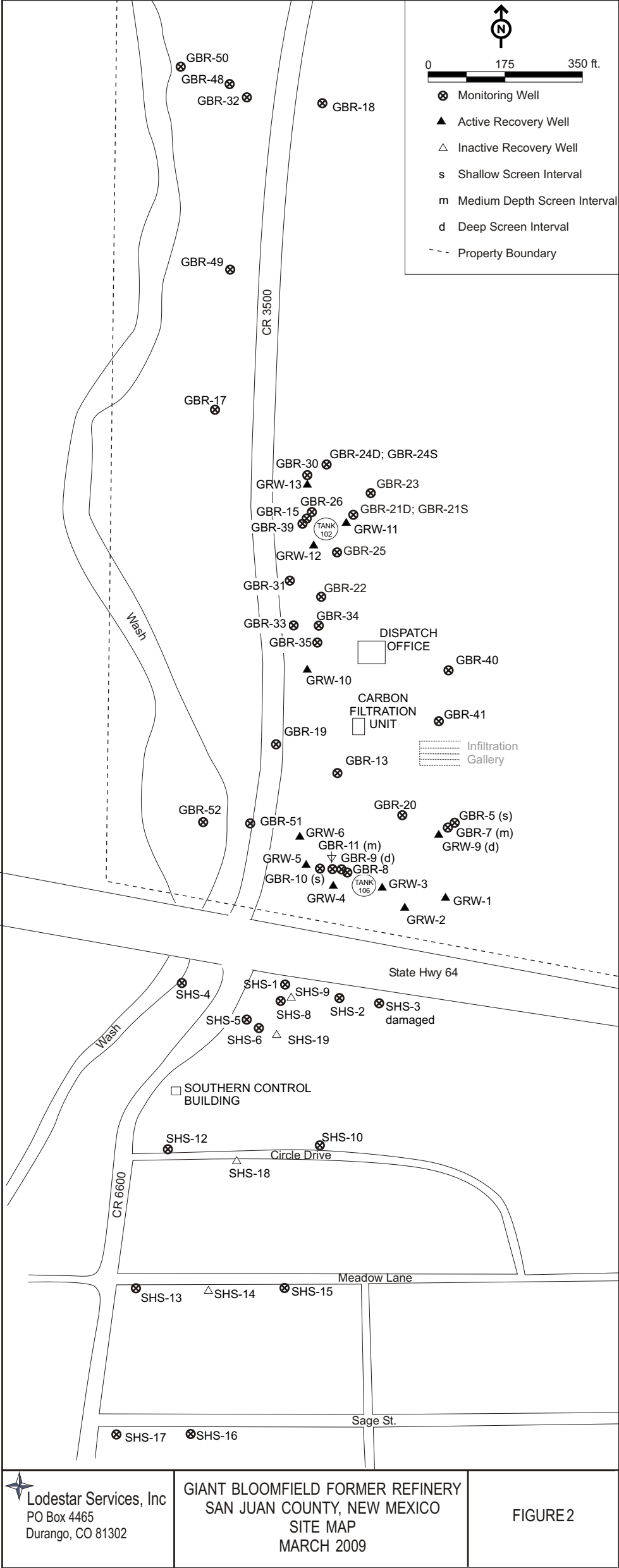


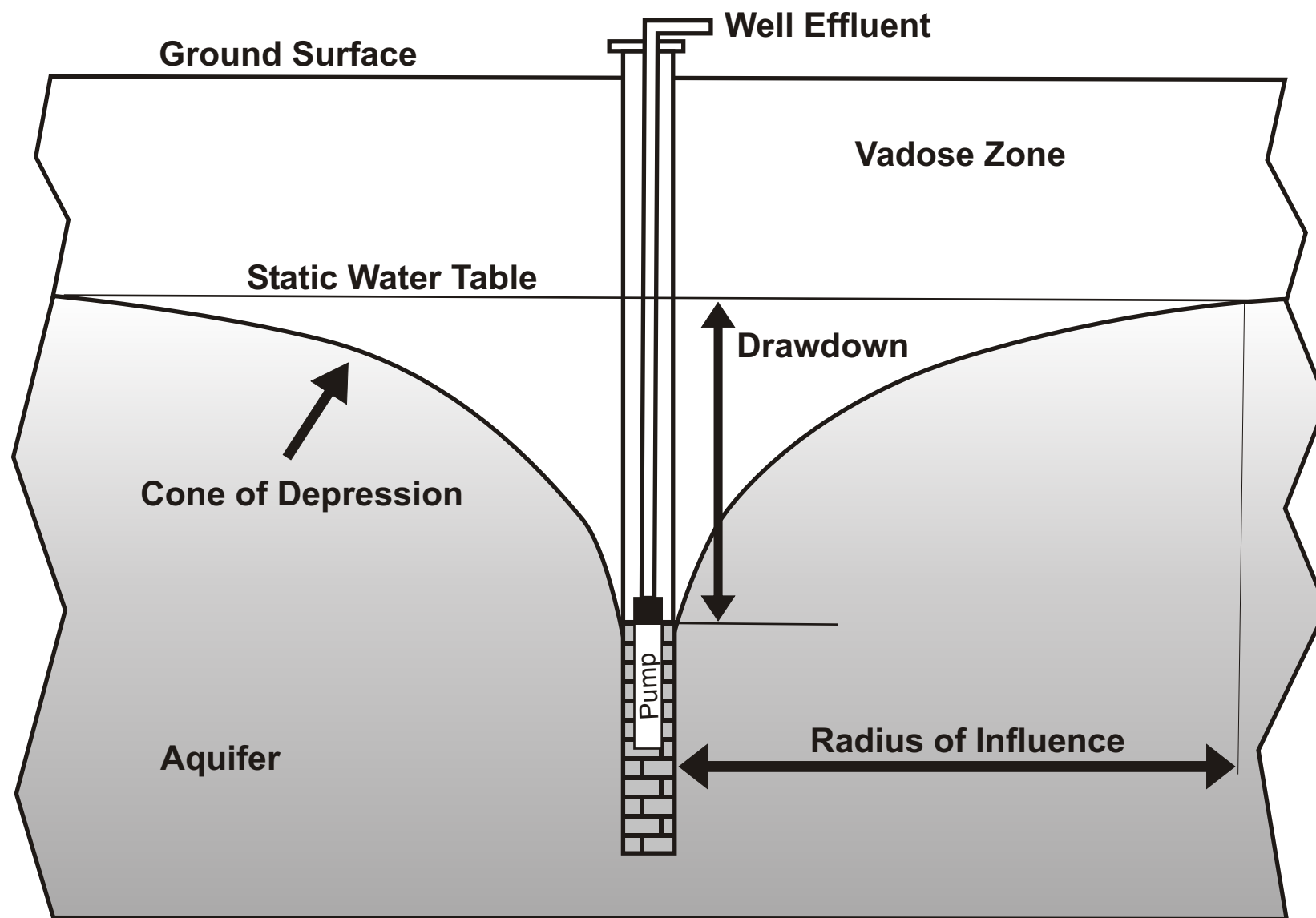
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GIANT BLOOMFIELD FORMER REFINERY
SAN JUAN COUNTY, NEW MEXICO
TOPOGRAPHIC MAP
(USGS 1:100,000 Scale Horn Canyon, New Mexico
Topographic Map)

PROJECT: FORMER REFINERY
ANNUAL REPORT
DRAWN BY: ALA
REVISED: 03/16/09

FIGURE 1



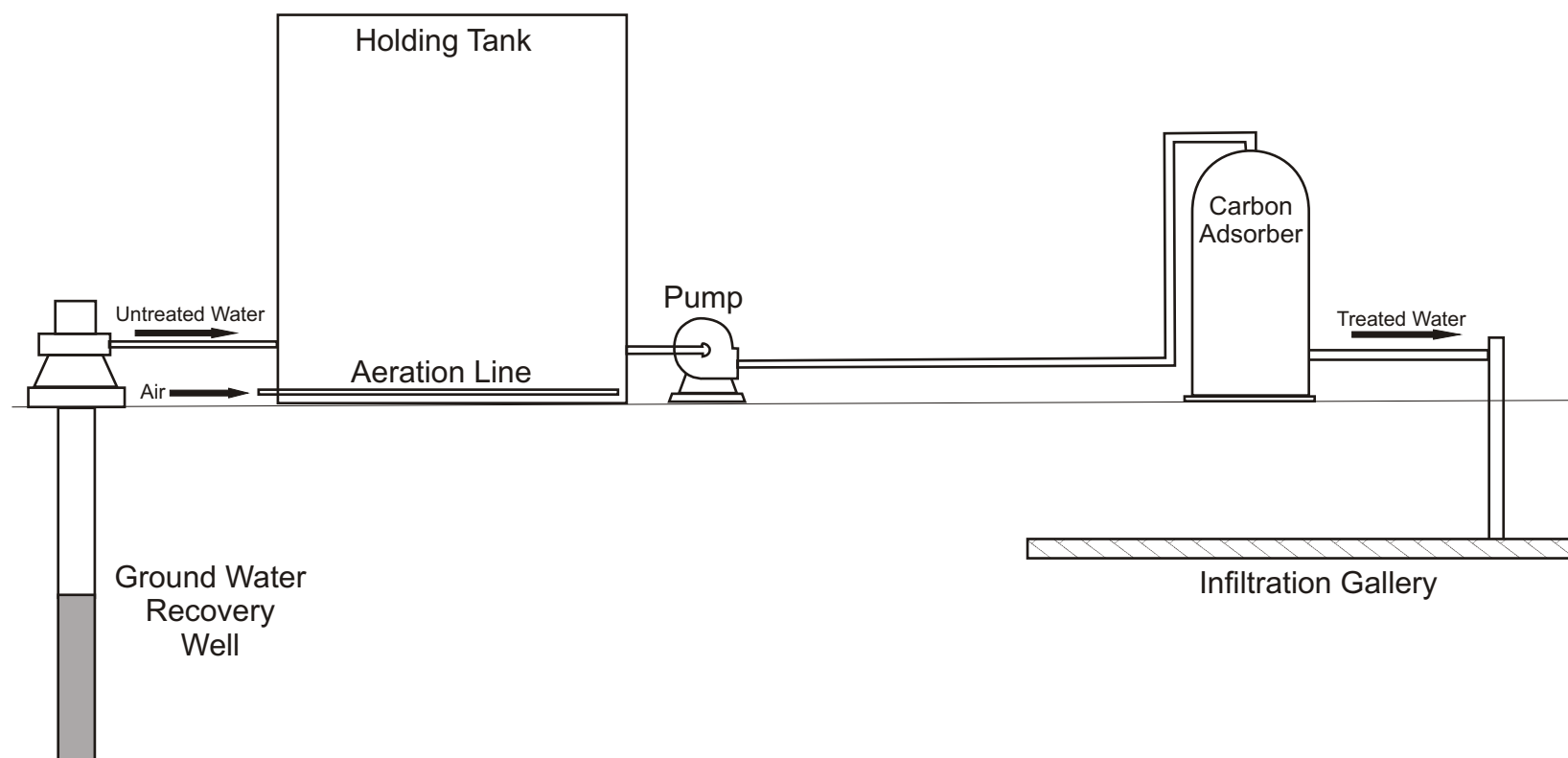


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EFFECT OF PUMPING
ON AN AQUIFER

PROJECT: FORMER REFINERY
ANNUAL REPORT
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REVISED: 03/17/09

FIGURE 3

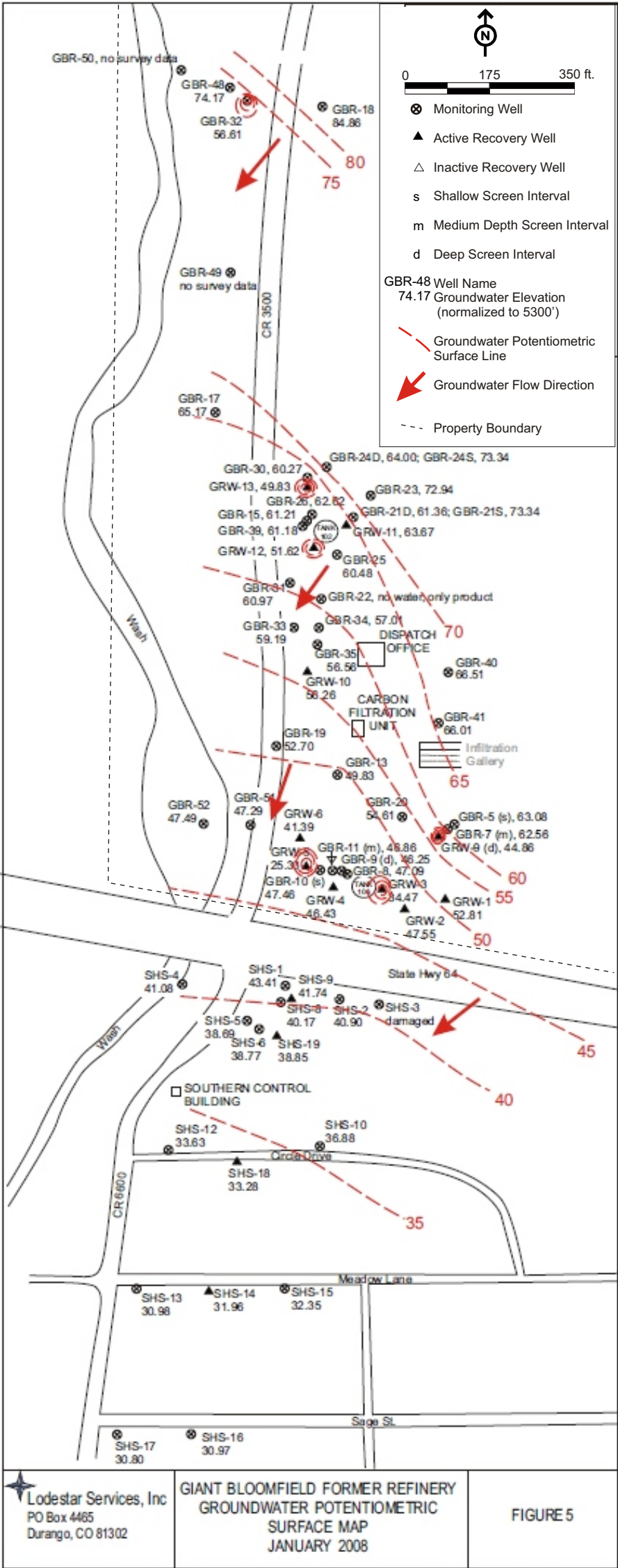


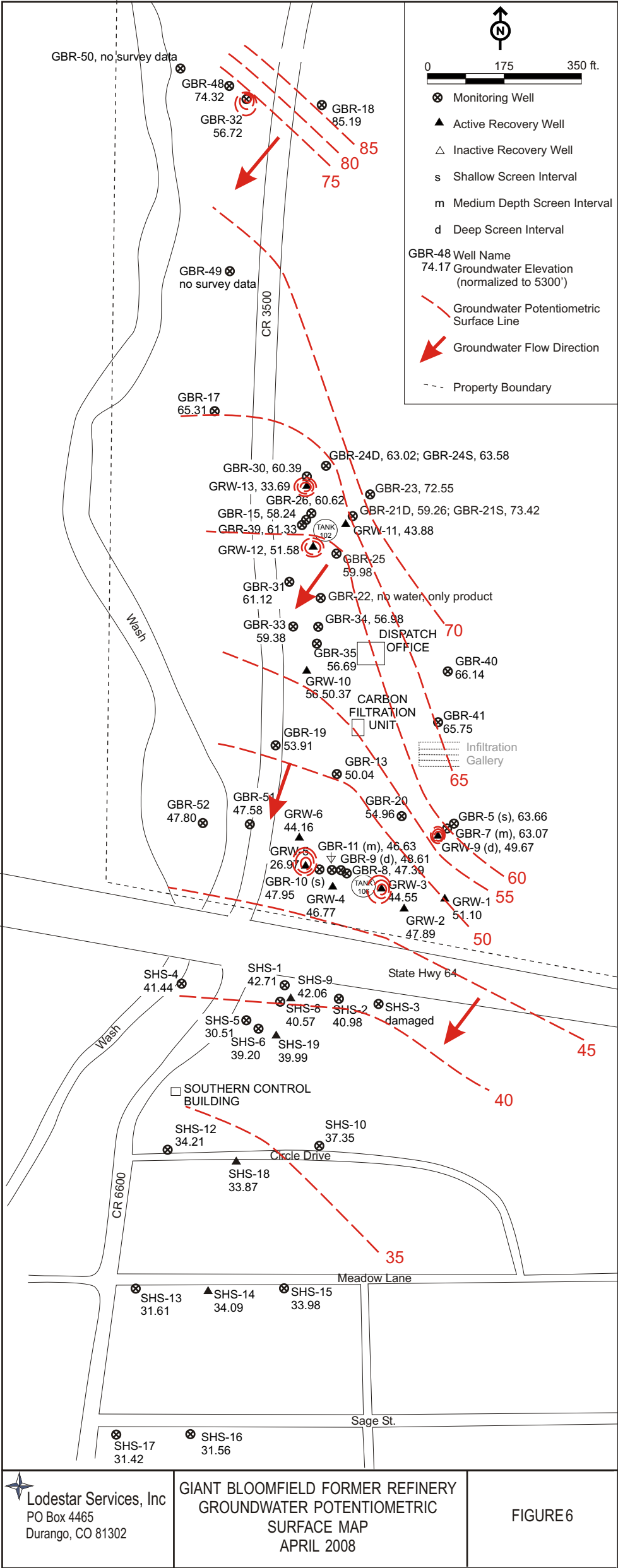
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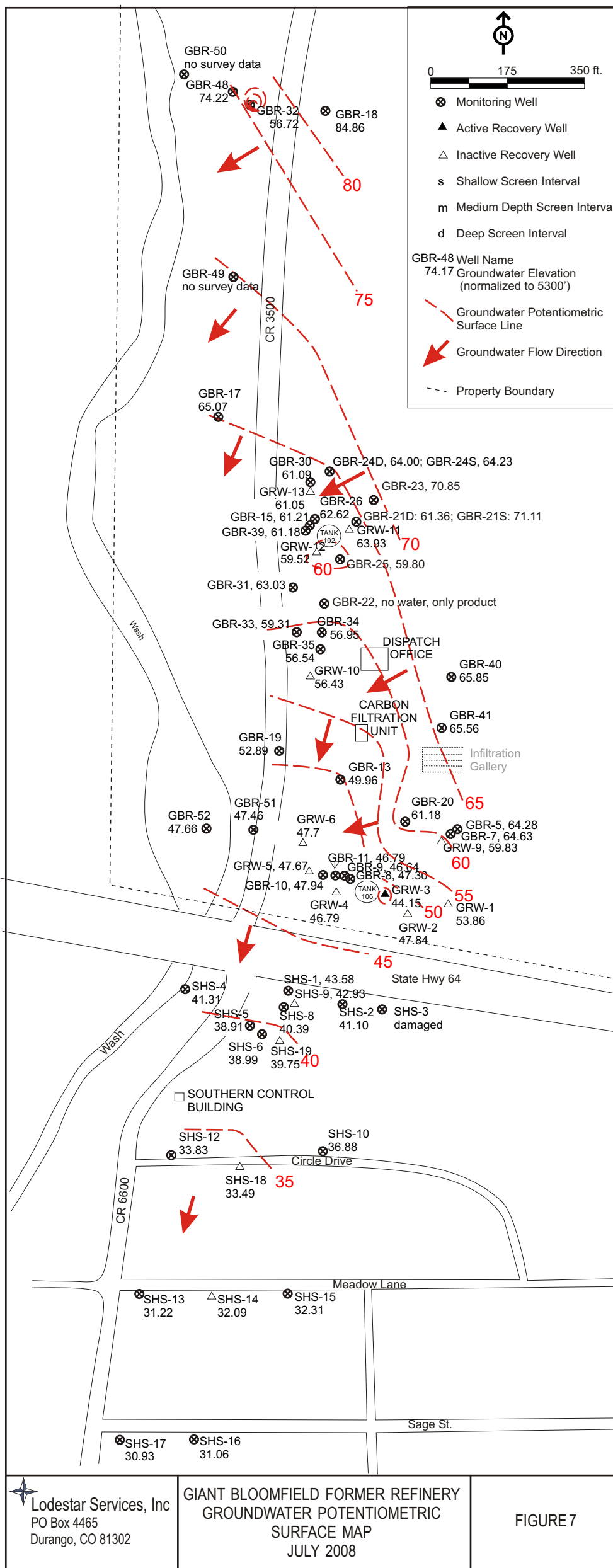
SIMPLIFIED REPRESENTATION OF
THE GROUNDWATER RECOVERY,
TREATMENT AND DISPOSAL SYSTEM

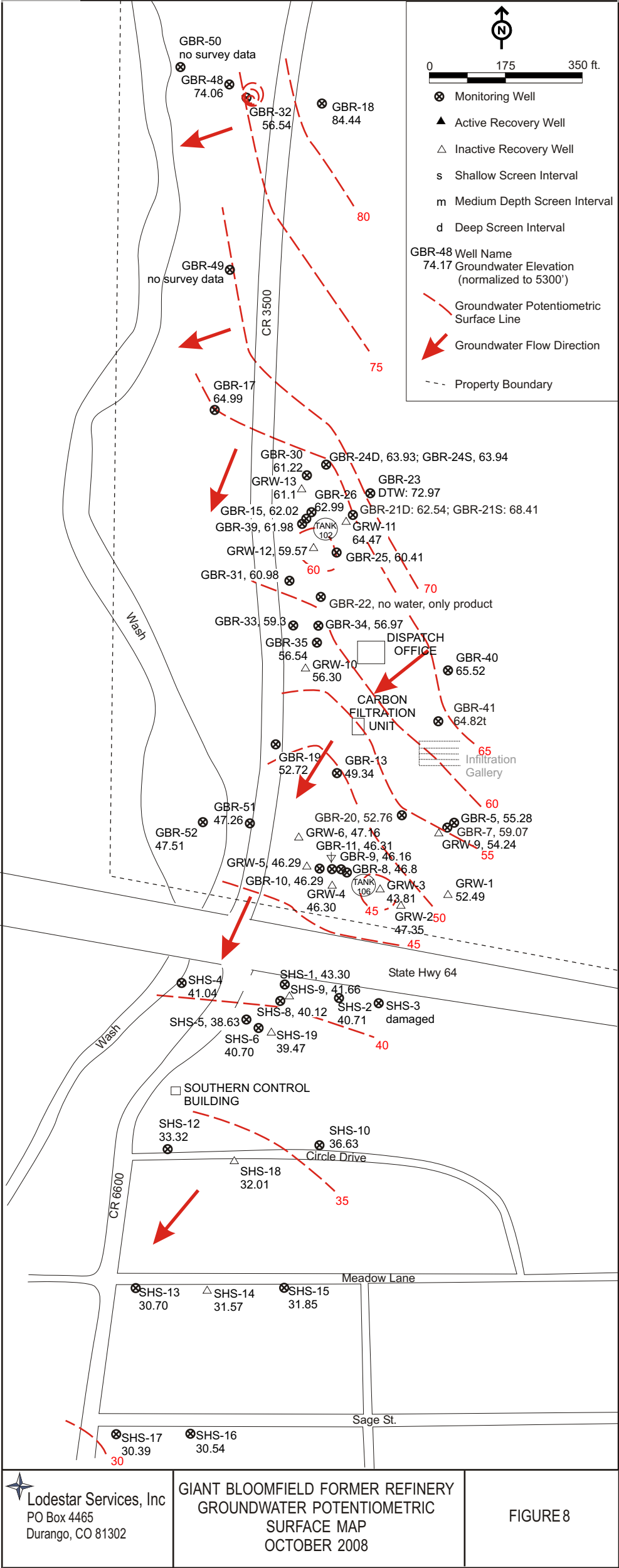
PROJECT: FORMER REFINERY
ANNUAL REPORT
DRAWN BY: ALA
REVISED: 03/17/09

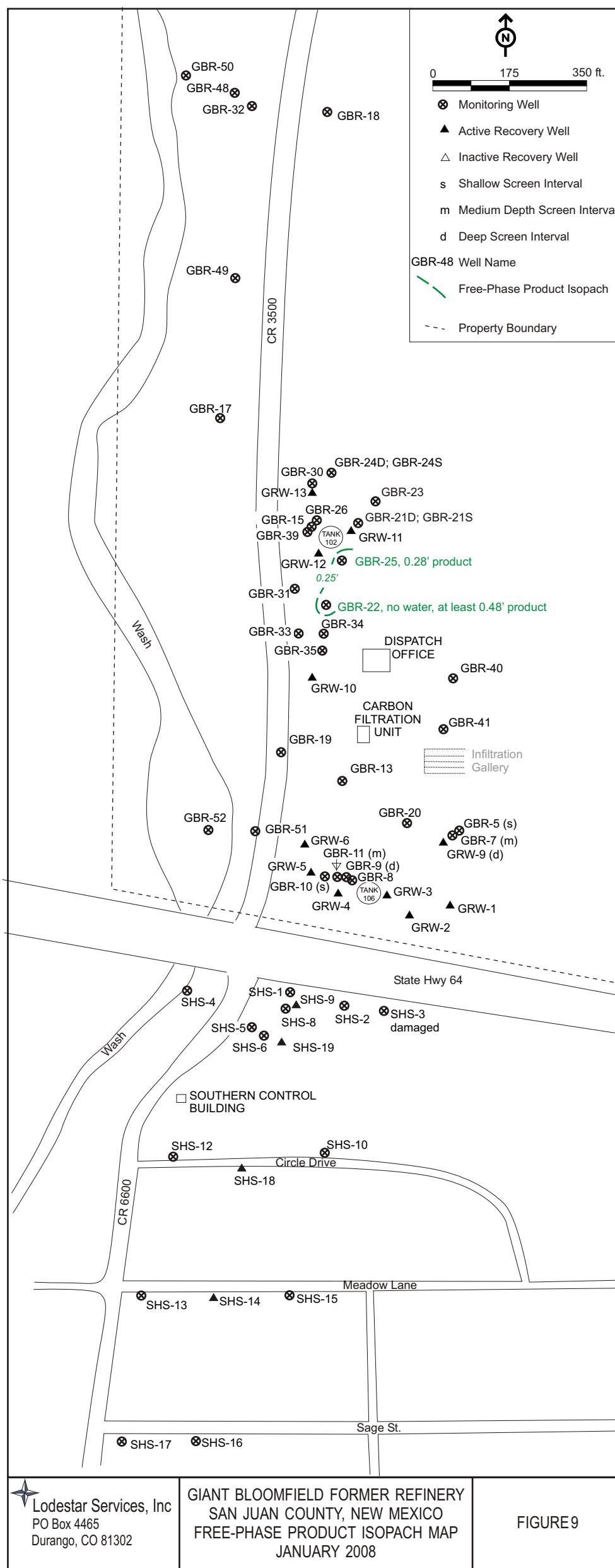
FIGURE 4

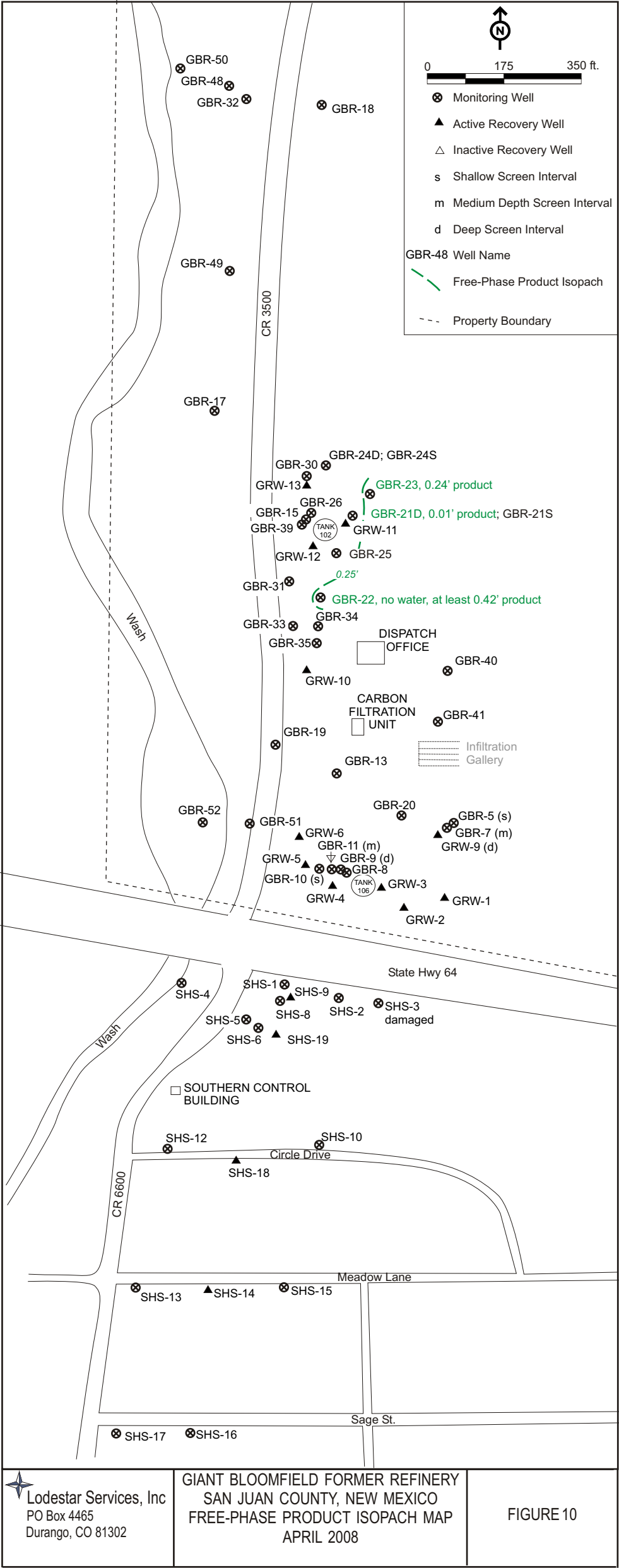


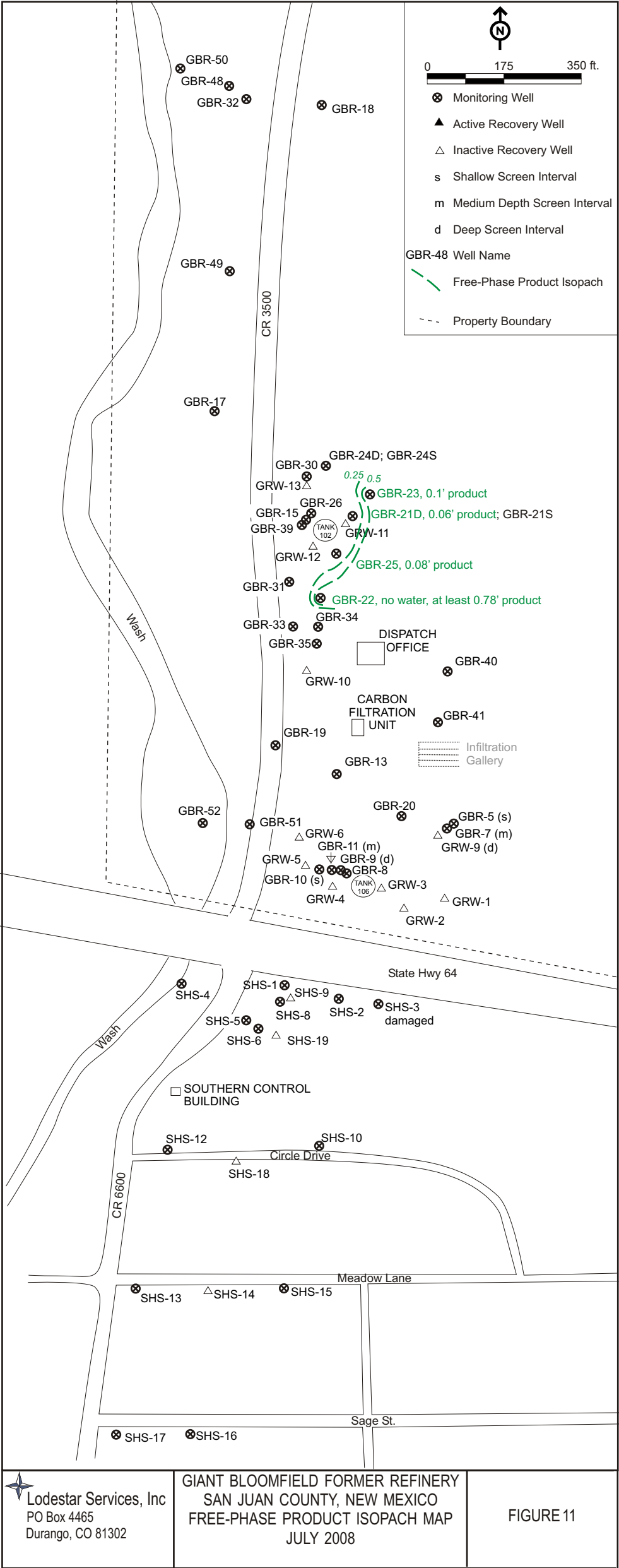








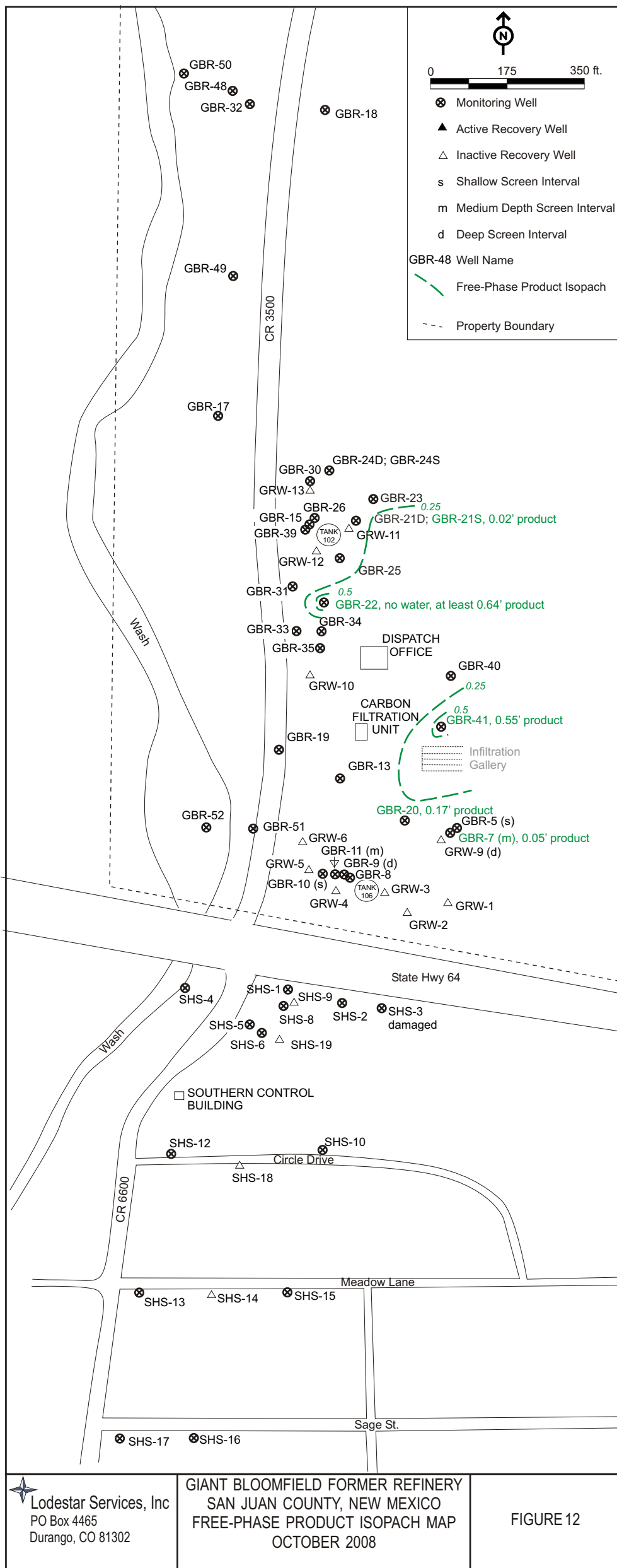


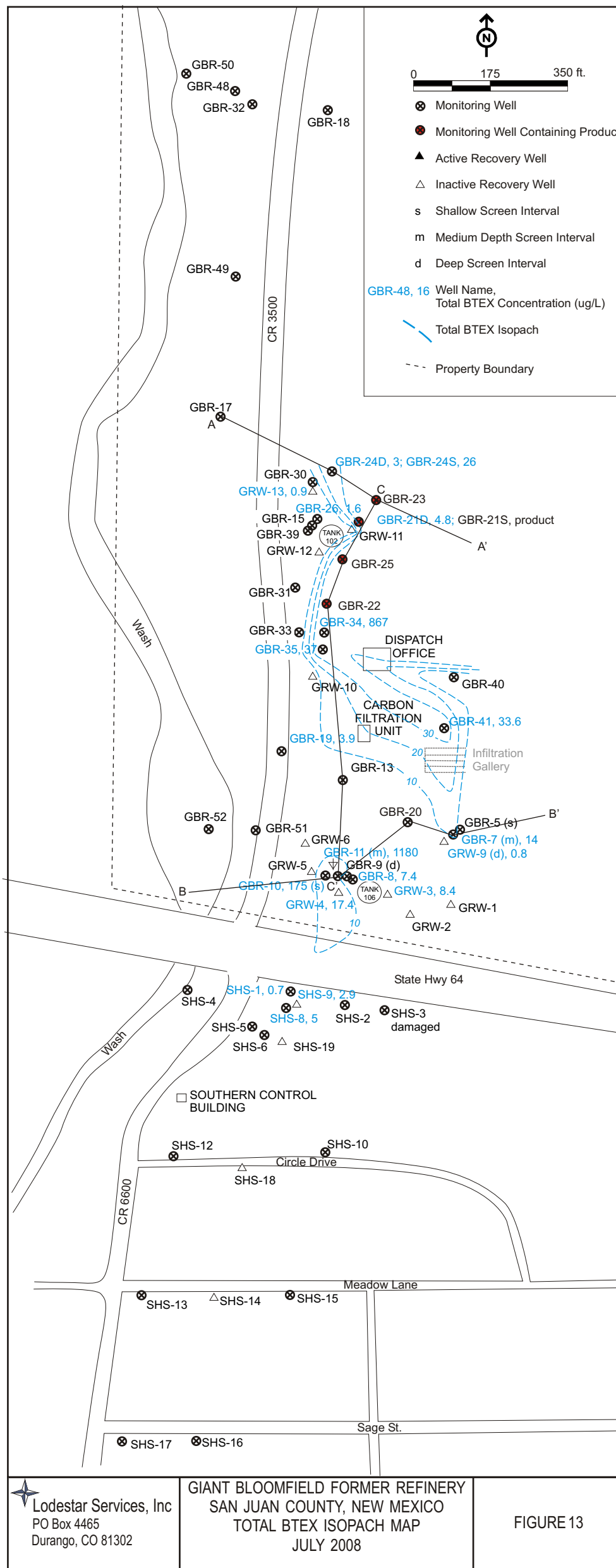


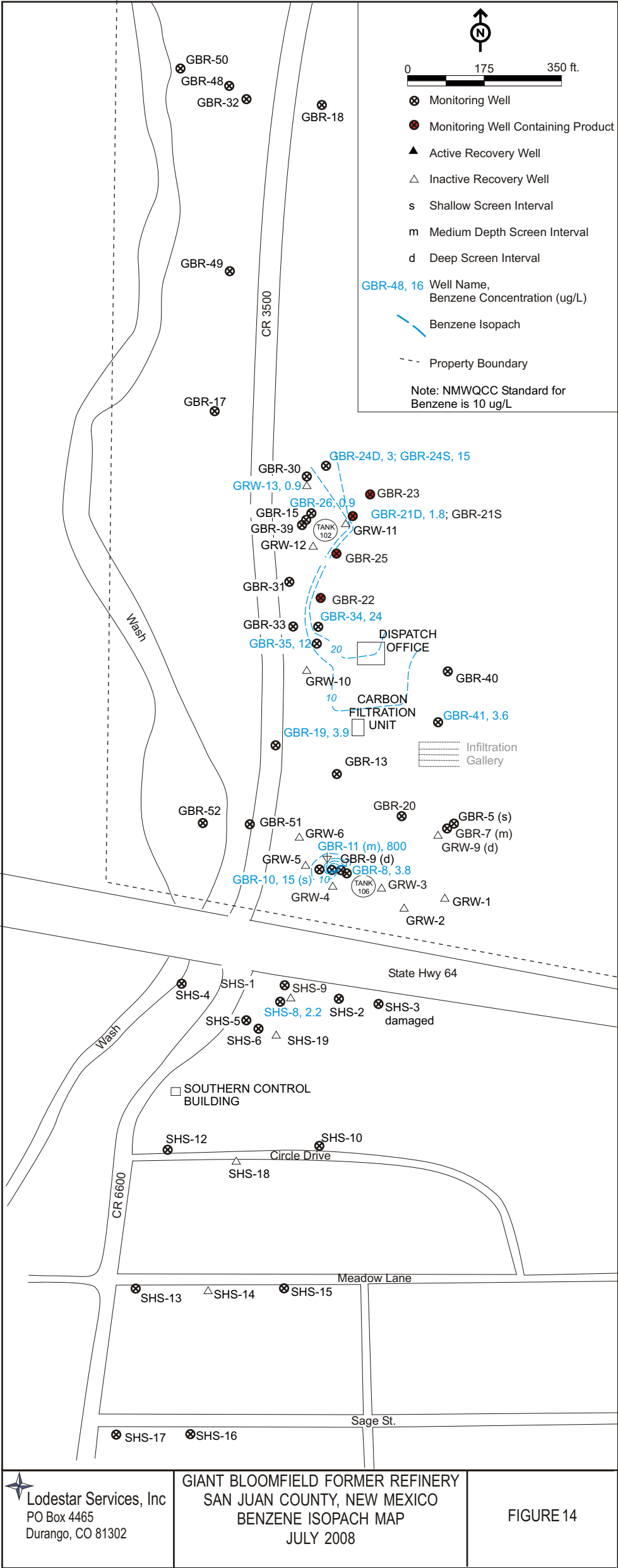
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GIANT BLOOMFIELD FORMER REFINERY
SAN JUAN COUNTY, NEW MEXICO
FREE-PHASE PRODUCT ISOPACH MAP
JULY 2008

FIGURE 11





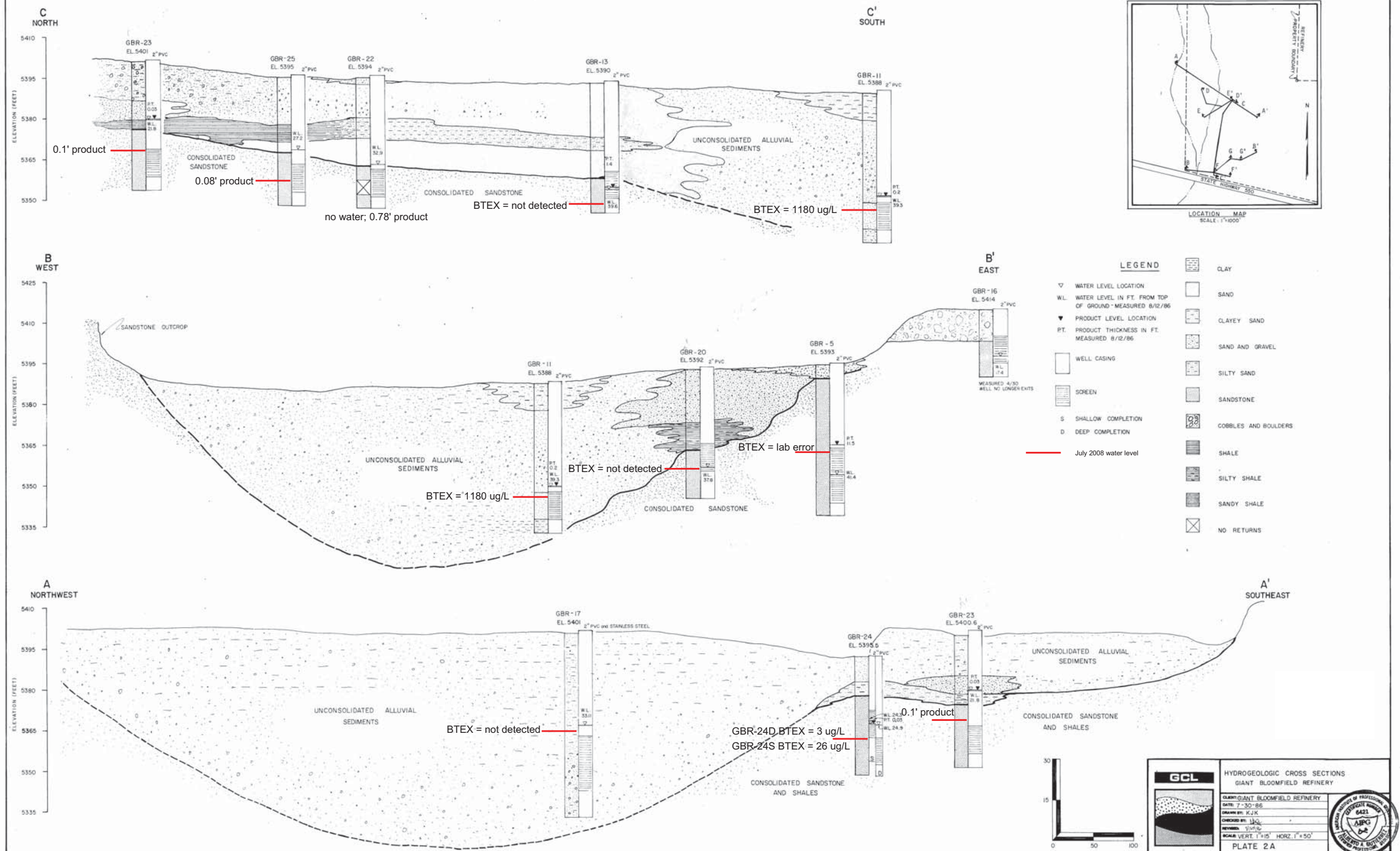


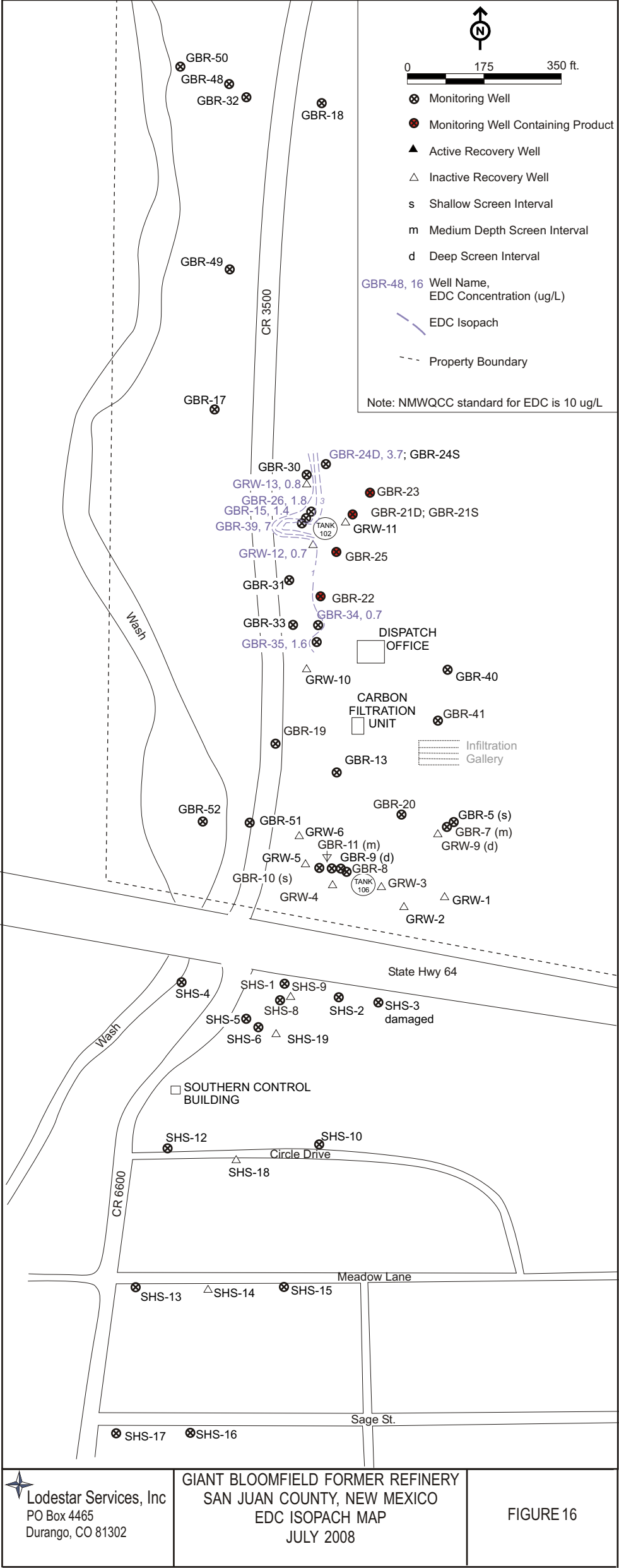
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GIANT BLOOMFIELD FORMER REFINERY
SAN JUAN COUNTY, NEW MEXICO
BENZENE ISOPACH MAP
JULY 2008

FIGURE 14

Figure 15
Cross Sections Showing BTEX Concentrations in July 2008





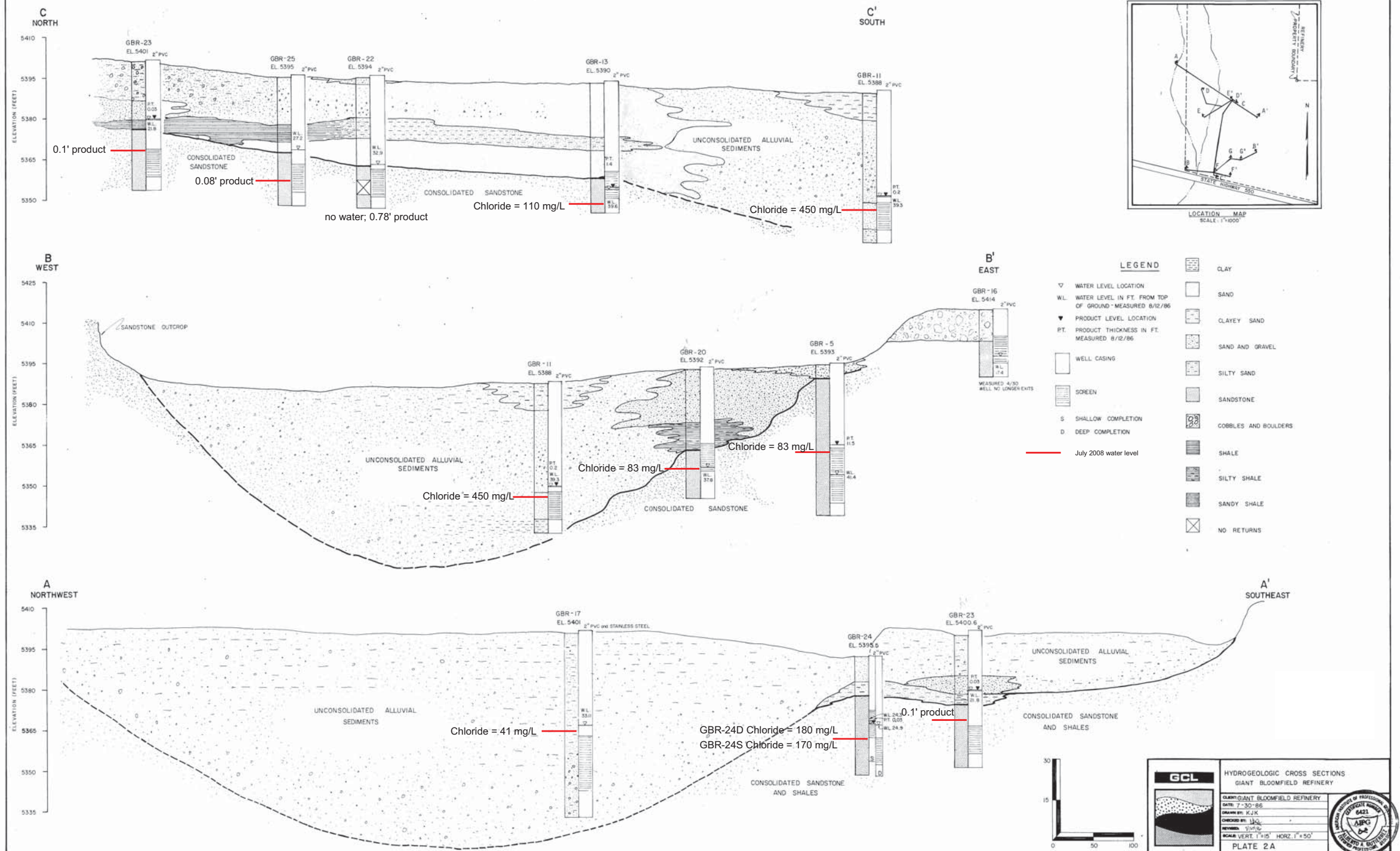
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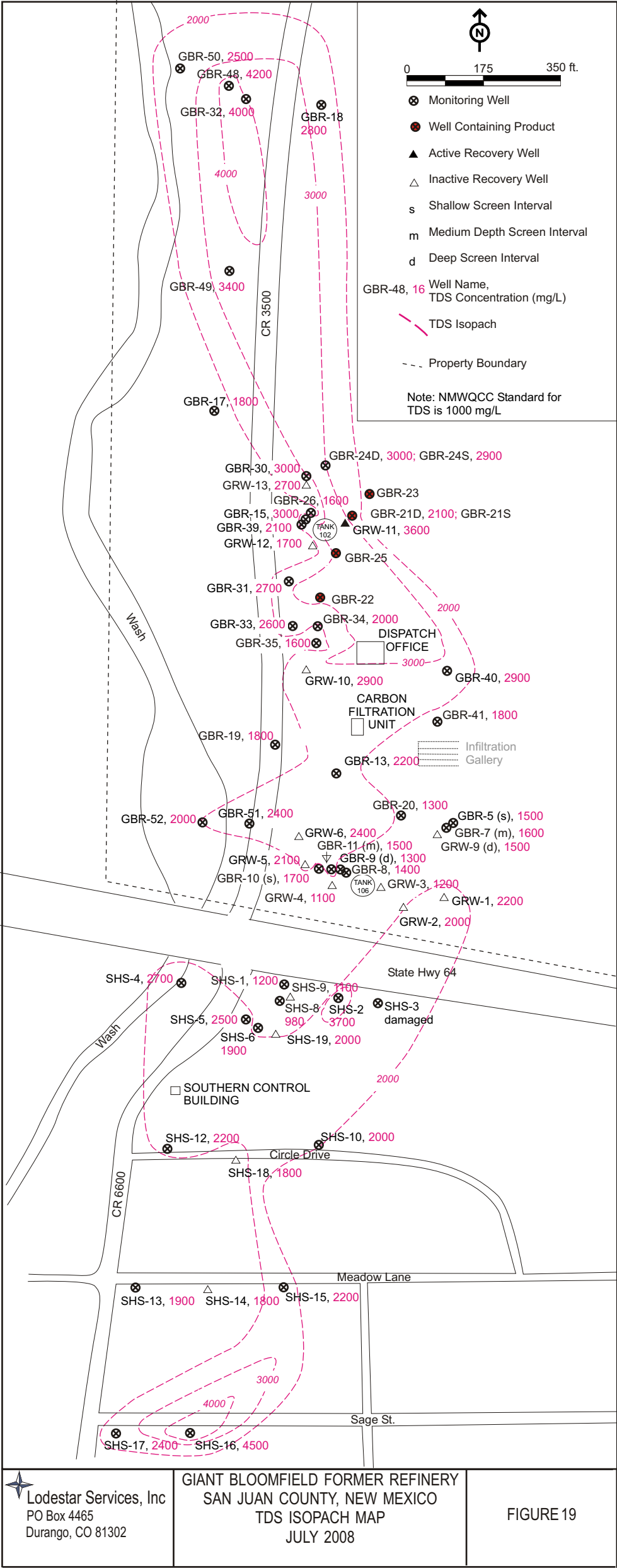
GIANT BLOOMFIELD FORMER REFINERY
SAN JUAN COUNTY, NEW MEXICO
EDC ISOPACH MAP
JULY 2008

FIGURE 16

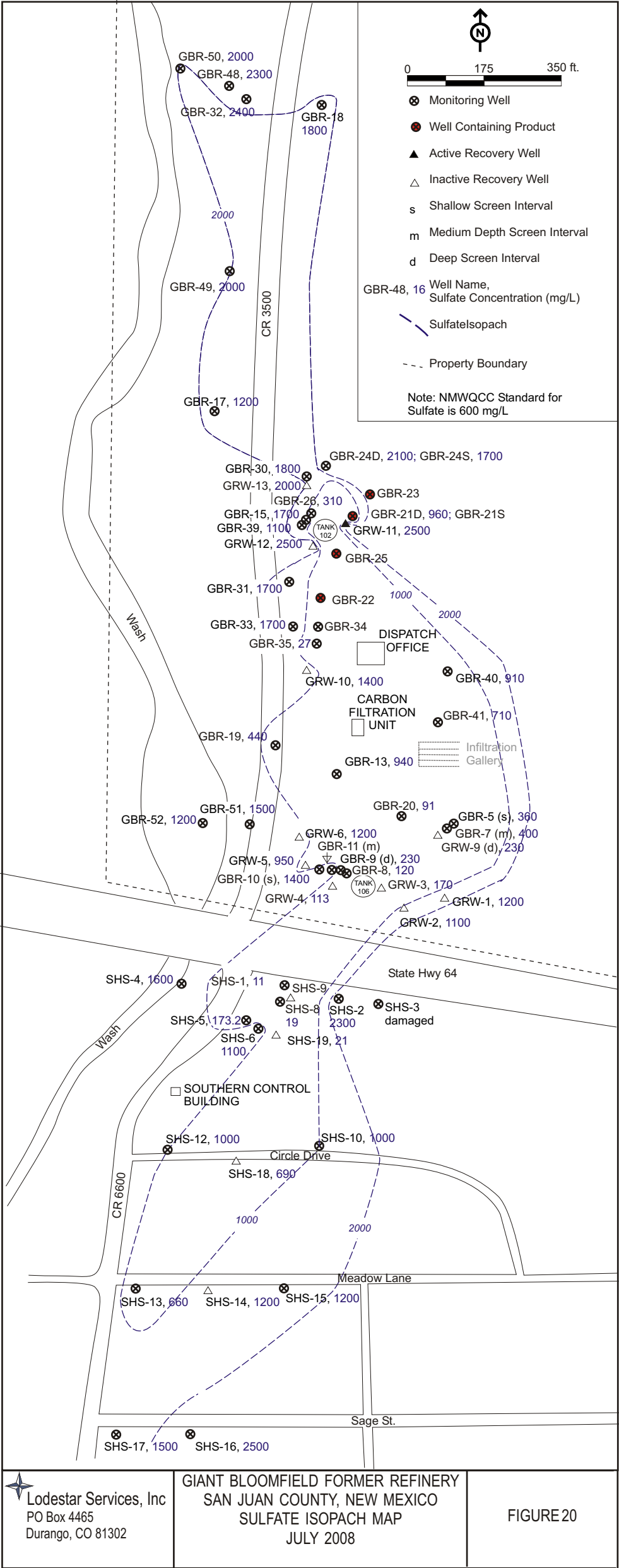


Figure 18
Cross Sections Showing Chloride Concentrations from July 2008





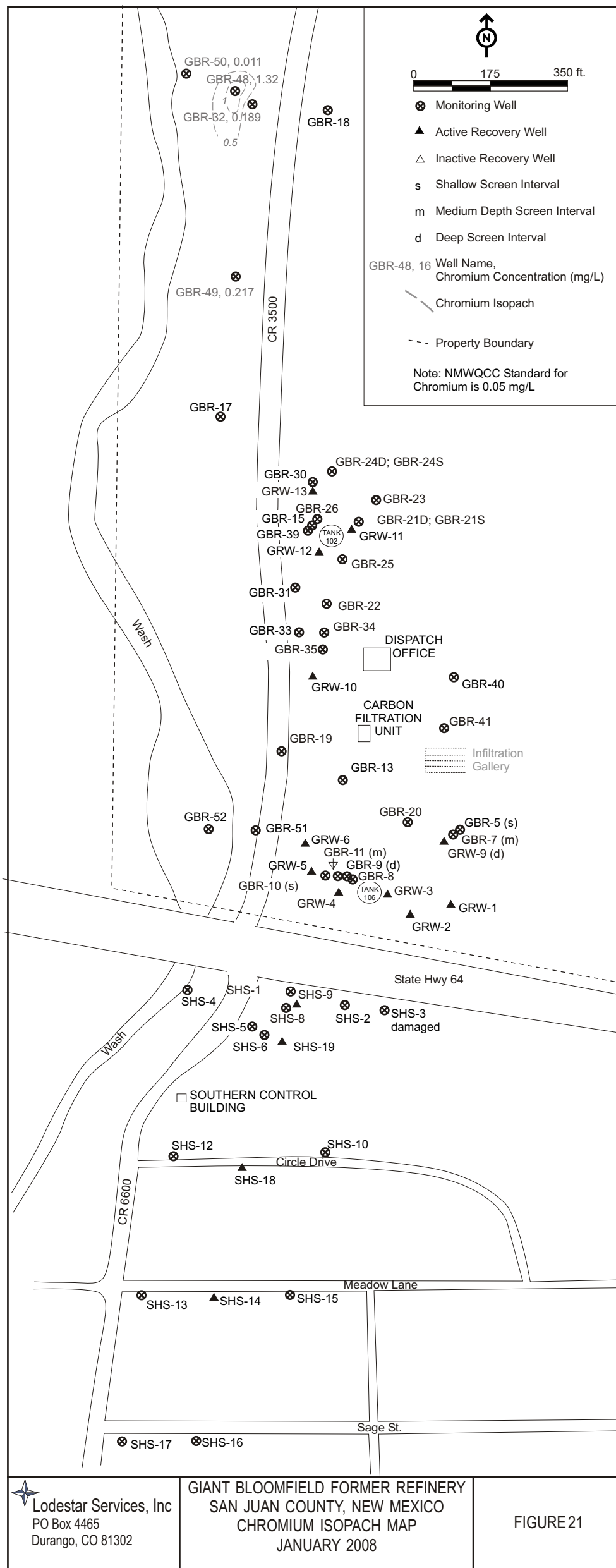
 Lodestar Services, Inc PO Box 4465 Durango, CO 81302	GIANT BLOOMFIELD FORMER REFINERY SAN JUAN COUNTY, NEW MEXICO TDS ISOPACH MAP JULY 2008	FIGURE 19
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GIANT BLOOMFIELD FORMER REFINERY
SAN JUAN COUNTY, NEW MEXICO
SULFATE ISOPACH MAP
JULY 2008

FIGURE 20



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Appendix A

Modifications to the Sampling Schedule

In 2005, Giant Industries (now Western) requested approval from the NMOCD to change the sampling schedule for groundwater wells located downgradient of the refinery. The proposed changes were based on historical results from sampling conducted at the site and are detailed in the letter dated March 13, 2005. Giant intended to plug and abandon nine groundwater monitoring wells and one groundwater recovery well and initiate closure sampling on additional monitoring wells. The following wells were to be abandoned:

Type of Well	Identification	Years of Monitoring Beneath Standards
Monitoring	SHS-3	7
Monitoring	SHS-4	8
Monitoring	SHS-6	8
Monitoring	SHS-10	8
Monitoring	SHS-12	8
Monitoring	SHS-13	8
Recovery	SHS-14	3
Monitoring	SHS-15	8
Monitoring	SHS-16	8
Monitoring	SHS-17	7

The proposal suggested quarterly sampling at wells SHS-9, SHS-18 and SHS-19 until the analytical results from four consecutive quarters fell beneath New Mexico Water Quality Control Commission (NMWQCC) standards, at which time those wells could be abandoned. Wells SHS-1, SHS-2, SHS-5 and SHS-8 had not previously been included on the sampling schedule. Giant proposed annual sampling at these wells until laboratory analyses indicated the groundwater was beneath NMWQCC standards, at which time quarterly sampling should begin and closure pursued.

The NMOCD did not formally responded to this proposal. Subsequently, Giant submitted a revised sample schedule in Discharge Plan GW040 in 2006 and an amended Discharge Plan GW040 in 2007 to remove the wells listed above from the sampling matrix and discontinue pumping well SHS-14 based on the number of clean reporting quarters.

The revised sampling schedule was instituted in October of 2006. The wells listed above for abandonment, which have not yet been abandoned, were last sampled in the first quarter of 2006. Quarterly sampling of groundwater from SHS-9, SHS-18 and SHS-19 began in November 2007 and in SHS-1, SHS-2, SHS-5 and SHS-8 beginning in January

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of 2008. The 2007 amended Discharge Plan GW040 and, consequently, the amended sampling schedule, was approved on February 5, 2008.

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Appendix B

Quarterly Water and Product Level Data

2008 Water and Product Levels

Well Number	Wellhead Elevation (ft)	January 2008				April 2008				July 2008				October 2008			
		Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL* (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL* (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL* (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL* (ft)
GRW-1	5394.3	41.49	-	-	5352.81	43.20	-	-	5351.10	40.44	-	-	5353.86	41.81	-	-	5352.49
GRW-2	5391.28	43.73	-	-	5347.55	43.39	-	-	5347.89	43.44	-	-	5347.84	43.93	-	-	5347.35
GRW-3	5388.77	54.3	-	-	5334.47	44.22	-	-	5344.55	44.62	-	-	5344.15	44.96	-	-	5343.81
GRW-4	5390.02	43.59	-	-	5346.43	43.25	-	-	5346.77	43.23	-	-	5346.79	43.72	-	-	5346.30
GRW-5	5390.56	65.23	-	-	5325.33	63.59	-	-	5326.97	42.89	-	-	5347.67	44.27	-	-	5346.29
GRW-6	5390.81	49.42	-	-	5341.39	46.65	-	-	5344.16	43.11	-	-	5347.70	43.65	-	-	5347.16
GRW-9	5395.7	50.84	-	-	5344.86	46.03	-	-	5349.67	35.87	-	-	5359.83	41.46	-	-	5354.24
GRW-10	5395.02	38.76	-	-	5356.26	44.65	-	-	5350.37	38.59	-	-	5356.43	38.72	-	-	5356.30
GRW-11	5397.85	34.18	-	-	5363.67	53.97	-	-	5343.88	33.92	-	-	5363.93	33.38	-	-	5364.47
GRW-12	5397.24	45.62	-	-	5351.62	45.66	-	-	5351.58	37.72	-	-	5359.52	37.67	-	-	5359.57
GRW-13	5396.9	47.07	-	-	5349.83	63.21	-	-	5333.69	35.85	-	-	5361.05	35.8	-	-	5361.10
GBR-5	5395.07	31.99	-	-	5363.08	31.41	-	-	5363.66	30.79	-	-	5364.28	39.79	-	-	5355.28
GBR-7	5395.85	33.29	-	-	5362.56	32.78	-	-	5363.07	31.22	-	-	5364.63	36.82	36.77	0.05	5359.07
GBR-8	5390.5	43.41	-	-	5347.09	43.11	-	-	5347.39	43.2	-	-	5347.30	43.7	-	-	5346.80
GBR-9	5389.92	43.67	-	-	5346.25	41.31	-	-	5348.61	43.28	-	-	5346.64	43.76	-	-	5346.16
GBR-10	5390.57	43.11	-	-	5347.46	42.62	-	-	5347.95	42.63	-	-	5347.94	44.28	-	-	5346.29
GBR-11	5389.43	42.57	-	-	5346.86	42.8	-	-	5346.63	42.64	-	-	5346.79	43.12	-	-	5346.31
GBR-13	5393.04	43.37	-	-	5349.67	43	-	-	5350.04	43.08	-	-	5349.96	43.7	-	-	5349.34
GBR-15	5397.99	36.78	-	-	5361.21	39.75	-	-	5358.24	36.34	-	-	5361.65	35.97	-	-	5362.02
GBR-17	5402.69	37.52	-	-	5365.17	37.38	-	-	5365.31	37.62	-	-	5365.07	37.7	-	-	5364.99
GBR-18	5421.68	36.82	-	-	5384.86	36.49	-	-	5385.19	36.83	-	-	5384.85	37.24	-	-	5384.44
GBR-19	5393.83	41.13	-	-	5352.70	39.92	-	-	5353.91	40.98	-	-	5352.85	41.11	-	-	5352.72
GBR-20	5393.47	38.86	-	-	5354.61	38.51	-	-	5354.96	37.55	-	-	5355.92	40.85	40.68	0.17	5352.76
GBR-21D	5400.19	38.83	-	-	5361.36	40.93	-	-	5359.26	39.01	-	-	5361.18	37.65	-	-	5362.54
GBR-21S	5400.65	27.31	-	-	5373.34	27.24	27.23	0.01	5373.42	29.58	29.52	0.06	5371.12	32.26	32.24	0.02	5368.41
GBR-22	5395.91	no water	38.25	0.48	-	no water	38.31	0.42	-	no water	37.95	0.78	-	no water	38.09	0.64	-
GBR-23	5403.72	30.78	-	-	5372.94	31.36	31.12	0.24	5372.55	32.95	32.85	0.1	5370.85	30.75	-	-	5372.97
GBR-24D	5396.77	32.77	-	-	5364.00	33.75	-	-	5363.02	32.98	-	-	5363.79	32.84	-	-	5363.93
GBR-24S	5396.08	31.85	-	-	5364.23	32.5	-	-	5363.58	32.51	-	-	5363.57	32.14	-	-	5363.94
GBR-25	5397.03	36.77	36.49	0.28	5360.48	37.05	-	-	5359.98	37.29	37.21	0.08	5359.80	36.62	-	-	5360.41
GBR-26	5396.72	34.1	-	-	5362.62	36.1	-	-	5360.62	34.38	-	-	5362.34	33.73	-	-	5362.99
GBR-30	5395.59	35.32	-	-	5360.27	35.2	-	-	5360.39	34.5	-	-	5361.09	34.37	-	-	5361.22
GBR-31	5396.58	35.61	-	-	5360.97	35.46	-	-	5361.12	33.55	-	-	5363.03	35.6	-	-	5360.98
GBR-32	5394.86	38.25	-	-	5356.61	38.07	-	-	5356.79	38.14	-	-	5356.72	38.32	-	-	5356.54
GBR-33	5396.28	37.09	-	-	5359.19	36.9	-	-	5359.38	36.97	-	-	5359.31	36.98	-	-	5359.30
GBR-34	5394	36.99	-	-	5357.01	37.02	-	-	5356.98	37.05	-	-	5356.95	37.03	-	-	5356.97
GBR-35	5393.66	37.1	-	-	5356.56	36.97	-	-	5356.69	37.12	-	-	5356.54	37.12	-	-	5356.54
GBR-39	5397.55	36.37	-	-	5361.18	36.22	-	-	5361.33	36.07	-	-	5361.48	35.57	-	-	5361.98
GBR-40	5400.76	34.25	-	-	5366.51	34.62	-	-	5366.14	34.91	-	-	5365.85	35.24	-	-	5365.52
GBR-41	5396.35	30.34	-	-	5366.01	30.6	-	-	5365.75	30.79	-	-	5365.56	31.97	31.42	0.55	5364.82
GBR-48	5413.9	39.73	-	-	5374.17	39.58	-	-	5374.32	39.68	-	-	5374.22	39.84	-	-	5374.06
GBR-49	*	36.2	-	-	-	36.03	-	-	-	36.11	-	-	-	36.27	-	-	-
GBR-50	*	35.47	-	-	-	35.29	-	-	-	35.4	-	-	-	35.52	-	-	-
GBR-51	5389.68	42.39	-	-	5347.29	42.10	-	-	5347.58	42.22	-	-	5347.46	42.42	-	-	5347.26
GBR-52	5387.74	40.25	-	-	5347.49	39.94	-	-	5347.80	40.08	-	-	5347.66	40.23	-	-	5347.51
SHS-1	5383.54	40.13	-	-	5343.41	40.83	-	-	5342.71	39.96	-	-	5343.58	40.24	-	-	5343.30
SHS-2	5381.66	40.76	-	-	5340.90	40.68	-	-	5340.98	40.56	-	-	5341.10	40.95	-	-	5340.71
SHS-3	5383.33	**	-	-	-	**	-	-	-	**	-	-	-	**	-	-	-
SHS-4	5383.62	42.54	-	-	5341.08	42.18	-	-	5341.44	42.31	-	-	5341.31	42.58	-	-	5341.04
SHS-5	5378.36	39.67	-	-	5338.69	47.85	-	-	5330.51	39.45	-	-	5338.91	39.73	-	-	5338.63
SHS-6	5378.17	39.4	-	-	5338.77	38.97	-	-	5339.20	39.18	-	-	5338.99	37.47	-	-	5340.70
SHS-8	5380.25	40.08	-	-	5340.17	39.68	-	-	5340.57	39.86	-	-	5340.39	40.13	-	-	5340.12
SHS-9	5380.79	39.05	-	-	5341.74	38.73	-	-	5342.06	37.86	-	-	5342.93	39.13	-	-	5341.66
SHS-10	5373.8	36.92	-	-	5336.88	36.45	-	-	5337.35	36.92	-	-	5336.88	37.17	-	-	5336.63
SHS-12	5373.94	40.31	-	-	5333.63	39.73	-	-	5334.21	40.11	-	-	5333.83	40.62	-	-	5333.32
SHS-13	5367.81	36.83	-	-	5330.98	36.20	-	-	5331.61	36.59	-	-	5331.22	37.11	-	-	5330.70
SHS-14	5367.07	35.11	-	-	5331.96	32.98	-	-	5334.09	34.98	-	-	5332.09	35.5	-	-	5331.57
SHS-15	5366.21	33.86	-	-	5332.35	32.23	-	-	5333.98	33.9	-	-	5332.31	34.36	-	-	5331.85
SHS-16	5362.58	31.61	-	-	5330.97	31.02	-	-	5331.56	31.52	-	-	5331.06	32.04	-	-	5330.54
SHS-17	5364.35	33.55	-	-	5330.80	32.93	-	-	5331.42	33.42	-	-	5330.93	33.96	-	-	5330.39
SHS-18	5373.64	40.36	-	-	5333.28	39.77	-	-	5333.87	40.15	-	-	5333.49	41.63	-	-	5332.01
SHS-19	5378.89	40.04	-	-	5338.85	38.9	-	-	5339.99	39.14	-	-	5339.75	39.42	-	-	5339.47

* Casing Elevation is unknown

** Well is damaged by tree root

A corrected groundwater elevation has been calculated for wells containing free-phase product.

Annual Report 2008, Former Giant Refinery
Western Refining, Inc.
March 2009

Appendix C

Groundwater Sampling Laboratory Results

Analysis		Station		Date		Well Number																					
				Influent	Effluent	GRW-3	GRW-6	GBR-17	GBR-24D	GBR-30	GBR-31	GBR-32	GBR-48	GBR-49	GBR-50	GBR-51	GBR-52	SHS-1	SHS-2	SHS-5	SHS-8	SHS-9	SHS-18	SHS-19			
Method 601/602																											
methyl-t-butyl ether		ug/L	ND	ND	ND	ND	ND	ND	59	ND	ND	ND	ND	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
benzene	10	ug/L	ND	ND	ND	ND	ND	ND	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
toluene	750	ug/L	ND	ND	ND	ND	ND	ND	7.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
ethylbenzene	750	ug/L	ND	ND	ND	ND	ND	ND	4.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
total xylenes	620	ug/L	ND	ND	ND	ND	ND	ND	71.8	ND	ND	ND	ND	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
TOTAL BTEX		ug/L	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	ND				
chloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
vinyl chloride	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
trichlorofluoromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	17	ND			
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
methylene chloride	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,1-dichloroethane	25	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
chloroform	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,2-dichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
trichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
cis-1,3-dichloroporpene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
tetrachloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	2.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
chlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,1,2,2-tetrachloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
1,2-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
Anions																											
chloride	250	mg/L	82	87.7	94.3	64.5	43.8	102	212	79.4	104	144	99.7	46.5	60.8	ND	94.2	100	62.8	186	101	98.6	94.3				
sulfate	600	mg/L	920	1090	453	957	843	1600	1290	1360	1750	698	1720	1380	1270	1330	69.5	2200	1200	77.9	73.6	401	453				
Cations																											
calcium		mg/L	264	232	351	257	288	501	433	407	454	167	441	326	372	29.4	82.3	465	405	105	159	166	144				
potassium		mg/L	3.13	2.51	4.66	2.79	1.72	7	4.69	3.59	4.28	3.89	4.34	2.56	1.59	54.5	2.29	7.93	4.03	5.55	3	2.70	1.37				
magnesium		mg/L	25.1	22.3	19	24.8	23.2	68.7	40.3	34.6	49.5	17.8	38.6	25	29	5.96	17.9	118	33.6	15.6	38.6	19.6	22.3				
sodium		mg/L	466	408	589	451	249	501	411	436	665	266	508	320	298	1200	383	505	312	310	399	424	404				
copper	1.0	mg/L		0.004							0.189	0.02	0.019	0.016													
zinc	10	mg/L		0.021							0.279	0.02	0.56	0.25													
General Chemistry																											
pH	6-9	S.U.	7.4	7.3	7.4	7.2	7.3	7.1	6.9	7.2	7.4	7.6	6.3	7.2	7.4	7.3	7.3	6.9	7.3	6.6	7.3	7.4	7.4				
specific conductance		umhos/cm	3240	3430	4110	3190	2560	4560	3880	3650	5510	2230	4430	3420	3160	3400	1950	4760	3010	1970	2290	2530	2640				
total dissolved solids	1000	mg/L	2470	2430	3210	2180	1910	3660	3010	2890	4270	1460	3460	2830	2460	2740	1170	4090	2530	1070	1370	1570	1630				
hardness		mg/L	763	578	955	744	732	1530	1250	1160	1340	490	1260	916	1050	97.9	251	1480	1030	295	556	445	451				
total alkalinity		mg/L	510	494	290	613	215	568	263	261	359	279	211	224	222	236	1010	389	251	693	224	904	840				
bicarbonate alkalinity		mg/L	509	492	290	611	215	568	262	261	357	272	211	224	221	235	1010	389	251	693	224	903	838				
carbonate alkalinity		mg/L	ND	1.64	ND	1.48	ND	ND	ND	ND	2.52	ND	ND	ND	ND	ND	1.8	ND	ND	ND	ND	1.24	1.99				
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				
Other Metals																											
antimony		mg/L		ND								ND	ND	0.002	0.002												
arsenic	0.1	mg/L		0.002								0.006	ND	0.005	0.002												
beryllium		mg/L		ND								ND	ND	ND	ND												
cadmium	0.01	mg/L		ND								0.002	ND	0.001	0.006												
chromium	0.05	mg/L		0.003								0.189	1.32	0.217	0.011												
lead	0.05	mg/L		ND								0.003	0.005	0.002	0.009												
nickel	0.2	mg/L		0.014								0.123	0.08	0.158	0.018												
selenium	0.05	mg/L		0.008								0.04	0.04	0.013	0.009												
silver	0.05	mg/L		ND								ND	ND	ND	ND												
thallium		mg/L		ND								ND	ND	ND	ND												
Mercury		mg/L		ND								ND	ND	ND	ND												
PAH																											
1-methyl-Naphthalene		ug/L		ND	ND	ND	ND	1.98	ND	ND																	
2-methyl-Naphthalene		ug/L		ND	ND	ND	ND	1.08	ND	ND																	
Acenaphthene		ug/L		ND	ND	ND	ND	0.51	ND	ND																	
Acenaphthylene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
Anthracene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
Benzo(a)anthracene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
Benzo(a)pyrene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
Benzo(b)fluoranthene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
Benzo(g,h,i)perylene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
Benzo(k)fluoranthene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
Chrysene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
Dibenz(a,h)anthracene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
fluoranthene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
fluorene		ug/L		ND	ND	ND	ND	0.91	ND	ND																	
indeno(1,2,3-cd)pyrene		ug/L		ND	ND	ND	ND	ND	ND	ND																	
naphthalene		ug/L		ND																							

Analyte	Standard	Unit	Well Number								
			Influent	Effluent	SHS-1	SHS-2	SHS-5	SHS-8	SHS-9	SHS-18	SHS-19
Method 601/602											
methyl-t-butyl ether		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L	ND	ND	ND	ND	ND	2.7	ND	ND	ND
toluene	750	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	750	ug/L	ND	ND	0.7	0.4	ND	6.6	0.7	ND	ND
total xylenes	620	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL BTEX		ug/L	ND	ND	0.7	0.4	ND	9.3	0.7	ND	ND
chloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloroform	100	ug/L	ND	ND	ND	ND	ND	ND	ND	0.5	ND
1,2-dichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	ND	ND	1.3	ND	ND	0.8	ND	ND	0.9
Anions											
chloride	250	mg/L	86	86	97	170	61	110	99	140	93
fluoride		mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
nitrate		mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
sulfate	600	mg/L	1500	1400	33	220	1400	22	51	640	31
carbonate		mg/L	0	1.3	5.3	ND	1.1	1	4.2	2.1	3.8
bi-carbonate		mg/L	410	400	1000	250	240	710	1000	820	1000
Cations											
calcium		mg/L	310	320	84	520	380	77	120	220	50
potassium		mg/L	5.1	5.1	7.1	9.4	10	5.7	6.1	7.5	1.1
magnesium		mg/L	27	29	21	110	35	12	31	28	14
sodium		mg/L	510	510	440	540	370	360	430	550	400
copper	1.0	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND
iron	1.0	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
manganese	0.2	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
zinc	10	mg/L	0.08	ND	ND	ND	ND	ND	ND	ND	ND
General Chemistry											
pH	6-9	SU	7.3	7.4	7.4	6.4	7.3	7.1	7.4	7.2	7.4
specific conductance		umhos/cm	3600	3600	2000	4800	3200	1800	2100	3100	1900
total dissolved solids	1000	mg/L	2900	2800	1200	3800	2400	990	1300	2000	1200
hardness		mg/L	880	910	300	1600	1100	240	420	670	180
total alkalinity		mg/L	410	400	1000	250	240	710	1000	820	1000
bicarbonate alkalinity		mg/L	410	400	1000	250	240	710	1000	820	1000
carbonate alkalinity		mg/L	ND	1.3	5.3	ND	1.1	1	4.2	2.1	3.8
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND

Analyte	Standard	Unit	Well Number								
			Influent	Effluent	SHS-1	SHS-2	SHS-5	SHS-8	SHS-9	SHS-18	SHS-19
Method 601/602											
methyl-t-butyl ether	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene		ug/L	ND	ND	ND	ND	ND	2.2	ND	ND	ND
toluene		750	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene		750	ug/L	ND	ND	0.7	ND	ND	2.8	2.9	ND
total xylenes	620	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL BTEX		ug/L	ND	ND	0.7	ND	ND	5.0	2.9	ND	ND
chloromethane	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloroform	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloroporpene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	ND	ND	1.2	ND	ND	0.9	ND	ND	ND
Anions											
chloride	250	mg/L	84	86	91	160	56	100	95	100	110
sulfate	600	mg/L	1250	1253	11	2300	1500	19	ND	690	21
Cations											
calcium		mg/L	293	248	75	510	350	64	84	790	190
potassium		mg/L	4.2	2.75	1.8	9.2	1.7	1.2	2.5	5.6	1.8
magnesium		mg/L	28	24	17	96	29	8.2	29	23	33
sodium		mg/L	468	502	410	480	320	320	400	460	460
General Chemistry											
pH	6-9	SU	7.3	7.3	7.09	6.26	7.23	6.71	7.16	7.22	7.12
specific conductance		umhos/cm	3280	3490	1900	4500	2900	1600	2100	2800	2800
total dissolved solids	1000	mg/L	2500	2560	1200	3700	2500	980	1100	1800	2000
total alkalinity		mg/L	468	521	1000	210	220	730	1100	760	600
bicarbonate alkalinity		mg/L	467	521	1000	210	220	730	1100	760	600
carbonate alkalinity		mg/L	ND	ND	2.2	ND	ND	ND	2.7	1.9	1.4
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Analyte	Standard	Unit	Well Number								
			Influent	Effluent	SHS-1	SHS-2	SHS-5	SHS-8	SHS-9	SHS-18	SHS-19
Method 601/602											
methyl-t-butyl ether		ug/L			ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L			ND	ND	ND	ND	ND	ND	ND
toluene	750	ug/L			ND	ND	ND	ND	ND	ND	ND
ethylbenzene	750	ug/L			ND	ND	ND	ND	5.4	ND	ND
total xylenes	620	ug/L			ND	ND	ND	ND	3.3	ND	ND
TOTAL BTEX		ug/L			ND	ND	ND	ND	8.7	ND	ND
chloromethane		ug/L									
vinyl chloride	1	ug/L									
bromomethane		ug/L									
chloroethane		ug/L									
trichlorofluoromethane		ug/L									
1,1-dichloroethene		ug/L									
methylene chloride	100	ug/L									
trans-1,2-dichloroethene		ug/L									
1,1-dichloroethane	25	ug/L									
chloroform	100	ug/L									
1,2-dichloroethane	10	ug/L									
1,1,1-trichloroethane	60	ug/L									
carbon tetrachloride	10	ug/L									
1,2-dichloropropane		ug/L									
trichloroethene		ug/L									
bromodichloromethane		ug/L									
cis-1,3-dichloroporpene		ug/L									
trans-1,3-dichloropropene		ug/L									
1,1,2-trichloroethane	10	ug/L									
dibromochloromethane		ug/L									
1,2-dibromoethane		ug/L									
tetrachloroethene		ug/L									
chlorobenzene		ug/L									
bromoform		ug/L									
1,1,2,2-tetrachloroethane	10	ug/L									
1,3-dichlorobenzene		ug/L									
1,4-dichlorobenzene		ug/L									
1,2-dichlorobenzene		ug/L									
Anions											
chloride	250	mg/L									
sulfate	600	mg/L									
Cations											
calcium		mg/L									
potassium		mg/L									
magnesium		mg/L									
sodium		mg/L									
copper	1.0	mg/L									
zinc	10	mg/L									
General Chemistry											
pH	6-9	SU									
specific conductance		umhos/cm									
total dissolved solids	1000	mg/L									
hardness		mg/L									
total alkalinity		mg/L									
bicarbonate alkalinity		mg/L									
carbonate alkalinity		mg/L									
hydroxide alkalinity		mg/L									

Groundwater Remediation System Evaluation Sampling Results July 2008

Analyte	Standard	Unit	Well Number							
			GBR-05	GBR-07	GBR-08	GBR-09	GBR-10	GBR-11	GBR-13	GBR-15
Method 601/602										
methyl-t-butyl ether		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L	Lab Error	ND	3.8	ND	15	800 E	ND	ND
toluene	750	ug/L	Lab Error	3.0	ND	ND	ND	ND	ND	ND
ethylbenzene	750	ug/L	Lab Error	0.8	3.7	ND	160	380	ND	ND
total xylenes	620	ug/L	Lab Error	9.7	ND	ND	ND	ND	ND	ND
TOTAL BTEX		ug/L	Lab Error	14	7.5	ND	175	1180	ND	ND
chloromethane		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	1	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
methylene chloride	100	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
chloroform	100	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	1.4
1,1,1-trichloroethane	60	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloroporpene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
chlorobenzene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	Lab Error	ND	ND	ND	ND	ND	ND	0.8
total alkalinity		mg/L	880	820	980	550	1600	520	740	330
bicarbonate alkalinity		mg/L	880	820	980	550	1500	520	740	330
carbonate alkalinity		mg/L	2	2.6	4	3.8	12	ND	1	ND
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND
chloride	250	mg/L	83	96	89	94	69	450	110	120
sulfate	600	mg/L	360	400	120	230	19	ND	940	1700
pH		SU	7.39	7.5	7.24	8.04	7.82	6.5	7.07	7.11
specific conductance		umhos/cm	2400	2400	2200	2000	2900	2400	3100	4000
total dissolved solids	1000	mg/L	1500	1600	1400	1300	1700	1500	2200	3000
calcium		mg/L	120	140	94	44	28	100	240	380
hardness		mg/L	140	450	340	150	280	320	750	1100
magnesium		mg/L	26	24	24	11	52	18	38	31
potassium		mg/L	2.6	1.2	1.7	14	3.5	10	3.8	10
sodium		mg/L	430	440	430	480	670	400	470	560
cation-anion balance (% diff)		%	5	6.8	9	5	12.2	6.4	1.1	2.1
dissolved oxygen (mean)		mg/L	4.11	5.45		4.32				
ORP		mV	-296.28	-285.50		-180.75				

E=estimated value/exceeded calibration range

D20 = Reported from a 20X dilution

Groundwater Remediation System Evaluation Sampling Results July 2008

Analyte	Standard	Unit	GBR-17	GBR-18	GBR-19	GBR-20	GBR-21D	GBR-24D	GBR-24S	GBR-26
Method 601/602										
methyl-t-butyl ether		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L	ND	ND	3.9	ND	1.8	3	15	0.9
toluene	750	ug/L	ND	ND	ND	ND	1.4	ND	ND	ND
ethylbenzene	750	ug/L	ND	ND	ND	ND	1.6	ND	6.2	0.7
total xylenes	620	ug/L	ND	ND	ND	ND	ND	ND	5	ND
TOTAL BTEX		ug/L	ND	ND	3.9	ND	4.8	3	26	1.6
chloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroform	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ug/L	ND	ND	ND	ND	1	1.2	3.7	1.8
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
total alkalinity		mg/L	220	220	730	1100	430	220	550	830
bicarbonate alkalinity		mg/L	210	220	730	1100	430	220	540	820
carbonate alkalinity		mg/L	ND	ND	1.4	17	ND	ND	1.5	1.3
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND
chloride	250	mg/L	41	83	360	83	360	180	170	200
sulfate	600	mg/L	1200	1800	440	91	960	2100	1700	310
pH		SU	7.25	7.18	7.13	7.5	7.1	7.19	7.21	694
specific conductance		umhos/cm	2500	3800	3000	2200	3700	4500	4200	2600
total dissolved solids	1000	mg/L	1800	2800	1800	1300	2100	3000	2900	1600
calcium		mg/L	300	370	220	84	260	450	370	200
hardness		mg/L	860	1000	690	310	790	1200	1100	600
magnesium		mg/L	24	26	32	25	34	45	47	27
potassium		mg/L	1.2	6.3	13	1.9	10	9.2	18	5
sodium		mg/L	270	500	440	450	570	620	620	380
cation-anion balance (% diff)		%	1.5	1.1	2.7	6.2	4.7	0.9	0.7	6
dissolved oxygen (mean)		mg/L		3.35		5.45				
ORP		mV		-120.63		-309.20				

E=estimated value/exceeded calibration range

D20 = Reported from a 20X dilution

Groundwater Remediation System Evaluation Sampling Results July 2008

Analyte	Standard	Unit	GBR-30	GBR-31	GBR-32	GBR-33	GBR-34	GBR-35	GBR-39	GBR-40
Method 601/602										
methyl-t-butyl ether		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L	ND	ND	ND	ND	24	12	ND	ND
toluene	750	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	750	ug/L	ND	ND	ND	ND	310 D20	13	ND	ND
total xylenes	620	ug/L	ND	ND	ND	ND	470 D20	12	ND	ND
TOTAL BTEX		ug/L	ND	ND	ND	ND	63	37	ND	ND
chloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroform	100	ug/L	ND	ND	0.8	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ug/L	ND	ND	ND	ND	0.7	1.6	7	ND
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	ND	ND	0.7	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	ND	0.9	1.9	1.6	ND	ND	ND	ND
chlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
total alkalinity		mg/L	250	250	380	290	1300	1500	ND	910
bicarbonate alkalinity		mg/L	250	250	380	290	1300	1500	ND	910
carbonate alkalinity		mg/L	ND	ND	1.4	ND	1.8	2.4	ND	1.8
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND
chloride	250	mg/L	250	84	480	210	380	220	360	420
sulfate	600	mg/L	1800	1700	2400	1700	ND	27	1100	910
pH		SU	7.01	7.16	7.36	7.17	7.03	7.01	5.86	7.22
specific conductance		umhos/cm	4100	3600	5800	4300	3500	2900	3000	4600
total dissolved solids	1000	mg/L	3000	2700	4000	2600	2000	1600	2100	2900
calcium		mg/L	490	380	540	370	210	190	250	250
hardness		mg/L	1200	1100	1600	1100	710	670	720	1200
magnesium		mg/L	43	33	54	36	48	45	23	130
potassium		mg/L	11	5.7	8	5.8	27	12	12	11
sodium		mg/L	490	430	810	560	690	480	350	620
cation-anion balance (% diff)		%	1	1.6	2.2	0.1	16.9	4.5	5	4.8
dissolved oxygen (mean)		mg/L								
ORP		mV								

E=estimated value/exceeded calibration range

D20 = Reported from a 20X dilution

Groundwater Remediation System Evaluation Sampling Results July 2008

Analyte	Standard	Unit	GBR-41	GBR-48	GBR-49	GBR-50	GBR-51	GBR-52	GRW-01	GRW-02
Method 601/602										
methyl-t-butyl ether		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L	3.6	ND	ND	ND	ND	ND	ND	ND
toluene	750	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	750	ug/L	18	ND	ND	ND	ND	ND	ND	ND
total xylenes	620	ug/L	12	ND	ND	ND	ND	ND	ND	ND
TOTAL BTEX		ug/L	33.6	ND	ND	ND	ND	ND	ND	ND
chloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	ND	ND	0.3	ND	ND	ND	ND	ND
chloroform	100	ug/L	ND	0.8	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	ND	0.4	0.9	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	ND	1.3	2.7	ND	ND	ND	ND	ND
chlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
total alkalinity		mg/L	550	340	220	210	220	210	670	680
bicarbonate alkalinity		mg/L	550	340	220	210	220	210	670	680
carbonate alkalinity		mg/L	ND	1	ND	ND	ND	ND	2	ND
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND
chloride	250	mg/L	140	760	310	45	57	64	96	93
sulfate	600	mg/L	710	2300	2000	2000	1500	1700	1200	1100
pH		SU	6.62	7.3	6.51	7.2	7.22	7.34	7.28	6.81
specific conductance		umhos/cm	2600	6100	4700	3200	3100	3400	3100	3000
total dissolved solids	1000	mg/L	1800	4200	3400	2500	2400	2600	2200	2000
calcium		mg/L	170	640	500	370	350	470	240	190
hardness		mg/L	580	1900	1300	1000	1000	1300	750	660
magnesium		mg/L	40	61	46	29	29	35	34	42
potassium		mg/L	2.7	11	6.4	4.1	1.7	1.9	5.5	3.1
sodium		mg/L	360	720	630	370	320	330	470	500
cation-anion balance (% diff)		%	0.4	4.4	2.1	11.2	3.7	0.1	4.6	2.7
dissolved oxygen (mean)		mg/L					3.64	4.28	1.35	2.61
ORP		mV					-37.81	26.06	-55.08	-91.35

E=estimated value/exceeded calibration range

D20 = Reported from a 20X dilution

Groundwater Remediation System Evaluation Sampling Results July 2008

Analyte	Standard	Unit	GRW-03	GRW-04	GRW-05	GRW-06	GRW-09	GRW-10	GRW-11	GRW-12
Method 601/602										
methyl-t-butyl ether		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
toluene	750	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	750	ug/L	8.4	13	ND	ND	0.8	ND	ND	ND
total xylenes	620	ug/L	ND	4.4	ND	ND	ND	ND	ND	ND
TOTAL BTEX		ug/L	8.4	17.4	ND	ND	0.8	ND	ND	ND
chloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroform	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	0.7
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	ND	0.6	ND	ND	ND	ND	ND	0.7
total alkalinity		mg/L	910	950	700	580	820	790	120	1000
bicarbonate alkalinity		mg/L	900	940	700	570	820	780	120	1000
carbonate alkalinity		mg/L	1.9	1.6	2.1	1.5	1.4	7.7	ND	1.8
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND
chloride	250	mg/L	99	91	82	82	85	88	35	120
sulfate	600	mg/L	170	160	950	1200	370	1400	2500	320
pH		SU	7.08	7.21	7.36	7.17	7.23	8.37	7.2	7.09
specific conductance		umhos/cm	2100	2200	3200	3400	2300	4600	4700	2600
total dissolved solids	1000	mg/L	1200	1100	2100	2400	1500	2900	3600	1700
calcium		mg/L	91	150	210	290	130	49	470	210
hardness		mg/L	2330	490	670	900	440	240	1100	630
magnesium		mg/L	24	26	37	45	29	27	21	28
potassium		mg/L	1.7	ND	2.8	1.7	1.5	20	9.8	1.5
sodium		mg/L	420	460	520	480	430	1100	720	420
cation-anion balance (% diff)		%	8	16.2	3.7	3.2	7.9	8.6	1.6	8
dissolved oxygen (mean)		mg/L	2.45	2.58	1.79	2.47	3.61	1.79	3.00	4.43
ORP		mV	-173.77	-299.25	-122.42	-110.10	-306.00		-151.21	-192.97

E=estimated value/exceeded calibration range

D20 = Reported from a 20X dilution

Groundwater Remediation System Evaluation Sampling Results July 2008

Analyte	Standard	Unit	GRW-13	SHS-01	SHS-02	SHS-04	SHS-05	SHS-06	SHS-08	SHS-09
Method 601/602										
methyl-t-butyl ether		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L	0.9	ND	ND	ND	ND	ND	2.2	ND
toluene	750	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	750	ug/L	ND	0.7	ND	ND	ND	ND	2.8	2.9
total xylenes	620	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL BTEX		ug/L	0.9	0.7	ND	ND	ND	ND	5.0	2.9
chloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroform	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ug/L	0.8	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	ND	1.2	ND	ND	ND	ND	0.9	ND
total alkalinity		mg/L	190	1000	210	200	220	410	730	1100
bicarbonate alkalinity		mg/L	190	1000	210	200	220	410	730	1100
carbonate alkalinity		mg/L	ND	2.2	ND	ND	ND	ND	ND	2.7
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND
chloride	250	mg/L	180	91	160	62	56	76	100	95
sulfate	600	mg/L	2000	11	2300	1600	1500	1100	19	ND
pH		SU	7.02	7.09	6.26	7.21	7.23	7.17	6.71	7.16
specific conductance		umhos/cm	4200	1900	4500	3300	2900	2800	1600	2100
total dissolved solids	1000	mg/L	2700	1200	3700	2700	2500	1900	980	1100
calcium		mg/L	370	75	510	400	350	240	64	84
hardness		mg/L	1000	260	1700	1100	990	760	190	330
magnesium		mg/L	27	17	96	34	29	36	8.2	29
potassium		mg/L	8.5	1.8	9.2	3.7	1.7	2.5	1.2	2.5
sodium		mg/L	600	410	480	330	320	400	320	400
cation-anion balance (% diff)		%	2.9	8.9	1.2	1.5	3.7	1	8	7.2
dissolved oxygen (mean)		mg/L	2.94				4.98	2.00	1.08	1.01
ORP		mV	-49.63	-80.76			41.65	22.71	-0.92	-122.22

E=estimated value/exceeded calibration range

D20 = Reported from a 20X dilution

Groundwater Remediation System Evaluation Sampling Results July 2008

Analyte	Standard	Unit	SHS-10	SHS-12	SHS-13	SHS-14	SHS-15	SHS-16	SHS-17	SHS-18
Method 601/602										
methyl-t-butyl ether		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
benzene	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
toluene	750	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	750	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
total xylenes	620	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL BTEX		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	1	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichlorofluoromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	25	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chloroform	100	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	60	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromodichloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-trichloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
dibromochloromethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromoethane		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
bromoform		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene		ug/L	ND	ND	ND	ND	ND	ND	ND	ND
total alkalinity		mg/L	410	610	750	280	250	390	340	760
bicarbonate alkalinity		mg/L	410	600	740	280	250	390	340	760
carbonate alkalinity		mg/L	1.4	2.3	4.2	ND	1.1	1.1	ND	1.9
hydroxide alkalinity		mg/L	ND	ND	ND	ND	ND	ND	ND	ND
chloride	250	mg/L	49	88	180	41	110	490	95	100
sulfate	600	mg/L	1000	1000	660	1200	1200	2500	1500	690
pH		SU	7.26	7.3	7.05	7.28	7.44	729	7.29	7.22
specific conductance		umhos/cm	2500	3100	2700	2300	2800	6100	3000	2800
total dissolved solids	1000	mg/L	2000	2200	1900	1800	2200	4500	2400	1800
calcium		mg/L	270	260	270	290	300	800	380	190
hardness		mg/L	900	740	800	840	950	2300	1200	570
magnesium		mg/L	56	24	32	30	46	81	52	23
potassium		mg/L	11	12	2.9	2.9	5.1	11	14	2.6
sodium		mg/L	270	420	360	210	290	670	340	460
cation-anion balance (% diff)		%	1.9	0.5	1.2	8.1	1.1	2.5	1.4	2.9
dissolved oxygen (mean)		mg/L	2.31	1.88	3.38	2.85	8.20	0.91	3.67	12.73
ORP		mV	-69.06	-108.80	-95.43	-45.68	48.79	140.77	133.63	-48.21

E=estimated value/exceeded calibration range

D20 = Reported from a 20X dilution

Groundwater Remediation System Evaluation Sampling Results July 2008

Analyte	Standard	Unit	SHS-19
Method 601/602			
methyl-t-butyl ether		ug/L	ND
benzene	10	ug/L	ND
toluene	750	ug/L	ND
ethylbenzene	750	ug/L	ND
total xylenes	620	ug/L	ND
TOTAL BTEX		ug/L	ND
chloromethane		ug/L	ND
vinyl chloride	1	ug/L	ND
bromomethane		ug/L	ND
chloroethane		ug/L	ND
trichlorofluoromethane		ug/L	ND
1,1-dichloroethene		ug/L	ND
methylene chloride	100	ug/L	ND
trans-1,2-dichloroethene		ug/L	ND
1,1-dichloroethane	25	ug/L	ND
chloroform	100	ug/L	ND
1,2-dichloroethane	10	ug/L	ND
1,1,1-trichloroethane	60	ug/L	ND
carbon tetrachloride	10	ug/L	ND
1,2-dichloropropane		ug/L	ND
trichloroethene		ug/L	ND
bromodichloromethane		ug/L	ND
cis-1,3-dichloropropene		ug/L	ND
trans-1,3-dichloropropene		ug/L	ND
1,1,2-trichloroethane	10	ug/L	ND
dibromochloromethane		ug/L	ND
1,2-dibromoethane		ug/L	ND
tetrachloroethene		ug/L	ND
chlorobenzene		ug/L	ND
bromoform		ug/L	ND
1,1,2,2-tetrachloroethane	10	ug/L	ND
1,3-dichlorobenzene		ug/L	ND
1,4-dichlorobenzene		ug/L	ND
1,2-dichlorobenzene		ug/L	ND
total alkalinity		mg/L	600
bicarbonate alkalinity		mg/L	600
carbonate alkalinity		mg/L	1.4
hydroxide alkalinity		mg/L	ND
chloride	250	mg/L	110
sulfate	600	mg/L	21
pH		SU	7.12
specific conductance		umhos/cm	2800
total dissolved solids	1000	mg/L	2000
calcium		mg/L	210
hardness		mg/L	650
magnesium		mg/L	33
potassium		mg/L	1.8
sodium		mg/L	460
cation-anion balance (% diff)		%	42.5
dissolved oxygen (mean)		mg/L	1.02
ORP		mV	-80.71

E=estimated value/exceeded calibration range

D20 = Reported from a 20X dilution

Annual Report 2008, Former Giant Refinery
Western Refining, Inc.
March 2009

Appendix D

Groundwater Sampling Laboratory Reports

ANNUAL REPORT

FORMER GIANT BLOOMFIELD REFINERY BLOOMFIELD, NEW MEXICO

MARCH 2010



ANNUAL REPORT
FORMER GIANT BLOOMFIELD REFINERY
BLOOMFIELD, NEW MEXICO

MARCH 2010

Prepared for:

WESTERN REFINING SOUTHWEST, INCORPORATED
111 CR 4990
Bloomfield, New Mexico 87413

Prepared by:

LT ENVIRONMENTAL, INC.
2243 Main Avenue, Suite 3
Durango, Colorado 81301
(970) 385-1096



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EXECUTIVE SUMMARY

This report was prepared by LT Environmental, Inc. (LTE), on behalf of Western Refining Southwest, Incorporated (Western), to document work completed at the former Giant Bloomfield Refinery (Site) in Bloomfield, New Mexico during 2009, including:

- Groundwater elevations gauged in monitoring wells;
- Free-phase product levels observed in groundwater monitoring wells;
- Analytical data obtained from groundwater sampling; and
- Volume of treated water.

The Site is located in the northwest quarter of Section 27 and the southwest quarter of Section 22, Township 29 North, Range 12 West in San Juan County, New Mexico. It is on the corner of Highway 64 and County Road 350, approximately five miles west of the town of Bloomfield, New Mexico (Figure 1).

The scope of work for this project focuses on mitigation of hydrocarbon impacts to groundwater identified after the refinery closed in 1982. During 2009, Western utilized a groundwater recovery and treatment system consisting of groundwater monitoring and recovery wells, remediation by carbon filtration and a treated water infiltration trench. The system was installed in 1988 and has gradually been simplified over time as groundwater quality improved. It operates under the conditions of Discharge Permit GW-040.

LTE conducted regular operations and maintenance on the system hardware and monitored system effectiveness. Regular monitoring included gauging groundwater and product levels in all monitoring wells. The influent and effluent water were sampled on a regular basis, as were specific monitoring wells. LTE implemented recommended changes to the sampling schedule presented in the 2008 annual report. These changes were based on findings of a supplemental evaluation of remedial operations conducted in 2008. A summary of field activities, analytical results from groundwater sampling, conclusions and recommendations are presented in the subsequent sections of this report.

The remediation system at the Site has been successful in reducing phase-separated hydrocarbon accumulations and dissolved phase contaminants in the groundwater. Currently, it is most effective at controlling migration of remaining contaminants. Minor changes to the system are recommended, the implementation of which will facilitate a more targeted approach to reducing contaminants within the source areas.

SECTION 1.0

INTRODUCTION

LT Environmental, Inc. (LTE) prepared this report for Western Refining Southwest, Incorporated (Western) to document work completed during 2009 at the former Giant Bloomfield Refinery (Site) in Bloomfield, New Mexico.

1.1 SITE DESCRIPTION

The Site is located on the northeast corner of Highway 64 and County Road 350, approximately five miles west of Bloomfield, New Mexico (Figure 1). The legal description is the northwest quarter of Section 27 and the southwest quarter of Section 22, Township 29 North, Range 12 West in San Juan County.

The Site consists of facilities, tanks and equipment associated with the operation of the former Giant Bloomfield Refinery, as well as remedial equipment, groundwater recovery wells and groundwater monitoring wells both within and south of the refinery property boundary (Figure 2).

1.2 SITE HISTORY

The refinery operated from 1974 to 1982 and is presently inactive. The refinery produced leaded and unleaded gasoline, diesel, kerosene and other refined petroleum products. Subsequent to closure of the refinery in the late 1980s, groundwater contamination was discovered and investigated within the refinery property. The area within the refinery is referred to as the On-Site Area. Details of the investigation and initial remediation efforts are contained in a report entitled *Soil and Groundwater Investigations and Remedial Action Plan, Giant Industries, Inc. Bloomfield Refinery, Bloomfield, New Mexico*. In 1990, evidence of contamination south of the refinery boundary was investigated. This area is referred to as the Off-Site Area. The results of the investigation and remedial plans for the Off-Site Area are contained in three volumes of the *Remedial Investigation Report for Lee Acres Landfill*.

The Lee Acres Landfill was located up-gradient of the Site and operated as a county landfill from 1962 to 1986. The landfill location is shown in Figure 1. Solid wastes were disposed in trenches, and a series of lagoons were used for disposal of a variety of liquid wastes. The New Mexico Oil Conservation Division (NMOCD) sampled the lagoons in 1985 and showed the liquids in the impoundments contained a variety of chlorinated solvents, petroleum constituents, heavy metals and salts. In April 1985, a breach in the dike of the lagoons released the liquid wastes into an arroyo that flows across from the refinery and the down-stream Lee Acres Subdivision (Figure 1). The NMOCD and the New Mexico Environment Department (NMED) identified contaminated water in private water wells in the Lee Acres Subdivision. The NMOCD required Giant Industries, Arizona (Giant, the former owner of the refinery) to perform a groundwater investigation

related to the refinery's activities, and the NMED required the Bureau of Land Management (BLM) to investigate contaminated water downgradient of the landfill. The investigations identified two separate plumes of contaminated groundwater that became commingled across the refinery and into the Lee Acres Subdivision.

Groundwater contaminants contained in the refinery plume included phase-separated hydrocarbons (PSH) and dissolved phase petroleum products. The dissolved-phase constituents included benzene, toluene, ethyl-benzene and total xylenes (BTEX), naphthalene and 1,2 dichloroethane (EDC). The second groundwater contaminant plume originated from the landfill and contained 1,1 dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, tetrachloroethene, 1,1,1-trichloroethane, trichloroethene, total dissolved solids (TDS), chloride, sulfate and manganese. More information about landfill groundwater investigations can be found in the references listed at the end of this report.

In addition to the Lee Acres Landfill, historical investigations identified three other source areas within the On-Site Area and shown on Figure 2:

- Northern Area (Diesel Spill Area): 10,000 to 15,000 gallons of diesel leaked from a pipeline in 1985;
- Central Area (Truck Fueling Area): 15,000 gallons of diesel leaked from a pipeline in 1986; and
- Southern Area: representing a former catchment area for stormwater and a seep. This area may have been impacted by historic releases from the former fire fighting drill area.

In response to these findings, Giant installed a groundwater recovery, treatment and disposal system in stages beginning in 1988 to restrict the migration of contaminants and to remediate groundwater from both the On-Site and Off-Site areas. Forty-five monitoring/recovery wells were initially installed and designated GBR wells. Eleven of these wells were put into service as recovery wells and re-numbered as GRW wells. Seventeen monitoring/recovery wells designated as SHS wells were completed south of Highway 64. Four of the wells operated as recovery wells (Figure 2).

As groundwater quality improved, the system was gradually simplified. It currently consists of a series of groundwater monitoring wells, groundwater recovery wells, water treatment facilities and a treated water infiltration gallery (Figure 2). It operates under the conditions of Discharge Permit GW-040. For several years, the groundwater remediation program operated in an operation and maintenance mode. Constituents of concern (COCs) within the system's influent and effluent had been at non-detect levels for years. During late 2008, Western began a supplemental evaluation of the remedial operations, which included shutting down the system and sampling all groundwater wells under static conditions in an effort to redefine the area of impact and assess effectiveness of the system. Existing equipment was inspected and repaired to optimize system performance. Results from the sampling event were included in the 2008 Annual Report submitted to the NMOCD last year. On February 19, 2009 pumping and treating operations resumed.

1.3 SITE HYROGEOLOGY

Historical investigations indicate that the Site is located on weathered outcrops of the Nacimiento Formation, which is comprised of shales, sandstones and siltstones of Cretaceous-Tertiary age. Immediately to the west of the Site is a large unnamed arroyo, which is underlain by 30 to 60 feet of Quaternary alluvial sediments. Older Quaternary terrace deposits of cobbles and boulders are observed on the interfluvial ridges adjacent to the arroyo. These terrace deposits may have been utilized as fill on the Site. The San Juan River Valley is located immediately to the south. Within the Site, the Nacimiento Formation has been eroded to form a paleo-channel that appears to be similar in morphology to the existing surface arroyo located to the west. The bedrock is overlain by recent alluvial deposits (gravel, sand, silt and clay), which extend to greater depths towards the southwest.

The subsurface geology is a controlling feature determining groundwater flow and contaminant migration at the Site. The Site as a whole is generally unconfined with some local areas potentially under semi-confined conditions. There are two aquifers of concern that are in direct hydraulic communication: 1) a shallow aquifer composed of recent alluvial materials and 2) a bedrock aquifer that exists in the underlying Nacimiento Formation. The alluvial aquifer has generally the higher permeability of the two aquifers and recovery wells completed within this aquifer have higher yields with larger radii of influence.

1.4 SCOPE OF WORK

The scope of work for this project included operations and maintenance of the groundwater pump and treat system, groundwater monitoring and tracking of the amount of groundwater treated between January 1, 2009 and December 31, 2009. A summary of field activities, analytical results from groundwater sampling, conclusions and recommendations are presented in the subsequent sections of this report.

SECTION 2.0

METHODOLOGY

2.1 GROUNDWATER FILTRATION SYSTEM

The groundwater remediation system at the Site is designed to pump impacted groundwater from the local aquifer through a series of recovery wells, which prevent migration of impacted water beyond the influence of the wells. Figure 3 illustrates the concept. The recovered groundwater is collected in a storage tank (Tank 102) and subsequently treated. The method of treatment used at the Site is carbon adsorption, where recovered water is pumped into a carbon matrix lining the tank.

The treated water is discharged into the aquifer through an infiltration trench or gallery. The infiltration trench consists of subsurface distribution system placed within gravel packs. Water infiltrates the surrounding strata and eventually makes its way back to the aquifer. The return of recovered water to the aquifer serves as a recharge mechanism. Figure 4 is a simplified diagram representation of groundwater recovery, treatment and disposal at the Site.

During 2008, Western conducted an assessment of the treatment system, which included turning the pumping system off for an extended period. The system was still off during January, but pumping resumed on February 19, 2009.

2.2 INSPECTIONS AND MAINTENANCE

Regular weekly inspections are performed to assure safe and efficient operation of the remediation system. The Control Panel, located in the Dispatch Office, serves to monitor and control the operation of the treatment system, while providing alarm and shutdown functions to safeguard against overflows and other undesirable events. The Control Panel is checked weekly. An inspection is also made in the control building at Tank 102, the infiltration gallery and each recovery well. Treated effluent volumes and flow rates are monitored weekly with a water meter that has been installed near the carbon adsorption tank. These values are recorded and compared with previous readings to ensure normal operation. Maintenance of the system includes repair and replacement of well pumps, replacement of filters in well houses, equipment lubrication, air compressor oil changes, listening for unusual pump and motor noise, inspecting the carbon pre-filter and repairing all equipment as required. Observations are recorded in a bound field logbook with the date, time and person recording the information noted. Meter readings are entered into a spreadsheet to calculate flow volumes and monitor flow rates. All equipment is inspected for leaks and malfunctions. The operator is familiar with the location of underground lines and notes any surface indication of underground leaks. Leaks of any size are noted and repaired.

2.3 GROUNDWATER MONITORING

Monitoring includes regular sampling of groundwater from select groundwater wells located within and south of the Site (Table 1). Following submittal of the previous annual report in April 2008, a revised sampling schedule was instituted in March 2009 based on recommendations made in that report. Water and product levels in each well are determined quarterly. This information is tabulated and utilized to prepare potentiometric surface maps. Oil absorbent socks are used to recover PSH. The socks are checked quarterly and replaced as necessary. The amount of product recovered by the socks is noted each time the socks are replaced.

Influent water is collected from a system valve before it enters Tank 102. Samples of effluent water are collected through a sample valve as treated water exits the carbon adsorption tank. Water is collected in appropriate pre-cleaned and/or pre-preserved sample bottles or glass vials. For United States Environmental Protection Agency (USEPA) Method 8260 analysis, vials are filled and capped with no air inside to prevent degradation of the sample. Samples are labeled with the date and time of collection, sample designation, project name, collector's name and parameters to be analyzed. They are immediately sealed and packed on ice. The samples are shipped to a laboratory in Albuquerque, New Mexico in a sealed cooler before designated holding times expire. Proper chain-of-custody procedures are followed with logs documenting the date and time sampled, sample number, type of sample, sampler's name, preservative used, analyses required and sampler's signatures.

For groundwater monitoring wells, depth to groundwater and total depth of wells is measured with a Keck oil-water interface probe prior to sampling. Presence of any PSH is also investigated using the interface probe. The interface probe is decontaminated with AlconoxTM soap and rinsed with de-ionized water before each measurement. The volume of water in the wells is calculated, and a minimum of three casing volumes of water is purged from each well using a disposable bailer or a permanent decontaminated PVC bailer. As water is extracted, pH, electric conductivity and temperature are monitored. Wells are purged until these properties stabilize or the well bails dry, indicating the purge water is representative of aquifer conditions. Stabilization is defined as three consecutive stable readings for each water property (± 0.4 units for pH, ± 10 percent for electric conductivity and $\pm 2^\circ$ Celsius for temperature). Once each monitoring well is properly purged, groundwater samples are collected in bottles or vials and shipped to the laboratory as described above. The method for sampling recovery wells is similar, the difference being that pumps installed within the wells are used to purge groundwater.

SECTION 3.0

RESULTS

3.1 QUARTERLY GROUNDWATER AND PRODUCT LEVELS

Groundwater monitoring wells have been installed throughout the On-Site and Off-Site areas to monitor groundwater quality and flow direction. Groundwater and PSH levels in each well are measured quarterly. These data are presented in Table 2 and are utilized to prepare the potentiometric surface maps shown in Figures 5-8. The maps are used to determine direction of groundwater flow and effectiveness of hydraulic control achieved by the recovery well system.

Groundwater flow is towards the southwest and is consistent throughout the year. Draw-down around recovery wells is evident when the remediation system is pumping water. Little to no drawdown at recovery wells was observed in January 2009, since the remediation system was off as part of an extensive study conducted during 2008. Pumping resumed on February 19, 2009 and groundwater levels in recovery wells declined as a result.

Thin accumulations of PSH were observed in groundwater monitoring wells from each of the source areas in the On-Site Area. Data collected are shown in Table 2 and isopach maps showing thickness of PSH throughout the year are shown in Figures 9 through 12. Within the Northern Area, PSH was measured in GBR-23 year-round, ranging in thickness from 0.03 feet to 0.93 feet. Small thicknesses (<0.1 feet) of PSH were detected in wells GBR-25 and GBR-26, but these occurrences were not consistent.

In the Central Area, between 0.32 and 1.19 feet of product was measured in GBR-34 while the pumping system was in operation (April, July and October 2009). When the remediation system was off in January 2009, no product was detected in GBR-34, but 0.82 feet was detected in nearby GBR-22.

In January 2009, when the remediation system was off, monitoring wells in the Southern Area contained measurable thicknesses of PSH. GBR-7 contained 0.51 feet of PSH, GBR-20 contained 0.18 feet of PSH and GBR-8 contained 0.05 feet of PSH. The appearance of PSH in these wells corresponds with a drop in water levels.

The amount of PSH removed from wells is shown in Table 4. The amounts are estimations based on saturation of oil-absorbent socks when they are replaced. The total amount of product removed from the water table during 2009 (0.86 gallons) is also shown. Insufficient records exist to calculate a cumulative amount of product removed since Site remediation began.

3.2 GROUNDWATER SAMPLING

Laboratory results obtained from groundwater sampling at the Site during 2009 are shown in Table 3. Concentrations of analytes over New Mexico Water Quality Control

Commission (NMWQCC) standards are shown in bold type. The standards are listed in the table for reference. Laboratory reports are included in Appendix A. The following list summarizes laboratory detection of COCs:

- Volatile organic compounds were occasionally detected from groundwater samples, but in minor amounts that are well below NMWQCC standards.
- The poly-aromatic hydrocarbon (PAH), Naphthalene, was detected above NMWQCC standards in the annual sample collected from GRW-3. Naphthalene was not detected in any other well.
- Elevated levels of the selenium and chromium were detected in wells GBR-32, GBR-48 and GBR-49. These wells are located within the arroyo adjacent to and up-gradient of the refinery. The NMWQCC standard for selenium was exceeded in the annual effluent sample, but neither selenium nor chromium were detected in other On-Site Area monitoring wells.
- Chloride concentrations were above standards in four wells sampled in January. Only one of these wells (GBR-30) is located near a source area. The other wells (GBR-32, GBR-48 and GBR-49) are located up-gradient of the refinery.
- Sulfate and total dissolved solids (TDS) were over NMWQCC standards in groundwater samples from most wells and from the influent and effluent samples. Similar results for TDS have been reported from groundwater samples collected in the past, and high concentrations are observed up-gradient of the refinery.

Isopach maps and cross sections showing distribution of COCs is not included, because the sampling events do not sample wells from all current problem areas. Such a presentation of results would not be indicative of true conditions at the Site.

3.3 TOTAL VOLUME HISTORY

Table 5 presents the volume of groundwater managed for the year. Total volume pumped from each well is reported. It should be noted that the recovery wells did not pump water during the month of January and the first part of February during 2009. When the system was turned back on, pumping of SHS wells on the Off-Site Area was not resumed, as recommended in the 2008 annual report. A total of 9,455,408 gallons of groundwater was recovered, treated by carbon filtration and re-injected through an infiltration gallery. This volume represents a significant increase compared to 2008 volumes. The change is a result of pump maintenance and replacement conducted during the system assessment in late 2008.

SECTION 4.0

CONCLUSIONS

Influent and effluent water associated with the pump and treat system at the Site is consistently clean, with little to no detection of COCs. The primary benefit of the system is a hydraulic barrier generated by the pumping action of the recovery wells. The barrier restricts migration of PSH and contaminants from moving off site.

Groundwater impacts are contained within the On-Site Area and are characterized by a thin accumulation of PSH. PSH is consistently evident in two source locations, the Northern Area and the Central Area. Presence and thickness of PSH within the Southern Area is controlled by pumping and discharging of groundwater at the Site, and PSH is not present in this area when the system is operational.

Groundwater from the Off-Site Area exhibited no PSH and no concentrations of COCs, confirming that migration of pollutants is restricted by the pumping action.

High sulfate, chloride and TDS levels are historically characteristic of almost all wells at the Site and are related to a release at the Lee Acres Landfill in 1985. These COCs were identified in earlier studies as constituents within the groundwater contaminant plume that originated from the landfill. Previous investigations at the landfill reported elevated levels of chloride present in the water sampled from liquid waste lagoons (McQuillan, D. and Longmire, P. *Water Quality Investigations at the Lee Acres Landfill and Vicinity, San Juan County, New Mexico*), and the landfill accepted produced water from natural gas well operations in the San Juan Basin. Chloride is currently evident in up-gradient, as well as downgradient, monitoring well samples. During initial landfill investigations, the up-gradient area near GBR-32, GBR-48, GBR-49 and GBR-50 was identified as the "northern containment slug." Groundwater representative of this area contained TDS concentrations ranging from 2125-6068 mg/kg, sulfate concentrations ranging from 1920-5830 mg/kg and chloride concentrations ranging from 14.7-2110 mg/kg (Roy F. Weston, Inc., *Remedial Investigation Report for Lee Acres Landfill, Volume 1*).

Chromium and selenium were detected in up-gradient wells during the annual sampling in January 2009. Selenium was also detected in the remediation system effluent within the On-Site Area. Previous studies conducted for the Lee Acres Landfill identified chromium and selenium in groundwater sampled up-gradient of the landfill. *Remedial Investigation Report for Lee Acres Landfill, Volume 1* states that up-gradient background alluvial aquifer contains elevated levels of chromium and suggests an unidentified source that is unrelated to the landfill or the refinery.

Additional sampling parameters (cations, anions, general chemistry, metals and PAHs) have shown consistently low or normal values for many years in almost all groundwater monitoring conducted at the Site.

In the Northern Area, it is apparent that the recovery wells have been successful in removing the PSH and impacted dissolved phase hydrocarbons in the areas close to the

recovery wells, but the radius of influence is limited. In this area, the potentiometric surface lies in the bedrock aquifer (Nacimiento Formation). There currently appears to be a thin (less than 1 foot) accumulation of PSH in the Northern Area that is not within the capture zone of the northern recovery wells.

The Central Area is located immediately south of the Northern Area. It appears that near GBR-34 and GBR-22, there has been little improvement since the remediation began and it is likely that this area is too far from GRW-10 and GRW-12 to be influenced by recovery operations. However, GBR-22 is probably silted in, making evaluation difficult.

Significant progress has been made in remediation of the Southern Area, with little PSH detected most of the year. Some accumulations were recently measured in the northeastern portion of this area (GBR-7, GBR-8 and GBR-20) when the system was not operational. GRW-4 is located a short distance down-gradient and should capture most COCs that flow through this area.

SECTION 5.0

RECOMMENDATIONS

Monitoring recommendations made in last year's annual report were instituted in March 2009 and should continue:

- Influent and Effluent should be monitored for volatile organic compounds on a quarterly basis.
- Eliminate laboratory analysis of groundwater samples for sulfate, chloride, TDS and metals since these constituents are sourced up-gradient of the Site.
- Eliminate laboratory analysis of groundwater samples for COCs that are not and have not been present above standards for years:
 - Discontinue analysis of anions, cations, general chemistry, metals and PAHs in all monitoring and recovery wells, except GBR-24D.
 - Discontinue analysis of anions, cations and general chemistry in GBR-24D, but continue to analyze for PAHs.

Following completion of the site assessment in 2008, RPS JDC Consulting offered recommendations for future actions to address the remaining groundwater impacts. The most recent analytical results collected in 2009 confirm previous findings and similar recommendations are offered in this report:

- To address thin accumulations of PSH in the Northern Area, recovery operations should continue at GRW-11, GRW-12 and GRW-13.
- Well GBR-15 is screened approximately 12 feet below the potentiometric surface and should be plugged and abandoned. There are other wells nearby that are properly screened to provide data that are more representative of groundwater impacts.
- In the Central Area, monitoring well GBR-22 should be redeveloped. The PSH occurrence in this area should be re-evaluated after the well is redeveloped. If significant PSH thickness is observed, it may be beneficial to initiate recovery operations closer to GBR-22.
- There is a row of recovery wells in the Southern Area (GRW-1, GRW-2, GRW-3, GRW-4, GRW-5 and GRW-6) that have been relied upon to generate a hydraulic barrier to capture and/or control off-site migration of PSH and contaminated groundwater. GRW-9 is located slightly up-gradient to the northeast of the row of recovery wells. Based on review of chemical analyses of groundwater samples

collected in 2008 and 2009 from the area and the subsurface hydrogeology, it appears that there is a possible preferential pathway in the center of the area near GBR-11. Operation of GRW-3, GRW-4 and GRW-5 should be capable of controlling contaminant migration in the Southern Area, which will allow termination of recovery operations at GRW-1, GRW-2, GRW-6 and GRW-9.

- Chemical analyses should be conducted on groundwater samples from GRW-1 and GRW-2 to monitor groundwater quality flowing through the Southern Area.
- Passive PSH recovery techniques (e.g. absorbent socks) should be used in wells showing thin accumulations of PSH that sporadically occur at the Site.

SECTION 6.0

REFERENCES

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TABLES

TABLE 1
2009 SAMPLING SCHEDULE
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING

	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09
System Influent		VOC GWC		VOC GWC			VOC GWC				VOC GWC	
System Effluent		VOC GWC Metals PAH		VOC GWC			VOC GWC				VOC GWC	
GRW-3	VOC GWC PAH											
GRW-6	VOC GWC PAH											
GBR-17	VOC GWC PAH											
GBR-24D	VOC GWC PAH											
GBR-30	VOC GWC PAH											
GBR-31	VOC GWC PAH											
GBR-32	VOC GWC Metals											
GBR-48	VOC GWC Metals											
GBR-49	VOC GWC Metals											
GBR-50	VOC GWC Metals											
GBR-51	VOC GWC											
GBR-52	VOC GWC											
SHS-1	VOC GWC											
SHS-2	VOC GWC											
SHS-5	VOC GWC											
SHS-8	VOC GWC											
SHS-9	VOC GWC											
SHS-18	VOC GWC											
SHS-19	VOC GWC											

Notes:

VOC - volatile organic compounds analyzed by USEPA Method 8260B

GWC - groundwater characteristics: alkalinity, electric conductivity, pH, total dissolved solids, cation/anion balance

PAH - polycyclic aromatic hydrocarbons analyzed by USEPA Method 8310

Metals - RCRA 8 Metals

Influent and Effluent was sampled in February instead of January because the treatment system was restarted on February 19, 2009



TABLE 2
GROUNDWATER ELEVATIONS AND PSH LEVELS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING

Well Number	Wellhead Elevation (ft)	January 2009				April 2009				July 2009				October 2009			
		Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL (ft)
GRW-1	5394.30	43.12	-	-	5351.18	58.53	-	-	5335.77	60.10	-	-	5334.20	39.77	-	-	5354.53
GRW-2	5391.28	44.70	-	-	5346.58	50.71	-	-	5340.57	51.35	-	-	5339.93	41.65	-	-	5349.63
GRW-3	5388.77	45.11	-	-	5343.66	54.20	-	-	5334.57	52.95	-	-	5335.82	53.42	-	-	5335.35
GRW-4	5390.02	43.96	-	-	5346.06	49.02	-	-	5341.00	48.05	-	-	5341.97	58.80	-	-	5331.22
GRW-5	5390.56	44.35	-	-	5346.21	65.34	-	-	5325.22	65.35	-	-	5325.21	66.91	-	-	5323.65
GRW-6	5390.81	43.75	-	-	5347.06	50.12	-	-	5340.69	48.73	-	-	5342.08	47.95	-	-	5342.86
GRW-9	5395.70	42.02	-	-	5353.68	49.03	-	-	5346.67	52.02	-	-	5343.68	51.48	-	-	5344.22
GRW-10	5395.02	38.62	-	-	5356.40	60.20	-	-	5334.82	55.23	-	-	5339.79	41.32	-	-	5353.70
GRW-11	5397.85	33.24	-	-	5364.61	56.13	-	-	5341.72	57.88	-	-	5339.97	58.03	-	-	5339.82
GRW-12	5397.24	37.63	-	-	5359.61	45.43	-	-	5351.81	41.84	-	-	5355.40	41.12	-	-	5356.12
GRW-13	5396.90	35.72	-	-	5361.18	56.14	-	-	5340.76	56.60	-	-	5340.30	56.30	-	-	5340.60
GBR-5	5395.07	41.32	-	-	5353.75	27.52	-	-	5367.55	26.40	-	-	5368.67	28.10	-	-	5366.97
GBR-7	5395.85	41.88	41.37	0.51	5354.38	30.98	-	-	5364.87	30.69	-	-	5365.16	31.27	-	-	5364.58
GBR-8	5390.50	44.02	43.97	0.05	5346.52	43.55	-	-	5346.95	41.86	-	-	5348.64	42.51	-	-	5347.99
GBR-9	5389.92	43.98	-	-	5345.94	48.45	-	-	5341.47	47.13	-	-	5342.79	47.75	-	-	5342.17
GBR-10	5390.57	47.29	-	-	5343.28	47.28	-	-	5343.29	47.27	-	-	5343.30	47.28	-	-	5343.29
GBR-11	5389.43	43.30	-	-	5346.13	43.18	-	-	5346.25	42.00	-	-	5347.43	47.55	-	-	5341.88
GBR-13	5393.04	43.82	-	-	5349.22	41.85	-	-	5351.19	41.15	-	-	5351.89	42.23	-	-	5350.81
GBR-15	5397.99	35.75	-	-	5362.24	41.07	-	-	5356.92	40.46	-	-	5357.53	39.92	-	-	5358.07
GBR-17	5402.69	37.68	-	-	5365.01	37.85	-	-	5364.84	37.94	-	-	5364.75	38.09	-	-	5364.60
GBR-18	5421.68	36.89	-	-	5384.79	36.41	-	-	5385.27	36.58	-	-	5385.10	36.91	-	-	5384.77
GBR-19	5393.83	40.13	-	-	5353.70	41.25	-	-	5352.58	41.10	-	-	5352.73	40.68	-	-	5353.15
GBR-20	5393.47	41.46	41.28	0.18	5352.15	36.55	-	-	5356.92	36.44	-	-	5357.03	31.66	-	-	5361.81
GBR-21D	5400.19	37.39	-	-	5362.80	41.26	-	-	5358.93	41.15	-	-	5359.04	40.87	-	-	5359.32
GBR-21S	5400.65	32.77	-	-	5367.88	33.33	-	-	5367.32	34.18	-	-	5366.47	no water	-	-	-
GBR-22	5395.91	no water	37.91	0.82	-	no water	-	-	-	no water	-	-	-	no water	-	-	-
GBR-23	5403.72	30.71	30.68	0.03	5373.03	33.83	32.90	0.93	5370.63	36.14	35.72	0.42	5367.92	36.05	35.84	0.21	5367.67
GBR-24D	5396.77	32.58	-	-	5364.19	34.69	-	-	5362.08	34.40	-	-	5362.37	33.94	-	-	5362.83
GBR-24S	5396.08	31.98	-	-	5364.10	33.73	-	-	5362.35	33.26	-	-	5362.82	32.67	-	-	5363.41
GBR-25	5397.03	36.21	-	-	5360.82	38.07	-	-	5358.96	38.62	38.56	0.06	5358.46	39.16	39.08	0.08	5357.87
GBR-26	5396.72	33.62	33.61	0.01	5363.11	36.67	-	-	5360.05	36.35	36.34	0.01	5360.38	36.14	-	-	5360.58
GBR-30	5395.59	35.34	-	-	5360.25	35.64	-	-	5359.95	35.63	-	-	5359.96	35.75	-	-	5359.84
GBR-31	5396.58	35.82	-	-	5360.76	36.22	-	-	5360.36	36.12	-	-	5360.46	36.10	-	-	5360.48
GBR-32	5414.86	38.17	-	-	5376.69	38.10	-	-	5376.76	38.27	-	-	5376.59	38.62	-	-	5376.24
GBR-33	5396.28	36.96	-	-	5359.32	37.83	-	-	5358.45	37.74	-	-	5358.54	37.55	-	-	5358.73
GBR-34	5394.00	36.88	-	-	5357.12	39.00	37.81	1.19	5355.95	39.32	38.48	0.84	5355.35	38.52	38.20	0.32	5355.48
GBR-35	5393.66	37.02	-	-	5356.64	37.77	-	-	5355.89	37.83	-	-	5355.83	37.64	-	-	5356.02
GBR-39	5397.55	35.40	-	-	5362.15	40.44	-	-	5357.11	39.93	-	-	5357.62	39.40	-	-	5358.15
GBR-40	5400.76	35.30	-	-	5365.46	35.24	-	-	5365.52	36.20	-	-	5364.56	32.87	-	-	5367.89
GBR-41	5396.35	32.03	-	-	5364.32	28.90	-	-	5367.45	30.61	-	-	5365.74	27.63	-	-	5368.72
GBR-48	5413.90	39.70	-	-	5374.20	39.60	-	-	5374.30	39.80	-	-	5374.10	39.98	-	-	5373.92
GBR-49	*	36.16	-	-	-	36.11	-	-	-	36.27	-	-	-	36.54	-	-	-
GBR-50	*	35.41	-	-	-	35.35	-	-	-	35.53	-	-	-	35.87	-	-	-
GBR-51	5389.68	40.18	-	-	5349.50	42.62	-	-	5347.06	42.15	-	-	5347.53	41.48	-	-	5348.20
GBR-52	5387.74	42.38	-	-	5345.36	41.56	-	-	5346.18	40.07	-	-	5347.67	40.34	-	-	5347.40

Well Number	Wellhead Elevation (ft)	January 2009				April 2009				July 2009				October 2009			
		Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL (ft)	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Adjusted GWEL (ft)
SHS-1	5383.54	40.15	-	-	5343.39	40.27	-	-	5343.27	39.92	-	-	5343.62	40.27	-	-	5343.27
SHS-2	5381.66	41.03	-	-	5340.63	41.25	-	-	5340.41	40.96	-	-	5340.70	40.73	-	-	5340.93
SHS-3	5383.33	**	-	-	-	**	-	-	-	**	-	-	-	**	-	-	-
SHS-4	5383.62	42.51	-	-	5341.11	42.62	-	-	5341.00	42.27	-	-	5341.35	42.61	-	-	5341.01
SHS-5	5378.36	39.62	-	-	5338.74	39.63	-	-	5338.73	39.42	-	-	5338.94	39.79	-	-	5338.57
SHS-6	5378.17	39.34	-	-	5338.83	39.35	-	-	5338.82	39.16	-	-	5339.01	39.52	-	-	5338.65
SHS-8	5380.25	40.03	-	-	5340.22	40.12	-	-	5340.13	39.82	-	-	5340.43	40.19	-	-	5340.06
SHS-9	5380.79	39.12	-	-	5341.67	pump	-	-	-	38.83	-	-	5341.96	39.14	-	-	5341.65
SHS-10	5373.80	36.83	-	-	5336.97	37.58	-	-	5336.22	36.86	-	-	5336.94	37.30	-	-	5336.50
SHS-12	5373.94	40.28	-	-	5333.66	40.02	-	-	5333.92	40.12	-	-	5333.82	40.72	-	-	5333.22
SHS-13	5367.81	36.82	-	-	5330.99	36.45	-	-	5331.36	36.67	-	-	5331.14	37.24	-	-	5330.57
SHS-14	5367.07	35.01	-	-	5332.06	35.62	-	-	5331.45	34.96	-	-	5332.11	35.61	-	-	5331.46
SHS-15	5366.21	33.82	-	-	5332.39	33.40	-	-	5332.81	33.85	-	-	5332.36	34.44	-	-	5331.77
SHS-16	5362.58	31.62	-	-	5330.96	33.21	-	-	5329.37	31.61	-	-	5330.97	32.08	-	-	5330.50
SHS-17	5364.35	33.56	-	-	5330.79	31.28	-	-	5333.07	33.49	-	-	5330.86	34.06	-	-	5330.29
SHS-18	5373.64	40.27	-	-	5333.37	39.96	-	-	5333.68	40.18	-	-	5333.46	40.73	-	-	5332.91
SHS-19	5378.89	39.61	-	-	5339.28	39.36	-	-	5339.53	39.13	-	-	5339.76	39.51	-	-	5339.38

Notes:

PSH - phase-separated hydrocarbon

GWEL - groundwater elevation

* Top-of-casing elevation is unknown

** Well is damaged by a tree root

TABLE 3

**GROUNDWATER ANALYTICAL RESULTS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING**

Analyte	NMWQCC Standard	Unit	INFLUENT				EFFLUENT			
			Feb 2009	Apr 2009	Jul 2009	Oct 2009	Feb 2009	Apr 2009	Jul 2009	Oct 2009
USEPA Method 8260B										
benzene	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	750	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethylbenzene	750	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
methyl tert-butyl ether (MTBE)		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-trimethylbenzene	620	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3,5-trimethylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane (EDC)	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dibromoethane (EDB)		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
naphthalene		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1-methylnaphthalene		ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
2-methylnaphthalene		ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
acetone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10
bromobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromodichloromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromoform		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromomethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-butanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10
carbon disulfide		ug/L	<10	<10	<10	<10	<10	<10	<10	<10
carbon tetrachloride	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
chlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
chloroethane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
chloroform	100	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-chlorotoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-chlorotoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-DCE		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dibromo-3-chloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<2.0	<2.0
dibromochloromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0	<1.0
dibromomethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
dichlorodifluoromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	25	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethene	5	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloropropane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-dichloropropane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,2-dichloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
hexachlorobutadene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-hexanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10
isopropylbenzene		ug/L	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0
4-isopropyltoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-methyl-2-pentanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10
methylene chloride	100	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
n-butylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
n-propylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
sac-butylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
styrene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tert-butylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1,2-tetrachloroethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	10	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
tetrachloroethene (PCE)	20	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-DCE		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-trichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-trichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-trichloroethane	60	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-trichloroethane	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethene (TCE)	100	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichlorofluoromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-trichloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
vinyl chloride	1	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
xylene, total	620	ug/L	<1.5	2.1	2.4	<1.5	<1.5	<1.5	<1.5	<1.5

TABLE 3

GROUNDWATER ANALYTICAL RESULTS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING

Analyte	NMWQCC Standard	Unit	INFLUENT				EFFLUENT				
			Feb 2009	Apr 2009	Jul 2009	Oct 2009	Feb 2009	Apr 2009	Jul 2009	Oct 2009	
General Chemistry											
total alkalinity	6-9	mg/L	260	300	420	440	260	310	420	430	
carbonate		mg/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
bicarbonate		mg/L	260	300	420	440	260	310	420	430	
specific conductance		umhos/cm	3300	3100	3000	3200	3300	3100	3100	3200	
pH		pH Units	7.35	7.35	7.50	7.59	7.32	7.47	7.85	7.62	
total dissolved solids	1000	mg/L	2800	2700	2700	2700	2800	2800	2700	2700	
Anions - Method 300.0											
fluoride	250	mg/L	0.80	0.72	0.80	0.90	0.79	0.87	0.84	0.88	
chloride		mg/L	81	87	88	85	82	85	87	83	
bromide		mg/L	0.50	<0.5	<0.50	0.18	0.51	0.93	<0.5	<0.5	
nitrate + nitrite		mg/L	1.2	0.38	0.51	0.51	1.1	0.37	0.51	0.51	
phosphorus	600	mg/L	<0.5	1.0	2.7	<0.5	<0.5	<0.5	2.3	<0.5	
sulfate		mg/L	1800	1800	1600	1400	1800	1600	1500	1500	
Cations - Method 6010B											
calcium		mg/L	370	340	300	290	370	340	310	290	
iron		mg/L	NT	0.04	1.1	0.066	<0.02	0.03	0.49	0.021	
magnesium		mg/L	29	26	32	32	29	27	33	32	
manganese		mg/L	NT	0.37	0.54	0.58	0.27	0.36	<0.1	0.58	
potassium		mg/L	3.1	3.2	2.7	3.1	3.1	3.0	2.7	3.2	
sodium		mg/L	490	420	510	500	480	410	510	490	
Other Metals - Method 6010B											
mercury	0.1	mg/L					<0.0002				
arsenic		mg/L					<0.02				
barium		mg/L					<0.02				
cadmium		mg/L					<0.002				
chromium	0.01	mg/L					<0.006				
lead	0.05	mg/L					<0.005				
selenium	0.05	mg/L					0.25				
silver	0.05	mg/L					<0.005				
PAH - Method 8310											
naphthalene	30	ug/L					<2.0				
1-methylnaphthalene		ug/L					<2.0				
2-methylnaphthalene		ug/L					<2.0				
acenaphthylene		ug/L					<2.5				
acenaphthene		ug/L					<5.0				
fluorene		ug/L					<0.8				
phenanthrene		ug/L					<0.6				
anthracene		ug/L					<0.6				
fluoranthene		ug/L					<0.3				
pyrene		ug/L					<0.3				
benz(a)anthracene		ug/L					<0.07				
chrysene		ug/L					<0.2				
benzo(b)fluoranthene		ug/L					<0.1				
benzo(k)fluoranthene		ug/L					<0.07				
benzo(a)pyrene		0.7	ug/L					<0.07			
dibenz(a,h)anthracene			ug/L					<0.07			
benzo(g,h,i)perylene			ug/L					<0.08			
indeno(1,2,3-cd)pyrene			ug/L					<0.08			

Notes

NMWQCC - New Mexico Water Quality Control Commission

ug/L - micrograms per liter

mg/L - milligrams per liter

umhos/cm - microhms per centimeter

NT- not tested

TABLE 3

**GROUNDWATER ANALYTICAL RESULTS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING**

Analyte	NMWQCC Standard	Unit	GRW-3	GRW-6	GBR-17	GBR-24D	GBR-30	GBR-31	GBR-32	GBR-48	GBR-49
			Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
USEPA Method 8260B											
benzene	10	ug/L	<1.0	<1.0	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	750	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethylbenzene	750	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
methyl tert-butyl ether (MTBE)		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-trimethylbenzene	620	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3,5-trimethylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane (EDC)	10	ug/L	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dibromoethane (EDB)		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
naphthalene		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1-methylnaphthalene		ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
2-methylnaphthalene		ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
acetone		ug/L	<10	<10	<10	13	<10	<10	<10	<10	<10
bromobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromodichloromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromoform		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromomethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-butanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10
carbon disulfide		ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10
carbon tetrachloride	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
chlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
chloroethane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
chloroform	100	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-chlorotoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-chlorotoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-DCE		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dibromo-3-chloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
dibromochloromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
dibromomethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
dichlorodifluoromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	25	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethene	5	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloropropane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-dichloropropane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,2-dichloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
hexachlorobutadene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-hexanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10
isopropylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-isopropyltoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-methyl-2-pentanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10
methylene chloride	100	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
n-butylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
n-propylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
sac-butylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
styrene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tert-butylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1,2-tetrachloroethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	10	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
tetrachloroethene (PCE)	20	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.3	1.2	2.4
trans-1,2-DCE		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-trichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-trichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-trichloroethane	60	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-trichloroethane	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethene (TCE)	100	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichlorofluoromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-trichloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
vinyl chloride	1	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
xylene, total	620	ug/L	<1.5	<1.5	<1.5	1.8	<1.5	<1.5	<1.5	<1.5	<1.5



Table 3_Former Giant Bloomfield Refinery Analytical Results.xls

TABLE 3

GROUNDWATER ANALYTICAL RESULTS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING

	NMWQCC Standard	Unit	GRW-3	GRW-6	GBR-17	GBR-24D	GBR-30	GBR-31	GBR-32	GBR-48	GBR-49
Analyte			Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
General Chemistry											
total alkalinity		mg/L	670	520	210	230	260	230	350	280	240
carbonate		mg/L	<4.0	<4.0	<2.0	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0
bicarbonate		mg/L	670	520	210	230	260	230	350	280	240
specific conductance		umhos/cm	2600	3000	2300	3900	3700	3300	5000	3900	4000
pH	6-9	pH Units	7.13	7.11	7.39	7.33	7.26	7.30	7.57	7.28	6.93
total dissolved solids	1000	mg/L	1900	2400	1800	3100	3200	2600	4100	2700	3300
Anions - Method 300.0											
fluoride		mg/L	0.85	0.55	0.76	0.98	0.74	0.68	0.57	0.68	0.70
chloride	250	mg/L	75	100	40	230	270	83	530	560	280
bromide		mg/L	0.56	0.78	0.22	1.2	0.96	0.29	1.3	2.2	0.74
nitrate + nitrite		mg/L	<1.0	<1.0	3.9	<1.0	0.85	1.3	2.0	4.4	0.11
phosphorus		mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
sulfate	600	mg/L	790	1100	1200	2100	1700	1700	2100	1300	2100
Cations - Method 6010B											
calcium		mg/L							480	300	420
iron		mg/L							<0.1	<0.10	1.4
magnesium		mg/L							50	32	40
manganese		mg/L							0.7	0.012	3.5
potassium		mg/L							4.2	NT	2.8
sodium		mg/L							710	550	540
Other Metals - Method 6010B											
mercury		mg/L							<0.0002	<0.0002	<0.0002
arsenic	0.1	mg/L							<0.02	<0.10	<0.02
barium		mg/L							0.029	0.072	0.021
cadmium	0.01	mg/L							<0.005	<0.005	<0.005
chromium	0.05	mg/L							0.10	0.43	0.056
lead	0.05	mg/L							<0.005	<0.005	<0.005
selenium	0.05	mg/L							0.059	0.10	0.047
silver	0.05	mg/L							<0.01	<0.01	<0.01
PAH - Method 8310											
naphthalene	30	ug/L	39	<4.0	<2.0	<2.0	<2.0	<2.0			
1-methylnaphthalene		ug/L	<4.0	<4.0	<2.0	<2.0	<2.0	<2.0			
2-methylnaphthalene		ug/L	<4.0	<4.0	<2.0	<2.0	<2.0	<2.0			
acenaphthylene		ug/L	<5.0	<5.0	<2.5	<2.5	<2.5	<2.5			
acenaphthene		ug/L	<10	<10	<5.0	<5.0	<5.0	<5.0			
fluorene		ug/L	3.5	<1.6	<0.8	<0.8	<0.8	<0.8			
phenanthrene		ug/L	<1.2	<1.2	<0.6	<0.6	<0.6	<0.6			
anthracene		ug/L	<1.2	<1.2	<0.6	<0.6	<0.6	<0.6			
fluoranthene		ug/L	<0.60	<0.60	<0.3	<0.3	<0.3	<0.3			
pyrene		ug/L	<0.60	<0.60	<0.3	<0.3	<0.3	<0.3			
benz(a)anthracene		ug/L	<0.14	<0.14	<0.07	<0.07	<0.07	<0.07			
chrysene		ug/L	<0.4	<0.4	<0.2	<0.2	<0.2	<0.2			
benzo(b)fluoranthene		ug/L	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1			
benzo(k)fluoranthene		ug/L	<0.14	<0.14	<0.07	<0.07	<0.07	<0.07			
benzo(a)pyrene	0.7	ug/L	<0.14	<0.14	<0.07	<0.07	<0.07	<0.07			
dibenz(a,h)anthracene		ug/L	<0.14	<0.14	<0.07	<0.07	<0.07	<0.07			
benzo(g,h,i)perylene		ug/L	<0.16	<0.16	<0.08	<0.08	<0.08	<0.08			
indeno(1,2,3-cd)pyrene		ug/L	<0.16	<0.16	<0.08	<0.08	<0.08	<0.08			

Notes

NMWQCC - New Mexico Water Quality Control Commissi

ug/L - micrograms per liter

mg/L - milligrams per liter

umhos/cm - microhms per centimeter

NT- not tested



TABLE 3

GROUNDWATER ANALYTICAL RESULTS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING

Analyte	NMWQCC Standard	Unit	GBR-50	GBR-51	GBR-52	SHS-1	SHS-2	SHS-5	SHS-8	SHS-9	SHS-18	SHS-19
			Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
USEPA Method 8260B												
benzene	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
toluene	750	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ethylbenzene	750	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.6	<1.0	<1.0	<1.0
methyl tert-butyl ether (MTBE)		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-trimethylbenzene	620	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3,5-trimethylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloroethane (EDC)	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dibromoethane (EDB)		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
naphthalene		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1-methylnaphthalene		ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
2-methylnaphthalene		ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
acetone		ug/L	<10	<10	<10	<10	<10	<10	<10	14	<10	<10
bromobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromodichloromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromoform		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bromomethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-butanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
carbon disulfide		ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
carbon tetrachloride	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
chlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
chloroethane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
chloroform	100	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-chlorotoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-chlorotoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-DCE		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dibromo-3-chloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
dibromochloromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
dibromomethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-dichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
dichlorodifluoromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethane	25	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-dichloroethene	5	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-dichloropropane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-dichloropropane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,2-dichloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
hexachlorobutadiene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-hexanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
isopropylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	<1.0
4-isopropyltoluene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-methyl-2-pentanone		ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
methylene chloride	100	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
n-butylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
n-propylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
sac-butylbenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0
styrene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tert-butylbenzene		ug/L	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1,2-tetrachloroethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	10	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
tetrachloroethene (PCE)	20	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-DCE		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-dichloropropene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-trichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-trichlorobenzene		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-trichloroethane	60	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-trichloroethane	10	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichloroethene (TCE)	100	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trichlorofluoromethane		ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-trichloropropane		ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
vinyl chloride	1	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
xylene, total	620	ug/L	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5

Table 3_Former Giant Bloomfield Refinery Analytical Results.xls



TABLE 3

**GROUNDWATER ANALYTICAL RESULTS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING**

Analyte	NMWQCC Standard	Unit	GBR-50	GBR-51	GBR-52	SHS-1	SHS-2	SHS-5	SHS-8	SHS-9	SHS-18	SHS-19	
			Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
General Chemistry													
total alkalinity	6-9 1000	mg/L	210	210	190	970	230	210	770	980	760	690	
carbonate		mg/L	<4.0	<2.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<2.0	<4.0	
bicarbonate		mg/L	210	210	190	970	230	210	770	980	760	690	
specific conductance		umhos/cm	3000	2800	3100	2100	4000	2900	1700	2000	2500	2500	
pH		pH Units	7.18	7.21	7.29	7.33	6.36	7.28	6.83	7.33	7.11	7.17	
total dissolved solids		mg/L	2400	2200	2500	1200	3700	3000	1100	1300	1800	1800	
Anions - Method 300.0													
fluoride	250	mg/L	0.65	0.78	0.88	1.1	0.63	0.8	1.2	0.65	1	0.88	
chloride		mg/L	44	55	61	69	190	57	110	98	95	93	
bromide		mg/L	0.52	<0.5	0.43	0.54	2.3	0.74	<0.5	0.88	0.93	0.62	
nitrate + nitrite		mg/L	3.2	0.67	5.6	0.11	<0.1	4.1	0.67	<1.0	<1.0	<1.0	
phosphorus	600	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	
sulfate		mg/L	1700	1400	1700	85	2100	1400	39	49	550	630	
Cations - Method 6010B													
calcium	0.1 0.01 0.05 0.05 0.05 0.05	mg/L	390										
iron		mg/L	0.41										
magnesium		mg/L	29										
manganese		mg/L	0.05										
potassium		mg/L	NT										
sodium		mg/L	3740										
Other Metals - Method 6010B													
mercury			mg/L	<0.0002									
arsenic			mg/L	<0.02									
barium		mg/L	0.034										
cadmium		mg/L	0.0083										
chromium		mg/L	0.018										
lead		mg/L	0.0059										
selenium		mg/L	0.05										
silver		mg/L	<0.01										
PAH - Method 8310													
naphthalene	30 <												

Notes

NMWQCC - New Mexico Water Quality Control Commissi

ug/L - micrograms per liter

mg/L - milligrams per liter

umhos/cm - microhms per centimeter

NT- not tested



TABLE 4

**ESTIMATED VOLUMES OF PSH
REMOVED FROM MONITORING WELLS
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING**

Well Number	Volume Removed (ounces)				
	Jan-09	Apr-09	Jul-09	Oct-09	Total
GBR-7		0.07			0.07
GBR-22	0.13	0.05			0.18
GBR-23	0.10	0.05	0.10	0.05	0.30
GBR-25				0.07	0.07
GBR-26	0.07		0.07		0.14
GBR-34			0.05	0.05	0.10
Total Volume Removed (gallons)					0.86

Notes:

PSH - phase-separated hydrocarbon



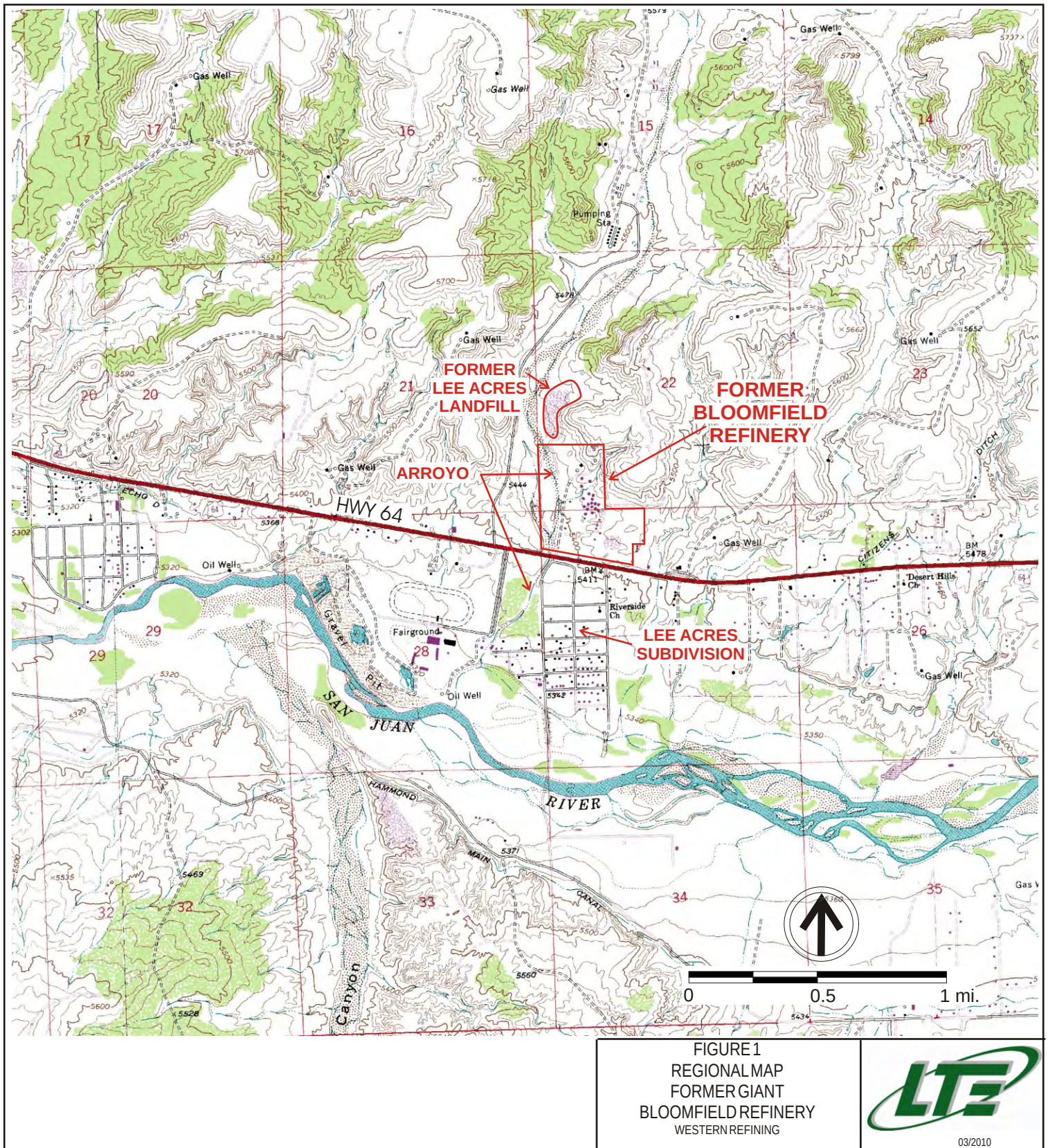
TABLE 5

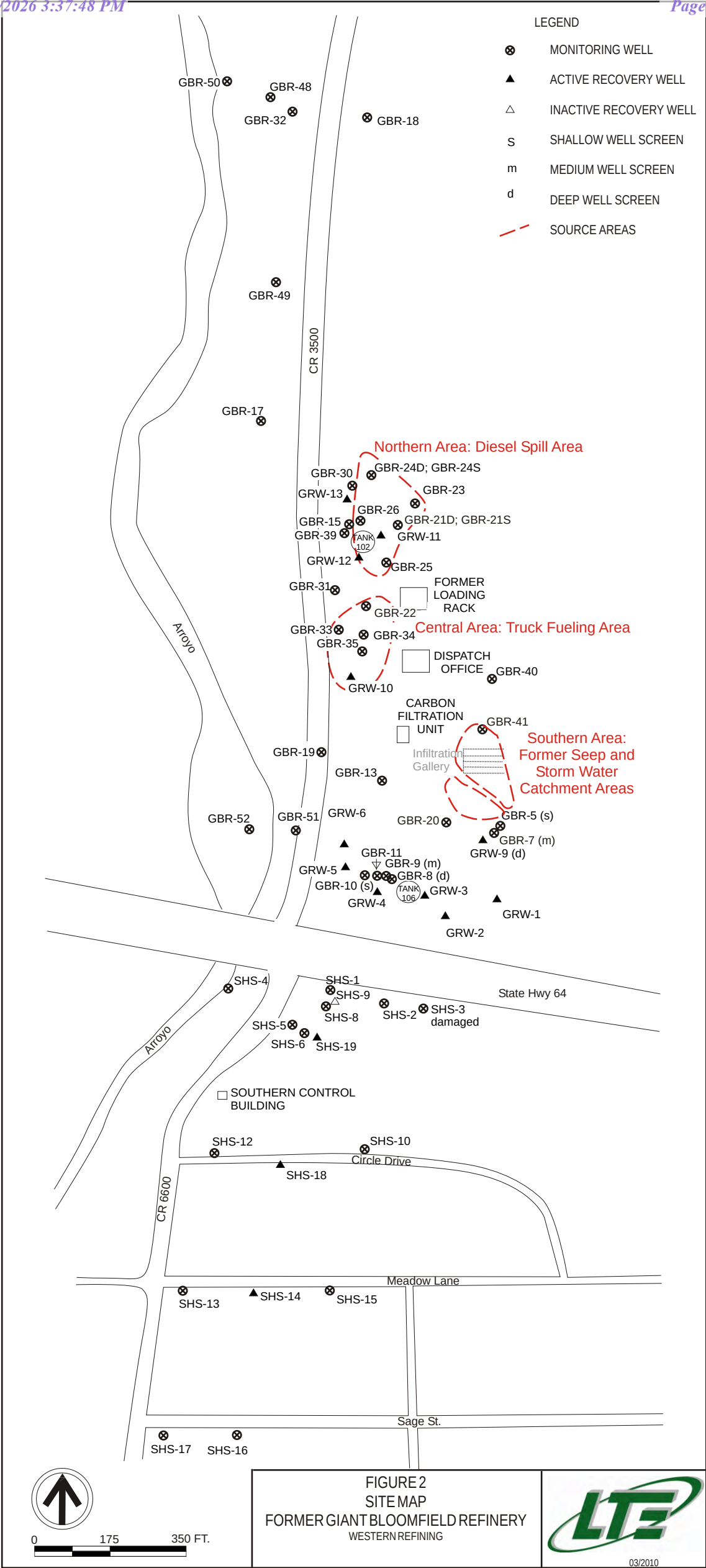
**RECOVERY WELL VOLUME TABULATION
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING**

Well Number	Total Volume Pumped (Gallons)
GRW-1	208,668
GRW-2	98,597
GRW-3	130,001
GRW-4	157,837
GRW-5	134,819
GRW-6	127,499
GRW-9	64,779
GRW-10	8,295,461
GRW-11	191,523
GRW-12	6,329
GRW-13	39,895
Total Volume Pumped (Gallons)	9,455,408



FIGURES





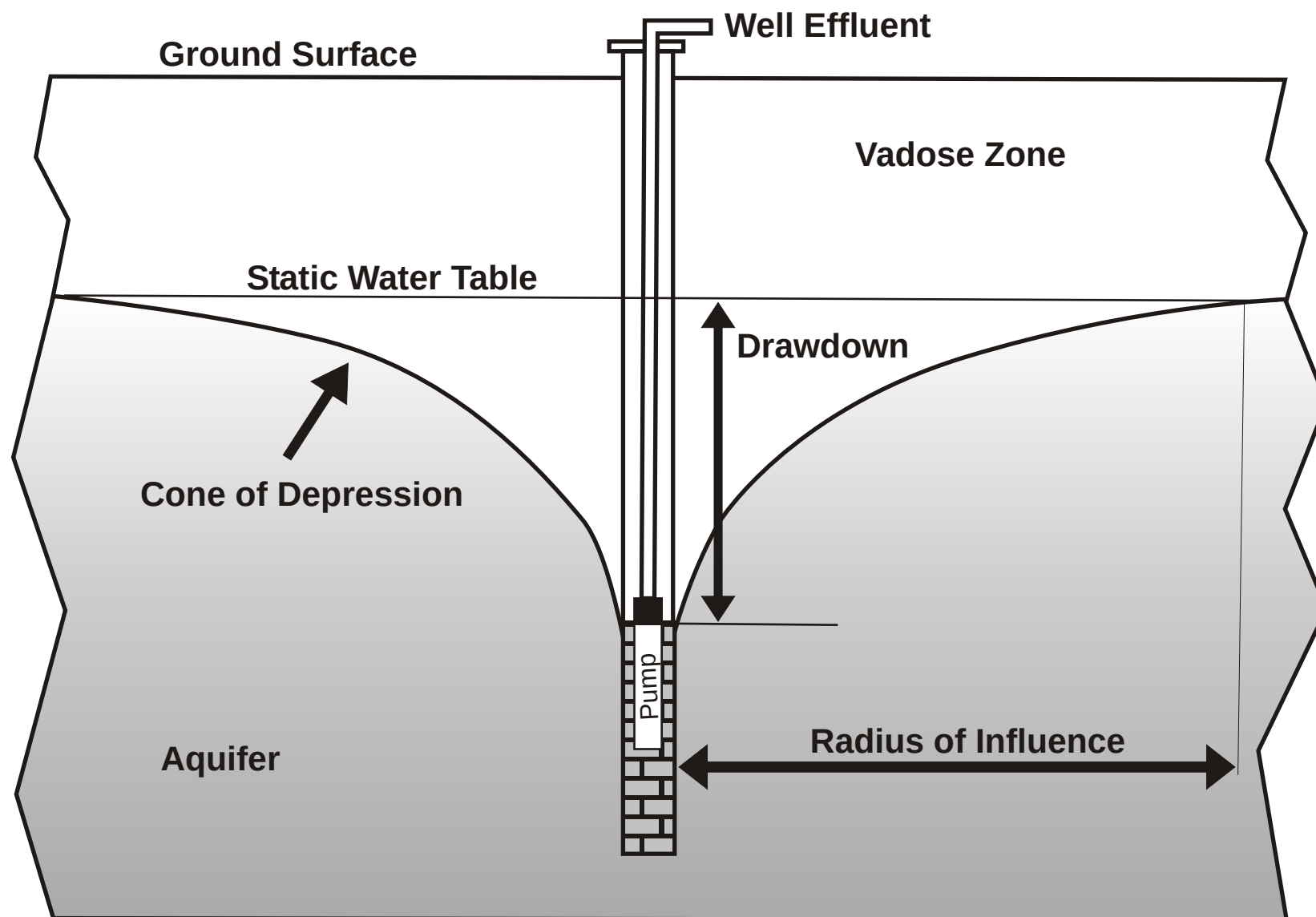


FIGURE 3
HYDRAULIC BARRIER CREATED BY
PUMPING IN AN AQUIFER
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING



03/2010

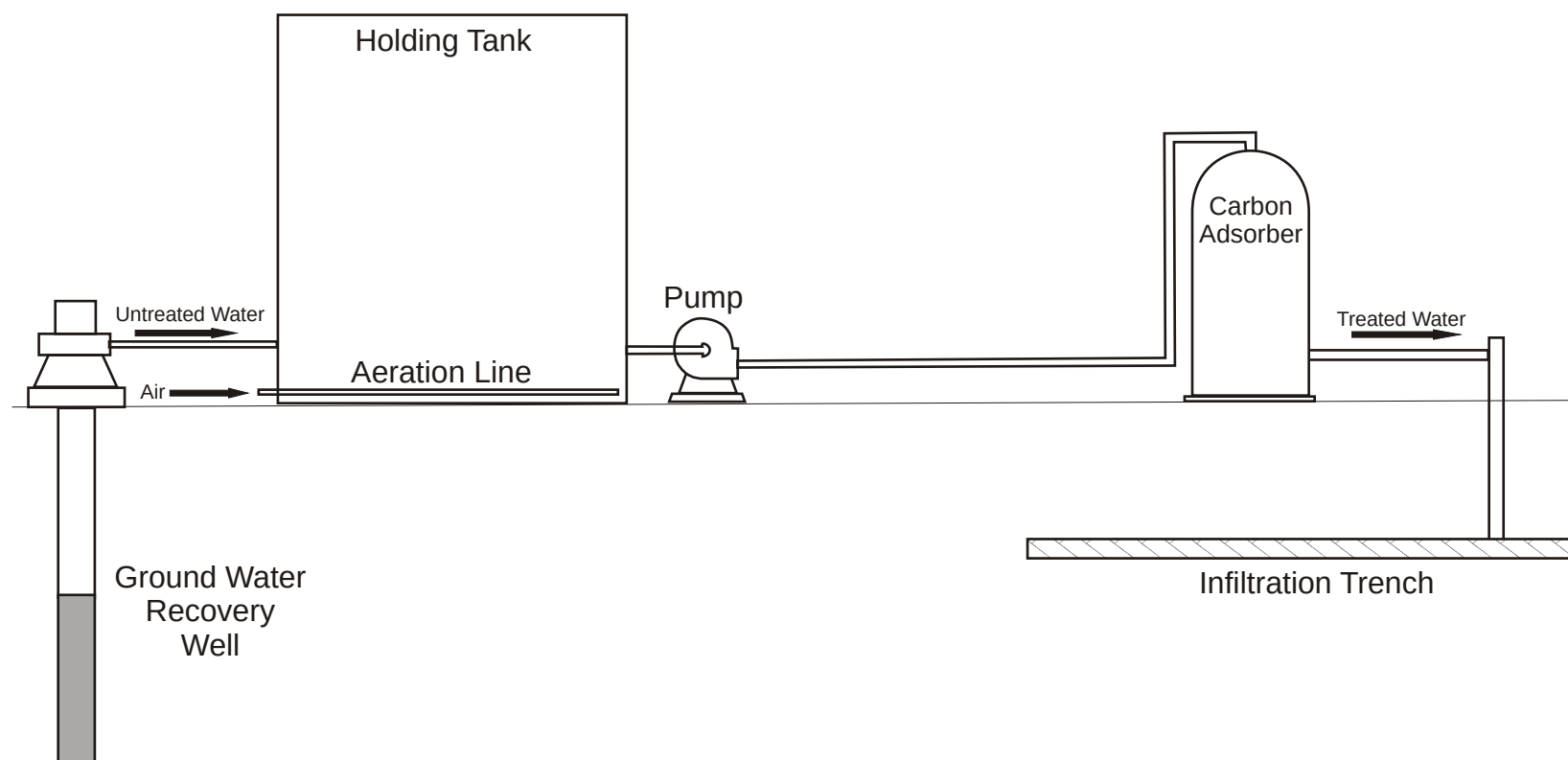
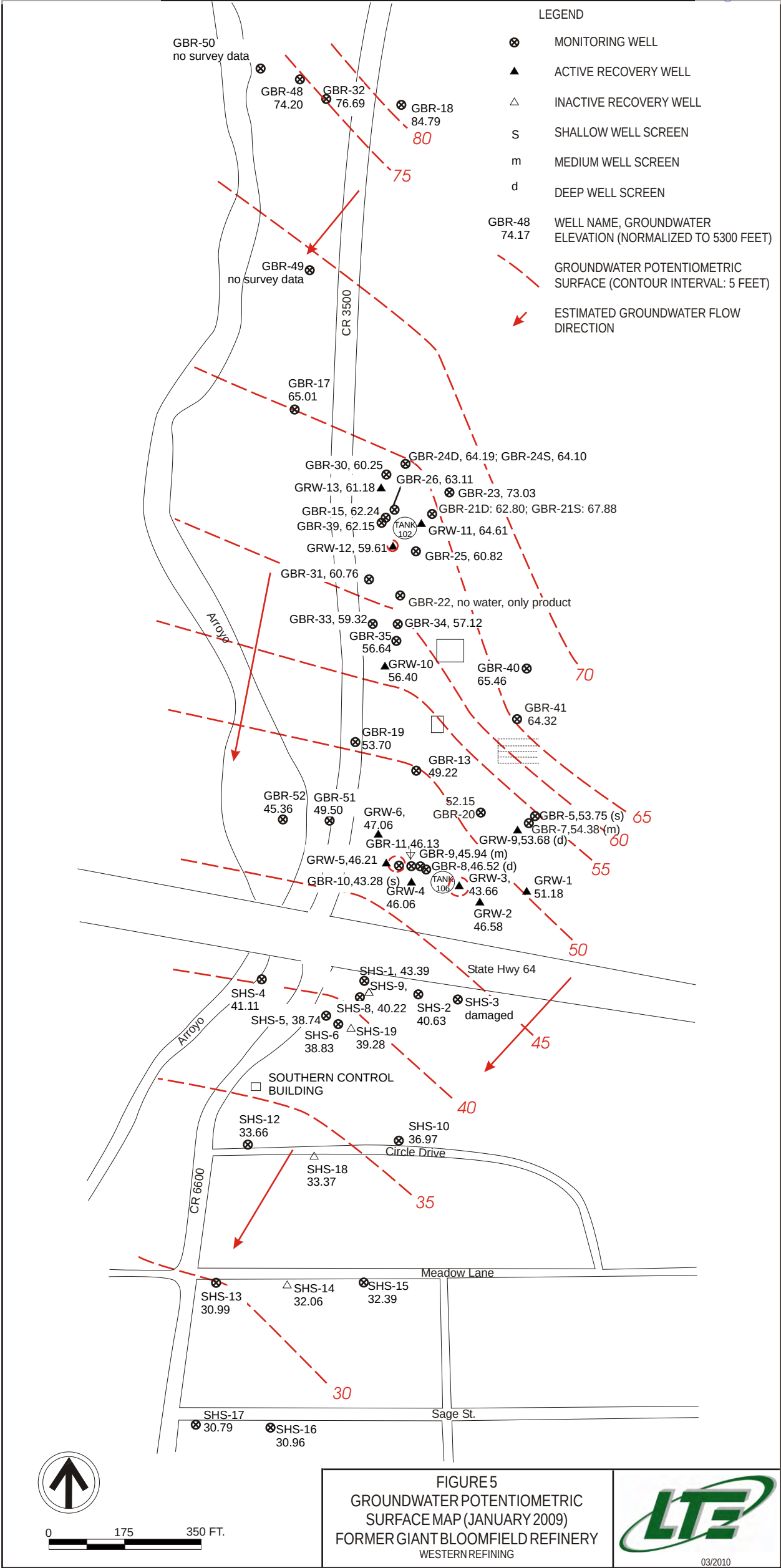


FIGURE 4
SIMPLIFIED REPRESENTATION OF THE
GROUNDWATER RECOVERY, TREATMENT AND
DISPOSAL SYSTEM
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING



03/2010

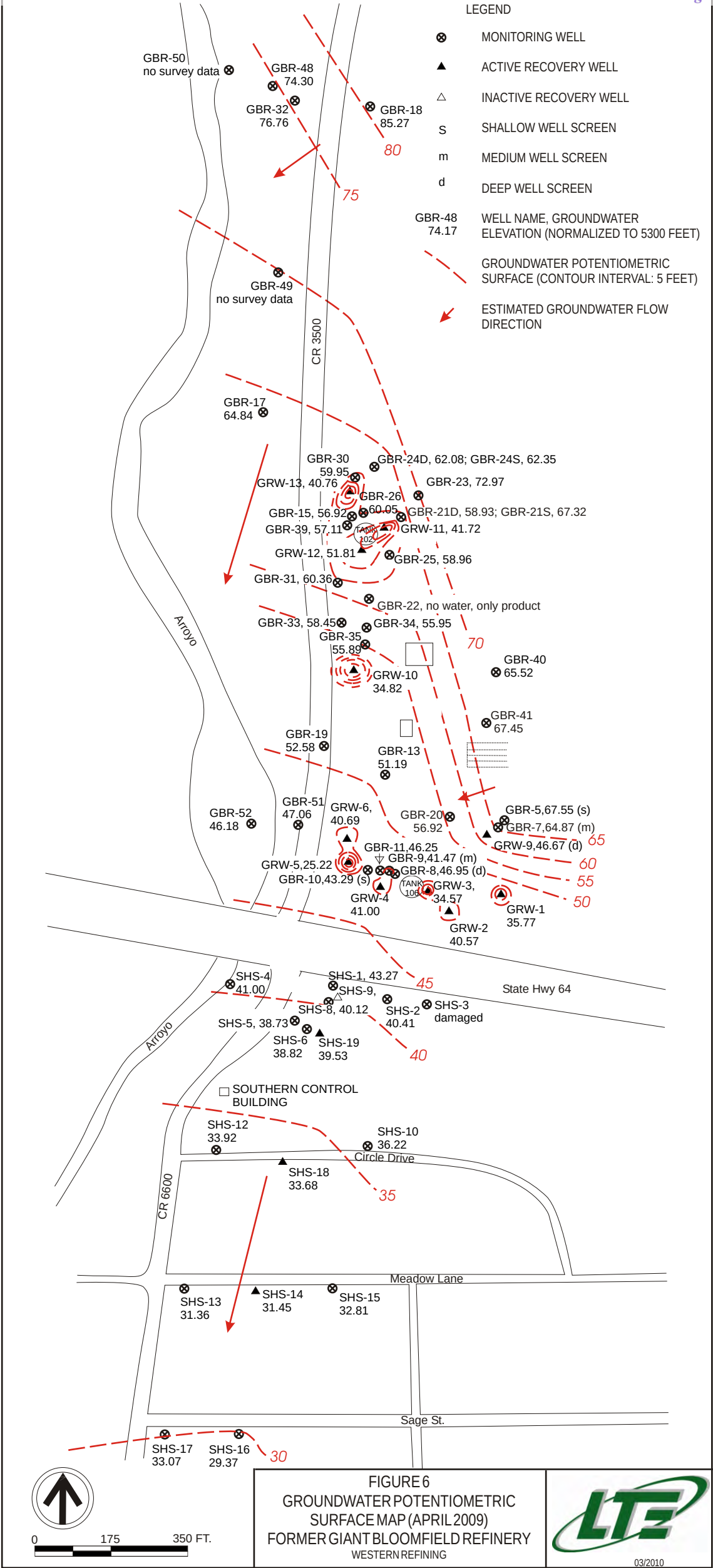


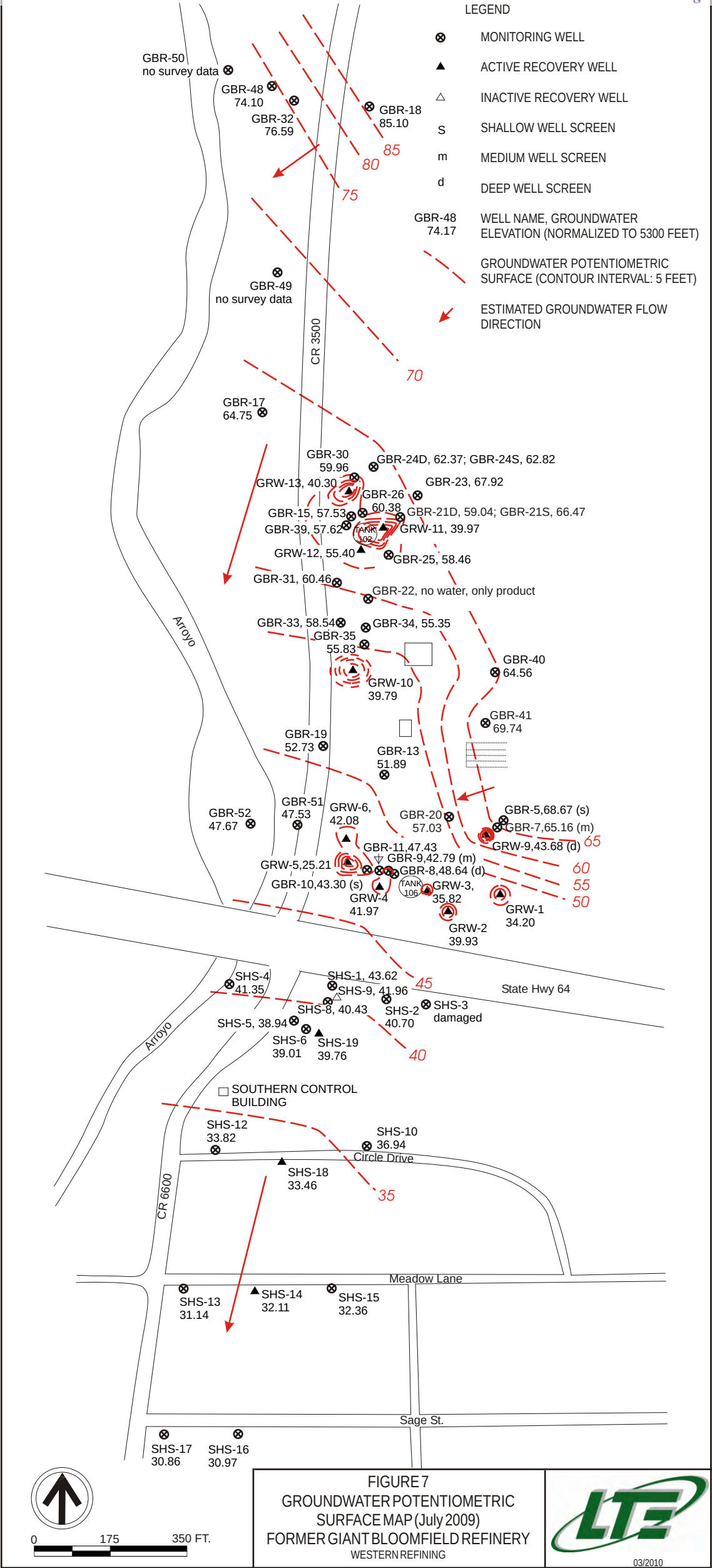
0 175 350 FT.

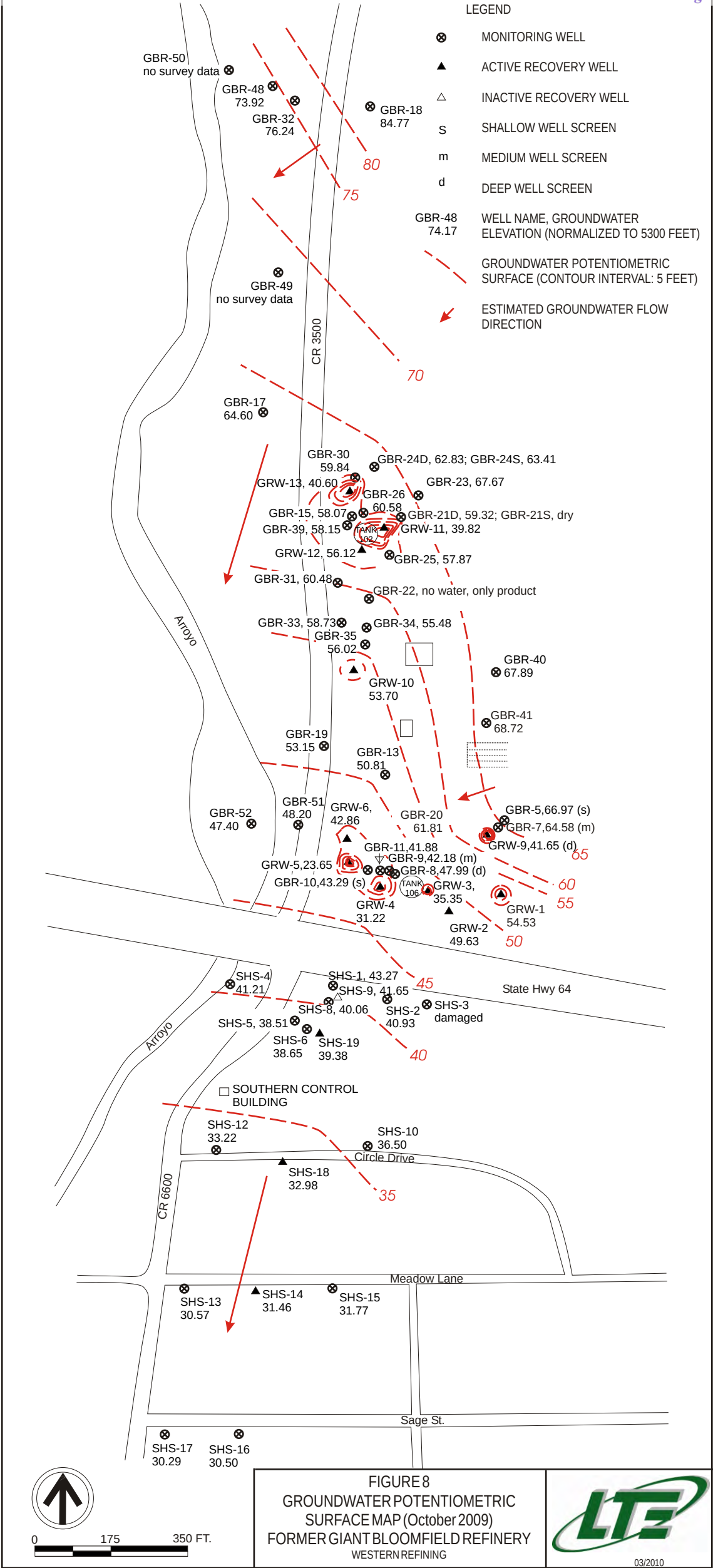
FIGURE 5
GROUNDWATER POTENTIOMETRIC
SURFACE MAP (JANUARY 2009)
FORMER GIANT BLOOMFIELD REFINERY
WESTERN REFINING

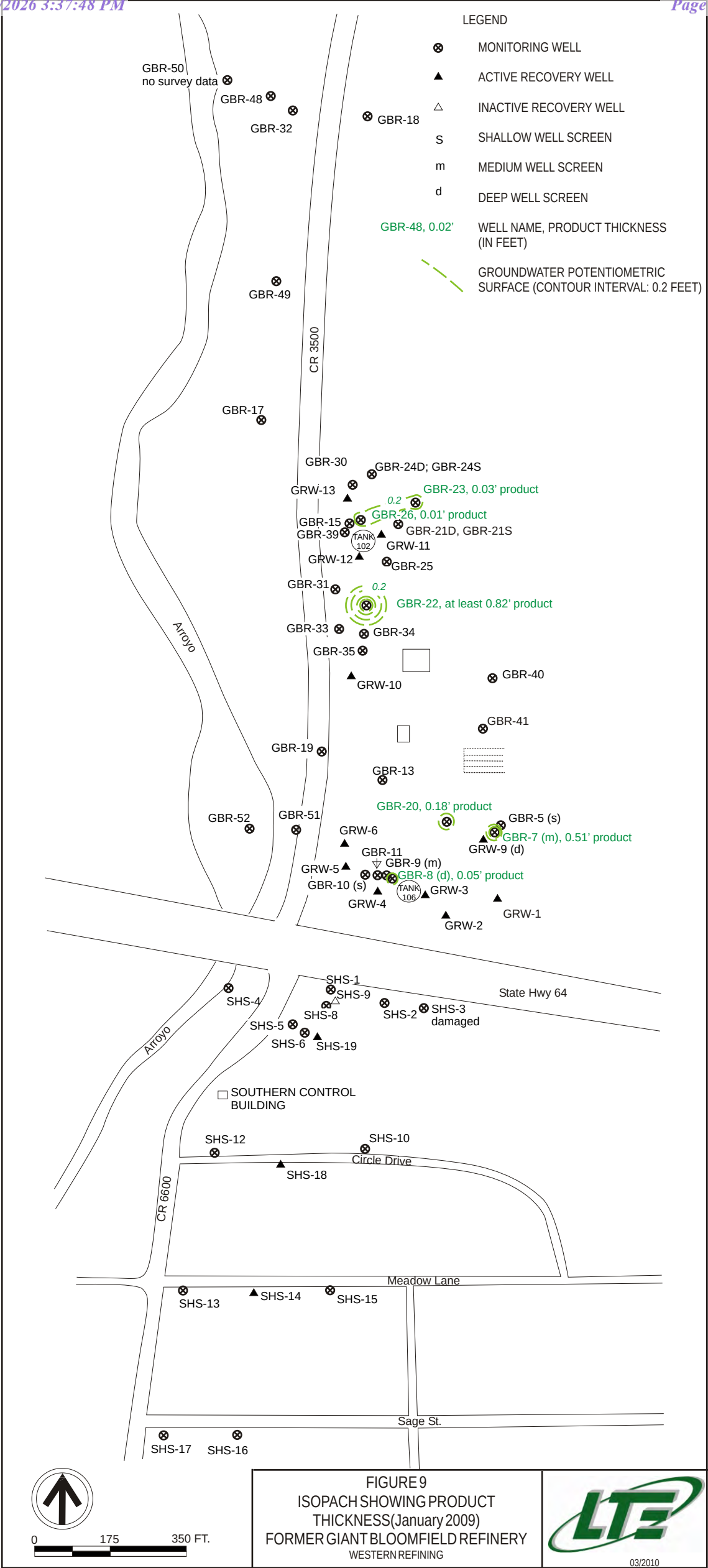


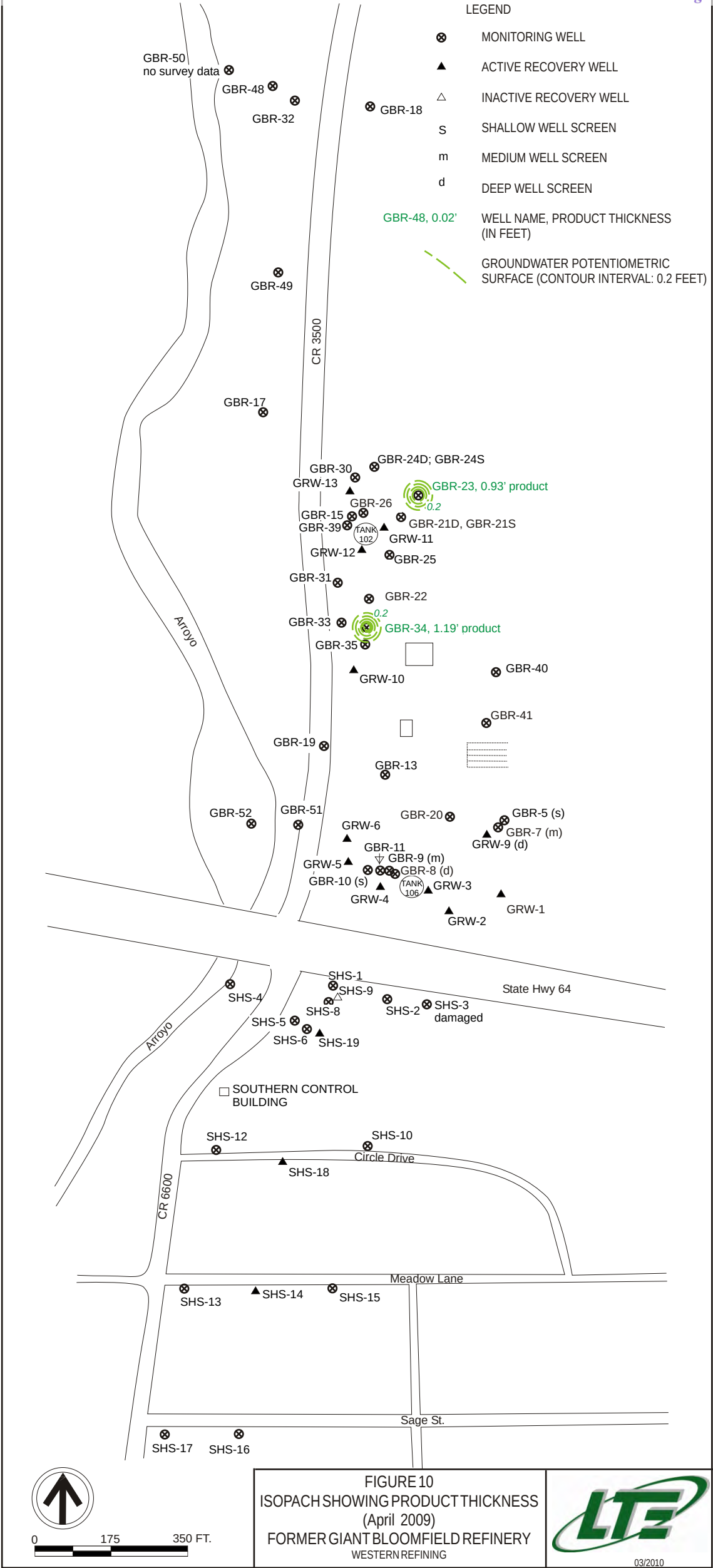
03/2010

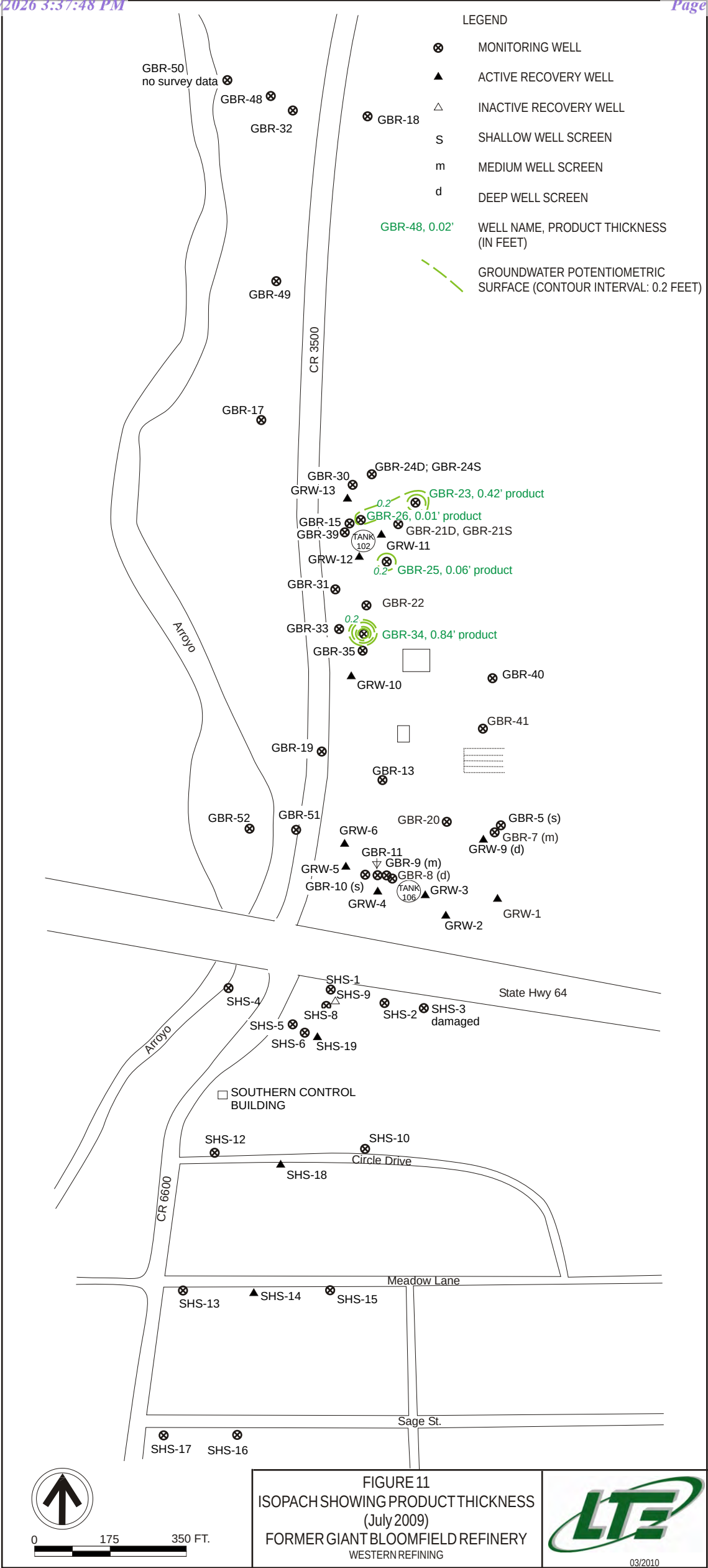


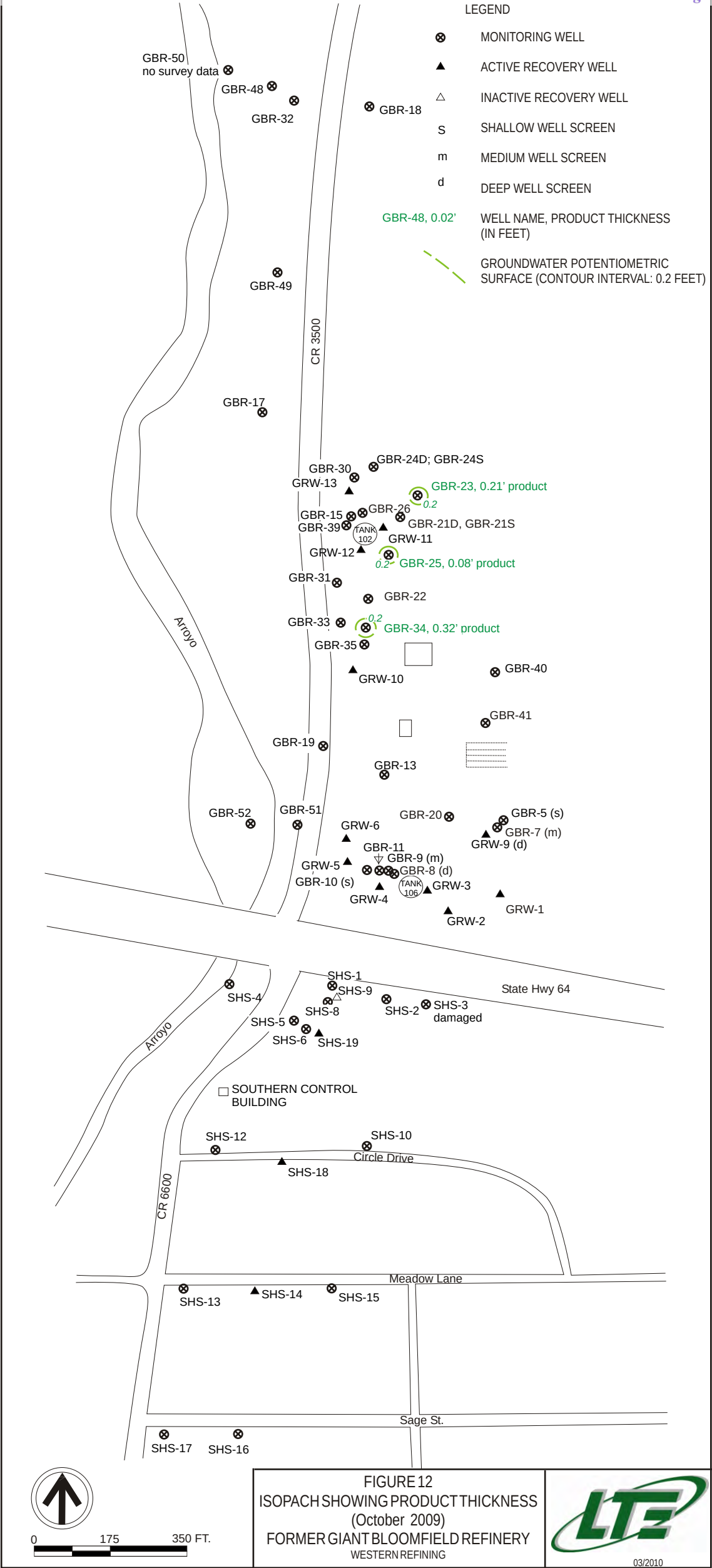












APPENDIX A
LABORATORY REPORTS



COVER LETTER

Tuesday, February 03, 2009

Ashley Ager
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (970) 946-1093
FAX (505) 632-3911

RE: Giant Former Refinery/Giant Bloomfield Refinery

Order No.: 0901240

Dear Ashley Ager:

Hall Environmental Analysis Laboratory, Inc. received 14 sample(s) on 1/16/2009 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman".

Andy Freeman, Business Manager
Nancy McDuffie, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

www.hallenvironmental.com

Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-18
Lab Order: 0901240 **Collection Date:** 1/14/2009 12:28:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-01 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	1.0	0.10		mg/L	1	1/24/2009 1:35:18 AM
Chloride	95	1.0		mg/L	10	1/24/2009 1:52:42 AM
Bromide	0.93	0.10		mg/L	1	1/24/2009 1:35:18 AM
Nitrate (As N)+Nitrite (As N)	ND	1.0		mg/L	5	1/26/2009 7:10:14 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/24/2009 1:35:18 AM
Sulfate	550	5.0		mg/L	10	1/24/2009 1:52:42 AM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Toluene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Naphthalene	ND	2.0		µg/L	1	1/16/2009 10:27:46 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2009 10:27:46 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2009 10:27:46 PM
Acetone	ND	10		µg/L	1	1/16/2009 10:27:46 PM
Bromobenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Bromoform	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Bromomethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
2-Butanone	ND	10		µg/L	1	1/16/2009 10:27:46 PM
Carbon disulfide	ND	10		µg/L	1	1/16/2009 10:27:46 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Chloroethane	ND	2.0		µg/L	1	1/16/2009 10:27:46 PM
Chloroform	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Chloromethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2009 10:27:46 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Dibromomethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 1 of 41

Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-18
Lab Order: 0901240 **Collection Date:** 1/14/2009 12:28:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-01 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2009 10:27:46 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
2-Hexanone	ND	10		µg/L	1	1/16/2009 10:27:46 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2009 10:27:46 PM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2009 10:27:46 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Styrene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2009 10:27:46 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2009 10:27:46 PM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2009 10:27:46 PM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2009 10:27:46 PM
Surr: 1,2-Dichloroethane-d4	62.4	68.1-123		%REC	1	1/16/2009 10:27:46 PM
Surr: 4-Bromofluorobenzene	101	53.2-145		%REC	1	1/16/2009 10:27:46 PM
Surr: Dibromofluoromethane	94.1	68.5-119		%REC	1	1/16/2009 10:27:46 PM
Surr: Toluene-d8	90.1	64-131		%REC	1	1/16/2009 10:27:46 PM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	760	20		mg/L CaCO3	1	1/20/2009
Carbonate	ND	2.0		mg/L CaCO3	1	1/20/2009
Bicarbonate	760	20		mg/L CaCO3	1	1/20/2009

EPA 120.1: SPECIFIC CONDUCTANCE

Analyst: KMS

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	E Estimated value	H Holding times for preparation or analysis exceeded
	J Analyte detected below quantitation limits	MCL Maximum Contaminant Level
	ND Not Detected at the Reporting Limit	RL Reporting Limit
	S Spike recovery outside accepted recovery limits	

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	SHS-18
Lab Order:	0901240	Collection Date:	1/14/2009 12:28:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-01	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						
Specific Conductance	2500	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						
pH	7.11	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						
Total Dissolved Solids	1800	200		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GBR-51
Lab Order: 0901240 **Collection Date:** 1/15/2009 11:40:00 AM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-02 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.78	0.10		mg/L	1	1/21/2009 4:59:09 PM
Chloride	55	1.0		mg/L	10	1/16/2009 9:11:43 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/16/2009 8:02:05 PM
Bromide	0.87	0.10		mg/L	1	1/16/2009 8:02:05 PM
Nitrogen, Nitrate (As N)	5.8	0.10		mg/L	1	1/16/2009 8:02:05 PM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	1/16/2009 8:02:05 PM
Sulfate	1400	25		mg/L	50	1/21/2009 5:16:34 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
Toluene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Naphthalene	ND	2.0		µg/L	1	1/16/2009 10:58:14 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2009 10:56:14 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2009 10:56:14 PM
Acetone	ND	10		µg/L	1	1/16/2009 10:56:14 PM
Bromobenzene	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Bromoform	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
Bromomethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
2-Butanone	ND	10		µg/L	1	1/16/2009 10:56:14 PM
Carbon disulfide	ND	10		µg/L	1	1/16/2009 10:58:14 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
Chloroethane	ND	2.0		µg/L	1	1/16/2009 10:56:14 PM
Chloroform	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
Chloromethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2009 10:58:14 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Dibromomethane	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:58:14 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GBR-51
Lab Order: 0901240 **Collection Date:** 1/15/2009 11:40:00 AM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-02 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2009 10:56:14 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
2-Hexanone	ND	10		µg/L	1	1/16/2009 10:56:14 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2009 10:56:14 PM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2009 10:56:14 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Styrene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2009 10:56:14 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2009 10:56:14 PM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2009 10:56:14 PM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2009 10:56:14 PM
Surr: 1,2-Dichloroethane-d4	81.6	66.1-123		%REC	1	1/16/2009 10:56:14 PM
Surr: 4-Bromofluorobenzene	97.2	53.2-145		%REC	1	1/16/2009 10:56:14 PM
Surr: Dibromofluoromethane	43.3	68.5-119	S	%REC	1	1/16/2009 10:56:14 PM
Surr: Toluene-d8	88.1	64-131		%REC	1	1/16/2009 10:56:14 PM

SM 2320B: ALKALINITY

Analyst: KMS

Alkalinity, Total (As CaCO ₃)	210	20		mg/L CaCO ₃	1	1/20/2009
Carbonate	ND	2.0		mg/L CaCO ₃	1	1/20/2009
Bicarbonate	210	20		mg/L CaCO ₃	1	1/20/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	GBR-51
Lab Order:	0901240	Collection Date:	1/15/2009 11:40:00 AM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-02	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	2800	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.21	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	2200	200		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** SHS-9**Lab Order:** 0901240**Collection Date:** 1/14/2009 3:24:00 PM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/16/2009**Lab ID:** 0901240-03**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.65	0.10		mg/L	1	1/26/2009 10:01:29 AM
Chloride	98	1.0		mg/L	10	1/26/2009 10:18:54 AM
Bromide	0.88	0.10		mg/L	1	1/26/2009 10:01:29 AM
Nitrate (As N)+Nitrite (As N)	ND	1.0		mg/L	5	1/26/2009 7:27:38 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/26/2009 10:01:29 AM
Sulfate	49	0.50		mg/L	1	1/26/2009 10:01:29 AM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Toluene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Ethylbenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Naphthalene	ND	2.0		µg/L	1	1/16/2009 11:24:38 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2009 11:24:38 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2009 11:24:38 PM
Acetone	14	10		µg/L	1	1/16/2009 11:24:38 PM
Bromobenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Bromoform	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Bromomethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
2-Butanone	ND	10		µg/L	1	1/16/2009 11:24:38 PM
Carbon disulfide	ND	10		µg/L	1	1/16/2009 11:24:38 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Chloroethane	ND	2.0		µg/L	1	1/16/2009 11:24:38 PM
Chloroform	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Chloromethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2009 11:24:38 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Dibromomethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-9
Lab Order: 0901240 **Collection Date:** 1/14/2009 3:24:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-03 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2009 11:24:38 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
2-Hexanone	ND	10		µg/L	1	1/16/2009 11:24:38 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2009 11:24:38 PM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2009 11:24:38 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Styrene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2009 11:24:38 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2009 11:24:38 PM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2009 11:24:38 PM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2009 11:24:38 PM
Surr: 1,2-Dichloroethane-d4	81.1	68.1-123		%REC	1	1/16/2009 11:24:38 PM
Surr: 4-Bromofluorobenzene	99.8	53.2-145		%REC	1	1/16/2009 11:24:38 PM
Surr: Dibromofluoromethane	90.7	68.5-119		%REC	1	1/16/2009 11:24:38 PM
Surr: Toluene-d8	89.6	64-131		%REC	1	1/16/2009 11:24:38 PM

SM 2320B: ALKALINITY

Analyst: KMS

Alkalinity, Total (As CaCO ₃)	980	40	mg/L CaCO ₃	2	1/20/2009
Carbonate	ND	4.0	mg/L CaCO ₃	2	1/20/2009
Bicarbonate	980	40	mg/L CaCO ₃	2	1/20/2009

EPA 120.1: SPECIFIC CONDUCTANCE

Analyst: KMS

Qualifiers:	*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
	E	Estimated value	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	MCL	Maximum Contaminant Level
	ND	Not Detected at the Reporting Limit	RL	Reporting Limit
	S	Spike recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	SHS-9
Lab Order:	0901240	Collection Date:	1/14/2009 3:24:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-03	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	2000	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.33	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	1300	200		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-8
Lab Order: 0901240 **Collection Date:** 1/14/2009 4:00:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-04 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	1.2	0.10		mg/L	1	1/19/2009 6:20:17 PM
Chloride	110	1.0		mg/L	10	1/16/2009 7:44:40 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/16/2009 3:58:20 PM
Bromide	0.67	0.10		mg/L	1	1/16/2009 3:58:20 PM
Nitrogen, Nitrate (As N)	ND	0.10		mg/L	1	1/16/2009 3:58:20 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/19/2009 6:20:17 PM
Sulfate	39	0.50		mg/L	1	1/16/2009 3:58:20 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Toluene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Ethylbenzene	3.6	1.0		µg/L	1	1/16/2009 11:53:06 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Naphthalene	ND	2.0		µg/L	1	1/16/2009 11:53:06 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2009 11:53:06 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/16/2009 11:53:06 PM
Acetone	ND	10		µg/L	1	1/16/2009 11:53:06 PM
Bromobenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Bromoform	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Bromomethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
2-Butanone	ND	10		µg/L	1	1/16/2009 11:53:06 PM
Carbon disulfide	ND	10		µg/L	1	1/16/2009 11:53:06 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Chlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Chloroethane	ND	2.0		µg/L	1	1/16/2009 11:53:06 PM
Chloroform	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Chloromethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/16/2009 11:53:06 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Dibromomethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-8
Lab Order: 0901240 **Collection Date:** 1/14/2009 4:00:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-04 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/16/2009 11:53:06 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
2-Hexanone	ND	10		µg/L	1	1/16/2009 11:53:06 PM
Isopropylbenzene	1.6	1.0		µg/L	1	1/16/2009 11:53:06 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/16/2009 11:53:06 PM
Methylene Chloride	ND	3.0		µg/L	1	1/16/2009 11:53:06 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
sec-Butylbenzene	1.4	1.0		µg/L	1	1/16/2009 11:53:06 PM
Styrene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/16/2009 11:53:06 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/16/2009 11:53:06 PM
Vinyl chloride	ND	1.0		µg/L	1	1/16/2009 11:53:06 PM
Xylenes, Total	ND	1.5		µg/L	1	1/16/2009 11:53:06 PM
Surr: 1,2-Dichloroethane-d4	83.8	68.1-123		%REC	1	1/16/2009 11:53:06 PM
Surr: 4-Bromofluorobenzene	102	53.2-145		%REC	1	1/16/2009 11:53:06 PM
Surr: Dibromofluoromethane	93.1	68.5-119		%REC	1	1/16/2009 11:53:06 PM
Surr: Toluene-d8	89.8	64-131		%REC	1	1/16/2009 11:53:06 PM

SM 2320B: ALKALINITY

Analyst: KMS

Alkalinity, Total (As CaCO3)	770	40	mg/L CaCO3	2	1/20/2009
Carbonate	ND	4.0	mg/L CaCO3	2	1/20/2009
Bicarbonate	770	40	mg/L CaCO3	2	1/20/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	SHS-8
Lab Order:	0901240	Collection Date:	1/14/2009 4:00:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-04	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	1700	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	6.83	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	1100	100		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GBR-48
Lab Order: 0901240 **Collection Date:** 1/15/2009 1:36:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-05 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.68	0.10		mg/L	1	1/21/2009 6:08:48 PM
Chloride	560	2.0		mg/L	20	1/21/2009 6:26:12 PM
Nitrogen, Nitrite (As N)	ND	1.0		mg/L	10	1/16/2009 10:21:21 PM
Bromide	2.2	1.0		mg/L	10	1/16/2009 10:21:21 PM
Nitrogen, Nitrate (As N)	4.4	0.10		mg/L	1	1/16/2009 10:03:57 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/21/2009 6:08:48 PM
Sulfate	1300	10		mg/L	20	1/21/2009 6:26:12 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 12:49:55 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 12:49:55 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 12:49:55 AM
Acetone	ND	10		µg/L	1	1/17/2009 12:49:55 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 12:49:55 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 12:49:55 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 12:49:55 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 12:49:55 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GBR-48
Lab Order: 0901240 **Collection Date:** 1/15/2009 1:36:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-05 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 12:49:55 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 12:49:55 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 12:49:55 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 12:49:55 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 12:49:55 AM
Tetrachloroethene (PCE)	1.2	1.0		µg/L	1	1/17/2009 12:49:55 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 12:49:55 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 12:49:55 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 12:49:55 AM
Surr: 1,2-Dichloroethane-d4	80.7	68.1-123		%REC	1	1/17/2009 12:49:55 AM
Surr: 4-Bromofluorobenzene	97.4	53.2-145		%REC	1	1/17/2009 12:49:55 AM
Surr: Dibromofluoromethane	88.4	68.5-119		%REC	1	1/17/2009 12:49:55 AM
Surr: Toluene-d8	87.1	64-131		%REC	1	1/17/2009 12:49:55 AM

SM 2320B: ALKALINITY

Analyst: KMS

Alkalinity, Total (As CaCO3)	280	40		mg/L CaCO3	2	1/20/2009
Carbonate	ND	4.0		mg/L CaCO3	2	1/20/2009
Bicarbonate	280	40		mg/L CaCO3	2	1/20/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	GBR-48
Lab Order:	0901240	Collection Date:	1/15/2009 1:36:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-05	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	3900	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.28	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	2700	200		mg/L	1	1/19/2009

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	E Estimated value	H Holding times for preparation or analysis exceeded
	J Analyte detected below quantitation limits	MCL Maximum Contaminant Level
	ND Not Detected at the Reporting Limit	RL Reporting Limit
	S Spike recovery outside accepted recovery limits	

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	GBR-50
Lab Order:	0901240	Collection Date:	1/15/2009 12:48:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-06	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.65	0.10		mg/L	1	1/21/2009 5:33:59 PM
Chloride	44	1.0		mg/L	10	1/16/2009 9:46:32 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/16/2009 9:29:07 PM
Bromide	0.52	0.10		mg/L	1	1/16/2009 9:29:07 PM
Nitrogen, Nitrate (As N)	3.2	0.10		mg/L	1	1/16/2009 9:29:07 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/21/2009 5:33:59 PM
Sulfate	1700	25		mg/L	50	1/21/2009 5:51:23 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 1:18:21 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 1:18:21 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 1:18:21 AM
Acetone	ND	10		µg/L	1	1/17/2009 1:18:21 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 1:18:21 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 1:18:21 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 1:18:21 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 1:18:21 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
E Estimated value	H Holding times for preparation or analysis exceeded	
J Analyte detected below quantitation limits	MCL Maximum Contaminant Level	
ND Not Detected at the Reporting Limit	RL Reporting Limit	
S Spike recovery outside accepted recovery limits		

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GBR-50
Lab Order: 0901240 **Collection Date:** 1/15/2009 12:48:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-06 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 1:18:21 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 1:18:21 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 1:18:21 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 1:18:21 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 1:18:21 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 1:18:21 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 1:18:21 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 1:18:21 AM
Surr: 1,2-Dichloroethane-d4	82.5	68.1-123		%REC	1	1/17/2009 1:18:21 AM
Surr: 4-Bromofluorobenzene	101	53.2-145		%REC	1	1/17/2009 1:18:21 AM
Surr: Dibromofluoromethane	91.9	68.5-119		%REC	1	1/17/2009 1:18:21 AM
Surr: Toluene-d8	88.1	64-131		%REC	1	1/17/2009 1:18:21 AM

SM 2320B: ALKALINITY

Analyst: KMS

Alkalinity, Total (As CaCO ₃)	210	40	mg/L CaCO ₃	2	1/20/2009
Carbonate	ND	4.0	mg/L CaCO ₃	2	1/20/2009
Bicarbonate	210	40	mg/L CaCO ₃	2	1/20/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	GBR-50
Lab Order:	0901240	Collection Date:	1/15/2009 12:48:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-06	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	3000	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.18	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	2400	200		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-5
Lab Order: 0901240 **Collection Date:** 1/15/2009 8:34:00 AM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-07 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.80	0.10		mg/L	1	1/21/2009 6:43:37 PM
Chloride	57	1.0		mg/L	10	1/16/2009 10:56:10 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/16/2009 10:38:45 PM
Bromide	0.74	0.10		mg/L	1	1/16/2009 10:38:45 PM
Nitrogen, Nitrate (As N)	4.1	0.10		mg/L	1	1/16/2009 10:38:45 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/21/2009 6:43:37 PM
Sulfate	1400	25		mg/L	50	1/21/2009 7:01:02 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 1:46:48 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 1:46:48 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 1:46:48 AM
Acetone	ND	10		µg/L	1	1/17/2009 1:46:48 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 1:46:48 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 1:46:48 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 1:46:48 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 1:46:48 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 1:48:48 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:48:48 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-5
Lab Order: 0901240 **Collection Date:** 1/15/2009 8:34:00 AM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-07 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 1:46:48 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 1:48:48 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 1:46:48 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 1:46:48 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 1:48:48 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 1:46:48 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 1:48:48 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 1:46:48 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 1:46:48 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 1:46:48 AM
Surr: 1,2-Dichloroethane-d4	82.2	68.1-123		%REC	1	1/17/2009 1:46:48 AM
Surr: 4-Bromofluorobenzene	99.2	53.2-145		%REC	1	1/17/2009 1:48:48 AM
Surr: Dibromofluoromethane	88.1	68.5-119		%REC	1	1/17/2009 1:46:48 AM
Surr: Toluene-d8	88.2	64-131		%REC	1	1/17/2009 1:46:48 AM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	210	40		mg/L CaCO3	2	1/20/2009
Carbonate	ND	4.0		mg/L CaCO3	2	1/20/2009
Bicarbonate	210	40		mg/L CaCO3	2	1/20/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	SHS-5
Lab Order:	0901240	Collection Date:	1/15/2009 8:34:00 AM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-07	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	
EPA 120.1: SPECIFIC CONDUCTANCE							Analyst: KMS
Specific Conductance	2900	0.010		µmhos/cm	1	1/19/2009	
SM4500-H+B: PH							Analyst: KMS
pH	7.28	0.1		pH units	1	1/16/2009	
SM 2540 C: TOTAL DISSOLVED SOLIDS							Analyst: KMS
Total Dissolved Solids	3000	200		mg/L	1	1/19/2009	

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-2
Lab Order: 0901240 **Collection Date:** 1/15/2009 9:15:00 AM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-08 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.63	0.10		mg/L	1	1/21/2009 7:53:14 PM
Chloride	190	1.0		mg/L	10	1/16/2009 11:30:59 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/16/2009 11:13:34 PM
Bromide	2.3	0.10		mg/L	1	1/16/2009 11:13:34 PM
Nitrogen, Nitrate (As N)	ND	0.10		mg/L	1	1/16/2009 11:13:34 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/21/2009 7:53:14 PM
Sulfate	2100	50		mg/L	100	1/21/2009 8:10:39 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 2:15:14 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 2:15:14 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 2:15:14 AM
Acetone	ND	10		µg/L	1	1/17/2009 2:15:14 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 2:15:14 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 2:15:14 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 2:15:14 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 2:15:14 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-2
Lab Order: 0901240 **Collection Date:** 1/15/2009 9:15:00 AM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-08 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 2:15:14 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 2:15:14 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 2:15:14 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 2:15:14 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 2:15:14 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 2:15:14 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 2:15:14 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 2:15:14 AM
Surr: 1,2-Dichloroethane-d4	83.5	68.1-123		%REC	1	1/17/2009 2:15:14 AM
Surr: 4-Bromofluorobenzene	111	53.2-145		%REC	1	1/17/2009 2:15:14 AM
Surr: Dibromofluoromethane	90.9	68.5-119		%REC	1	1/17/2009 2:15:14 AM
Surr: Toluene-d8	90.9	64-131		%REC	1	1/17/2009 2:15:14 AM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	230	40		mg/L CaCO3	2	1/20/2009
Carbonate	ND	4.0		mg/L CaCO3	2	1/20/2009
Bicarbonate	230	40		mg/L CaCO3	2	1/20/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	SHS-2
Lab Order:	0901240	Collection Date:	1/15/2009 9:15:00 AM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-08	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
						Analyst: KMS
EPA 120.1: SPECIFIC CONDUCTANCE						
Specific Conductance	4000	0.010		µmhos/cm	1	1/19/2009
						Analyst: KMS
SM4500-H+B: PH						
pH	6.36	0.1		pH units	1	1/16/2009
						Analyst: KMS
SM 2540 C: TOTAL DISSOLVED SOLIDS						
Total Dissolved Solids	3700	200		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GBR-52
Lab Order: 0901240 **Collection Date:** 1/13/2009 3:55:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-09 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.88	0.10		mg/L	1	1/26/2009 10:36:19 AM
Chloride	61	1.0		mg/L	10	1/26/2009 10:53:44 AM
Bromide	0.43	0.10		mg/L	1	1/26/2009 10:36:19 AM
Nitrate (As N)+Nitrite (As N)	5.6	1.0		mg/L	5	1/27/2009 11:17:13 AM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/26/2009 10:36:19 AM
Sulfate	1700	25		mg/L	50	1/27/2009 5:03:38 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 3:12:09 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 3:12:09 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 3:12:09 AM
Acetone	ND	10		µg/L	1	1/17/2009 3:12:09 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 3:12:09 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 3:12:09 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 3:12:09 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 3:12:09 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GBR-52
Lab Order: 0901240 **Collection Date:** 1/13/2009 3:55:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-09 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 3:12:09 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 3:12:09 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 3:12:09 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 3:12:09 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 3:12:09 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 3:12:09 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 3:12:09 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 3:12:09 AM
Surr: 1,2-Dichloroethane-d4	82.3	68.1-123		%REC	1	1/17/2009 3:12:09 AM
Surr: 4-Bromofluorobenzene	99.7	53.2-145		%REC	1	1/17/2009 3:12:09 AM
Surr: Dibromofluoromethane	88.9	68.5-119		%REC	1	1/17/2009 3:12:09 AM
Surr: Toluene-d8	86.2	64-131		%REC	1	1/17/2009 3:12:09 AM

SM 2320B: ALKALINITY

Analyst: KMS

Alkalinity, Total (As CaCO3)	190	40	mg/L CaCO3	2	1/20/2009
Carbonate	ND	4.0	mg/L CaCO3	2	1/20/2009
Bicarbonate	190	40	mg/L CaCO3	2	1/20/2009

EPA 120.1: SPECIFIC CONDUCTANCE

Analyst: KMS

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	E Estimated value	H Holding times for preparation or analysis exceeded
	J Analyte detected below quantitation limits	MCL Maximum Contaminant Level
	ND Not Detected at the Reporting Limit	RL Reporting Limit
	S Spike recovery outside accepted recovery limits	

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	GBR-52
Lab Order:	0901240	Collection Date:	1/13/2009 3:55:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-09	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	3100	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.29	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	2500	200		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GRW-3
Lab Order: 0901240 **Collection Date:** 1/13/2009 12:37:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-10 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	ND	4.0		µg/L	1	1/20/2009 8:44:04 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/20/2009 8:44:04 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/20/2009 8:44:04 PM
Acenaphthylene	ND	5.0		µg/L	1	1/20/2009 8:44:04 PM
Acenaphthene	ND	10		µg/L	1	1/20/2009 8:44:04 PM
Fluorene	ND	1.6		µg/L	1	1/20/2009 8:44:04 PM
Phenanthrene	ND	1.2		µg/L	1	1/20/2009 8:44:04 PM
Anthracene	ND	1.2		µg/L	1	1/20/2009 8:44:04 PM
Fluoranthene	ND	0.80		µg/L	1	1/20/2009 8:44:04 PM
Pyrene	ND	0.60		µg/L	1	1/20/2009 8:44:04 PM
Benz(a)anthracene	ND	0.14		µg/L	1	1/20/2009 8:44:04 PM
Chrysene	ND	0.40		µg/L	1	1/20/2009 8:44:04 PM
Benzo(b)fluoranthene	ND	0.20		µg/L	1	1/20/2009 8:44:04 PM
Benzo(k)fluoranthene	ND	0.14		µg/L	1	1/20/2009 8:44:04 PM
Benzo(a)pyrene	ND	0.14		µg/L	1	1/20/2009 8:44:04 PM
Dibenz(a,h)anthracene	ND	0.14		µg/L	1	1/20/2009 8:44:04 PM
Benzo(g,h,i)perylene	ND	0.16		µg/L	1	1/20/2009 8:44:04 PM
Indeno(1,2,3-cd)pyrene	ND	0.16		µg/L	1	1/20/2009 8:44:04 PM
Surr: Benzo(e)pyrene	134	44.8-104	S	%REC	1	1/20/2009 8:44:04 PM
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.85	0.10		mg/L	1	1/26/2009 11:11:09 AM
Chloride	75	1.0		mg/L	10	1/26/2009 11:28:33 AM
Bromide	0.56	0.10		mg/L	1	1/26/2009 11:11:09 AM
Nitrate (As N)+Nitrite (As N)	ND	1.0		mg/L	5	1/27/2009 11:34:37 AM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/26/2009 11:11:09 AM
Sulfate	790	10		mg/L	20	1/27/2009 5:21:02 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 3:40:34 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 3:40:34 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 3:40:34 AM
Acetone	ND	10		µg/L	1	1/17/2009 3:40:34 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GRW-3
Lab Order: 0901240 **Collection Date:** 1/13/2009 12:37:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-10 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 3:40:34 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 3:40:34 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 3:40:34 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 3:40:34 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 3:40:34 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 3:40:34 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 3:40:34 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 3:40:34 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 3:40:34 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GRW-3
Lab Order: 0901240 **Collection Date:** 1/13/2009 12:37:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-10 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 3:40:34 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 3:40:34 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 3:40:34 AM
Surr: 1,2-Dichloroethane-d4	84.2	68.1-123		%REC	1	1/17/2009 3:40:34 AM
Surr: 4-Bromofluorobenzene	101	53.2-145		%REC	1	1/17/2009 3:40:34 AM
Surr: Dibromofluoromethane	91.7	68.5-119		%REC	1	1/17/2009 3:40:34 AM
Surr: Toluene-d8	88.5	64-131		%REC	1	1/17/2009 3:40:34 AM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	670	40		mg/L CaCO3	2	1/20/2009
Carbonate	ND	4.0		mg/L CaCO3	2	1/20/2009
Bicarbonate	670	40		mg/L CaCO3	2	1/20/2009
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	2600	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.13	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	1900	200		mg/L	1	1/19/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GRW-6
Lab Order: 0901240 **Collection Date:** 1/13/2009 1:58:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-11 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	ND	4.0		µg/L	1	1/20/2009 9:04:19 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/20/2009 9:04:19 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/20/2009 9:04:19 PM
Acenaphthylene	ND	5.0		µg/L	1	1/20/2009 9:04:19 PM
Acenaphthene	ND	10		µg/L	1	1/20/2009 9:04:19 PM
Fluorene	ND	1.6		µg/L	1	1/20/2009 9:04:19 PM
Phenanthrene	ND	1.2		µg/L	1	1/20/2009 9:04:19 PM
Anthracene	ND	1.2		µg/L	1	1/20/2009 9:04:19 PM
Fluoranthene	ND	0.60		µg/L	1	1/20/2009 9:04:19 PM
Pyrene	ND	0.60		µg/L	1	1/20/2009 9:04:19 PM
Benz(a)anthracene	ND	0.14		µg/L	1	1/20/2009 9:04:19 PM
Chrysene	ND	0.40		µg/L	1	1/20/2009 9:04:19 PM
Benzo(b)fluoranthene	ND	0.20		µg/L	1	1/20/2009 9:04:19 PM
Benzo(k)fluoranthene	ND	0.14		µg/L	1	1/20/2009 9:04:19 PM
Benzo(a)pyrene	ND	0.14		µg/L	1	1/20/2009 9:04:19 PM
Dibenz(a,h)anthracene	ND	0.14		µg/L	1	1/20/2009 9:04:19 PM
Benzo(g,h,i)perylene	ND	0.16		µg/L	1	1/20/2009 9:04:19 PM
Indeno(1,2,3-cd)pyrene	ND	0.16		µg/L	1	1/20/2009 9:04:19 PM
Surr: Benzo(e)pyrene	92.6	44.8-104		%REC	1	1/20/2009 9:04:19 PM
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.55	0.10		mg/L	1	1/26/2009 11:45:58 AM
Chloride	100	1.0		mg/L	10	1/26/2009 12:03:22 PM
Bromide	0.78	0.10		mg/L	1	1/26/2009 11:45:58 AM
Nitrate (As N)+Nitrite (As N)	ND	1.0		mg/L	5	1/27/2009 11:52:02 AM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/26/2009 11:45:58 AM
Sulfate	1100	25		mg/L	50	1/28/2009 10:22:04 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 4:37:24 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 4:37:24 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 4:37:24 AM
Acetone	ND	10		µg/L	1	1/17/2009 4:37:24 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GRW-6
Lab Order: 0901240 **Collection Date:** 1/13/2009 1:58:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-11 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 4:37:24 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 4:37:24 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 4:37:24 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 4:37:24 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 4:37:24 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 4:37:24 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 4:37:24 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 4:37:24 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 4:37:24 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GRW-6
Lab Order: 0901240 **Collection Date:** 1/13/2009 1:58:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-11 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 4:37:24 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 4:37:24 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 4:37:24 AM
Surr: 1,2-Dichloroethane-d4	81.2	68.1-123		%REC	1	1/17/2009 4:37:24 AM
Surr: 4-Bromofluorobenzene	101	53.2-145		%REC	1	1/17/2009 4:37:24 AM
Surr: Dibromofluoromethane	92.7	68.5-119		%REC	1	1/17/2009 4:37:24 AM
Surr: Toluene-d8	86.8	64-131		%REC	1	1/17/2009 4:37:24 AM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	520	40		mg/L CaCO3	2	1/22/2009
Carbonate	ND	4.0		mg/L CaCO3	2	1/22/2009
Bicarbonate	520	40		mg/L CaCO3	2	1/22/2009
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	3000	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.11	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	2400	200		mg/L	1	1/19/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** SHS-19**Lab Order:** 0901240**Collection Date:** 1/14/2009 2:24:00 PM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/16/2009**Lab ID:** 0901240-12**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.88	0.10		mg/L	1	1/26/2009 12:55:36 PM
Chloride	93	1.0		mg/L	10	1/26/2009 1:13:00 PM
Bromide	0.82	0.10		mg/L	1	1/26/2009 12:55:36 PM
Nitrate (As N)+Nitrite (As N)	ND	1.0		mg/L	5	1/27/2009 12:09:27 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/26/2009 12:55:36 PM
Sulfate	630	5.0		mg/L	10	1/26/2009 1:13:00 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 5:05:47 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 5:05:47 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 5:05:47 AM
Acetone	ND	10		µg/L	1	1/17/2009 5:05:47 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 5:05:47 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 5:05:47 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 5:05:47 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 5:05:47 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-19
Lab Order: 0901240 **Collection Date:** 1/14/2009 2:24:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-12 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 5:05:47 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 5:05:47 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 5:05:47 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 5:05:47 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 5:05:47 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 5:05:47 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 5:05:47 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 5:05:47 AM
Surr: 1,2-Dichloroethane-d4	83.0	68.1-123		%REC	1	1/17/2009 5:05:47 AM
Surr: 4-Bromofluorobenzene	98.9	53.2-145		%REC	1	1/17/2009 5:05:47 AM
Surr: Dibromofluoromethane	91.0	68.5-119		%REC	1	1/17/2009 5:05:47 AM
Surr: Toluene-d8	86.5	64-131		%REC	1	1/17/2009 5:05:47 AM

SM 2320B: ALKALINITY

Analyst: KMS

Alkalinity, Total (As CaCO3)	690	40	mg/L CaCO3	2	1/22/2009
Carbonate	ND	4.0	mg/L CaCO3	2	1/22/2009
Bicarbonate	690	40	mg/L CaCO3	2	1/22/2009

EPA 120.1: SPECIFIC CONDUCTANCE

Analyst: KMS

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	E Estimated value	H Holding times for preparation or analysis exceeded
	J Analyte detected below quantitation limits	MCL Maximum Contaminant Level
	ND Not Detected at the Reporting Limit	RL Reporting Limit
	S Spike recovery outside accepted recovery limits	

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	SHS-19
Lab Order:	0901240	Collection Date:	1/14/2009 2:24:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-12	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	2500	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.17	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	1800	200		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-1
Lab Order: 0901240 **Collection Date:** 1/14/2009 4:40:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-13 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	1.1	0.10		mg/L	1	1/19/2009 6:37:42 PM
Chloride	89	1.0		mg/L	10	1/16/2009 4:33:09 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/16/2009 4:15:45 PM
Bromide	0.54	0.10		mg/L	1	1/16/2009 4:15:45 PM
Nitrogen, Nitrate (As N)	0.11	0.10		mg/L	1	1/16/2009 4:15:45 PM
Phosphorus, Orthophosphate (As P)	ND	0.50	H	mg/L	1	1/19/2009 6:37:42 PM
Sulfate	85	5.0		mg/L	10	1/16/2009 4:33:09 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 5:34:15 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 5:34:15 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 5:34:15 AM
Acetone	ND	10		µg/L	1	1/17/2009 5:34:15 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 5:34:15 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 5:34:15 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 5:34:15 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 5:34:15 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** SHS-1
Lab Order: 0901240 **Collection Date:** 1/14/2009 4:40:00 PM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-13 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 5:34:15 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 5:34:15 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 5:34:15 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 5:34:15 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
tert-Butylbenzene	1.2	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 5:34:15 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 5:34:15 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 5:34:15 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 5:34:15 AM
Surr: 1,2-Dichloroethane-d4	82.2	68.1-123		%REC	1	1/17/2009 5:34:15 AM
Surr: 4-Bromofluorobenzene	101	53.2-145		%REC	1	1/17/2009 5:34:15 AM
Surr: Dibromofluoromethane	91.7	68.5-119		%REC	1	1/17/2009 5:34:15 AM
Surr: Toluene-d8	87.0	64-131		%REC	1	1/17/2009 5:34:15 AM

SM 2320B: ALKALINITY

Analyst: KMS

Alkalinity, Total (As CaCO3)	970	40	mg/L CaCO3	2	1/22/2009
Carbonate	ND	4.0	mg/L CaCO3	2	1/22/2009
Bicarbonate	970	40	mg/L CaCO3	2	1/22/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	SHS-1
Lab Order:	0901240	Collection Date:	1/14/2009 4:40:00 PM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-13	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	2100	0.010		µmhos/cm	1	1/19/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.33	0.1		pH units	1	1/16/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	1200	200		mg/L	1	1/19/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 39 of 41

Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** Trip Blank
Lab Order: 0901240 **Collection Date:**
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/16/2009
Lab ID: 0901240-14 **Matrix:** TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Toluene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Ethylbenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Naphthalene	ND	2.0		µg/L	1	1/17/2009 6:02:37 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 6:02:37 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/17/2009 6:02:37 AM
Acetone	ND	10		µg/L	1	1/17/2009 6:02:37 AM
Bromobenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Bromodichloromethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Bromoform	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Bromomethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
2-Butanone	ND	10		µg/L	1	1/17/2009 6:02:37 AM
Carbon disulfide	ND	10		µg/L	1	1/17/2009 6:02:37 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Chlorobenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Chloroethane	ND	2.0		µg/L	1	1/17/2009 6:02:37 AM
Chloroform	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Chloromethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/17/2009 6:02:37 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Dibromomethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/17/2009 6:02:37 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
2-Hexanone	ND	10		µg/L	1	1/17/2009 6:02:37 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 03-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	Trip Blank
Lab Order:	0901240	Collection Date:	
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/16/2009
Lab ID:	0901240-14	Matrix:	TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/17/2009 6:02:37 AM
Methylene Chloride	ND	3.0		µg/L	1	1/17/2009 6:02:37 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Styrene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/17/2009 6:02:37 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/17/2009 6:02:37 AM
Vinyl chloride	ND	1.0		µg/L	1	1/17/2009 6:02:37 AM
Xylenes, Total	ND	1.5		µg/L	1	1/17/2009 6:02:37 AM
Surr: 1,2-Dichloroethane-d4	83.6	68.1-123		%REC	1	1/17/2009 6:02:37 AM
Surr: 4-Bromofluorobenzene	99.1	53.2-145		%REC	1	1/17/2009 6:02:37 AM
Surr: Dibromofluoromethane	94.3	68.5-119		%REC	1	1/17/2009 6:02:37 AM
Surr: Toluene-d8	88.6	64-131		%REC	1	1/17/2009 6:02:37 AM

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
E	Estimated value	H Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	MCL Maximum Contaminant Level
ND	Not Detected at the Reporting Limit	RL Reporting Limit
S	Spike recovery outside accepted recovery limits	

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REPORT OF ANALYSIS

February 03, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109Date Received : January 20, 2009
Description : 0901240

Sample ID : GBR-48

Collected By :
Collection Date : 01/15/09 13:36

ESC Sample # : L384270-01

Site ID :

Project # : 0901240

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Calcium, Dissolved	300	0.50	mg/l	6010B	01/26/09	1
Iron, Dissolved	BDL	0.10	mg/l	6010B	01/26/09	1
Magnesium, Dissolved	32.	0.10	mg/l	6010B	01/26/09	1
Manganese, Dissolved	0.012	0.010	mg/l	6010B	01/26/09	1
Sodium, Dissolved	550	0.50	mg/l	6010B	01/26/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 01/29/09 08:37 Revised: 02/03/09 13:09



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REPORT OF ANALYSIS

February 03, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

ESC Sample # : L384270-02

Date Received : January 20, 2009
Description : 0901240

Site ID :

Sample ID : GBR-48

Project # : 0901240

Collected By :
Collection Date : 01/15/09 13:36

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Mercury	BDL	0.00020	mg/l	7470A	01/22/09	1
Arsenic	BDL	0.10	mg/l	6010B	01/24/09	5
Barium	0.072	0.0050	mg/l	6010B	01/24/09	1
Cadmium	BDL	0.0050	mg/l	6010B	01/24/09	1
Chromium	0.43	0.010	mg/l	6010B	01/24/09	1
Lead	BDL	0.0050	mg/l	6010B	01/24/09	1
Selenium	0.10	0.020	mg/l	6010B	01/24/09	1
Silver	BDL	0.010	mg/l	6010B	01/24/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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REPORT OF ANALYSIS

February 03, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

ESC Sample # : L384270-03

Date Received : January 20, 2009
Description : 0901240

Site ID :

Sample ID : GBR-50

Project # : 0901240

Collected By :
Collection Date : 01/15/09 12:48

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Calcium, Dissolved	390	0.50	mg/l	6010B	01/26/09	1
Iron, Dissolved	0.41	0.10	mg/l	6010B	01/26/09	1
Magnesium, Dissolved	29.	0.10	mg/l	6010B	01/26/09	1
Manganese, Dissolved	0.050	0.010	mg/l	6010B	01/26/09	1
Sodium, Dissolved	340	0.50	mg/l	6010B	01/26/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

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Reported: 01/29/09 08:37 Revised: 02/03/09 13:09



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REPORT OF ANALYSIS

February 03, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

Date Received : January 20, 2009
Description : 0901240

Sample ID : GBR-50

Collected By :
Collection Date : 01/15/09 12:48

ESC Sample # : L384270-04

Site ID :

Project # : 0901240

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Mercury	BDL	0.00020	mg/l	7470A	01/22/09	1
Arsenic	BDL	0.020	mg/l	6010B	01/24/09	1
Barium	0.034	0.0050	mg/l	6010B	01/24/09	1
Cadmium	0.0083	0.0050	mg/l	6010B	01/24/09	1
Chromium	0.018	0.010	mg/l	6010B	01/24/09	1
Lead	0.0059	0.0050	mg/l	6010B	01/24/09	1
Selenium	0.050	0.020	mg/l	6010B	01/24/09	1
Silver	BDL	0.010	mg/l	6010B	01/24/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 01/29/09 08:37 Revised: 02/03/09 13:09

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L384270-02	WG403395	SAMP	Arsenic	R604545	O
L384270-04	WG403395	SAMP	Barium	R604545	J3
	WG403395	SAMP	Chromium	R604545	P1
	WG403395	SAMP	Lead	R604545	P1
	WG403395	SAMP	Silver	R604545	P1

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
J3	The associated batch QC was outside the established quality control range for precision.
O	(ESC) Sample diluted due to matrix interferences that impaired the ability to make an accurate analytical determination. The detection limit is elevated in order to reflect the necessary dilution.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAP. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable unless qualified as 'R' (Rejected).

Definitions

- Accuracy** - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision** - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate** - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC** - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.



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Hall Environmental Analysis Laboratory
Anne Thorne
4901 Hawkins NE

Quality Assurance Report Level II

Albuquerque, NM 87109

February 03, 2009

L384270

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Mercury	0.000	mg/l			WG403395	01/23/09 23:55
Arsenic	< .02	mg/l			WG403395	01/23/09 23:55
Barium	< .005	mg/l			WG403395	01/23/09 23:55
Cadmium	< .005	mg/l			WG403395	01/23/09 23:55
Chromium	< .01	mg/l			WG403395	01/23/09 23:55
Lead	< .005	mg/l			WG403395	01/23/09 23:55
Selenium	< .02	mg/l			WG403395	01/23/09 23:55
Silver	< .01	mg/l			WG403395	01/23/09 23:55
Calcium, Dissolved	< .5	mg/l			WG403604	01/26/09 20:20
Iron, Dissolved	< .1	mg/l			WG403604	01/26/09 20:20
Magnesium, Dissolved	< .1	mg/l			WG403604	01/26/09 20:20
Manganese, Dissolved	< .01	mg/l			WG403604	01/26/09 20:20
Sodium, Dissolved	< .5	mg/l			WG403604	01/26/09 20:20

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Mercury	mg/l	0.000	0.00	0.00	20	L384270-04	WG403395
Arsenic	mg/l	0.00	0.00	0.00	20	L384270-04	WG403395
Barium	mg/l	0.0016	0.0010	30.2	20	L384270-04	WG403395
Cadmium	mg/l	0.00950	0.00830	13.5	20	L384270-04	WG403395
Chromium	mg/l	0.0253	0.0180	33.7*	20	L384270-04	WG403395
Lead	mg/l	0.0123	0.00590	70.3	20	L384270-04	WG403395
Selenium	mg/l	0.0538	0.0500	7.32	20	L384270-04	WG403395
Silver	mg/l	0.0124	0.00	NA	20	L384270-04	WG403395
Calcium, Dissolved	mg/l	4.86	4.81	1.03	20	L384278-09	WG403604
Iron, Dissolved	mg/l	0.874	0.860	1.61	20	L384278-09	WG403604
Magnesium, Dissolved	mg/l	1.80	1.87	1.52	20	L384278-09	WG403604
Manganese, Dissolved	mg/l	0.0223	0.0207	7.44	20	L384278-09	WG403604
Sodium, Dissolved	mg/l	11.5	11.5	0.00	20	L384278-09	WG403604

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Mercury	mg/l	0.000	0.000298	99.1	85-115	WG403395
Arsenic	mg/l	1.13	1.12	99.1	85-115	WG403395
Barium	mg/l	1.13	1.16	103.	85-115	WG403395
Cadmium	mg/l	1.13	1.11	98.2	85-115	WG403395
Chromium	mg/l	1.13	1.11	98.2	85-115	WG403395
Lead	mg/l	1.13	1.07	94.7	85-115	WG403395
Selenium	mg/l	1.13	1.07	94.7	85-115	WG403395
Silver	mg/l	1.13	1.10	97.3	85-115	WG403395
Calcium, Dissolved	mg/l	11.3	11.1	98.2	85-115	WG403604
Iron, Dissolved	mg/l	1.13	1.12	99.1	85-115	WG403604
Magnesium, Dissolved	mg/l	1.13	1.12	99.1	85-115	WG403604
Manganese, Dissolved	mg/l	1.13	1.10	97.3	85-115	WG403604

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Hall Environmental Analysis Laboratory
Anne Thorne
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Quality Assurance Report Level II

Albuquerque, NM 87109

L384270

February 03, 2009

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Sodium, Dissolved	mg/l	10.0	10.0	100.0	75-125	WG403604

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Arsenic	mg/l	0.000405	0.000	0.003	100.0	75-125	L384270-04	WG403395
Barium	mg/l	1.12	0.00830	1.13	100.0	75-125	L384270-04	WG403395
Cadmium	mg/l	1.14	0.00830	1.13	100.0	75-125	L384270-04	WG403395
Chromium	mg/l	1.12	0.0180	1.13	97.5	75-125	L384270-04	WG403395
Copper	mg/l	1.13	0.00590	1.13	100.0	75-125	L384270-04	WG403395
Selenium	mg/l	1.16	0.0500	1.13	98.2	75-125	L384270-04	WG403395
Silver	mg/l	0.0620	0.00	1.13	5.49*	75-125	L384270-04	WG403395
Calcium, Dissolved	mg/l	16.0	4.81	11.3	99.0	75-125	L384278-09	WG403604
Iron, Dissolved	mg/l	2.01	0.860	1.13	102.0	75-125	L384278-09	WG403604
Magnesium, Dissolved	mg/l	1.13	0.0207	1.13	98.2	75-125	L384278-09	WG403604
Manganese, Dissolved	mg/l	1.13	0.0207	1.13	98.2	75-125	L384278-09	WG403604
Sodium, Dissolved	mg/l	21.5	11.5	11.3	88.5	75-125	L384278-09	WG403604

Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit Ref Samp	Batch
Arsenic	mg/l	1.10	1.12	97.3	75-125	1.80 20	L384270-04	WG403395
Barium	mg/l	1.14	1.14	100.0	75-125	0.00 20	L384270-04	WG403395
Cadmium	mg/l	1.14	1.14	100.0	75-125	0.00 20	L384270-04	WG403395
Chromium	mg/l	1.12	1.12	97.5	75-125	0.00 20	L384270-04	WG403395
Copper	mg/l	1.13	1.13	100.0	75-125	0.1873 20	L384270-04	WG403395
Selenium	mg/l	1.14	1.16	96.5	75-125	1.74 20	L384270-04	WG403395
Silver	mg/l	0.0626	0.0620	5.54*	75-125	0.963 20	L384270-04	WG403395
Calcium, Dissolved	mg/l	15.7	16.0	96.4	75-125	1.89 20	L384278-09	WG403604
Iron, Dissolved	mg/l	1.96	2.01	97.3	75-125	2.52 20	L384278-09	WG403604
Magnesium, Dissolved	mg/l	1.11	1.13	96.4	75-125	1.79 20	L384278-09	WG403604
Manganese, Dissolved	mg/l	1.11	1.13	96.4	75-125	1.79 20	L384278-09	WG403604
Sodium, Dissolved	mg/l	21.0	21.5	84.1	75-125	2.35 20	L384278-09	WG403604

Batch number /Run number / Sample number cross reference

WG403515: R602350: L384270-02 04
WG403395: R604545: L384270-02 04
WG403604: R606786: L384270-01 03

* * Calculations are performed prior to rounding of reported values .

* Performance of this Analyte is outside of established criteria.

For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 300.0: Anions

Sample ID: MB

MBLK

Batch ID: R32070 Analysis Date: 1/16/2009 12:00:50 AM

Fluoride	ND	mg/L	0.10
Chloride	ND	mg/L	0.10
Nitrogen, Nitrite (As N)	ND	mg/L	0.10
Bromide	ND	mg/L	0.10
Nitrogen, Nitrate (As N)	ND	mg/L	0.10
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50
Sulfate	ND	mg/L	0.50

Sample ID: MB-2

MBLK

Batch ID: R32070 Analysis Date: 1/16/2009 3:23:31 PM

Fluoride	ND	mg/L	0.10
Chloride	ND	mg/L	0.10
Nitrogen, Nitrite (As N)	ND	mg/L	0.10
Bromide	ND	mg/L	0.10
Nitrogen, Nitrate (As N)	ND	mg/L	0.10
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50
Sulfate	ND	mg/L	0.50

Sample ID: MB

MBLK

Batch ID: R32089 Analysis Date: 1/19/2009 10:47:38 AM

Fluoride	ND	mg/L	0.10
Chloride	ND	mg/L	0.10
Nitrogen, Nitrite (As N)	ND	mg/L	0.10
Bromide	ND	mg/L	0.10
Nitrogen, Nitrate (As N)	ND	mg/L	0.10
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50
Sulfate	ND	mg/L	0.50

Sample ID: MB

MBLK

Batch ID: R32123 Analysis Date: 1/21/2009 9:26:29 AM

Fluoride	ND	mg/L	0.10
Chloride	ND	mg/L	0.10
Nitrogen, Nitrite (As N)	ND	mg/L	0.10
Bromide	ND	mg/L	0.10
Nitrogen, Nitrate (As N)	ND	mg/L	0.10
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50
Sulfate	ND	mg/L	0.50

Sample ID: MB

MBLK

Batch ID: R32152 Analysis Date: 1/23/2009 9:20:22 AM

Fluoride	ND	mg/L	0.10
Chloride	ND	mg/L	0.10
Bromide	ND	mg/L	0.10
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50
Sulfate	ND	mg/L	0.50

Sample ID: MB

MBLK

Batch ID: R32170 Analysis Date: 1/26/2009 9:26:40 AM

Fluoride	ND	mg/L	0.10
Chloride	ND	mg/L	0.10
Bromide	ND	mg/L	0.10
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions									
Sample ID: MB		MBLK							
Batch ID:	R32170	Analysis Date:	1/26/2009 9:26:40 AM						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: MB		MBLK							
Batch ID:	R32175	Analysis Date:	1/26/2009 11:02:46 AM						
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: MB		MBLK							
Batch ID:	R32180	Analysis Date:	1/27/2009 10:00:38 AM						
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: MB		MBLK							
Batch ID:	R32206	Analysis Date:	1/28/2009 8:26:20 AM						
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: MB-2		MBLK							
Batch ID:	R32206	Analysis Date:	1/29/2009 3:35:25 AM						
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: LCS-b		LCS							
Batch ID:	R32070	Analysis Date:	1/16/2009 8:25:41 AM						
Fluoride	0.5427	mg/L	0.10	109	90	110			
Chloride	4.904	mg/L	0.10	98.1	90	110			
Nitrogen, Nitrite (As N)	1.031	mg/L	0.10	103	90	110			
Bromide	2.641	mg/L	0.10	106	90	110			
Nitrogen, Nitrate (As N)	2.509	mg/L	0.10	100	90	110			
Phosphorus, Orthophosphate (As P)	5.416	mg/L	0.50	108	90	110			
Sulfate	10.42	mg/L	0.50	104	90	110			
Sample ID: LCS-2		LCS							
Batch ID:	R32070	Analysis Date:	1/16/2009 3:40:55 PM						
Fluoride	0.5832	mg/L	0.10	117	90	110			S
Chloride	4.974	mg/L	0.10	99.5	90	110			
Nitrogen, Nitrite (As N)	1.054	mg/L	0.10	105	90	110			
Bromide	2.678	mg/L	0.10	107	90	110			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions									
Sample ID: LCS-2		LCS			Batch ID: R32070		Analysis Date:	1/16/2009 3:40:55 PM	
Nitrogen, Nitrate (As N)	2.576	mg/L	0.10	103	90	110			
Phosphorus, Orthophosphate (As P)	5.526	mg/L	0.50	111	90	110			S
Sulfate	10.51	mg/L	0.50	105	90	110			
Sample ID: LCS		LCS			Batch ID: R32089		Analysis Date:	1/19/2009 11:05:02 AM	
Fluoride	0.4963	mg/L	0.10	99.3	90	110			
Chloride	4.931	mg/L	0.10	98.6	90	110			
Nitrogen, Nitrite (As N)	1.001	mg/L	0.10	100	90	110			
Bromide	2.635	mg/L	0.10	105	90	110			
Nitrogen, Nitrate (As N)	2.477	mg/L	0.10	99.1	90	110			
Phosphorus, Orthophosphate (As P)	5.235	mg/L	0.50	105	90	110			
Sulfate	10.28	mg/L	0.50	103	90	110			
Sample ID: LCS		LCS			Batch ID: R32123		Analysis Date:	1/21/2009 9:43:53 AM	
Fluoride	0.5204	mg/L	0.10	104	90	110			
Chloride	4.865	mg/L	0.10	97.3	90	110			
Nitrogen, Nitrite (As N)	0.9892	mg/L	0.10	98.9	90	110			
Bromide	2.577	mg/L	0.10	103	90	110			
Nitrogen, Nitrate (As N)	2.457	mg/L	0.10	98.3	90	110			
Phosphorus, Orthophosphate (As P)	5.110	mg/L	0.50	102	90	110			
Sulfate	10.19	mg/L	0.50	102	90	110			
Sample ID: LCS		LCS			Batch ID: R32152		Analysis Date:	1/23/2009 9:37:46 AM	
Fluoride	0.5090	mg/L	0.10	102	90	110			
Chloride	4.818	mg/L	0.10	96.4	90	110			
Bromide	2.529	mg/L	0.10	101	90	110			
Nitrate (As N)+Nitrite (As N)	3.423	mg/L	0.20	97.8	90	110			
Phosphorus, Orthophosphate (As P)	4.953	mg/L	0.50	99.1	90	110			
Sulfate	9.935	mg/L	0.50	99.3	90	110			
Sample ID: LCS		LCS			Batch ID: R32170		Analysis Date:	1/26/2009 9:44:04 AM	
Fluoride	0.4851	mg/L	0.10	97.0	90	110			
Chloride	4.642	mg/L	0.10	92.8	90	110			
Bromide	2.459	mg/L	0.10	98.3	90	110			
Nitrate (As N)+Nitrite (As N)	3.251	mg/L	0.20	92.9	90	110			
Phosphorus, Orthophosphate (As P)	4.699	mg/L	0.50	94.0	90	110			
Sulfate	9.696	mg/L	0.50	97.0	90	110			
Sample ID: LCS		LCS			Batch ID: R32175		Analysis Date:	1/26/2009 10:10:34 AM	
Fluoride	0.5247	mg/L	0.10	105	90	110			
Chloride	4.893	mg/L	0.10	97.9	90	110			
Bromide	2.404	mg/L	0.10	96.2	90	110			
Nitrate (As N)+Nitrite (As N)	3.335	mg/L	0.20	95.3	90	110			
Phosphorus, Orthophosphate (As P)	5.254	mg/L	0.50	105	90	110			
Sulfate	9.700	mg/L	0.50	97.0	90	110			
Sample ID: LCS		LCS			Batch ID: R32180		Analysis Date:	1/27/2009 10:18:02 AM	
Fluoride	0.5198	mg/L	0.10	104	90	110			
Chloride	4.841	mg/L	0.10	96.8	90	110			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions									
Sample ID: LCS		LCS							
					Batch ID: R32180		Analysis Date:		1/27/2009 10:18:02 AM
Bromide	2.578	mg/L	0.10	103	90	110			
Nitrate (As N)+Nitrite (As N)	3.410	mg/L	0.20	97.4	90	110			
Phosphorus, Orthophosphate (As P)	5.082	mg/L	0.50	102	90	110			
Sulfate	10.20	mg/L	0.50	102	90	110			
Sample ID: LCS		LCS							
					Batch ID: R32206		Analysis Date:		1/28/2009 8:43:44 AM
Fluoride	0.5296	mg/L	0.10	106	90	110			
Chloride	4.769	mg/L	0.10	95.4	90	110			
Bromide	2.435	mg/L	0.10	97.4	90	110			
Nitrate (As N)+Nitrite (As N)	3.411	mg/L	0.20	97.4	90	110			
Phosphorus, Orthophosphate (As P)	5.094	mg/L	0.50	102	90	110			
Sulfate	10.13	mg/L	0.50	101	90	110			
Sample ID: LCS-2		LCS							
					Batch ID: R32206		Analysis Date:		1/29/2009 3:52:50 AM
Fluoride	0.5294	mg/L	0.10	106	90	110			
Chloride	4.819	mg/L	0.10	96.4	90	110			
Bromide	2.476	mg/L	0.10	99.0	90	110			
Nitrate (As N)+Nitrite (As N)	3.443	mg/L	0.20	98.4	90	110			
Phosphorus, Orthophosphate (As P)	5.073	mg/L	0.50	101	90	110			
Sulfate	10.12	mg/L	0.50	101	90	110			
Method: SM 2320B: Alkalinity									
Sample ID: MB-R32099		MBLK							
					Batch ID: R32099		Analysis Date:		1/20/2009
Alkalinity, Total (As CaCO ₃)	ND	mg/L CaC	20						
Carbonate	ND	mg/L CaC	2.0						
Bicarbonate	ND	mg/L CaC	20						
Sample ID: MB		MBLK							
					Batch ID: R32142		Analysis Date:		1/22/2009
Alkalinity, Total (As CaCO ₃)	ND	mg/L CaC	20						
Carbonate	ND	mg/L CaC	2.0						
Bicarbonate	ND	mg/L CaC	20						
Sample ID: LCS-R32099		LCS							
					Batch ID: R32099		Analysis Date:		1/20/2009
Alkalinity, Total (As CaCO ₃)	83.00	mg/L CaC	20	101	80	120			
Sample ID: LCS		LCS							
					Batch ID: R32142		Analysis Date:		1/22/2009
Alkalinity, Total (As CaCO ₃)	84.00	mg/L CaC	20	103	80	120			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8310: PAHs

Sample ID: MB-18113

MBLK

Batch ID: 18113 Analysis Date: 1/20/2009 7:43:26 PM

Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	2.0
2-Methylnaphthalene	ND	µg/L	2.0
Acenaphthylene	ND	µg/L	2.5
Acenaphthene	ND	µg/L	5.0
Fluorene	ND	µg/L	0.80
Phenanthrene	ND	µg/L	0.60
Anthracene	ND	µg/L	0.80
Fluoranthene	ND	µg/L	0.30
Pyrene	ND	µg/L	0.30
Benz(a)anthracene	ND	µg/L	0.070
Chrysene	ND	µg/L	0.20
Benzo(b)fluoranthene	ND	µg/L	0.10
Benzo(k)fluoranthene	ND	µg/L	0.070
Benzo(a)pyrene	ND	µg/L	0.070
Dibenz(a,h)anthracene	ND	µg/L	0.070
Benzo(g,h,i)perylene	ND	µg/L	0.080
Indeno(1,2,3-cd)pyrene	ND	µg/L	0.080

Sample ID: LCS-18113

LCS

Batch ID: 18113 Analysis Date: 1/20/2009 8:03:38 PM

Naphthalene	54.66	µg/L	2.0	68.3	31.5	90.7
1-Methylnaphthalene	57.28	µg/L	2.0	71.4	32.5	93.3
2-Methylnaphthalene	56.72	µg/L	2.0	70.9	32.8	89.6
Acenaphthylene	61.44	µg/L	2.5	76.6	37.8	92.4
Acenaphthene	64.53	µg/L	5.0	80.7	38.6	93.9
Fluorene	4.850	µg/L	0.80	60.5	38	95.5
Phenanthrene	3.020	µg/L	0.60	75.1	32.9	107
Anthracene	2.830	µg/L	0.60	70.4	35.2	98.3
Fluoranthene	6.400	µg/L	0.30	79.8	36.4	104
Pyrene	4.770	µg/L	0.30	59.5	37.1	102
Benz(a)anthracene	0.6300	µg/L	0.070	78.6	33.7	101
Chrysene	3.230	µg/L	0.20	80.3	35.2	96.1
Benzo(b)fluoranthene	0.7800	µg/L	0.10	77.8	33.6	94.2
Benzo(k)fluoranthene	0.4100	µg/L	0.070	82.0	25.4	110
Benzo(a)pyrene	0.4200	µg/L	0.070	83.7	26.9	102
Dibenz(a,h)anthracene	0.8100	µg/L	0.070	80.6	40.7	92.1
Benzo(g,h,i)perylene	0.7600	µg/L	0.080	76.0	24.3	109
Indeno(1,2,3-cd)pyrene	1.460	µg/L	0.080	72.9	42.6	99.9

Sample ID: LCSD-18113

LCSD

Batch ID: 18113 Analysis Date: 1/20/2009 8:23:50 PM

Naphthalene	45.72	µg/L	2.0	57.2	31.5	90.7	17.8	32.1
1-Methylnaphthalene	49.30	µg/L	2.0	61.5	32.5	93.3	15.0	32.7
2-Methylnaphthalene	47.41	µg/L	2.0	59.3	32.8	89.6	17.9	34
Acenaphthylene	48.33	µg/L	2.5	60.3	37.8	92.4	23.9	38.8
Acenaphthene	51.01	µg/L	5.0	63.8	38.6	93.9	23.4	38.6
Fluorene	3.860	µg/L	0.80	48.1	38	95.5	22.7	29.3

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 8310: PAHs									
Sample ID: LCSD-18113									
		LCSD			Batch ID: 18113		Analysis Date: 1/20/2009 8:23:50 PM		
Phenanthrene	2.450	µg/L	0.60	60.9	32.9	107	20.8	25	
Anthracene	2.050	µg/L	0.60	51.0	35.2	98.3	32.0	23.9	R
Fluoranthene	4.760	µg/L	0.30	59.4	36.4	104	29.4	15.7	R
Pyrene	3.690	µg/L	0.30	46.0	37.1	102	25.5	15.3	R
Benz(a)anthracene	0.4700	µg/L	0.070	56.6	33.7	101	29.1	19	R
Chrysene	2.430	µg/L	0.20	60.4	35.2	96.1	28.3	16.6	R
Benzo(b)fluoranthene	0.5800	µg/L	0.10	57.9	33.6	94.2	29.4	21.7	R
Benzo(k)fluoranthene	0.2900	µg/L	0.070	58.0	25.4	110	34.3	19.4	R
Benzo(a)pyrene	0.3100	µg/L	0.070	61.8	26.9	102	30.1	16.7	R
Dibenz(a,h)anthracene	0.6100	µg/L	0.070	60.9	40.7	92.1	28.2	17.3	R
Benzo(g,h,i)perylene	0.5600	µg/L	0.080	56.0	24.3	109	30.3	18	R
Indeno(1,2,3-cd)pyrene	1.100	µg/L	0.080	54.9	42.6	99.9	28.1	17.7	R

Method: SM 2540 C: Total Dissolved Solids

Sample ID: MBLK-18115									
		MBLK			Batch ID: 18115		Analysis Date: 1/19/2009		
Total Dissolved Solids	ND	mg/L	20						
Sample ID: LCS-18115									
		LCS			Batch ID: 18115		Analysis Date: 1/19/2009		
Total Dissolved Solids	1011	mg/L	20	101	80	120			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 0901240-01A MSD

MSD

Batch ID: R32059 Analysis Date: 1/17/2009 6:59:26 AM

Benzene	20.11	µg/L	1.0	101	84.9	122	0.879	15
Toluene	18.42	µg/L	1.0	92.1	80.3	114	0.884	15
Chlorobenzene	19.46	µg/L	1.0	97.3	71.9	134	1.86	15
1,1-Dichloroethene	22.37	µg/L	1.0	112	88	144	1.53	17.8
Trichloroethene (TCE)	20.43	µg/L	1.0	102	87.1	114	1.19	19.8

Sample ID: 5ml rb

MBLK

Batch ID: R32059 Analysis Date: 1/16/2009 8:37:15 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropene	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 1

Hall Environmental Analysis Laboratory, Inc.

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb **MBLK**

Batch ID: R32059 **Analysis Date:** 1/16/2009 8:37:15 AM

2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b5 **MBLK**

Batch ID: R32059 **Analysis Date:** 1/16/2009 8:33:56 PM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b5

MBLK

Batch ID: R32059 Analysis Date: 1/16/2009 8:33:56 PM

2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 3

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901240

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b5 *MBLK*

Batch ID: R32059 **Analysis Date:** 1/16/2009 8:33:56 PM

Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng lcs *LCS*

Batch ID: R32059 **Analysis Date:** 1/16/2009 9:34:07 AM

Benzene	19.45	µg/L	1.0	97.3	88	116
Toluene	18.09	µg/L	1.0	90.4	82.9	112
Chlorobenzene	19.41	µg/L	1.0	97.0	71.4	133
1,1-Dichloroethene	20.80	µg/L	1.0	104	97.9	140
Trichloroethene (TCE)	19.84	µg/L	1.0	99.2	90.5	112

Sample ID: 100ng lcs *LCS*

Batch ID: R32059 **Analysis Date:** 1/16/2009 9:30:50 PM

Benzene	20.45	µg/L	1.0	102	88	116
Toluene	18.80	µg/L	1.0	94.0	82.9	112
Chlorobenzene	19.81	µg/L	1.0	99.1	71.4	133
1,1-Dichloroethene	22.98	µg/L	1.0	115	97.9	140
Trichloroethene (TCE)	20.41	µg/L	1.0	102	90.5	112

Sample ID: 0901240-01A MS *MS*

Batch ID: R32059 **Analysis Date:** 1/17/2009 6:30:59 AM

Benzene	19.93	µg/L	1.0	99.7	84.9	122
Toluene	18.26	µg/L	1.0	91.3	80.3	114
Chlorobenzene	19.82	µg/L	1.0	99.1	71.9	134
1,1-Dichloroethene	22.72	µg/L	1.0	114	88	144
Trichloroethene (TCE)	20.19	µg/L	1.0	101	87.1	114

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name WESTERN REFINING SOUT

Date Received:

1/16/2009

Work Order Number 0901240

Received by:

TLS

Checklist completed by:

Signature

Sample ID labels checked by:

Initials

Matrix:

Carrier name Greyhound

Shipping container/cooler in good condition?

Yes ☒No ☐Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☒No ☐Not Present ☐Not Shipped ☐

Custody seals intact on sample bottles?

Yes ☐No ☐N/A ☒

Chain of custody present?

Yes ☒No ☐

Chain of custody signed when relinquished and received?

Yes ☒No ☐

Chain of custody agrees with sample labels?

Yes ☒No ☐

Samples in proper container/bottle?

Yes ☒No ☐

Sample containers intact?

Yes ☒No ☐

Sufficient sample volume for indicated test?

Yes ☒No ☐

All samples received within holding time?

Yes ☒No ☐

Water - VOA vials have zero headspace?

No VOA vials submitted ☐Yes ☒No ☐

Water - Preservation labels on bottle and cap match?

Yes ☒No ☐N/A ☐

Water - pH acceptable upon receipt?

Yes ☒No ☐N/A ☐

Container/Temp Blank temperature?

3°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted

Date contacted:

Person contacted

Contacted by:

Regarding:

Comments:

As per AA analysis requested is 8260, cation/anion balance, RECA8 metals, 8310. AS 1/16 for GBR 48 + GBR 50

no 8310 Analysis for GRW-3 & GRW-6 / AA 11/19/09
 Per AA added Fe, Mn to head #50 + LC. Called ESC and
 added test. TS 1/27/09

1/27/09 Requested AA to Re-do LC for samples collected
 on 1/27/14, 15/09 AS

27/1/09

Chain-of-Custody Record

Client: Giant

Contact: Bill Richardson

Mailing Address: 111 CR 4990

Bloomfield NM 87413

Phone #: _____

Email or Fax#: _____

QA/QC Package:

☒ Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

Date	Time	Matrix	Sample Request ID
011309	1237	G-W	GRW-3
011309	1358	G-W	GRW-6
011409	1424	G-W	SHS-19
011409	1640	G-W	SHS-1
011309	0700	G-W	trip blank

Date: 011609 Time: 8:30

Date: _____ Time: _____

Relinquished by: Troy Urban

Relinquished by: _____

Turn-Around Time:

☒ Standard ☐ Rush

Project Name: Giant Former Refinery

Giant Bloomfield Refinery

Project #: _____

Project Manager: Ashley Ager

970-946-1093

Sampler: Troy Urban

On Ice ☒ Dry ☐ No _____

Sample Temperature: 3

Container Type and #	Preservative Type	HEAT No
6 total	HCl, None H ₂ SO ₄	10
6 total	HCl, None H ₂ SO ₄	11
5 total	HCl, None H ₂ SO ₄	12
5 total	HCl, None H ₂ SO ₄	13
2	HCl	14

Received by: [Signature] Date: 1/16/09 Time: _____

Received by: _____ Date: _____ Time: _____



HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

BTEX + MTBE + TMBs (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	BA10 (PMA or PAH) (8015)	RCRA 8 Metals	Anions (F, Cl, NO ₃ , NO ₂ , PO ₄ , SO ₄)	8081 Pesticides / 8082 PCBs	8260B (VOA)	8270 (Semi-VOA)	601/602 BTEX	Hardness (Ca, Mg, K, Na, Cl, SO₄)	TPS, ALE, EC, pH	Air Bubbles (Y or N)
											X	X	X	
											X	X	X	
											X	X	X	
											X	X	X	
											X	X	X	

Remarks: please send results to ALA@iodestarservices.com

see checklist for analysis



COVER LETTER

Monday, February 09, 2009

Ashley Ager
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (970) 946-1093
FAX (505) 632-3911

RE: Giant Former Refinery/Giant Bloomfield Refinery

Order No.: 0901286

Dear Ashley Ager:

Hall Environmental Analysis Laboratory, Inc. received 7 sample(s) on 1/21/2009 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", written over a horizontal line.

Andy Freeman, Business Manager
Nancy McDuffie, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

www.hallenvironmental.com

Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0901286
Project: Giant Former Refinery/Giant Bloomfield Refiner
Lab ID: 0901286-01

Client Sample ID: GBR-24D
Collection Date: 1/20/2009 8:37:00 AM
Date Received: 1/21/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	ND	2.0		µg/L	1	1/28/2009 2:34:31 PM
1-Methylnaphthalene	ND	2.0		µg/L	1	1/28/2009 2:34:31 PM
2-Methylnaphthalene	ND	2.0		µg/L	1	1/28/2009 2:34:31 PM
Acenaphthylene	ND	2.5		µg/L	1	1/28/2009 2:34:31 PM
Acenaphthene	ND	5.0		µg/L	1	1/28/2009 2:34:31 PM
Fluorene	ND	0.80		µg/L	1	1/28/2009 2:34:31 PM
Phenanthrene	ND	0.80		µg/L	1	1/28/2009 2:34:31 PM
Anthracene	ND	0.60		µg/L	1	1/28/2009 2:34:31 PM
Fluoranthene	ND	0.30		µg/L	1	1/28/2009 2:34:31 PM
Pyrene	ND	0.30		µg/L	1	1/28/2009 2:34:31 PM
Benz(a)anthracene	ND	0.070		µg/L	1	1/28/2009 2:34:31 PM
Chrysene	ND	0.20		µg/L	1	1/28/2009 2:34:31 PM
Benzo(b)fluoranthene	ND	0.10		µg/L	1	1/28/2009 2:34:31 PM
Benzo(k)fluoranthene	ND	0.070		µg/L	1	1/28/2009 2:34:31 PM
Benzo(a)pyrene	ND	0.070		µg/L	1	1/28/2009 2:34:31 PM
Dibenz(a,h)anthracene	ND	0.070		µg/L	1	1/28/2009 2:34:31 PM
Benzo(g,h,i)perylene	ND	0.080		µg/L	1	1/28/2009 2:34:31 PM
Indeno(1,2,3-cd)pyrene	ND	0.080		µg/L	1	1/28/2009 2:34:31 PM
Surr: Benzo(e)pyrene	70.2	44.8-104		%REC	1	1/28/2009 2:34:31 PM
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.98	0.10		mg/L	1	1/22/2009 1:23:07 PM
Chloride	230	1.0		mg/L	10	1/23/2009 4:52:38 PM
Bromide	1.2	0.10		mg/L	1	1/22/2009 1:23:07 PM
Nitrate (As N)+Nitrite (As N)	ND	1.0		mg/L	5	1/22/2009 1:05:42 PM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	1/22/2009 1:23:07 PM
Sulfate	2100	25		mg/L	50	1/23/2009 5:10:03 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	1.5	1.0		µg/L	1	1/23/2009 7:04:56 AM
Toluene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Ethylbenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2-Dichloroethane (EDC)	1.1	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Naphthalene	ND	2.0		µg/L	1	1/23/2009 7:04:56 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/23/2009 7:04:56 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/23/2009 7:04:56 AM
Acetone	13	10		µg/L	1	1/23/2009 7:04:56 AM
Bromobenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 1 of 20

Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GBR-24D
Lab Order: 0901286 **Collection Date:** 1/20/2009 8:37:00 AM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/21/2009
Lab ID: 0901286-01 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Bromodichloromethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Bromoform	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Bromomethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
2-Butanone	ND	10		µg/L	1	1/23/2009 7:04:56 AM
Carbon disulfide	ND	10		µg/L	1	1/23/2009 7:04:56 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Chlorobenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Chloroethane	ND	2.0		µg/L	1	1/23/2009 7:04:56 AM
Chloroform	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Chloromethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
2-Chlorotoluene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
4-Chlorotoluene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
cis-1,2-DCE	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/23/2009 7:04:56 AM
Dibromochloromethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Dibromomethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/23/2009 7:04:56 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
2-Hexanone	ND	10		µg/L	1	1/23/2009 7:04:56 AM
Isopropylbenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/23/2009 7:04:56 AM
Methylene Chloride	ND	3.0		µg/L	1	1/23/2009 7:04:56 AM
n-Butylbenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
n-Propylbenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
sec-Butylbenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Styrene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
tert-Butylbenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,1,1,2-Tetrachloroethane	ND	2.0		µg/L	1	1/23/2009 7:04:56 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
trans-1,2-DCE	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	GBR-24D
Lab Order:	0901286	Collection Date:	1/20/2009 8:37:00 AM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/21/2009
Lab ID:	0901286-01	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/23/2009 7:04:56 AM
Vinyl chloride	ND	1.0		µg/L	1	1/23/2009 7:04:56 AM
Xylenes, Total	1.8	1.5		µg/L	1	1/23/2009 7:04:56 AM
Surr: 1,2-Dichloroethane-d4	113	68.1-123		%REC	1	1/23/2009 7:04:56 AM
Surr: 4-Bromofluorobenzene	104	53.2-145		%REC	1	1/23/2009 7:04:56 AM
Surr: Dibromofluoromethane	97.6	68.5-119		%REC	1	1/23/2009 7:04:56 AM
Surr: Toluene-d8	100	64-131		%REC	1	1/23/2009 7:04:56 AM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	230	20		mg/L CaCO3	1	2/2/2009
Carbonate	ND	2.0		mg/L CaCO3	1	2/2/2009
Bicarbonate	230	20		mg/L CaCO3	1	2/2/2009
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	3900	0.010		µmhos/cm	1	1/27/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.33	0.1		pH units	1	1/23/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	3100	200		mg/L	1	1/22/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-32**Lab Order:** 0901286**Collection Date:** 1/20/2009 12:36:00 PM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-02**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.57	0.10		mg/L	1	1/22/2009 11:21:15 AM
Chloride	530	5.0		mg/L	50	1/23/2009 3:43:00 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/22/2009 11:21:15 AM
Bromide	1.3	0.10		mg/L	1	1/22/2009 11:21:15 AM
Nitrogen, Nitrate (As N)	2.0	0.10		mg/L	1	1/22/2009 11:21:15 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	1/22/2009 11:21:15 AM
Sulfate	2100	25		mg/L	50	1/23/2009 3:43:00 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Toluene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Ethylbenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Naphthalene	ND	2.0		µg/L	1	1/22/2009 2:25:41 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 2:25:41 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 2:25:41 PM
Acetone	ND	10		µg/L	1	1/22/2009 2:25:41 PM
Bromobenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Bromoform	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Bromomethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
2-Butanone	ND	10		µg/L	1	1/22/2009 2:25:41 PM
Carbon disulfide	ND	10		µg/L	1	1/22/2009 2:25:41 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Chlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Chloroethane	ND	2.0		µg/L	1	1/22/2009 2:25:41 PM
Chloroform	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Chloromethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/22/2009 2:25:41 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Dibromomethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-32**Lab Order:** 0901286**Collection Date:** 1/20/2009 12:36:00 PM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-02**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/22/2009 2:25:41 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
2-Hexanone	ND	10		µg/L	1	1/22/2009 2:25:41 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/22/2009 2:25:41 PM
Methylene Chloride	ND	3.0		µg/L	1	1/22/2009 2:25:41 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Styrene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/22/2009 2:25:41 PM
Tetrachloroethene (PCE)	1.3	1.0		µg/L	1	1/22/2009 2:25:41 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/22/2009 2:25:41 PM
Vinyl chloride	ND	1.0		µg/L	1	1/22/2009 2:25:41 PM
Xylenes, Total	ND	1.5		µg/L	1	1/22/2009 2:25:41 PM
Surr: 1,2-Dichloroethane-d4	105	68.1-123		%REC	1	1/22/2009 2:25:41 PM
Surr: 4-Bromofluorobenzene	99.9	53.2-145		%REC	1	1/22/2009 2:25:41 PM
Surr: Dibromofluoromethane	105	68.5-119		%REC	1	1/22/2009 2:25:41 PM
Surr: Toluene-d8	110	64-131		%REC	1	1/22/2009 2:25:41 PM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	350	20		mg/L CaCO3	1	2/2/2009
Carbonate	ND	2.0		mg/L CaCO3	1	2/2/2009
Bicarbonate	350	20		mg/L CaCO3	1	2/2/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-32**Lab Order:** 0901286**Collection Date:** 1/20/2009 12:36:00 PM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-02**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
Analyst: KMS						
EPA 120.1: SPECIFIC CONDUCTANCE						
Specific Conductance	5000	0.010		µmhos/cm	1	1/27/2009
Analyst: KMS						
SM4500-H+B: PH						
pH	7.57	0.1		pH units	1	1/29/2009
Analyst: KMS						
SM 2540 C: TOTAL DISSOLVED SOLIDS						
Total Dissolved Solids	4100	200		mg/L	1	1/22/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.

Client Sample ID: Trip Blank

Lab Order: 0901286

Collection Date:

Project: Giant Former Refinery/Giant Bloomfield Refiner

Date Received: 1/21/2009

Lab ID: 0901286-03

Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Toluene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Ethylbenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Naphthalene	ND	2.0		µg/L	1	1/22/2009 2:54:31 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 2:54:31 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 2:54:31 PM
Acetone	ND	10		µg/L	1	1/22/2009 2:54:31 PM
Bromobenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Bromoform	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Bromomethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
2-Butanone	ND	10		µg/L	1	1/22/2009 2:54:31 PM
Carbon disulfide	ND	10		µg/L	1	1/22/2009 2:54:31 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Chlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Chloroethane	ND	2.0		µg/L	1	1/22/2009 2:54:31 PM
Chloroform	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Chloromethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/22/2009 2:54:31 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Dibromomethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/22/2009 2:54:31 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
2-Hexanone	ND	10		µg/L	1	1/22/2009 2:54:31 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** Trip Blank**Lab Order:** 0901286**Collection Date:****Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-03**Matrix:** TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/22/2009 2:54:31 PM
Methylene Chloride	ND	3.0		µg/L	1	1/22/2009 2:54:31 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Styrene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/22/2009 2:54:31 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/22/2009 2:54:31 PM
Vinyl chloride	ND	1.0		µg/L	1	1/22/2009 2:54:31 PM
Xylenes, Total	ND	1.5		µg/L	1	1/22/2009 2:54:31 PM
Surr: 1,2-Dichloroethane-d4	103	68.1-123		%REC	1	1/22/2009 2:54:31 PM
Surr: 4-Bromofluorobenzene	110	53.2-145		%REC	1	1/22/2009 2:54:31 PM
Surr: Dibromofluoromethane	96.5	68.5-119		%REC	1	1/22/2009 2:54:31 PM
Surr: Toluene-d8	106	64-131		%REC	1	1/22/2009 2:54:31 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0901286
Project: Giant Former Refinery/Giant Bloomfield Refiner
Lab ID: 0901286-04

Client Sample ID: GBR-17
Collection Date: 1/20/2009 11:02:00 AM
Date Received: 1/21/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	ND	2.0		µg/L	1	1/28/2009 2:54:50 PM
1-Methylnaphthalene	ND	2.0		µg/L	1	1/28/2009 2:54:50 PM
2-Methylnaphthalene	ND	2.0		µg/L	1	1/28/2009 2:54:50 PM
Acenaphthylene	ND	2.5		µg/L	1	1/28/2009 2:54:50 PM
Acenaphthene	ND	5.0		µg/L	1	1/28/2009 2:54:50 PM
Fluorene	ND	0.80		µg/L	1	1/28/2009 2:54:50 PM
Phenanthrene	ND	0.60		µg/L	1	1/28/2009 2:54:50 PM
Anthracene	ND	0.60		µg/L	1	1/28/2009 2:54:50 PM
Fluoranthene	ND	0.30		µg/L	1	1/28/2009 2:54:50 PM
Pyrene	ND	0.30		µg/L	1	1/28/2009 2:54:50 PM
Benz(a)anthracene	ND	0.070		µg/L	1	1/28/2009 2:54:50 PM
Chrysene	ND	0.20		µg/L	1	1/28/2009 2:54:50 PM
Benzo(b)fluoranthene	ND	0.10		µg/L	1	1/28/2009 2:54:50 PM
Benzo(k)fluoranthene	ND	0.070		µg/L	1	1/28/2009 2:54:50 PM
Benzo(a)pyrene	ND	0.070		µg/L	1	1/28/2009 2:54:50 PM
Dibenz(a,h)anthracene	ND	0.070		µg/L	1	1/28/2009 2:54:50 PM
Benzo(g,h,i)perylene	ND	0.080		µg/L	1	1/28/2009 2:54:50 PM
Indeno(1,2,3-cd)pyrene	ND	0.080		µg/L	1	1/28/2009 2:54:50 PM
Surr: Benzo(e)pyrene	71.8	44.8-104		%REC	1	1/28/2009 2:54:50 PM
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.76	0.10		mg/L	1	1/22/2009 10:11:37 AM
Chloride	40	0.10		mg/L	1	1/22/2009 10:11:37 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/22/2009 10:11:37 AM
Bromide	0.22	0.10		mg/L	1	1/22/2009 10:11:37 AM
Nitrogen, Nitrate (As N)	3.9	0.10		mg/L	1	1/22/2009 10:11:37 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	1/22/2009 10:11:37 AM
Sulfate	1200	10		mg/L	20	1/23/2009 3:08:11 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Toluene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Ethylbenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Naphthalene	ND	2.0		µg/L	1	1/22/2009 3:23:20 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 3:23:20 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 3:23:20 PM
Acetone	ND	10		µg/L	1	1/22/2009 3:23:20 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-17**Lab Order:** 0901286**Collection Date:** 1/20/2009 11:02:00 AM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-04**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Bromobenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Bromoform	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Bromomethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
2-Butanone	ND	10		µg/L	1	1/22/2009 3:23:20 PM
Carbon disulfide	ND	10		µg/L	1	1/22/2009 3:23:20 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Chlorobenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Chloroethane	ND	2.0		µg/L	1	1/22/2009 3:23:20 PM
Chloroform	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Chloromethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/22/2009 3:23:20 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Dibromomethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/22/2009 3:23:20 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
2-Hexanone	ND	10		µg/L	1	1/22/2009 3:23:20 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/22/2009 3:23:20 PM
Methylene Chloride	ND	3.0		µg/L	1	1/22/2009 3:23:20 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Styrene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/22/2009 3:23:20 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-17**Lab Order:** 0901286**Collection Date:** 1/20/2009 11:02:00 AM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-04**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
trans-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/22/2009 3:23:20 PM
Vinyl chloride	ND	1.0		µg/L	1	1/22/2009 3:23:20 PM
Xylenes, Total	ND	1.5		µg/L	1	1/22/2009 3:23:20 PM
Surr: 1,2-Dichloroethane-d4	104	68.1-123		%REC	1	1/22/2009 3:23:20 PM
Surr: 4-Bromofluorobenzene	97.6	53.2-145		%REC	1	1/22/2009 3:23:20 PM
Surr: Dibromofluoromethane	96.9	68.5-119		%REC	1	1/22/2009 3:23:20 PM
Surr: Toluene-d8	110	64-131		%REC	1	1/22/2009 3:23:20 PM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	210	20		mg/L CaCO3	1	2/2/2009
Carbonate	ND	2.0		mg/L CaCO3	1	2/2/2009
Bicarbonate	210	20		mg/L CaCO3	1	2/2/2009
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	2300	0.010		µmhos/cm	1	1/27/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.39	0.1		pH units	1	1/23/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	1800	200		mg/L	1	1/22/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-30**Lab Order:** 0901286**Collection Date:** 1/20/2009 10:03:00 AM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-05**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	ND	2.0		µg/L	1	1/28/2009 3:15:05 PM
1-Methylnaphthalene	ND	2.0		µg/L	1	1/28/2009 3:15:05 PM
2-Methylnaphthalene	ND	2.0		µg/L	1	1/28/2009 3:15:05 PM
Acenaphthylene	ND	2.5		µg/L	1	1/28/2009 3:15:05 PM
Acenaphthene	ND	5.0		µg/L	1	1/28/2009 3:15:05 PM
Fluorene	ND	0.80		µg/L	1	1/28/2009 3:15:05 PM
Phenanthrene	ND	0.60		µg/L	1	1/28/2009 3:15:05 PM
Anthracene	ND	0.80		µg/L	1	1/28/2009 3:15:05 PM
Fluoranthene	ND	0.30		µg/L	1	1/28/2009 3:15:05 PM
Pyrene	ND	0.30		µg/L	1	1/28/2009 3:15:05 PM
Benz(a)anthracene	ND	0.070		µg/L	1	1/28/2009 3:15:05 PM
Chrysene	ND	0.20		µg/L	1	1/28/2009 3:15:05 PM
Benzo(b)fluoranthene	ND	0.10		µg/L	1	1/28/2009 3:15:05 PM
Benzo(k)fluoranthene	ND	0.070		µg/L	1	1/28/2009 3:15:05 PM
Benzo(a)pyrene	ND	0.070		µg/L	1	1/28/2009 3:15:05 PM
Dibenz(a,h)anthracene	ND	0.070		µg/L	1	1/28/2009 3:15:05 PM
Benzo(g,h,i)perylene	ND	0.080		µg/L	1	1/28/2009 3:15:05 PM
Indeno(1,2,3-cd)pyrene	ND	0.080		µg/L	1	1/28/2009 3:15:05 PM
Surr: Benzo(e)pyrene	82.7	44.8-104		%REC	1	1/28/2009 3:15:05 PM
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.74	0.10		mg/L	1	1/22/2009 9:38:48 AM
Chloride	270	1.0		mg/L	10	1/22/2009 9:54:12 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/22/2009 9:36:48 AM
Bromide	0.96	0.10		mg/L	1	1/22/2009 9:36:48 AM
Nitrogen, Nitrate (As N)	0.85	0.10		mg/L	1	1/22/2009 9:36:48 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	1/22/2009 9:36:48 AM
Sulfate	1700	25		mg/L	50	1/23/2009 2:50:47 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Toluene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Ethylbenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Naphthalene	ND	2.0		µg/L	1	1/22/2009 4:50:55 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 4:50:55 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 4:50:55 PM
Acetone	ND	10		µg/L	1	1/22/2009 4:50:55 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-30**Lab Order:** 0901286**Collection Date:** 1/20/2009 10:03:00 AM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-05**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Bromobenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Bromoform	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Bromomethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
2-Butanone	ND	10		µg/L	1	1/22/2009 4:50:55 PM
Carbon disulfide	ND	10		µg/L	1	1/22/2009 4:50:55 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Chlorobenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Chloroethane	ND	2.0		µg/L	1	1/22/2009 4:50:55 PM
Chloroform	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Chloromethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/22/2009 4:50:55 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Dibromomethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/22/2009 4:50:55 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
2-Hexanone	ND	10		µg/L	1	1/22/2009 4:50:55 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/22/2009 4:50:55 PM
Methylene Chloride	ND	3.0		µg/L	1	1/22/2009 4:50:55 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Styrene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/22/2009 4:50:55 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-30**Lab Order:** 0901286**Collection Date:** 1/20/2009 10:03:00 AM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-05**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
trans-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/22/2009 4:50:55 PM
Vinyl chloride	ND	1.0		µg/L	1	1/22/2009 4:50:55 PM
Xylenes, Total	1.8	1.5		µg/L	1	1/22/2009 4:50:55 PM
Surr: 1,2-Dichloroethane-d4	106	68.1-123		%REC	1	1/22/2009 4:50:55 PM
Surr: 4-Bromofluorobenzene	99.6	53.2-145		%REC	1	1/22/2009 4:50:55 PM
Surr: Dibromofluoromethane	92.7	68.5-119		%REC	1	1/22/2009 4:50:55 PM
Surr: Toluene-d8	100	64-131		%REC	1	1/22/2009 4:50:55 PM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	260	20		mg/L CaCO3	1	2/2/2009
Carbonate	ND	2.0		mg/L CaCO3	1	2/2/2009
Bicarbonate	260	20		mg/L CaCO3	1	2/2/2009
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	3700	0.010		µmhos/cm	1	1/27/2009
SM4500-H+B: PH						Analyst: KMS
pH	7.26	0.1		pH units	1	1/23/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	3200	200		mg/L	1	1/22/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-31**Lab Order:** 0901286**Collection Date:** 1/20/2009 1:38:00 PM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-06**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	ND	2.0		µg/L	1	1/28/2009 3:35:22 PM
1-Methylnaphthalene	ND	2.0		µg/L	1	1/28/2009 3:35:22 PM
2-Methylnaphthalene	ND	2.0		µg/L	1	1/28/2009 3:35:22 PM
Acenaphthylene	ND	2.5		µg/L	1	1/28/2009 3:35:22 PM
Acenaphthene	ND	5.0		µg/L	1	1/28/2009 3:35:22 PM
Fluorene	ND	0.80		µg/L	1	1/28/2009 3:35:22 PM
Phenanthrene	ND	0.60		µg/L	1	1/28/2009 3:35:22 PM
Anthracene	ND	0.60		µg/L	1	1/28/2009 3:35:22 PM
Fluoranthene	ND	0.30		µg/L	1	1/28/2009 3:35:22 PM
Pyrene	ND	0.30		µg/L	1	1/28/2009 3:35:22 PM
Benz(a)anthracene	ND	0.070		µg/L	1	1/28/2009 3:35:22 PM
Chrysene	ND	0.20		µg/L	1	1/28/2009 3:35:22 PM
Benzo(b)fluoranthene	ND	0.10		µg/L	1	1/28/2009 3:35:22 PM
Benzo(k)fluoranthene	ND	0.070		µg/L	1	1/28/2009 3:35:22 PM
Benzo(a)pyrene	ND	0.070		µg/L	1	1/28/2009 3:35:22 PM
Dibenz(a,h)anthracene	ND	0.070		µg/L	1	1/28/2009 3:35:22 PM
Benzo(g,h,i)perylene	ND	0.080		µg/L	1	1/28/2009 3:35:22 PM
Indeno(1,2,3-cd)pyrene	ND	0.080		µg/L	1	1/28/2009 3:35:22 PM
Surr: Benzo(e)pyrene	83.0	44.8-104		%REC	1	1/28/2009 3:35:22 PM
EPA METHOD 300.0: ANIONS						Analyst: RAGE
Fluoride	0.68	0.10		mg/L	1	1/22/2009 12:30:54 PM
Chloride	83	1.0		mg/L	10	1/22/2009 12:48:18 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/22/2009 12:30:54 PM
Bromide	0.29	0.10		mg/L	1	1/22/2009 12:30:54 PM
Nitrogen, Nitrate (As N)	1.3	0.10		mg/L	1	1/22/2009 12:30:54 PM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	1/22/2009 12:30:54 PM
Sulfate	1700	25		mg/L	50	1/23/2009 4:00:25 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Toluene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Ethylbenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Naphthalene	ND	2.0		µg/L	1	1/22/2009 5:20:15 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 5:20:15 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 5:20:15 PM
Acetone	ND	10		µg/L	1	1/22/2009 5:20:15 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-31**Lab Order:** 0901286**Collection Date:** 1/20/2009 1:38:00 PM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-06**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Bromobenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Bromoform	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Bromomethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
2-Butanone	ND	10		µg/L	1	1/22/2009 5:20:15 PM
Carbon disulfide	ND	10		µg/L	1	1/22/2009 5:20:15 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Chlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Chloroethane	ND	2.0		µg/L	1	1/22/2009 5:20:15 PM
Chloroform	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Chloromethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/22/2009 5:20:15 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Dibromomethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/22/2009 5:20:15 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
2-Hexanone	ND	10		µg/L	1	1/22/2009 5:20:15 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/22/2009 5:20:15 PM
Methylene Chloride	ND	3.0		µg/L	1	1/22/2009 5:20:15 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Styrene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/22/2009 5:20:15 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-31**Lab Order:** 0901286**Collection Date:** 1/20/2009 1:38:00 PM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-06**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
						Analyst: HL
EPA METHOD 8260B: VOLATILES						
trans-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/22/2009 5:20:15 PM
Vinyl chloride	ND	1.0		µg/L	1	1/22/2009 5:20:15 PM
Xylenes, Total	ND	1.5		µg/L	1	1/22/2009 5:20:15 PM
Surr: 1,2-Dichloroethane-d4	99.9	68.1-123		%REC	1	1/22/2009 5:20:15 PM
Surr: 4-Bromofluorobenzene	99.2	53.2-145		%REC	1	1/22/2009 5:20:15 PM
Surr: Dibromofluoromethane	92.7	68.5-119		%REC	1	1/22/2009 5:20:15 PM
Surr: Toluene-d8	101	64-131		%REC	1	1/22/2009 5:20:15 PM
						Analyst: KMS
SM 2320B: ALKALINITY						
Alkalinity, Total (As CaCO3)	230	20		mg/L CaCO3	1	2/2/2009
Carbonate	ND	2.0		mg/L CaCO3	1	2/2/2009
Bicarbonate	230	20		mg/L CaCO3	1	2/2/2009
						Analyst: KMS
EPA 120.1: SPECIFIC CONDUCTANCE						
Specific Conductance	3300	0.010		µmhos/cm	1	1/27/2009
						Analyst: KMS
SM4500-H+B: PH						
pH	7.30	0.1		pH units	1	1/23/2009
						Analyst: KMS
SM 2540 C: TOTAL DISSOLVED SOLIDS						
Total Dissolved Solids	2600	200		mg/L	1	1/22/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** GBR-49**Lab Order:** 0901286**Collection Date:** 1/20/2009 11:40:00 AM**Project:** Giant Former Refinery/Giant Bloomfield Refiner**Date Received:** 1/21/2009**Lab ID:** 0901286-07**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.70	0.10		mg/L	1	1/22/2009 10:46:25 AM
Chloride	280	1.0		mg/L	10	1/22/2009 11:03:50 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	1/22/2009 10:46:25 AM
Bromide	0.74	0.10		mg/L	1	1/22/2009 10:46:25 AM
Nitrogen, Nitrate (As N)	0.11	0.10		mg/L	1	1/22/2009 10:46:25 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	1/22/2009 10:46:25 AM
Sulfate	2100	25		mg/L	50	1/23/2009 3:25:36 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Toluene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Ethylbenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Naphthalene	ND	2.0		µg/L	1	1/22/2009 5:49:30 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 5:49:30 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	1/22/2009 5:49:30 PM
Acetone	ND	10		µg/L	1	1/22/2009 5:49:30 PM
Bromobenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Bromodichloromethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Bromoform	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Bromomethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
2-Butanone	ND	10		µg/L	1	1/22/2009 5:49:30 PM
Carbon disulfide	ND	10		µg/L	1	1/22/2009 5:49:30 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Chlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Chloroethane	ND	2.0		µg/L	1	1/22/2009 5:49:30 PM
Chloroform	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Chloromethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
2-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
4-Chlorotoluene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
cis-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	1/22/2009 5:49:30 PM
Dibromochloromethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Dibromomethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0901286
Project: Giant Former Refinery/Giant Bloomfield Refiner
Lab ID: 0901286-07

Client Sample ID: GBR-49
Collection Date: 1/20/2009 11:40:00 AM
Date Received: 1/21/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	1/22/2009 5:49:30 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
2-Hexanone	ND	10		µg/L	1	1/22/2009 5:49:30 PM
Isopropylbenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	1/22/2009 5:49:30 PM
Methylene Chloride	ND	3.0		µg/L	1	1/22/2009 5:49:30 PM
n-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
n-Propylbenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
sec-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Styrene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
tert-Butylbenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/22/2009 5:49:30 PM
Tetrachloroethene (PCE)	2.4	1.0		µg/L	1	1/22/2009 5:49:30 PM
trans-1,2-DCE	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	1/22/2009 5:49:30 PM
Vinyl chloride	ND	1.0		µg/L	1	1/22/2009 5:49:30 PM
Xylenes, Total	ND	1.5		µg/L	1	1/22/2009 5:49:30 PM
Surr: 1,2-Dichloroethane-d4	104	68.1-123		%REC	1	1/22/2009 5:49:30 PM
Surr: 4-Bromofluorobenzene	98.1	53.2-145		%REC	1	1/22/2009 5:49:30 PM
Surr: Dibromofluoromethane	103	68.5-119		%REC	1	1/22/2009 5:49:30 PM
Surr: Toluene-d8	104	64-131		%REC	1	1/22/2009 5:49:30 PM
SM 2320B: ALKALINITY						Analyst: KMS
Alkalinity, Total (As CaCO3)	240	20		mg/L CaCO3	1	2/2/2009
Carbonate	ND	2.0		mg/L CaCO3	1	2/2/2009
Bicarbonate	240	20		mg/L CaCO3	1	2/2/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 19 of 20

Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT:	Western Refining Southwest, Inc.	Client Sample ID:	GBR-49
Lab Order:	0901286	Collection Date:	1/20/2009 11:40:00 AM
Project:	Giant Former Refinery/Giant Bloomfield Refiner	Date Received:	1/21/2009
Lab ID:	0901286-07	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: KMS
Specific Conductance	4000	0.010		µmhos/cm	1	1/27/2009
SM4500-H+B: PH						Analyst: KMS
pH	6.93	0.1		pH units	1	1/29/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	3300	200		mg/L	1	1/22/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 20 of 20



ENVIRONMENTAL SCIENCE CORP.

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Est. 1970

REPORT OF ANALYSIS

January 30, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

ESC Sample # : L384827-01

Date Received : January 23, 2009
Description : 0901286

Site ID :

Sample ID : GBR-32

Project # : 0901286

Collected By :
Collection Date : 01/20/09 12:36

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Calcium, Dissolved	480	0.50	mg/l	6010B	01/29/09	1
Iron, Dissolved	BDL	0.10	mg/l	6010B	01/29/09	1
Magnesium, Dissolved	50.	0.10	mg/l	6010B	01/29/09	1
Manganese, Dissolved	0.70	0.010	mg/l	6010B	01/29/09	1
Potassium, Dissolved	4.2	0.50	mg/l	6010B	01/29/09	1
Sodium, Dissolved	710	0.50	mg/l	6010B	01/29/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 01/30/09 16:33 Printed: 01/30/09 16:34



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REPORT OF ANALYSIS

January 30, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

Date Received : January 23, 2009
Description : 0901286

Sample ID : GBR-32

Collected By :
Collection Date : 01/20/09 12:36

ESC Sample # : L384827-02

Site ID :

Project # : 0901286

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Mercury	BDL	0.00020	mg/l	7470A	01/29/09	1
Arsenic	BDL	0.020	mg/l	6010B	01/29/09	1
Barium	0.029	0.0050	mg/l	6010B	01/29/09	1
Cadmium	BDL	0.0050	mg/l	6010B	01/29/09	1
Chromium	0.10	0.010	mg/l	6010B	01/29/09	1
Lead	BDL	0.0050	mg/l	6010B	01/29/09	1
Selenium	0.059	0.020	mg/l	6010B	01/29/09	1
Silver	BDL	0.010	mg/l	6010B	01/29/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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REPORT OF ANALYSIS

January 30, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

Date Received : January 23, 2009
Description : 0901286

Sample ID : GBR-49

Collected By :
Collection Date : 01/20/09 11:40

ESC Sample # : L384827-03

Site ID :

Project # : 0901286

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Calcium, Dissolved	420	0.50	mg/l	6010B	01/29/09	1
Iron, Dissolved	1.4	0.10	mg/l	6010B	01/29/09	1
Magnesium, Dissolved	40.	0.10	mg/l	6010B	01/29/09	1
Manganese, Dissolved	3.5	0.010	mg/l	6010B	01/29/09	1
Potassium, Dissolved	2.8	0.50	mg/l	6010B	01/29/09	1
Sodium, Dissolved	540	0.50	mg/l	6010B	01/29/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

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Fax (615) 758-5859

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Est. 1970

REPORT OF ANALYSIS

January 30, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

Date Received : January 23, 2009
Description : 0901286

Sample ID : GBR-49

Collected By :
Collection Date : 01/20/09 11:40

ESC Sample # : L384827-04

Site ID :

Project # : 0901286

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Mercury	BDL	0.00020	mg/l	7470A	01/29/09	1
Arsenic	BDL	0.020	mg/l	6010B	01/29/09	1
Barium	0.021	0.0050	mg/l	6010B	01/29/09	1
Cadmium	BDL	0.0050	mg/l	6010B	01/29/09	1
Chromium	0.056	0.010	mg/l	6010B	01/29/09	1
Lead	BDL	0.0050	mg/l	6010B	01/29/09	1
Selenium	0.047	0.020	mg/l	6010B	01/29/09	1
Silver	BDL	0.010	mg/l	6010B	01/29/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 01/30/09 16:33 Printed: 01/30/09 16:34

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901286

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions									
Sample ID: 0901286-06CMSD	MSD		Batch ID: R32137		Analysis Date: 1/22/2009 2:15:19 PM				
Fluoride	1.105	mg/L	0.10	84.1	65.1	121	1.61	20	
Nitrogen, Nitrite (As N)	1.003	mg/L	0.10	100	52.9	128	2.25	20	
Bromide	2.545	mg/L	0.10	90.2	75.6	132	10.9	20	
Nitrogen, Nitrate (As N)	3.508	mg/L	0.10	86.7	83.8	112	0.360	20	
Nitrate (As N)+Nitrite (As N)	4.512	mg/L	0.20	90.6	78.4	118	0.777	20	
Phosphorus, Orthophosphate (As P)	4.299	mg/L	0.50	86.0	77.6	118	0.116	20	
Sample ID: MB	MBLK		Batch ID: R32137		Analysis Date: 1/22/2009 9:01:59 AM				
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Nitrogen, Nitrite (As N)	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrogen, Nitrate (As N)	ND	mg/L	0.10						
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: MB	MBLK		Batch ID: R32155		Analysis Date: 1/23/2009 9:54:47 AM				
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Nitrogen, Nitrite (As N)	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrogen, Nitrate (As N)	ND	mg/L	0.10						
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: LCS	LCS		Batch ID: R32137		Analysis Date: 1/22/2009 9:19:24 AM				
Fluoride	0.4836	mg/L	0.10	96.7	90	110			
Chloride	4.924	mg/L	0.10	98.5	90	110			
Nitrogen, Nitrite (As N)	0.9496	mg/L	0.10	95.0	90	110			
Bromide	2.518	mg/L	0.10	101	90	110			
Nitrogen, Nitrate (As N)	2.446	mg/L	0.10	97.8	90	110			
Nitrate (As N)+Nitrite (As N)	3.396	mg/L	0.20	97.0	90	110			
Phosphorus, Orthophosphate (As P)	4.821	mg/L	0.50	96.4	90	110			
Sulfate	10.51	mg/L	0.50	105	90	110			
Sample ID: LCS-b	LCS		Batch ID: R32155		Analysis Date: 1/23/2009 10:47:00 AM				
Fluoride	0.4562	mg/L	0.10	91.2	90	110			
Chloride	4.671	mg/L	0.10	93.4	90	110			
Nitrogen, Nitrite (As N)	0.9169	mg/L	0.10	91.7	90	110			
Bromide	2.397	mg/L	0.10	95.9	90	110			
Nitrogen, Nitrate (As N)	2.337	mg/L	0.10	93.5	90	110			
Nitrate (As N)+Nitrite (As N)	3.254	mg/L	0.20	93.0	90	110			
Phosphorus, Orthophosphate (As P)	4.648	mg/L	0.50	93.0	90	110			
Sulfate	9.410	mg/L	0.50	94.1	90	110			
Sample ID: 0901286-06CMS	MS		Batch ID: R32137		Analysis Date: 1/22/2009 1:57:55 PM				

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 1

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901286

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 300.0: Anions

Sample ID: 0901286-08CMS

MS

Batch ID: R32137 Analysis Date: 1/22/2009 1:57:55 PM

Fluoride	1.088	mg/L	0.10	80.5	65.1	121			
Nitrogen, Nitrite (As N)	0.9810	mg/L	0.10	98.1	52.9	128			
Bromide	2.840	mg/L	0.10	102	75.6	132			
Nitrogen, Nitrate (As N)	3.496	mg/L	0.10	86.2	83.8	112			
Nitrate (As N)+Nitrite (As N)	4.477	mg/L	0.20	89.6	78.4	118			
Phosphorus, Orthophosphate (As P)	4.304	mg/L	0.50	86.1	77.6	118			

Method: SM 2320B: Alkalinity

Sample ID: MB

MBLK

Batch ID: R32256 Analysis Date: 2/2/2009

Alkalinity, Total (As CaCO3)	ND	mg/L CaC	20						
Carbonate	ND	mg/L CaC	2.0						
Bicarbonate	ND	mg/L CaC	20						

Sample ID: LCS

LCS

Batch ID: R32256 Analysis Date: 2/2/2009

Alkalinity, Total (As CaCO3)	85.00	mg/L CaC	20	104	80	120			
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Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 2

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901286

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8310: PAHs

Sample ID: MB-18144

MBLK

Batch ID: 18144 Analysis Date: 1/28/2009 1:33:44 PM

Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	2.0
2-Methylnaphthalene	ND	µg/L	2.0
Acenaphthylene	ND	µg/L	2.5
Acenaphthene	ND	µg/L	5.0
Fluorene	ND	µg/L	0.80
Phenanthrene	ND	µg/L	0.60
Anthracene	ND	µg/L	0.60
Fluoranthene	ND	µg/L	0.30
Pyrene	ND	µg/L	0.30
Benz(a)anthracene	ND	µg/L	0.070
Chrysene	ND	µg/L	0.20
Benzo(b)fluoranthene	ND	µg/L	0.10
Benzo(k)fluoranthene	ND	µg/L	0.070
Benzo(a)pyrene	ND	µg/L	0.070
Dibenz(a,h)anthracene	ND	µg/L	0.070
Benzo(g,h,i)perylene	ND	µg/L	0.080
Indeno(1,2,3-cd)pyrene	ND	µg/L	0.080

Sample ID: LCS-18144

LCS

Batch ID: 18144 Analysis Date: 1/28/2009 1:54:01 PM

Naphthalene	52.84	µg/L	2.0	68.1	31.5	90.7
1-Methylnaphthalene	53.01	µg/L	2.0	66.1	32.5	93.3
2-Methylnaphthalene	52.88	µg/L	2.0	66.1	32.8	89.6
Acenaphthylene	56.18	µg/L	2.5	70.0	37.8	92.4
Acenaphthene	57.06	µg/L	5.0	71.3	38.6	93.9
Fluorene	4.230	µg/L	0.80	52.7	38	95.5
Phenanthrene	2.550	µg/L	0.60	63.4	32.9	107
Anthracene	2.420	µg/L	0.60	60.2	35.2	98.3
Fluoranthene	5.570	µg/L	0.30	69.5	36.4	104
Pyrene	4.340	µg/L	0.30	54.1	37.1	102
Benz(a)anthracene	0.5400	µg/L	0.070	67.3	33.7	101
Chrysene	2.770	µg/L	0.20	68.9	35.2	96.1
Benzo(b)fluoranthene	0.6700	µg/L	0.10	66.9	33.6	94.2
Benzo(k)fluoranthene	0.3500	µg/L	0.070	70.0	25.4	110
Benzo(a)pyrene	0.3600	µg/L	0.070	71.7	26.9	102
Dibenz(a,h)anthracene	0.7000	µg/L	0.070	69.9	40.7	92.1
Benzo(g,h,i)perylene	0.7000	µg/L	0.080	70.0	24.3	109
Indeno(1,2,3-cd)pyrene	1.350	µg/L	0.080	67.4	42.6	99.9

Sample ID: LCSD-18144

LCSD

Batch ID: 18144 Analysis Date: 1/28/2009 2:14:18 PM

Naphthalene	53.61	µg/L	2.0	67.0	31.5	90.7	1.45	32.1
1-Methylnaphthalene	54.67	µg/L	2.0	68.2	32.5	93.3	3.08	32.7
2-Methylnaphthalene	53.48	µg/L	2.0	66.9	32.8	89.6	1.13	34
Acenaphthylene	57.78	µg/L	2.5	72.0	37.8	92.4	2.81	38.8
Acenaphthene	58.57	µg/L	5.0	73.2	38.6	93.9	2.61	38.6
Fluorene	4.500	µg/L	0.80	56.1	38	95.5	6.19	29.3

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901286

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8310: PAHs

Sample ID: LCSD-18144

LCSD

Batch ID: 18144 **Analysis Date:** 1/28/2009 2:14:18 PM

Phenanthrene	2.690	µg/L	0.60	66.9	32.9	107	5.34	25	
Anthracene	2.540	µg/L	0.60	63.2	35.2	98.3	4.84	23.9	
Fluoranthene	5.680	µg/L	0.30	70.8	36.4	104	1.96	15.7	
Pyrene	4.540	µg/L	0.30	56.6	37.1	102	4.50	15.3	
Benz(a)anthracene	0.5600	µg/L	0.070	69.8	33.7	101	3.64	19	
Chrysene	2.830	µg/L	0.20	70.4	35.2	96.1	2.14	16.6	
Benzo(b)fluoranthene	0.6900	µg/L	0.10	68.9	33.6	94.2	2.94	21.7	
Benzo(k)fluoranthene	0.3500	µg/L	0.070	70.0	25.4	110	0	19.4	
Benzo(a)pyrene	0.3700	µg/L	0.070	73.7	26.9	102	2.74	16.7	
Dibenz(a,h)anthracene	0.7100	µg/L	0.070	70.9	40.7	92.1	1.42	17.3	
Benzo(g,h,i)perylene	0.7200	µg/L	0.080	72.0	24.3	109	2.82	18	
Indeno(1,2,3-cd)pyrene	1.390	µg/L	0.080	69.4	42.6	99.9	2.92	17.7	

Method: SM 2540 C: Total Dissolved Solids

Sample ID: MBLK-18137

MBLK

Batch ID: 18137 **Analysis Date:** 1/22/2009

Total Dissolved Solids ND mg/L 20

Sample ID: LCS-18137

LCS

Batch ID: 18137 **Analysis Date:** 1/22/2009

Total Dissolved Solids 1011 mg/L 20 101 80 120

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901286

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
---------	--------	-------	-----	------	----------	-----------	------	----------	------

Method: EPA Method 8260B: VOLATILES

Sample ID: 0901286-04a MSD

MSD

Batch ID: R32131 Analysis Date: 1/22/2009 4:21:28 PM

Benzene	19.28	µg/L	1.0	96.4	84.9	122	0.507	15	
Toluene	17.04	µg/L	1.0	84.3	80.3	114	3.32	15	
Chlorobenzene	17.22	µg/L	1.0	86.1	71.9	134	2.47	15	
1,1-Dichloroethene	22.63	µg/L	1.0	113	88	144	5.80	17.8	
Trichloroethene (TCE)	19.12	µg/L	1.0	95.6	87.1	114	0.553	19.8	

Sample ID: 5ml rb

MBLK

Batch ID: R32131 Analysis Date: 1/22/2009 8:36:53 AM

Benzene	ND	µg/L	1.0						
Toluene	ND	µg/L	1.0						
Ethylbenzene	ND	µg/L	1.0						
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0						
1,2,4-Trimethylbenzene	ND	µg/L	1.0						
1,3,5-Trimethylbenzene	ND	µg/L	1.0						
1,2-Dichloroethane (EDC)	ND	µg/L	1.0						
1,2-Dibromoethane (EDB)	ND	µg/L	1.0						
Naphthalene	ND	µg/L	2.0						
1-Methylnaphthalene	ND	µg/L	4.0						
2-Methylnaphthalene	ND	µg/L	4.0						
Acetone	ND	µg/L	10						
Bromobenzene	ND	µg/L	1.0						
Bromodichloromethane	ND	µg/L	1.0						
Bromoform	ND	µg/L	1.0						
Bromomethane	ND	µg/L	1.0						
2-Butanone	ND	µg/L	10						
Carbon disulfide	ND	µg/L	10						
Carbon Tetrachloride	ND	µg/L	1.0						
Chlorobenzene	ND	µg/L	1.0						
Chloroethane	ND	µg/L	2.0						
Chloroform	ND	µg/L	1.0						
Chloromethane	ND	µg/L	1.0						
2-Chlorotoluene	ND	µg/L	1.0						
4-Chlorotoluene	ND	µg/L	1.0						
cis-1,2-DCE	ND	µg/L	1.0						
cis-1,3-Dichloropropene	ND	µg/L	1.0						
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0						
Dibromochloromethane	ND	µg/L	1.0						
Dibromomethane	ND	µg/L	1.0						
1,2-Dichlorobenzene	ND	µg/L	1.0						
1,3-Dichlorobenzene	ND	µg/L	1.0						
1,4-Dichlorobenzene	ND	µg/L	1.0						
Dichlorodifluoromethane	ND	µg/L	1.0						
1,1-Dichloroethane	ND	µg/L	1.0						
1,1-Dichloroethene	ND	µg/L	1.0						
1,2-Dichloropropane	ND	µg/L	1.0						
1,3-Dichloropropane	ND	µg/L	1.0						

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901286

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
---------	--------	-------	-----	------	----------	-----------	------	----------	------

Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R32131 Analysis Date: 1/22/2009 8:36:53 AM

2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b8

MBLK

Batch ID: R32131 Analysis Date: 1/23/2009 2:09:01 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 2

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901286

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b8

MBLK

Batch ID: R32131 Analysis Date: 1/23/2009 2:09:01 AM

2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 3

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901286

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b8 MBLK Batch ID: R32131 Analysis Date: 1/23/2009 2:09:01 AM

Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng lcs_b LCS Batch ID: R32131 Analysis Date: 1/22/2009 12:58:57 PM

Benzene	19.44	µg/L	1.0	97.2	88	116
Toluene	17.62	µg/L	1.0	88.1	82.9	112
Chlorobenzene	18.25	µg/L	1.0	91.2	71.4	133
1,1-Dichloroethene	22.68	µg/L	1.0	113	97.9	140
Trichloroethene (TCE)	18.92	µg/L	1.0	94.6	90.5	112

Sample ID: 100ng lcs_c LCS Batch ID: R32131 Analysis Date: 1/23/2009 1:39:58 AM

Benzene	19.59	µg/L	1.0	98.0	88	116
Toluene	17.90	µg/L	1.0	89.5	82.9	112
Chlorobenzene	17.74	µg/L	1.0	87.8	71.4	133
1,1-Dichloroethene	22.54	µg/L	1.0	113	97.9	140
Trichloroethene (TCE)	18.67	µg/L	1.0	93.4	90.5	112

Sample ID: 0901286-04a MS Batch ID: R32131 Analysis Date: 1/22/2009 3:52:12 PM

Benzene	19.38	µg/L	1.0	96.9	84.9	122
Toluene	17.61	µg/L	1.0	87.1	80.3	114
Chlorobenzene	17.65	µg/L	1.0	88.3	71.9	134
1,1-Dichloroethene	21.35	µg/L	1.0	107	88	144
Trichloroethene (TCE)	19.22	µg/L	1.0	96.1	87.1	114

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 4

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name WESTERN REFINING SOUT

Date Received:

1/21/2009

Work Order Number 0901286

Received by: ARS

Checklist completed by:

Signature

Date

Sample ID labels checked by:

Initials

Matrix:

Carrier name Greyhound

Shipping container/cooler in good condition? Yes ☒ No ☐ Not Present ☐

Custody seals intact on shipping container/cooler? Yes ☒ No ☐ Not Present ☐ Not Shipped ☐

Custody seals intact on sample bottles? Yes ☐ No ☐ N/A ☒

Chain of custody present? Yes ☒ No ☐

Chain of custody signed when relinquished and received? Yes ☒ No ☐

Chain of custody agrees with sample labels? Yes ☒ No ☐

Samples in proper container/bottle? Yes ☒ No ☐

Sample containers intact? Yes ☒ No ☐

Sufficient sample volume for indicated test? Yes ☒ No ☐

All samples received within holding time? Yes ☒ No ☐

Water - VOA vials have zero headspace? No VOA vials submitted ☐ Yes ☒ No ☐

Water - Preservation labels on bottle and cap match? Yes ☒ No ☐ N/A ☐

Water - pH acceptable upon receipt? Yes ☒ No ☐ N/A ☐

Container/Temp Blank temperature? 5° <6° C Acceptable
If given sufficient time to cool.

COMMENTS:

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: As per AA analysis requested, 8260, cat/anion balance, 8310 (GBR-240, GBR-17, GBR-30, GBR-31) and RCR metals (GBR-32, GBR-49) AS 1/26/09
Per AA added Fe, Mn to head #2c + 7c. Called ESC to add test. TS 1/27/09

Corrective Action

Requested AA to redo LOC 1/27/09 as for samples collected on 1/20/09 / AS 1/27/09



COVER LETTER

Monday, February 09, 2009

Ashley Ager
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413

TEL: (970) 946-1093
FAX (505) 632-3911

RE: Giant Former Refinery/Giant Bloomfield Refinery

Order No.: 0901383

Dear Ashley Ager:

Hall Environmental Analysis Laboratory, Inc. received 2 sample(s) on 1/28/2009 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", written over a horizontal line.

Andy Freeman, Business Manager
Nancy McDuffie, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** GRW-3
Lab Order: 0901383 **Collection Date:** 1/28/2009 7:40:00 AM
Project: Giant Former Refinery/Giant Bloomfield Refiner **Date Received:** 1/28/2009
Lab ID: 0901383-01 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	39	4.0		µg/L	1	2/5/2009 8:27:35 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	2/5/2009 8:27:35 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	2/5/2009 8:27:35 PM
Acenaphthylene	ND	5.0		µg/L	1	2/5/2009 8:27:35 PM
Acenaphthene	ND	10		µg/L	1	2/5/2009 8:27:35 PM
Fluorene	3.5	1.6		µg/L	1	2/5/2009 8:27:35 PM
Phenanthrene	ND	1.2		µg/L	1	2/5/2009 8:27:35 PM
Anthracene	ND	1.2		µg/L	1	2/5/2009 8:27:35 PM
Fluoranthene	ND	0.60		µg/L	1	2/5/2009 8:27:35 PM
Pyrene	ND	0.60		µg/L	1	2/5/2009 8:27:35 PM
Benz(a)anthracene	ND	0.14		µg/L	1	2/5/2009 8:27:35 PM
Chrysene	ND	0.40		µg/L	1	2/5/2009 8:27:35 PM
Benzo(b)fluoranthene	ND	0.20		µg/L	1	2/5/2009 8:27:35 PM
Benzo(k)fluoranthene	ND	0.14		µg/L	1	2/5/2009 8:27:35 PM
Benzo(a)pyrene	ND	0.14		µg/L	1	2/5/2009 8:27:35 PM
Dibenz(a,h)anthracene	ND	0.14		µg/L	1	2/5/2009 8:27:35 PM
Benzo(g,h,i)perylene	ND	0.16		µg/L	1	2/5/2009 8:27:35 PM
Indeno(1,2,3-cd)pyrene	ND	0.16		µg/L	1	2/5/2009 8:27:35 PM
Surr: Benzo(e)pyrene	62.3	44.8-104		%REC	1	2/5/2009 8:27:35 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 1 of 2

Hall Environmental Analysis Laboratory, Inc.

Date: 09-Feb-09

CLIENT: Western Refining Southwest, Inc.

Client Sample ID: GRW-6

Lab Order: 0901383

Collection Date: 1/28/2009 7:52:00 AM

Project: Giant Former Refinery/Giant Bloomfield Refiner

Date Received: 1/28/2009

Lab ID: 0901383-02

Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	ND	4.0		µg/L	1	2/5/2009 8:47:50 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	2/5/2009 8:47:50 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	2/5/2009 8:47:50 PM
Acenaphthylene	ND	5.0		µg/L	1	2/5/2009 8:47:50 PM
Acenaphthene	ND	10		µg/L	1	2/5/2009 8:47:50 PM
Fluorene	ND	1.6		µg/L	1	2/5/2009 8:47:50 PM
Phenanthrene	ND	1.2		µg/L	1	2/5/2009 8:47:50 PM
Anthracene	ND	1.2		µg/L	1	2/5/2009 8:47:50 PM
Fluoranthene	ND	0.60		µg/L	1	2/5/2009 8:47:50 PM
Pyrene	ND	0.60		µg/L	1	2/5/2009 8:47:50 PM
Benz(a)anthracene	ND	0.14		µg/L	1	2/5/2009 8:47:50 PM
Chrysene	ND	0.40		µg/L	1	2/5/2009 8:47:50 PM
Benzo(b)fluoranthene	ND	0.20		µg/L	1	2/5/2009 8:47:50 PM
Benzo(k)fluoranthene	ND	0.14		µg/L	1	2/5/2009 8:47:50 PM
Benzo(a)pyrene	ND	0.14		µg/L	1	2/5/2009 8:47:50 PM
Dibenz(a,h)anthracene	ND	0.14		µg/L	1	2/5/2009 8:47:50 PM
Benzo(g,h,i)perylene	ND	0.16		µg/L	1	2/5/2009 8:47:50 PM
Indeno(1,2,3-cd)pyrene	ND	0.16		µg/L	1	2/5/2009 8:47:50 PM
Surr: Benzo(e)pyrene	83.3	44.8-104		%REC	1	2/5/2009 8:47:50 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 2 of 2

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901383

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8310: PAHs

Sample ID: MB-18212

MBLK

Batch ID: 18212 **Analysis Date:** 2/5/2009 7:26:53 PM

Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	2.0
2-Methylnaphthalene	ND	µg/L	2.0
Acenaphthylene	ND	µg/L	2.5
Acenaphthene	ND	µg/L	5.0
Fluorene	ND	µg/L	0.80
Phenanthrene	ND	µg/L	0.60
Anthracene	ND	µg/L	0.80
Fluoranthene	ND	µg/L	0.30
Pyrene	ND	µg/L	0.30
Benz(a)anthracene	ND	µg/L	0.070
Chrysene	ND	µg/L	0.20
Benzo(b)fluoranthene	ND	µg/L	0.10
Benzo(k)fluoranthene	ND	µg/L	0.070
Benzo(a)pyrene	ND	µg/L	0.070
Dibenz(a,h)anthracene	ND	µg/L	0.070
Benzo(g,h,i)perylene	ND	µg/L	0.080
Indeno(1,2,3-cd)pyrene	ND	µg/L	0.080

Sample ID: LCS-18212

LCS

Batch ID: 18212 **Analysis Date:** 2/5/2009 7:47:07 PM

Naphthalene	49.75	µg/L	2.0	62.2	31.5	90.7
1-Methylnaphthalene	52.33	µg/L	2.0	65.2	32.5	93.3
2-Methylnaphthalene	51.58	µg/L	2.0	64.5	32.8	89.6
Acenaphthylene	53.21	µg/L	2.5	66.3	37.8	92.4
Acenaphthene	54.84	µg/L	5.0	68.3	38.6	93.9
Fluorene	4.060	µg/L	0.80	50.6	38	95.5
Phenanthrene	2.580	µg/L	0.60	63.7	32.9	107
Anthracene	2.430	µg/L	0.60	60.4	35.2	98.3
Fluoranthene	5.090	µg/L	0.30	63.5	36.4	104
Pyrene	4.680	µg/L	0.30	58.4	37.1	102
Benz(a)anthracene	0.5400	µg/L	0.070	67.3	33.7	101
Chrysene	2.680	µg/L	0.20	68.7	35.2	96.1
Benzo(b)fluoranthene	0.5900	µg/L	0.10	58.9	33.6	94.2
Benzo(k)fluoranthene	0.3500	µg/L	0.070	70.0	25.4	110
Benzo(a)pyrene	0.3400	µg/L	0.070	67.7	26.9	102
Dibenz(a,h)anthracene	0.6400	µg/L	0.070	63.9	40.7	92.1
Benzo(g,h,i)perylene	0.6500	µg/L	0.080	65.0	24.3	109
Indeno(1,2,3-cd)pyrene	1.250	µg/L	0.080	62.4	42.8	99.9

Sample ID: LCSD-18212

LCSD

Batch ID: 18212 **Analysis Date:** 2/5/2009 8:07:21 PM

Naphthalene	55.94	µg/L	2.0	69.9	31.5	90.7	11.7	32.1
1-Methylnaphthalene	59.44	µg/L	2.0	74.1	32.5	93.3	12.7	32.7
2-Methylnaphthalene	55.97	µg/L	2.0	70.0	32.8	89.6	8.16	34
Acenaphthylene	60.31	µg/L	2.5	75.2	37.8	92.4	12.5	38.8
Acenaphthene	62.81	µg/L	5.0	78.5	38.6	93.9	13.9	38.6
Fluorene	4.340	µg/L	0.80	54.1	38	95.5	6.67	29.3

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery/Giant Bloomfield Refiner

Work Order: 0901383

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8310: PAHs

Sample ID: LCSD-18212

LCSD

Batch ID: 18212 **Analysis Date:** 2/5/2009 8:07:21 PM

Phenanthrene	2.780	µg/L	0.60	69.2	32.9	107	8.24	25
Anthracene	2.730	µg/L	0.60	67.9	35.2	98.3	11.6	23.9
Fluoranthene	5.890	µg/L	0.30	73.4	36.4	104	14.6	15.7
Pyrene	5.080	µg/L	0.30	63.3	37.1	102	8.20	15.3
Benz(a)anthracene	0.5900	µg/L	0.070	73.6	33.7	101	8.85	19
Chrysene	2.990	µg/L	0.20	74.4	35.2	96.1	10.9	16.6
Benzo(b)fluoranthene	0.6900	µg/L	0.10	68.9	33.6	94.2	15.6	21.7
Benzo(k)fluoranthene	0.3800	µg/L	0.070	72.0	25.4	110	2.82	19.4
Benzo(a)pyrene	0.3900	µg/L	0.070	77.7	26.9	102	13.7	16.7
Dibenz(a,h)anthracene	0.7400	µg/L	0.070	73.9	40.7	92.1	14.5	17.3
Benzo(g,h,i)perylene	0.7400	µg/L	0.080	74.0	24.3	109	12.9	18
Indeno(1,2,3-cd)pyrene	1.430	µg/L	0.080	71.4	42.6	99.9	13.4	17.7

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name WESTERN REFINING SOUT

Date Received:

1/28/2009

Work Order Number 0901383

Received by: TLS

Checklist completed by:

Signature

Date

Sample ID labels checked by:

Initials

Matrix:

Carrier name Greyhound

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☒	No ☐	Not Present ☐ Not Shipped ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	N/A ☒
Chain of custody present?	Yes ☒	No ☐	
Chain of custody signed when relinquished and received?	Yes ☒	No ☐	
Chain of custody agrees with sample labels?	Yes ☒	No ☐	
Samples in proper container/bottle?	Yes ☒	No ☐	
Sample containers intact?	Yes ☒	No ☐	
Sufficient sample volume for indicated test?	Yes ☒	No ☐	
All samples received within holding time?	Yes ☒	No ☐	
Water - VOA vials have zero headspace?	No VOA vials submitted ☒	Yes ☐	No ☐
Water - Preservation labels on bottle and cap match?	Yes ☐	No ☐	N/A ☒
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☒
Container/Temp Blank temperature?	9°	<6° C Acceptable If given sufficient time to cool.	

COMMENTS:

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: _____

Corrective Action _____



COVER LETTER

Thursday, March 12, 2009

Bruce Cauthen
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4161
FAX (505) 632-3911

RE: Giant Former Refinery

Order No.: 0902314

Dear Bruce Cauthen:

Hall Environmental Analysis Laboratory, Inc. received 2 sample(s) on 2/27/2009 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman".

Andy Freeman, Business Manager
Nancy McDuffie, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

www.hallenvironmental.com

Hall Environmental Analysis Laboratory, Inc.

Date: 12-Mar-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0902314
Project: Giant Former Refinery
Lab ID: 0902314-01

Client Sample ID: Effluent
Collection Date: 2/26/2009 10:24:00 AM
Date Received: 2/27/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8310: PAHS						Analyst: DMG
Naphthalene	ND	2.0		µg/L	1	3/6/2009 3:37:33 PM
1-Methylnaphthalene	ND	2.0		µg/L	1	3/6/2009 3:37:33 PM
2-Methylnaphthalene	ND	2.0		µg/L	1	3/6/2009 3:37:33 PM
Acenaphthylene	ND	2.5		µg/L	1	3/6/2009 3:37:33 PM
Acenaphthene	ND	5.0		µg/L	1	3/6/2009 3:37:33 PM
Fluorene	ND	0.80		µg/L	1	3/6/2009 3:37:33 PM
Phenanthrene	ND	0.60		µg/L	1	3/6/2009 3:37:33 PM
Anthracene	ND	0.60		µg/L	1	3/6/2009 3:37:33 PM
Fluoranthene	ND	0.30		µg/L	1	3/6/2009 3:37:33 PM
Pyrene	ND	0.30		µg/L	1	3/6/2009 3:37:33 PM
Benz(a)anthracene	ND	0.070		µg/L	1	3/6/2009 3:37:33 PM
Chrysene	ND	0.20		µg/L	1	3/6/2009 3:37:33 PM
Benzo(b)fluoranthene	ND	0.10		µg/L	1	3/6/2009 3:37:33 PM
Benzo(k)fluoranthene	ND	0.070		µg/L	1	3/6/2009 3:37:33 PM
Benzo(a)pyrene	ND	0.070		µg/L	1	3/6/2009 3:37:33 PM
Dibenz(a,h)anthracene	ND	0.070		µg/L	1	3/6/2009 3:37:33 PM
Benzo(g,h,i)perylene	ND	0.080		µg/L	1	3/6/2009 3:37:33 PM
Indeno(1,2,3-cd)pyrene	ND	0.080		µg/L	1	3/6/2009 3:37:33 PM
Surr: Benzo(e)pyrene	73.6	44.8-104		%REC	1	3/6/2009 3:37:33 PM
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.79	0.10		mg/L	1	2/28/2009 12:26:56 AM
Chloride	82	1.0		mg/L	10	2/28/2009 12:44:21 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	2/28/2009 12:26:56 AM
Bromide	0.51	0.10		mg/L	1	2/28/2009 12:26:56 AM
Nitrogen, Nitrate (As N)	1.1	0.10		mg/L	1	2/28/2009 12:26:56 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	2/28/2009 12:26:56 AM
Sulfate	1800	25		mg/L	50	3/4/2009 5:03:01 AM
EPA METHOD 7470: MERCURY						Analyst: SNV
Mercury	ND	0.00020		mg/L	1	3/9/2009 4:50:57 PM
EPA METHOD 6010B: DISSOLVED METALS						Analyst: TES
Calcium	370	10		mg/L	10	3/2/2009 6:09:43 PM
Iron	ND	0.020		mg/L	1	3/2/2009 5:12:35 PM
Magnesium	29	1.0		mg/L	1	3/2/2009 5:12:35 PM
Manganese	0.27	0.0020		mg/L	1	3/2/2009 5:12:35 PM
Potassium	3.1	1.0		mg/L	1	3/2/2009 5:12:35 PM
Sodium	480	10		mg/L	10	3/2/2009 6:09:43 PM
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: TES
Arsenic	ND	0.020		mg/L	1	3/5/2009 12:02:05 PM

Qualifiers:

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- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 12-Mar-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0902314
Project: Giant Former Refinery
Lab ID: 0902314-01

Client Sample ID: Effluent
Collection Date: 2/26/2009 10:24:00 AM
Date Received: 2/27/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: TES
Barium	ND	0.020		mg/L	1	3/5/2009 12:02:05 PM
Cadmium	ND	0.0020		mg/L	1	3/5/2009 12:02:05 PM
Chromium	ND	0.0060		mg/L	1	3/5/2009 12:02:05 PM
Lead	ND	0.0050		mg/L	1	3/5/2009 12:02:05 PM
Selenium	ND	0.25		mg/L	5	3/5/2009 2:07:04 PM
Silver	ND	0.0050		mg/L	1	3/5/2009 12:02:05 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Toluene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Ethylbenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Naphthalene	ND	2.0		µg/L	1	2/27/2009 5:27:39 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	2/27/2009 5:27:39 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	2/27/2009 5:27:39 PM
Acetone	ND	10		µg/L	1	2/27/2009 5:27:39 PM
Bromobenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Bromodichloromethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Bromoform	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Bromomethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
2-Butanone	ND	10		µg/L	1	2/27/2009 5:27:39 PM
Carbon disulfide	ND	10		µg/L	1	2/27/2009 5:27:39 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Chlorobenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Chloroethane	ND	2.0		µg/L	1	2/27/2009 5:27:39 PM
Chloroform	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Chloromethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
2-Chlorotoluene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
4-Chlorotoluene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
cis-1,2-DCE	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	2/27/2009 5:27:39 PM
Dibromochloromethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Dibromomethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM

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- S Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

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Lab Order: 0902314
Project: Giant Former Refinery
Lab ID: 0902314-01

Client Sample ID: Effluent
Collection Date: 2/26/2009 10:24:00 AM
Date Received: 2/27/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
1,1-Dichloroethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	2/27/2009 5:27:39 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
2-Hexanone	ND	10		µg/L	1	2/27/2009 5:27:39 PM
Isopropylbenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	2/27/2009 5:27:39 PM
Methylene Chloride	ND	3.0		µg/L	1	2/27/2009 5:27:39 PM
n-Butylbenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
n-Propylbenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
sec-Butylbenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Styrene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
tert-Butylbenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	2/27/2009 5:27:39 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
trans-1,2-DCE	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	2/27/2009 5:27:39 PM
Vinyl chloride	ND	1.0		µg/L	1	2/27/2009 5:27:39 PM
Xylenes, Total	ND	1.5		µg/L	1	2/27/2009 5:27:39 PM
Surr: 1,2-Dichloroethane-d4	106	68.1-123		%REC	1	2/27/2009 5:27:39 PM
Surr: 4-Bromofluorobenzene	110	53.2-145		%REC	1	2/27/2009 5:27:39 PM
Surr: Dibromofluoromethane	110	68.5-119		%REC	1	2/27/2009 5:27:39 PM
Surr: Toluene-d8	94.4	64-131		%REC	1	2/27/2009 5:27:39 PM

SM 2320B: ALKALINITY

Analyst: BDH

Alkalinity, Total (As CaCO3)	260	20	mg/L CaCO3	1	3/3/2009
Carbonate	ND	2.0	mg/L CaCO3	1	3/3/2009
Bicarbonate	260	20	mg/L CaCO3	1	3/3/2009

EPA 120.1: SPECIFIC CONDUCTANCE

Analyst: BDH

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	E Estimated value	H Holding times for preparation or analysis exceeded
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	ND Not Detected at the Reporting Limit	RL Reporting Limit
	S Spike recovery outside accepted recovery limits	

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Hall Environmental Analysis Laboratory, Inc.

Date: 12-Mar-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0902314
Project: Giant Former Refinery
Lab ID: 0902314-01

Client Sample ID: Effluent
Collection Date: 2/26/2009 10:24:00 AM
Date Received: 2/27/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
Analyst: BDH						
EPA 120.1: SPECIFIC CONDUCTANCE						
Specific Conductance	3300	0.010		µmhos/cm	1	3/3/2009
Analyst: BDH						
SM4500-H+B: PH						
pH	7.32	0.1		pH units	1	3/3/2009
Analyst: JMP						
SM 2540 C: TOTAL DISSOLVED SOLIDS						
Total Dissolved Solids	2800	40		mg/L	1	3/2/2009

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Hall Environmental Analysis Laboratory, Inc.

Date: 12-Mar-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0902314
Project: Giant Former Refinery
Lab ID: 0902314-02

Client Sample ID: Influent
Collection Date: 2/26/2009 11:07:00 AM
Date Received: 2/27/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.80	0.10		mg/L	1	2/28/2009 1:01:45 AM
Chloride	81	1.0		mg/L	10	2/28/2009 1:19:10 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	2/28/2009 1:01:45 AM
Bromide	0.50	0.10		mg/L	1	2/28/2009 1:01:45 AM
Nitrogen, Nitrate (As N)	1.2	0.10		mg/L	1	2/28/2009 1:01:45 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	2/28/2009 1:01:45 AM
Sulfate	1800	25		mg/L	50	3/4/2009 5:20:25 AM
EPA METHOD 6010B: DISSOLVED METALS						Analyst: TES
Calcium	370	5.0		mg/L	5	3/2/2009 5:29:18 PM
Magnesium	29	1.0		mg/L	1	3/2/2009 5:16:45 PM
Potassium	3.1	1.0		mg/L	1	3/2/2009 5:16:45 PM
Sodium	490	5.0		mg/L	5	3/2/2009 5:29:18 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Toluene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Ethylbenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Naphthalene	ND	2.0		µg/L	1	2/27/2009 6:54:28 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	2/27/2009 6:54:28 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	2/27/2009 6:54:28 PM
Acetone	ND	10		µg/L	1	2/27/2009 6:54:28 PM
Bromobenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Bromodichloromethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Bromoform	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Bromomethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
2-Butanone	ND	10		µg/L	1	2/27/2009 6:54:28 PM
Carbon disulfide	ND	10		µg/L	1	2/27/2009 6:54:28 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Chlorobenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Chloroethane	ND	2.0		µg/L	1	2/27/2009 6:54:28 PM
Chloroform	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Chloromethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
2-Chlorotoluene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
4-Chlorotoluene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
cis-1,2-DCE	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

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 H Holding times for preparation or analysis exceeded
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Lab Order: 0902314
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Lab ID: 0902314-02

Client Sample ID: Influent
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Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	2/27/2009 6:54:28 PM
Dibromochloromethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Dibromomethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	2/27/2009 8:54:28 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	2/27/2009 6:54:28 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
2-Hexanone	ND	10		µg/L	1	2/27/2009 6:54:28 PM
Isopropylbenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	2/27/2009 8:54:28 PM
Methylene Chloride	ND	3.0		µg/L	1	2/27/2009 6:54:28 PM
n-Butylbenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
n-Propylbenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
sec-Butylbenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Styrene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
tert-Butylbenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	2/27/2009 6:54:28 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
trans-1,2-DCE	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	2/27/2009 6:54:28 PM
Vinyl chloride	ND	1.0		µg/L	1	2/27/2009 6:54:28 PM
Xylenes, Total	ND	1.5		µg/L	1	2/27/2009 6:54:28 PM
Surr: 1,2-Dichloroethane-d4	109	68.1-123		%REC	1	2/27/2009 6:54:28 PM
Surr: 4-Bromofluorobenzene	104	53.2-145		%REC	1	2/27/2009 6:54:28 PM
Surr: Dibromofluoromethane	107	68.5-119		%REC	1	2/27/2009 6:54:28 PM
Surr: Toluene-d8	95.1	64-131		%REC	1	2/27/2009 6:54:28 PM

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- * Value exceeds Maximum Contaminant Level
- E Estimated value
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- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
MCL Maximum Contaminant Level
RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 12-Mar-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0902314
Project: Giant Former Refinery
Lab ID: 0902314-02

Client Sample ID: Influent
Collection Date: 2/26/2009 11:07:00 AM
Date Received: 2/27/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
SM 2320B: ALKALINITY						Analyst: BDH
Alkalinity, Total (As CaCO ₃)	260	20		mg/L CaCO ₃	1	3/3/2009
Carbonate	ND	2.0		mg/L CaCO ₃	1	3/3/2009
Bicarbonate	260	20		mg/L CaCO ₃	1	3/3/2009
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: BDH
Specific Conductance	3300	0.010		µmhos/cm	1	3/3/2009
SM4500-H+B: PH						Analyst: BDH
pH	7.35	0.1		pH units	1	3/3/2009
SM 2540 C: TOTAL DISSOLVED SOLIDS						Analyst: JMP
Total Dissolved Solids	2800	40		mg/L	1	3/2/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 7 of 7

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery

Work Order: 0902314

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions									
Sample ID: MB		MBLK	Batch ID: R32617 Analysis Date: 2/27/2009 12:37:37 PM						
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Nitrogen, Nitrite (As N)	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrogen, Nitrate (As N)	ND	mg/L	0.10						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: MB		MBLK	Batch ID: R32646 Analysis Date: 3/3/2009 10:46:14 AM						
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Nitrogen, Nitrite (As N)	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrogen, Nitrate (As N)	ND	mg/L	0.10						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: LCS		LCS	Batch ID: R32617 Analysis Date: 2/27/2009 1:42:48 PM						
Fluoride	0.4937	mg/L	0.10	98.7	90	110			
Chloride	4.930	mg/L	0.10	98.6	90	110			
Nitrogen, Nitrite (As N)	0.9198	mg/L	0.10	92.0	90	110			
Bromide	2.468	mg/L	0.10	98.7	90	110			
Nitrogen, Nitrate (As N)	2.547	mg/L	0.10	102	90	110			
Phosphorus, Orthophosphate (As P)	4.955	mg/L	0.50	99.1	90	110			
Sulfate	10.06	mg/L	0.50	101	90	110			
Sample ID: LCS		LCS	Batch ID: R32646 Analysis Date: 3/3/2009 11:03:38 AM						
Fluoride	0.5639	mg/L	0.10	113	90	110			S
Chloride	5.038	mg/L	0.10	101	90	110			
Nitrogen, Nitrite (As N)	1.053	mg/L	0.10	105	90	110			
Bromide	2.664	mg/L	0.10	107	90	110			
Nitrogen, Nitrate (As N)	2.517	mg/L	0.10	101	90	110			
Phosphorus, Orthophosphate (As P)	5.013	mg/L	0.50	100	90	110			
Sulfate	10.40	mg/L	0.50	104	90	110			
Method: SM 2320B: Alkalinity									
Sample ID: 0902314-01CMSD		MSD	Batch ID: R32639 Analysis Date: 3/3/2009						
Alkalinity, Total (As CaCO3)	337.2	mg/L CaC	20	93.8	80	120	0.238	20	
Sample ID: MB		MBLK	Batch ID: R32639 Analysis Date: 3/3/2009						
Alkalinity, Total (As CaCO3)	ND	mg/L CaC	20						
Carbonate	ND	mg/L CaC	2.0						
Bicarbonate	ND	mg/L CaC	20						
Sample ID: 80PPM LCS		LCS	Batch ID: R32639 Analysis Date: 3/3/2009						
Alkalinity, Total (As CaCO3)	80.04	mg/L CaC	20	100	80	120			
Sample ID: 0902314-01CMS		MS	Batch ID: R32639 Analysis Date: 3/3/2009						
Alkalinity, Total (As CaCO3)	336.4	mg/L CaC	20	92.7	80	120			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 1

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery

Work Order: 0902314

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 0902314-01a MSD *MSD*

Batch ID: R32600 **Analysis Date:** 2/27/2009 6:25:32 PM

Benzene	21.90	µg/L	1.0	110	84.9	122	6.25	15
Toluene	19.29	µg/L	1.0	96.4	80.3	114	0.551	15
Chlorobenzene	17.59	µg/L	1.0	88.0	71.9	134	3.76	15
1,1-Dichloroethene	24.64	µg/L	1.0	123	88	144	2.54	17.8
Trichloroethene (TCE)	21.42	µg/L	1.0	107	87.1	114	10.3	19.8

Sample ID: 5ml rb *MBLK*

Batch ID: R32600 **Analysis Date:** 2/27/2009 8:59:55 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: Giant Former Refinery

Work Order: 0902314

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb MBLK

Batch ID: R32600 Analysis Date: 2/27/2009 8:59:55 AM

2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng lcs

LCS

Batch ID: R32600 Analysis Date: 2/27/2009 9:58:07 AM

Benzene	21.36	µg/L	1.0	107	88	116
Toluene	20.05	µg/L	1.0	100	82.9	112
Chlorobenzene	18.13	µg/L	1.0	90.7	71.4	133
1,1-Dichloroethene	24.58	µg/L	1.0	123	97.9	140
Trichloroethene (TCE)	20.50	µg/L	1.0	102	90.5	112

Sample ID: 0902314-01a MS

MS

Batch ID: R32600 Analysis Date: 2/27/2009 5:56:32 PM

Benzene	23.31	µg/L	1.0	117	84.9	122
Toluene	19.18	µg/L	1.0	95.9	80.3	114
Chlorobenzene	18.26	µg/L	1.0	91.3	71.9	134
1,1-Dichloroethene	25.28	µg/L	1.0	126	88	144
Trichloroethene (TCE)	23.74	µg/L	1.0	119	87.1	114

S

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery

Work Order: 0902314

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8310: PAHs

Sample ID: MB-18439

MBLK

Batch ID: 18439 **Analysis Date:** 3/6/2009 11:14:14 AM

Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	2.0
2-Methylnaphthalene	ND	µg/L	2.0
Acenaphthylene	ND	µg/L	2.5
Acenaphthene	ND	µg/L	5.0
Fluorene	ND	µg/L	0.80
Phenanthrene	ND	µg/L	0.60
Anthracene	ND	µg/L	0.60
Fluoranthene	ND	µg/L	0.30
Pyrene	ND	µg/L	0.30
Benz(a)anthracene	ND	µg/L	0.070
Chrysene	ND	µg/L	0.20
Benzo(b)fluoranthene	ND	µg/L	0.10
Benzo(k)fluoranthene	ND	µg/L	0.070
Benzo(a)pyrene	ND	µg/L	0.070
Dibenz(a,h)anthracene	ND	µg/L	0.070
Benzo(g,h,i)perylene	ND	µg/L	0.080
Indeno(1,2,3-cd)pyrene	ND	µg/L	0.080

Sample ID: LCS-18439

LCS

Batch ID: 18439 **Analysis Date:** 3/6/2009 11:34:29 AM

Naphthalene	53.54	µg/L	2.0	66.9	31.5	90.7
1-Methylnaphthalene	59.92	µg/L	2.0	74.7	32.5	93.3
2-Methylnaphthalene	53.67	µg/L	2.0	67.1	32.8	89.6
Acenaphthylene	60.32	µg/L	2.5	75.2	37.8	92.4
Acenaphthene	60.13	µg/L	5.0	75.2	38.6	93.9
Fluorene	4.400	µg/L	0.80	54.9	38	95.5
Phenanthrene	2.870	µg/L	0.60	71.4	32.9	107
Anthracene	2.740	µg/L	0.60	68.2	35.2	98.3
Fluoranthene	6.030	µg/L	0.30	75.2	36.4	104
Pyrene	5.170	µg/L	0.30	64.5	37.1	102
Benz(a)anthracene	0.6200	µg/L	0.070	77.3	33.7	101
Chrysene	3.120	µg/L	0.20	77.6	35.2	96.1
Benzo(b)fluoranthene	0.7400	µg/L	0.10	73.9	33.6	94.2
Benzo(k)fluoranthene	0.3800	µg/L	0.070	76.0	25.4	110
Benzo(a)pyrene	0.4200	µg/L	0.070	83.7	26.9	102
Dibenz(a,h)anthracene	0.7900	µg/L	0.070	78.8	40.7	92.1
Benzo(g,h,i)perylene	0.8000	µg/L	0.080	80.0	24.3	109
Indeno(1,2,3-cd)pyrene	1.500	µg/L	0.080	74.9	42.6	99.9

Sample ID: LCSD-18439

LCSD

Batch ID: 18439 **Analysis Date:** 3/6/2009 11:54:44 AM

Naphthalene	46.09	µg/L	2.0	57.6	31.5	90.7	15.0	32.1
1-Methylnaphthalene	51.49	µg/L	2.0	64.2	32.5	93.3	15.1	32.7
2-Methylnaphthalene	45.14	µg/L	2.0	56.4	32.8	89.6	17.3	34
Acenaphthylene	55.60	µg/L	2.5	69.3	37.8	92.4	8.14	38.8
Acenaphthene	57.43	µg/L	5.0	71.8	38.6	93.9	4.59	38.6
Fluorene	4.150	µg/L	0.80	51.7	38	95.5	5.85	29.3

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
 Project: Giant Former Refinery

Work Order: 0902314

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8310: PAHs

Sample ID: LCSD-18439

LCSD

Batch ID: 18439

Analysis Date: 3/6/2009 11:54:44 AM

Phenanthrene	2.930	µg/L	0.60	72.9	32.9	107	2.07	25	
Anthracene	2.740	µg/L	0.60	68.2	35.2	98.3	0	23.9	
Fluoranthene	6.040	µg/L	0.30	75.3	36.4	104	0.166	15.7	
Pyrene	5.270	µg/L	0.30	65.7	37.1	102	1.92	15.3	
Benz(a)anthracene	0.6400	µg/L	0.070	79.8	33.7	101	3.17	19	
Chrysene	3.280	µg/L	0.20	81.1	35.2	96.1	4.39	16.6	
Benzo(b)fluoranthene	0.7700	µg/L	0.10	76.8	33.6	94.2	3.97	21.7	
Benzo(k)fluoranthene	0.3900	µg/L	0.070	78.0	25.4	110	2.60	19.4	
Benzo(a)pyrene	0.4200	µg/L	0.070	83.7	26.9	102	0	16.7	
Dibenz(a,h)anthracene	0.8100	µg/L	0.070	80.8	40.7	92.1	2.50	17.3	
Benzo(g,h,i)perylene	0.8200	µg/L	0.080	82.0	24.3	109	2.47	18	
Indeno(1,2,3-cd)pyrene	1.540	µg/L	0.080	76.8	42.6	99.9	2.63	17.7	

Method: EPA Method 7470: Mercury

Sample ID: MB-18477

MBLK

Batch ID: 18477

Analysis Date: 3/9/2009 4:16:39 PM

Mercury ND mg/L 0.00020

Sample ID: LCS-18477

LCS

Batch ID: 18477

Analysis Date: 3/9/2009 4:18:24 PM

Mercury 0.004668 mg/L 0.00020 93.4 80 120

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery

Work Order: 0902314

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 6010B: Dissolved Metals

Sample ID: 0902314-02CMSD		MSD			Batch ID: R32628		Analysis Date: 3/2/2009 5:25:06 PM	
Iron	0.5840	mg/L	0.020	97.5	75	125	0.314	20
Magnesium	81.40	mg/L	1.0	103	75	125	1.57	20
Manganese	0.7624	mg/L	0.0020	97.8	75	125	1.62	20
Potassium	61.15	mg/L	1.0	106	75	125	1.80	20

Potassium	511.5	mg/L	5.0	95.3	75	125	2.71	20	E
Sample ID: 0902314-02CMSD		MSD			Batch ID: R32628	Analysis Date: 3/2/2009 5:49:58 PM			
Calcium	611.5	mg/L	5.0	95.3	75	125	2.71	20	E
Sodium	724.1	mg/L	5.0	94.6	75	125	2.75	20	E

Sample ID: MB				MBLK	Batch ID: R32628	Analysis Date: 3/2/2009 3:58:23 PM
Calcium	ND	mg/L	1.0			
Iron	ND	mg/L	0.020			
Magnesium	ND	mg/L	1.0			
Manganese	ND	mg/L	0.0020			
Potassium	ND	mg/L	1.0			
Sodium	ND	mg/L	1.0			

Sodium	50.97	mg/L	1.0	101	80	120			
Sample ID: LCS		LCS			Batch ID: R32628	Analysis Date:	3/2/2009 4:01:25 PM		
Calcium	48.16	mg/L	1.0	95.3	80	120			
Iron	0.4909	mg/L	0.020	98.2	80	120			
Magnesium	50.46	mg/L	1.0	99.9	80	120			
Manganese	0.4830	mg/L	0.0020	92.6	80	120			
Potassium	54.91	mg/L	1.0	99.7	80	120			
Sodium	50.97	mg/L	1.0	101	80	120			

Sodium	55.97	mg/L	0.020	97.8	75	125	Batch ID: R32628 Analysis Date: 3/2/2009 5:21:00 PM
Sample ID: 0902314-02CMS		MS					
Iron	0.5658	mg/L	0.020	97.8	75	125	
Magnesium	80.13	mg/L	1.0	101	75	125	
Manganese	0.7502	mg/L	0.0020	95.3	75	125	
Potassium	60.06	mg/L	1.0	104	75	125	

Sample ID: 0902314-02CMS		<i>MS</i>	Batch ID: R32628				Analysis Date:	3/2/2009 5:34:02 PM
Calcium	595.2	mg/L	5.0	88.8	75	125		E
Sodium	704.4	mg/L	5.0	86.8	75	125		E

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: Giant Former Refinery

Work Order: 0902314

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA 8010B: Total Recoverable Metals

Sample ID: MB-18449 *MBLK*

Batch ID: 18449 **Analysis Date:** 3/5/2009 11:35:13 AM

Arsenic	ND	mg/L	0.020						
Barium	ND	mg/L	0.010						
Cadmium	ND	mg/L	0.0020						
Chromium	ND	mg/L	0.0060						
Lead	ND	mg/L	0.0050						
Selenium	ND	mg/L	0.050						
Silver	ND	mg/L	0.0050						

Sample ID: LCS-18449 *LCS*

Batch ID: 18449 **Analysis Date:** 3/5/2009 11:38:15 AM

Arsenic	0.4725	mg/L	0.020	94.5	80	120			
Barium	0.4524	mg/L	0.010	90.5	80	120			
Cadmium	0.4577	mg/L	0.0020	91.5	80	120			
Chromium	0.4606	mg/L	0.0060	92.1	80	120			
Lead	0.4609	mg/L	0.0050	92.2	80	120			
Selenium	0.4538	mg/L	0.050	90.8	80	120			
Silver	0.4560	mg/L	0.0050	91.2	80	120			

Method: SM 2540 C: Total Dissolved Solids

Sample ID: MB-18436 *MBLK*

Batch ID: 18436 **Analysis Date:** 3/2/2009

Total Dissolved Solids	ND	mg/L	20						
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Sample ID: LCS-18436 *LCS*

Batch ID: 18436 **Analysis Date:** 3/2/2009

Total Dissolved Solids	1014	mg/L	20	101	80	120			
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Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name WESTERN REFINING SOUT

Date Received:

2/27/2009

Work Order Number 0902314

Received by: TLS

Checklist completed by:

Signature

Date

Sample ID labels checked by:

Initials

Matrix:

Carrier name: Greyhound

Shipping container/cooler in good condition?

Yes ☒No ☐Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☒No ☐Not Present ☐Not Shipped ☐

Custody seals intact on sample bottles?

Yes ☐No ☐N/A ☒

Chain of custody present?

Yes ☒No ☐

Chain of custody signed when relinquished and received?

Yes ☒No ☐

Chain of custody agrees with sample labels?

Yes ☒No ☐

Samples in proper container/bottle?

Yes ☒No ☐

Sample containers intact?

Yes ☒No ☐

Sufficient sample volume for indicated test?

Yes ☒No ☐

All samples received within holding time?

Yes ☒No ☐

Water - VOA vials have zero headspace?

No VOA vials submitted ☐Yes ☒No ☐

Water - Preservation labels on bottle and cap match?

Yes ☒No ☐N/A ☐

Water - pH acceptable upon receipt?

Yes ☒No ☐N/A ☐

Container/Temp Blank temperature?

1°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted

Date contacted:

Person contacted

Contacted by:

Regarding:

Comments:

Corrective Action



COVER LETTER

Monday, May 11, 2009

Bruce Cauthen
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4161
FAX (505) 632-3911
RE: GBR

Order No.: 0905001

Dear Bruce Cauthen:

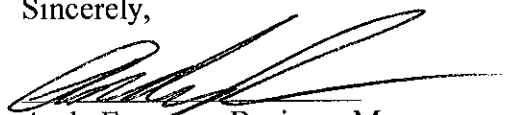
Hall Environmental Analysis Laboratory, Inc. received 2 sample(s) on 5/1/2009 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,



Andy Freeman, Business Manager
Nancy McDuffie, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

Hall Environmental Analysis Laboratory, Inc.

Date: 11-May-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0905001
Project: GBR
Lab ID: 0905001-01

Client Sample ID: Influent
Collection Date: 4/30/2009 12:14:00 PM
Date Received: 5/1/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: TAF
Fluoride	0.72	0.10		mg/L	1	5/1/2009 8:25:30 AM
Chloride	87	1.0		mg/L	10	5/1/2009 8:42:55 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	5/1/2009 8:25:30 AM
Bromide	0.38	0.10		mg/L	1	5/1/2009 8:25:30 AM
Nitrogen, Nitrate (As N)	1.0	0.10		mg/L	1	5/1/2009 8:25:30 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	5/1/2009 8:25:30 AM
Sulfate	1800	25		mg/L	50	5/2/2009 3:37:59 PM
EPA METHOD 6010B: DISSOLVED METALS						Analyst: NMO
Calcium	340	10		mg/L	10	5/5/2009 11:57:31 AM
Iron	0.040	0.020		mg/L	1	5/5/2009 11:14:15 AM
Magnesium	26	1.0		mg/L	1	5/5/2009 11:14:15 AM
Manganese	0.37	0.0020		mg/L	1	5/5/2009 11:14:15 AM
Potassium	3.2	1.0		mg/L	1	5/5/2009 11:14:04 PM
Sodium	420	10		mg/L	10	5/5/2009 11:57:31 AM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Toluene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Ethylbenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Naphthalene	ND	2.0		µg/L	1	5/2/2009 4:26:04 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	5/2/2009 4:26:04 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	5/2/2009 4:26:04 PM
Acetone	ND	10		µg/L	1	5/2/2009 4:26:04 PM
Bromobenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Bromodichloromethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Bromoform	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Bromomethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
2-Butanone	ND	10		µg/L	1	5/2/2009 4:26:04 PM
Carbon disulfide	ND	10		µg/L	1	5/2/2009 4:26:04 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Chlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Chloroethane	ND	2.0		µg/L	1	5/2/2009 4:26:04 PM
Chloroform	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Chloromethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
2-Chlorotoluene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
4-Chlorotoluene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Date: 11-May-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0905001
Project: GBR
Lab ID: 0905001-01

Client Sample ID: Influent
Collection Date: 4/30/2009 12:14:00 PM
Date Received: 5/1/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
cis-1,2-DCE	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	5/2/2009 4:26:04 PM
Dibromochloromethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Dibromomethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	5/2/2009 4:26:04 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
2-Hexanone	ND	10		µg/L	1	5/2/2009 4:26:04 PM
Isopropylbenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	5/2/2009 4:26:04 PM
Methylene Chloride	ND	3.0		µg/L	1	5/2/2009 4:26:04 PM
n-Butylbenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
n-Propylbenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
sec-Butylbenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Styrene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
tert-Butylbenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	5/2/2009 4:26:04 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
trans-1,2-DCE	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	5/2/2009 4:26:04 PM
Vinyl chloride	ND	1.0		µg/L	1	5/2/2009 4:26:04 PM
Xylenes, Total	2.1	1.5		µg/L	1	5/2/2009 4:26:04 PM
Surr: 1,2-Dichloroethane-d4	82.8	68.1-123		%REC	1	5/2/2009 4:26:04 PM
Surr: 4-Bromofluorobenzene	86.2	53.2-145		%REC	1	5/2/2009 4:26:04 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 2 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 11-May-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0905001
Project: GBR
Lab ID: 0905001-01

Client Sample ID: Influent
Collection Date: 4/30/2009 12:14:00 PM
Date Received: 5/1/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Surr: Dibromofluoromethane	84.1	68.5-119		%REC	1	5/2/2009 4:26:04 PM
Surr: Toluene-d8	95.3	64-131		%REC	1	5/2/2009 4:26:04 PM
SM 2320B: ALKALINITY						Analyst: BDH
Alkalinity, Total (As CaCO ₃)	300	20		mg/L CaCO ₃	1	5/1/2009
Carbonate	ND	2.0		mg/L CaCO ₃	1	5/1/2009
Bicarbonate	300	20		mg/L CaCO ₃	1	5/1/2009
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: BDH
Specific Conductance	3100	0.010		µmhos/cm	1	5/1/2009
SM4500-H+B: PH						Analyst: BDH
pH	7.35	0.1		pH units	1	5/1/2009
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	2700	40		mg/L	1	5/6/2009

Qualifiers:

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- E Estimated value
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- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 3 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 11-May-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0905001
Project: GBR
Lab ID: 0905001-02

Client Sample ID: Effluent
Collection Date: 4/30/2009 12:45:00 PM
Date Received: 5/1/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: TAF
Fluoride	0.87	0.10		mg/L	1	5/1/2009 9:00:20 AM
Chloride	85	1.0		mg/L	10	5/1/2009 9:17:45 AM
Nitrogen, Nitrite (As N)	0.15	0.10		mg/L	1	5/1/2009 9:00:20 AM
Bromide	0.37	0.10		mg/L	1	5/1/2009 9:00:20 AM
Nitrogen, Nitrate (As N)	0.78	0.10		mg/L	1	5/1/2009 9:00:20 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	5/1/2009 9:00:20 AM
Sulfate	1600	25		mg/L	50	5/2/2009 4:30:13 PM
EPA METHOD 6010B: DISSOLVED METALS						Analyst: NMO
Calcium	340	10		mg/L	10	5/5/2009 11:59:57 AM
Iron	0.030	0.020		mg/L	1	5/5/2009 11:17:24 AM
Magnesium	27	1.0		mg/L	1	5/5/2009 11:17:24 AM
Manganese	0.36	0.0020		mg/L	1	5/5/2009 11:17:24 AM
Potassium	3.0	1.0		mg/L	1	5/5/2009 1:15:56 PM
Sodium	410	10		mg/L	10	5/5/2009 11:59:57 AM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Toluene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Ethylbenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Naphthalene	ND	2.0		µg/L	1	5/2/2009 4:54:41 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	5/2/2009 4:54:41 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	5/2/2009 4:54:41 PM
Acetone	ND	10		µg/L	1	5/2/2009 4:54:41 PM
Bromobenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Bromodichloromethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Bromoform	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Bromomethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
2-Butanone	ND	10		µg/L	1	5/2/2009 4:54:41 PM
Carbon disulfide	ND	10		µg/L	1	5/2/2009 4:54:41 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Chlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Chloroethane	ND	2.0		µg/L	1	5/2/2009 4:54:41 PM
Chloroform	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Chloromethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
2-Chlorotoluene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
4-Chlorotoluene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 4 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 11-May-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0905001
Project: GBR
Lab ID: 0905001-02

Client Sample ID: Effluent
Collection Date: 4/30/2009 12:45:00 PM
Date Received: 5/1/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
cis-1,2-DCE	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	5/2/2009 4:54:41 PM
Dibromochloromethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Dibromomethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	5/2/2009 4:54:41 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
2-Hexanone	ND	10		µg/L	1	5/2/2009 4:54:41 PM
Isopropylbenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	5/2/2009 4:54:41 PM
Methylene Chloride	ND	3.0		µg/L	1	5/2/2009 4:54:41 PM
n-Butylbenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
n-Propylbenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
sec-Butylbenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Styrene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
tert-Butylbenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	5/2/2009 4:54:41 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
trans-1,2-DCE	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	5/2/2009 4:54:41 PM
Vinyl chloride	ND	1.0		µg/L	1	5/2/2009 4:54:41 PM
Xylenes, Total	ND	1.5		µg/L	1	5/2/2009 4:54:41 PM
Surr: 1,2-Dichloroethane-d4	86.0	68.1-123		%REC	1	5/2/2009 4:54:41 PM
Surr: 4-Bromofluorobenzene	88.2	53.2-145		%REC	1	5/2/2009 4:54:41 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 5 of 6

Hall Environmental Analysis Laboratory, Inc.

Date: 11-May-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0905001
Project: GBR
Lab ID: 0905001-02

Client Sample ID: Effluent
Collection Date: 4/30/2009 12:45:00 PM
Date Received: 5/1/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Surr: Dibromofluoromethane	87.6	68.5-119		%REC	1	5/2/2009 4:54:41 PM
Surr: Toluene-d8	93.4	64-131		%REC	1	5/2/2009 4:54:41 PM
SM 2320B: ALKALINITY						Analyst: BDH
Alkalinity, Total (As CaCO ₃)	310	20		mg/L CaCO ₃	1	5/1/2009
Carbonate	ND	2.0		mg/L CaCO ₃	1	5/1/2009
Bicarbonate	310	20		mg/L CaCO ₃	1	5/1/2009
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: BDH
Specific Conductance	3100	0.010		µmhos/cm	1	5/1/2009
SM4500-H+B: PH						Analyst: BDH
pH	7.47	0.1		pH units	1	5/1/2009
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	2800	40		mg/L	1	5/6/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 6 of 6

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0905001

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions									
Sample ID: MB		MBLK							
					Batch ID: R33502		Analysis Date:		5/1/2009 7:50:41 AM
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Nitrogen, Nitrite (As N)	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrogen, Nitrate (As N)	ND	mg/L	0.10						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: MB-2		MBLK							
					Batch ID: R33502		Analysis Date:		5/1/2009 11:13:20 PM
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Nitrogen, Nitrite (As N)	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrogen, Nitrate (As N)	ND	mg/L	0.10						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: MB		MBLK							
					Batch ID: R33509		Analysis Date:		5/2/2009 1:01:19 PM
Fluoride	ND	mg/L	0.10						
Chloride	ND	mg/L	0.10						
Nitrogen, Nitrite (As N)	ND	mg/L	0.10						
Bromide	ND	mg/L	0.10						
Nitrogen, Nitrate (As N)	ND	mg/L	0.10						
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50						
Sulfate	ND	mg/L	0.50						
Sample ID: LCS		LCS							
					Batch ID: R33502		Analysis Date:		5/1/2009 8:08:05 AM
Fluoride	0.5169	mg/L	0.10	103	90	110			
Chloride	5.237	mg/L	0.10	105	90	110			
Nitrogen, Nitrite (As N)	0.9641	mg/L	0.10	96.4	90	110			
Bromide	2.657	mg/L	0.10	106	90	110			
Nitrogen, Nitrate (As N)	2.668	mg/L	0.10	107	90	110			
Phosphorus, Orthophosphate (As P)	5.230	mg/L	0.50	105	90	110			
Sulfate	10.43	mg/L	0.50	104	90	110			
Sample ID: LCS-2		LCS							
					Batch ID: R33502		Analysis Date:		5/1/2009 11:30:45 PM
Fluoride	0.5035	mg/L	0.10	101	90	110			
Chloride	5.098	mg/L	0.10	102	90	110			
Nitrogen, Nitrite (As N)	0.9539	mg/L	0.10	95.4	90	110			
Bromide	2.602	mg/L	0.10	104	90	110			
Nitrogen, Nitrate (As N)	2.631	mg/L	0.10	105	90	110			
Phosphorus, Orthophosphate (As P)	5.167	mg/L	0.50	103	90	110			
Sulfate	10.26	mg/L	0.50	103	90	110			
Sample ID: LCS		LCS							
					Batch ID: R33509		Analysis Date:		5/2/2009 1:18:43 PM
Fluoride	0.4675	mg/L	0.10	93.5	90	110			
Chloride	5.064	mg/L	0.10	101	90	110			
Nitrogen, Nitrite (As N)	0.9170	mg/L	0.10	91.7	90	110			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 1

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 0905001

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 300.0: Anions

Sample ID: LCS

LCS

Batch ID: R33509 Analysis Date: 5/2/2009 1:18:43 PM

Bromide	2.553	mg/L	0.10	102	90	110			
Nitrogen, Nitrate (As N)	2.621	mg/L	0.10	105	90	110			
Phosphorus, Orthophosphate (As P)	5.077	mg/L	0.50	102	90	110			
Sulfate	10.20	mg/L	0.50	102	90	110			

Method: SM 2320B: Alkalinity

Sample ID: 0905001-02BMSD

MSD

Batch ID: R33508 Analysis Date: 5/1/2009

Alkalinity, Total (As CaCO ₃)	381.4	mg/L CaC	20	94.1	80	120	0.0315	20	
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Sample ID: MB-R33508

MBLK

Batch ID: R33508 Analysis Date: 5/1/2009

Alkalinity, Total (As CaCO ₃)	ND	mg/L CaC	20						
Carbonate	ND	mg/L CaC	2.0						
Bicarbonate	ND	mg/L CaC	20						

Sample ID: LCS-R33508

LCS

Batch ID: R33508 Analysis Date: 5/1/2009

Alkalinity, Total (As CaCO ₃)	82.20	mg/L CaC	20	103	80	120			
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Sample ID: 0905001-02BMS

MS

Batch ID: R33508 Analysis Date: 5/1/2009

Alkalinity, Total (As CaCO ₃)	381.3	mg/L CaC	20	93.9	80	120			
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Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 0905001

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 6010B: Dissolved Metals

Sample ID: 0905001-02CMSD MSD Batch ID: R33535 Analysis Date: 5/5/2009 11:38:47 AM

Iron 0.5004 mg/L 0.020 94.1 75 125 4.30 20

Magnesium 72.00 mg/L 1.0 89.3 75 125 12.2 20

Manganese 0.8511 mg/L 0.0020 97.3 75 125 2.30 20

Sample ID: 0905001-02CMSD MSD Batch ID: R33535 Analysis Date: 5/5/2009 1:30:56 PM

Potassium 56.96 mg/L 1.0 98.0 75 125 12.4 20

Sample ID: MB MBLK Batch ID: R33535 Analysis Date: 5/5/2009 10:03:59 AM

Calcium ND mg/L 1.0

Iron ND mg/L 0.020

Magnesium ND mg/L 1.0

Manganese ND mg/L 0.0020

Potassium ND mg/L 1.0

Sodium ND mg/L 1.0

Sample ID: LCS LCS Batch ID: R33535 Analysis Date: 5/5/2009 10:07:02 AM

Calcium 52.58 mg/L 1.0 104 80 120

Iron 0.4987 mg/L 0.020 99.7 80 120

Magnesium 52.26 mg/L 1.0 103 80 120

Manganese 0.4851 mg/L 0.0020 97.0 80 120

Potassium 54.47 mg/L 1.0 98.9 80 120

Sodium 56.98 mg/L 1.0 113 80 120

Sample ID: 0905001-02CMS MS Batch ID: R33535 Analysis Date: 5/5/2009 11:34:48 AM

Iron 0.5224 mg/L 0.020 98.5 75 125

Magnesium 81.37 mg/L 1.0 108 75 125

Manganese 0.8317 mg/L 0.0020 93.5 75 125

Sample ID: 0905001-02CMS MS Batch ID: R33535 Analysis Date: 5/5/2009 1:29:03 PM

Potassium 64.50 mg/L 1.0 112 75 125

Method: SM2540C MOD: Total Dissolved Solids

Sample ID: 0905001-02BMSD MSD Batch ID: 19030 Analysis Date: 5/6/2009

Total Dissolved Solids 4810 mg/L 40 103 80 120 0.375 20

Sample ID: MB-19030 MBLK Batch ID: 19030 Analysis Date: 5/6/2009

Total Dissolved Solids ND mg/L 20

Sample ID: LCS-19030 LCS Batch ID: 19030 Analysis Date: 5/6/2009

Total Dissolved Solids 1020 mg/L 20 102 80 120

Sample ID: 0905001-02BMS MS Batch ID: 19030 Analysis Date: 5/6/2009

Total Dissolved Solids 4792 mg/L 40 102 80 120

Qualifiers:

E Estimated value

J Analyte detected below quantitation limits

R RPD outside accepted recovery limits

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

S Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 0905001

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R33496 Analysis Date: 5/1/2009 8:54:14 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 1

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0905001

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R33496 Analysis Date: 5/1/2009 8:54:14 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b5

MBLK

Batch ID: R33496 Analysis Date: 5/1/2009 10:42:43 PM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 2

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 0905001

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b5

MBLK

Batch ID: R33496 Analysis Date: 5/1/2009 10:42:43 PM

Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b8

MBLK

Batch ID: R33496 Analysis Date: 5/2/2009 11:10:33 AM

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 3

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 0905001

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b6

MBLK

Batch ID: R33496 Analysis Date: 5/2/2009 11:10:33 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0905001

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b8

MBLK

Batch ID: R33496 Analysis Date: 5/2/2009 11:10:33 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng lcs_b

LCS

Batch ID: R33496 Analysis Date: 5/1/2009 10:58:26 AM

Benzene	19.52	µg/L	1.0	97.6	76.7	114
Toluene	19.53	µg/L	1.0	97.7	78.4	117
Chlorobenzene	21.67	µg/L	1.0	108	80.7	127
1,1-Dichloroethene	21.66	µg/L	1.0	108	80.2	128
Trichloroethene (TCE)	18.53	µg/L	1.0	92.6	77.4	115

Sample ID: 100ng lcs_c

LCS

Batch ID: R33496 Analysis Date: 5/1/2009 11:40:04 PM

Benzene	19.21	µg/L	1.0	96.1	76.7	114
Toluene	19.61	µg/L	1.0	98.1	78.4	117
Chlorobenzene	21.31	µg/L	1.0	107	80.7	127
1,1-Dichloroethene	20.84	µg/L	1.0	104	80.2	128
Trichloroethene (TCE)	18.05	µg/L	1.0	90.3	77.4	115

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name WESTERN REFINING SOUT

Date Received:

5/1/2009

Work Order Number 0905001

Received by: TLS

Checklist completed by:

Signature

Date

Sample ID labels checked by:

Initials

Matrix:

Carrier name: Greyhound

Shipping container/cooler in good condition?	Yes ☒	No ☐	Not Present ☐	
Custody seals intact on shipping container/cooler?	Yes ☒	No ☐	Not Present ☐	Not Shipped ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	N/A ☒	
Chain of custody present?	Yes ☒	No ☐		
Chain of custody signed when relinquished and received?	Yes ☒	No ☐		
Chain of custody agrees with sample labels?	Yes ☒	No ☐		
Samples in proper container/bottle?	Yes ☒	No ☐		
Sample containers intact?	Yes ☒	No ☐		
Sufficient sample volume for indicated test?	Yes ☒	No ☐		
All samples received within holding time?	Yes ☒	No ☐		
Water - VOA vials have zero headspace?	No VOA vials submitted ☐	Yes ☒	No ☐	
Water - Preservation labels on bottle and cap match?	Yes ☒	No ☐	N/A ☐	
Water - pH acceptable upon receipt?	Yes ☒	No ☐	N/A ☐	
Container/Temp Blank temperature?	4°	<6° C Acceptable If given sufficient time to cool.		

COMMENTS:

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: Per TL head #2 was collected at 1245. TS 5/1/09

Corrective Action _____

Chain-of-Custody Record

Client: Western Refining

Bruce Canthen

Address: 111 CR 4990

Bloomfield, NM 87413

Phone #:

email or Fax#:

QA/QC Package:

☒ Standard ☐ Level 4 (Full Validation)

Standard

☐ Other _____☐ EDD (Type)

Da

Time

Sample Request ID

Container

Preservative
Type

HEAL No.

043009

214

Influent

643059

056

8th June +

Date: _____

Time:

Relinquished by:

Relinquished by: _____

Received by:

1

Date: 5/

Time:

Relinquished by:

Reiminished by: 10/10/10

Bacillus/bac

1

Remarks:

Turn-Around Time:	☒ Standard ☐ Rush
Project Name:	GBR
Project #:	

Project Manager: Ashley Ager	
Sampler:	
On-site:	Yes ☒ No ☐
Sample Temperature:	°F

[illegible]

Received by:	5/1/09	715
Received by:		

[illegible]

Page 2732 of 2732



COVER LETTER

Wednesday, July 15, 2009

Bruce Cauthen
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4161
FAX (505) 632-3911
RE: GBR

Order No.: 0907100

Dear Bruce Cauthen:

Hall Environmental Analysis Laboratory, Inc. received 3 sample(s) on 7/7/2009 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", written over a horizontal line.

Andy Freeman, Business Manager
Nancy McDuffie, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0907100
Project: GBR
Lab ID: 0907100-01

Client Sample ID: Influent
Collection Date: 7/6/2009 8:12:00 AM
Date Received: 7/7/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.80	0.10		mg/L	1	7/7/2009 11:06:01 PM
Chloride	88	2.0		mg/L	20	7/7/2009 11:23:26 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	7/7/2009 11:06:01 PM
Bromide	0.51	0.10		mg/L	1	7/7/2009 11:06:01 PM
Nitrogen, Nitrate (As N)	2.7	0.10		mg/L	1	7/7/2009 11:06:01 PM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	7/7/2009 11:06:01 PM
Sulfate	1600	25		mg/L	50	7/8/2009 8:13:37 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Toluene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Ethylbenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Naphthalene	ND	2.0		µg/L	1	7/9/2009 5:10:27 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	7/9/2009 5:10:27 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	7/9/2009 5:10:27 PM
Acetone	ND	10		µg/L	1	7/9/2009 5:10:27 PM
Bromobenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Bromodichloromethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Bromoform	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Bromomethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
2-Butanone	ND	10		µg/L	1	7/9/2009 5:10:27 PM
Carbon disulfide	ND	10		µg/L	1	7/9/2009 5:10:27 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Chlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Chloroethane	ND	2.0		µg/L	1	7/9/2009 5:10:27 PM
Chloroform	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Chloromethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
2-Chlorotoluene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
4-Chlorotoluene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
cis-1,2-DCE	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/9/2009 5:10:27 PM
Dibromochloromethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Dibromomethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

CLIENT: Western Refining Southwest, Inc.
 Lab Order: 0907100
 Project: GBR
 Lab ID: 0907100-01

Client Sample ID: Influent
 Collection Date: 7/6/2009 8:12:00 AM
 Date Received: 7/7/2009
 Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	7/9/2009 5:10:27 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
2-Hexanone	ND	10		µg/L	1	7/9/2009 5:10:27 PM
Isopropylbenzene	1.2	1.0		µg/L	1	7/9/2009 5:10:27 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	7/9/2009 5:10:27 PM
Methylene Chloride	ND	3.0		µg/L	1	7/9/2009 5:10:27 PM
n-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
n-Propylbenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
sec-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Styrene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
tert-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/9/2009 5:10:27 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
trans-1,2-DCE	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/9/2009 5:10:27 PM
Vinyl chloride	ND	1.0		µg/L	1	7/9/2009 5:10:27 PM
Xylenes, Total	2.4	1.5		µg/L	1	7/9/2009 5:10:27 PM
Surr: 1,2-Dichloroethane-d4	105	68.1-123		%REC	1	7/9/2009 5:10:27 PM
Surr: 4-Bromofluorobenzene	107	53.2-145		%REC	1	7/9/2009 5:10:27 PM
Surr: Dibromofluoromethane	111	68.5-119		%REC	1	7/9/2009 5:10:27 PM
Surr: Toluene-d8	100	64-131		%REC	1	7/9/2009 5:10:27 PM

SM 2320B: ALKALINITY

Analyst: NSB

Alkalinity, Total (As CaCO3)	420	20		mg/L CaCO3	1	7/10/2009
Carbonate	ND	2.0		mg/L CaCO3	1	7/10/2009
Bicarbonate	420	20		mg/L CaCO3	1	7/10/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

S Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0907100
Project: GBR
Lab ID: 0907100-01

Client Sample ID: Influent
Collection Date: 7/6/2009 8:12:00 AM
Date Received: 7/7/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: NSB
Specific Conductance	3000	0.010		µmhos/cm	1	7/10/2009
SM4500-H+B: PH						Analyst: NSB
pH	7.50	0.1		pH units	1	7/13/2009
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: KMS
Total Dissolved Solids	2700	20		mg/L	1	7/8/2009

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0907100
Project: GBR
Lab ID: 0907100-02

Client Sample ID: Effluent
Collection Date: 7/6/2009 8:40:00 AM
Date Received: 7/7/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: RAGS
Fluoride	0.84	0.10		mg/L	1	7/7/2009 11:40:51 PM
Chloride	87	2.0		mg/L	20	7/7/2009 11:58:16 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	7/7/2009 11:40:51 PM
Bromide	0.51	0.10		mg/L	1	7/7/2009 11:40:51 PM
Nitrogen, Nitrate (As N)	2.3	0.10		mg/L	1	7/7/2009 11:40:51 PM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	7/7/2009 11:40:51 PM
Sulfate	1500	25		mg/L	50	7/8/2009 8:31:02 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Toluene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Ethylbenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Naphthalene	ND	2.0		µg/L	1	7/9/2009 5:39:49 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	7/9/2009 5:39:49 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	7/9/2009 5:39:49 PM
Acetone	ND	10		µg/L	1	7/9/2009 5:39:49 PM
Bromobenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Bromodichloromethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Bromoform	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Bromomethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
2-Butanone	ND	10		µg/L	1	7/9/2009 5:39:49 PM
Carbon disulfide	ND	10		µg/L	1	7/9/2009 5:39:49 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Chlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Chloroethane	ND	2.0		µg/L	1	7/9/2009 5:39:49 PM
Chloroform	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Chloromethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
2-Chlorotoluene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
4-Chlorotoluene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
cis-1,2-DCE	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/9/2009 5:39:49 PM
Dibromochloromethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Dibromomethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 4 of 8

Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0907100
Project: GBR
Lab ID: 0907100-02

Client Sample ID: Effluent
Collection Date: 7/6/2009 8:40:00 AM
Date Received: 7/7/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	7/9/2009 5:39:49 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
2-Hexanone	ND	10		µg/L	1	7/9/2009 5:39:49 PM
Isopropylbenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	7/9/2009 5:39:49 PM
Methylene Chloride	ND	3.0		µg/L	1	7/9/2009 5:39:49 PM
n-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
n-Propylbenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
sec-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Styrene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
tert-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/9/2009 5:39:49 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
trans-1,2-DCE	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/9/2009 5:39:49 PM
Vinyl chloride	ND	1.0		µg/L	1	7/9/2009 5:39:49 PM
Xylenes, Total	ND	1.5		µg/L	1	7/9/2009 5:39:49 PM
Surr: 1,2-Dichloroethane-d4	108	68.1-123		%REC	1	7/9/2009 5:39:49 PM
Surr: 4-Bromofluorobenzene	102	53.2-145		%REC	1	7/9/2009 5:39:49 PM
Surr: Dibromofluoromethane	106	68.5-119		%REC	1	7/9/2009 5:39:49 PM
Surr: Toluene-d8	104	64-131		%REC	1	7/9/2009 5:39:49 PM
SM 2320B: ALKALINITY						Analyst: NSB
Alkalinity, Total (As CaCO3)	420	20		mg/L CaCO3	1	7/10/2009
Carbonate	ND	2.0		mg/L CaCO3	1	7/10/2009
Bicarbonate	420	20		mg/L CaCO3	1	7/10/2009

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 5 of 8

Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0907100
Project: GBR
Lab ID: 0907100-02

Client Sample ID: Effluent
Collection Date: 7/6/2009 8:40:00 AM
Date Received: 7/7/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
Analyst: NSB						
EPA 120.1: SPECIFIC CONDUCTANCE						7/10/2009
Specific Conductance	3100	0.010		µmhos/cm	1	
Analyst: NSB						
SM4500-H+B: PH						7/13/2009
pH	7.85	0.1		pH units	1	
Analyst: KMS						
SM2540C MOD: TOTAL DISSOLVED SOLIDS						7/8/2009
Total Dissolved Solids	2700	20		mg/L	1	

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 6 of 8

Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0907100
Project: GBR
Lab ID: 0907100-03

Client Sample ID: TRIP BLANK
Collection Date:
Date Received: 7/7/2009
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Toluene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Ethylbenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Naphthalene	ND	2.0		µg/L	1	7/9/2009 7:07:52 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	7/9/2009 7:07:52 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	7/9/2009 7:07:52 PM
Acetone	ND	10		µg/L	1	7/9/2009 7:07:52 PM
Bromobenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Bromodichloromethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Bromoform	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Bromomethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
2-Butanone	ND	10		µg/L	1	7/9/2009 7:07:52 PM
Carbon disulfide	ND	10		µg/L	1	7/9/2009 7:07:52 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Chlorobenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Chloroethane	ND	2.0		µg/L	1	7/9/2009 7:07:52 PM
Chloroform	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Chloromethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
2-Chlorotoluene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
4-Chlorotoluene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
cis-1,2-DCE	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/9/2009 7:07:52 PM
Dibromochloromethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Dibromomethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,3-Dichloropropane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	7/9/2009 7:07:52 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
2-Hexanone	ND	10		µg/L	1	7/9/2009 7:07:52 PM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

Page 7 of 8

Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0907100
Project: GBR
Lab ID: 0907100-03

Client Sample ID: TRIP BLANK
Collection Date:
Date Received: 7/7/2009
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	7/9/2009 7:07:52 PM
Methylene Chloride	ND	3.0		µg/L	1	7/9/2009 7:07:52 PM
n-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
n-Propylbenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
sec-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Styrene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
tert-Butylbenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/9/2009 7:07:52 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
trans-1,2-DCE	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/9/2009 7:07:52 PM
Vinyl chloride	ND	1.0		µg/L	1	7/9/2009 7:07:52 PM
Xylenes, Total	ND	1.5		µg/L	1	7/9/2009 7:07:52 PM
Surr: 1,2-Dichloroethane-d4	105	68.1-123		%REC	1	7/9/2009 7:07:52 PM
Surr: 4-Bromofluorobenzene	100	53.2-145		%REC	1	7/9/2009 7:07:52 PM
Surr: Dibromofluoromethane	112	68.5-119		%REC	1	7/9/2009 7:07:52 PM
Surr: Toluene-d8	103	64-131		%REC	1	7/9/2009 7:07:52 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 8 of 8

ENVIRONMENTAL
SCIENCE CORP.12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

July 15, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109Date Received : July 08, 2009
Description : 0907100

Sample ID : INFLUENT

Collected By :
Collection Date : 07/06/09 08:12

ESC Sample # : L411159-01

Site ID :

Project # : 0907100

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Calcium, Dissolved	300	0.50	mg/l	6010B	07/12/09	1
Magnesium, Dissolved	32.	0.10	mg/l	6010B	07/12/09	1
Potassium, Dissolved	2.7	0.50	mg/l	6010B	07/12/09	1
Sodium, Dissolved	510	0.50	mg/l	6010B	07/12/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Tax I.D. 62-0814289
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REPORT OF ANALYSIS

July 15, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

Date Received : July 08, 2009
Description : 0907100
Sample ID : INFLOUENT
Collected By :
Collection Date : 07/06/09 08:12

ESC Sample # : L411159-02
Site ID :
Project # : 0907100

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Manganese	0.54	0.0020	mg/l	6020	07/14/09	1
Iron	1.1	0.10	mg/l	6010B	07/14/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

The reported analytical results relate only to the sample submitted.

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REPORT OF ANALYSIS

July 15, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109

Date Received : July 08, 2009
Description : 0907100
Sample ID : EFFLUENT
Collected By :
Collection Date : 07/06/09 08:40

ESC Sample # : L411159-03

Site ID :
Project # : 0907100

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Calcium, Dissolved	310	0.50	mg/l	6010B	07/12/09	1
Magnesium, Dissolved	33.	0.10	mg/l	6010B	07/12/09	1
Potassium, Dissolved	2.7	0.50	mg/l	6010B	07/12/09	1
Sodium, Dissolved	510	0.50	mg/l	6010B	07/12/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit (PQL)

Note:

The reported analytical results relate only to the sample submitted.

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REPORT OF ANALYSIS

July 15, 2009

Anne Thorne
Hall Environmental Analysis Laborat
4901 Hawkins NE
Albuquerque, NM 87109Date Received : July 08, 2009
Description : 0907100

Sample ID : EFFLUENT

Collected By :
Collection Date : 07/06/09 08:40

ESC Sample # : L411159-04

Site ID :

Project # : 0907100

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Manganese	0.49	0.0020	mg/l	6020	07/14/09	1
Iron	BDL	0.10	mg/l	6010B	07/14/09	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 07/15/09 10:31 Printed: 07/15/09 10:31

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L411159-04	WG430518	SAMP	Manganese	R818246	V

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
-----------	---------

V	(ESC) - Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.
---	---

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable unless qualified as 'R' (Rejected).

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.



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Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

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Hall Environmental Analysis Laboratory
Anne Thorne
4901 Hawkins NE

Quality Assurance Report Level II

Albuquerque, NM 87109

July 15, 2009

L411159

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Calcium, Dissolved	< .1	mg/l		20	WG430704	07/13/09 03:58
Magnesium, Dissolved	< .1	mg/l		20	WG430704	07/13/09 03:58
Potassium, Dissolved	< .5	mg/l		20	WG430704	07/13/09 03:58
Sodium, Dissolved	< .5	mg/l		20	WG430704	07/13/09 03:58
Manganese	< .002	mg/l		20	WG430518	07/14/09 17:09
Iron	< .1	mg/l		20	WG430880	07/14/09 02:00

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Calcium, Dissolved	mg/l	16.4	16.5	2.26	20	L411168-08	WG430704
Magnesium, Dissolved	mg/l	4.38	4.48	0.00	20	L411168-08	WG430704
Potassium, Dissolved	mg/l	3.07	3.07	0.00	20	L411168-08	WG430704
Sodium, Dissolved	mg/l	3.93	3.88	1.19	20	L411168-08	WG430704
Manganese	mg/l	0.506	0.490	3.21	20	L411159-04	WG430518
Iron	mg/l	6.15	6.10	0.816	20	L411428-02	WG430880

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Calcium, Dissolved	mg/l	10.9	10.7	97.7	85-115	WG430704
Magnesium, Dissolved	mg/l	11.3	11.0	97.3	85-115	WG430704
Potassium, Dissolved	mg/l	11.3	10.6	93.8	85-115	WG430704
Sodium, Dissolved	mg/l	11.3	10.8	95.6	85-115	WG430704
Manganese	mg/l	0.0567	0.0545	96.1	85-115	WG430518
Iron	mg/l	1.13	1.12	99.1	85-115	WG430880

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Calcium, Dissolved	mg/l	26.7	16.2	11.3	84.7	75-125	L411168-08	WG430704
Magnesium, Dissolved	mg/l	14.1	4.48	11.3	85.1	75-125	L411168-08	WG430704
Potassium, Dissolved	mg/l	12.5	3.07	11.3	83.5	75-125	L411168-08	WG430704
Sodium, Dissolved	mg/l	3.29	3.38	11.3	0.00	75-125	L411168-08	WG430704
Manganese	mg/l	0.559	0.490	0.567	122.	70-130	L411159-04	WG430518
Iron	mg/l	7.23	6.10	1.13	100.	75-125	L411428-02	WG430880

Analyte	Units	MSD	Ref	% Rec	Limit	RPD	Limit	Ref Samp	Batch
Calcium, Dissolved	mg/l	26.7	26.1	107	75-125	8.49	20	L411168-08	WG430704
Magnesium, Dissolved	mg/l	15.8	14.1	100.	75-125	11.4	20	L411168-08	WG430704
Potassium, Dissolved	mg/l	14.0	12.5	96.7	75-125	11.3	20	L411168-08	WG430704

* Performance of this Analyte is outside of established criteria.

For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Hall Environmental Analysis Laboratory
Anne Thorne
4901 Hawkins NE

Quality Assurance Report Level II

Albuquerque, NM 87109

July 15, 2009

L411159

Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Sodium Dissolved	mg/l	0.570	0.559	141.093*	70-130	1.95	20	L411159-04	WG430704
Manganese	mg/l	7.36	7.23	112.	75-125	1.78	20	L411428-02	WG430518
Iron	mg/l								WG430880

Batch number / Run number / Sample number cross reference

WG430704: R813886: L411159-01 03
WG430518: R818246: L411159-02 04
WG430880: R818306: L411159-02 04

* * Calculations are performed prior to rounding of reported values .
* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0907100

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
---------	--------	-------	-----	------	----------	-----------	------	----------	------

Method: EPA Method 300.0: Anions

Sample ID: MB MBLK

Batch ID: R34419 Analysis Date: 7/7/2009 8:00:43 AM

Fluoride	ND	mg/L	0.10
Chloride	ND	mg/L	0.10
Nitrogen, Nitrite (As N)	ND	mg/L	0.10
Bromide	ND	mg/L	0.10
Nitrogen, Nitrate (As N)	ND	mg/L	0.10
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50
Sulfate	ND	mg/L	0.50

Sample ID: MB MBLK

Batch ID: R34435 Analysis Date: 7/8/2009 6:03:53 AM

Fluoride	ND	mg/L	0.10
Chloride	ND	mg/L	0.10
Nitrogen, Nitrite (As N)	ND	mg/L	0.10
Bromide	ND	mg/L	0.10
Nitrogen, Nitrate (As N)	ND	mg/L	0.10
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50
Sulfate	ND	mg/L	0.50

Sample ID: LCS LCS

Batch ID: R34419 Analysis Date: 7/7/2009 8:18:08 AM

Fluoride	0.4974	mg/L	0.10	99.5	90	110
Chloride	4.785	mg/L	0.10	95.7	90	110
Nitrogen, Nitrite (As N)	0.9147	mg/L	0.10	91.5	90	110
Bromide	2.511	mg/L	0.10	100	90	110
Nitrogen, Nitrate (As N)	2.445	mg/L	0.10	97.8	90	110
Phosphorus, Orthophosphate (As P)	4.768	mg/L	0.50	95.4	90	110
Sulfate	9.675	mg/L	0.50	96.7	90	110

Sample ID: LCS LCS

Batch ID: R34435 Analysis Date: 7/8/2009 6:21:18 AM

Fluoride	0.5170	mg/L	0.10	103	90	110
Chloride	4.947	mg/L	0.10	98.9	90	110
Nitrogen, Nitrite (As N)	0.9284	mg/L	0.10	92.8	90	110
Bromide	2.574	mg/L	0.10	103	90	110
Nitrogen, Nitrate (As N)	2.551	mg/L	0.10	102	90	110
Phosphorus, Orthophosphate (As P)	4.903	mg/L	0.50	98.1	90	110
Sulfate	9.833	mg/L	0.50	98.3	90	110

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0907100

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: SM 2320B: Alkalinity Sample ID: 0907100-02BMSD <i>MSD</i>									
Alkalinity, Total (As CaCO3)	477.7	mg/L CaC	20	73.1	80	120	1.80	20	S
Sample ID: MB <i>MBLK</i>									
Alkalinity, Total (As CaCO3)	ND	mg/L CaC	20						
Carbonate	ND	mg/L CaC	2.0						
Bicarbonate	ND	mg/L CaC	20						
Sample ID: MB <i>MBLK</i>									
Alkalinity, Total (As CaCO3)	ND	mg/L CaC	20						
Carbonate	ND	mg/L CaC	2.0						
Bicarbonate	ND	mg/L CaC	20						
Sample ID: 80PPM LCS <i>LCS</i>									
Alkalinity, Total (As CaCO3)	79.28	mg/L CaC	20	87.2	80	120			
Sample ID: 80PPM LCS <i>LCS</i>									
Alkalinity, Total (As CaCO3)	79.92	mg/L CaC	20	83.9	80	120			
Sample ID: 0907100-02BMS <i>MS</i>									
Alkalinity, Total (As CaCO3)	486.4	mg/L CaC	20	84.0	80	120			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Date: 15-Jul-09

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 0907100

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
---------	--------	-------	-----	------	----------	-----------	------	----------	------

Method: EPA Method 8260B: VOLATILES

Sample ID: 0907100-02a MSD

MSD

Batch ID: R34458 Analysis Date: 7/9/2009 6:38:37 PM

Benzene	20.73	µg/L	1.0	104	84.9	122	2.03	15
Toluene	19.13	µg/L	1.0	95.6	80.3	114	6.27	15
Chlorobenzene	19.17	µg/L	1.0	95.8	71.9	134	4.62	15
1,1-Dichloroethene	23.12	µg/L	1.0	116	88	144	0.621	17.8
Trichloroethene (TCE)	19.51	µg/L	1.0	97.5	87.1	114	3.89	19.8

Sample ID: 5ml rb

MBLK

Batch ID: R34458 Analysis Date: 7/9/2009 10:46:20 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0907100

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R34458 Analysis Date: 7/9/2009 10:46:20 AM

2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng lcs

LCS

Batch ID: R34458 Analysis Date: 7/9/2009 11:44:36 AM

Benzene	20.62	µg/L	1.0	103	76.7	114
Toluene	20.57	µg/L	1.0	103	78.4	117
Chlorobenzene	20.21	µg/L	1.0	101	80.7	127
1,1-Dichloroethene	23.91	µg/L	1.0	120	80.2	128
Trichloroethene (TCE)	21.14	µg/L	1.0	106	77.4	115

Sample ID: 0907100-02a MS

MS

Batch ID: R34458 Analysis Date: 7/9/2009 6:09:16 PM

Benzene	20.32	µg/L	1.0	102	84.9	122
Toluene	20.37	µg/L	1.0	102	80.3	114
Chlorobenzene	20.07	µg/L	1.0	100	71.9	134
1,1-Dichloroethene	23.27	µg/L	1.0	116	88	144
Trichloroethene (TCE)	20.28	µg/L	1.0	101	87.1	114

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.

Project: GBR

Work Order: 0907100

Analyte	Result	Units	PQL	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: SM2540C MOD: Total Dissolved Solids

Sample ID: MB-19668

MBLK

Batch ID: 19668 Analysis Date: 7/8/2009

Total Dissolved Solids ND mg/L 20

Sample ID: LCS-19568

LCS

Batch ID: 19568 Analysis Date: 7/8/2009

Total Dissolved Solids 1024 mg/L 20 102 80 120

Qualifiers:

E Estimated value

J Analyte detected below quantitation limits

R RPD outside accepted recovery limits

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

S Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name **WESTERN REFINING SOUT**

Date Received:

7/7/2009

Work Order Number **0907100**Received by: **TLS**

Checklist completed by:

Signature

Date

Sample ID labels checked by:

Initials

Matrix:

Carrier name: Greyhound

Shipping container/cooler in good condition?

Yes ☒No ☐Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☒No ☐Not Present ☐Not Shipped ☐

Custody seals intact on sample bottles?

Yes ☐No ☐N/A ☒

Chain of custody present?

Yes ☒No ☐

Chain of custody signed when relinquished and received?

Yes ☒No ☐

Chain of custody agrees with sample labels?

Yes ☒No ☐

Samples in proper container/bottle?

Yes ☒No ☐

Sample containers intact?

Yes ☒No ☐

Sufficient sample volume for indicated test?

Yes ☒No ☐

All samples received within holding time?

Yes ☒No ☐

Water - VOA vials have zero headspace?

No VOA vials submitted ☐Yes ☒No ☐

Water - Preservation labels on bottle and cap match?

Yes ☒No ☐N/A ☐

Water - pH acceptable upon receipt?

Yes ☒No ☐N/A ☐Number of preserved
bottles checked for
pH:4
<2 >12 unless noted
below.

Container/Temp Blank temperature?

4.9°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted

Date contacted:

Person contacted

Contacted by:

Regarding:

Comments:

Corrective Action



HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

BTEX + MTBE + TM
 BTEX + MTBE + TP
 TPH Method 8015B
 TPH (Method 418.1)
 EDB (Method 504.1)
 8310 (PNA or PAH)
 RCRA 8 Metals
 Anions (F, Cl, NO₃, NO₂)
 8081 Pesticides / 808
 8260B (VOA)
 8270 (Semi-VOA)
 Cations, anions
 TDS, EC
 pH
 Air Bubbles (Y or N)

A grid of graph paper with handwritten checkmarks. The checkmarks are located in the top-left corner, specifically in the first three rows and first two columns. There are 6 checkmarks in total.

Remarks: please copy results to
ala @ lodestar services.com

Chain-of-Custody Record

Client: Western Refining

3. We can then

Mailing Address: 111 CP 4990

Bloomfield NM 87413

Phone #:

Email or Fax#:

A/QC Package:

☐ Standard

Other

EDD (Type)

Wash DC

Sample Temperature

HEAL No
0907100

Container

Preservative
Type

Sample Request ID

	GW	Influent
0609 0812	GW	Effluent
0609 0410	GW	trip blank
0609 0700	GW	

Date:	Time:	Relinquished by:
-------	-------	------------------

1000

Date:	Time:	Relinquished by:
-------	-------	------------------

Received by:

2

Received by:

2

Date _____ Time _____

5

Date	Time
------	------

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.



COVER LETTER

Tuesday, October 27, 2009

Ashley Ager
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (970) 946-1093
FAX (505) 632-3911

RE: GBR

Order No.: 0910270

Dear Ashley Ager:

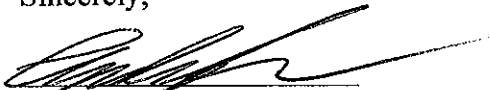
Hall Environmental Analysis Laboratory, Inc. received 3 sample(s) on 10/15/2009 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,



Andy Freeman, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107

www.hallenvironmental.com

Hall Environmental Analysis Laboratory, Inc.

Date: 27-Oct-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0910270
Project: GBR
Lab ID: 0910270-01

Client Sample ID: Effluent
Collection Date: 10/14/2009 11:31:00 AM
Date Received: 10/15/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: TAF
Fluoride	0.88	0.10		mg/L	1	10/16/2009 1:58:14 AM
Chloride	83	2.0		mg/L	20	10/16/2009 2:15:39 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	10/16/2009 1:58:14 AM
Bromide	0.51	0.10		mg/L	1	10/16/2009 1:58:14 AM
Nitrogen, Nitrate (As N)	ND	0.10		mg/L	1	10/16/2009 1:58:14 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	10/16/2009 1:58:14 AM
Sulfate	1500	25		mg/L	50	10/20/2009 10:34:26 PM
EPA METHOD 6010B: DISSOLVED METALS						Analyst: SNV
Calcium	290	5.0		mg/L	5	10/16/2009 2:37:42 PM
Iron	0.021	0.020		mg/L	1	10/16/2009 12:36:10 PM
Magnesium	32	1.0		mg/L	1	10/16/2009 12:36:10 PM
Manganese	0.58	0.0020		mg/L	1	10/16/2009 12:36:10 PM
Potassium	3.2	1.0		mg/L	1	10/16/2009 12:36:10 PM
Sodium	490	5.0		mg/L	5	10/16/2009 2:37:42 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Toluene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Ethylbenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Naphthalene	ND	2.0		µg/L	1	10/16/2009 12:10:41 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	10/16/2009 12:10:41 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	10/16/2009 12:10:41 AM
Acetone	ND	10		µg/L	1	10/16/2009 12:10:41 AM
Bromobenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Bromodichloromethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Bromoform	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Bromomethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
2-Butanone	ND	10		µg/L	1	10/16/2009 12:10:41 AM
Carbon disulfide	ND	10		µg/L	1	10/16/2009 12:10:41 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Chlorobenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Chloroethane	ND	2.0		µg/L	1	10/16/2009 12:10:41 AM
Chloroform	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Chloromethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
2-Chlorotoluene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
4-Chlorotoluene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 1 of 8

Hall Environmental Analysis Laboratory, Inc.

Date: 27-Oct-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0910270
Project: GBR
Lab ID: 0910270-01

Client Sample ID: Effluent
Collection Date: 10/14/2009 11:31:00 AM
Date Received: 10/15/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
cis-1,2-DCE	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	10/16/2009 12:10:41 AM
Dibromochloromethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Dibromomethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	10/16/2009 12:10:41 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
2-Hexanone	ND	10		µg/L	1	10/16/2009 12:10:41 AM
Isopropylbenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	10/16/2009 12:10:41 AM
Methylene Chloride	ND	3.0		µg/L	1	10/16/2009 12:10:41 AM
n-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
n-Propylbenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
sec-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Styrene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
tert-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/16/2009 12:10:41 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
trans-1,2-DCE	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	10/16/2009 12:10:41 AM
Vinyl chloride	ND	1.0		µg/L	1	10/16/2009 12:10:41 AM
Xylenes, Total	ND	1.5		µg/L	1	10/16/2009 12:10:41 AM
Surr: 1,2-Dichloroethane-d4	91.5	54.6-141		%REC	1	10/16/2009 12:10:41 AM
Surr: 4-Bromofluorobenzene	95.5	60.1-133		%REC	1	10/16/2009 12:10:41 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 2 of 8

Hall Environmental Analysis Laboratory, Inc.

Date: 27-Oct-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0910270
Project: GBR
Lab ID: 0910270-01

Client Sample ID: Effluent
Collection Date: 10/14/2009 11:31:00 AM
Date Received: 10/15/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Surr: Dibromofluoromethane	92.7	78.5-130		%REC	1	10/16/2009 12:10:41 AM
Surr: Toluene-d8	91.5	79.5-126		%REC	1	10/16/2009 12:10:41 AM
SM 2320B: ALKALINITY						Analyst: DAM
Alkalinity, Total (As CaCO ₃)	430	20		mg/L CaCO ₃	1	10/19/2009 5:34:00 PM
Carbonate	ND	2.0		mg/L CaCO ₃	1	10/19/2009 5:34:00 PM
Bicarbonate	430	20		mg/L CaCO ₃	1	10/19/2009 5:34:00 PM
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: DAM
Specific Conductance	3200	0.010		µmhos/cm	1	10/19/2009 5:34:00 PM
SM4500-H+B: PH						Analyst: DAM
pH	7.62	0.1		pH units	1	10/19/2009 5:34:00 PM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: MMS
Total Dissolved Solids	2700	20.0		mg/L	1	10/22/2009 5:32:00 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

Page 3 of 8

Hall Environmental Analysis Laboratory, Inc.

Date: 27-Oct-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0910270
Project: GBR
Lab ID: 0910270-02

Client Sample ID: Influent
Collection Date: 10/14/2009 11:51:00 AM
Date Received: 10/15/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: TAF
Fluoride	0.90	0.10		mg/L	1	10/16/2009 2:33:04 AM
Chloride	85	2.0		mg/L	20	10/16/2009 2:50:28 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	10/16/2009 2:33:04 AM
Bromide	0.51	0.10		mg/L	1	10/16/2009 2:33:04 AM
Nitrogen, Nitrate (As N)	0.18	0.10		mg/L	1	10/16/2009 2:33:04 AM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	10/16/2009 2:33:04 AM
Sulfate	1400	25		mg/L	50	10/20/2009 10:51:50 PM
EPA METHOD 6010B: DISSOLVED METALS						Analyst: SNV
Calcium	290	5.0		mg/L	5	10/16/2009 2:40:57 PM
Iron	0.066	0.020		mg/L	1	10/16/2009 12:40:31 PM
Magnesium	32	1.0		mg/L	1	10/16/2009 12:40:31 PM
Manganese	0.58	0.0020		mg/L	1	10/16/2009 12:40:31 PM
Potassium	3.1	1.0		mg/L	1	10/16/2009 12:40:31 PM
Sodium	500	5.0		mg/L	5	10/16/2009 2:40:57 PM
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Toluene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Ethylbenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Naphthalene	ND	2.0		µg/L	1	10/16/2009 1:33:40 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	10/16/2009 1:33:40 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	10/16/2009 1:33:40 AM
Acetone	ND	10		µg/L	1	10/16/2009 1:33:40 AM
Bromobenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Bromodichloromethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Bromoform	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Bromomethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
2-Butanone	ND	10		µg/L	1	10/16/2009 1:33:40 AM
Carbon disulfide	ND	10		µg/L	1	10/16/2009 1:33:40 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Chlorobenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Chloroethane	ND	2.0		µg/L	1	10/16/2009 1:33:40 AM
Chloroform	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Chloromethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
2-Chlorotoluene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
4-Chlorotoluene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM

Qualifiers: * Value exceeds Maximum Contaminant Level
 E Estimated value
 J Analyte detected below quantitation limits
 ND Not Detected at the Reporting Limit
 S Spike recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 MCL Maximum Contaminant Level
 RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 27-Oct-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0910270
Project: GBR
Lab ID: 0910270-02

Client Sample ID: Influent
Collection Date: 10/14/2009 11:51:00 AM
Date Received: 10/15/2009
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
cis-1,2-DCE	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	10/16/2009 1:33:40 AM
Dibromochloromethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Dibromomethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	10/16/2009 1:33:40 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
2-Hexanone	ND	10		µg/L	1	10/16/2009 1:33:40 AM
Isopropylbenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	10/16/2009 1:33:40 AM
Methylene Chloride	ND	3.0		µg/L	1	10/16/2009 1:33:40 AM
n-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
n-Propylbenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
sec-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Styrene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
tert-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/16/2009 1:33:40 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
trans-1,2-DCE	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	10/16/2009 1:33:40 AM
Vinyl chloride	ND	1.0		µg/L	1	10/16/2009 1:33:40 AM
Xylenes, Total	ND	1.5		µg/L	1	10/16/2009 1:33:40 AM
Surr: 1,2-Dichloroethane-d4	93.2	54.6-141		%REC	1	10/16/2009 1:33:40 AM
Surr: 4-Bromofluorobenzene	94.1	60.1-133		%REC	1	10/16/2009 1:33:40 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 27-Oct-09

CLIENT: Western Refining Southwest, Inc.**Client Sample ID:** Influent**Lab Order:** 0910270**Collection Date:** 10/14/2009 11:51:00 AM**Project:** GBR**Date Received:** 10/15/2009**Lab ID:** 0910270-02**Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Surr: Dibromofluoromethane	93.1	78.5-130		%REC	1	10/16/2009 1:33:40 AM
Surr: Toluene-d8	95.7	79.5-126		%REC	1	10/16/2009 1:33:40 AM
SM 2320B: ALKALINITY						Analyst: DAM
Alkalinity, Total (As CaCO ₃)	440	20		mg/L CaCO ₃	1	10/19/2009 5:52:00 PM
Carbonate	ND	2.0		mg/L CaCO ₃	1	10/19/2009 5:52:00 PM
Bicarbonate	440	20		mg/L CaCO ₃	1	10/19/2009 5:52:00 PM
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: DAM
Specific Conductance	3200	0.010		µmhos/cm	1	10/19/2009 5:52:00 PM
SM4500-H+B: PH						Analyst: DAM
pH	7.59	0.1		pH units	1	10/19/2009 5:52:00 PM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: MMS
Total Dissolved Solids	2700	20.0		mg/L	1	10/22/2009 5:32:00 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 27-Oct-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0910270
Project: GBR
Lab ID: 0910270-03

Client Sample ID: TRIP BLANK**Collection Date:****Date Received:** 10/15/2009**Matrix:** TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Benzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Toluene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Ethylbenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Naphthalene	ND	2.0		µg/L	1	10/16/2009 2:01:22 AM
1-Methylnaphthalene	ND	4.0		µg/L	1	10/16/2009 2:01:22 AM
2-Methylnaphthalene	ND	4.0		µg/L	1	10/16/2009 2:01:22 AM
Acetone	ND	10		µg/L	1	10/16/2009 2:01:22 AM
Bromobenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Bromodichloromethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Bromoform	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Bromomethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
2-Butanone	ND	10		µg/L	1	10/16/2009 2:01:22 AM
Carbon disulfide	ND	10		µg/L	1	10/16/2009 2:01:22 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Chlorobenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Chloroethane	ND	2.0		µg/L	1	10/16/2009 2:01:22 AM
Chloroform	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Chloromethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
2-Chlorotoluene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
4-Chlorotoluene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
cis-1,2-DCE	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	10/16/2009 2:01:22 AM
Dibromochloromethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Dibromomethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Dichlorodifluoromethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2-Dichloropropane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,3-Dichloropropane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
2,2-Dichloropropane	ND	2.0		µg/L	1	10/16/2009 2:01:22 AM
1,1-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Hexachlorobutadiene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
2-Hexanone	ND	10		µg/L	1	10/16/2009 2:01:22 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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Hall Environmental Analysis Laboratory, Inc.

Date: 27-Oct-09

CLIENT: Western Refining Southwest, Inc.
Lab Order: 0910270
Project: GBR
Lab ID: 0910270-03

Client Sample ID: TRIP BLANK
Collection Date:
Date Received: 10/15/2009
Matrix: TRIP BLANK

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: HL
Isopropylbenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
4-Isopropyltoluene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
4-Methyl-2-pentanone	ND	10		µg/L	1	10/16/2009 2:01:22 AM
Methylene Chloride	ND	3.0		µg/L	1	10/16/2009 2:01:22 AM
n-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
n-Propylbenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
sec-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Styrene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
tert-Butylbenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/16/2009 2:01:22 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
trans-1,2-DCE	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Trichlorofluoromethane	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	10/16/2009 2:01:22 AM
Vinyl chloride	ND	1.0		µg/L	1	10/16/2009 2:01:22 AM
Xylenes, Total	ND	1.5		µg/L	1	10/16/2009 2:01:22 AM
Surr: 1,2-Dichloroethane-d4	91.5	54.6-141		%REC	1	10/16/2009 2:01:22 AM
Surr: 4-Bromofluorobenzene	98.1	60.1-133		%REC	1	10/16/2009 2:01:22 AM
Surr: Dibromofluoromethane	92.2	78.5-130		%REC	1	10/16/2009 2:01:22 AM
Surr: Toluene-d8	97.5	79.5-126		%REC	1	10/16/2009 2:01:22 AM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- RL Reporting Limit

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QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0910270

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions											
Sample ID: MB		MBLK		Batch ID: R35809		Analysis Date: 10/20/2009 10:58:03 AM					
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.10								
Nitrogen, Nitrite (As N)	ND	mg/L	0.10								
Bromide	ND	mg/L	0.10								
Nitrogen, Nitrate (As N)	ND	mg/L	0.10								
Phosphorus, Orthophosphate (As P)	ND	mg/L	0.50								
Sulfate	ND	mg/L	0.50								
Sample ID: LCS		LCS		Batch ID: R35809		Analysis Date: 10/20/2009 11:15:27 AM					
Fluoride	0.5029	mg/L	0.10	0.5	0	101	90	110			
Chloride	4.952	mg/L	0.10	5	0	99.0	90	110			
Nitrogen, Nitrite (As N)	1.010	mg/L	0.10	1	0	101	90	110			
Bromide	2.519	mg/L	0.10	2.5	0	101	90	110			
Nitrogen, Nitrate (As N)	2.486	mg/L	0.10	2.5	0	99.4	90	110			
Phosphorus, Orthophosphate (As P)	4.913	mg/L	0.50	5	0	98.3	90	110			
Sulfate	9.919	mg/L	0.50	10	0	99.2	90	110			
Method: SM 2320B: Alkalinity											
Sample ID: MB		MBLK		Batch ID: R35785		Analysis Date: 10/19/2009 2:36:00 PM					
Alkalinity, Total (As CaCO3)	ND	mg/L Ca	20								
Carbonate	ND	mg/L Ca	2.0								
Bicarbonate	ND	mg/L Ca	20								
Sample ID: LCS		LCS		Batch ID: R35785		Analysis Date: 10/19/2009 2:16:00 PM					
Alkalinity, Total (As CaCO3)	80.52	mg/L Ca	20	80	0	101	80	120			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 1

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0910270

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 6010B: Dissolved Metals

Sample ID: MB MBLK Batch ID: R35782 Analysis Date: 10/16/2009 11:22:02 AM

Calcium	ND	mg/L	1.0								
Iron	ND	mg/L	0.020								
Magnesium	ND	mg/L	1.0								
Manganese	ND	mg/L	0.0020								
Potassium	ND	mg/L	1.0								
Sodium	ND	mg/L	1.0								

Sample ID: LCS LCS Batch ID: R35782 Analysis Date: 10/16/2009 11:25:15 AM

Calcium	51.44	mg/L	1.0	50.5	0.0232	102	80	120			
Iron	0.4807	mg/L	0.020	0.5	0	96.1	80	120			
Magnesium	51.02	mg/L	1.0	50.5	0.0224	101	80	120			
Manganese	0.4724	mg/L	0.0020	0.5	0	94.5	80	120			
Potassium	53.50	mg/L	1.0	55	0.1543	97.0	80	120			
Sodium	54.13	mg/L	1.0	50.5	0.0669	107	80	120			

Sample ID: LCS LCS Batch ID: R35782 Analysis Date: 10/16/2009 11:28:41 AM

Calcium	51.76	mg/L	1.0	50.5	0.0232	102	80	120			
Iron	0.4832	mg/L	0.020	0.5	0	96.6	80	120			
Magnesium	51.23	mg/L	1.0	50.5	0.0224	101	80	120			
Manganese	0.4698	mg/L	0.0020	0.5	0	94.0	80	120			
Potassium	53.88	mg/L	1.0	55	0.1543	97.7	80	120			
Sodium	54.39	mg/L	1.0	50.5	0.0669	108	80	120			

Method: SM2540C MOD: Total Dissolved Solids

Sample ID: MB-20383 MBLK Batch ID: 20383 Analysis Date: 10/22/2009 5:32:00 PM

Total Dissolved Solids	ND	mg/L	20.0								
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Sample ID: LCS-20383 LCS Batch ID: 20383 Analysis Date: 10/22/2009 5:32:00 PM

Total Dissolved Solids	1029	mg/L	20.0	1000	0	103	80	120			
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Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0910270

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R35736 Analysis Date: 10/15/2009 8:51:09 AM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0
Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 1

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0910270

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 5ml rb

MBLK

Batch ID: R35736 Analysis Date: 10/15/2009 8:51:09 AM

4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: b7

MBLK

Batch ID: R35736 Analysis Date: 10/15/2009 9:24:35 PM

Benzene	ND	µg/L	1.0
Toluene	ND	µg/L	1.0
Ethylbenzene	ND	µg/L	1.0
Methyl tert-butyl ether (MTBE)	ND	µg/L	1.0
1,2,4-Trimethylbenzene	ND	µg/L	1.0
1,3,5-Trimethylbenzene	ND	µg/L	1.0
1,2-Dichloroethane (EDC)	ND	µg/L	1.0
1,2-Dibromoethane (EDB)	ND	µg/L	1.0
Naphthalene	ND	µg/L	2.0
1-Methylnaphthalene	ND	µg/L	4.0
2-Methylnaphthalene	ND	µg/L	4.0
Acetone	ND	µg/L	10
Bromobenzene	ND	µg/L	1.0
Bromodichloromethane	ND	µg/L	1.0
Bromoform	ND	µg/L	1.0
Bromomethane	ND	µg/L	1.0
2-Butanone	ND	µg/L	10
Carbon disulfide	ND	µg/L	10
Carbon Tetrachloride	ND	µg/L	1.0
Chlorobenzene	ND	µg/L	1.0
Chloroethane	ND	µg/L	2.0
Chloroform	ND	µg/L	1.0

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 2

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0910270

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: b7 MBLK

Batch ID: R36736 Analysis Date: 10/15/2009 9:24:35 PM

Chloromethane	ND	µg/L	1.0
2-Chlorotoluene	ND	µg/L	1.0
4-Chlorotoluene	ND	µg/L	1.0
cis-1,2-DCE	ND	µg/L	1.0
cis-1,3-Dichloropropene	ND	µg/L	1.0
1,2-Dibromo-3-chloropropane	ND	µg/L	2.0
Dibromochloromethane	ND	µg/L	1.0
Dibromomethane	ND	µg/L	1.0
1,2-Dichlorobenzene	ND	µg/L	1.0
1,3-Dichlorobenzene	ND	µg/L	1.0
1,4-Dichlorobenzene	ND	µg/L	1.0
Dichlorodifluoromethane	ND	µg/L	1.0
1,1-Dichloroethane	ND	µg/L	1.0
1,1-Dichloroethene	ND	µg/L	1.0
1,2-Dichloropropane	ND	µg/L	1.0
1,3-Dichloropropane	ND	µg/L	1.0
2,2-Dichloropropane	ND	µg/L	2.0
1,1-Dichloropropene	ND	µg/L	1.0
Hexachlorobutadiene	ND	µg/L	1.0
2-Hexanone	ND	µg/L	10
Isopropylbenzene	ND	µg/L	1.0
4-Isopropyltoluene	ND	µg/L	1.0
4-Methyl-2-pentanone	ND	µg/L	10
Methylene Chloride	ND	µg/L	3.0
n-Butylbenzene	ND	µg/L	1.0
n-Propylbenzene	ND	µg/L	1.0
sec-Butylbenzene	ND	µg/L	1.0
Styrene	ND	µg/L	1.0
tert-Butylbenzene	ND	µg/L	1.0
1,1,1,2-Tetrachloroethane	ND	µg/L	1.0
1,1,2,2-Tetrachloroethane	ND	µg/L	2.0
Tetrachloroethene (PCE)	ND	µg/L	1.0
trans-1,2-DCE	ND	µg/L	1.0
trans-1,3-Dichloropropene	ND	µg/L	1.0
1,2,3-Trichlorobenzene	ND	µg/L	1.0
1,2,4-Trichlorobenzene	ND	µg/L	1.0
1,1,1-Trichloroethane	ND	µg/L	1.0
1,1,2-Trichloroethane	ND	µg/L	1.0
Trichloroethene (TCE)	ND	µg/L	1.0
Trichlorofluoromethane	ND	µg/L	1.0
1,2,3-Trichloropropane	ND	µg/L	2.0
Vinyl chloride	ND	µg/L	1.0
Xylenes, Total	ND	µg/L	1.5

Sample ID: 100ng Ics LCS

Batch ID: R36736 Analysis Date: 10/15/2009 9:46:33 AM

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

Page 3

QA/QC SUMMARY REPORT

Client: Western Refining Southwest, Inc.
Project: GBR

Work Order: 0910270

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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Method: EPA Method 8260B: VOLATILES

Sample ID: 100ng lcs

LCS

Batch ID: R35736 Analysis Date: 10/15/2009 9:46:33 AM

Benzene	18.69	µg/L	1.0	20	0	93.4	76.7	114
Toluene	20.85	µg/L	1.0	20	0	104	78.4	117
Chlorobenzene	20.22	µg/L	1.0	20	0	101	80.7	127
1,1-Dichloroethene	21.58	µg/L	1.0	20	0	108	80.2	128
Trichloroethene (TCE)	16.79	µg/L	1.0	20	0	84.0	77.4	115

Sample ID: 100ng lcs_b

LCS

Batch ID: R35736 Analysis Date: 10/15/2009 10:19:57 PM

Benzene	18.64	µg/L	1.0	20	0	93.2	76.7	114
Toluene	20.30	µg/L	1.0	20	0	102	78.4	117
Chlorobenzene	19.82	µg/L	1.0	20	0	99.1	80.7	127
1,1-Dichloroethene	20.92	µg/L	1.0	20	0	105	80.2	128
Trichloroethene (TCE)	16.74	µg/L	1.0	20	0	83.7	77.4	115

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
R	RPD outside accepted recovery limits	S	Spike recovery outside accepted recovery limits

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Hall Environmental Analysis Laboratory, Inc.

Sample Receipt Checklist

Client Name **WESTERN REFINING SOUT**

Date Received:

10/15/2009

Work Order Number **0910270**Received by: **TLS**

Sample ID labels checked by:

Initials

Checklist completed by:

Signature

Date

Matrix:

Carrier name: Greyhound

Shipping container/cooler in good condition?

Yes ☒No ☐Not Present ☐

Custody seals intact on shipping container/cooler?

Yes ☒No ☐Not Present ☐Not Shipped ☐

Custody seals intact on sample bottles?

Yes ☐No ☐N/A ☒

Chain of custody present?

Yes ☒No ☐

Chain of custody signed when relinquished and received?

Yes ☒No ☐

Chain of custody agrees with sample labels?

Yes ☒No ☐

Samples in proper container/bottle?

Yes ☒No ☐

Sample containers intact?

Yes ☒No ☐

Sufficient sample volume for indicated test?

Yes ☒No ☐

All samples received within holding time?

Yes ☒No ☐

Water - VOA vials have zero headspace?

No VOA vials submitted ☐Yes ☒No ☐

Water - Preservation labels on bottle and cap match?

Yes ☒No ☐N/A ☐

Water - pH acceptable upon receipt?

Yes ☒No ☐N/A ☐Number of preserved
bottles checked for
pH:

☒ <2 ☒ >12 unless noted
 below.

Container/Temp Blank temperature?

2.9°

<6° C Acceptable

If given sufficient time to cool.

COMMENTS:

Client contacted

Date contacted:

Person contacted

Contacted by:

Regarding:

Comments:

Corrective Action

Sante Fe Main Office
Phone: (505) 476-3441

General Information
Phone: (505) 629-6116

Online Phone Directory
<https://www.emnrd.nm.gov/ocd/contact-us>

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 625796

CONDITIONS

Operator: Western Refining Southwest LLC 539 South Main Street Findlay, OH 45840	OGRID: 267595
	Action Number: 625796
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
amaxwell	Historical documentation accepted for record.	9/22/2026
amaxwell	Summary table of activity.	9/22/2026
amaxwell	Reports for 1988, 1991, 1992, 1993, 1994, 1995-1997, 1998-2001, 2005 Discharge Plan, 2026, 2007, 2008, 2009, 2010.	9/22/2026