GW - 032

ANNUAL MONITORING REPORT

August 2009

Western Refining
GALLUP

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March 26, 2010

James P. Bearzi
Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive, East, Building 1
Santa Fe, NM, 87505-6303

Re: **Revised Annual Groundwater Monitoring Report:**
Gallup Refinery - 2008
Western Refining Company, Southwest, Inc., Gallup Refinery
EPA ID # NMD000333211
HWB-GRCC-09-004

Dear Mr. Bearzi:

It is a pleasure to submit a revised **Annual Groundwater Monitoring Report: Gallup Refinery - 2008**, and this response letter to your Notice of Disapproval dated January 26, 2010.

Comment 1
The permittee has reviewed the document, removed all references to the as-yet unapproved Facility-wide Groundwater Monitoring Plan and made sure that our reporting is compliant with the requirements of the OCD Groundwater Discharge permit GW-032. .

Comment 2
The permittee has added a description of the sampling methods and procedures reflecting the actual methods used in the field when monitoring was conducted, in section 2.3 page 25.

Comment 3
The permittee has added a discussion of deviations from the OCD Groundwater Discharge Permit GW-032 in section 5.4, page 91

Comment 4
The permittee has included a discussion of investigation (IDW) derived waste in section 2.4, page 38.

Comment 5
The permittee has corrected the description of the measurements of the depths to water levels and Separate Phase Hydrocarbons in section 2.1, paragraph 3, page 21.

Comments 6, 7, 8, and 9
A new, revised Table 1 has been substituted for the previous tables that had inaccuracies – section 2.3, pages 27 – 37.

Comment 10
The description of how product is recovered has been clarified in section 2.7, page 38.

Comment 11
Table 32 has been corrected, in section 4.4, page 82 – and is now Table 31.

Comment 12
The RRSL standard for benzene is correct, and the NMED/HWB comment is incorrect.

Comment 13
The date of sampling of well OW-11 has been clarified as having been sampled in August 2008.

Comment 14
The missing data have been provided in Table 15 (formerly Table 16) on page 54.

Comment 15
The sentence left unfinished has been deleted on page 90.

Comment 16
All the data tables have been revised to have continuation titles, and the data have been presented in a clear and organized manner.

Comment 17
The requirement for quarterly sampling of wells OW-13, OW-14, OW-29, and OW-30 was instituted in the fourth quarter of 2008. This has been clarified in Tables 6 and 7 on pages 45 and 46.

Comment 18
Table 30 (formerly Table 31) has been revised as required on page 74.

If you have any further questions, or need more information, please do not hesitate to contact me or Dr. Gaurav Rajen of my staff at 505-722-3833.

Sincerely,

Ed Riege
Environmental Manager
Gallup Refinery, Western Refining

Cc: J. Kieling, NMED HWB
D. Cobrain, NMED HWB
H. Monzeglio, NMED HWB
K. Van Horn, NMED HWB
C. Chavez, OCD
G. Rajen, Gallup Refinery

/Enclosure

Binder 1

Annual Groundwater Monitoring Report: Gallup Refinery - 2008

Western Refining
Gallup, New Mexico

March 2010

Prepared by:

Gaurav Rajen, Ph.D.
Environmental Engineer

Reviewed by:

Ed Riege, M.P.H.
Environmental Manager

Executive Summary

This Annual Groundwater Monitoring Report for 2008 (report) has been prepared in response to requirements stated in Groundwater Discharge Permit, GW-032, issued by the Oil Conservation Division (OCD) of the New Mexico Energy Minerals and Natural Resources Department to the Gallup Refinery owned by Western Refining ("refinery" or "facility").

This report describes monitoring and remediation activities undertaken throughout 2008, and includes conclusions and recommendations. In this Executive Summary, we provide a broad overview of groundwater impacts – all of our interpretations, conclusions, and recommendations are supported by data tables, graphs and maps in the main body of the report.

The monitoring activities have collected data that are used to characterize the nature and extent of impacts to groundwater at the refinery, and to recognize any levels of contaminants that exceed applicable standards. These standards are the New Mexico Water Quality Standards (NMWQS) set by the New Mexico Water Quality Control Commission (WQCC), and the U.S. Environmental Protection Agency's (EPA's) Maximum Contaminant Levels (MCLs). If NMWQS standards or MCLs do not exist for a contaminant, we compare levels against the EPA Regional Screening Levels set for Residential Risk-Based Screening Levels for Tap Water (RRSLs). As stated by the EPA, exceeding a RRSL does not "automatically designate a site as "dirty" or trigger a response action; however, exceeding a [RRSL] suggests that further evaluation of the potential risks by site contaminants is appropriate."[1] The EPA recommends that for a specific site, the screening levels be recalculated using site-specific data.

Essentially, there are two major sections of the Refinery which we have defined as the East and the West side. Shallow groundwater enters the refinery from the northern, southern, and eastern portions of the site and flows out along the western portions. Detailed discussions of monitoring and remediation activities in the East and the West sides, the data generated, and other issues are provided in chapters 2, 3 and 4 of the report. Chapter 5 provides detailed sets of conclusions and recommendations.

On the East side, in the north-east corner of the active refinery perimeter (but not the refinery property as a whole) a plume of Methyl-Tert Butyl Ether (MTBE) is known to exist in shallow groundwater within refinery property. This groundwater enters the refinery from the east, and then moves slowly north-west into the Facility property. In three wells, OW-14, OW-29, and OW-30, the MTBE is in the range of 0.05 to 1.3 ppm and at levels that exceed the RRSL (0.012 ppm). In this area volatile hydrocarbons have also been detected in shallow groundwater and benzene (in OW-14 at a level of 0.074 ppm) is at a level that exceeds NMWQS for drinking water (0.005 ppm). There are downgradient wells that have not yet shown more than trace levels of benzene, that is, close to the levels of detection of analytical methods. These wells are within a few hundred feet of OW-14, the well at which benzene has been detected at levels above

[1] http://www.epa.gov/reg3hscd/risk/human/rb-concentration_table/faq.htm#FAQ1

NMWQS. Therefore, benzene in the groundwater in this region is expected to move approximately 10 feet per year – this is apparent from noting the time it has taken for trace levels to be detected downgradient. The nearest drinking water well in the direction of contaminant movement is probably more than 10,000 feet away and more than 3000 feet deep – while contamination is at shallow depths of 30-50 feet. Within the perimeter of the active refinery in this north-east section, there are also several shallow recovery wells from which separate-phase hydrocarbons have been recovered and still continue to be recovered, of the order of 4 gallons total in 2008.

On the West side, there are shallow groundwater issues likely stemming from the wastewater treatment system of the refinery that consists of aeration lagoons and a series of large evaporation ponds. Immediately downgradient (within 10 feet) of the refinery's oil/water separator, a sample from a shallow groundwater monitoring well (NAPIS-2) had MTBE at a level (0.32 ppm) greater than the RRSL (0.012 ppm), a few hydrocarbons above detection levels, and benzene above the NMWQS (0.91 ppm > 0.005 ppm). Downgradient of the two aeration lagoons, a shallow monitoring well, GWM-1, has also detected benzene above NMWQS, and other hydrocarbons at detectable levels. Some of these include several polycyclic aromatic hydrocarbons (PAHs), which though below any regulatory standards, are of concern as they are long-lived and could possibly impact deeper aquifers. Some of these wells have also shown levels of chlorides and sulfates above NMWQS and/or MCL. Elevated levels of arsenic and manganese have also been detected in GWM-1 above the NMWQS.

In this report, we also present data on our aeration lagoons, ponds and outfalls between the lagoons and ponds. We collect these data as a part of our permit GW-032, specifically items 16-20. There were no deviations from the sampling requirements of the OCD permit GW-032. Groundwater standards do not apply to these surface water bodies. However, these data are of great value in determining compliance with various provisions of the State of New Mexico as well as the EPA regarding hazardous waste treatment. None of the aeration lagoons or ponds has benzene levels greater than 0.5 ppm. (In a RCRA-driven sampling activity that studied benzene levels entering Aeration Lagoon 1, benzene levels greater than 0.5 ppm were found. However, these levels had fallen to well below 0.5 ppm, before the wastewater left Aeration Lagoon 1, as can be seen by our sampling data.) These data on our surface water treatment ponds also help us understand if the ponds are affecting groundwater. It should be noted that the aeration lagoons and ponds do contain volatile and semi-volatile organic compounds, some of which are also found in shallow wells (GWM-1, and SWM-2).

Finally, there are a series of boundary (BW), observation (OW), monitoring (MW) and shallow monitoring (SWM) wells in the western portions of the facility that are meant to detect any off-site movement of contaminants and also releases to groundwater. One of the OW wells has shown detectable levels of uranium, in one case above NMWQS. Uranium is ubiquitous in groundwater of New Mexico, and the location of this one well (OW-11) makes it unlikely that the uranium should be linked to refinery activity – OW-11 is located so that it is mainly affected by off-refinery groundwater, and also groundwater that is linked to movement through rock. Among the wells on the far west side are three deep drinking water wells, PW-3, PW-2, and PW-4 – none of these has ever been known to have any contamination at any detectable level. In one event in 2007, we found a semi-volatile hydrocarbon in PW-3, sampled again and found that it was non-detectable – we will continue to monitor this well, and believe the one anomalous reading was a laboratory artifact. Among MW and SWM monitoring wells in the west side, a few have shown traces of hydrocarbons. SMW-2 has shown a level of 1,4-Dioxane at 0.0136 ppm which is greater than the RRSL of 0.0061 ppm. All of the BW wells have shown that no organic contaminants are leaving the refinery's property, although some of these wells have high levels of sulfates (above drinking water standards).

Recommendations

1) Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB
2) Develop a subsurface hydrogeological map of the refinery
3) Collect samples of incoming shallow groundwater at the northern edges of the refinery and sample for metals – this may help establish what metals, if any, are possibly linked to the refinery
4) Recognizing that the MTBE and benzene plume in the north-east region is moving towards the north-west, and may have passed by existing wells, establish two new monitoring wells north and west of OW-29 at the Chinle/alluvium interface.

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Appendix I Laboratory Analytical Reports

LIST OF ACRONYMS

AL	Aeration lagoons
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
COD	Chemical Oxygen Demand
DRO	Diesel Range Organics
EP	Evaporation ponds
EPA	Environmental Protection Agency
GPM	Gallons per minute
GRO	Gasoline Range Organics
HWB	Hazardous Waste Bureau
MTBE	Methyl Tert Butyl Ether
MG/L	Milligrams/liter
NAPIS	New American Petroleum Institute Separator
NMED	New Mexico Environment Department
OCD	Oil Conservation Division
PPM	Parts per million
VOC	Volatile Organic Compounds
SVOC	Semi-volatile Organic Compounds
WWTP	Wastewater treatment plant

1.0 Introduction

This Annual Groundwater Monitoring Report for 2008 (Report) has been prepared in response to requirements stated in Groundwater Discharge Permit, GW-032, issued by the Oil Conservation Division (OCD) of the New Mexico Energy Minerals and Natural Resources Department to the Gallup Refinery owned by Western Refining ("Gallup Refinery" or "Facility").

This Report describes monitoring and remediation activities undertaken throughout 2008, and includes conclusions and recommendations. The monitoring activities have collected data that are used to characterize the nature and extent of impacts to groundwater at the Gallup Refinery, and recognize any levels of contaminants that exceed applicable standards. These standards are those set by the New Mexico Water Quality Control Commission (WQCC), or the U.S. Environmental Protection Agency's (EPA's) Maximum Contaminant Levels (MCLs). If WQCC standards or MCLs do not exist for a contaminant, we compare levels against the EPA Regional Screening Levels set for Residential Risk-Based Screening Levels for Tap Water (RRSLs).

1.1. Facility ownership, operation and location

This report pertains to the Western Refining Southwest Inc. Gallup Refinery located at Exit 39 on Interstate I-40. This refinery is known as the Gallup Refinery and is located at Jamestown New Mexico, approximately 17 miles east of Gallup. Figure 1 shows the regional location of the Gallup Refinery.

The owner is:		
	Western Refining 123 W. Mills Avenue El Paso, TX 79901	(Parent Corporation)
Operator:	Western Refining Southwest Inc Route 3, Box 7 Gallup, New Mexico 87301	(postal address)
	Western Refining Southwest Inc I-40, Exit 39 Jamestown, New Mexico 87347	(physical address)

SIC code 2911 (petroleum refining) applies to the Gallup Refinery.

The following regulatory identification and permit governs the Gallup Refinery:

- U.S. EPA ID Number NMD000333211
- OCD Discharge Permit No. GW-032

The facility status is corrective action/compliance. Annual, semi-annual and quarterly groundwater sampling is conducted at the facility to evaluate present contamination. The refinery is situated on an 810 acre irregular shaped tract of land that is substantially located within the lower one quarter of Section 28 and throughout Section 33 of

Township 15 North, Range 15 West of the New Mexico Prime Meridian. A small component of the property lies within the northeastern one quarter of Section 4 of Township 14 North, Range 15 West. Figure 2 is a topographic map showing the general layout of the refinery in comparison to the local topography.

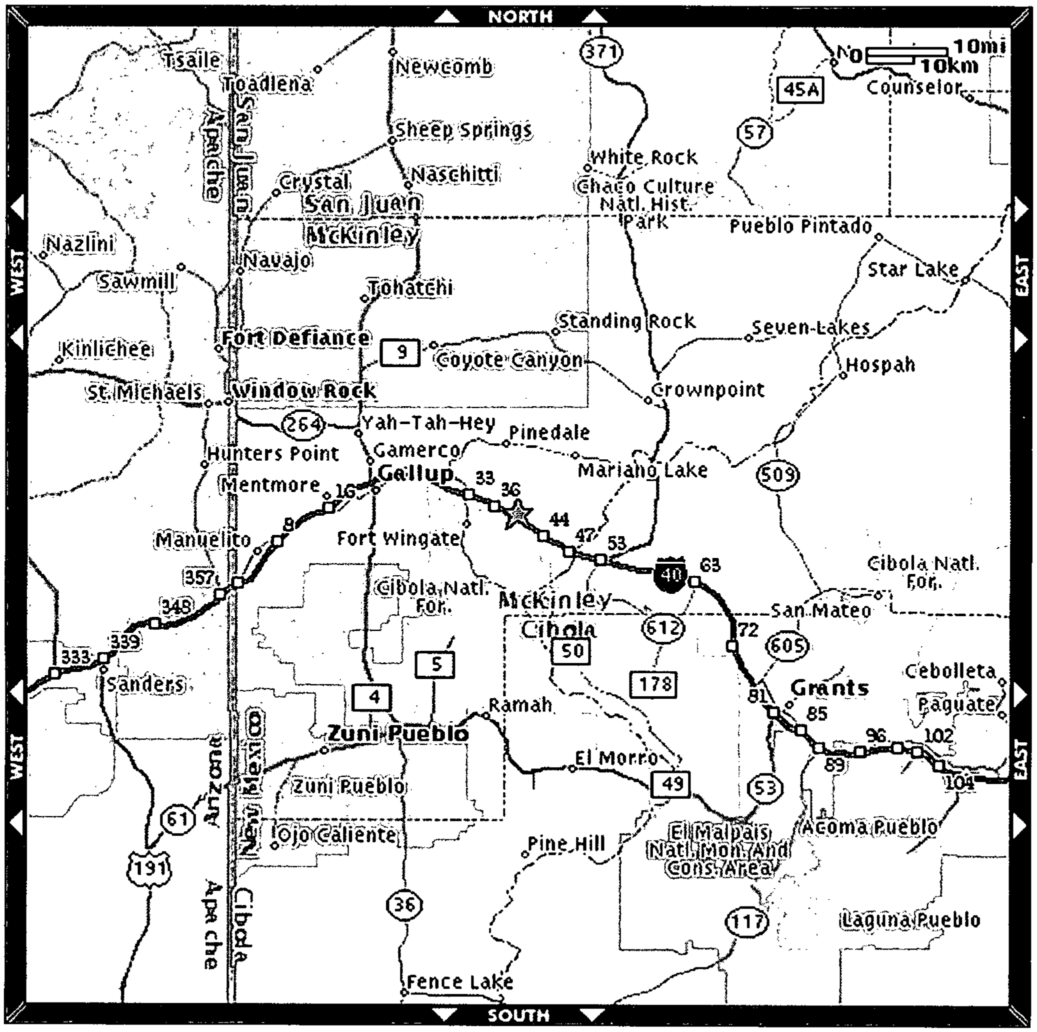

Figure 1: Regional map showing the location of the Gallup Refinery (red star along Interstate-40, 20 miles east of the City of Gallup).

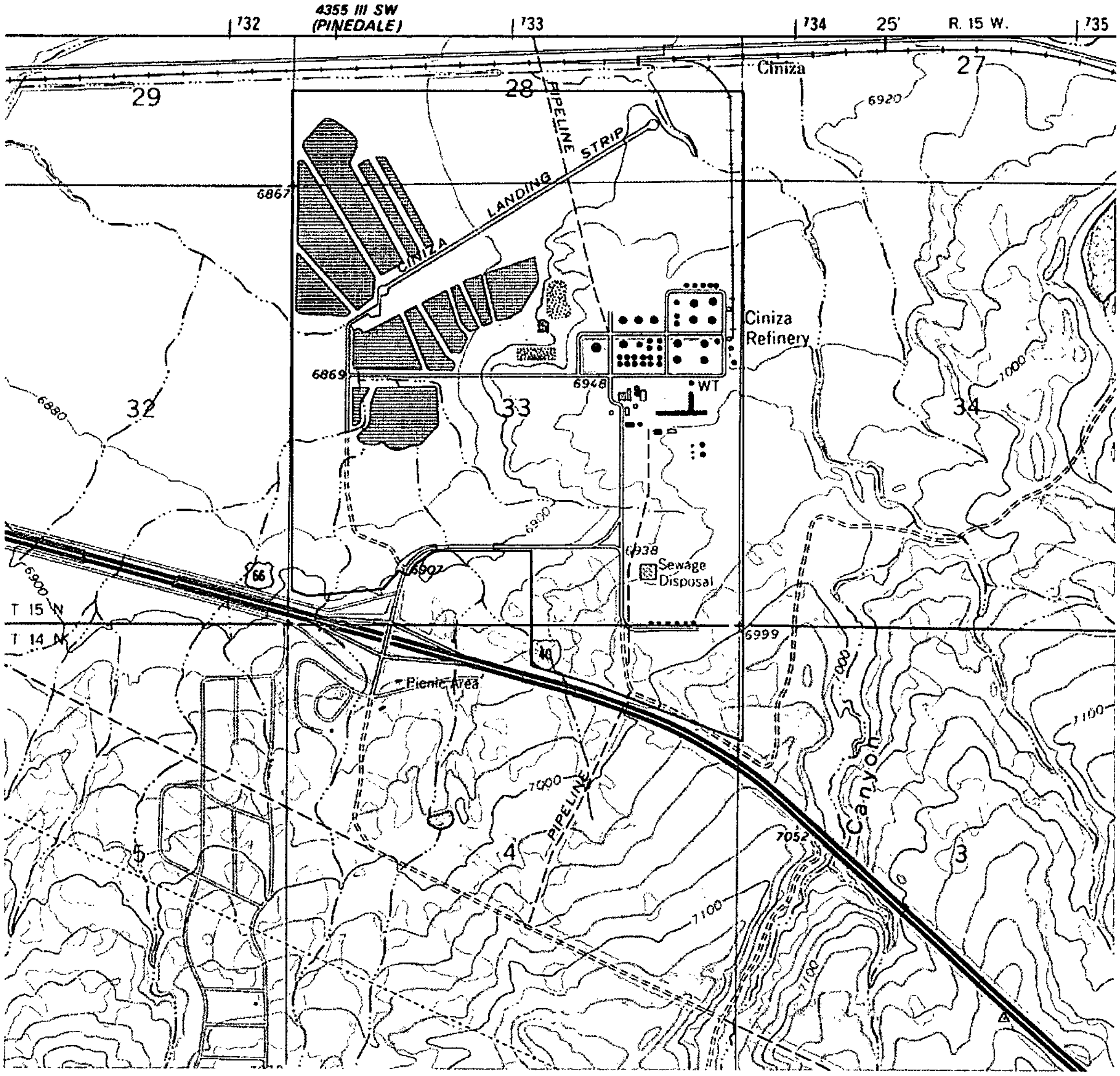

Figure 2: Topographic Map of the Gallup Refinery Site - USGS Topographical Map - Gallup Quadrangle (Revised 1980)

1.2 Historical and current site uses

The Gallup Refinery is located within a rural and sparsely populated section of McKinley County in Jamestown New Mexico. The setting is a high desert plain on the western slope of the continental divide. The surrounding land is comprised primarily of public lands and is used for cattle and sheep grazing at a density of less than six cattle or 30 sheep per section.[2] The nearest population centers are the Pilot (formerly Giant) Travel Center refueling plaza, the Interstate 40 highway corridor, and a small cluster of residential homes located on the south side of Interstate 40 approximately 2 miles southwest of the refinery (Jamestown). Except for the City of Gallup, McKinley County is a predominantly rural area, as are the adjoining portions of neighboring counties.

Historically, this area has been populated by Native Americans, as it is even today with the contemporary Navajo Nation and the Pueblo of Zuni located in the region. The area has always been a crossroads for East to West and North to South trade routes; and many modern highways in the area, such as Interstate-40, trace routes established well over a thousand years ago. Irrigated agriculture in the area also dates back to several thousands of years, and continues to this day. There are remnants of an irrigation ditch in the north-central portion of the site which attests to farming having occurred on the site.

Since the arrival of the Spanish in 1540, grazing of livestock became another major land use. In the early 1900s, highly intensive livestock grazing occurred in this region that led to severe degradation of the land.

Along with irrigated farming and livestock, artisan work has been a mainstay of the local economy and continues till current times. In 1880, coal mining began to be a major land use in the region; and in 1881 the railroad arrived. The railroad carried Indian made goods for sale across the nation. Today, a railroad line runs just north of the facility, and a rail spur brings railroad cars into the north-east end of the facility to deliver crude oil, ethanol and other feedstock.

From the early 1900s to the 1940s extensive logging occurred in the region, especially thirty miles to the south-west of the facility in the Zuni Mountains. This aggravated the forming of arroyos from erosion, and impacted the local watersheds.

From the 1950s to the early 1980s, uranium mining was a major extractive industry in the region with a large number of mines located in the general area of the facility, with the nearest mines being around 20 miles distant towards the east. No historical mining has ever occurred on the facility. It is important to note that impacts have occurred to groundwater in the area from the mining and processing of uranium ore.

Today, built in the 1950s, and refurbished and expanded over time, a petroleum refinery is located on a man-made terrace towards the central and southern portions of the facility.

The refinery primarily receives crude oil via two 6 inch diameter pipelines; Bisti Pipeline comes down from the Four Corners Area and enters the refinery property from the north and Hospah Pipeline comes in from the northeast and is an interconnection with a main interstate pipeline. In addition, the refinery also receives natural gasoline feedstocks via a 4-inch diameter pipeline that comes in from the west along the Interstate 40 corridor from the Conoco gas plant. Crude oil and other products also arrive at the site via railroad cars. These feedstocks are then stored in tanks until refined into products.

[2] See, for example, the web site of McKinley County at http://www.co.mckinley.nm.us/

Figure 3 depicts an aerial photograph of the Gallup Refinery.

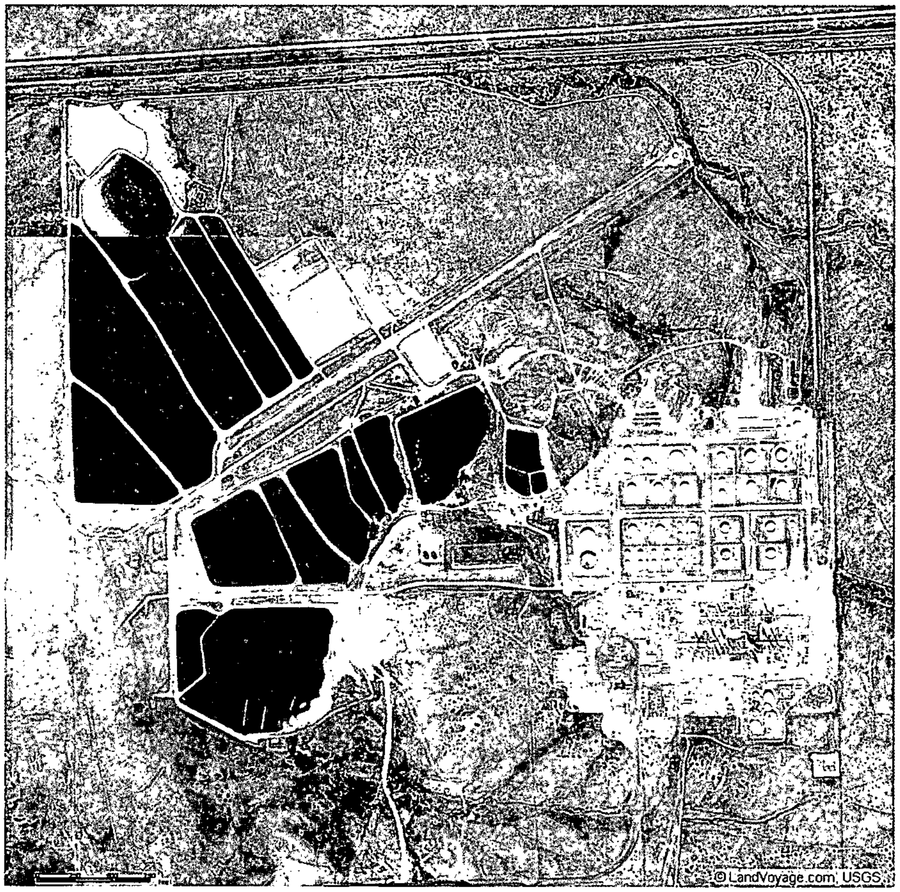

Figure 3: Aerial photograph of the Gallup Refinery

The refinery incorporates various processing units that convert crude oil and natural gasoline into finished products. These units are briefly described as follows.

- The crude distillation unit separates crude oil into various fractions; including gas, naphtha, light oil, heavy oil, and residuals.
- The fluidized catalytic cracking unit (FCCU) dissociates (cracks) long-chain hydrocarbon molecules into smaller molecules, and essentially converts heavier oils into naphtha and lighter oils.
- The alkylation unit combines specific types of hydrocarbon molecules into a high octane gasoline blending component.
- The reforming unit breaks up and reforms low octane naphtha molecules to form high octane naphtha.
- The hydrotreating unit removes undesirable sulfur and nitrogen compounds from intermediate feedstocks, and also saturates the feedstocks with hydrogen to make diesel fuel.
- Additional treater units later also remove impurities from various intermediate and blending feedstocks in order to produce finished products that comply with sales specifications.
- The isomerization unit converts low octane hydrocarbon molecules into high octane molecules.
- A set of acid gas treating and sulfur recovery units convert and recover various sulfur compounds from other processing units and then produce either Ammonium Thiosulfate or a solid elemental sulfur byproduct.

As a result of these processing steps, the refinery produces a wide range of petroleum products including propane, butane, unleaded gasoline, diesel, kerosene, and residual fuel. In addition to the aforementioned processing units, various other equipment and systems support the operation of the refinery and are briefly described as follows.

Storage tanks are used throughout the refinery to hold and store crude oil, natural gasoline, intermediate feedstocks, finished products, chemicals, and water. These tanks are all located aboveground and range in size from 80,000 barrels to less than a 1,000 barrels. A grouping of tanks is commonly referred to as a "tank farm" such as the hot oil "tank farm".

Pumps, valves, and piping systems are used throughout the refinery to transfer various liquids among storage tanks and processing units.

A railroad spur track and a railcar loading rack are used to transfer feed-stocks and products from refinery storage tanks into and out of railcars.

Several tank truck loading racks are used at the refinery to load out finished products and also may receive crude oil, other feedstocks, additives, and chemicals.

A pipeline from the refinery carries diesel fuel to the Pilot (formerly Giant) Travel Center. Gasoline is delivered to the Pilot Center via tanker truck.

A firefighting training facility is used to conduct employee firefighting training. Waste water from the facility, when training is conducted, is pumped into a tank which is then pumped out by a vacuum truck. The vacuum truck pumps the oily water into a process sewer leading to the New API Separator (NAPIS).

The process wastewater system is a network of curbing, paving, catch basins, and underground piping that collects waste water effluent from various processing areas within the refinery and then conveys this wastewater to the NAPIS.

The NAPIS is a two compartment oil water separator. Oil is separated from water based on the principle that, given a quiet surface, oil will float to the water surface where it can be skimmed off. The skimmed slop oil is passed to a collection chamber where it is pumped back into the refinery process. The clarified water is piped to the top of dual stripping columns where benzene is removed. The stripped water flows into the first aeration lagoon. Sludge sinks to the bottom of the NAPIS which is periodically vacuumed out by a vacuum truck and disposed as hazardous waste at an approved landfill or recycled and reused in refineries that have this allowable exemption under RCRA.

At the stripping columns, ambient air is blown upwards through the falling cascade of clarified wastewater as it passes through distillation column packing. Countercurrent desorption of benzene from the water occurs due to the high volume of air passing over the relatively large surface area provided by the packing. The desorbed benzene is absorbed into the air stream and vented to the atmosphere. Effluent from the stripper columns gravity flows through piping into the first aeration lagoon.

At the aeration basins, the treated wastewater is mixed with air in order to oxidize any remaining organic constituents and increase the dissolved oxygen concentration available in the water for growth of bacteria and other microbial organisms. The microbes degrade hydrocarbons into carbon dioxide and water. Three 15-hp mechanical aerators provide aeration in the first aeration lagoon with two 15-hp aerators providing aeration in the second lagoon. Effluent from the second aeration lagoon flows onward into the first of several evaporation ponds of various sizes.

At the evaporation ponds, wastewater is converted into vapor via solar and mechanical wind-effect evaporation. No wastewater is discharged from the refinery to surface waters of the state because all of the waste water evaporates. Therefore, the refinery is not required to have a NPDES discharge permit for discharge of treated process water. However, the Gallup refinery does have a NPDES permit for storm water discharge.

The storm water system is a network of valves, gates, berms, embankments, culverts, trenches, ditches, natural arroyos, and retention ponds that collect, convey, control, treat, and release storm water that falls within or passes through refinery property. Storm water that falls within the processing areas is considered equivalent to process wastewater and is sent through the NAPIS, benzene strippers and wastewater treatment system for retention in evaporation ponds. Strom water that falls on undeveloped land is allowed to leave the property. Storm water discharge from the refinery is very infrequent due to the arid desert-like nature of the surrounding geographical area. The Gallup Refinery maintains a storm water pollution prevention plan (SWPPP) that includes Best Management Practices (BMPs) for effective storm water pollution prevention. The refinery has constructed several new berms in various areas and improved outfalls to minimize the possibility of contaminated runoff leaving the refinery property.

1.3 Current site topography and location of natural and manmade structures

Local topography consists of a gradually inclined down-slope from high ground in the southeast to a lowland fluvial plain in the northwest. The highest point on refinery property is located at the southeast corner boundary (elevation approximately 7,040 feet) and the lowest point is located at the northwest corner boundary (elevation approximately 6,860 feet). The refinery processing facility is located on a flat man-made terrace at an elevation of approximately 6,950 feet.

Surface water in this region consists of the man-made evaporation ponds and aeration basins located within the refinery, a livestock watering pond (Jon Myer's Pond) located east of the refinery, two small unnamed spring fed ponds located south of the refinery, and the South Fork of the Puerco River and its tributary arroyos. The various ponds and basins typically contain water consistently throughout the year.

The South Fork of the Puerco River and its tributaries are intermittent and generally contain water only during, and immediately after, the occurrence of precipitation. It is likely that shallow groundwater in the vicinity of the refinery follows to some extent the flow direction of the South Fork of the Puerco River and its tributaries in the area.

The 810 acre refinery property site is located on a layered geologic formation. Surface soils generally consist of fluvial and alluvial deposits; primarily clay and silt with minor inter-bedded sand layers. Below this surface layer is the Chinle Formation, which consists of low permeability claystones and siltstones that comprise the shales of this formation. As such, the Chinle Formation effectively serves as an aquiclude. Inter-bedded within the Chinle Formation is the Sonsela Sandstone bed, which represents the uppermost potential aquifer in the region.

The Sonsela Sandstone bed lies within and parallels the dip of the Chinle Formation. As such, its high point is located southeast of the refinery and it slopes downward to the northwest as it passes under the refinery. Due to the confinement of the Chinle Formation aquiclude, the Sonsela Sandstone bed acts as a water-bearing reservoir and is artesian at its lower extremis. Artesian conditions exist through much of the central and western portions of the refinery property.

Groundwater flow within the Chinle Formation is extremely slow and typically averages less than 10^{-10} centimeters per second (less than 0.01 feet per year). Groundwater flow within the surface soil layer above the Chinle Formation is highly variable due to the presence of complex and irregular stratigraphy; including sand stringers, cobble beds, and dense clay layers. As such, hydraulic conductivity may range from 10^{-8} centimeters per second in the clay soil layers located near the surface up to 0^{-2} centimeters per second in the gravelly sands immediately overlying the Chinle Formation.

Figure 4 depicts the regional surface water flows in the area, and Figure 5 shows a more localized scale. As can be seen from the surface water channels in Figure 5, shallow groundwater flows (~ at 40 feet) are likely to be to the north-west direction in the north-east sections of the refinery; presumably much more directly north in the central and northern portions of the refinery, and west and north-west in the western and southern portions. The zones of shallow groundwater are somewhat perched as there are many adjacent shallow wells at similar depths that are often dry with their neighbors containing groundwater

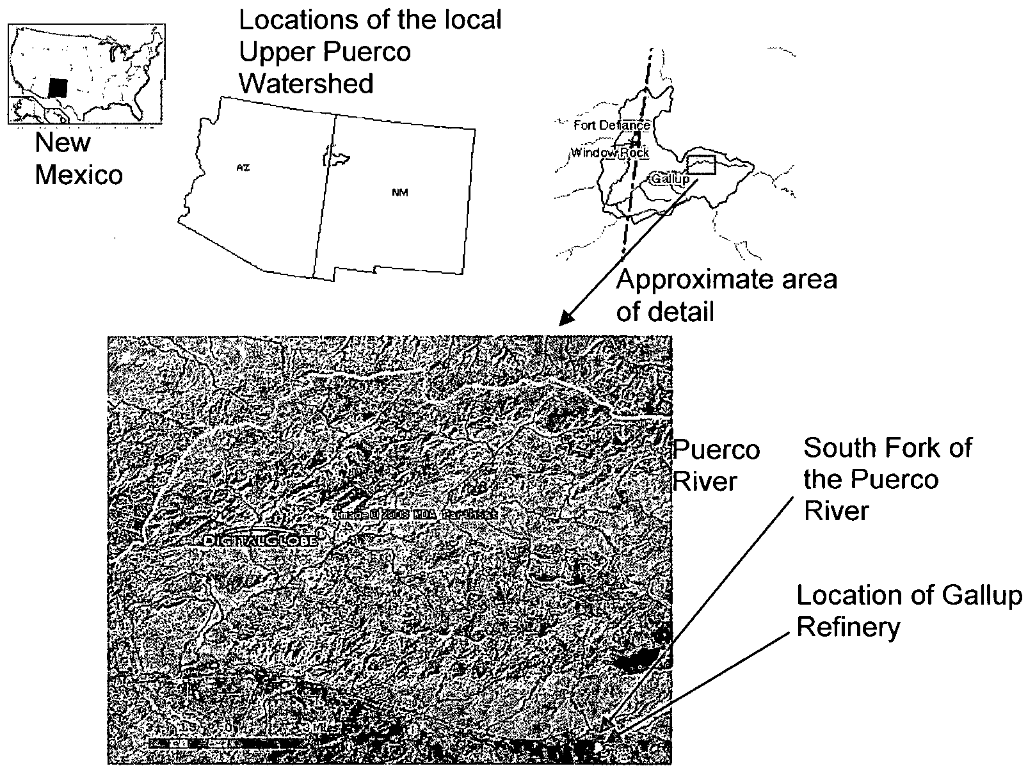

Figure 4: Regional scale: Flow lines and major surface water bodies (from: EPA Enviromapper - http://map24.epa.gov/EMR/?ZoomToWatershed=15020006) North is towards the top of the page.

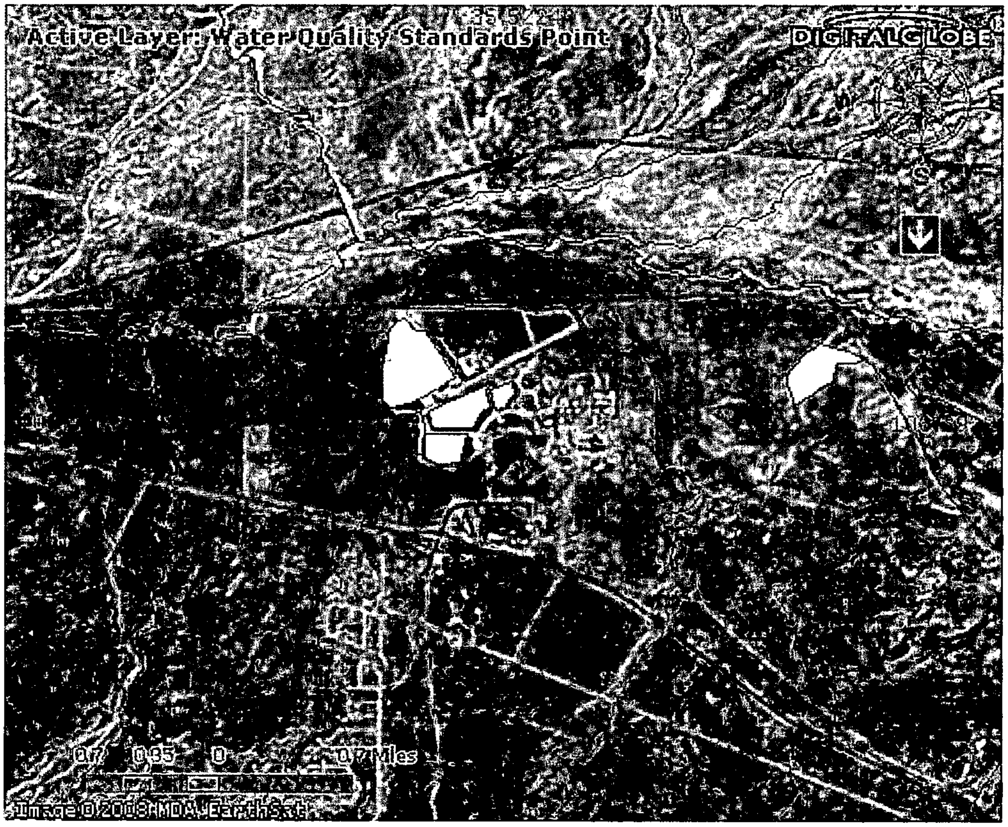

Figure 5: Localized scale: Flow lines and major surface water bodies (from: EPA Enviromapper - http://map24.epa.gov/EMR/?ZoomToWatershed=15020006) North is towards the top of the page. The pond to the east is Jon Myers' Livestock Pond.

Shallow groundwater located under refinery property generally flows along the upper contact of the Chinle Formation. Although the prevailing flow direction is from the southeast and toward the northwest; a subsurface ridge has been identified and is thought to deflect some flow in a northeasterly direction in the vicinity of the refinery tank farm.

2.0 Monitoring and Remediation Activities in 2008

2.1 Groundwater elevation surveys

Ground water elevation data are collected from the wells listed in Table 1. Figure 6 shows the locations of these wells. The data gathered are presented in section 3.0. As directed by NMED HWB, ground water elevation data are collected on a quarterly or an annual basis. Groundwater levels and SPH thickness measurements (from the RW series of wells) are collected quarterly to monitor groundwater elevation and product thickness fluctuations over time.

Measurement data and the date and time of each measurement are recorded on a site monitoring data sheet. The depth to groundwater and SPH thickness levels are measured to the nearest 0.01 ft. The depth to groundwater and SPH thickness are recorded relative to the surveyed well casing rim or other surveyed datum. A corrected water table elevation is provided in wells containing SPH by adding 0.8 times the measured SPH thickness to the calculated water table elevation.

All water/product levels are measured to an accuracy of the nearest 0.01 foot using an electrical conductivity based meter, the Heron Instruments 100 ft. DipperT electric water depth tape complying with US GGG-T-106E, EEC Class II. After determining water levels, well volumes are calculated using the appropriate conversion factors for a given well based on its internal diameter. Volume is equal to the height of the liquid column times the internal cross-sectional area of the well.

Groundwater and SPH levels are measured in all wells within 48 hours of the start of groundwater sampling activities. All manual extraction of SPH and water from recovery wells, observation wells, and collection wells is discontinued for 48 hours prior to the measurement of water and SPH levels.

2.2 Monitoring and Sampling Program

The purpose of this and subsequent sections is to describe the types of activities that are conducted and the methods that are used.

The primary objective of groundwater monitoring is to provide data which will be used to assess groundwater quality at and near the Facility. Groundwater elevation data are collected to evaluate groundwater flow conditions. The groundwater monitoring program for the Facility consists of sample collection and analysis from a series of monitoring wells, recovery wells, outfalls, and evaporation pond locations.

The monitoring network is divided into two investigation areas (East Side and West Side). The sampling frequency, analyses and target analytes vary for each investigation area and well/outfall/evaporation pond location. The combined data from these investigation areas is used to assess groundwater quality beneath and immediately down-gradient of the Facility, and evaluate local groundwater flow conditions.

Samples are not collected from monitoring wells that have measurable SPH. For wells that are purged dry, samples will be collected if recharge volume is sufficient for sample collection within 24 hours. Wells not sampled due to insufficient recharge will be documented in the field log.

Daily field activities, including observations and field procedures, will be recorded using indelible ink on field sampling forms. The original field forms will be maintained at Gallup Refinery. Completed forms will be maintained in a bound and sequentially numbered field file for reference during field activities. The daily record of field activities will include the following information:

- Well ID/ Evaporation pond location/ Outfall
- Date
- Start and finish sampling time
- Field team members, including visitors
- Weather conditions
- Daily activities and times conducted
- Observations
- Record of samples collected with sample designations
- Photo log (if needed)
- Field monitoring data, including health and safety monitoring (if needed)
- Equipment used and calibration records, if appropriate
- List of additional data sheets and maps completed
- An inventory of the waste generated and the method of storage or disposal
- Signature of personnel completing the field record

All samples collected for analysis will be recorded in the field report or data sheets. Chain-of-custody forms will be completed at the end of each sampling day, prior to the transfer of samples off site, and will accompany the samples during shipment to the laboratory. A signed and dated custody seal will be affixed to the lid of the shipping container. Upon receipt of the samples at the laboratory, the custody seals will be broken, the chain-of-custody form will be signed as received by the laboratory, and the conditions of the samples will be recorded on the form. The original chain-of-custody form will remain with the laboratory. Gallup Refinery will maintain copies of all chain –of-custody forms generated as part of sampling activities. Copies of the chain-of-custody records will be included with all draft and final laboratory reports submitted to NMED and OCD.

Field duplicates and trip blanks may be obtained for quality assurance during sampling activities. The samples will be handled as described in Section 4.2.3.

Trip blanks will accompany laboratory sample bottles and shipping and storage containers intended for VOC analyses. Trip blanks will consist of a sample of analyte free de-ionized water placed in an appropriate sample container. Trip blanks will be analyzed at a frequency of one for each shipping event involving twenty or more samples. Generally, a trip blank will only be placed in one of the containers, if more than one container is used to ship the set of samples.

The following sub-sections outline the monitoring program for each investigation area.

2.2.1. East Side – Sampling Locations

The location of the East Side monitoring and recovery wells are shown in Figure 6. The following wells will be sampled (as described in Table 1) within the East Side area:

These wells are –
Recovery wells

- RW-1
- RW-2
- RW-5
- RW-6

Monitoring wells

- OW-29
- OW-30
- OW-13
- OW-14
- OW-50
- OW-52

2.2.2. West Side – Sampling Locations

The locations of wells on the West Side are shown in Figure 6.

The following wells, outfalls, and ponds will be sampled (as described in Table 1) within the West Side area:

(Note: these outfalls are from one section of the wastewater treatment system to another – they do not discharge to any location outside the facility.)

Monitoring wells

- NAPIS 1
- NAPIS 2
- NAPIS 3
- KA-3
- GWM-1
- SMW-2
- SMW-4
- MW-1
- MW-4
- MW-5
- OW-11

- OW-12
- BW-1A
- BW-1B
- BW-1C
- BW-2A
- BW-2B
- BW-2C
- BW-3A
- BW-2A
- BW-3A
- PW-2
- PW-3
- PW-4

Outfalls
- AL1 Inlet
- AL2 Inlet
- EP1 Inlet
- AL2 to EP-1
- Pilot Travel Center effluent
- NAPIS effluent
- Boiler water Inlet to EP-2

Ponds
- EP1 Inlet
- EP2 Inlet
- Pond 1
- Pond 2
- Pond 3
- Pond 4
- Pond 5
- Pond 6
- Pond 7
- Pond 8

2.3 Sampling Methods and Procedures

All monitoring wells scheduled for sampling during a groundwater sampling event are sampled within 15 working days of the start of the monitoring and sampling event.

Each monitoring well is purged by removing groundwater prior to sampling in order to ensure that formation water is being sampled. Generally, at least three well volumes (or a minimum of two if the well has low recharge) is purged from each well prior to sampling. Field water quality measurements must stabilize for a minimum of three consecutive readings before purging will be discontinued. Field water quality measurements include pH, electrical conductivity, and temperature. Field water quality measurement stability is determined as when field parameter readings stabilize to within ten percent between readings for three consecutive measurements. Once the readings are within ten percent, purging stops and the well is ready for sample collection. The volume of groundwater purged, the instruments used, and the readings obtained at each interval are recorded on the field-monitoring log. Well purging and sampling are performed using disposable bailers and/or appropriate sampling pumps.

Groundwater samples are obtained from each well within 24 hours of the completion of well purging. Sample collection methods are documented in the field monitoring reports. The samples are transferred to the appropriate, clean, laboratory-prepared containers provided by the analytical laboratory.

All purged groundwater and decontamination water from contaminated wells is disposed off in the refinery wastewater treatment system upstream of the API Separator. If the wells are known to be clean, purged groundwater is disposed off onto the surface soils near the wells.

Groundwater samples intended for metals analysis are submitted to the laboratory as total metals samples. Groundwater samples obtained for dissolved metals analysis are filtered using disposable filters with a 0.45 micrometers mesh size.

At a minimum, the following procedures are used when collecting samples:

- Neoprene, nitrile, or other protective gloves are worn when collecting samples. New disposable gloves are used to collect each sample.
- All samples collected for chemical analysis are transferred into clean sample containers supplied by the analytical laboratory. The sample container is clearly marked. Sample container volumes and preservation methods are in accordance with the most recent standard EPA and industry accepted practices for use by accredited analytical laboratories. Sufficient sample volumes are obtained for the laboratory to complete the method-specific QC analyses on a laboratory-batch basis.
- Sample labels and documentation are completed for each sample.

Immediately after the samples are collected, they are stored in a cooler with ice or other appropriate storage method until they are delivered to the analytical laboratory. Standard chain-of-custody procedures are followed for all samples collected. All samples are submitted to the laboratory to allow the laboratory to conduct the analyses within the method holding times.

The following shipping procedures are performed during each sampling event:

- Individual sample containers are packed to prevent breakage and transported in a sealed cooler with ice or other suitable coolant or other EPA or industry-wide accepted method. The drainage hole at the bottom of the cooler is sealed and secured in case of sample container leakage.
- Each cooler or other container is delivered directly to the analytical laboratory.
- Glass bottles are separated in the shipping container by cushioning material to prevent breakage.
- Plastic containers are protected from possible puncture during shipping using cushioning material.
- The chain-of-custody form and sample request form are shipped inside the sealed storage container to be delivered to the laboratory.
- Signed and dated chain-of-custody seals are applied to each cooler prior to transport of samples from the site.

The objective of the decontamination procedures is to minimize the potential for cross-contamination

The majority of field equipment used for groundwater sampling is disposable and, therefore, does not require decontamination. In order to prevent cross-contamination, field equipment that comes into contact with water or soil is decontaminated between each sampling location. The decontamination procedure consists of washing the equipment with a non-phosphate detergent solution (examples include Fantastik™, Liqui-Nox®), followed by two rinses of distilled water and air dried.

Decontamination water and rinsate is contained and disposed of the same way as purge water Decontamination procedures and the cleaning agents used are documented in the daily field log.

Field equipment requiring calibration is calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures. Calibration checks are conducted daily and the instruments recalibrated if necessary. Calibration measurements are recorded in the daily field logs.

If field equipment becomes inoperable, its use will be discontinued until the necessary repairs are made. A properly calibrated replacement instrument is used in the interim. Instrumentation used during sampling events is recorded in the daily field logs.

Table 1: **Gallup Refinery - Groundwater Monitoring Schedule**

Sampling Location ID	Sampling Frequency	Collect GW Elevation DTW, DTP	Water Quality Parameters	Analytical Suite
Pilot Effluent	Quarterly (Q)			VOC/ DRO extended/GRO/BOB/COD/WQCC Metals
NAPIS Effluent	Q			Gen Chem/VOC/SVOC(phenol)/DRO extended//GRO/WQCC Metals
AL2 to EP-1	Q			Major cations/major anions/VOC/SVOC (phenol)/DRO extended/GRO/WQCC Metals
Influent to AL-1	Q			VOC/BOD/COD/chlorides/DRO extended/GRO/pH/phenol
Influent to AL-2	Q			VOC/BOD/COD/chlorides/DRO extended/GRO/pH/phenol
Influent to Evaporation Pond 1	Q			Major cations/ major anions/pH/BOD/COD/chlorides/VOC/SVOC (phenol)/DRO extended/GRO/WQCC metals
NAPI 2ndary Containment	Q			BTEX/DRO extended/GRO/WQCC Metals or check for fluids
RW-1	Q	X		Measure DTW,DTP
RW-2	Q	X		Measure DTW,DTP
RW-5	Q	X		Measure DTW,DTP
RW-6	Q	X		Measure DTW,DTP

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
OW-1	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Visual check for artesian flow conditions; Major cations/major anions/ VOC/DRO extended / WQCC Metals
OW-10	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Water level measurement of the Sonsela Aquifer water table Major cations /major anions/ VOC/DRO extended/ WQCC Metals
OW-13	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
OW-14	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
OW-29	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
OW-30	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
GWM-2	Q	X		Check for water – if water is detected report to OCD & NMED within 24 hours; sample for BTEX + MTBE/GRO/DRO extended/major cations/ Major anions.
GWM-3	Q	X		Check for water – if water is detected report to OCD & NMED within 24 hours; sample for BTEX + MTBE/GRO/DRO extended/major cations/ Major anions.
GWM-1	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC Metals
NAPIS-1(a)	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/ BTEX + MTBE/SVOCs/DRO/GRO WQCC Metals
NAPIS-2 (a)	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/ BTEX + MTBE/SVOCs/DRO/GRO WQCC Metals
NAPIS-3(a)	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/ BTEX + MTBE/SVOCs/DRO/GRO WQCC Metals

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
KA- 3 (a)	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/ BTEX + MTBE/ SVOCs /DRO/GRO WQCC Metals
Boiler Water & Cooling Tower Blowdown inlet To EP-2	Semi Annual (SA)		pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions
Evaporation Pond 1 (b)	Semi Annual		pH , E.C., D.O, ORP, Temp, TDS	General Chemistry / VOC/SVOC/WQCC 20.6.2.3103 constituents/BOD/COD/E-coli Bacteria/RCRA 8 Metals
Evaporation Pond 2 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 3 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 4 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.

Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
Evaporation Pond 5 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 6 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 7 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 8 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 9A (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 11 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
Evaporation Pond 12A (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 12B (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Any temporary Pond containing Fluid	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
BW-1-A	Annual (A)	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
Evaporation Pond 9A (b)	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
Evaporation Pond 11 (b)	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
BW-2-A	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-2-B	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-2-C	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-3-A	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-3-B	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-3-C	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
Pond 2 Inlet	A			VOC/DRO extended/GRO/BOD/COD/TDS

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
MW-1	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals
MW-4	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals
MW-5	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals
OW-11	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
OW-12	A	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
SWM-2	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
SWM-4	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals
PW-2	Every 3 yrs Starting in 2008			VOC/SVOC/ WQCC metals/cyanide/nirates
PW-3	Every 3 yrs Starting in 2008			VOC/SVOC/ WQCC metals/cyanide/nirates
PW-4	Every 3 yrs Starting in 2007			VOC/SVOC/ WQCC metals/cyanide/nirates
Effluent from Old API (storm Water separator Effluent	Monthly flow rate Measurements To New API Separator			Collect monthly flow rate readings from the Old API to the New API Separator. If effluent is re-routed to any other location than the New API Separator, NMED/OCD must be contracted to determine whether additional sampling and analysis is required.

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
All Wells Including the Recovery wells Containing Separate phase hydrocarbons	Annual Sampling Event			Major cations/major anions/VOC/SVOC/WQCC 20.6.2.3103

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.
(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table Notes

Pilot Effluent - Effluent from the Pilot Gas Station to the Aeration Lagoon

Pond 2 Inlet- Sample collected at the inlet to Evaporation Pond 2 from Evaporation Pond 1

NAPIS Effluent – Effluent leaving the New API Separator

AL-2 to EP-1- sample collection at the inlet from Aeration Lagoon 2 to Evaporation Pond 1 (influent location into EP 1)

NAPIS 1= (KA-1R); NAPIS-2 = (KA-2R), NAPIS 3= (KA-3R) – monitor wells positioned around NAPIS to detect leakage

DO- dissolved oxygen; ORP- oxygen reduction potential temp-temperature E.C. – electrical or specific conductivity

TDS- total dissolved solids VOCs- volatile organic compounds – EPA Method 8260, must include MTBE

SVOCs- semi volatile organic compounds- EPA Method 8720, must include phenol

DRO – diesel range organics – EPA Method 8015B (or as modified)

GRO – gasoline range organics – EPA Method 8015B (or as modified)

BTEX – benzene, toluene, ethylbenzene, xylene, plus Methyl Tertiary-Butyl Ether (MTBE) – EPA Method 8021 + MTBE

DTW- Depth to water DTP-depth to product EP- Evaporation Pond

BW wells – boundary wells GWM wells – are located around the aeration lagoons to detect leakage

MW – Monitor Well OW- observation well RW- recovery well PW- raw water production well

2.4 Collection and Management of Investigation Derived Waste

Investigation derived waste (IDW) generated during each groundwater sampling event may include purge water, decontamination water, excess sample material, and disposable sampling equipment. All water from known contaminated wells generated during sampling and decontamination activities is temporarily stored in labeled 55-gallon drums until disposed of in the refinery wastewater treatment system upstream of the API separator. Water generated from known clean wells may be disposed of on the surface soils near the well site. All other solid waste generated during sampling activities (including sampling gloves, tubing, etc) is disposed of with the Refinery's general municipal waste.

2.5 Collection of surface water samples

At the evaporation ponds, samples are collected near the inlets, and are a grab sample at the pond edge near the inlet. This location is noted in the field notebooks. For outfalls, a grab sample is collected at the pipe end, and recorded.

2.6 Analytical Methods

Groundwater and surface water samples collected during the monitoring events are analyzed for the constituents listed in Table 1. In addition, for various locations the list of metals is modified to either be the Skinner list of the NM Water Quality Control Commission list. Table 1 provides a summary of target analytes for each EPA analytical method.

2.7 Remediation Activities

Separated Phase Hydrocarbons (SPHs) have been found in wells RW-1, RW-5 and RW-6. In the past these were recovered either through the use of pumps, or via hand-bailing. Sections 4.3 and 4.4 and Appendix A provide details of the volumes of product recovered and the dates and the depths to water and SPH that we have measured in these wells. In 2008, this volume was approximately 4 gallons from RW-1. In the past, product was also recovered from RW-5 and RW-6.

The method of collection is to use a hand bailer, extract the product gently to avoid excessive stirring, and empty the product into an appropriate container. Then, after the well liquids have stabilized, this set of actions is repeated until the product within the well is recovered. The amount recovered is measured and cross-referenced with the initial measurement of product thickness and estimation of volume.

Figure 6: Locations of wells

3.0 Data Summary

3.1 Applicable Standards

The main set of standards that we check our data against are those of the State of New Mexico – the NMWQS of the WQCC. We also check against the EPA's Maximum Contaminant Levels (MCLs) for drinking water, taking the lower of these two sets of limits. If NMWQS standards or MCLs do not exist for a contaminant, we compare levels against the EPA Regional Screening Levels set for Residential Risk-Based Screening Levels for Tap Water (RRSLs). We also use the NMED's TPH Screening Guidelines for Gasoline Range Organics and Diesel Range Organics. All of these standards, limits and screening levels are provided in Appendix B.

3.2 Summary data Tables and constituents exceeding standards

In the following Tables we have summarized our analytical data. Only constituents above levels of detection are generally described. If a constituent exceeds any standard, we have marked it in bold and underlined its value. Appendix I (the last Appendix in its own binder, Binder 3) contains the laboratory reports.

In 2007, we found that in PW-3, the contaminant 2-Methylnapthalene was at a level of 0.032 mg/l. This level exceeded the current NMWQS of 0.03 mg/l for 2-Methylnapthalene.

We sampled PW-3 again in 2008, along with a blind duplicate, and found that the levels were non-detectable. We believe the level found in 2007 was a laboratory artifact, as no such contaminant had ever been found before – and it did not show up again in 2008. Generally, we only present results for contaminants that have been found at levels above the level of detection either in 2008 or in previous years. In this case, as there was some concern in 2007, we present the result for 2008 and for the blind duplicate sample.

Table 2: EPA METHOD 8260B VOLATILES. Levels of detected compounds (or hydrocarbons of concern) in Potable Water Wells – all units of concentrations are in mg/l. Contaminants not detected are not presented.

	Year[3]	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylene	MTBE	2-Methyl-napthalene
PW-2	2004	12-9-2004	<0.001	<0.001	<0.001	<0.0015	-	
PW-4	2004	8-4-2004	<0.001	<0.001	<0.001	<0.0015	-	
PW-3	2006	10-27-2006	<0.001	<0.001	<0.001	<0.0015	<0.001	
	2007	Sampling activities were primarily conducted from December 27-31, 2007 (Sampling of this well was completed on 1-1-2008 because of inclement weather.)	<0.001	<0.001	<0.001	<0.0015	<0.001	0.032
PW-2	2008	9/12/2008	<0.001	<0.001	<0.001	<0.0015	<0.001	
PW-3	2008	8/21/08	<0.001	<0.001	<0.001	<0.0015	<0.001	<0.01 Duplicate = <0.01
PW-4	2008	9/12/2008	<0.001	<0.001	<0.001	<0.0015	<0.001	
NMWQS			**0.01**	**0.75**	**0.75**	**0.62**		
EPA MCLS			**0.005**	**1**	**0.7**	**10.0**		
RRSL			**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**	

[3] No potable wells were sampled in 2005.

Table 3: EPA METHOD 300.0 ANIONS, 6010B RECOVERABLE METALS, 8260B VOLATILES, 8270C SEMI VOLATILES. Levels of all detected compounds in Potable Well # 2, 3 - all units of concentrations are in mg/l. Compounds not detected are not presented.

	Ba	**Fe**	**Pb**	**Mn**	**U**	**Zn**	**Cyanide**	**Nitrate as N**	**Phenols**
PW-2	0.013	0.07	<0.005	<0.002	.00161	<0.02	<0.01	<1.0	<0.001
PW-3	<0.02	<.05	<0.005	<0.002	.00063	<0.05	<0.004	.13	<0.001
PW-4	0.013	0.11	<0.005	<0.005	.0014	<0.02	<0.01	<1.0	<0.001
NMWQS	**1.0**			**0.2**	**5.0**	**10**	**0.2**		**.005**
EPA MCLS	**2.0**	**0.3**	**0.015**[4]	**0.3**	**0.03**		**0.2**	**10**	
RRSL	**7.3**	**26.0**		**0.88**	**0.11 (soluble salts)**	**11.0**	**0.73**	**58.0**	**11.0**

[4] Action Level

Table 4: EPA METHOD 300.0 ANIONS, EPA 120.1 SPECIFIC CONDUCTANCE, SM4500-H+B: pH. Levels of detected compounds and other parameters in Boundary and Observation wells. All units are in mg/l, except for pH and Specific Conductivity. Compounds not detected are not presented.

	Date Sampled	Fluoride	Chloride	Nitrate + Nitrite as N	Bromide	Phosphorous Orthophosphate (as P)	Sulfate	pH	Specific Conductance (umhos/cm)
OW-11	8/14/08	2.2	90	.75	.29	<.0.5	940	8.39	2600
	12/27/07								
	10/24/06	2.5	86			<.0.5	1100	8.4	3100
BW-1C	7/31/08	2.4	35	<1.0	<0.10	<0.5	260	8.68	1400
	12/31/07	2.6	35	<1.0		<0.5	270	8.5	1400
	10/27/06	2.7	36	<0.5		<0.5		8.39	1400
BW-2A	7/30/08	1.1	40	<1.0	.43	0.75	7.3	7.87	1400
	12/31/07	1.3	42	<1.0		0.70	7.7	7.76	1400
	10/27/06	1.3	39	<0.5		0.64	7.5	8.27	1400
BW-2B	7/30/08	1.6	30	<1.0	1.1	<.0.5	150	7.76	2200
	12/31/07	1.8	30	<1.0		<0.5	150	7.77	2400
	10/27/06	1.9	31	<0.5		<0.5	140	8.1	1400
BW-2C	7/30/08	1.9	44	<1.0	.14	<0.5	270	8.83	1400
	12/31/07	2.3	45	<1.0		<0.5	290	8.73	1400
	10/27/06	2.4	42	<0.5		<0.5	270	8.52	1300
BW-3B	7/31/08	1.4	34	<1.0	.42	1.1	55	7.95	1500
	12/31/07	1.6	35	<1.0		1.1	51	7.93	1600
	10/27/06	1.7	33	<0.5		1.1	250	8.5	1600
BW-3C	8/1/08	1.5	34	<2.0	<1.0	<5.0	240	8.63	1500
	12/31/07	1.8	38	<1.0		<0.5	300	8.59	1500
	10/27/06	1.9	37	<0.5		<0.5	280	8.39	1400
NMWQS		1.6	**250 (domestic water)**	**10**			**600**	**6 - 9**	
EPA MCLS		4.0	**250**	**10 Nitrate 1 Nitrite**			**250**	**6 - 9**	
RRSL				**58.0**					

Table 5: EPA METHOD 6010B TOTAL RECOVERABLE METALS.
Levels detected in Boundary Wells. Only data for detected metals are presented. All units are in mg/l. Metals not detected are not presented.

	Date Sampled	Ba	Ca	Cr	Fe	Mg	Mn	K	Na	Zn	U
OW-11	8/14/08	<0.01	11		<.0.05	1.3	.015	1.8	640		**.249**
	12/27/07	<0.01	11		<.0.05	1.3	.016	1.6	690		**.22**
	10/28/06	<0.02	12		<.0.05	1.4					
BW-1C	7/31/08	.016	3.0		<.0.05	.62	.013	<1.0	310		.00115
	12/31/07	0.023	3.6		<0.05	0.74	0.01	<1.0	360		<0.1
	10/28/06	<0.02	3.4		<0.05	<1.0					
BW-2A	7/30/08	0.14	8.6		0.37	3.2	0.14	<1.0	320		<.001
	12/31/07	0.18	11		0.7	3.9	0.22	<1/0	380		<0.1
	10/28/06	0.15	10		<0.05						
BW-2B	7/30/08	0.041	13		.064	3.0	0.16	<1.0	570		.0115
	12/31/07	0.07	16		0.62	3.6	0.29	1.6	640		<0.1
	10/28/06	0.071	23		<0.05						
BW-2C	7/30/08	0.13	24		1.3	2.0	.43	1.1	300		.00728
	12/31/07	0.026	2.9		0.16	0.68	0.024	<1.0	340		<0.1
	10/28/06	0.031	5.6		<0.05	<1.0					
BW-3B	7/31/08	0.11	8.3		0.43	2.6	0.12	<1.0	370		<.001
	12/31/07	0.099	9.0		0.64	2.9	0.13	<1.0	430		<0.1
	10/28/06	0.11	9.0		<0.05						
BW-3C	8/1/08	.27	28	.0078	3.0	2.2	0.41	1.6	350	.032	.00251
	12/31/07	0.068	4.2		0.14	0.81	0.015	1.1	360		<0.1
	10/28/06	0.029	6.0		<0.05						
NMWQS		**1.0**		**.05**	**1.0**		**0.2**			**10.0**	**5.0**
EPA MCLS		**2.0**		**0.1**	**0.3**		**0.3**				**0.03**
RRSL		**7.3**			**26.0**		**0.88**			**11.0**	**0.11***

* Soluble salts

Table 6: EPA METHOD 8260B VOLATILES: Levels of hydrocarbons of concern found in the Boundary and Observation Wells – all units of concentrations are in mg/l

	Year	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
OW-11	2008	8/14/08	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/27/07	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/24/06	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-1C	2008	7/31/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-2A	2008	7/30/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-2B	2008	7/30/08	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-2C	2008	7/30/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-3B	2008	7/31/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-3C	2008	8/1/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
NMWQS			**0.01**	**0.75**	**0.75**	**0.62**	
EPA MCLS			**0.005**	**1.0**	**0.7**	**10.0**	
RRSL			**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**

Table 7: EPA METHOD 8260B VOLATILES, EPA METHOD 8021B SEMI VOLATILES: Levels in Observation Wells and Monitoring Well (GWM-1 and GWM-2) – all units of concentrations are in mg/l. Quarterly Sampling of OW-13, 14, 29 & 30 began Fourth Quarter 2008.[5]

	Year	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
OW#12	2008	8/19/08	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12-27-2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10-27-2006	<0.001	<0.001	<0.001	<0.001	<0.0025
OW#13 **	2008	11/13/08	<0.001	<0.001	<0.001	<0.0015	0.0016
	2008	8/19/08	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12-27-2007	<0.001	<0.001	<0.001	<0.0015	0.0013
	2006	10-27-2006	<0.001	<0.001	<0.001	<0.001	<0.0025
OW#14 *	2008	11/12/08	**0.0082**	<0.001	<0.001	<0.002	**0.91**
	2008	8/21/08	.0035	<0.001	<0.001	<0.0015	**1.3**
	2007	1-1-2008	**0.014**	<0.001	<0.001	<0.0015	**0.92**
	2006	12-28-2006	0.0042	<0.001	0.0025	<0.003	**0.18**
	2006	10-27-2006	0.0034	<0.001	<0.001	<0.003	**0.016**
	2005	9-27-2005	0.017	0.0022	0.0023	0.0014	**0.077**
OW#29 **	2008	11/14/08	<0.001	<0.001	<0.001	<0.0015	**0.015**
	2008	8/19/08	<0.001	<0.001	<0.001	<0.0015	.0092
	2007	12-28-2007	<0.001	<0.001	<0.001	<0.0015	0.0043
	2006	10-27-2006	<0.001	<0.001	<0.001	<0.003	<0.0025
	2005	9-27-2005	<0.001	<0.001	<0.001	<0.0005	<0.0025
OW#30 *	2008	11/12/08	<0.001	<0.001	<0.001	<0.002	**0.88**
	2008	8/20/08	<0.001	<0.001	<0.001	<0.0015	**1.1**
	2007	12-28-2007	<0.001	<0.001	<0.001	<0.0015	**0.29**
	2006	10-27-2006	<0.001	<0.001	<0.001	<0.003	<0.0025
	2005	9-27-2005	<0.001	<0.001	<0.001	<0.0005	**0.018**
GWM-1	2008	7/10/08	**.011**	.0021	.0039	.019	**0.12**
	2007	5-24-2007	**0.016**	<0.001	<0.001	<0.0015	**0.23**
	2006	10-27-2006	**0.012**	<0.001	<0.001	<0.0015	**0.16**
GWM-2[6]	2008	2/28/08	<0.001	<0.001	<0.001	<0.0015	**0.028**
NMWQS			**0.01**	**0.75**	**0.75**	**0.62**	
EPA MCLS			**0.005**	**1.0**	**0.7**	**10.0**	
RRSL			**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**

* Method EPA 8021B Semi-Volatiles used for Fourth Quarter Analysis.
** Method EPA 8260B Volatiles used for Fourth Quarter Analysis.

[5] The OCD requirement was for annual sampling of OW-29, 30, and semi-annual for OW-14 in 2008. The NMED/HWB made this a quarterly sampling requirement from the fourth quarter of 2008 which is continuing in 2009.

[6] Well GWM-2 is checked for water; and, if available, a sample is collected as occurred on 2/28/2008

Table 8: EPA METHOD 8260B VOLATILES: Levels of detected VOCs in Groundwater Monitoring and Boundary Wells in 2008- all units of concentrations are in mg/l. Compounds not detected are not presented. Quarterly sampling began Fourth Quarter 2008 for OW-14, 29, 30 (see footnote 5 on the previous page).

	DATE SAMPLED	GWM-1	OW-13	OW-14	OW-29	OW-30	SMW-2	NMWQS	MCL	RRSL
ACETONE	8/14/08						.00753			**22**
	11/13/08		<0.01	<0.01	<0.01	<0.01				
1,2,4 TRIMETHYLBENZENE	7/10/08	0.0046							**0.005**	
	11/14/08		<0.001	<0.001	<0.001	<0.001				
1-METHYLNAPHTHALENE	8/21/08			**<u>0.012</u>**				**0.03**		**0.0023**
	11/13/08		<0.004	**<u>0.016</u>**	<0.004	<0.04				
ISOPROPYLBENZENE	8/21/08			0.0016					**0.005**	
	11/13/08		<0.001	0.0015	<0.001	<0.001				
Sec-BUTYLBENZENE	8/21/08			0.002					**0.005**	
	11/13/08		<0.001	0.0025	<0.001	<0.001				
1,2-DICHLOROETHANE (EDC)	8/21/08							**0.01**	**0.005**	**0.00015**
	11/13/08		<0.001	**<u>0.0018</u>**	**0.001**	**.0013**				

Table 9: EPA METHOD 8270C SEMI VOLATILES: Levels of detected SVOCs in Groundwater Monitoring and Boundary Wells in 2008- all units of concentrations are in mg/l. Compounds not detected are not presented.

	GWM-1	MW-4	SMW-2	SMW-4	NMWQS	MCL	RRSL
BIS(2-ETHYLHEXL) PHTHALATE		.000679					**0.0048**
DIETHYL PHTHALATE			.000057	.0005			**29**
2,4-DIMETHYLPHENOL	0.028					**0.71**	**0.73**
1,4-DIOXANE			**.0136**				**0.0061**
PHENOL	0.0046			.00113	**.005**		**11.0**

Table 10: EPA METHOD 300.0 ANIONS and 120.1 SPECIFIC CONDUCTANCE, pH: Levels in Monitoring Wells (All units are in mg/l, except for pH and Specific **Conductivity)**

	Date Sampled	Fluoride	Chloride	Nitrate + Nitrite as N	Bromide	Phosphorous Orthophosphate (as P)	Sulfate	pH	Specific Conductance (umhos/cm)
GWM-1	7/10/08	1.7	1800	<2.0		<0.5	110	6.92	7400
	5/24/07	1.9	1800	<2.0		<0.5	120	6.8	8100
	10/26/06	2.0	3700	<2.0		<2.5	120	6.87	
MW-1	8/4/08	.81	51	<1.0		<0.5	160	8.95	1100
	12/29/07	0.69	53	<1.0		<0.5	170	8.89	1100
	10/26/06	0.84	46	<0.5		<0.5	150	8.98	
MW-4	8/5/08	.37	17	<1.0		<0.5	160	8.63	1200
	12/29/07	0.42	17	<1.0		<0.5	160	8.63	1200
MW-5	8/13/08	0.85	63	<1.0	.15	<0.5	180	9.02	1200
	12/29/07								
SMW-2	8/14/08	.36	2000	<1.0	3.1	<0.5	1600	7.25	8700
	1/1/08								
SMW-4	8/14/08	1.1	52	.11	.15	<0.5	150	8.63	1200
	12/29/07	1.4	60	<1.0		<0.5	160	8.34	1300
NMW QS		**1.6**	**250 (drinking water)**	**10**			**600**	**6 - 9**	
EPA MCLS		**4.0**		**10 Nitrate 1 Nitrite**			**250**	**6 - 9**	
RRSL				**58**					

Note: Wells MW-4, MW-5, SMW-2 and SMW-4 were not sampled in 2006.

Table 11: EPA 6010B TOTAL RECOVERABLE METALS. Levels detected in Monitoring Wells (Note: Only data for detected metals are presented. All units are in mg/l.)

Well No.	Date Sampled	As	Ba	Ca	Cr	Mg	Mn	Ni	K	Na
GWM-1	7/10/08	0.070	0.45	350	<.0060	81	3.6	-	3.3	1400
	5/24/07	0.081	0.44	360	<0.006	87	-	<0.01	3.7	1300
	10/26/06	0.077	0.53	380	<0.006	93	-	<0.01	4.2	1400
MW-1	8/4/08	<0.02	<.0.02	1.7	<0.006	<1.0	-	<0.01	<1.0	260
	12/29/07	0.020	<0.02	3.2	<0.006	<1.0	0.018	-	<1.0	230
	10/26/06	<0.02			<0.006		-	<0.01		
MW-4	8/5/08	<0.02	<0.02	1.8	<0.0060	<1.0	-	<0.01	<1.0	280
	12/29/07	<0.02	0.021	1.9	<0.006	<1.0	0.0052	<0.01	<1.0	320
MW-5	8/13/08	<0.02	<0.02	1.4	<0.006	<1.0	-	<0.01	<1.0	260
	12/29/07	<0.02	<0.02	1.4	<0.006	<1.0	0.0045	-	<1.0	290
SMW-2	8/14/08	<0.02	<0.02	200	.0092	64	-	.017	<1.0	1900
	1/1/08	<0.02	<0.02	200	0.055	69	-	0.026	1.1	2200
SMW-4	8/14/08	<0.02	<0.02	3.0	<0.006	61.0	-	-	<1.0	280
	12/29/07	<0.02	0.024	4.6	<0.006	1.2	-	<0.01	<1.0	340
NMWQS		**0.1**	**1.0**		**.05**		**0.2**			
EPA MCLS		**0.01**	**2.0**				**0.3**			
RRSL			**7.3**				**0.88**	**0.73**[7]		

[7] Soluble salts

Table 11 (continued): EPA 6010B TOTAL RECOVERABLE METALS. Levels detected in Monitoring Wells (Note: Only data for detected metals are presented. All units are in mg/l.)

Well No.	**Date Sampled**	**Cu**	**Fe**	**Pb**	**Co**	**V**	**Zn**
GWM-1	7/10/08	.014	14	.010	-	-	-
MW-1	8/4/08	-	-	<0.005	-	-	-
MW-4	8/5/08	-	-	<0.005	-	-	-
MW-5	8/13/08	-	-	<0.005	-	-	-
SMW-2	8/14/08	-	-	<0.005	-	-	.11
SMW-4	8/14/08	-	-	<0.005	**.017**	0.053	-
NMWQS		**1.0**	**1.0**	**.05**			**10.0**
EPA MCLS		**1.3**		**0**			
RRSL		**1.5**	**26**		**0.011**	**0.26**	**11.0**

Note: Wells MW-4, MW-5, SMW-2 and SMW-4 were not sampled in 2006. Analyses for dissolved metals were not conducted in 2006.

Table 12: EPA METHOD 8260B VOLATILES, EPA METHOD 8015B DRO/GRO. Levels in Monitoring Wells – all units of concentrations are in mg/l. (Only Well SMW-2 has VOCs above the level of non-detection: MTBE at 0.0099 below regulatory standards, and Gasoline Range Organics at 0.69 mg/l. All other wells have non-detectable levels of VOCs.)

	Year	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE	DRO	GRO
MW-1	2008	8/4/08	<0.005	<0.005	<0.005	<0.005	-	<1.0	<0.05
	2007	12/29/07	<0.001	<0.001	<0.001	<0.0015	<0.001	<1.0	<0.05
	2006	10/26/06	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
MW-4	2008	8/5/08	<0.005	<0.005	<0.005	<0.005	-	<1.0	<0.05
	2007	12/29/07	<0.001	<0.001	<0.001	<0.0015	<0.001	<1.0	<0.05
	2005	10/12/05	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
MW-5	2008	8/13/08	<0.005	<0.005	<0.005	-	-	<1.0	<0.05
	2007	12/29/07	<0.001	<0.001	<0.001	<0.0015	<0.001	<1.0	<0.05
	2005	10/12/05	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
SMW-2	2008	8/14/08	<0.005	<0.005	<0.005	-	-	<1.0	**.36**
	2007	1/1/08	<0.001	<0.001	<0.001	<0.0015	0.0099	<1.0	0.69
	2005	10/12/05	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
SMW-4	2008	8/14/08	<0.005	<0.005	<0.005	-	-	<1.0	<0.05
	2007	12/29/07	<0.001	<0.001	<0.001	<0.0015	<0.001	<1.0	<0.05
	2005	10/12/05	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
NMWQS			**0.01**	**0.75**	**0.75**	**0.62**			
NM TPH Screening Guidelines[8]								**0.2**	**0.2**
EPA MCLS			**0.005**	**1**	**0.7**	**10.0**			
RRSL			**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**		

[8] We have used the limit set by direct ingestion of groundwater contaminated with unknown oil. When the exposure from groundwater is via inhalation, and not direct ingestion, the TPH screening guideline for unknown oil is 50 ppm.

Table 13: EPA METHOD 8260B VOLATILES. Levels of VOCs of concern from within Ponds 1 through 8 – all units of concentrations are in mg/l.

	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
Pond 1	12/2/08	.0083	0.089	0.033	0.26	<0.005
	9/9/08	.0033	.0058	.0026	.02	<.001
	6/17/08	<.001	.0056	.0016	.012	<.001
	3/11/08	0.19	0.47	.0087	0.54	.0059
Pond 2	12/2/08	.0018	0.02	.0072	.057	<.001
	9/9/08	<.001	.0011	<.001	.0044	<.001
	6/17/08	<.005	<.005	<.005	<.0075	<.005
	3/11/08	.0038	.011	.0021	.014	<.001
Pond 3	12/2/08	.0011	.012	.0043	.034	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	.0019	<.001	.004	<.001
Pond 4	12/2/08	<.001	.008	.0029	.022	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	.002	<.001
Pond 5	12/2/08	<.001	.0026	.0010	.0072	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	<.0015	<.001
Pond 6	12/2/08	<.001	<.001	<.001	<.0015	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	<.0015	<.001
Pond 7	12/2/08	<.001	<.001	<.001	<.0015	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	<.0015	<.001
Pond 8	12/2/08	<.001	<.001	<.001	<.0015	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	<.0015	<.001

Table 14: EPA METHOD 300.0 ANIONS, EPA 120.1 SPECIFIC CONDUCTANCE, EPA 410.1 COD, EPA 405.1 BOD, SM4500-H+B: pH Levels of all detected compounds in Evaporation Ponds 1 through 8 in 2008- all units of concentrations are in mg/l.

	DATE	pH	Specific Conductance (umhos/cm)	COD	BOD	E-Coli (cfu/100ml)	Fluoride	Chloride	NITROGEN Nitrite (as N) Nitrate (as N)	Phosphorus Orthophosphate (asP)	Sulfate
POND 1	12/2/08	7.76	4400				110	360	<1.0	7.2	780
	9/9/08	7.82	4500	3000	299	58	99	150	<1.0	<5.0	7700
	6/17/08	7.57	4600	1230	327		120	120	<1.0	15	1100
	3/11/08	3.81	4900	965	556	Absent	560	540	<5.0	<25	980
POND 2	12/2/08	7.80	8500				37	1800	<2.0	<2.0	1000
	9/9/08	7.97	10000	2500	122	300	48	2800	<1.0	<1.0	960
	6/17/08	7.90	11000	790	110		63	2900	<4.0	<5.0	1300
	3/11/08	6.81	8400	871	.71	Absent	63	2200	<5.0	<25	970
POND 3	12/2/08	7.86	8500				26	1800	<2.0	<10	980
	9/9/08	7.94	10000	950	73.0	310	51	2800	<1.0	<1.0	1100
	6/17/08	7.91	13000	691	96.9		44	3700	<4.0	<5.0	1400
	3/11/08	7.86	9800	871	323	Present	41	2700	<5.0	<5.0	1000
POND 4	12/2/08	7.89	9100				27	2000	<2.0	<2.0	1000
	6/17/08	7.90	11000	850	68.0	54.5	49	2900	<1.0	<1.0	1100
	6/17/08	7.94	15000	110	103		34	4500	<4.0	<5.0	1500
	3/11/08	8.06	10000	663	275	Present	32	2800	<5.0	<5.0	1000
POND 5	12/2/08	7.82	14000				29	2900	<4.0	<10	1200
	9/9/08	7.93	10000	667	59.0	54.5	33	3000	<1.0	<1.0	890
	6/7/08	7.86	17000	578	<128		26	5400	<10	<5.0	1800
	3/11/08	7.82	10000	506	178	Present	41	2900	<5.0	<5.0	1100
POND 6	12/2/08	7.70	19000				28	5500	<4.0	<10	7600
	9/9/08	7.83	16000	949	47.0	90.9	26	4900	<4.0	<5.0	1900
	6/17/08	7.64	25000	723	<128		29	6600	<10	<5.0	2600
	3/11/08	7.7	13000	847	126	Present	35	4100	<5.0	<5.0	1600
POND 7	12/2/08	7.55	140000				35	42000	<40	<10	8300
	9/9/08	7.52	110000	3330	47.8	27.9	25	38000	<40	<5.0	8500
	6/17/08	7.34	180000	4340	17.7		29	64000	<100	<5.0	15000
	3/11/08	7.61	68000	2118	15.7	Absent	22	22000	<5.0	<5.0	5600
POND 8	12/2/08	7.39	170000				31	46000	<40	<25	8600
	9/9/08	7.75	51000	3080	<16.0	102	26	17000	<20	<5.0	3400
	6/17/08	6.28	420000	16100	8.2		94	160000	<200	<5.0	20000
	3/11/08	7.47	94000	1770	17.4	Absent	25	3000	<5.0	<5.0	6100

Table 15: EPA METHOD 7470 MERCURY, 6010B TOTAL RECOVERABLE METALS. Levels of all detected metals in Evaporations Ponds 1-8 in 2008. All units of concentrations are in mg/l.

	DATE	Hg	As	Ba	Ca	Cr	Cu	Fe	Pb	Mg	Mn	K	Na	U	Zn
POND 1	12/2/08	<0.0002	<0.02	0.098	43	<0.01	<0.02	7.6	<0.0050	16	0.27	92	590	<0.001	0.36
	9/9/08	<.0002	<0.02	0.76	45	<.006	<.006	-	<.005	14	0.22	62	460	<.001	0.12
	6/17/08	.00035	<0.02	0.10	57	.0085	.010	4.9	.0052	15	0.14	96	540	<.10	0.88
	3/11/08	<.0002	<0.02	.029	18	.061	<.006	55	<0.005	17	0.80	36	910	<0.50	1.8
POND 2	12/2/08	<0.0002	<0.02	0.06	170	<0.01	<0.02	2.7	<0.005	56	0.19	75	1500	<0.001	0.089
	9/9/08	<.0002	<0.02	0.10	340	<.006	<.006	-	<.0005	84	0.21	52	1900	<.00207	.086
	6/17/08	<.0002	<0.02	.066	290	<.006	<.006	1.4	<0005	78	0.14	110	2200	<0.10	0.31
	3/11/08	<.0002	<0.02	.022	81	<.006	<.006	5.4	-	55	0.28	88	1700	<0.10	0.12
POND 3	12/2/08	<0.0002	0.024	0.052	140	<0.01	<0.02	1.8	<0.005	52	0.2	78	1700	<0.001	<0.03
	9/9/08	<.0002	<0.02	0.11	340	<.006	<.006		<.005	87	0.21	54	2000	.00237	.047
	6/17/08	<.0002	<0.02	.061	320	<.006	<.006	0.73	<.005	97	0.15	140	2700	<0.10	0.14
	3/11/08	<.0002	<0.02	.037	170	<.006	<0006	1.4	-	71	0.23	93	2000	<0.10	.045
POND 4	12/2/08	<0.0002	<0.02	0.017	160	<0.01	<0.02	1.4	<0.005	59	0.20	81	1700	<0.001	<0.03
	9/9/08	<.0005	<0.02	0.13	320	<.006	<.006	-	<.005	87	0.23	54	2000	.00187	.021
	6/17/08	<.0002	<0.02	.065	340	<.030	<.030	0.42	<.025	130	0.19	160	3000	<0.50	<0.10
	3/11/08	<.0002	<0.02	.045	230	<.006	<.006	0.73	-	80	0.21	94	2000	<0.10	.034
POND 5	12/2/08	<.0002	<0.02	0.084	270	<0.01	<0.02	0.90	<0.005	82	0.26	88	2200	0.001	<0.03
	9/9/08	<.0002	<0.02	0.14	220	<.006	<.006	-	<.005	82	0.17	70	2000	.00142	<.020
	6/17/08	<.0002	<0.02	0.074	390	<.030	<.030	<.25	<.025	150	0.44	190	3600	<0.50	<0.10
	3/11/08	<.0002	<0.02	.059	290	<.006	<.006	0.64	-	80	0.28	83	1900	<0.10	0.029
POND 6	12/2/08	<.0002	0.024	0.12	320	<0.01	<0.02	0.3	<0.005	130	0.48	160	3708	0.002	<0.03
	9/9/08	<.0002	<0.02	0.11	330	<.006	<.006	-	<.005	130	0.46	130	3300	.00125	<.020
	6/17/08	<.0002	<0.02	.093	460	<.030	<.030	<.025	<.025	170	1.1	190	4600	<0.50	<0.10
	3/11/08	<.0002	<0.02	.073	300	<.030	<.030	1.3	-	100	0.52	110	2800	<0.50	<0.10
POND 7	12/2/08	<.0002	<0.02	0.14	820	<0.05	<0.1	<0.5	<0.025	1000	1.8	1560	25000	0.002	<0.15
	9/9/08	<.0002	<0.02	0.11	730	<.006	<.006	-	<.050	960	5.8	1100	28000	.00103	<.020
	6/17/08	<.0002	<0.02	<0.20	1400	<0.12	<0.12	<0.25	<0.10	1400	8.1	1800	49000	<2.0	<0.40
	3/11/08	<.0002	<0.02	.074	690	<.030	<.030	0.69	-	490	3.2	590	13000	<0.50	<0.10
POND 8	12/2/08	<.0002	0.13	0.16	830	<0.05	<0.1	<0.5	<0.025	1400	5.5	2300	33000	0.002	<0.15
	9/9/08	<.0002	<0.02	0.12	530	<.030	<.030	-	<.025	420	2.4	800	9500	.00148	<0.10
	6/17/08	<.0008	<0.02	<0.50	1100	<0.30	<0.30	<0.50	<0.25	8800	82	12000	99000	<5.0	<1.0
	3/11/08	<.0002	<0.02	<0.10	590	<.060	<.060	1.4	-	760	5.8	1100	20000	<1.0	<0.20

Table 16: EPA METHOD 8260B VOLATILES. Levels of detected VOCs in Ponds 1 through 8 – all units of concentrations are in mg/l.

		POND 1 (MG/L)	POND 2 MG/L	POND 3 (MG/L)	POND 4 (MG/L)	POND 5 MG/L	POND 6 (MG/L)	POND 7 (MG/L)	POND 8 (MG/L)
1,2,4 TRIMETHYL BENZENE	12/2/08	0.13	.028	.018	.013	.048	.001	.0013	<.001
	9/9/08	.027	.0064	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	.017	.015	.002	<.001	<.001	<.001	.0012	.0011
	3/11/08	0.38	.012	.0043	.0028	.0015	.002	<.001	
1,3,5 TRIMETHYL BENZENE	12/2/08	.046	.0097	.0065	.0048	.019	<.001	<.001	<.001
	9/9/08	.0095	.0021	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	.0044	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	0.11	.0032	.001	<.001	<.001	<.001	<.001	<.001
NAPHTHA LENE	12/2/08	.074	.016	.011	.0075	.0025	<.002	<.002	<.002
	9/9/08	.033	.0064	<.02	<.02	<.02	<.02	<.02	<.02
	6/17/08	.031	.014	.003	<.002	<.002	<.002	<.002	<.002
	3/11.0/	0.2	.020	.0087	.0066	.0037	.004	<.002	<.001
1-METHY LNAPHTHA LENE	12/2/08	.140	.037	.024	.014	.0061	<.004	<.004	<.004
	9/9/0/	.062	.016	<.04	<.04	<.04	<.04	<.04	<.04
	6/17/08	.072	.033	.015	<.004	<.004	<.004	<.004	<.004
	3/11/08	0.28	.034	.020	.015	.011	.015	<.004	<.004
2-METHYL NAPHTHAL ENE	12/2/08	.220	.053	.035	.021	.0089	<.004	<.004	<.004
	9/9/08	.088	.023	<.04	<.04	<.04	<.04	<.04	<.04
	6/17/08	0.3	.050	.023	<.004	<.004	<.004	<.004	<.004
	3/11/08	0.39	.049	.028	.022	.017	.020	<.004	<.004
ACETONE	12/2/08	1.0	.65	.67	.60	.20	<.01	.017	<.01
	9/9/08	1.6	.36	.11	<.10	<0.1	<0.1	<0.1	<0.1
	6/17/08	1.6	0.64	.16	.059	.046	<.010	.049	.12
	3/11/08	1.4	1.7	.920	.80	.19	.64	.034	.024
2-BUTANONE	12/2/08	.094	.072	.064	.043	.016	<.01	<.01	<.01
	9/9/08	.15	.035	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	6/17/08	.19	.080	.018	<.01	<.01	<.01	<.01	.014
	3/11/08	.16	.12	.064	.042	.023	.032	<.01	<.01
CARBON DISULFIDE	12/2/08	<.05	.026	.028	.034	.015	<.01	<.01	<.01
	9/9/08	.039	.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	6/17/08	.011	<.05	.010	.050	.033	<.01	<.01	<.01
	3/11/08	<.05	.018	.045	.063	.097	.040	<.01	<.01
CHLORO METHANE	6/17/08								.0013
ISOPROPYL BENZENE	12/2/08	.0081	.0018	.0011	.001	<.001	<.001	<.001	<.001
	9/9/08	.0011	<.001	<.01	<.001	<.01	<.01	<.01	<.01
	6/17/08	<.001	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.01	<.001	<.001	<.001	<.001	<.001	<.001	<.001
4-ISOPROPYL TOLUENE	12/2/08	.0072	.0015	<.001	<.001	<.001	<.001	<.001	<.001
	9/9/08	.0020	<.001	<.01	<.001	<.01	<.01	<.01	<.01
	6/17/08	<.001	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.0052	<.001	<.001	<.001	<.001	<.001	<.001	<.001
N-BUTYL BENZENE	12/2/08	.021	.0041	.0024	.0023	.0011	<.001	<.001	<.001
	9/9/08	.0087	.0025	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	.0055	.009	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.046	.0014	<.001	<.001	<.001	<.001	<.001	<.001
N-PROPYL BENZENE	12/2/08	.015	.0030	.0019	.0018	<.001	<.001	<.001	<.001
	9/9/08	.0029	<.001	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	.0015	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.036	<.001	<.001	<.001	<.001	<.001	<.001	<.001
SEC-BUTYL BENZENE	12/2/08	.0064	<.001	<.001	.001	<.001	<.001	<.001	<.001
	9/9/08	.0024	<.001	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	<.001	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.0086	<.001	<.001	<.001	<.001	<.001	<.001	<.001

Table 17: EPA METHOD 8260B VOLATILES. Levels of BTEX+MTBE in inlets to Evaporation Ponds 1 and 2. All units of concentrations are in mg/l.

	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
Evaporation Pond 1 Inlet	8/21/08	.023	.028	<.005	.029	<.005
Evaporation Pond 2 Inlet	8/21/08	<.01	.026	.014	.010	<0.01

Table 18: EPA METHOD 300.0 ANIONS, EPA 120.1 SPECIFIC CONDUCTANCE, EPA 410.1 COD, EPA 405.1 BOD, SM4500-H+B: pH. Levels of all detected analytes and other parameters in inlets to Evaporation Ponds 1 and 2. All units of concentrations are in mg/l.

	DATE	pH	Specific Conductance (umhos/cm)	COD	BOD	E-Coli (cfu/100ml)	Fluoride	Chloride	NITROGEN Nitrite (as N) Nitrate (as N)	Phosphorus Orthophosphate (asP)	Sulfate
EP 1 INLET	8/21/08	7.9	4400				32	150	<1.0	<5.0	1300
EP 2 INLET	8/21/08			1540	345						

Table 19: EPA METHOD 7470 MERCURY, 6010B TOTAL RECOVERABLE METALS Levels of all detected metals in inlets to Evaporation Ponds 1 and 2. All units of concentrations are in mg/l.

	DATE	Hg	Ba	Ca	Cr	Cu	Fe	Pb	Mg	Mn	K	Na	U	Zn
EP-1 INLET	8/21/08		0.92	77	<.006	<.0063			17	.13	32	420		.29
EP-2 INLET	8/21/08				<.006	<.006								

Table 20: EPA METHOD 8260B VOLATILES. Levels of all detected VOCs in Inlets to Evaporation Ponds 1 and 2 in 2008 - all units of concentrations are in mg/l.

	Evaporation Pond 1 Inlet Concentration Levels (mg/l)	**Evaporation Pond 2 Inlet Concentration Levels (mg/l)**
1,2,4 TRIMETHYLBENZENE	.027	.0064
1,3,5 TRIMETHYLBENZENE	.0095	.0021
NAPTHALENE	.033	.0064
1-METHYLNAPHTHALENE	.062	.016
2-METHYLNAPHTHALENE	.088	.023
ACETONE	1.6	0.36
2-BUTANONE	0.15	0.035
CARBON DISULFIDE	.039	.025
ISOPROPYLBENZENE	.0011	
4-ISOPROPYLTOLUENE	.002	
N-BUTYLBENZENE	.0087	.0025
N-PROPYLBENZENE	.0029	
SEC-BUTYLBENZENE	.0024	

Table 21: EPA METHOD 8260B VOLATILES. Quarterly Sampling Requirements: Levels of BTEX + MTBE in AL-2 to EP-1, Pilot Effluent and NAPIS Effluent and EP-1. All units of concentrations are in mg/l (Note: Contaminants not presented were not detected.)

	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
AL-2 TO EP-1	3/11/08	.19	.46	0.099	0.68	<0.01
	6/17/08	<0.02	<0.02	<0.02	<0.03	<002
	9/9/08	<0.02	<0.02	<0.02	<0.03	<0.02
	12/2/08	0.012	0.085	0.028	0.21	<0.005
PILOT EFFLUENT	3/11/08	<0.001	.0015	<0.001	<0.0015	<0.001
	6/17/08	<0.001	0.0062	<0.001	<0.0015	<0.001
	9/9/08	<0.005	<0.005	<0.005	<0.005	<0.0075
	12/2/08	<0.001	<0.001	<0.001	<0.001	<0.001
NAPIS EFFLUENT	3/10/08	0.47	0.73	0.150	0.970	<0.05
	6/17/08	0.84	1.5	0.14	0.89	<0.1
	9/9/08	0.36	0.39	.028	0.2	<0.02
	12/2/08	1.4	3.3	0.36	1.9	<0.05
EP-1	3/11/08	0.19	0.44	0.079	0.48	0.0058
	6/17/08	<0.01	0.012	<0.01	0.024	<0.01
	9/9/08	<0.01	<0.01	<0.01	0.018	<0.01
	12/2/08	0.007	0.081	0.030	0.23	<0.005

Table 22: EPA METHOD 8260B VOLATILES. Quarterly Sampling Requirements. Levels of All detected VOCs in AL-2 to EP-1, Pilot Effluent and NAPIS Effluent and EP-1. All units of concentrations are in mg/l

	AL-2 TO EP-1 (MG/L)		PILOT EFFLUENT MG/L	NAPIS EFFLUENT (MG/L)	EP-1 (MG/L)
1,2,4 TRIMETHYLBENZENE	3/10/08	0.60	<0.001	0.590	0.3
	6/17/08	0.039	<0.001	0.26	0.033
	9/9/08	<0.02	<0.005	0.053	0.04
	12/208	0.12	<0.001	0.4	0.11
1,3,5 TRIMETHYLBENZENE	3/10/08	0.170	<0.001	0.170	0.09
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	0.041	<0.001	0.1	0.037
NAPHTHALENE	3/10/08	0.330	<0.002	0.200	0.17
	6/17/08	0.051	<0.002	0.29	0.053
	9/9/08	<0.04	<0.010	0.087	0.067
	12/2/08	0.078	<0.002	0.43	0.072
1-METHYLNAPHTHALENE	3/10/08	0.340	<0.004	0.250	0.19
	6/17/08	0.18	<0.004	0.4	0.087
	9/9/08	<0.08	<0.02	<0.08	0.24
	12/2/08	0.19	<0.004	0.29	0.14
2-METHYLNAPHTHALENE	3/10/08	0.520	<0.004	0.380	0.29
	6/17/08	0.26	<0.004	<0.4	0.13
	9/9/08	<0.08	<0.02	<0.08	0.35
	12/2/08	0.28	<0.004	0.46	0.22
ACETONE	3/10/08	2.2	0.490	0.500	1.2
	6/17/08	3.8	0.078	17.0	1.6
	9/9/08	2.2	0.3	17.0	1.7
	12/2/08	1.9	0.058	4.7	1.7
2-BUTANONE	3/10/08	0.480	<0.01	<0.5	0.17
	6/17/08	0.350	0.010	2.5	0.32
	9/9/08	<0.2	<0.05	1.9	0.21
	12/2/08	0.095	<0.001	<0.5	0.10
CHLOROFORM	3/11/08	<0.01	0.0069	<0.05	<0.005
	6/17/08	<0.02	0.0044	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	<0.005	<0.001	<0.05	<0.005
ISOPROPYLBENZENE	3/10/08	0.012	<0.001	<0.05	.0079
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	0.0066	<0.001	<0.05	0.0073
4-ISOPROPYLTOLUENE	3/10/08	0.015	<0.001	<0.05	<0.005
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	0.0067	<0.001	<0.05	0.0055
N-BUTYLBENZENE	3/10/08	0.055	<0.001	<0.05	<0.005
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.011
	12/2/08	<0.005	<0.001	<0.05	0.0019
N-PROPYLBENZENE	3/10/08	0.045	<0.001	<0.05	0.027
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	0.013	<0.001	<0.05	0.0013
SEC-BUTYLBENZENE	3/11/08	<0.01	<0.001	<0.05	0.005
	6/17/08	<0.02	<0.01	<0.1	<0.01
	9/9/08	<0.02	<0.05	<0.02	<0.01
	12/2/08	<0.05	<0.001	<0.05	<0.01
1-4 DICHLORABENZENE	3/11/08	<0.01	<0.001	<0.05	<0.01
	6/17/08	<0.02	0.0018	<0.1	<0.01
	9/9/08	<0.02	<0.05	<0.02	<0.01
	12/2/08	<0.05	<0.001	<0.05	<0.01

Table 23: EPA METHOD 7470 MERCURY, 6010B TOTAL RECOVERABLE METALS and EPA METHOD 8015B DRO/GRO. Quarterly Levels of metals, DRO and GRO in Al-2 to EP-1, Pilot Effluent, NAPIS Effluent, and EP-1. All units of concentrations are in mg/l.

	DATE	DRO	GRO	Hg	As	Ba	Cd	Ca	Cr	Cu
Al-2 to EP-1	3/10/08	24	1.7	<0.0002	<0.20	0.017	<0.002		0.1	<0.006
	6/17/08	140	1.4	0.00076	<0.02	0.14	<0.002		0.013	0.015
	9/9/08	44	<5.0	<0.0002	<0.02	0.069	<0.002		0.0072	<0.006
	12/2/08	160	<5.0	0.00048	<0.02	0.20	<0.005		<0.01	<0.02
PILOT EFFLUENT	3/11/08	12	<0.05	<0.0002	<0.02	0.022	<0.002		<0.006	0.018
	6/17/08	5.4	0.078	<0.0002	<0.02	0.019	<0.002		<0.006	0.012
	9/9/08	6.3	<1.0	<0.0002	<0.02	0.017	<0.002		<0.006	0.021
	12/2/08	10	<0.5	<0.0002	<0.02	0.021	<0.005	220	<0.01	0.040
NAPIS EFFLUENT	3/10/08	290	11	0.00028	<0.2	0.32	<0.002	120	0.019	0.053
	6/17/08	44	11	<0.0002	<0.02	0.081	<0.002	50	<0.006	<0.006
	9/9/08	35	<10	<0.0002	<0.02	0.062	<0.002	42	<0.006	<0.006
	12/2/08	68	20	0.00026	<0.02	0.11	<0.005		<0.01	<0.02
EP-1	3/11/08	32	1.9							
	6/17/08	140	2.7							
	9/9/08	140	<20							
	12/2/08	120	<5.0							

Table 23 (continued): EPA METHOD 7470 MERCURY, 6010B TOTAL RECOVERABLE METALS and EPA METHOD 8015B DRO/GRO. Quarterly Levels of metals, DRO and GRO in Al-2 to EP-1, Pilot Effluent, NAPIS Effluent, and EP-1. All units of concentrations are in mg/l

	DATE	Fe	Pb	Mg	Mn	K	Se	Ag	Na	U	Zn
Al-2 to EP-1	3/10/08	110	<0.005		1.4		<0.05	<0.005		1.9	1.9
	6/17/08	9.0	0.0057		0.13		<0.05	<0.005		.00071	1.6
	9/9/08	2.5	<0.005		0.13		<0.05	<0.005		<0.001	0.19
	12/2/08	6.8	<0.005		0.40		0.034	<0.01			0.59
PILOT EFFLUENT	3/11/08	0.35	<0.005		0.092		<0.5	<0.005		<0.1	0.055
	6/17/08	0.44	<0.005		0.1		<0.05	<0.005		.0009	0.043
	9/9/08	0.49	<0.005		0.085		<0.05	<0.005		<0.001	0.057
	12/2/08	0.36	<0.005	51	0.086	31	<0.02	<0.01	260		0.068
NAPIS EFFLUENT	3/10/08	10	0.013	28	0.2	22	<0.5	<0.005	550	<0.1	1.3
	6/17/08	1.1	<0.005	12	0.057	13	<0.05	<0.005	320	<0.00063	0.19
	9/9/08	0.073	<0.005	9.0	0.057	7.7	0.052	<0.005	200	<0.001	<0.02
	12/2/08	1.8	<0.005		0.17		<0.02	<0.01			0.23

Table 24: EPA METHOD 300.0 ANIONS, EPA 120.1 SPECIFIC CONDUCTANCE, EPA 410.1 COD, EPA 405.1 BOD, SM4500-H+B: PH. Quarterly Sampling Requirements for Pilot Effluent and NAPIS Effluent, EP-1 and Boiler Water to EP-2. All units of concentrations are in mg/l.

	Date Sampled	pH	Specific Conductance (umhos/cm)	COD	BOD	Fluoride	Chloride	Nitrogen Nitrite (as N)	Nitrogen Nitrate (as N)	Phosphorus Orthophosphate (as P)	Sulfate
NAPIS EFFLUENT	3/10/08					69	480	<5.0	<5.0	<25	570
	6/17/08	9.07	4600			19	93	<1.0	3.4	37	630
	9/9/08	9.44	3300			11	78	1.8		14	440
	12/2/08	8.63	2200			12	160	<1.0	1.2	<5.0	510
PILOT EFFLUENT	3/11/08			824	618						
	6/17/08			699	399						
	9/9/08			795	375						
				336	642						
EP-1	3/11/08	3.81		965	510		500				
	6/17/08	7.43		2650	294						
	9/9/08	7.93		1360	262		170				
	12/2/08	7.62		840	231		350				
Boiler Water to EP-2	6/17/08	7.90	6500			1.3	67	<1.0	<0.10	<0.50	2600

Table 25: EPA METHOD 8270C SEMIVOLATILES. Quarterly Sampling Requirements. Levels of all detected SVOCs in NAPIS Effluent and EP-1. All units of concentrations are in mg/l

	NAPIS EFFLUENT (MG/L)		EP-1 MG/L
	DATE	RESULTS	RESULTS
2,4-DIMETHYLPHENOL	3/10/08		0.1
	6/17/08	0.15	0.13
	9/9/08	0.49	0.2
	12/208	0.12	0.087
CARBAZOLE	3/10/08	0.071	
	6/17/08		
	9/9/08		
	12/2/08		
CHRYSENE	3/10/08	0.12	
	6/17/08		
	9/9/08		
	12/2/08		
FLUORENE	3/10/08	0.093	
	6/17/08		
	9/9/08		
	12/2/08		
2-METHYLNAPHTHALENE	3/10/08	0.59	
	6/17/08	0.5	
	9/9/08	0.063	
	12/2/08		
2-METHYLPHENOL	3/10/08	0.15	0.88
	6/17/08	4.9	0.37
	9/9/08	7.4	0.45
	12/2/08	0.62	0.55
3+4-METHYLPHENOL	3/10/08	0.17	1.3
	6/17/08	8.5	0.40
	9/9/08	13	0.6
	12/2/08	3.2	0.86
PHENANTHRENE	3/11/08	0.44	
	6/17/08	0.16	
	9/9/08		
	12/2/08		
PHENOL	3/10/08	0.19	0.45
	6/17/08	17	1.2
	9/9/08	25	1.3
	12/2/08	6.8	15
PYRENE	3/10/08	0.15	
	6/17/08		
	9/9/08		
	12/2/08		
ANILINE	3/10/08		
	6/17/08	0.4	
	9/9/08	2.1	
	12/2/08		
NAPHTHALENE	3/10/08		
	6/17/08	0.24	
	9/9/08	0.076	
	12/2/08		

Table 26: EPA METHOD 8015B GRO/DRO, EPA METHOD 300.0 ANIONS, EPA 120:1 SPECIFIC CONDUCTANCE, SM4500-H+B: PH. Levels of all contaminants found in NAPIS Wells 1, 2, 3 (formerly tagged as KA-1R, KA-2R, KA-3R), and KA-3. All units of concentrations are in mg/l.

	DATE	pH	Specific Conductance (umhos/cm)	GRO	DRO	Fluoride	Chloride	Nitrate + Nitrite as N	Phosphorus Orthophosphate (as P)	Sulfate
NAPIS 1 (KA-1R)	4/11/08	7.26	2000	<0.05	<1.0	0.79	170	0.55 <0.10	<0.50	80
	7/9/08	7.27	1900	<0.05	<1.0	1.4	180	<1.0	<0.50	98
	9/30/08			<0.05	<1.0					
	11/10/08	7.30	1900	<0.05	<1.0	0.73	160	1.6 <0.10	<0.50	63
NAPIS 2 (KA-2R)	4/11/08	7.0	2100	2.2	1.5	0.92	360	<0.10 <1.0	<0.50	42
	7/9/08	7.18	2000	0.74	2.4	1.1	270	<1.0	<0.50	33
	9/30/08			0.45	3.9					
	11/10/08	7.21	1600	0.59	4.0	1.4	200	<0.1	<0.50	32
NAPIS 3 (KA-3R)	7/9/08	8.29	4200	<0.05	<1.0	0.46	1100	9.1	<0.50	270
	9/30/08	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
	11/10/08	8.05	4300	<0.05	<1.0	1.1	1100	2.6 <1.0	<0.50	310
KA-3	11/10/08	7.34	2700	0.15	<1.0	0.46	590	11 2.0	<0.50	140
NMWQS						**1.6**	**250** (Domestic Water)	**10 Nitrate 1 Nitrite**		**600**
NM TPH Screening Guidelines[9]				**0.2**	**0.2**					
EPA MCLS		**6-9**				**4.0**		**0.2**	**10**	**250**
RRSL								**58**		

Note: NAPIS 1 & NAPIS 2 - began sampling in second quarter 2008.
NAPIS 3 – began sampling third quarter 2008.
KA3 – Began sampling fourth Quarter 2008.

[9] We have used the limit set by direct ingestion of groundwater contaminated with unknown oil. When the exposure from groundwater is via inhalation, and not direct ingestion, the TPH screening guideline for unknown oil is 50 ppm.

Table 27: EPA METHOD 8021B, VOLATILES, EPA 6010B TOTAL RECOVERABLE METALS, EPA METHOD 8310: PAHS. Levels of all contaminants found in NAPIS Wells 1, 2, 3 (Formerly tagged as KA-1R, KA-2R, KA-3R), AND KA-3. EPA Method 8310 – PAHS showed only one hit in the Fourth Quarter in NAPIS 2 (KA-2R) for Fluorene .00099mg/l. All units of concentrations are in mg/l.)

	DATE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENE	MTBE	Ba	Ca	Pb	Mg	K	Na	Fluorene
NAPIS 1 (KA-1R)	4/11/08	<0.001	<0.001	<0.001	<0.002	<0.0025		72		13	1.5	370	
	7/9/08	<0.001	<0.001	<0.001	<0.002	<0.0025		70		12	2.1	430	
	9/30/08	<0.001	<0.001	<0.001	<0.002	*	*	*	*	*	*	*	
	11/10/08	<0.001	<0.001	<0.001	<0.002	<0.0025	0.13	78		14	1.2	390	
NAPIS 2 (KA-2R)	4/11/08	**0.91**	0.019	0.051	0.12	**0.32**		110		19	1.3	380	
	7/9/08	**0.013**	<0.001	0.011	0.0056	**0.2**		70		13	<0.001	360	
	9/30/08	**0.016**	<0.001	0.0016	0.0041	*	*	*	*	*	*	*	*
	11/10/08	**0.025**	<0.001	0.011	<0.002	**0.18**	0.42	50	.0065	9.7		330	.00099
NAPIS 3 (KA-3R)	7/9/08	<0.001	<0.001	<0.001	<0.002	<0.0025		65		7.8	4.1	910	
	9/30/08	*	*	*	*	*	*	*	*	*	*	*	*
	11/10/08	<0.001	<0.001	<0.001	<0.002	<0.0025	0.13	41		6.6	4.4	960	
KA-3	11/10/08	<0.001	<0.001	<0.001	<0.002	**0.13**	0.20	65	.0095	11	1.8	570	
EPA MCLS		**0.005**	**1**	**0.7**	**10.0**		**20**		**0**				
NMWQS		**0.01**	**0.75**	**0.75**	**0.62**		**1.0**		**.05**				
RRSL		**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**	**7.3**						

*Third Quarter 2008 - Not analyzed for MTBE, or EPA 6010B. NAPIS 3 Well not sampled – not enough water in well for testing after purging.

Table 28: EPA METHOD 410.1 CHEMICAL OXYGEN DEMAND (COD), 405.1 BIOCHEMICAL OXYGEN DEMAND (BOD) Weekly Levels of COD and BOD at Inlet to EP-2 All units of concentrations are in mg/l.

	DATE	COD	BOD
Inlet to EP-2	1/10/08	1350	449
	1/17/08	1460	462
	1/24/08	1200	520
	1/31/08	1290	414
	2/7/08	2570	671
	2/15/08	2290	570
	2/21/08	1950	>394
	2/28/08	2440	46.1
	3/6/08	1520	947
	3/11/08	1150	651
	3/20/08	829	344
	3/26/08	1430	649

Table 29: EPA METHOD 410.1 CHEMICAL OXYGEN DEMAND (COD), 405.1 BIOCHEMICAL OXYGEN DEMAND (BOD), 8270C SEMI-VOLATILES (Phenols) Monthly levels of COD, BOD and Phenols at Inlet to AL-1, AL-2, EP-1 All units of concentrations are in mg/l.

	Date	COD	BOD	2,4 Dimethyl-phenol	2-Methyl-phenol	3+4 Methyl-phenol	Phenol	2-Methyl-napthlene	Phenan-threne
Inlet to AL-1	5/29/08	4210	1674	0.570	4.1	7.3	16.0		
	6/26/08	1180	741	0.2	3.6	6.2	16.0		
	7/23/08[10]	634	334	0.064	1.2	1.5	4.0	0.45	0.082
	8/26/08	5190	>2930	0.27	5.4	10.0	21.0		
	9/23/08	4620	>2460	0.57	6.3	11.0	18.0		
	10/14/08	3080	1665	<0.5	<0.5	0.84	1.2		
	11/12/08	1120	303	0.15	2.8	5.8	11.0		
	12/16/08	564	285	0.17	1.1	3.6	10.0		
Inlet to AL-2	5/29/08	2358	717	0.170	2.7	3.0	8.7		
	6/26/08	4470	1600	0.13	0.7	0.68	1.9		
	7/23/08	439	266	0.11	1.6	2.7	6.3	0.067	<0.05
	8/26/08	5360	2400	0.33	4.2	6.2	15.0		
	9/23/08	2620	872	0.36	6.9	13.0	22.0		
	10/14/08	4620	1032	0.13	2.4	4.4	12.0		
	11/12/08	3250	>2620	0.14	1.5	2.3	5.3		
	12/16/08	820	437	0.19	2.2	3.5	6.7		
Inlet to EP-1	5/29/08	2631	497	<0.1	1.0	1.5	3.4		
	6/26/08	4000	1756	0.22	<0.05	0.12	<0.05		
	7/23/08	658	285	0.062	0.11	0.11	0.18	0.13	0.12
	8/26/08	6100	1530	0.26	2.3	2.4	7.6		
	9/23/08	2310	755	0.26	3.7	6.2	2.4		
	10/14/08	2420	2058	0.15	3.2	6.0	17.0		
	11/12/08	2250	>2860	<0.5	1.9	2.8	6.2		
	12/16/08	718	385	0.27	3.0	5.1	9.9		

[10] It appears that on 7/23/08, the laboratory ran the full suite of SVOCs and not just modified for phenols.

Graphs of concentrations versus time

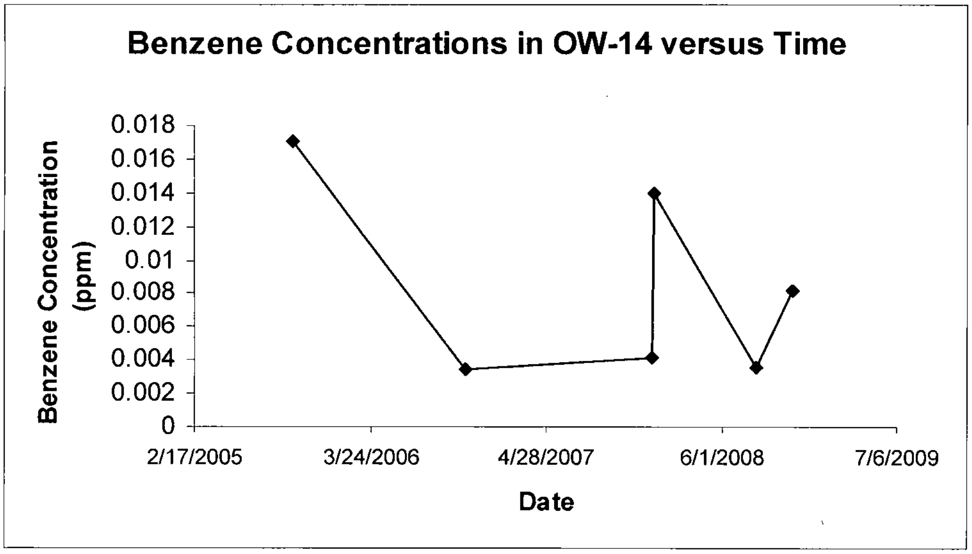

Figure 7: Benzene concentrations in OW-14 versus time

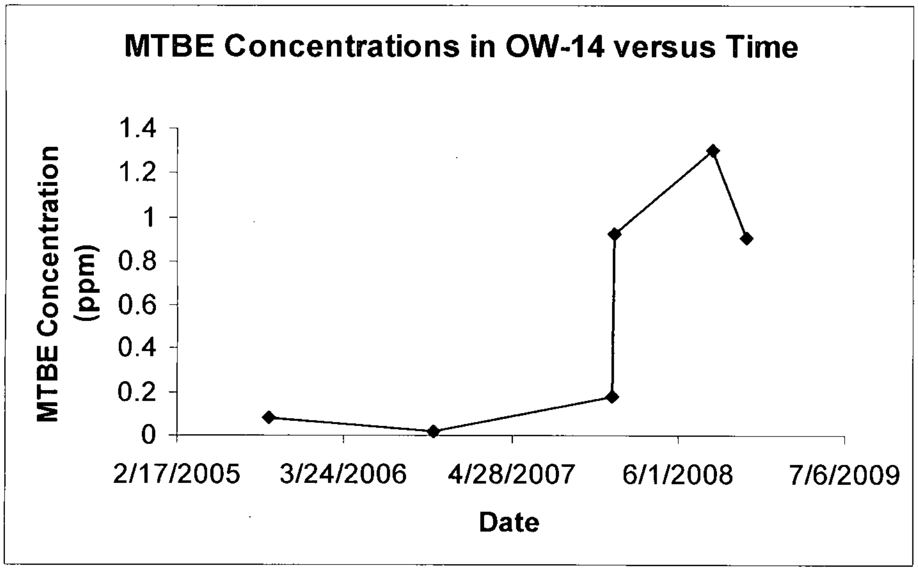

Figure 8: MTBE concentrations in OW-14 versus time

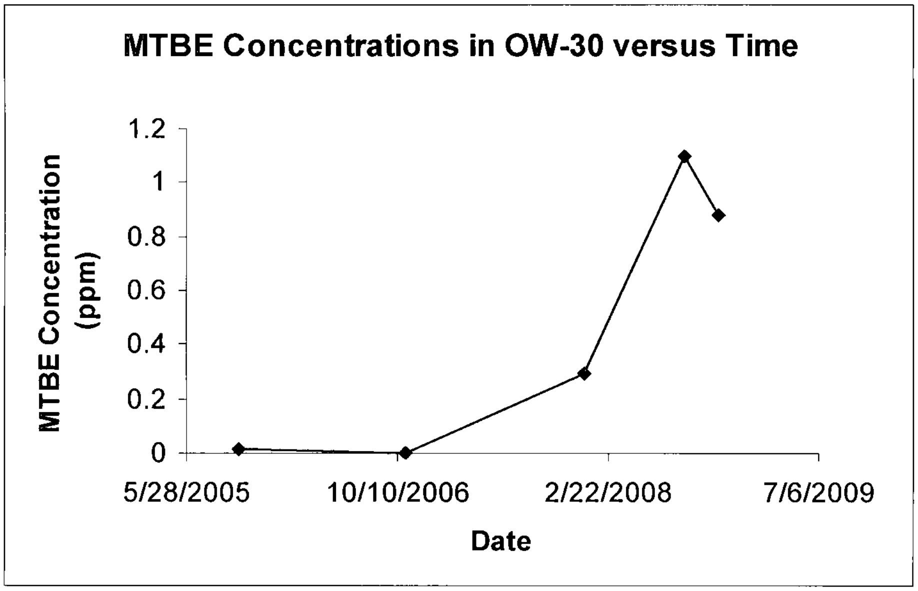

Figure 9: MTBE concentrations in OW-30 versus time

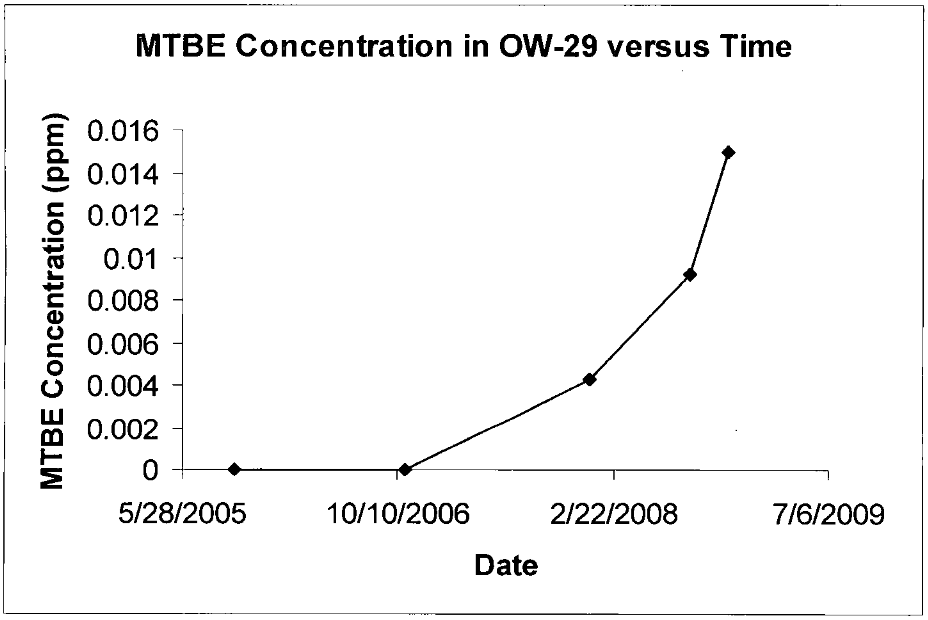

Figure 10: MTBE concentrations in OW-29 versus time

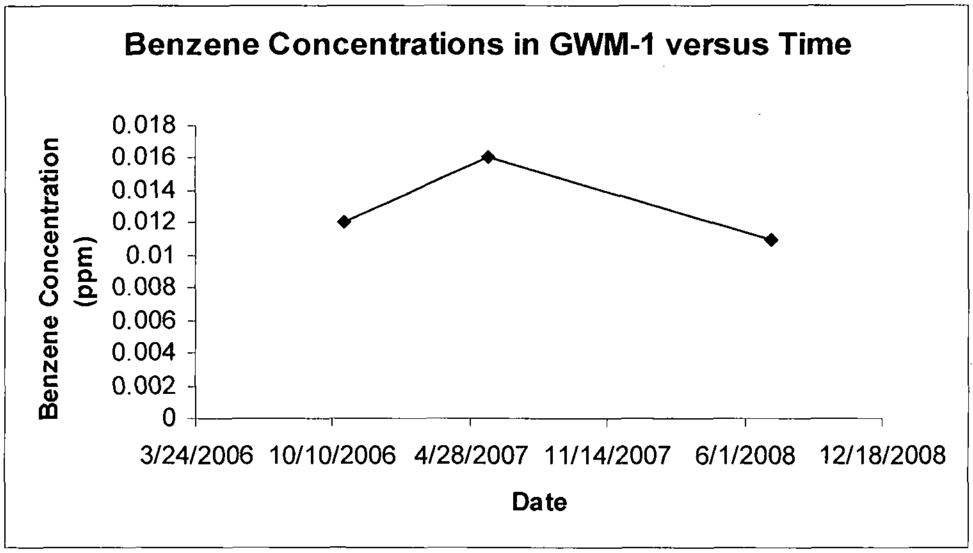

Figure 11: Benzene concentrations in GWM-1 versus time

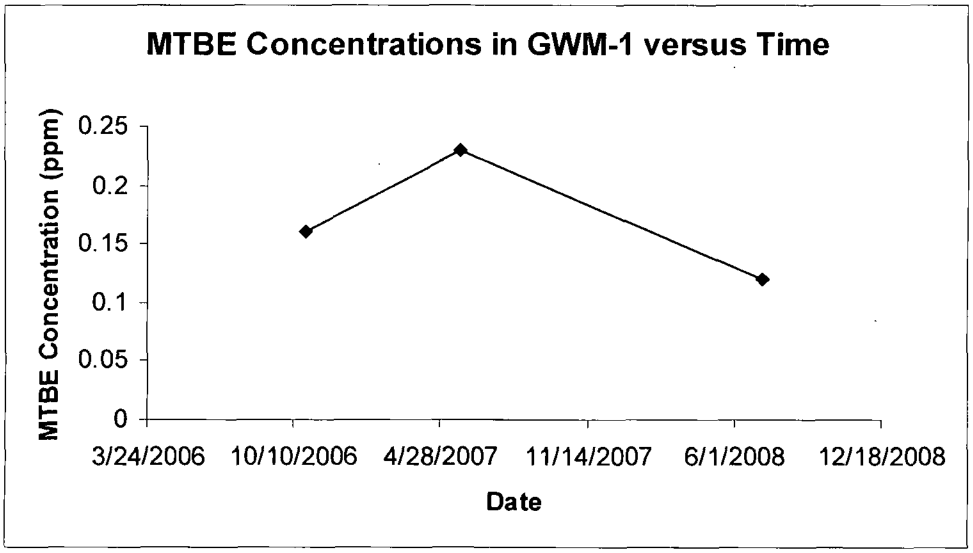

Figure 12: MTBE concentrations in GWM-1 versus time

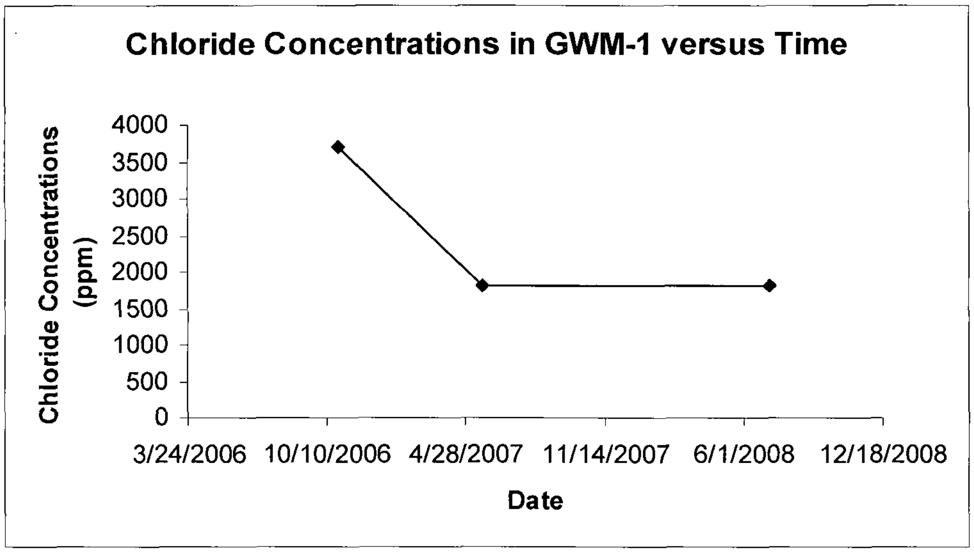

Figure 13: Chloride concentrations in GWM-1 versus time

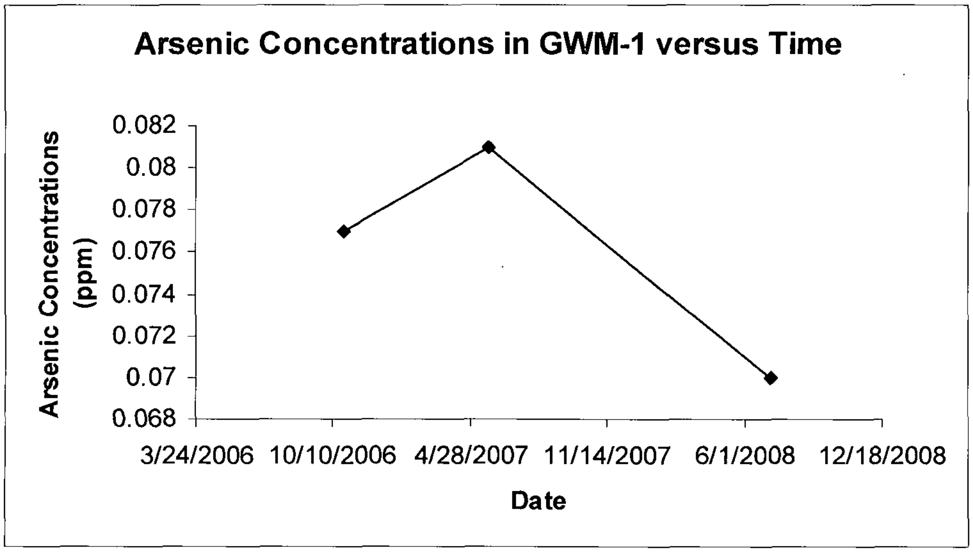

Figure 14: Arsenic concentrations in GWM-1 versus time

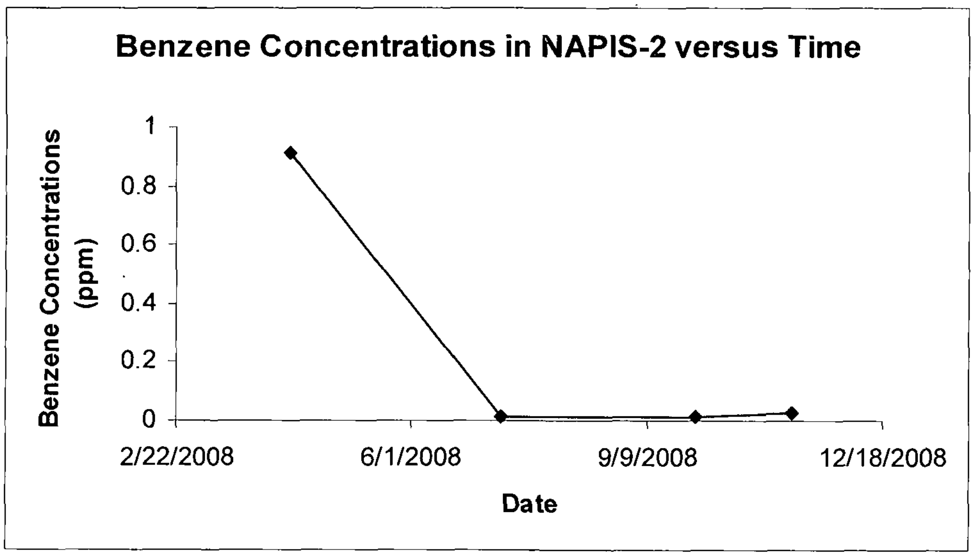

Figure 15: Benzene concentrations in NAPIS-2 versus time

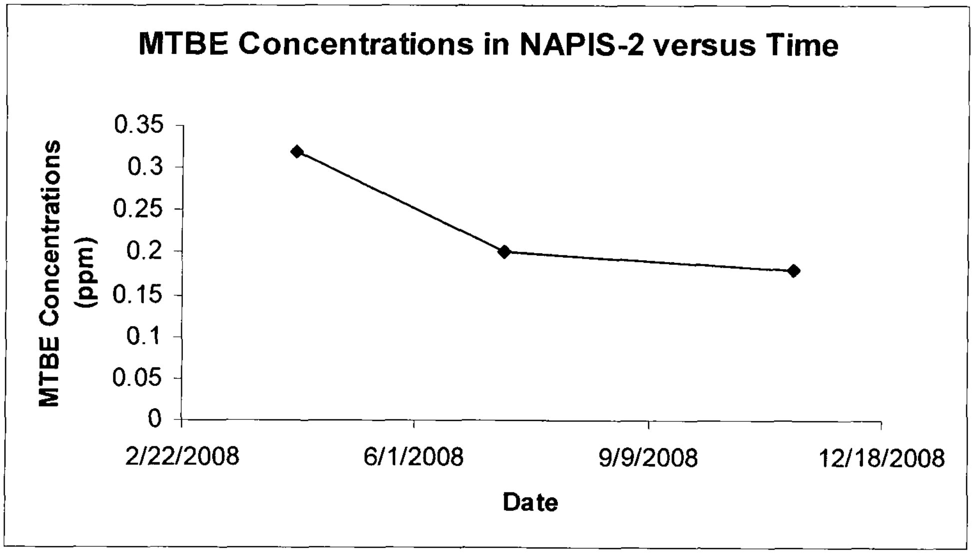

Figure 16: MTBE concentrations in NAPIS-2 versus time

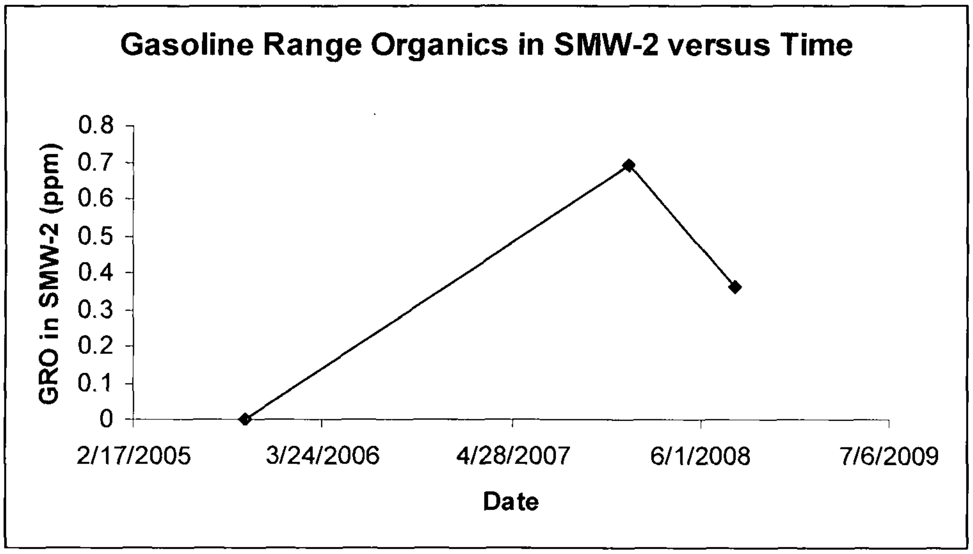

Figure 17: Gasoline Range Organics in SMW-2 versus time

4.0 Groundwater Elevations and Separate-Phase Hydrocarbons

4.1 Potentiometric map

In 2007 we collected groundwater elevation data on the Chinle/alluvium wells in December. In 2008, these data were collected in July. The subsurface ridge that reverses a section of the shallow groundwater from the predominantly north-west flow direction to the north-east direction (seen earlier in December) does not seem to exist in July when a greater quantity of shallow groundwater is present.

This change in flow direction is in the same direction as where the surface water flows. It appears that the shallow groundwater would flow north-west and then outside the refinery boundary probably swing around and head to the south-west along with the surface water bodies that do the same shift in direction. This means that the shallow groundwater will never interact with the nearest community about 4 miles or more away which is in the north-west direction across the forks and tributaries of the Puerco River.

Figure 18 presents a potentiometric map showing groundwater elevations in some of the Chinle/alluvium wells and contours. Table 31 provides groundwater elevation data gathered during 2008.

Figure 18: Potentiometric map showing groundwater elevations at the Chinle/alluvium interface July 2008

Table 30: Well Water Elevation Data – 2008 (Please note: some data on screened intervals are missing – these will be sent by April 30, 2010)

Well ID Number	Measurement date	A Well Casing Rim Elevations (ft)	Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thickness (ft)	C Depth to Water	D = A-C Groundwater Elevation (ft)	= 0.8B + D Corrected Water Table Elevation (ft)	Screened Interval Depth (ft): Top of screen to bottom (below ground surface)	Purge Volume = 3 Well Vol. (gals)
BW-1A	7/30/2008	6,876.73	6,836.73	40.00	NA	NA	DRY	DRY	NA	30-40	1.05
BW-1B	7/30/2008	6,876.91	6,811.71	67.55	NA	NA	DRY	DRY	NA	54.6-64.6	0.02
BW-1C	7/30/2008	6,876.75	6,719.75	157.00	NA	NA	6.84	6,869.91	NA	125-135	7.50
BW-2A	7/30/2008	6,874.72	6,809.22	65.50	NA	NA	31.97	6,842.75	NA	55-65	16.5
BW-2B	7/30/2008	6,874.58	6,784.08	90.50	NA	NA	27.91	6,846.67	NA	80-90	30.6
BW-2C	7/30/2008	6,875.40	6,724.40	151.00	NA	NA	20.64	6,854.76	NA	139.5-149.5	63.8
BW-3A	7/30/2008	6,878.22	6,828.22	52.60	NA	NA	DRY	DRY	NA	39.5-49.5	
BW-3B	7/31/2008	6,878.79	6,803.79	75.00	NA	NA	32.73	6,846.06	NA	63-73	20.6
BW-3C	7/31/2008	6,878.08	6,723.08	155.00	NA	NA	8.08	6,870.00	NA	144.5-154.5	72.00
OW-1	2/18/2008	6,868.00	6,773.96	94.04	NA	NA	1.75	6,866.25	NA	89.3-99.3	NA
OW-1	5/21/2008	6,868.00	6,773.96	94.04	NA	NA	1.75	6,866.25	NA		NA
OW-1	9/15/2008	6,868.00	6,773.96	94.04	NA	NA	1.78	6,866.22	NA		NA
OW-1	11/3/2008	6,868.00	6,773.96	94.04	NA	NA	2.78	6,865.22	NA		NA
OW-10	2/18/2008	6,872.00	6,804.00	68.00	NA	NA	1.25	6,870.75	NA	40-60	NA
OW-10	5/21/2008	6,872.00	6,804.00	68.00	NA	NA	1.61	6,870.39	NA		NA
OW-10	9/10/2008	6,872.00	6,804.00	68.00	NA	NA	1.59	6,870.41	NA		NA
OW-10	11/3/2008	6,872.00	6,804.00	68.00	NA	NA	2.04	6,869.96	NA		NA
OW-11	8/14/2008	6,923.89	6,857.27	66.62	NA	NA	20.91	6,902.98	NA	43-65	102.5
OW-12	8/18/2008	6,940.43	6,795.43	145*	NA	NA	49.05	6,891.38	NA	127.8-137.8	213.5
OW-13	8/18/2008	6,920.12	6,820.12	100.00	NA	NA	24.41	6,895.71	NA	78.2-98.2	168.9
OW-14	8/21/2008	6,926.64	6,881.64	45.00	NA	NA	27.13	6,899.51	NA	35-45	40.6

Table 30 (continued): Well Water Elevation Data - 2008

Well ID Number	Measurement date	A Well Casing Rim Elevations (ft)	Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thickness (ft)	C Depth to Water	D = A-C Groundwater Elevation (ft)	= 0.8B + D Corrected Water Table Elevation (ft)	Screened Interval Depth (ft): Top of screen to bottom (below ground surface	Purge Volume = 3 Well Vol. (gals)
OW-29	8/19/2008	6,913.50	6,864.50	49.00	NA	NA	21.95	6,891.55	NA	37.5-47.5	67.9
OW-30	8/20/2008	6,921.60	6,873.20	48.40	NA	NA	26.34	6,895.26	NA	37.9-47.9	42.5
MW-1	8/4/2008	6,878.52	6,746.50	132.02	NA	NA	7.28	6,871.24	NA		381.0
MW-4	8/4/2008	6,882.54	6,760.40	122.14	NA	NA	7.95	6,874.59	NA	87.5-120	350.3
MW-5	8/14/2008	6,883.32	6,750.30	133.02	NA	NA	11.37	6,871.95	NA	112-122.5	269.00
RW-1	2/18/2008	6,943.50			30.18	4.59	34.77	6,908.73	6912.402		
(OW-27)	5/21/2008	6,943.50			30.40	4.17	34.57	6,908.93	6912.266		
	9/12/2008	6,943.50			30.03	4.56	34.59	6,908.91	6912.558		
	11/3/2008	6,943.50			30.02	4.61	34.63	6,908.87	6912.558		
RW-2	2/18/2008	6,927.20				NA	28.16	6,899.04	N/A		
(OW-28)	5/21/2008	6,927.20				NA	27.22	6,899.98	N/A		
	9/12/2008	6,927.20				NA	27.03	6,900.17	N/A		
	11/3/2008	6,927.20				NA	27.10	6,900.10	N/A		
RW-5	2/18/2008	6,942.50	6,902.50	40.00	33.1875	0.7604	33.9479	6,908.55	6909.16042		
	5/21/2008	6,942.50	6,902.50	40.00	32.77	1.07	33.84	6,908.66	6909.516		
	9/10/2008	6,942.50	6,902.50	40.00	32.62	0.23	32.85	6,909.65	6909.834		
	11/3/2008	6,942.50	6,902.50	40.00	31.05	1.29	32.34	6,910.16	6911.192		
RW-6	2/18/2008	6,972.60	6,933.80	38.80	33.4375	0.9165	34.354	6,938.25	6938.9792		
	5/21/2008	6,972.60	6,933.80	38.80	33.02	1.1	34.12	6,938.48	6939.36		
	9/10/2008	6,972.60	6,933.80	38.80	32.83	0.29	33.12	6,939.48	6939.712		
	11/3/2008	6,972.60	6,933.80	38.80	32.46	0.23	32.69	6,939.91	6940.094		

Table 30 (continued): Well Water Elevation Data – 2008

Well ID Number	Measurement date	A Well Casing Rim Elevations (ft)	Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thickness (ft)	C Depth to Water	D = A-C Groundwater Elevation (ft)	= 0.8B + D Corrected Water Table Elevation (ft)	Screened Interval Depth (ft): Top of screen to bottom (below ground surface	Purge Volume = 3 Well Vol. (gals)
SMW-2	8/14/2008	6,884.44	6,827.10	57.34	NA	NA	25.89	6,858.55	N/A	31.6-51.6	15.4
SMW-4	8/13/2008	6,882.54	6,760.40	122.14	NA	NA	29.57	6,852.97	N/A	46.9-66.9	20.9
GWM-1	2/18/2008	6,912.65	6,888.95	23.70	NA	NA	19.91	6,892.74	N/A		
	5/21/2008	6,912.65	6,888.95	23.70	NA	NA	19.47	6,893.18	N/A		
	9/10/2008	6,912.65	6,888.95	23.70	NA	NA	20.24	6,892.41	N/A		
	11/3/2008	6,912.65	6,888.95	23.70	NA	NA	20.55	6,892.10	N/A		
GWM-2	2/18/2008	6,913.17	6,896.97	18.97	NA	NA	18.45	6,894.72	N/A	18.95-28.95	
	3/17/2008	6,913.17	6,896.97	18.97	NA	NA	DRY	NA	N/A		
	5/21/2008	6,913.17	6,896.97	18.97	NA	NA	DRY	NA	N/A		
	9/10/2008	6,913.17	6,896.97	18.97	NA	NA	DRY	NA	N/A		
	11/3/2008	6,913.17	6,896.97	18.97	NA	NA	DRY	NA	N/A		
GWM-3	2/18/2008	6,912.65	6,896.15	17.94	NA	NA	DRY	NA	N/A	17.95-27.95	
	5/21/2008	6,912.65	6,896.15	17.94	NA	NA	DRY	NA	N/A		
	9/10/2008	6,912.65	6,896.15	17.94	NA	NA	DRY	NA	N/A		

Table 30 (continued): Well Water Elevation Data - 2008

Well ID Number	Measurement date	A Well Casing Rim Elevations (ft)	Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thickness (ft)	C Depth to Water	D = A-C Groundwater Elevation (ft)	= 0.8B + D Corrected Water Table Elevation (ft)	Screened Interval Depth (ft): Top of screen to bottom (below ground surface	Purge Volume = 3 Well Vol. (gals)
	11/3/2008	6,912.65	6,896.15	17.94	NA	NA	DRY	NA	N/A		
NAPIS 1(KA-1R)	4/11/2008	6,918.43	6,904.40	14.00	NA	NA	8.58	6,909.85	N		
	7/11/2008	6,918.43	6,904.40	14.00	NA	NA	8.98	6,909.45	N		
	11/4/2008	6,918.43	6,904.40	14.00	NA	NA	8.83	6,909.60	N		
NAPIS 2 (KA-2R)	4/11/2008	6,917.27	6,902.80	14.50	NA	NA	8.83	6,908.44	N		
	7/11/2008	6,917.27	6,902.80	14.50	NA	NA	8.96	6,908.31	N		
	11/4/2008	6,917.27	6,902.80	14.50	NA	NA	9.23	6,908.04	N		
NAPIS 3 (KA-3R)	4/11/2008	6,917.31	6,886.60	30.70	NA	NA	14.98	6,902.33	N		
	7/11/2008	6,917.31	6,886.60	30.70	NA	NA	9.72	6,907.59	N		
	11/4/2008	6,917.31	6,886.60	30.70	NA	NA	8.71	6,908.60	N		
KA-3	11/4/2008	6,917.17	6,892.40	25.00	NA	NA	9.01	6,908.16	N	15-26	7.7

NAPIS 1(KA-1R), NAPIS 2 (KA-2R), NAPIS 3 (KA-3R): NAPIS wells installed on 3/15/08. Quarterly monitoring began third quarter of 2008.

KA-3: Began sampling 4th Quarter 2008.

SPH = Separate Phase Hydrocarbons

NA = If no SPH was detected then this is shown on the table as NA (not applicable)

Corrected water table elevations are only provided if SPH was detected.

*OW-12: Annual inspection revealed well depth measurement to be 126 feet instead of 145 feet as listed.

4.2 Water table elevations versus time

Figures 19-21 show changes in groundwater elevation (corrected for RW-1 that has free product) at wells RW-1, GWM-1, and NAPIS-1, 2, and 3.

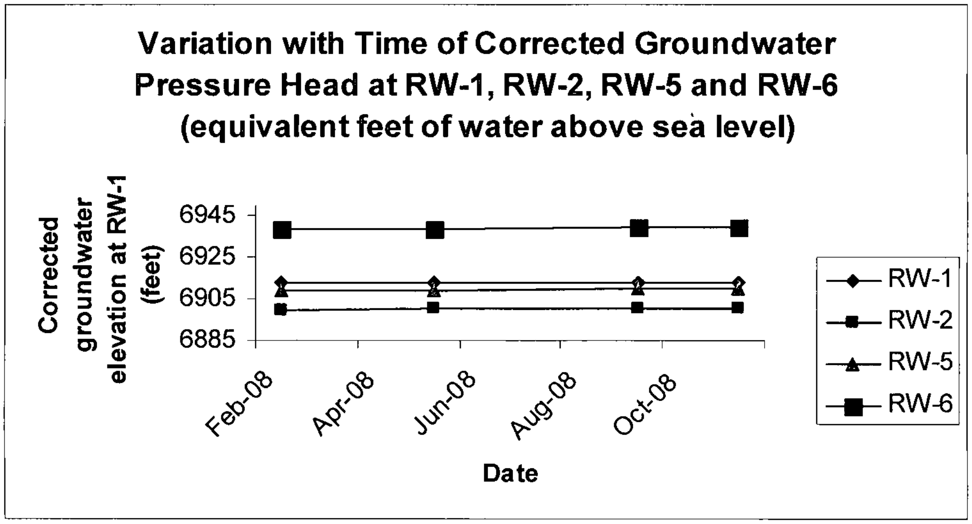

Figure 19: Variation with time of corrected groundwater elevation at RW-1, RW-2, RW-5, and RW-6

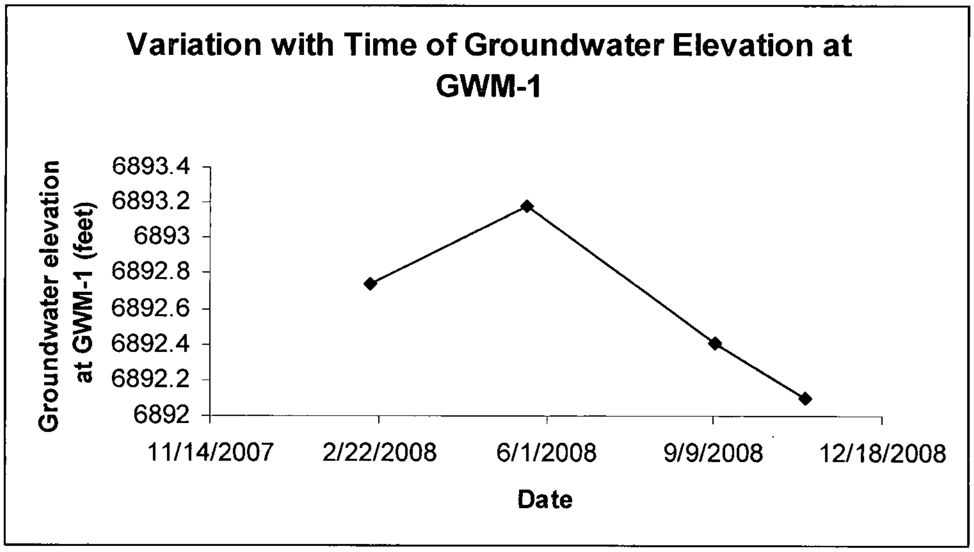

Figure 20: Variation with time of groundwater elevation at GWM-1

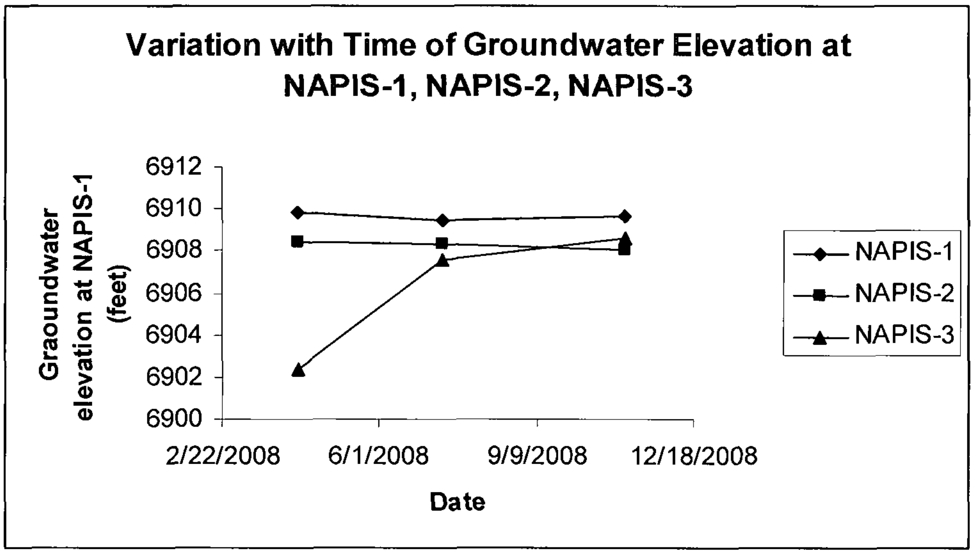

Figure 21: Variation with time of groundwater elevation at NAPIS-1, 2, and 3

4.3 Annual product thickness and iso-concentration contours

Figure 22 depicts the variation of product thickness at RW-1, RW-5, and RW-6.

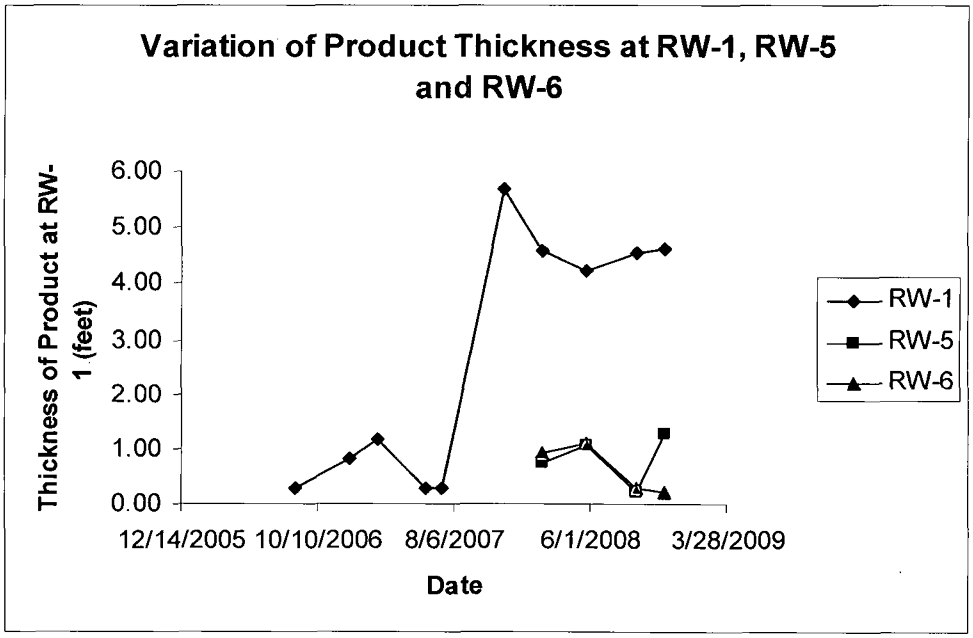

Figure 22: Variation of product thickness at RW-1 with time

Figure 23 depicts equal concentration contour maps for benzene around wells OW-14, OW-30, OW-29, and OW-13.

Figure 23: Equal concentration contour maps for benzene around wells OW-14, OW-30, OW-29, and OW-13.

4.4 Volume of product recovered

Table 31 presents data on volume of product recovered from well RW-1.

Table 31: Volume of product recovered in 2008 from RW-1

Date of measurement	Time	Quarter	Well #	Depth to Product (feet)	Depth to Water (feet)	Product Level Thickness (feet)	Volume of Product Bailed (gallons)
2/18/2008	1532	1st.	**RW-1**	30.18	34.77	4.59	1.66
5/21/2008	1410	2nd	**RW-1**	30.33	34.57	4.24	1.39
9/12/2008	1430	3rd	**RW-1**	30.03	34.59	4.56	NOT BAILED
11/13/2008	1300	4TH	**RW-1**	30.02	34.63	4.61	0.94

The total volume of product recovered is – **3.99 gallons**.

5.0 Conclusions and Recommendations

In this section, we present our major overall conclusions and recommendations; and then discuss the findings for groundwater monitoring wells individually or in similar groups.

5.1 Overall conclusions

On the East side, in the north-east corner of the active refinery perimeter (but not the refinery property as a whole) a plume of Methyl-Tert Butyl Ether (MTBE) is known to exist in shallow groundwater within refinery property. This groundwater enters the refinery from the east, and then moves slowly north-west into the Facility property. In three wells, OW-14, OW-29, and OW-30, the MTBE is in the range of 0.05 to 1.3 ppm and at levels that exceed the RRSL (0.012 ppm). In this area volatile hydrocarbons have also been detected in shallow groundwater and benzene (in OW-14 at a level of 0.074 ppm) is at a level that exceeds NMWQS for drinking water (0.005 ppm). There are downgradient wells that have not yet shown more than trace levels of benzene, that is, close to the levels of detection of analytical methods. These wells are within a few hundred feet of OW-14, the well at which benzene has been detected at levels above NMWQS. Therefore, benzene in the groundwater in this region is expected to move approximately 10 feet per year – this is apparent from noting the time it has taken for trace levels to be detected downgradient. The nearest drinking water well in the direction of contaminant movement is probably more than 10,000 feet away and more than 3000 feet deep – while contamination is at shallow depths of 30-50 feet. Within the perimeter of the active refinery in this north-east section, there are also several shallow recovery wells from which separate-phase hydrocarbons have been recovered and still continue to be recovered, of the order of 4 gallons total in 2008.

On the West side, there are shallow groundwater issues likely stemming from the wastewater treatment system of the refinery that consists of aeration lagoons and a series of large evaporation ponds. Immediately downgradient (within 10 feet) of the refinery's oil/water separator, a sample from a shallow groundwater monitoring well (NAPIS-2) had MTBE at a level (0.32 ppm) greater than the RRSL (0.012 ppm), a few hydrocarbons above detection levels, and benzene above the NMWQS (0.91 ppm > 0.005 ppm). Downgradient of the two aeration lagoons, a shallow monitoring well, GWM-1, has also detected benzene above NMWQS, and other hydrocarbons at detectable levels. Some of these include several polycyclic aromatic hydrocarbons (PAHs), which though generally below any regulatory standards, are of concern as they are long-lived and could possibly impact deeper aquifers. Some of these wells have also shown levels of chlorides and sulfates above NMWQS and/or MCL. Elevated levels of arsenic and manganese have also been detected in GWM-1 above the NMWQS.

In this report, we also present data on our aeration lagoons, ponds and outfalls between the lagoons and ponds. We collect these data as a part of our permit GW-032. Groundwater standards do not apply to these surface water bodies. However, these data are of great value in determining compliance with various provisions of the State of New

Mexico as well as the EPA regarding hazardous waste treatment. None of the aeration lagoons or ponds has benzene levels greater than 0.5 ppm. (Appendix D presents information on a RCRA-driven sampling activity that studied benzene levels entering Aeration Lagoon 1, in which benzene levels greater than 0.5 ppm were found. However, these levels had fallen to well below 0.5 ppm, before the wastewater left Aeration Lagoon 1, as can be seen by our sampling data.) These data on our surface water treatment ponds also help us understand if the ponds are affecting groundwater. It should be noted that the aeration lagoons and ponds do contain volatile and semi-volatile organic compounds, some of which are also found in shallow wells (GWM-1, and SWM-2).

Finally, there are a series of boundary (BW), observation (OW), monitoring (MW) and shallow monitoring (SWM) wells in the western portions of the facility that are meant to detect any off-site movement of contaminants and also releases to groundwater. One of the OW wells has shown detectable levels of uranium, in one case above NMWQS. Uranium is ubiquitous in groundwater of New Mexico, and the location of this one well (OW-11) makes it unlikely that the uranium should be linked to refinery activity – OW-11 is located so that it is mainly affected by off-refinery groundwater, and also groundwater that is linked to movement through rock.

Among the wells on the far west side are three deep drinking water wells, PW-3, PW-2, and PW-4 – none of these has ever been known to have any contamination at any detectable level. In one event in 2007, we found a semi-volatile hydrocarbon in PW-3, sampled again and found that it was non-detectable – we will continue to monitor this well, and believe the one anomalous reading was a laboratory artifact. Among MW and SWM monitoring wells in the west side, a few have shown traces of hydrocarbons. SMW-2 has shown a level of 1,4-Dioxane at 0.0136 ppm which is greater than the RRSL of 0.0061 ppm. All of the BW wells have shown that no contaminants are leaving the refinery's property.

5.2 Overall recommendations

- Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB
- Develop a subsurface hydrogeological map of the refinery
- Collect samples of incoming shallow groundwater at the northern edges of the refinery and sample for metals – this may help establish what metals, if any, are possibly linked to the refinery
- Recognizing that the MTBE and benzene plume in the north-east region is moving towards the north-west, and may have passed by existing wells, establish two new monitoring wells north and west of OW-29 at the Chinle/alluvium interface.

5.3 Conclusions and recommendation on individual wells

5.3.1 Wells with hydrocarbon contamination above standards

OW-14, OW-30, OW-29, OW13

These wells have shown levels of benzene and MTBE, plus OW-14 has shown some VOCs. They were sampled between 8/19/08-8/21/08, and 11/12/08-11/14/08. They are being sampled quarterly starting from the third quarter of 2008. They are sampled for VOCs, BTEX, and MTBE. Figure 24 depicts the situation at these wells.

Among these wells, benzene is only found in OW-14. In the last two quarters of 2008, benzene in OW-14 went up from 0.0035 ppm to 0.0082 ppm, which exceeds the MCL of 0.005 ppm. In the third and fourth quarters, we also found some VOCs in OW-14: 1-methylnapthalene, isopropylbenzene, Sec-butylbenzene, and 1, 2 dichloroethane (only in the fourth quarter). Of these, 1-methylnapthalene (0.012, 0.016), and 1, 2 dichloroethane (0.0018) were at levels greater than the RRSLs of 0.0023 ppm, and 0.00015 ppm respectively.

In the last two quarters of 2008, respectively, MTBE went up, then down in OW-14 (1.3 ppm, 0.91 ppm) and OW-30 (1.1 ppm, 0.88 ppm). MTBE went up in OW-29 (0.0092 ppm, 0.015). These levels are greater than the RRSL of 0.012 ppm. Similarly, MTBE went up in OW-13 (<0.001 ppm, 0.0016 ppm).
Recommendation:
Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB. Drill two new wells to the north-west of OW-29, to better 65-determine the extent of contamination.

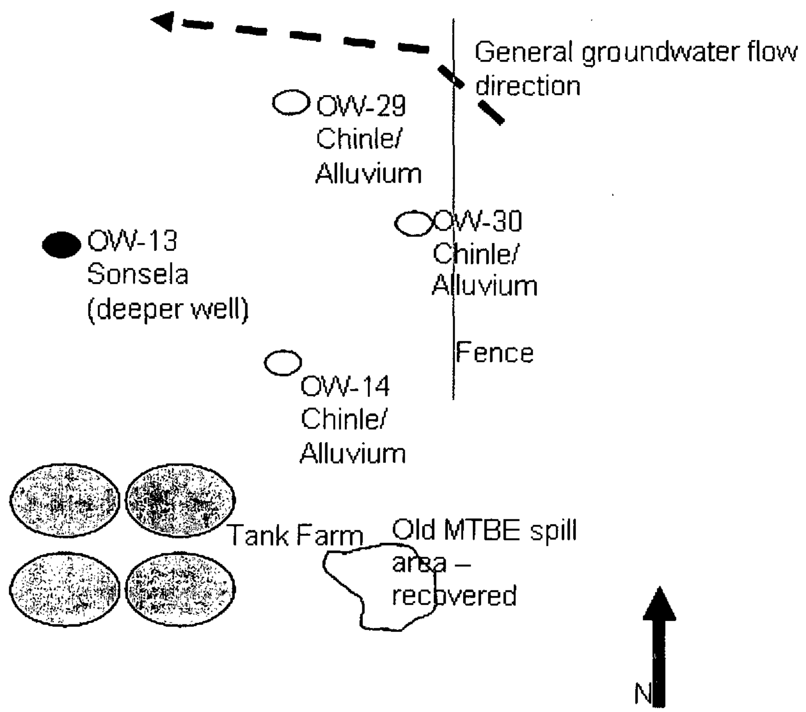

Figure 24: General location and situation around OW-14, OW-30, OW-29, and OW-13

GWM-1 and GWM-2

GWM-1 well was sampled on 7/10/08. It has a level of benzene (0.011 ppm) that exceeds the EPA's MCL of 0.005 ppm, and the NMWQS of 0.01 ppm. MTBE in this well is at 0.12 ppm, which exceeds the RRSL of 0.012 ppm. We have also detected VOCs (1, 2, 4 trimethylbenzene), and SVOCs (2, 4 dimethylphenol, and phenol) – but these are at levels below the NMWQS, MCLs, and RRSLs. This well also has chlorides at a level of 1800 ppm that is greater than the NMWQS drinking water standard of 250 ppm. In February 2008, GWM-2 was found to contain water, and this well was also sampled. GWM-2 had non-detectable levels of hydrocarbon contaminants, except for MTBE which was above the RRSL.

This well is downgradient of the two aeration lagoons, and the levels detected appear to be stemming from their waters. We plan to close the aeration lagoons and permanently remove this potential source. At that time, we will also close GWM-1.

Recommendation:
Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB. Monitor water levels quarterly, and collect annual samples for VOCs, SVOCs, and BTEX plus MTBE. Monitor presence of water in GWM-2 and sample if sufficient quantity available.

SMW-2, SMW-4

These wells are located downgradient of a closed Land Treatment Unit. In SMW-2 we have detected levels of acetone (0.00753 ppm), diethylphtalate (0.000057 ppm), and 1, 4 dioxane (0.0136 ppm). The level of 1, 4 dioxane is greater than the RRSL of 0.0061 ppm. In SMW-4, we have detected levels of diethylphtalate (0.0005 ppm), and phenol (0.00113 ppm). These levels are below the NMWQS, MCLs, and RRSLs.

In 2009, we will be doing soil sampling below the Land Treatment Unit in the vadose zone. Based on these results and if we detect contaminants migrating into the subsurface, we will evaluate the existing annual frequency of monitoring SMW-2 and SMW-4.

Recommendation:

Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB. Based on results of soil tests for possible migration of contaminants into the subsurface, evaluate monitoring frequency.

NAPIS-1, NAPIS-2, NAPIS-3, KA-3

These shallow wells are located around the NAPIS. NAPIS-1 is an upgradient well on the south and east side of the NAPIS. NAPIS-2 is located immediately downgradient on the south and west side of the NAPIS. KA-3 and NAPIS3 are located on the west side at the north end.

NAPIS-1 has no detectable levels of contaminants. NAPIS-2 has shown elevated levels of benzene (dropping over the year from 0.91 ppm to 0.025 ppm, yet above the MCL of 0.005 ppm) and MTBE (dropping over the year from 0.32 ppm to 0.18 ppm, above the RRSL of 0.012 ppm). No contaminants have been detected in NAPIS-3. KA-3 has shown elevated levels of MTBE at 0.13 ppm.

In the third quarter of 2008, NAPIS-3 did not have enough water to collect a sufficient quantity. KA-3 well was then added to the sampling schedule.

Recommendation:
Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB.

5.3.2 Wells without hydrocarbon contamination[11]

OW-11

A grab sample from OW-11 was taken on August 14, 2008. No metals or volatiles were found at levels exceeding applicable MCLs, NM ground water, and NM TPH screening levels. In 2008, the general chemistry results showed that fluoride (2.2 mg/l) and sulfate (940 mg/l) were present at levels greater than the NMWQS for fluoride (1.6 mg/l) and sulfate (600 mg/l).

Recommendation:

Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB.

OW-12

OW-12 was sampled on August 19, 2007 and analyzed for VOCs and SVOCs. The laboratory analyses showed all parameters at non-detectable levels.

Recommendation:

Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB.

BW-1A, BW-1B, BW-3A

BW-1A, BW-1B, and BW-3A are dry wells and therefore were not sampled in 2008.

Recommendation:

Continue sampling as per current facility-wide groundwater monitoring plan

The Gallup Refinery will continue to visually inspect BW-1A and BW-1B annually for any liquids. If liquids are observed, then sampling will occur. All samples will be analyzed for VOC, SVOC, BTEX, MTBE, Metals, and General Chemistry.

BW-1C, BW-2B, BW-2C. BW-3B, BW-3C

BW-1C was sampled on July 31, 2008; BW-2B, BW-2C, BW-3B and BW-3C were sampled on July 30, 2008. The samples were analyzed for VOC, SVOC, BTEX, MTBE, WQCC metals, and General Chemistry. Laboratory analysis showed concentrations less than (all non-detect) all applicable standards for benzene, toluene, ethylbenzene, xylene, and MTBE. However, laboratory results showed that fluorides and sulfates were greater than the NMWQS (1.6 ppm, and 250 ppm respectively) for these wells, except that BW-3B had levels of fluorides below the NMWQS.

Recommendation:

[11] These wells may have other contaminants present at levels greater than applicable standards, such as sulfates.

Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB.

PW-2, PW-3, PW-4

PW-3 was sampled in 2007. All parameters were less than the applicable standards and MCLs, except for 2-Methylnapthalene which was found at 0.032 mg/l to be greater than the NMWQS of 0.03 mg/l. This well was not scheduled for 2008. However, we collected a sample from this well, as well as a blind duplicate. No detectable 2-Methylnapthalene was found in either of these two samples. PW-2 and PW-4 were scheduled for 2008 and did not show any levels above applicable standards and no hydrocarbons were detected.

Recommendation:
Monitor PW-3 again in 2010; and then revert to the alternate year cycle for PW-2 and PW-4 (to be sampled in 2011), and PW-3 in 2012. Continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB.

OW-1 and OW-10

These wells are being visually checked on a quarterly basis starting the 4th quarter of 2004. In 2008, OW-1 was checked on 2/18/2008, 5/21/2008, 9/15/2008, and 11/3/2008. In 2008, OW-10 was checked on 2/18/2008, 5/21/2008, 9/10/2008, and 11/3/2008.

Recommendation:
The Gallup Refinery will continue to visually inspect OW-1 and OW-10 for artesian flow quarterly

MW-1, MW-4, MW-5

MW-1 was sampled on August 8, 2008. MW-4 was sampled on August 5, 2008. MW-5 was sampled on August 13, 2008. MW-4 showed a trace level of Bis (2-ethylhexl) pthlate at 0.000679 ppm, well below any applicable standards. MW-5 had a pH at 9.02 above the NMWQS limit of 6-9.

Recommendation
The Gallup Refinery will sample MW-1, MW-4, and MW-5 annually and continue monitoring as specified in the current OCD Groundwater discharge permit GW-032, and various requirements specified in directives from the NMED/HWB.

Ponds 1 through 8

Ponds 1 through 8 were sampled quarterly on 3/11/08, 6/17/08, 9/9/08, and 12/2/08. For Ponds 1 and 2, the locations were a significant distance away from the inlets that were sampled as a separate activity. The results for benzene showed no levels above the hazardous waste characteristic of 0.5 ppm. There were volatiles and semi-volatiles contaminants found that are seen to degrade as one progresses along the series of ponds from 1-8.

Recommendation
Western Refining will continue to monitor Ponds 1 through 8 on an annual basis for select General Chemistry parameters, VOCs, SVOCs, and WQCC metals.

Inlets to Pond #1, Pond #2, AL-2 to Pond 1, Boiler water to EP-2, NAPIS effluent, Pilot effluent

These outfalls were sampled annually and quarterly according to the Facility Site-wide Groundwater Monitoring Plan. No benzene levels above 0.5 ppm were found. What is of concern is that effluents entering EP1 had levels of DRO and GRO of approximately 24-160 ppm. This is of concern as the Gallup Refinery has a requirement to ensure no oil to EP-1 which would translate into levels less than 15 ppm – the levels at which a sheen of oil can be discerned. The Gallup Refinery is upgrading its wastewater treatment system to ensure that no oil gets to EP-1.

Recommendation
The Gallup Refinery will continue to monitor these various outfalls on an annual and quarterly basis for select General Chemistry parameters, VOCs, SVOCs, DRO, GRO and WQCC metals. After the wastewater treatment system's upgrades are completed, continue monitoring quarterly for one more year, after which the sampling frequencies could be reevaluated.

Inlets to AL-1 and AL-2

These outfalls were sampled monthly for COD, BOD and SVOCs (Phenols). In most cases, phenols were reduced in concentration from AL-1 to AL-2 and then to EP-1. However, in October 2008, the reverse trend was observed.

Recommendation
The Gallup Refinery will continue to monitor these various outfalls on a monthly basis for COD, BOD and SVOCs (Phenols). After the aeration lagoons are closed, these samples will be discontinued.

5.4 Deviations from OCD Groundwater Discharge Permit GW-032

There were no deviations from the OCD Groundwater Discharge permit GW-032. As PW-2 a deep aquifer well had shown a suspect level of methylnaphthalene in sampling conducted in 2007, in 2008 we collected an additional sample of this well, along with a blind duplicate – both these samples were clean.

All other outfalls required to be sampled under the OCD Groundwater Discharge permit GW-032, were monitored as required and these data have been presented in Tables presented in section 3.

Western Refining

WNR LISTED NYSE

GALLUP REFINERY

September 1, 2009

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New Mexico Environment Department
Hazardous Waste Bureau
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Carl J. Chavez, CHMM
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Dear Hope and Carl:

It is a pleasure to submit our 2008 Annual Groundwater Monitoring Report for the Gallup Refinery.

There are three binders in all.

We look forward to your review,

Sincerely,

Gaurav Rajen
Environmental Engineer
Gallup Refinery
Western Refining

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Binder 1

Annual Groundwater Monitoring Report:
Gallup Refinery - 2008

Western Refining
Gallup, New Mexico

August 2009

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Executive Summary

This Annual Groundwater Monitoring Report for 2008 (report) has been prepared in response to requirements stated in Groundwater Discharge Permit, GW-032, issued by the Oil Conservation Division (OCD) of the New Mexico Energy Minerals and Natural Resources Department to the Gallup Refinery owned by Western Refining ("refinery" or "facility").

This report describes monitoring and remediation activities undertaken throughout 2008, and includes conclusions and recommendations. In this Executive Summary, we provide a broad overview of groundwater impacts – all of our interpretations, conclusions, and recommendations are supported by data tables, graphs and maps in the main body of the report.

The monitoring activities have collected data that are used to characterize the nature and extent of impacts to groundwater at the refinery, and to recognize any levels of contaminants that exceed applicable standards. These standards are the New Mexico Water Quality Standards (NMWQS) set by the New Mexico Water Quality Control Commission (WQCC), and the U.S. Environmental Protection Agency's (EPA's) Maximum Contaminant Levels (MCLs). If NMWQS standards or MCLs do not exist for a contaminant, we compare levels against the EPA Regional Screening Levels set for Residential Risk-Based Screening Levels for Tap Water (RRSLs). As stated by the EPA, exceeding a RRSL does not "automatically designate a site as "dirty" or trigger a response action; however, exceeding a [RRSL] suggests that further evaluation of the potential risks by site contaminants is appropriate."[1] The EPA recommends that for a specific site, the screening levels be recalculated using site-specific data.

Essentially, there are two major sections of the Refinery which we have defined as the East and the West side. Shallow groundwater enters the refinery from the northern, southern, and eastern portions of the site and flows out along the western portions. Detailed discussions of monitoring and remediation activities in the East and the West sides, the data generated, and other issues are provided in chapters 2, 3 and 4 of the report. Chapter 5 provides detailed sets of conclusions and recommendations.

On the East side, in the north-east corner of the active refinery perimeter (but not the refinery property as a whole) a plume of Methyl-Tert Butyl Ether (MTBE) is known to exist in shallow groundwater within refinery property. This groundwater enters the refinery from the east, and then moves slowly north-west into the Facility property. In three wells, OW-14, OW-29, and OW-30, the MTBE is in the range of 0.05 to 1.3 ppm and at levels that exceed the RRSL (0.012 ppm). In this area volatile hydrocarbons have also been detected in shallow groundwater and benzene (in OW-14 at a level of 0.074 ppm) is at a level that exceeds NMWQS for drinking water (0.005 ppm). There are downgradient wells that have not yet shown more than trace levels of benzene, that is, close to the levels of detection of analytical methods. These wells are within a few hundred feet of OW-14, the well at which benzene has been detected at levels above

[1] http://www.epa.gov/reg3hscd/risk/human/rb-concentration_table/faq.htm#FAQ1

NMWQS. Therefore, benzene in the groundwater in this region is expected to move approximately 10 feet per year – this is apparent from noting the time it has taken for trace levels to be detected downgradient. The nearest drinking water well in the direction of contaminant movement is probably more than 10,000 feet away and more than 3000 feet deep – while contamination is at shallow depths of 30-50 feet. Within the perimeter of the active refinery in this north-east section, there are also several shallow recovery wells from which separate-phase hydrocarbons have been recovered and still continue to be recovered, of the order of 4 gallons total in 2008.

On the West side, there are shallow groundwater issues likely stemming from the wastewater treatment system of the refinery that consists of aeration lagoons and a series of large evaporation ponds. Immediately downgradient (within 10 feet) of the refinery's oil/water separator, a sample from a shallow groundwater monitoring well (NAPIS-2) had MTBE at a level (0.32 ppm) greater than the RRSL (0.012 ppm), a few hydrocarbons above detection levels, and benzene above the NMWQS (0.91 ppm > 0.005 ppm). Downgradient of the two aeration lagoons, a shallow monitoring well, GWM-1, has also detected benzene above NMWQS, and other hydrocarbons at detectable levels. Some of these include several polycyclic aromatic hydrocarbons (PAHs), which though below any regulatory standards, are of concern as they are long-lived and could possibly impact deeper aquifers. Some of these wells have also shown levels of chlorides and sulfates above NMWQS and/or MCL. Elevated levels of arsenic and manganese have also been detected in GWM-1 above the NMWQS.

In this report, we also present data on our aeration lagoons, ponds and outfalls between the lagoons and ponds. We collect these data as a part of our permit GW-032. Groundwater standards do not apply to these surface water bodies. However, these data are of great value in determining compliance with various provisions of the State of New Mexico as well as the EPA regarding hazardous waste treatment. None of the aeration lagoons or ponds has benzene levels greater than 0.5 ppm. (In a RCRA-driven sampling activity that studied benzene levels entering Aeration Lagoon 1, benzene levels greater than 0.5 ppm were found. However, these levels had fallen to well below 0.5 ppm, before the wastewater left Aeration Lagoon 1, as can be seen by our sampling data.) These data on our surface water treatment ponds also help us understand if the ponds are affecting groundwater. It should be noted that the aeration lagoons and ponds do contain volatile and semi-volatile organic compounds, some of which are also found in shallow wells (GWM-1, and SWM-2).

Finally, there are a series of boundary (BW), observation (OW), monitoring (MW) and shallow monitoring (SWM) wells in the western portions of the facility that are meant to detect any off-site movement of contaminants and also releases to groundwater. One of the OW wells has shown detectable levels of uranium, in one case above NMWQS. Uranium is ubiquitous in groundwater of New Mexico, and the location of this one well (OW-11) makes it unlikely that the uranium should be linked to refinery activity – OW-11 is located so that it is mainly affected by off-refinery groundwater, and also groundwater that is linked to movement through rock. Among the wells on the far west side are three deep drinking water wells, PW-3, PW-2, and PW-4 – none of these has ever been known to have any contamination at any detectable level. In one event in 2007, we found a semi-volatile hydrocarbon in PW-3, sampled again and found that it was non-detectable – we will continue to monitor this well, and believe the one anomalous reading was a laboratory artifact. Among MW and SWM monitoring wells in the west side, a few have shown traces of hydrocarbons. SMW-2 has shown a level of 1,4-Dioxane at 0.0136 ppm which is greater than the RRSL of 0.0061 ppm. All of the BW wells have shown that no organic contaminants are leaving the refinery's property, although some of these wells have high levels of sulfates (above drinking water standards).

Recommendations

1) Continue monitoring as specified in the current Facility-wide Groundwater Monitoring Plan
2) Develop a subsurface hydrogeological map of the refinery
3) Collect samples of incoming shallow groundwater at the northern edges of the refinery and sample for metals – this may help establish what metals, if any, are possibly linked to the refinery
4) Recognizing that the MTBE and benzene plume in the north-east region is moving towards the north-west, and may have passed by existing wells, establish two new monitoring wells north and west of OW-29 at the Chinle/alluvium interface.

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Appendix I Laboratory Analytical Reports

LIST OF ACRONYMS

AL	Aeration lagoons
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
COD	Chemical Oxygen Demand
DRO	Diesel Range Organics
EP	Evaporation ponds
EPA	Environmental Protection Agency
GPM	Gallons per minute
GRO	Gasoline Range Organics
HWB	Hazardous Waste Bureau
MTBE	Methyl Tert Butyl Ether
MG/L	Milligrams/liter
NAPIS	New American Petroleum Institute Separator
NMED	New Mexico Environment Department
OCD	Oil Conservation Division
PPM	Parts per million
VOC	Volatile Organic Compounds
SVOC	Semi-volatile Organic Compounds
WWTP	Wastewater treatment plant

1.0 Introduction

This Annual Groundwater Monitoring Report for 2008 (Report) has been prepared in response to requirements stated in Groundwater Discharge Permit, GW-032, issued by the Oil Conservation Division (OCD) of the New Mexico Energy Minerals and Natural Resources Department to the Gallup Refinery owned by Western Refining ("Gallup Refinery" or "Facility").

This Report describes monitoring and remediation activities undertaken throughout 2008, and includes conclusions and recommendations. The monitoring activities have collected data that are used to characterize the nature and extent of impacts to groundwater at the Gallup Refinery, and recognize any levels of contaminants that exceed applicable standards. These standards are those set by the New Mexico Water Quality Control Commission (WQCC), or the U.S. Environmental Protection Agency's (EPA's) Maximum Contaminant Levels (MCLs). If WQCC standards or MCLs do not exist for a contaminant, we compare levels against the EPA Regional Screening Levels set for Residential Risk-Based Screening Levels for Tap Water (RRSLs).

1.1. Facility ownership, operation and location

This Plan pertains to the Western Refining Southwest Inc. Gallup Refinery located at Exit 39 on Interstate I-40. This refinery is known as the Gallup Refinery and is located at Jamestown New Mexico, approximately 17 miles east of Gallup. Figure 1 shows the regional location of the Gallup Refinery.

The owner is:

	Western Refining	(parent corporation)
	123 W. Mills Avenue	
	El Paso, TX 79901	
Operator:	Western Refining Southwest Inc	(postal address)
	Route 3, Box 7	
	Gallup, New Mexico 87301	
	Western Refining Southwest Inc	(physical address)
	I-40, Exit 39	
	Jamestown, New Mexico 87347	

SIC code 2911 (petroleum refining) applies to the Gallup Refinery.

The following regulatory identification and permit governs the Gallup Refinery:

- U.S. EPA ID Number NMD000333211
- OCD Discharge Permit No. GW-032

The facility status is corrective action/compliance. Annual and quarterly groundwater sampling is conducted at the facility to evaluate present contamination.
The refinery is situated on an 810 acre irregular shaped tract of land that is substantially located within the lower one quarter of Section 28 and throughout Section 33 of

Township 15 North, Range 15 West of the New Mexico Prime Meridian. A small component of the property lies within the northeastern one quarter of Section 4 of Township 14 North, Range 15 West. Figure 2 is a topographic map showing the general layout of the refinery in comparison to the local topography.

Figure 1: Regional map showing the location of the Gallup Refinery (red star along Interstate-40, 20 miles east of the City of Gallup).

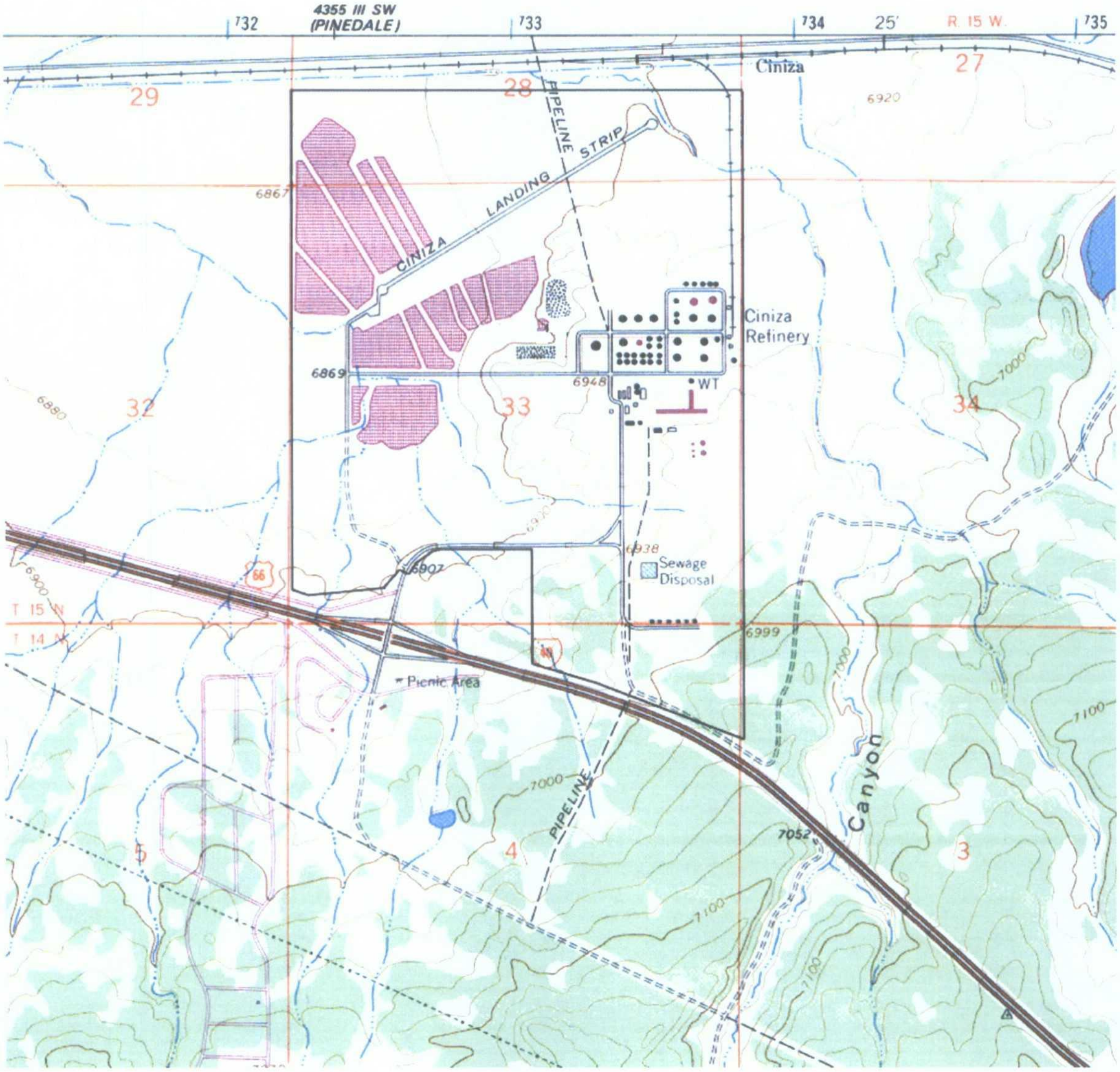

Figure 2: Topographic Map of the Gallup Refinery Site - USGS Topographical Map - Gallup Quadrangle (Revised 1980)

1.2 Historical and current site uses

The Gallup Refinery is located within a rural and sparsely populated section of McKinley County in Jamestown New Mexico. The setting is a high desert plain on the western slope of the continental divide. The surrounding land is comprised primarily of public lands and is used for cattle and sheep grazing at a density of less than six cattle or 30 sheep per section.[2] The nearest population centers are the Pilot (formerly Giant) Travel Center refueling plaza, the Interstate 40 highway corridor, and a small cluster of residential homes located on the south side of Interstate 40 approximately 2 miles southwest of the refinery (Jamestown). Except for the City of Gallup, McKinley County is a predominantly rural area, as are the adjoining portions of neighboring counties.

Historically, this area has been populated by Native Americans, as it is even today with the contemporary Navajo Nation and the Pueblo of Zuni located in the region. The area has always been a crossroads for East to West and North to South trade routes; and many modern highways in the area, such as Interstate-40, trace routes established well over a thousand years ago. Irrigated agriculture in the area also dates back to several thousands of years, and continues to this day. There are remnants of an irrigation ditch in the north-central portion of the site which attests to farming having occurred on the site.

Since the arrival of the Spanish in 1540, grazing of livestock became another major land use. In the early 1900s, highly intensive livestock grazing occurred in this region that led to severe degradation of the land.

Along with irrigated farming and livestock, artisan work has been a mainstay of the local economy and continues till current times. In 1880, coal mining began to be a major land use in the region; and in 1881 the railroad arrived. The railroad carried Indian made goods for sale across the nation. Today, a railroad line runs just north of the facility, and a rail spur brings railroad cars into the north-east end of the facility to deliver crude oil, ethanol and other feedstock.

From the early 1900s to the 1940s extensive logging occurred in the region, especially thirty miles to the south-west of the facility in the Zuni Mountains. This aggravated the forming of arroyos from erosion, and impacted the local watersheds.

From the 1950s to the early 1980s, uranium mining was a major extractive industry in the region with a large number of mines located in the general area of the facility, with the nearest mines being around 20 miles distant towards the east. No historical mining has ever occurred on the facility. It is important to note that impacts have occurred to groundwater in the area from the mining and processing of uranium ore.

Today, built in the 1950s, and refurbished and expanded over time, a petroleum refinery is located on a man-made terrace towards the central and southern portions of the facility.

The refinery primarily receives crude oil via two 6 inch diameter pipelines; Bisti Pipeline comes down from the Four Corners Area and enters the refinery property from the north and Hospah Pipeline comes in from the northeast and is an interconnection with a main interstate pipeline. In addition, the refinery also receives natural gasoline feedstocks via a 4-inch diameter pipeline that comes in from the west along the Interstate 40 corridor from the Conoco gas plant. Crude oil and other products also arrive at the site via railroad cars. These feedstocks are then stored in tanks until refined into products.

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[2] See, for example, the web site of McKinley County at http://www.co.mckinley.nm.us/

Figure 3 depicts an aerial photograph of the Gallup Refinery.

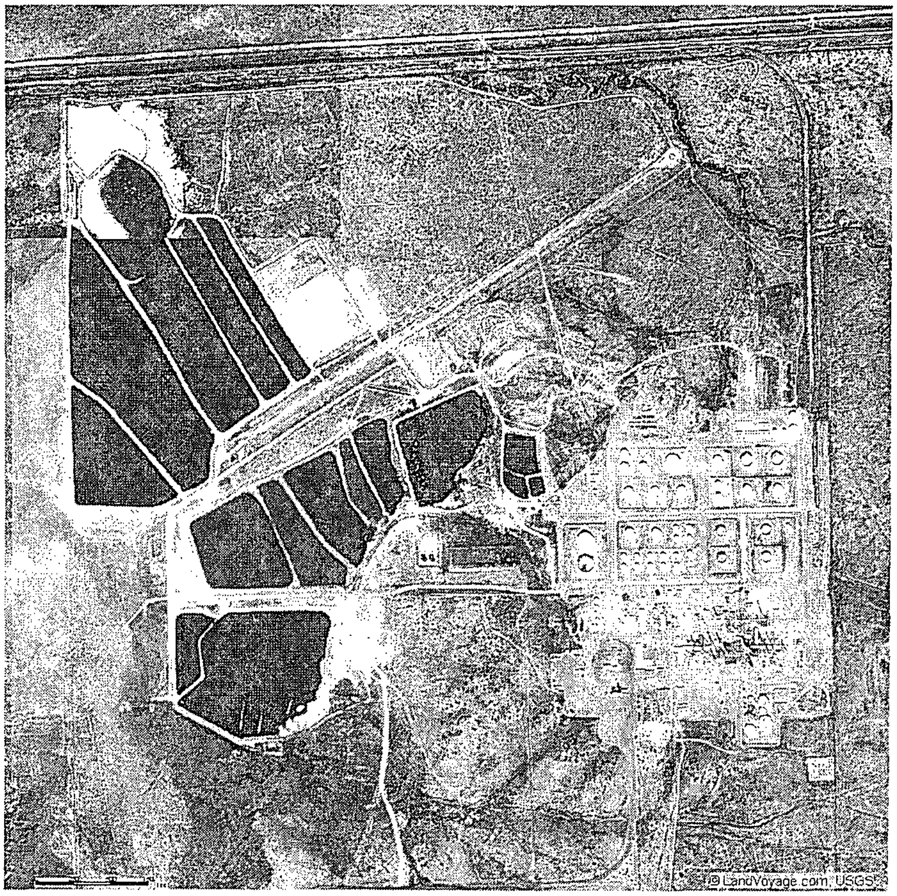

Figure 3: Aerial photograph of the Gallup Refinery

The refinery incorporates various processing units that convert crude oil and natural gasoline into finished products. These units are briefly described as follows.

- The crude distillation unit separates crude oil into various fractions; including gas, naphtha, light oil, heavy oil, and residuals.

- The fluidized catalytic cracking unit (FCCU) dissociates (cracks) long-chain hydrocarbon molecules into smaller molecules, and essentially converts heavier oils into naphtha and lighter oils.

- The alkylation unit combines specific types of hydrocarbon molecules into a high octane gasoline blending component.

- The reforming unit breaks up and reforms low octane naphtha molecules to form high octane naphtha.

- The hydrotreating unit removes undesirable sulfur and nitrogen compounds from intermediate feedstocks, and also saturates the feedstocks with hydrogen to make diesel fuel.

- Additional treater units later also remove impurities from various intermediate and blending feedstocks in order to produce finished products that comply with sales specifications.

- The isomerization unit converts low octane hydrocarbon molecules into high octane molecules.

- A set of acid gas treating and sulfur recovery units convert and recover various sulfur compounds from other processing units and then produce either Ammonium Thiosulfate or a solid elemental sulfur byproduct.

As a result of these processing steps, the refinery produces a wide range of petroleum products including propane, butane, unleaded gasoline, diesel, kerosene, and residual fuel. In addition to the aforementioned processing units, various other equipment and systems support the operation of the refinery and are briefly described as follows.

Storage tanks are used throughout the refinery to hold and store crude oil, natural gasoline, intermediate feedstocks, finished products, chemicals, and water. These tanks are all located aboveground and range in size from 80,000 barrels to less than a 1,000 barrels. A grouping of tanks is commonly referred to as a "tank farm" such as the hot oil "tank farm".

Pumps, valves, and piping systems are used throughout the refinery to transfer various liquids among storage tanks and processing units.

A railroad spur track and a railcar loading rack are used to transfer feed-stocks and products from refinery storage tanks into and out of railcars.

Several tank truck loading racks are used at the refinery to load out finished products and also may receive crude oil, other feedstocks, additives, and chemicals.

A pipeline from the refinery carries diesel fuel to the Pilot (formerly Giant) Travel Center. Gasoline is delivered to the Pilot Center via tanker truck.

A firefighting training facility is used to conduct employee firefighting training. Waste water from the facility, when training is conducted, is pumped into a tank which is then pumped out by a vacuum truck. The vacuum truck pumps the oily water into a process sewer leading to the New API Separator (NAPIS).

The process wastewater system is a network of curbing, paving, catch basins, and underground piping that collects waste water effluent from various processing areas within the refinery and then conveys this wastewater to the NAPIS.

The NAPIS is a two compartment oil water separator. Oil is separated from water based on the principle that, given a quiet surface, oil will float to the water surface where it can be skimmed off. The skimmed slop oil is passed to a collection chamber where it is pumped back into the refinery process. The clarified water is piped to the top of dual stripping columns where benzene is removed. The stripped water flows into the first aeration lagoon. Sludge sinks to the bottom of the NAPIS which is periodically vacuumed out by a vacuum truck and disposed as hazardous waste at an approved landfill or recycled and reused in refineries that have this allowable exemption under RCRA.

At the stripping columns, ambient air is blown upwards through the falling cascade of clarified wastewater as it passes through distillation column packing. Countercurrent desorption of benzene from the water occurs due to the high volume of air passing over the relatively large surface area provided by the packing. The desorbed benzene is absorbed into the air stream and vented to the atmosphere. Effluent from the stripper columns gravity flows through piping into the first aeration lagoon.

At the aeration basins, the treated wastewater is mixed with air in order to oxidize any remaining organic constituents and increase the dissolved oxygen concentration available in the water for growth of bacteria and other microbial organisms. The microbes degrade hydrocarbons into carbon dioxide and water. Three 15-hp mechanical aerators provide aeration in the first aeration lagoon with two 15-hp aerators providing aeration in the second lagoon. Effluent from the second aeration lagoon flows onward into the first of several evaporation ponds of various sizes.

At the evaporation ponds, wastewater is converted into vapor via solar and mechanical wind-effect evaporation. No wastewater is discharged from the refinery to surface waters of the state because all of the waste water evaporates. Therefore, the refinery is not required to have a NPDES discharge permit for discharge of treated process water. However, the Gallup refinery does have a NPDES permit for storm water discharge.

The storm water system is a network of valves, gates, berms, embankments, culverts, trenches, ditches, natural arroyos, and retention ponds that collect, convey, control, treat, and release storm water that falls within or passes through refinery property. Storm water that falls within the processing areas is considered equivalent to process wastewater and is sent through the NAPIS, benzene strippers and wastewater treatment system for retention in evaporation ponds. Strom water that falls on undeveloped land is allowed to leave the property. Storm water discharge from the refinery is very infrequent due to the arid desert-like nature of the surrounding geographical area. The Gallup Refinery maintains a storm water pollution prevention plan (SWPPP) that includes Best Management Practices (BMPs) for effective storm water pollution prevention. The refinery has constructed several new berms in various areas and improved outfalls to minimize the possibility of contaminated runoff leaving the refinery property.

1.3 Current site topography and location of natural and manmade structures

Local topography consists of a gradually inclined down-slope from high ground in the southeast to a lowland fluvial plain in the northwest. The highest point on refinery property is located at the southeast corner boundary (elevation approximately 7,040 feet) and the lowest point is located at the northwest corner boundary (elevation approximately 6,860 feet). The refinery processing facility is located on a flat man-made terrace at an elevation of approximately 6,950 feet.

Surface water in this region consists of the man-made evaporation ponds and aeration basins located within the refinery, a livestock watering pond (Jon Myer's Pond) located east of the refinery, two small unnamed spring fed ponds located south of the refinery, and the South Fork of the Puerco River and its tributary arroyos. The various ponds and basins typically contain water consistently throughout the year.

The South Fork of the Puerco River and its tributaries are intermittent and generally contain water only during, and immediately after, the occurrence of precipitation. It is likely that shallow groundwater in the vicinity of the refinery follows to some extent the flow direction of the South Fork of the Puerco River and its tributaries in the area.

The 810 acre refinery property site is located on a layered geologic formation. Surface soils generally consist of fluvial and alluvial deposits; primarily clay and silt with minor inter-bedded sand layers. Below this surface layer is the Chinle Formation, which consists of low permeability claystones and siltstones that comprise the shales of this formation. As such, the Chinle Formation effectively serves as an aquiclude. Inter-bedded within the Chinle Formation is the Sonsela Sandstone bed, which represents the uppermost potential aquifer in the region.

The Sonsela Sandstone bed lies within and parallels the dip of the Chinle Formation. As such, its high point is located southeast of the refinery and it slopes downward to the northwest as it passes under the refinery. Due to the confinement of the Chinle Formation aquiclude, the Sonsela Sandstone bed acts as a water-bearing reservoir and is artesian at its lower extremis. Artesian conditions exist through much of the central and western portions of the refinery property.

Groundwater flow within the Chinle Formation is extremely slow and typically averages less than 10^{-10} centimeters per second (less than 0.01 feet per year). Groundwater flow within the surface soil layer above the Chinle Formation is highly variable due to the presence of complex and irregular stratigraphy; including sand stringers, cobble beds, and dense clay layers. As such, hydraulic conductivity may range from 10^{-8} centimeters per second in the clay soil layers located near the surface up to 0^{-2} centimeters per second in the gravelly sands immediately overlying the Chinle Formation.

Figure 4 depicts the regional surface water flows in the area, and Figure 5 shows a more localized scale. As can be seen from the surface water channels in Figure 5, shallow groundwater flows (~ at 40 feet) are likely to be to the north-west direction in the north-east sections of the refinery; presumably much more directly north in the central and northern portions of the refinery, and west and north-west in the western and southern portions. The zones of shallow groundwater are somewhat perched as there are many adjacent shallow wells at similar depths that are often dry with their neighbors containing groundwater

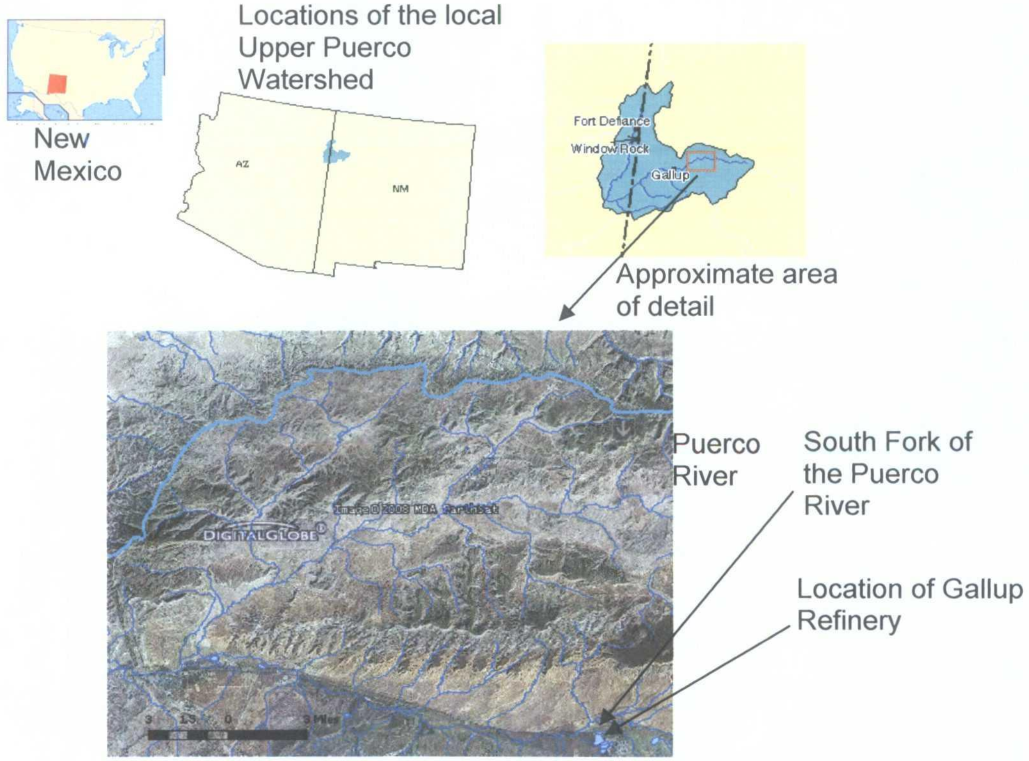

Figure 4: Regional scale: Flow lines and major surface water bodies (from: EPA Enviromapper - http://map24.epa.gov/EMR/?ZoomToWatershed=15020006) North is towards the top of the page.

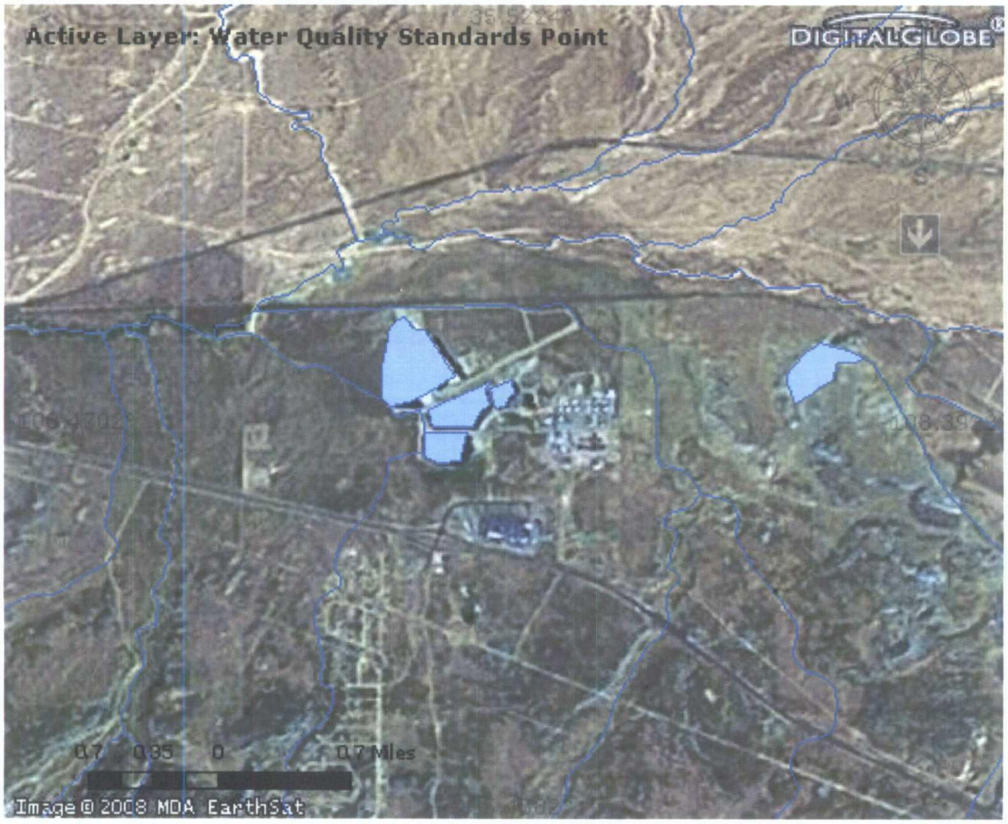

Figure 5: Localized scale: Flow lines and major surface water bodies (from: EPA Enviromapper - http://map24.epa.gov/EMR/?ZoomToWatershed=15020006) North is towards the top of the page. The pond to the east is Jon Myers' Livestock Pond.

Shallow groundwater located under refinery property generally flows along the upper contact of the Chinle Formation. Although the prevailing flow direction is from the southeast and toward the northwest; a subsurface ridge has been identified and is thought to deflect some flow in a northeasterly direction in the vicinity of the refinery tank farm.

2.0 Monitoring and Remediation Activities in 2008

2.1 Groundwater elevation surveys

Ground water elevation data were collected from the wells listed in Table 1. Figure 6 shows the locations of these wells. The data gathered are presented in section 4.0. As directed by NMED HWB, ground water elevation data are collected on a quarterly or an annual basis. Groundwater levels and SPH thickness measurements (from the RW series of wells) are collected quarterly to monitor groundwater elevation and product thickness fluctuations over time.

Measurement data and the date and time of each measurement are recorded on a site monitoring data sheet. The depth to groundwater and SPH thickness levels are measured to the nearest 0.01 ft. The depth to groundwater and SPH thickness are recorded relative to the surveyed well casing rim or other surveyed datum. A corrected water table elevation is provided in wells containing SPH by adding 0.8 times the measured SPH thickness to the calculated water table elevation.

Water level and SPH thickness measurements are collected using an oil/water interface probe: Solinst Model 122.[3] Solinst Oil/Water Interface Meters give clear and accurate measurements of product level and thickness in wells. The factory-sealed probes are pressure proof and the model used at the Gallup Refinery has a tape length of 100 feet. The 5/8" (16 mm) diameter P1 Probe allows easy access through tight spaces and into narrow wells. The Probe is designed for use in various monitoring applications. The technician records separate phase hydrocarbon (SPH), depth to water (DTW), and total well depth using the tape. The probe and tape is first washed with non-phosphate soap water then with de-ionized or distilled water before lowering into the well casing. Recovery wells with free product are checked using a reel gauge with water and hydrocarbon finding paste.

Groundwater and SPH levels are measured in all wells within 48 hours of the start of groundwater sampling activities. All manual extraction of SPH and water from recovery wells, observation wells, and collection wells is discontinued for 48 hours prior to the measurement of water and SPH levels.

2.2 Monitoring and Sampling Program

The primary objective of groundwater monitoring is to provide data which will be used to assess groundwater quality at and near the Facility. Groundwater elevation data are collected to evaluate groundwater flow conditions. The groundwater monitoring program for the Facility consists of sample collection and analysis from a series of monitoring wells, recovery wells, outfalls, and pond locations.[4]

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[3] More information is available at - http://www.solinst.com/Prod/122/122d1.html

[4] Sampling procedures, data quality objectives, and quality assurance and quality control methods have been described in a Facility-wide Groundwater Monitoring Plan currently under review by the NMED/HWB.

The monitoring network is divided into two investigation areas (East Side and West Side). The sampling frequency, analyses and target analytes varies for each investigation area and well/outfall/pond location. The combined data from these investigation areas are used to establish background groundwater quality, assess groundwater quality beneath and immediately down-gradient of the Facility, and evaluate local groundwater flow conditions.

Samples are not collected from monitoring wells that have measurable SPH. For wells that are purged dry, samples are collected if recharge volume is sufficient for sample collection within 24 hours. Wells not sampled due to insufficient recharge are documented in the field log. Wells that are usually dry and not sampled regularly are also checked for presence of water. If water is found, then (after consultation with NMED and OCD) a sample may be collected without purging, as purging could result in lack of a sufficient sample quantity.

A summary of the Facility-Wide Monitoring Plan is provided in Table 2.

Table 1: Wells that will have groundwater elevation monitored and frequency of such monitoring

Well ID	Frequency of monitoring groundwater elevation
BW-1A	Annual
BW-1B	Annual
BW-1C	Annual
BW-2A	Annual
BW-2B	Annual
BW-2C	Annual
BW-3A	Annual
BW-3B	Annual
BW-3C	Annual
OW-1	Quarterly
OW-10	Quarterly
OW-11	Annual
OW-12	Annual
OW-13	Annual
OW-14	Annual
OW-29	Annual
OW-30	Annual
MW-1	Annual
MW-4	Annual
MW-5	Annual
RW-1	Quarterly (including SPH)
RW-2	Quarterly (including SPH)
RW-5	Quarterly (including SPH)

RW-6	Quarterly (including SPH)
SMW-2	Annual
SMW-4	Annual
SMW-6	Annual
GWM-1	Quarterly
GWM-2	Quarterly
GWM-3	Quarterly
NAPIS-1	Quarterly
NAPIS-2	Quarterly
NAPIS-3	Quarterly
KA-3	Quarterly

The following sections outline the monitoring program for each investigation area.

Figure 6: Locations of wells

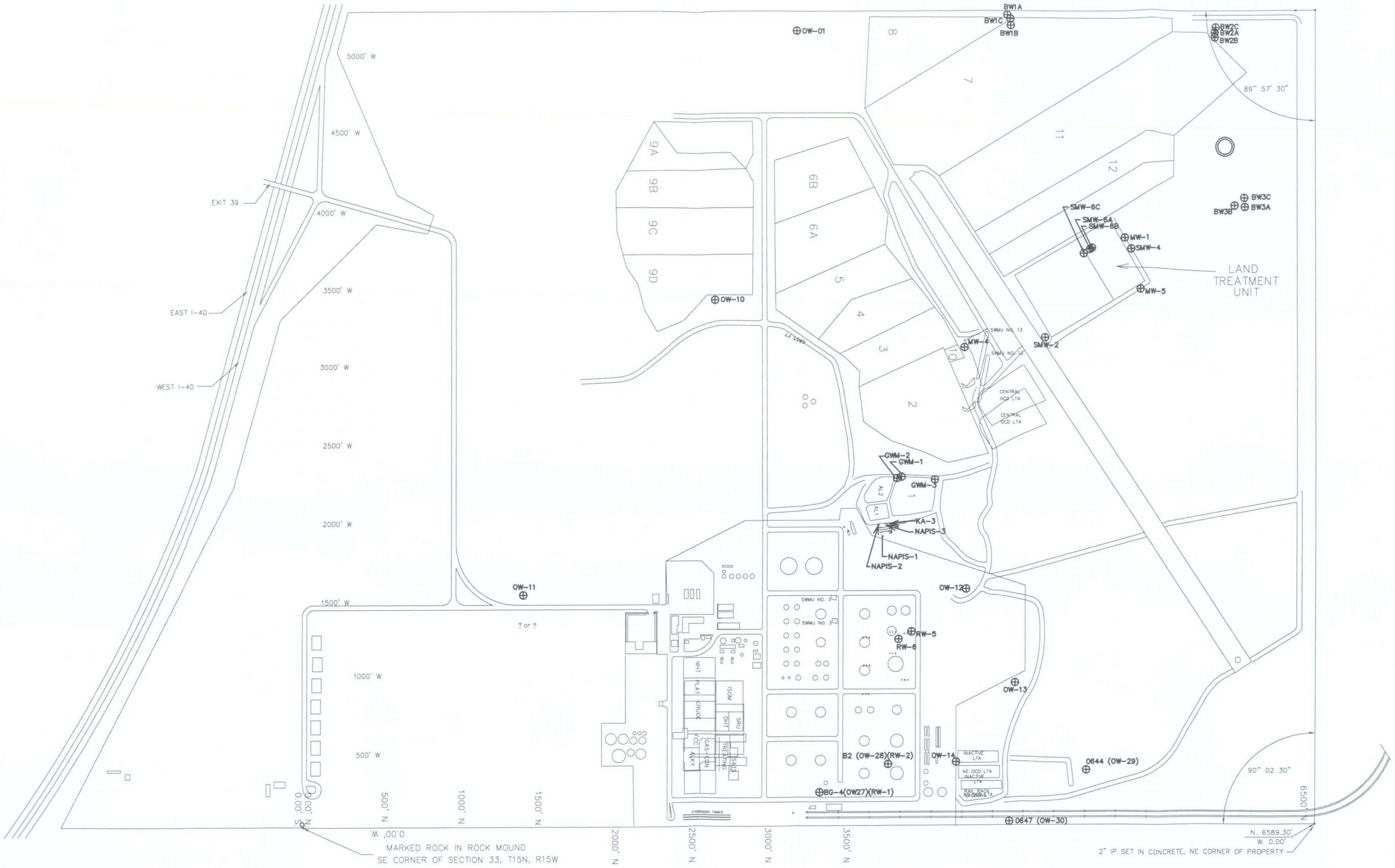


Figure 6
Well Locations

Western Refinery, - Gallup Refinery
Interstate 40, Exit 39
Jamestown, New Mexico 87347
Date: August 22, 2007

DWG NO.

REV

File 06-054

2.3 East Side
2.3.1 Sampling Locations

The location of the East Side monitoring and recovery wells are shown in Figure 6.

These wells are –
Recovery wells

- RW-1
- RW-2
- RW-5
- RW-6

Monitoring wells

- OW-29
- OW-30
- OW-13
- OW-14

2.3.2 Sampling Frequency and Analyses

On a quarterly basis, groundwater samples are collected from each of the OW wells in the East Side and analyzed for the following chemical constituents:

- VOCs (EPA method 8260B)
- BTEX plus MTBE (EPA method 8021B)

Table 2: Summary of sampling locations, frequencies, and tests required

SAMPLING REQUIREMENTS PER NMED/HWB REQUESTS		
LOCATION	**FREQUENCY**	**TEST METHOD**
	Quarterly	
Pond 1		General Chemistry., VOC, WQCC Metals, BOD, COD, E-coli Bacteria)
Pond 2		Same as above
Pond 3		Same as above
Pond 4		Same as above
Pond 5		Same as above
Pond 6		Same as above
Pond 7		Same as above
Pond 8		Same as above
Al-2 to EP-1		8260, 8015B include C6-C10, C10-C36, RCRA 8 Metals total
Pilot Effluent		VOC/DRO Extended, GRO, BOD, COD, WQCC METALS
NAPIS Effluent		GENERAL CHEMISTRY, VOC, SVOC (PHENOL), DRO Extended GRO, WQCC METALS
AL-1 Inlet	Monthly until 4/08 start quarterly (or more frequently)	BOD, COD, PHENOL
AL-2 Inlet		Same as above
EP-1 Inlet		Same as above
Evap. Pond 1	monthly until 12/08 then change to quarterly	VOC, BOD, COD, CI, DRO/GRO, MTBE, Ph, PHENOL
NAPIS 1		8021B (BTEX/MTBE), 8310 (Semi-VOCs), 8015B (DRO extended, GRO), RCRA metals, and GENERAL CHEMISTRY
NAPIS 2		8021B (BTEX/MTBE), 8310 (Semi-VOCs), 8015B (DRO extended, GRO), RCRA metals, and GENERAL CHEMISTRY
NAPIS-3		8021B (BTEX/MTBE), 8310 (Semi-VOCs), 8015B (DRO extended, GRO), RCRA metals, and GENERAL CHEMISTRY
KA-3		8021B (BTEX/MTBE), 8310 (Semi-VOCs), 8015B (DRO extended, GRO), RCRA metals, and GENERAL CHEMISTRY
OW-13		VOAs (8260B), BTEX + MTBE (8021B)
OW-14 (HIGH-BENZENE)		VOAs (8260B), BTEX + MTBE (8021B)
OW-29		VOAs (8260B), BTEX + MTBE (8021B)
OW-30		VOAs (8260B), BTEX + MTBE (8021B)

Pond 1 Inlet (EPI-IN)	**Semi-Annual**	General Chemistry, VOC, SVOC Including Phenol, DRO extended/GRO, WQCC Metals
Boiler Water inlet to EP-2		General Chemistry
	ANNUAL	
BW-1A		General Chemistry, VOC, SVOC, MTBE, WQCC Metals
BW-1B		Same as above
BW-1C		Same as above
BW-2A		Same as above
BW-2B		Same as above
BW-2C		Same as above
BW-3A		Same as above
BW-3B		Same as above
BW-3C		Same as above
MW-1		General Chemistry / RCRA List Constituents
MW-4		General Chemistry / RCRA List Constituents. Modified skinner list metals & organics.
MW-5		General Chemistry / RCRA List Constituents. Modified skinner list metals & organics.
OW-11		General Chemistry, VOC, SVOC, MTBE, WQCC Metals
OW-12		VOC/MTBE
	ANNUAL	
SMW-2		General Chemistry / RCRA List Constituents. Modified skinner list metals & organics.
SMW-4		General Chemistry / RCRA List Constituents. Modified skinner list metals & organics.
EP2-INLET		VOC/MTBE, DRO extended/GRO, BOD, COD, TDS
GWM-1 HIGH-BENZENE		General Chemistry, VOC, SVOC, MTBE, WQCC Metals
PW-2	Every 3 yrs starting with 2008	VOC, SVOC, WQCC METALS, CYANIDE, NITRATES
PW-3	Every 3 yrs starting with 2008	Same as above
PW-4	Every 3 yrs starting with 2008	Same as above

2.4 West Side
2.4.1 Sampling Locations

The locations of wells on the West Side are shown in Figure 6.

The following wells, outfalls, and ponds will be sampled within the West Side area: (Note: these outfalls are from one section of the wastewater treatment system to another – they do not discharge to any location outside the facility.)

Monitoring wells

- NAPIS 1
- NAPIS 2
- NAPIS 3
- KA-3
- GWM-1
- GWM-2 (Well GWM-2 is checked for water; and, if available, a sample is collected as occurred on 2/28/2008.)
- SMW-2
- SMW-4
- MW-1
- MW-4
- MW-5
- OW-11
- OW-12
- BW-1A
- BW-1B
- BW-1C
- BW-2A
- BW-2B
- BW-2C
- BW-3A
- BW-3B
- BW-3C
- PW-2
- PW-3
- PW-4

Outfalls

- AL1 Inlet
- AL2 Inlet
- EP1 Inlet
- AL2 to EP-1
- Pilot Travel Center effluent
- NAPIS effluent

- Boiler water Inlet to EP-2

Ponds

- EP1 Inlet
- EP2 Inlet
- Pond 1
- Pond 2
- Pond 3
- Pond 4
- Pond 5
- Pond 6
- Pond 7
- Pond 8

2.5 Remediation Activities

Separated Phase Hydrocarbons (SPHs) have been found in wells RW-1, RW-5 and RW-6. In the past these were recovered either through the use of pumps, or via hand-bailing. Sections 4.3 and 4.4 and Appendix A provide details of the volumes of product recovered and the dates and the depths to water and SPH that we have measured in these wells. In 2008, this volume was approximately 4 gallons from RW-1. In the past, product was also recovered from RW-5 and RW-6.

3.0 Data Summary

3.1 Applicable Standards

The main set of standards that we check our data against are those of the State of New Mexico – the NMWQS of the WQCC. We also check against the EPA's Maximum Contaminant Levels (MCLs) for drinking water, taking the lower of these two sets of limits. If NMWQS standards or MCLs do not exist for a contaminant, we compare levels against the EPA Regional Screening Levels set for Residential Risk-Based Screening Levels for Tap Water (RRSLs). We also use the NMED's TPH Screening Guidelines for Gasoline Range Organics and Diesel Range Organics. All of these standards, limits and screening levels are provided in Appendix B.

3.2 Summary data Tables and constituents exceeding standards

In the following Tables we have summarized our analytical data. Only constituents above levels of detection are generally described. If a constituent exceeds any standard, we have marked it in bold and underlined its value. Appendix I (the last Appendix in its own binder, Binder 3) contains the laboratory reports.

In 2007, we found that in PW-3, the contaminant 2-Methylnapthalene was at a level of 0.032 mg/l. This level exceeded the current NMWQS of 0.03 mg/l for 2-Methylnapthalene.

We sampled PW-3 again in 2008, along with a blind duplicate, and found that the levels were non-detectable. We believe the level found in 2007 was a laboratory artifact, as no such contaminant had ever been found before – and it did not show up again in 2008. Generally, we only present results for contaminants that have been found at levels above the level of detection either in 2008 or in previous years. In this case, as there was some concern in 2007, we present the result for 2008 and for the blind duplicate sample.

Table 3: EPA METHOD 8260B VOLATILES. Levels of detected compounds (or hydrocarbons of concern) in Potable Water Wells – all units of concentrations are in mg/l. Contaminants not detected are not presented.

	Year[5]	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylene	MTBE	2-Methyl-napthalene
PW-2	2004	12-9-2004	<0.001	<0.001	<0.001	<0.0015	-	
PW-4	2004	8-4-2004	<0.001	<0.001	<0.001	<0.0015	-	
PW-3	2006	10-27-2006	<0.001	<0.001	<0.001	<0.0015	<0.001	
	2007	Sampling activities were primarily conducted from December 27-31, 2007 (Sampling of this well was completed on 1-1-2008 because of inclement weather.)	<0.001	<0.001	<0.001	<0.0015	<0.001	0.032
PW-2	2008	9/12/2008	<0.001	<0.001	<0.001	<0.0015	<0.001	
PW-3	2008	8/21/08	<0.001	<0.001	<0.001	<0.0015	<0.001	<0.01 Duplicate = <0.01
PW-4	2008	9/12/2008	<0.001	<0.001	<0.001	<0.0015	<0.001	
NMWQS			**0.01**	**0.75**	**0.75**	**0.62**		
EPA MCLS			**0.005**	**1**	**0.7**	**10.0**		
RRSL			**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**	

[5] No potable wells were sampled in 2005.

Table 4: EPA METHOD 300.0 ANIONS, 6010B RECOVERABLE METALS, 8260B VOLATILES, 8270C SEMI VOLATILES. Levels of all detected compounds in Potable Well # 2, 3 - all units of concentrations are in mg/l. Compounds not detected are not presented.

	Ba	**Fe**	**Pb**	**Mn**	**U**	**Zn**	**Cyanide**	**Nitrate as N**	**Phenols**
PW-2	0.013	0.07	<0.005	<0.002	.00161	<0.02	<0.01	<1.0	<0.001
PW-3	<0.02	<.05	<0.005	<0.002	.00063	<0.05	<0.004	.13	<0.001
PW-4	0.013	0.11	<0.005	<0.005	.0014	<0.02	<0.01	<1.0	<0.001
NMWQS	**1.0**			**0.2**	**5.0**	**10**	**0.2**		**.005**
EPA MCLS	**2.0**	**0.3**	**0.015**[6]	**0.3**	**0.03**		**0.2**	**10**	
RRSL	**7.3**	**26.0**		**0.88**	**0.11 (soluble salts)**	**11.0**	**0.73**	**58.0**	**11.0**

[6] Action Level

Table 5: EPA METHOD 300.0 ANIONS, EPA 120.1 SPECIFIC CONDUCTANCE, SM4500-H+B: pH. Levels of detected compounds and other parameters in Boundary and Observation wells. All units are in mg/l, except for pH and Specific Conductivity. Compounds not detected are not presented.

	Date Sampled	Fluoride	Chloride	Nitrate + Nitrite as N	Bromide	Phosphorous Orthophosphate (as P)	Sulfate	pH	Specific Conductance (umhos/cm)
OW-11	8/14/08	2.2	90	.75	.29	<.0.5	940	8.39	2600
	12/27/07								
	10/24/06	2.5	86			<.0.5	1100	8.4	3100
BW-1C	7/31/08	2.4	35	<1.0	<0.10	<0.5	260	8.68	1400
	12/31/07	2.6	35	<1.0		<0.5	270	8.5	1400
	10/27/06	2.7	36	<0.5		<0.5		8.39	1400
BW-2A	7/30/08	1.1	40	<1.0	.43	0.75	7.3	7.87	1400
	12/31/07	1.3	42	<1.0		0.70	7.7	7.76	1400
	10/27/06	1.3	39	<0.5		0.64	7.5	8.27	1400
BW-2B	7/30/08	1.6	30	<1.0	1.1	<.0.5	150	7.76	2200
	12/31/07	1.8	30	<1.0		<0.5	150	7.77	2400
	10/27/06	1.9	31	<0.5		<0.5	140	8.1	1400
BW-2C	7/30/08	1.9	44	<1.0	.14	<0.5	270	8.83	1400
	12/31/07	2.3	45	<1.0		<0.5	290	8.73	1400
	10/27/06	2.4	42	<0.5		<0.5	270	8.52	1300
BW-3B	7/31/08	1.4	34	<1.0	.42	1.1	55	7.95	1500
	12/31/07	1.6	35	<1.0		1.1	51	7.93	1600
	10/27/06	1.7	33	<0.5		1.1	250	8.5	1600
BW-3C	8/1/08	1.5	34	<2.0	<1.0	<5.0	240	8.63	1500
	12/31/07	1.8	38	<1.0		<0.5	300	8.59	1500
	10/27/06	1.9	37	<0.5		<0.5	280	8.39	1400
NMWQS		1.6	**250** (domestic water)	**10**			**600**	**6 - 9**	
EPA MCLS		4.0	**250**	**10 Nitrate 1 Nitrite**			**250**	**6 - 9**	
RRSL				**58.0**					

Table 6: EPA METHOD 6010B TOTAL RECOVERABLE METALS.
Levels detected in Boundary Wells. Only data for detected metals are presented. All units are in mg/l. Metals not detected are not presented.

	Date Sampled	Ba	Ca	Cr	Fe	Mg	Mn	K	Na	Zn	U
OW-11	8/14/08	<0.01	11		<.0.05	1.3	.015	1.8	640		.249
	12/27/07	<0.01	11		<.0.05	1.3	.016	1.6	690		.22
	10/28/06	<0.02	12		<.0.05	1.4					
BW-1C	7/31/08	.016	3.0		<.0.05	.62	.013	<1.0	310		.00115
	12/31/07	0.023	3.6		<0.05	0.74	0.01	<1.0	360		<0.1
	10/28/06	<0.02	3.4		<0.05	<1.0					
BW-2A	7/30/08	0.14	8.6		0.37	3.2	0.14	<1.0	320		<.001
	12/31/07	0.18	11		0.7	3.9	0.22	<1/0	380		<0.1
	10/28/06	0.15	10		<0.05						
BW-2B	7/30/08	0.041	13		.064	3.0	0.16	<1.0	570		.0115
	12/31/07	0.07	16		0.62	3.6	0.29	1.6	640		<0.1
	10/28/06	0.071	23		<0.05						
BW-2C	7/30/08	0.13	24		1.3	2.0	.43	1.1	300		.00728
	12/31/07	0.026	2.9		0.16	0.68	0.024	<1.0	340		<0.1
	10/28/06	0.031	5.6		<0.05	<1.0					
BW-3B	7/31/08	0.11	8.3		0.43	2.6	0.12	<1.0	370		<.001
	12/31/07	0.099	9.0		0.64	2.9	0.13	<1.0	430		<0.1
	10/28/06	0.11	9.0		<0.05						
BW-3C	8/1/08	.27	28	.0078	3.0	2.2	0.41	1.6	350	.032	.00251
	12/31/07	0.068	4.2		0.14	0.81	0.015	1.1	360		<0.1
	10/28/06	0.029	6.0		<0.05						
NMWQS		**1.0**		**.05**	**1.0**		**0.2**			**10.0**	**5.0**
EPA MCLS		**2.0**		**0.1**	**0.3**		**0.3**				**0.03**
RRSL		**7.3**			**26.0**		**0.88**			**11.0**	**0.11***

* Soluble salts

Table 7: EPA METHOD 8260B VOLATILES: Levels of hydrocarbons of concern found in the Boundary and Observation Wells – all units of concentrations are in mg/l

	Year	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
OW-11	2008	8/14/08	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/27/07	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/24/06	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-1C	2008	7/31/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-2A	2008	7/30/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-2B	2008	7/30/08	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-2C	2008	7/30/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-3B	2008	7/31/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
BW-3C	2008	8/1/2008	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12/31/2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10/27/2006	<0.001	<0.001	<0.001	<0.0015	<0.001
NMWQS			**0.01**	**0.75**	**0.75**	**0.62**	
EPA MCLS			**0.005**	**1.0**	**0.7**	**10.0**	
RRSL			**0.00041**	2.3	**0.0015**	**0.2**	**0.012**

Table 8: EPA METHOD 8260B VOLATILES, EPA METHOD 8021B SEMI VOLATILES: Levels in Observation Wells and Monitoring Well (GWM-1 and GWM-2) – all units of concentrations are in mg/l. Quarterly Sampling of OW-13, 14, 29 & 30 began Fourth Quarter 2008.

	Year	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
OW#12	2008	8/19/08	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12-27-2007	<0.001	<0.001	<0.001	<0.0015	<0.001
	2006	10-27-2006	<0.001	<0.001	<0.001	<0.001	<0.0025
OW#13 **	2008	11/13/08	<0.001	<0.001	<0.001	<0.0015	0.0016
	2008	8/19/08	<0.001	<0.001	<0.001	<0.0015	<0.001
	2007	12-27-2007	<0.001	<0.001	<0.001	<0.0015	0.0013
	2006	10-27-2006	<0.001	<0.001	<0.001	<0.001	<0.0025
OW#14 *	2008	11/12/08	**0.0082**	<0.001	<0.001	<0.002	**0.91**
	2008	8/21/08	.0035	<0.001	<0.001	<0.0015	**1.3**
	2007	1-1-2008	**0.014**	<0.001	<0.001	<0.0015	**0.92**
	2006	12-28-2006	0.0042	<0.001	0.0025	<0.003	**0.18**
	2006	10-27-2006	0.0034	<0.001	<0.001	<0.003	**0.016**
	2005	9-27-2005	0.017	0.0022	0.0023	0.0014	**0.077**
OW#29 **	2008	11/14/08	<0.001	<0.001	<0.001	<0.0015	**0.015**
	2008	8/19/08	<0.001	<0.001	<0.001	<0.0015	.0092
	2007	12-28-2007	<0.001	<0.001	<0.001	<0.0015	0.0043
	2006	10-27-2006	<0.001	<0.001	<0.001	<0.003	<0.0025
	2005	9-27-2005	<0.001	<0.001	<0.001	<0.0005	<0.0025
OW#30 *	2008	11/12/08	<0.001	<0.001	<0.001	<0.002	**0.88**
	2008	8/20/08	<0.001	<0.001	<0.001	<0.0015	**1.1**
	2007	12-28-2007	<0.001	<0.001	<0.001	<0.0015	**0.29**
	2006	10-27-2006	<0.001	<0.001	<0.001	<0.003	<0.0025
	2005	9-27-2005	<0.001	<0.001	<0.001	<0.0005	**0.018**
GWM-1	2008	7/10/08	**.011**	.0021	.0039	.019	**0.12**
	2007	5-24-2007	**0.016**	<0.001	<0.001	<0.0015	**0.23**
	2006	10-27-2006	**0.012**	<0.001	<0.001	<0.0015	**0.16**
GWM-2[7]	2008	2/28/08	<0.001	<0.001	<0.001	<0.0015	**0.028**
NMWQS			**0.01**	**0.75**	**0.75**	**0.62**	
EPA MCLS			**0.005**	**1.0**	**0.7**	**10.0**	
RRSL			**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**

* Method EPA 8021B Semi-Volatiles used for Fourth Quarter Analysis.
** Method EPA 8260B Volatiles used for Fourth Quarter Analysis.

[7] Well GWM-2 is checked for water; and, if available, a sample is collected as occurred on 2/28/2008

Table 9: EPA METHOD 8260B VOLATILES: Levels of detected VOCs in Groundwater Monitoring and Boundary Wells in 2008- all units of concentrations are in mg/l. Compounds not detected are not presented. Quarterly sampling began Fourth Quarter 2008 for OW-14, 29, 30

	DATE SAMPLED	GWM-1	OW-13	OW-14	OW-29	OW-30	SMW-2	NMWQS	MCL	RRSL
ACETONE	8/14/08						.00753			**22**
	11/13/08		<0.01	<0.01	<0.01	<0.01				
1,2,4 TRIMETHYLBENZENE	7/10/08	0.0046							**0.005**	
	11/14/08		<0.001	<0.001	<0.001	<0.001				
1-METHYLNAPHTHALENE	8/21/08			**0.012**				**0.03**		**0.0023**
	11/13/08		<0.004	**0.016**	<0.004	<0.04				
ISOPROPYLBENZENE	8/21/08			0.0016					**0.005**	
	11/13/08		<0.001	0.0015	<0.001	<0.001				
Sec-BUTYLBENZENE	8/21/08			0.002					**0.005**	
	11/13/08		<0.001	0.0025	<0.001	<0.001				
1,2-DICHLOROETHANE (EDC)	8/21/08							**0.01**	**0.005**	**0.00015**
	11/13/08		<0.001	**0.0018**	**0.001**	**.0013**				

Table 10: EPA METHOD 8270C SEMI VOLATILES: Levels of detected SVOCs in Groundwater Monitoring and Boundary Wells in 2008- all units of concentrations are in mg/l. Compounds not detected are not presented. Quarterly sampling began Fourth Quarter 2008 for OW-14, 29, 30

	GWM-1	OW-14	MW-4	SMW-2	SMW-4	NMWQS	MCL	RRSL
BIS(2-ETHYLHEXL) PHTHALATE			.000679					**0.0048**
DIETHYL PHTHALATE				.000057	.0005			**29**
2,4-DIMETHYLPHENOL	0.028						**0.71**	**0.73**
1,4-DIOXANE				**.0136**				**0.0061**
PHENOL	0.0046				.00113	**.005**		**11.0**

Table 11: EPA METHOD 300.0 ANIONS and 120.1 SPECIFIC CONDUCTANCE, pH: Levels in Monitoring Wells (All units are in mg/l, except for pH and Specific **Conductivity)**

	Date Sampled	Fluoride	Chloride	Nitrate + Nitrite as N	Bromide	Phosphorous Orthophospha te (as P)	Sulfate	pH	Specific Conductance (umhos/cm)
GWM-1	7/10/08	1.7	1800	<2.0		<0.5	110	6.92	7400
	5/24/07	1.9	1800	<2.0		<0.5	120	6.8	8100
	10/26/06	2.0	3700	<2.0		<2.5	120	6.87	
MW-1	8/4/08	.81	51	<1.0		<0.5	160	8.95	1100
	12/29/07	0.69	53	<1.0		<0.5	170	8.89	1100
	10/26/06	0.84	46	<0.5		<0.5	150	8.98	
MW-4	8/5/08	.37	17	<1.0		<0.5	160	8.63	1200
	12/29/07	0.42	17	<1.0		<0.5	160	8.63	1200
MW-5	8/13/08	0.85	63	<1.0	.15	<0.5	180	9.02	1200
	12/29/07								
SMW-2	8/14/08	.36	2000	<1.0	3.1	<0.5	1600	7.25	8700
	1/1/08								
SMW-4	8/14/08	1.1	52	.11	.15	<0.5	150	8.63	1200
	12/29/07	1.4	60	<1.0		<0.5	160	8.34	1300
NMW QS		**1.6**	**250 (drinking water)**	**10**			**600**	**6 - 9**	
EPA MCLS		**4.0**		**10 Nitrate 1 Nitrite**			**250**	**6 - 9**	
RRSL				**58**					

Note: Wells MW-4, MW-5, SMW-2 and SMW-4 were not sampled in 2006.

Table 12: EPA 6010B TOTAL RECOVERABLE METALS. Levels detected in Monitoring Wells (Note: Only data for detected metals are presented. All units are in mg/l.)

Well No.	Date Sampled	As	Ba	Ca	Cr	Mg	Mn	Ni	K	Na
GWM-1	7/10/08	**0.070**	0.45	350	<.0060	81	**3.6**	-	3.3	1400
	5/24/07	**0.081**	0.44	360	<0.006	87	-	<0.01	3.7	1300
	10/26/06	**0.077**	0.53	380	<0.006	93	-	<0.01	4.2	1400
MW-1	8/4/08	<0.02	<.0.02	1.7	<0.006	<1.0	-	<0.01	<1.0	260
	12/29/07	**0.020**	<0.02	3.2	<0.006	<1.0	0.018	-	<1.0	230
	10/26/06	<0.02			<0.006		-	<0.01		
MW-4	8/5/08	<0.02	<0.02	1.8	<0.0060	<1.0	-	<0.01	<1.0	280
	12/29/07	<0.02	0.021	1.9	<0.006	<1.0	0.0052	<0.01	<1.0	320
MW-5	8/13/08	<0.02	<0.02	1.4	<0.006	<1.0	-	<0.01	<1.0	260
	12/29/07	<0.02	<0.02	1.4	<0.006	<1.0	0.0045	-	<1.0	290
SMW-2	8/14/08	<0.02	<0.02	200	.0092	64	-	.017	<1.0	1900
	1/1/08	<0.02	<0.02	200	**0.055**	69	-	0.026	1.1	2200
SMW-4	8/14/08	<0.02	<0.02	3.0	<0.006	61.0	-	-	<1.0	280
	12/29/07	<0.02	0.024	4.6	<0.006	1.2	-	<0.01	<1.0	340
NMWQS		**0.1**	**1.0**		**.05**		**0.2**			
EPA MCLS		**0.01**	**2.0**				**0.3**			
RRSL			**7.3**				**0.88**	**0.73**[8]		

[8] Soluble salts

Well No.	Date Sampled	Cu	Fe	Pb	Co	V	Zn
GWM-1	7/10/08	.014	14	.010	-	-	-
MW-1	8/4/08	-	-	<0.005	-	-	-
MW-4	8/5/08	-	-	<0.005	-	-	-
MW-5	8/13/08	-	-	<0.005	-	-	-
SMW-2	8/14/08	-	-	<0.005	-	-	.11
SMW-4	8/14/08	-	-	<0.005	.017	0.053	-
NMWQS		**1.0**	**1.0**	**.05**			**10.0**
EPA MCLS		**1.3**		**0**			
RRSL		**1.5**	**26**		**0.011**	**0.26**	**11.0**

Note: Wells MW-4, MW-5, SMW-2 and SMW-4 were not sampled in 2006. Analyses for dissolved metals were not conducted in 2006.

Table 13: EPA METHOD 8260B VOLATILES, EPA METHOD 8015B DRO/GRO. Levels in Monitoring Wells – all units of concentrations are in mg/l. (Only Well SMW-2 has VOCs above the level of non-detection: MTBE at 0.0099 below regulatory standards, and Gasoline Range Organics at 0.69 mg/l. All other wells have non-detectable levels of VOCs.)

	Year	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE	DRO	GRO
MW-1	2008	8/4/08	<0.005	<0.005	<0.005	<0.005	-	<1.0	<0.05
	2007	12/29/07	<0.001	<0.001	<0.001	<0.0015	<0.001	<1.0	<0.05
	2006	10/26/06	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
MW-4	2008	8/5/08	<0.005	<0.005	<0.005	<0.005	-	<1.0	<0.05
	2007	12/29/07	<0.001	<0.001	<0.001	<0.0015	<0.001	<1.0	<0.05
	2005	10/12/05	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
MW-5	2008	8/13/08	<0.005	<0.005	<0.005	-	-	<1.0	<0.05
	2007	12/29/07	<0.001	<0.001	<0.001	<0.0015	<0.001	<1.0	<0.05
	2005	10/12/05	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
SMW-2	2008	8/14/08	<0.005	<0.005	<0.005	-	-	<1.0	.36
	2007	1/1/08	<0.001	<0.001	<0.001	<0.0015	0.0099	<1.0	0.69
	2005	10/12/05	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
SMW-4	2008	8/14/08	<0.005	<0.005	<0.005	-	-	<1.0	<0.05
	2007	12/29/07	<0.001	<0.001	<0.001	<0.0015	<0.001	<1.0	<0.05
	2005	10/12/05	<0.001	<0.001	<0.001	<0.0015	<0.0015	<1.0	<0.05
NMWQS			**0.01**	**0.75**	**0.75**	**0.62**			
NM TPH Screening Guidelines[9]								**0.2**	**0.2**
EPA MCLS			**0.005**	**1**	**0.7**	**10.0**			
RRSL			**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**		

[9] We have used the limit set by direct ingestion of groundwater contaminated with unknown oil. When the exposure from groundwater is via inhalation, and not direct ingestion, the TPH screening guideline for unknown oil is 50 ppm.

Table 14: EPA METHOD 8260B VOLATILES. Levels of VOCs of concern from within Ponds 1 through 8 – all units of concentrations are in mg/l.

	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
Pond 1	12/2/08	.0083	0.089	0.033	0.26	<0.005
	9/9/08	.0033	.0058	.0026	.02	<.001
	6/17/08	<.001	.0056	.0016	.012	<.001
	3/11/08	0.19	0.47	.0087	0.54	.0059
Pond 2	12/2/08	.0018	0.02	.0072	.057	<.001
	9/9/08	<.001	.0011	<.001	.0044	<.001
	6/17/08	<.005	<.005	<.005	<.0075	<.005
	3/11/08	.0038	.011	.0021	.014	<.001
Pond 3	12/2/08	.0011	.012	.0043	.034	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	.0019	<.001	.004	<.001
Pond 4	12/2/08	<.001	.008	.0029	.022	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	.002	<.001
Pond 5	12/2/08	<.001	.0026	.0010	.0072	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	<.0015	<.001
Pond 6	12/2/08	<.001	<.001	<.001	<.0015	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	<.0015	<.001
Pond 7	12/2/08	<.001	<.001	<.001	<.0015	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	<.0015	<.001
Pond 8	12/2/08	<.001	<.001	<.001	<.0015	<.001
	9/9/08	<.010	<.010	<.010	<.015	<.010
	6/17/08	<.001	<.001	<.001	<.0015	<.001
	3/11/08	<.001	<.001	<.001	<.0015	<.001

Table 15: EPA METHOD 300.0 ANIONS, EPA 120.1 SPECIFIC CONDUCTANCE, EPA 410.1 COD, EPA 405.1 BOD, SM4500-H+B: pH Levels of all detected compounds in Evaporation Ponds 1 through 8 in 2008- all units of concentrations are in mg/l.

	DATE	pH	Specific Conductance (umhos/cm)	COD	BOD	E-Coli (cfu/100ml)	Fluoride	Chloride	NITROGEN Nitrite (as N) Nitrate (as N)	Phosphorus Orthophosphate (asP)	Sulfate
POND 1	12/2/08	7.76	4400				110	360	<1.0	7.2	780
	9/9/08	7.82	4500	3000	299	58	99	150	<1.0	<5.0	7700
	6/17/08	7.57	4600	1230	327		120	120	<1.0	15	1100
	3/11/08	3.81	4900	965	556	Absent	560	540	<5.0	<25	980
POND 2	12/2/08	7.80	8500				37	1800	<2.0	<2.0	1000
	9/9/08	7.97	10000	2500	122	300	48	2800	<1.0	<1.0	960
	6/17/08	7.90	11000	790	110		63	2900	<4.0	<5.0	1300
	3/11/08	6.81	8400	871	.71	Absent	63	2200	<5.0	<25	970
POND 3	12/2/08	7.86	8500				26	1800	<2.0	<10	980
	9/9/08	7.94	10000	950	73.0	310	51	2800	<1.0	<1.0	1100
	6/17/08	7.91	13000	691	96.9		44	3700	<4.0	<5.0	1400
	3/11/08	7.86	9800	871	323	Present	41	2700	<5.0	<5.0	1000
POND 4	12/2/08	7.89	9100				27	2000	<2.0	<2.0	1000
	6/17/08	7.90	11000	850	68.0	54.5	49	2900	<1.0	<1.0	1100
	6/17/08	7.94	15000	110	103		34	4500	<4.0	<5.0	1500
	3/11/08	8.06	10000	663	275	Present	32	2800	<5.0	<5.0	1000
POND 5	12/2/08	7.82	14000				29	2900	<4.0	<10	1200
	9/9/08	7.93	10000	667	59.0	54.5	33	3000	<1.0	<1.0	890
	6/7/08	7.86	17000	578	<128		26	5400	<10	<5.0	1800
	3/11/08	7.82	10000	506	178	Present	41	2900	<5.0	<5.0	1100
POND 6	12/2/08	7.70	19000				28	5500	<4.0	<10	7600
	9/9/08	7.83	16000	949	47.0	90.9	26	4900	<4.0	<5.0	1900
	6/17/08	7.64	25000	723	<128		29	6600	<10	<5.0	2600
	3/11/08	7.7	13000	847	126	Present	35	4100	<5.0	<5.0	1600
POND 7	12/2/08	7.55	140000				35	42000	<40	<10	8300
	9/9/08	7.52	110000	3330	47.8	27.9	25	38000	<40	<5.0	8500
	6/17/08	7.34	180000	4340	17.7		29	64000	<100	<5.0	15000
	3/11/08	7.61	68000	2118	15.7	Absent	22	22000	<5.0	<5.0	5600
POND 8	12/2/08	7.39	170000				31	46000	<40	<25	8600
	9/9/08	7.75	51000	3080	<16.0	102	26	17000	<20	<5.0	3400
	6/17/08	6.28	420000	16100	8.2		94	160000	<200	<5.0	20000
	3/11/08	7.47	94000	1770	17.4	Absent	25	3000	<5.0	<5.0	6100

Table 16: EPA METHOD 7470 MERCURY, 6010B TOTAL RECOVERABLE METALS. Levels of all detected metals in Evaporations Ponds 1-8 in 2008. All units of concentrations are in mg/l.

	DATE	Hg	Ba	Ca	Cr	Cu	Fe	Pb	Mg	Mn	K	Na	U	Zn
POND 1	12/2/08													
	9/9/08	<.0002	0.76	45	<.006	<.006		<.005	14	0.22	62	460	<.001	0.12
	6/17/08	.00035	0.10	57	.0085	.010	4.9	.0052	15	0.14	96	540	<.10	0.88
	3/11/08	<.0002	.029	18	.061	<.006	55		17	0.80	36	910	<0.50	1.8
POND 2	12/2/08													
	9/9/08	<.0002	0.10	340	<.006	<.006		<.0005	84	0.21	52	1900	<.00207	.086
	6/17/08	<.0002	.066	290	<.006	<.006	1.4	<0005	78	0.14	110	2200	<0.10	0.31
	3/11/08	<.0002	.022	81	<.006	<.006	5.4		55	0.28	88	1700	<0.10	0.12
POND 3	12/2/08													
	9/9/08	<.0002	0.11	340	<.006	<.006		<.005	87	0.21	54	2000	.00237	.047
	6/17/08	<.0002	.061	320	<.006	<.006	0.73	<.005	97	0.15	140	2700	<0.10	0.14
	3/11/08	<.0002	.037	170	<.006	<0006	1.4		71	0.23	93	2000	<0.10	.045
POND 4	12/2/08													
	9/9/08	<.0005	0.13	320	<.006	<.006		<.005	87	0.23	54	2000	.00187	.021
	6/17/08	<.0002	.065	340	<.030	<.030	0.42	<.025	130	0.19	160	3000	<0.50	<0.10
	3/11/08	<.0002	.045	230	<.006	<.006	0.73		80	0.21	94	2000	<0.10	.034
POND 5	12/2/08													
	9/9/08	<.0002	0.14	220	<.006	<.006		<.005	82	0.17	70	2000	.00142	<.020
	6/17/08	<.0002	0.074	390	<.030	<.030	<.25	<.025	150	0.44	190	3600	<0.50	<0.10
	3/11/08	<.0002	.059	290	<.006	<.006	0.64		80	0.28	83	1900	<0.10	0.029
POND 6	12/2/08													
	9/9/08	<.0002	0.11	330	<.006	<.006		<.005	130	0.46	130	3300	.00125	<.020
	6/17/08	<.0002	.093	460	<.030	<.030	<.025	<.025	170	1.1	190	4600	<0.50	<0.10
	3/11/08	<.0002	.073	300	<.030	<.030	1.3		100	0.52	110	2800	<0.50	<0.10
POND 7	12/2/08													
	9/9/08	<.0002	0.11	730	<.006	<.006		<.050	960	5.8	1100	28000	.00103	<.020
	6/17/08	<.0002	<0.20	1400	<0.12	<0.12	<0.25	<0.10	1400	8.1	1800	49000	<2.0	<0.40
	3/11/08	<.0002	.074	690	<.030	<.030	0.69		490	3.2	590	13000	<0.50	<0.10
POND 8	12/2/08													
	9/9/08	<.0002	0.12	530	<.030	<.030		<.025	420	2.4	800	9500	.00148	<0.10
	6/17/08	<.0008	<0.50	1100	<0.30	<0.30	<0.50	<0.25	8800	82	12000	99000	<5.0	<1.0
	3/11/08	<.0002	<0.10	590	<.060	<.060	1.4		760	5.8	1100	20000	<1.0	<0.20

12-2-08 4TH QUARTER 6010B analyses not run.

Table 17: EPA METHOD 8260B VOLATILES. Levels of detected VOCs in Ponds 1 through 8 – all units of concentrations are in mg/l.

		POND 1 (MG/L)	POND 2 MG/L	POND 3 (MG/L)	POND 4 (MG/L)	POND 5 MG/L	POND 6 (MG/L)	POND 7 (MG/L)	POND 8 (MG/L)
1,2,4 TRIMETHYL BENZENE	12/2/08	0.13	.028	.018	.013	.048	.001	.0013	<.001
	9/9/08	.027	.0064	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	.017	.015	.002	<.001	<.001	<.001	.0012	.0011
	3/11/08	0.38	.012	.0043	.0028	.0015	.002	<.001	
1,3,5 TRIMETHYL BENZENE	12/2/08	.046	.0097	.0065	.0048	.019	<.001	<.001	<.001
	9/9/08	.0095	.0021	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	.0044	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	0.11	.0032	.001	<.001	<.001	<.001	<.001	<.001
NAPHTHA LENE	12/2/08	.074	.016	.011	.0075	.0025	<.002	<.002	<.002
	9/9/08	.033	.0064	<.02	<.02	<.02	<.02	<.02	<.02
	6/17/08	.031	.014	.003	<.002	<.002	<.002	<.002	<.002
	3/11.0/	0.2	.020	.0087	.0066	.0037	.004	<.002	<.001
1-METHY LNAPHTHA LENE	12/2/08	.140	.037	.024	.014	.0061	<.004	<.004	<.004
	9/9/0/	.062	.016	<.04	<.04	<.04	<.04	<.04	<.04
	6/17/08	.072	.033	.015	<.004	<.004	<.004	<.004	<.004
	3/11/08	0.28	.034	.020	.015	.011	.015	<.004	<.004
2-METHYL NAPHTHAL ENE	12/2/08	.220	.053	.035	.021	.0089	<.004	<.004	<.004
	9/9/08	.088	.023	<.04	<.04	<.04	<.04	<.04	<.04
	6/17/08	0.3	.050	.023	<.004	<.004	<.004	<.004	<.004
	3/11/08	0.39	.049	.028	.022	.017	.020	<.004	<.004
ACETONE	12/2/08	1.0	.65	.67	.60	.20	<.01	.017	<.01
	9/9/08	1.6	.36	.11	<.10	<0.1	<0.1	<0.1	<0.1
	6/17/08	1.6	0.64	.16	.059	.046	<.010	.049	.12
	3/11/08	1.4	1.7	.920	.80	.19	.64	.034	.024
2-BUTANONE	12/2/08	.094	.072	.064	.043	.016	<.01	<.01	<.01
	9/9/08	.15	.035	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	6/17/08	.19	.080	.018	<.01	<.01	<.01	<.01	.014
	3/11/08	.16	.12	.064	.042	.023	.032	<.01	<.01
CARBON DISULFIDE	12/2/08	<.05	.026	.028	.034	.015	<.01	<.01	<.01
	9/9/08	.039	.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	6/17/08	.011	<.05	.010	.050	.033	<.01	<.01	<.01
	3/11/08	<.05	.018	.045	.063	.097	.040	<.01	<.01
CHLORO METHANE	6/17/08								.0013
ISOPROPYL BENZENE	12/2/08	.0081	.0018	.0011	.001	<.001	<.001	<.001	<.001
	9/9/08	.0011	<.001	<.01	<.001	<.01	<.01	<.01	<.01
	6/17/08	<.001	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.01	<.001	<.001	<.001	<.001	<.001	<.001	<.001
4-ISOPROPYL TOLUENE	12/2/08	.0072	.0015	<.001	<.001	<.001	<.001	<.001	<.001
	9/9/08	.0020	<.001	<.01	<.001	<.01	<.01	<.01	<.01
	6/17/08	<.001	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.0052	<.001	<.001	<.001	<.001	<.001	<.001	<.001
N-BUTYL BENZENE	12/2/08	.021	.0041	.0024	.0023	.0011	<.001	<.001	<.001
	9/9/08	.0087	.0025	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	.0055	.009	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.046	.0014	<.001	<.001	<.001	<.001	<.001	<.001
N-PROPYL BENZENE	12/2/08	.015	.0030	.0019	.0018	<.001	<.001	<.001	<.001
	9/9/08	.0029	<.001	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	.0015	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.036	<.001	<.001	<.001	<.001	<.001	<.001	<.001
SEC-BUTYL BENZENE	12/2/08	.0064	<.001	<.001	.001	<.001	<.001	<.001	<.001
	9/9/08	.0024	<.001	<.01	<.01	<.01	<.01	<.01	<.01
	6/17/08	<.001	<.005	<.001	<.001	<.001	<.001	<.001	<.001
	3/11/08	.0086	<.001	<.001	<.001	<.001	<.001	<.001	<.001

Table 18: EPA METHOD 8260B VOLATILES. Levels of BTEX+MTBE in inlets to Evaporation Ponds 1 and 2. All units of concentrations are in mg/l.

	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
Evaporation Pond 1 Inlet	8/21/08	.023	.028	<.005	.029	<.005
Evaporation Pond 2 Inlet	8/21/08	<.01	.026	.014	.010	<0.01

Table 19: EPA METHOD 300.0 ANIONS, EPA 120.1 SPECIFIC CONDUCTANCE, EPA 410.1 COD, EPA 405.1 BOD, SM4500-H+B: pH. Levels of all detected analytes and other parameters in inlets to Evaporation Ponds 1 and 2. All units of concentrations are in mg/l.

	DATE	pH	Specific Conductance (umhos/cm)	COD	BOD	E-Coli (cfu/100ml)	Fluoride	Chloride	NITROGEN Nitrite (as N) Nitrate (as N)	Phosphorus Orthophosphate (asP)	Sulfate
EP 1 INLET	8/21/08	7.9	4400				32	150	<1.0	<5.0	1300
EP 2 INLET	8/21/08			1540	345						

Table 20: EPA METHOD 7470 MERCURY, 6010B TOTAL RECOVERABLE METALS Levels of all detected metals in inlets to Evaporation Ponds 1 and 2. All units of concentrations are in mg/l.

	DATE	Hg	Ba	Ca	Cr	Cu	Fe	Pb	Mg	Mn	K	Na	U	Zn
EP-1 INLET	8/21/08		0.92	77	<.006	<.0063			17	.13	32	420		.29
EP-2 INLET	8/21/08				<.006	<.006								

Table 21: EPA METHOD 8260B VOLATILES. Levels of all detected VOCs in Inlets to Evaporation Ponds 1 and 2 in 2008 - all units of concentrations are in mg/l.

	Evaporation Pond 1 Inlet Concentration Levels (mg/l)	**Evaporation Pond 2 Inlet Concentration Levels (mg/l)**
1,2,4 TRIMETHYLBENZENE	.027	.0064
1,3,5 TRIMETHYLBENZENE	.0095	.0021
NAPTHALENE	.033	.0064
1-METHYLNAPHTHALENE	.062	.016
2-METHYLNAPHTHALENE	.088	.023
ACETONE	1.6	0.36
2-BUTANONE	0.15	0.035
CARBON DISULFIDE	.039	.025
ISOPROPYLBENZENE	.0011	
4-ISOPROPYLTOLUENE	.002	
N-BUTYLBENZENE	.0087	.0025
N-PROPYLBENZENE	.0029	
SEC-BUTYLBENZENE	.0024	

Table 22: EPA METHOD 8260B VOLATILES. Quarterly Sampling Requirements: Levels of BTEX + MTBE in AL-2 to EP-1, Pilot Effluent and NAPIS Effluent and EP-1. All units of concentrations are in mg/l (Note: Contaminants not presented were not detected.)

	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE
AL-2 TO EP-1	3/11/08	.19	.46	0.099	0.68	<0.01
	6/17/08	<0.02	<0.02	<0.02	<0.03	<002
	9/9/08	<0.02	<0.02	<0.02	<0.03	<0.02
	12/2/08	0.012	0.085	0.028	0.21	<0.005
PILOT EFFLUENT	3/11/08	<0.001	.0015	<0.001	<0.0015	<0.001
	6/17/08	<0.001	0.0062	<0.001	<0.0015	<0.001
	9/9/08	<0.005	<0.005	<0.005	<0.005	<0.0075
	12/2/08	<0.001	<0.001	<0.001	<0.001	<0.001
NAPIS EFFLUENT	3/10/08	0.47	0.73	0.150	0.970	<0.05
	6/17/08	0.84	1.5	0.14	0.89	<0.1
	9/9/08	0.36	0.39	.028	0.2	<0.02
	12/2/08	1.4	3.3	0.36	1.9	<0.05
EP-1	3/11/08	0.19	0.44	0.079	0.48	0.0058
	6/17/08	<0.01	0.012	<0.01	0.024	<0.01
	9/9/08	<0.01	<0.01	<0.01	0.018	<0.01
	12/2/08	0.007	0.081	0.030	0.23	<0.005

Table 23: EPA METHOD 8260B VOLATILES. Quarterly Sampling Requirements. Levels of All detected VOCs in AL-2 to EP-1, Pilot Effluent and NAPIS Effluent and EP-1. All units of concentrations are in mg/l

	AL-2 TO EP-1 (MG/L)		PILOT EFFLUENT MG/L	NAPIS EFFLUENT (MG/L)	EP-1 (MG/L)
1,2,4 TRIMETHYLBENZENE	3/10/08	0.60	<0.001	0.590	0.3
	6/17/08	0.039	<0.001	0.26	0.033
	9/9/08	<0.02	<0.005	0.053	0.04
	12/208	0.12	<0.001	0.4	0.11
1,3,5 TRIMETHYLBENZENE	3/10/08	0.170	<0.001	0.170	0.09
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	0.041	<0.001	0.1	0.037
NAPHTHALENE	3/10/08	0.330	<0.002	0.200	0.17
	6/17/08	0.051	<0.002	0.29	0.053
	9/9/08	<0.04	<0.010	0.087	0.067
	12/2/08	0.078	<0.002	0.43	0.072
1-METHYLNAPHTHALENE	3/10/08	0.340	<0.004	0.250	0.19
	6/17/08	0.18	<0.004	0.4	0.087
	9/9/08	<0.08	<0.02	<0.08	0.24
	12/2/08	0.19	<0.004	0.29	0.14
2-METHYLNAPHTHALENE	3/10/08	0.520	<0.004	0.380	0.29
	6/17/08	0.26	<0.004	<0.4	0.13
	9/9/08	<0.08	<0.02	<0.08	0.35
	12/2/08	0.28	<0.004	0.46	0.22
ACETONE	3/10/08	2.2	0.490	0.500	1.2
	6/17/08	3.8	0.078	17.0	1.6
	9/9/08	2.2	0.3	17.0	1.7
	12/2/08	1.9	0.058	4.7	1.7
2-BUTANONE	3/10/08	0.480	<0.01	<0.5	0.17
	6/17/08	0.350	0.010	2.5	0.32
	9/9/08	<0.2	<0.05	1.9	0.21
	12/2/08	0.095	<0.001	<0.5	0.10
CHLOROFORM	3/11/08	<0.01	0.0069	<0.05	<0.005
	6/17/08	<0.02	0.0044	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	<0.005	<0.001	<0.05	<0.005
ISOPROPYLBENZENE	3/10/08	0.012	<0.001	<0.05	.0079
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	0.0066	<0.001	<0.05	0.0073
4-ISOPROPYLTOLUENE	3/10/08	0.015	<0.001	<0.05	<0.005
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	0.0067	<0.001	<0.05	0.0055
N-BUTYLBENZENE	3/10/08	0.055	<0.001	<0.05	<0.005
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.011
	12/2/08	<0.005	<0.001	<0.05	0.0019
N-PROPYLBENZENE	3/10/08	0.045	<0.001	<0.05	0.027
	6/17/08	<0.02	<0.001	<0.1	<0.01
	9/9/08	<0.02	<0.005	<0.02	<0.01
	12/2/08	0.013	<0.001	<0.05	0.0013
SEC-BUTYLBENZENE	3/11/08	<0.01	<0.001	<0.05	0.005
	6/17/08	<0.02	<0.01	<0.1	<0.01
	9/9/08	<0.02	<0.05	<0.02	<0.01
	12/2/08	<0.05	<0.001	<0.05	<0.01
1-4 DICHLORABENZENE	3/11/08	<0.01	<0.001	<0.05	<0.01
	6/17/08	<0.02	0.0018	<0.1	<0.01
	9/9/08	<0.02	<0.05	<0.02	<0.01
	12/2/08	<0.05	<0.001	<0.05	<0.01

Table 24: EPA METHOD 7470 MERCURY, 6010B TOTAL RECOVERABLE METALS and EPA METHOD 8015B DRO/GRO. Quarterly Levels of metals, DRO and GRO in Al-2 to EP-1, Pilot Effluent, NAPIS Effluent, and EP-1. All units of concentrations are in mg/l.

	DATE	DRO	GRO	Hg	As	Ba	Cd	Ca	Cr	Cu
Al-2 to EP-1	3/10/08	24	1.7	<0.0002	<0.20	0.017	<0.002		0.1	<0.006
	6/17/08	140	1.4	0.00076	<0.02	0.14	<0.002		0.013	0.015
	9/9/08	44	<5.0	<0.0002	<0.02	0.069	<0.002		0.0072	<0.006
	12/2/08	160	<5.0	0.00048	<0.02	0.20	<0.005		<0.01	<0.02
PILOT EFFLUENT	3/11/08	12	<0.05	<0.0002	<0.02	0.022	<0.002		<0.006	0.018
	6/17/08	5.4	0.078	<0.0002	<0.02	0.019	<0.002		<0.006	0.012
	9/9/08	6.3	<1.0	<0.0002	<0.02	0.017	<0.002		<0.006	0.021
	12/2/08	10	<0.5	<0.0002	<0.02	0.021	<0.005	220	<0.01	0.040
NAPIS EFFLUENT	3/10/08	290	11	0.00028	<0.2	0.32	<0.002	120	0.019	0.053
	6/17/08	44	11	<0.0002	<0.02	0.081	<0.002	50	<0.006	<0.006
	9/9/08	35	<10	<0.0002	<0.02	0.062	<0.002	42	<0.006	<0.006
	12/2/08	68	20	0.00026	<0.02	0.11	<0.005		<0.01	<0.02
EP-1	3/11/08	32	1.9							
	6/17/08	140	2.7							
	9/9/08	140	<20							
	12/2/08	120	<5.0							

	DATE	Fe	Pb	Mg	Mn	K	Se	Ag	Na	U	Zn
Al-2 to EP-1	3/10/08	110	<0.005		1.4		<0.05	<0.005		1.9	1.9
	6/17/08	9.0	0.0057		0.13		<0.05	<0.005		.00071	1.6
	9/9/08	2.5	<0.005		0.13		<0.05	<0.005		<0.001	0.19
	12/2/08	6.8	<0.005		0.40		0.034	<0.01			0.59
PILOT EFFLUENT	3/11/08	0.35	<0.005		0.092		<0.5	<0.005		<0.1	0.055
	6/17/08	0.44	<0.005		0.1		<0.05	<0.005		.0009	0.043
	9/9/08	0.49	<0.005		0.085		<0.05	<0.005		<0.001	0.057
	12/2/08	0.36	<0.005	51	0.086	31	<0.02	<0.01	260		0.068
NAPIS EFFLUENT	3/10/08	10	0.013	28	0.2	22	<0.5	<0.005	550	<0.1	1.3
	6/17/08	1.1	<0.005	12	0.057	13	<0.05	<0.005	320	<0.00063	0.19
	9/9/08	0.073	<0.005	9.0	0.057	7.7	0.052	<0.005	200	<0.001	<0.02
	12/2/08	1.8	<0.005		0.17		<0.02	<0.01			0.23

Table 25: EPA METHOD 300.0 ANIONS, EPA 120.1 SPECIFIC CONDUCTANCE, EPA 410.1 COD, EPA 405.1 BOD, SM4500-H+B: PH. Quarterly Sampling Requirements for Pilot Effluent and NAPIS Effluent, EP-1 and Boiler Water to EP-2. All units of concentrations are in mg/l.

	Date Sampled	pH	Specific Conductance (umhos/cm)	COD	BOD	Fluoride	Chloride	Nitrogen Nitrite (as N)	Nitrogen Nitrate (as N)	Phosphorus Orthophosphate (as P)	Sulfate
NAPIS EFFLUENT	3/10/08					69	480	<5.0	<5.0	<25	570
	6/17/08	9.07	4600			19	93	<1.0	3.4	37	630
	9/9/08	9.44	3300			11	78	1.8		14	440
	12/2/08	8.63	2200			12	160	<1.0	1.2	<5.0	510
PILOT EFFLUENT	3/11/08			824	618						
	6/17/08			699	399						
	9/9/08			795	375						
				336	642						
EP-1	3/11/08	3.81		965	510		500				
	6/17/08	7.43		2650	294						
	9/9/08	7.93		1360	262		170				
	12/2/08	7.62		840	231		350				
Boiler Water to EP-2	6/17/08	7.90	6500			1.3	67	<1.0	<0.10	<0.50	2600

Table 26: EPA METHOD 8270C SEMIVOLATILES. Quarterly Sampling Requirements. Levels of all detected SVOCs in NAPIS Effluent and EP-1. All units of concentrations are in mg/l

	NAPIS EFFLUENT (MG/L)		EP-1 MG/L
	DATE	RESULTS	RESULTS
2,4-DIMETHYLPHENOL	3/10/08		0.1
	6/17/08	0.15	0.13
	9/9/08	0.49	0.2
	12/208	0.12	0.087
CARBAZOLE	3/10/08	0.071	
	6/17/08		
	9/9/08		
	12/2/08		
CHRYSENE	3/10/08	0.12	
	6/17/08		
	9/9/08		
	12/2/08		
FLUORENE	3/10/08	0.093	
	6/17/08		
	9/9/08		
	12/2/08		
2-METHYLNAPHTHALENE	3/10/08	0.59	
	6/17/08	0.5	
	9/9/08	0.063	
	12/2/08		
2-METHYLPHENOL	3/10/08	0.15	0.88
	6/17/08	4.9	0.37
	9/9/08	7.4	0.45
	12/2/08	0.62	0.55
3+4-METHYLPHENOL	3/10/08	0.17	1.3
	6/17/08	8.5	0.40
	9/9/08	13	0.6
	12/2/08	3.2	0.86
PHENANTHRENE	3/11/08	0.44	
	6/17/08	0.16	
	9/9/08		
	12/2/08		
PHENOL	3/10/08	0.19	0.45
	6/17/08	17	1.2
	9/9/08	25	1.3
	12/2/08	6.8	15
PYRENE	3/10/08	0.15	
	6/17/08		
	9/9/08		
	12/2/08		
ANILINE	3/10/08		
	6/17/08	0.4	
	9/9/08	2.1	
	12/2/08		
NAPHTHALENE	3/10/08		
	6/17/08	0.24	
	9/9/08	0.076	
	12/2/08		

Table 27: EPA METHOD 8015B GRO/DRO, EPA METHOD 300.0 ANIONS, EPA 120:1 SPECIFIC CONDUCTANCE, SM4500-H+B: PH. Levels of all contaminants found in NAPIS Wells 1, 2, 3 (formerly tagged as KA-1R, KA-2R, KA-3R), and KA-3. All units of concentrations are in mg/l.

	DATE	pH	Specific Conductance (umhos/cm)	GRO	DRO	Fluoride	Chloride	Nitrate + Nitrite as N	Phosphorus Orthophosphate (as P)	Sulfate
NAPIS 1 (KA-1R)	4/11/08	7.26	2000	<0.05	<1.0	0.79	170	0.55 <0.10	<0.50	80
	7/9/08	7.27	1900	<0.05	<1.0	1.4	180	<1.0	<0.50	98
	9/30/08			<0.05	<1.0					
	11/10/08	7.30	1900	<0.05	<1.0	0.73	160	1.6 <0.10	<0.50	63
NAPIS 2 (KA-2R)	4/11/08	7.0	2100	2.2	1.5	0.92	**360**	<0.10 <1.0	<0.50	42
	7/9/08	7.18	2000	0.74	2.4	1.1	**270**	<1.0	<0.50	33
	9/30/08			0.45	3.9					
	11/10/08	7.21	1600	0.59	4.0	1.4	200	<0.1	<0.50	32
NAPIS 3 (KA-3R)	7/9/08	8.29	4200	<0.05	<1.0	0.46	**1100**	9.1	<0.50	**270**
	9/30/08	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
	11/10/08	8.05	4300	<0.05	<1.0	1.1	**1100**	2.6 <1.0	<0.50	310
KA-3	11/10/08	7.34	2700	0.15	<1.0	0.46	**590**	11 2.0	<0.50	140
NMWQS						**1.6**	**250** (Domestic Water)	**10 Nitrate 1 Nitrite**		**600**
NM TPH Screening Guidelines[10]				**0.2**	**0.2**					
EPA MCLS		**6-9**				**4.0**		**0.2**	**10**	**250**
RRSL								**58**		

Note: NAPIS 1 & NAPIS 2 - began sampling in second quarter 2008.
NAPIS 3 – began sampling third quarter 2008.
KA3 – Began sampling fourth Quarter 2008.

[10] We have used the limit set by direct ingestion of groundwater contaminated with unknown oil. When the exposure from groundwater is via inhalation, and not direct ingestion, the TPH screening guideline for unknown oil is 50 ppm.

Table 28: EPA METHOD 8021B, VOLATILES, EPA 6010B TOTAL RECOVERABLE METALS, EPA METHOD 8310: PAHS. Levels of all contaminants found in NAPIS Wells 1, 2, 3 (Formerly tagged as KA-1R, KA-2R, KA-3R), AND KA-3. EPA Method 8310 – PAHS showed only one hit in the Fourth Quarter in NAPIS 2 (KA-2R) for Fluorene .00099mg/l. All units of concentrations are in mg/l.)

	DATE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENE	MTBE	Ba	Ca	Pb	Mg	K	Na	Fluorene
NAPIS 1 (KA-1R)	4/11/08	<0.001	<0.001	<0.001	<0.002	<0.0025		72		13	1.5	370	
	7/9/08	<0.001	<0.001	<0.001	<0.002	<0.0025		70		12	2.1	430	
	9/30/08	<0.001	<0.001	<0.001	<0.002	*	*	*	*	*	*	*	
	11/10/08	<0.001	<0.001	<0.001	<0.002	<0.0025	0.13	78		14	1.2	390	
NAPIS 2 (KA-2R)	4/11/08	0.91	0.019	0.051	0.12	0.32		110		19	1.3	380	
	7/9/08	0.013	<0.001	0.011	0.0056	0.2		70		13	<0.001	360	
	9/30/08	0.016	<0.001	0.0016	0.0041	*	*	*	*	*	*	*	*
	11/10/08	0.025	<0.001	0.011	<0.002	0.18	0.42	50	.0065	9.7		330	.00099
NAPIS 3 (KA-3R)	7/9/08	<0.001	<0.001	<0.001	<0.002	<0.0025		65		7.8	4.1	910	
	9/30/08	*	*	*	*	*	*	*	*	*	*	*	*
	11/10/08	<0.001	<0.001	<0.001	<0.002	<0.0025	0.13	41		6.6	4.4	960	
KA-3	11/10/08	<0.001	<0.001	<0.001	<0.002	0.13	0.20	65	.0095	11	1.8	570	
EPA MCLS		**0.005**	**1**	**0.7**	**10.0**		**20**		**0**				
NMWQS		**0.01**	**0.75**	**0.75**	**0.62**		**1.0**		**.05**				
RRSL		**0.00041**	**2.3**	**0.0015**	**0.2**	**0.012**	**7.3**						

*Third Quarter 2008 - Not analyzed for MTBE, or EPA 6010B. NAPIS 3 Well not sampled – not enough water in well for testing after purging.

Table 29: EPA METHOD 410.1 CHEMICAL OXYGEN DEMAND (COD), 405.1 BIOCHEMICAL OXYGEN DEMAND (BOD) Weekly Levels of COD and BOD at Inlet to EP-2 All units of concentrations are in mg/l.

	DATE	**COD**	**BOD**
Inlet to EP-2	1/10/08	1350	449
	1/17/08	1460	462
	1/24/08	1200	520
	1/31/08	1290	414
	2/7/08	2570	671
	2/15/08	2290	570
	2/21/08	1950	>394
	2/28/08	2440	46.1
	3/6/08	1520	947
	3/11/08	1150	651
	3/20/08	829	344
	3/26/08	1430	649

Table 30: EPA METHOD 410.1 CHEMICAL OXYGEN DEMAND (COD), 405.1 BIOCHEMICAL OXYGEN DEMAND (BOD), 8270C SEMI-VOLATILES (Phenols) Monthly levels of COD, BOD and Phenols at Inlet to AL-1, AL-2, EP-1 All units of concentrations are in mg/l.

	Date	COD	BOD	2,4 Dimethyl-phenol	2-Methyl-phenol	3+4 Methyl-phenol	Phenol	2-Methyl-napthlene	Phenan-threne
Inlet to AL-1	5/29/08	4210	1674	0.570	4.1	7.3	16.0		
	6/26/08	1180	741	0.2	3.6	6.2	16.0		
	7/23/08[11]	634	334	0.064	1.2	1.5	4.0	0.45	0.082
	8/26/08	5190	>2930	0.27	5.4	10.0	21.0		
	9/23/08	4620	>2460	0.57	6.3	11.0	18.0		
	10/14/08	3080	1665	<0.5	<0.5	0.84	1.2		
	11/12/08	1120	303	0.15	2.8	5.8	11.0		
	12/16/08	564	285	0.17	1.1	3.6	10.0		
Inlet to AL-2	5/29/08	2358	717	0.170	2.7	3.0	8.7		
	6/26/08	4470	1600	0.13	0.7	0.68	1.9		
	7/23/08	439	266	0.11	1.6	2.7	6.3	0.067	<0.05
	8/26/08	5360	2400	0.33	4.2	6.2	15.0		
	9/23/08	2620	872	0.36	6.9	13.0	22.0		
	10/14/08	4620	1032	0.13	2.4	4.4	12.0		
	11/12/08	3250	>2620	0.14	1.5	2.3	5.3		
	12/16/08	820	437	0.19	2.2	3.5	6.7		
Inlet to EP-1	5/29/08	2631	497	<0.1	1.0	1.5	3.4		
	6/26/08	4000	1756	0.22	<0.05	0.12	<0.05		
	7/23/08	658	285	0.062	0.11	0.11	0.18	0.13	0.12
	8/26/08	6100	1530	0.26	2.3	2.4	7.6		
	9/23/08	2310	755	0.26	3.7	6.2	2.4		
	10/14/08	2420	2058	0.15	3.2	6.0	17.0		
	11/12/08	2250	>2860	<0.5	1.9	2.8	6.2		
	12/16/08	718	385	0.27	3.0	5.1	9.9		

[11] It appears that on 7/23/08, the laboratory ran the full suite of SVOCs and not just modified for phenols.

3.2 Graphs of concentrations versus time

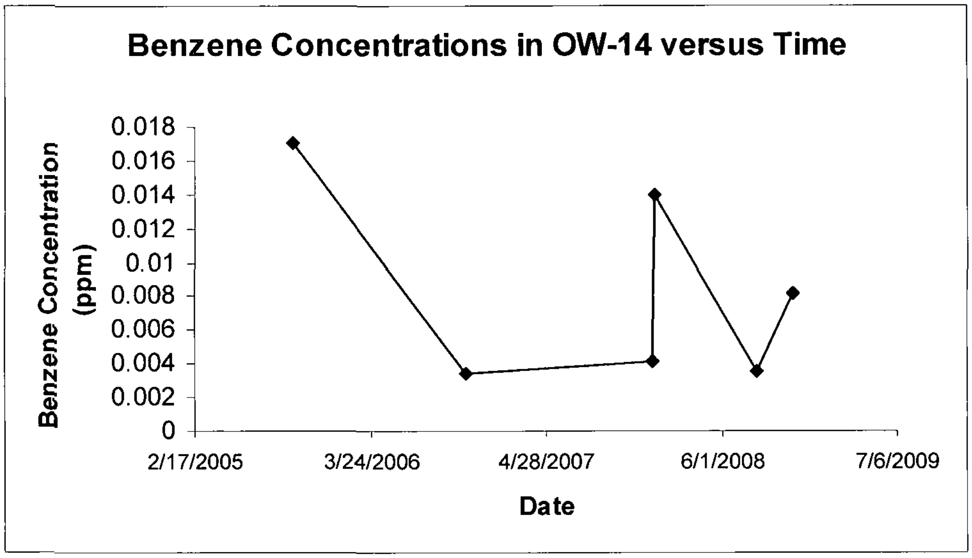


Figure 7: Benzene concentrations in OW-14 versus time

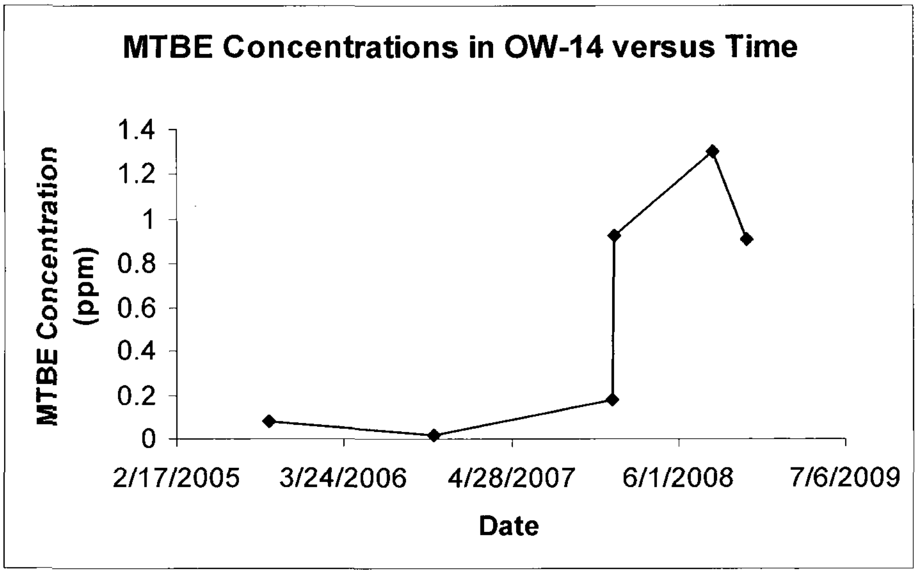


Figure 8: MTBE concentrations in OW-14 versus time

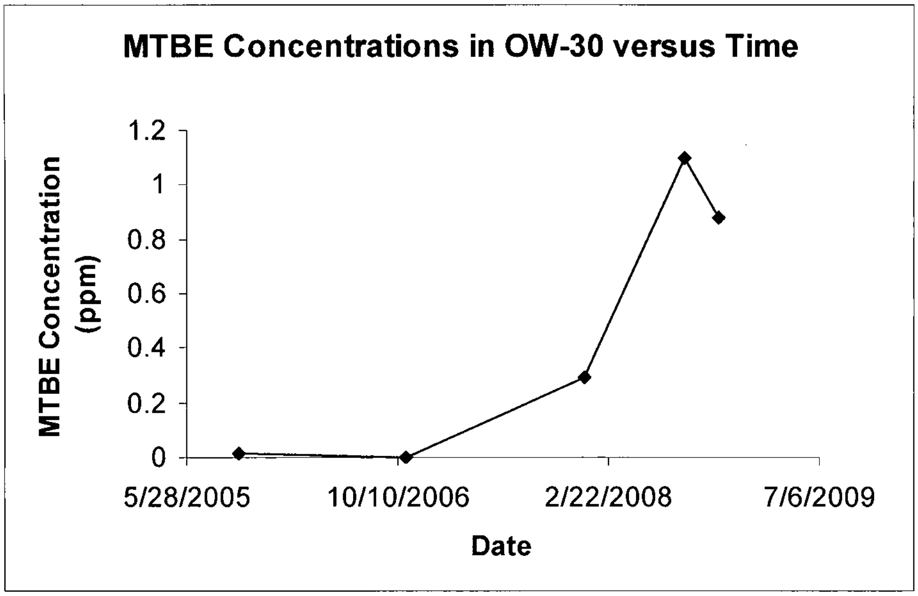


Figure 9: MTBE concentrations in OW-30 versus time

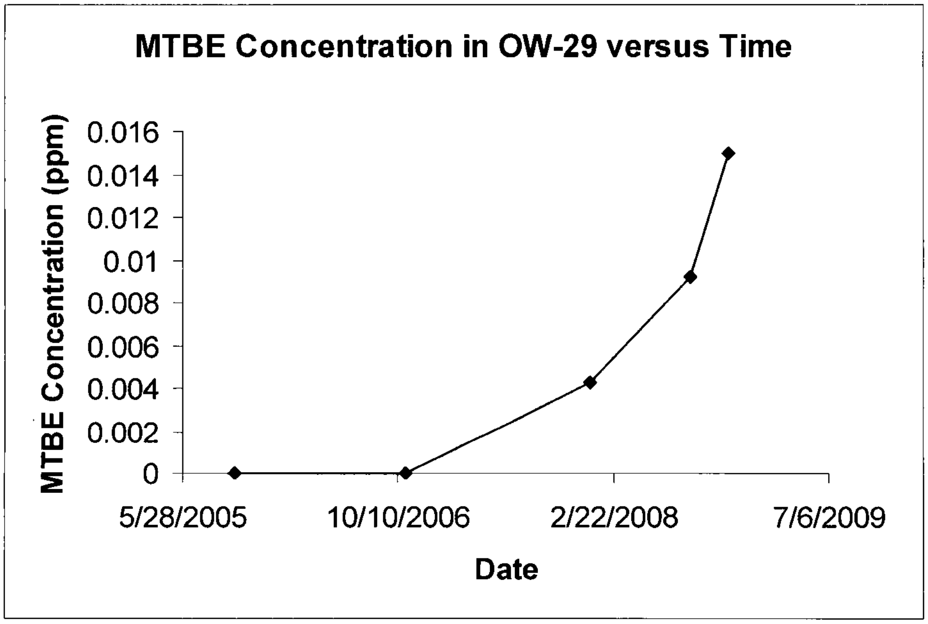


Figure 10: MTBE concentrations in OW-29 versus time

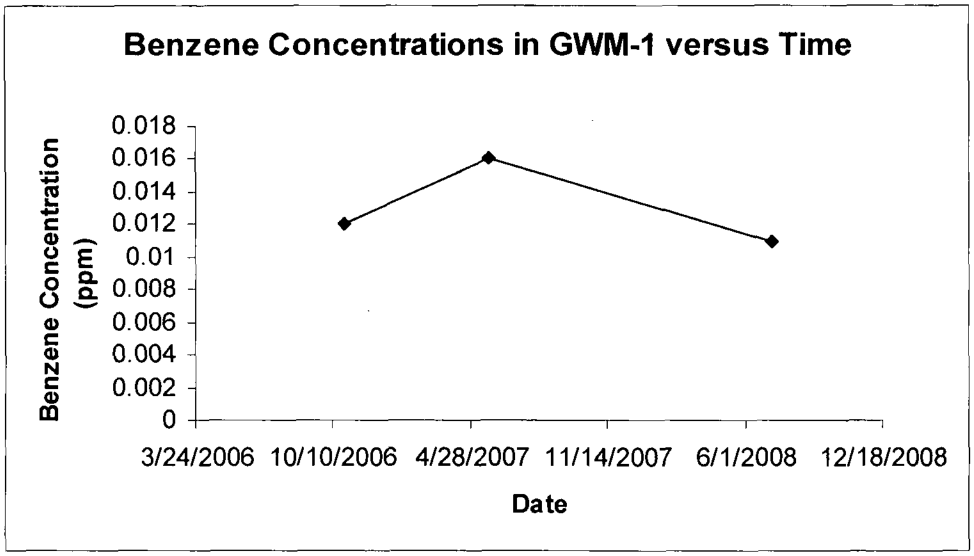


Figure 11: Benzene concentrations in GWM-1 versus time

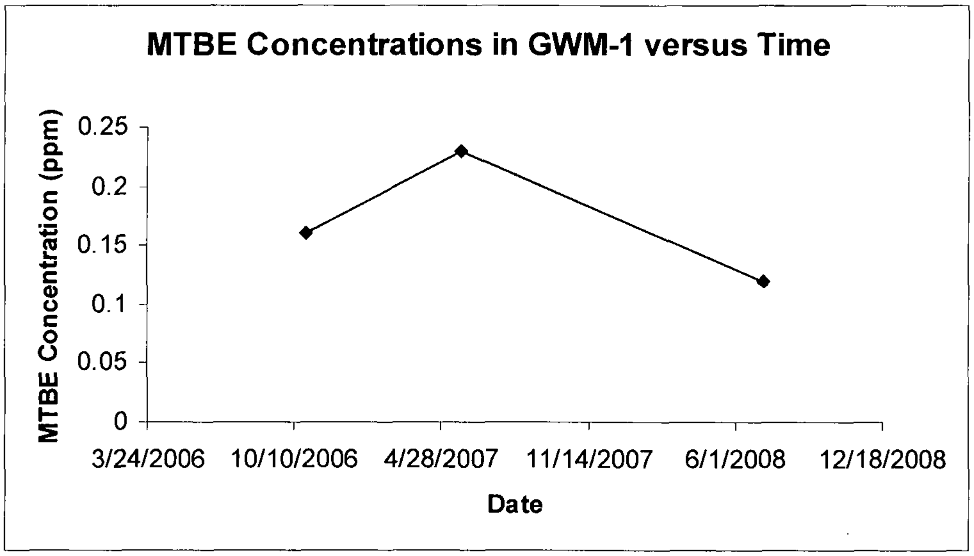


Figure 12: MTBE concentrations in GWM-1 versus time

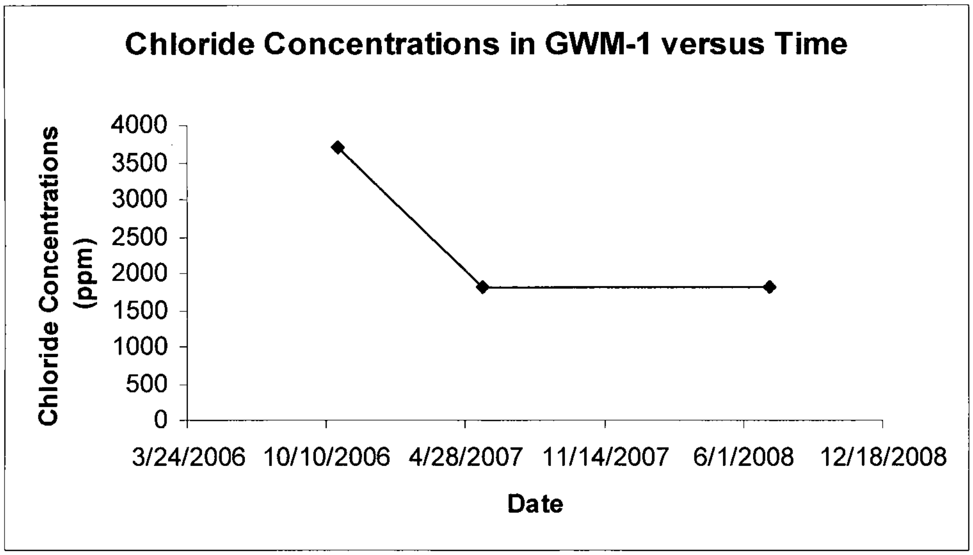


Figure 13: Chloride concentrations in GWM-1 versus time

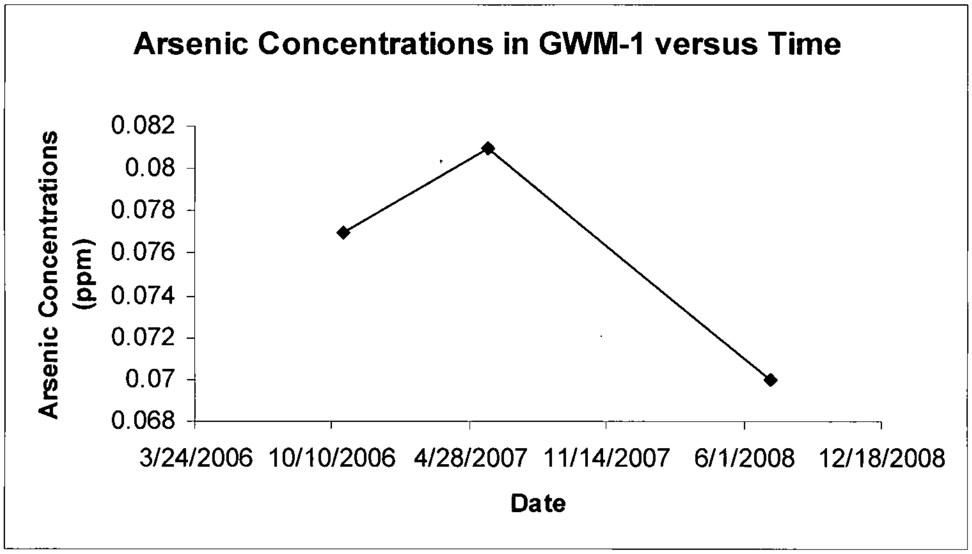


Figure 14: Arsenic concentrations in GWM-1 versus time

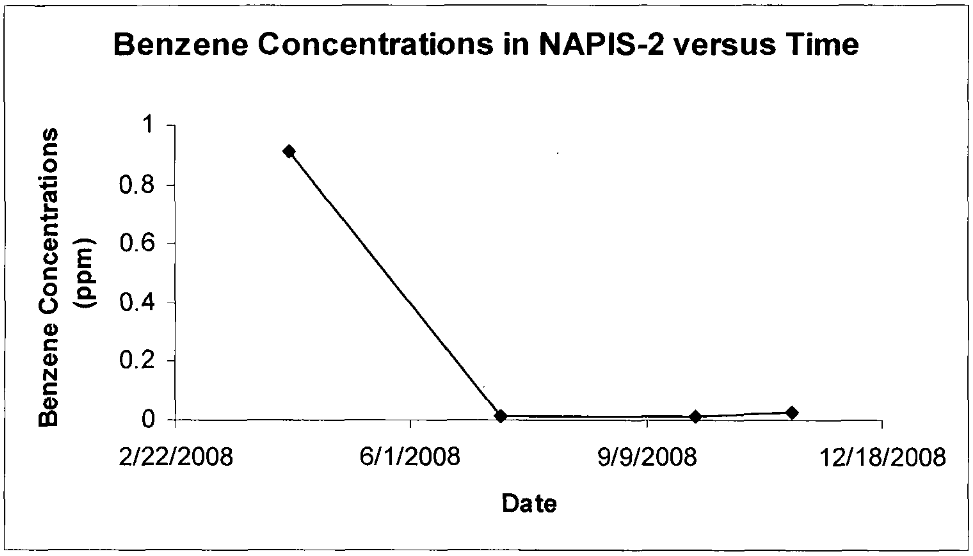


Figure 15: Benzene concentrations in NAPIS-2 versus time

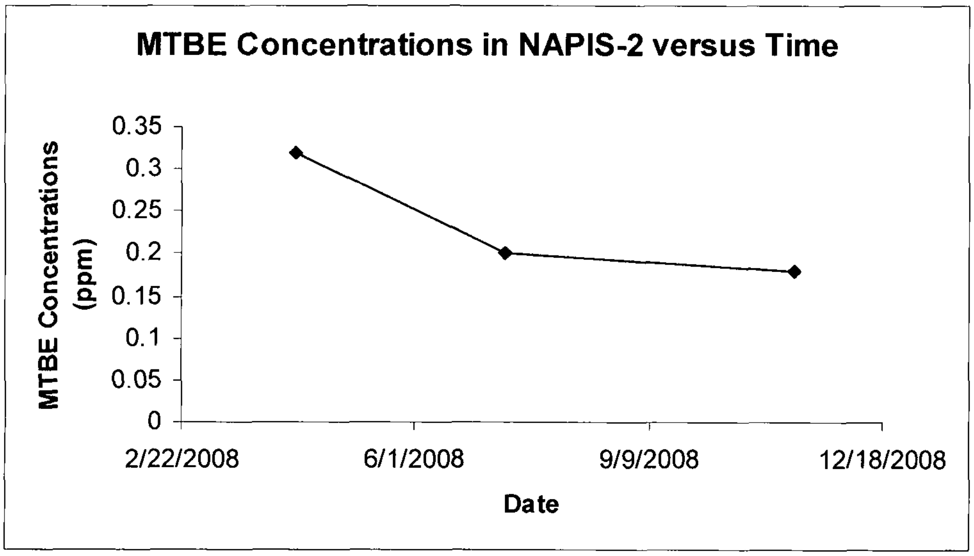


Figure 16: MTBE concentrations in NAPIS-2 versus time

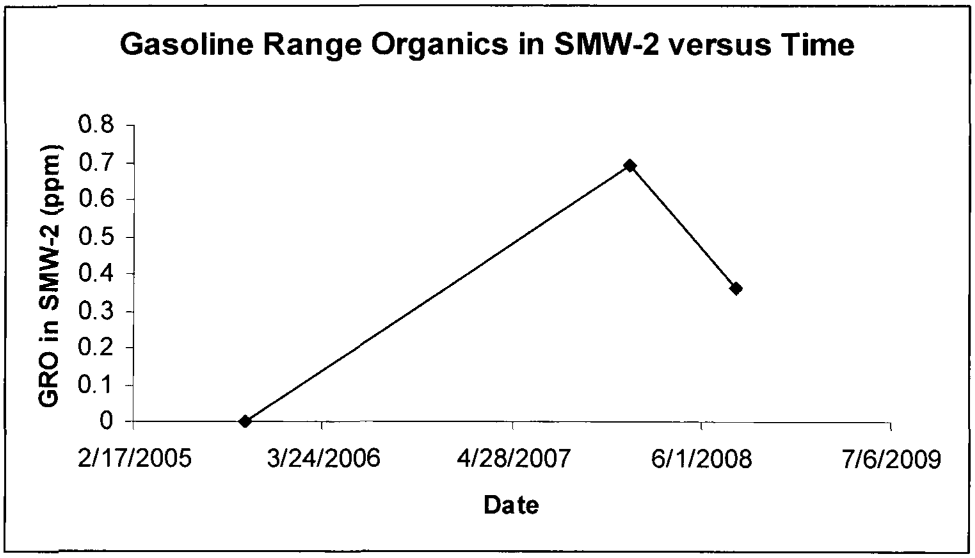


Figure 17: Gasoline Range Organics in SMW-2 versus time

4.0 Groundwater Elevations and Separate-Phase Hydrocarbons

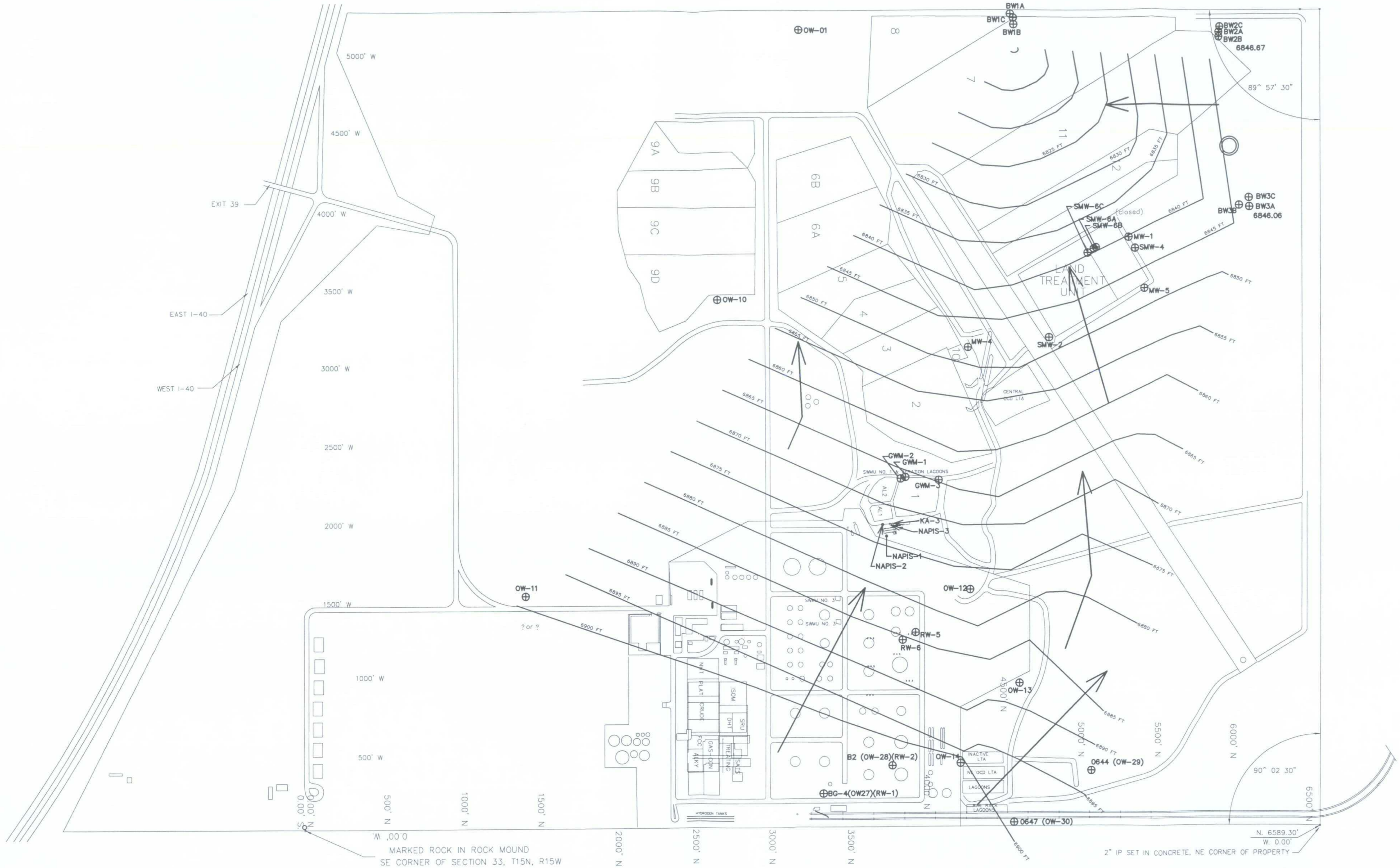
4.1 Potentiometric map

In 2007 we collected groundwater elevation data on the Chinle/alluvium wells in December. In 2008, these data were collected in July. The subsurface ridge that reverses a section of the shallow groundwater from the predominantly north-west flow direction to the north-east direction (seen earlier in December) does not seem to exist in July when a greater quantity of shallow groundwater is present.

This change in flow direction is in the same direction as where the surface water flows. It appears that the shallow groundwater would flow north-west and then outside the refinery boundary probably swing around and head to the south-west along with the surface water bodies that do the same shift in direction. This means that the shallow groundwater will never interact with the nearest community about 4 miles or more away which is in the north-west direction across the forks and tributaries of the Puerco River.

Figure 18 presents a potentiometric map showing groundwater elevations in some of the Chinle/alluvium wells and contours. Table 31 provides groundwater elevation data gathered during 2008.

Figure 18: Potentiometric map showing groundwater elevations at the Chinle/alluvium interface July 2008



File 06-054

Figure 18

Potentiometiric Map Showing Groundwater
Elevations at the Chinle/Alluvium Interface
July 2008

Western Refinery, - Gallup Refinery
Interstate 40, Exit 39
Jamestown, New Mexico 87347
Date: August 22, 2007

DWG NO.

REV

Table 31: Well Water Elevation Data - 2008

WELL DATA 2008 SUMMARY TABLE

2008 ANNUAL GROUNDWATER DISCHARGE REPORT

Well ID Number	Measurement date	A Well Casing Rim Elevations (ft)	Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thickness (ft)	C Depth to Water	D = A-C Groundwater Elevation (ft)	= 0.8B + D Corrected Water Table Elevation (ft)
BW-1A	7/30/2008	6,876.73	6,836.73	40.00	NA	NA	DRY	DRY	NA
BW-1B	7/30/2008	6,876.91	6,811.71	67.55	NA	NA	DRY	DRY	NA
BW-1C	7/30/2008	6,876.75	6,719.75	157.00	NA	NA	6.84	6,869.91	NA
BW-2A	7/30/2008	6,874.72	6,809.22	65.50	NA	NA	31.97	6,842.75	NA
BW-2B	7/30/2008	6,874.58	6,784.08	90.50	NA	NA	27.91	6,846.67	NA
BW-2C	7/30/2008	6,875.40	6,724.40	151.00	NA	NA	20.64	6,854.76	NA
BW-3A	7/30/2008	6,878.22	6,828.22	52.60	NA	NA	DRY	DRY	NA
BW-3B	7/31/2008	6,878.79	6,803.79	75.00	NA	NA	32.73	6,846.06	NA
BW-3C	7/31/2008	6,878.08	6,723.08	155.00	NA	NA	8.08	6,870.00	NA
OW-1	2/18/2008	6,868.00	6,773.96	94.04	NA	NA	1.75	6,866.25	NA
OW-1	5/21/2008	6,868.00	6,773.96	94.04	NA	NA	1.75	6,866.25	NA
OW-1	9/15/2008	6,868.00	6,773.96	94.04	NA	NA	1.78	6,866.22	NA
OW-1	11/3/2008	6,868.00	6,773.96	94.04	NA	NA	2.78	6,865.22	NA
OW-10	2/18/2008	6,872.00	6,804.00	68.00	NA	NA	1.25	6,870.75	NA
OW-10	5/21/2008	6,872.00	6,804.00	68.00	NA	NA	1.61	6,870.39	NA
OW-10	9/10/2008	6,872.00	6,804.00	68.00	NA	NA	1.59	6,870.41	NA
OW-10	11/3/2008	6,872.00	6,804.00	68.00	NA	NA	2.04	6,869.96	NA
OW-11	8/14/2008	6,923.89	6,857.27	66.62	NA	NA	20.91	6,902.98	NA
OW-12	8/18/2008	6,940.43	6,795.43	145*	NA	NA	49.05	6,891.38	NA
OW-13	8/18/2008	6,920.12	6,820.12	100.00	NA	NA	24.41	6,895.71	NA
OW-14	8/21/2008	6,926.64	6,881.64	45.00	NA	NA	27.13	6,899.51	NA

OW-29	8/19/2008	6,913.50	6,864.50	49.00	NA	NA	21.95	6,891.55	NA
OW-30	8/20/2008	6,921.60	6,873.20	48.40	NA	NA	26.34	6,895.26	NA
MW-1	8/4/2008	6,878.52	6,746.50	132.02	NA	NA	7.28	6,871.24	NA
MW-4	8/4/2008	6,882.54	6,760.40	122.14	NA	NA	7.95	6,874.59	NA
MW-5	8/14/2008	6,883.32	6,750.30	133.02	NA	NA	11.37	6,871.95	NA
RW-1	2/18/2008	6,943.50			30.18	4.59	34.77	6,908.73	6912.402
(OW-27)	5/21/2008	6,943.50			30.40	4.17	34.57	6,908.93	6912.266
	9/12/2008	6,943.50			30.03	4.56	34.59	6,908.91	6912.558
	11/3/2008	6,943.50			30.02	4.61	34.63	6,908.87	6912.558
RW-2	2/18/2008	6,927.20				NA	28.16	6,899.04	N/A
(OW-28)	5/21/2008	6,927.20				NA	27.22	6,899.98	N/A
	9/12/2008	6,927.20				NA	27.03	6,900.17	N/A
	11/3/2008	6,927.20				NA	27.10	6,900.10	N/A
RW-5	2/18/2008	6,942.50	6,902.50	40.00	33.1875	0.7604	33.9479	6,908.55	6909.16042
	5/21/2008	6,942.50	6,902.50	40.00	32.77	1.07	33.84	6,908.66	6909.516
	9/10/2008	6,942.50	6,902.50	40.00	32.62	0.23	32.85	6,909.65	6909.834
	11/3/2008	6,942.50	6,902.50	40.00	31.05	1.29	32.34	6,910.16	6911.192
RW-6	2/18/2008	6,972.60	6,933.80	38.80	33.4375	0.9165	34.354	6,938.25	6938.9792
	5/21/2008	6,972.60	6,933.80	38.80	33.02	1.1	34.12	6,938.48	6939.36
	9/10/2008	6,972.60	6,933.80	38.80	32.83	0.29	33.12	6,939.48	6939.712
	11/3/2008	6,972.60	6,933.80	38.80	32.46	0.23	32.69	6,939.91	6940.094
SMW-2	8/14/2008	6,884.44	6,827.10	57.34	NA	NA	25.89	6,858.55	N/A
SMW-4	8/13/2008	6,882.54	6,760.40	122.14	NA	NA	29.57	6,852.97	N/A
SMW-6		6,880.71	6,807.60	73.11				6,880.71	N/A
GWM-1	2/18/2008	6,912.65	6,888.95	23.70	NA	NA	19.91	6,892.74	N/A
	5/21/2008	6,912.65	6,888.95	23.70	NA	NA	19.47	6,893.18	N/A
	9/10/2008	6,912.65	6,888.95	23.70	NA	NA	20.24	6,892.41	N/A
	11/3/2008	6,912.65	6,888.95	23.70	NA	NA	20.55	6,892.10	N/A

GWM-2	2/18/2008	6,913.17	6,896.97	18.97	NA	NA	18.45	6,894.72	N/A
	3/17/2008	6,913.17	6,896.97	18.97	NA	NA	DRY	NA	N/A
	5/21/2008	6,913.17	6,896.97	18.97	NA	NA	DRY	NA	N/A
	9/10/2008	6,913.17	6,896.97	18.97	NA	NA	DRY	NA	N/A
	11/3/2008	6,913.17	6,896.97	18.97	NA	NA	DRY	NA	N/A
GWM-3	2/18/2008	6,912.65	6,896.15	17.94	NA	NA	DRY	NA	N/A
	5/21/2008	6,912.65	6,896.15	17.94	NA	NA	DRY	NA	N/A
	9/10/2008	6,912.65	6,896.15	17.94	NA	NA	DRY	NA	N/A
	11/3/2008	6,912.65	6,896.15	17.94	NA	NA	DRY	NA	N/A
NAPIS 1(KA-1R)	4/11/2008	6,918.43	6,904.40	14.00	NA	NA	8.58	6,909.85	N
	7/11/2008	6,918.43	6,904.40	14.00	NA	NA	8.98	6,909.45	N
	11/4/2008	6,918.43	6,904.40	14.00	NA	NA	8.83	6,909.60	N
NAPIS 2 (KA-2R)	4/11/2008	6,917.27	6,902.80	14.50	NA	NA	8.83	6,908.44	N
	7/11/2008	6,917.27	6,902.80	14.50	NA	NA	8.96	6,908.31	N
	11/4/2008	6,917.27	6,902.80	14.50	NA	NA	9.23	6,908.04	N
NAPIS 3 (KA-3R)	4/11/2008	6,917.31	6,886.60	30.70	NA	NA	14.98	6,902.33	N
	7/11/2008	6,917.31	6,886.60	30.70	NA	NA	9.72	6,907.59	N
	11/4/2008	6,917.31	6,886.60	30.70	NA	NA	8.71	6,908.60	N
KA-3	11/4/2008	6,917.17	6,892.40	25.00	NA	NA	9.01	6,908.16	N

NAPIS 1(KA-1R), NAPIS 2 (KA-2R), NAPIS 3 (KA-3R): NAPIS wells installed on 3/15/08. Quarterly monitoring began third quarter of 2008.

KA-3: Began sampling 4th Quarter 2008.

SPH = Separate Phase Hydrocarbons

NA = If no SPH was detected then this is shown on the table as NA (not applicable)

Corrected water table elevations are only provided if SPH was detected.

*OW-12: Annual inspection revealed well depth measurement to be 126 feet instead of 145 feet as listed.

4.2 Water table elevations versus time

Figures 19-21 show changes in groundwater elevation (corrected for RW-1 that has free product) at wells RW-1, GWM-1, and NAPIS-1, 2, and 3.

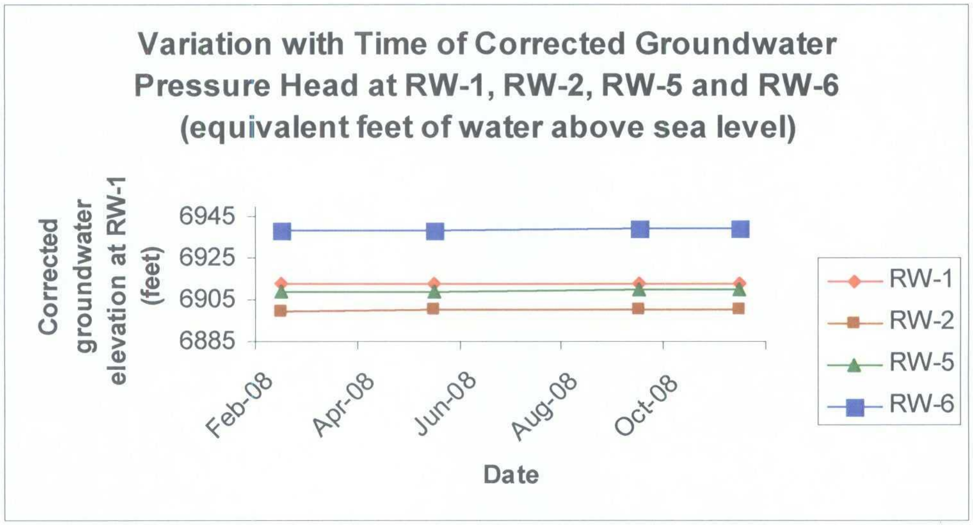


Figure 19: Variation with time of corrected groundwater elevation at RW-1

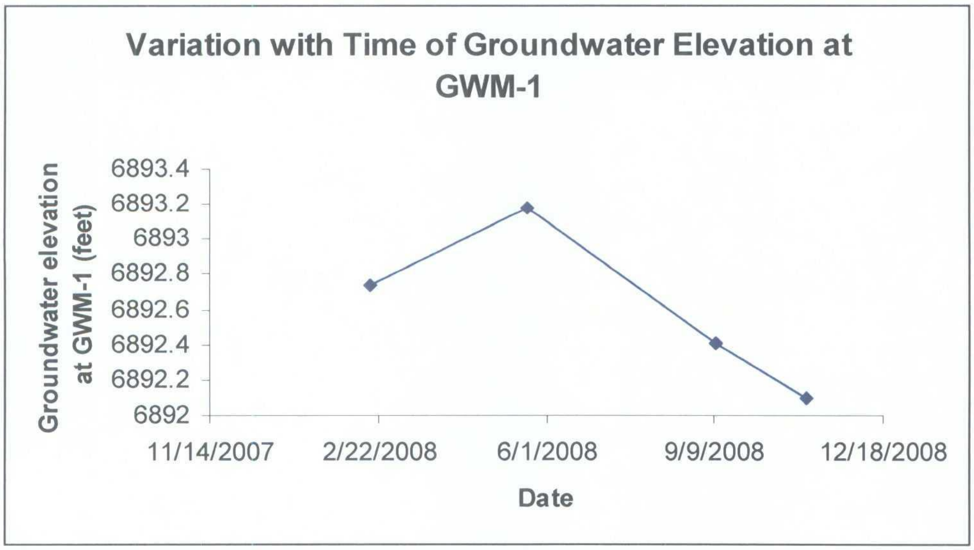


Figure 20: Variation with time of groundwater elevation at GWM-1

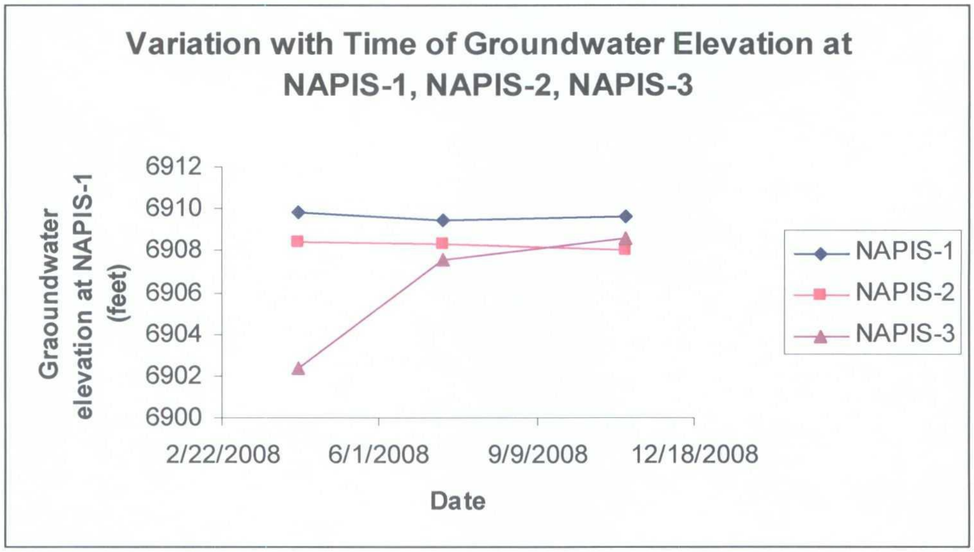


Figure 21: Variation with time of groundwater elevation at NAPIS-1, 2, and 3

4.3 Annual product thickness and iso-concentration contours

Figure 22 depicts the variation of product thickness at RW-1, RW-5, and RW-6.

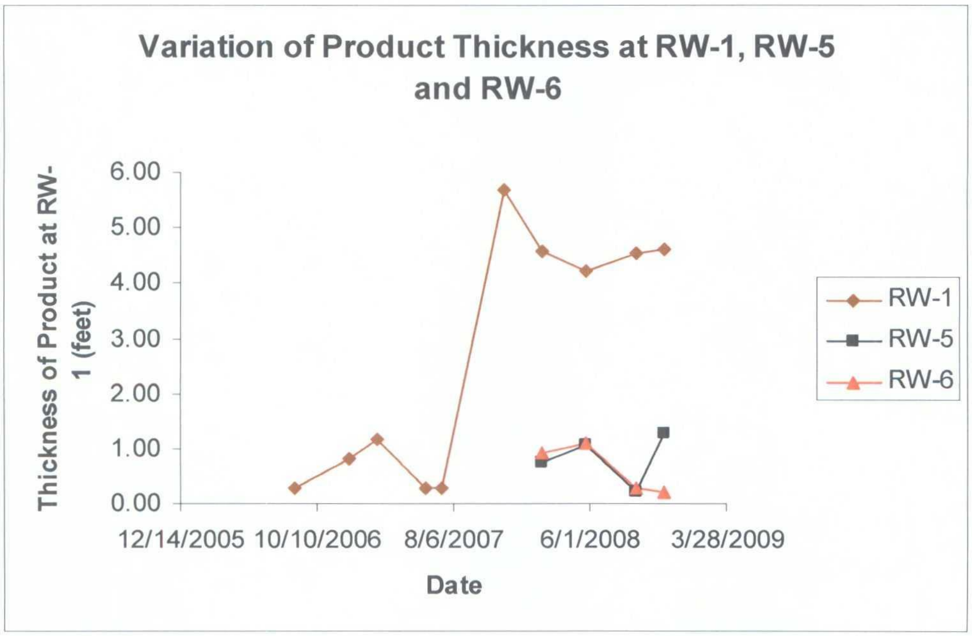


Figure 22: Variation of product thickness at RW-1 with time

Figure 23 depicts equal concentration contour maps for benzene around wells OW-14, OW-30, OW-29, and OW-13.

Figure 23: Equal concentration contour maps for benzene around wells OW-14, OW-30, OW-29, and OW-13.

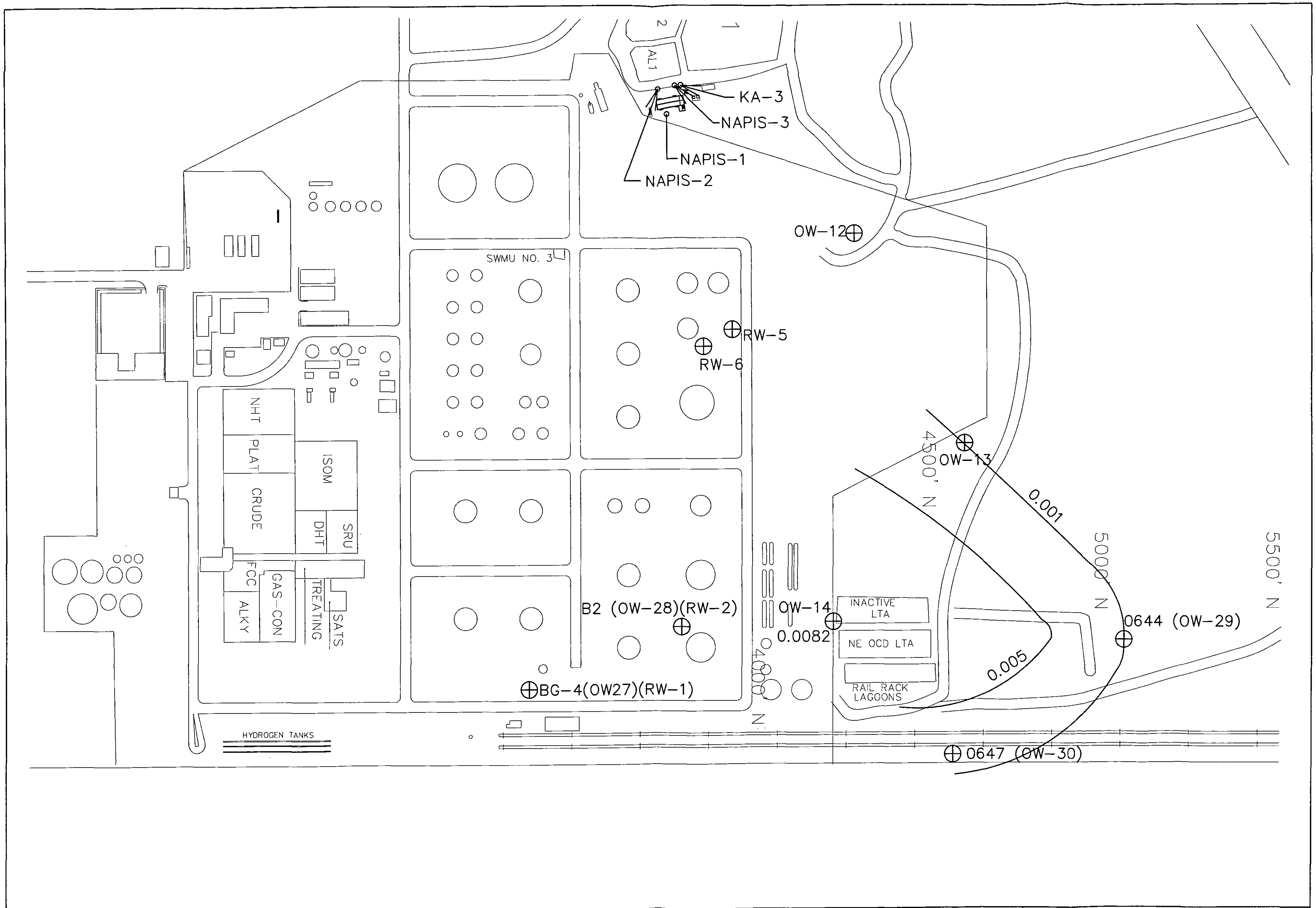


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Figure 23

Benzene Iso Concentration Contours

Western Refinery, – Gallup Refinery
Interstate 40, Exit 39
Jamestown, New Mexico 87347
Date: August 22, 2007

DWG NO.

REV

4.4 Volume of product recovered

Table 32 presents data on volume of product recovered from well RW-1.

Table 32: Volume of product recovered in 2008 from RW-1

Date of measurement	Time	Quarter	Well #	Depth to Product (feet)	Depth to Water (feet)	Product Level Thickness (feet)	Volume of Product Bailed (gallons)
38405	1532	1st.	**RW-1**	30.178	34.7708	0	1.66
39589	1410	2nd	**RW-1**	30.33	34.57	0	1.39
39703	1430	3rd	**RW-1**	30.03	34.59	0	NOT BAILED
39765	1300	4TH	**RW-1**	30.02	34.63	0	0.94

The total volume of product recovered is – **3.99 gallons**.

5.0 Conclusions and Recommendations

In this section, we present our major overall conclusions and recommendations; and then discuss the findings for groundwater monitoring wells individually or in similar groups.

5.1 Overall conclusions

On the East side, in the north-east corner of the active refinery perimeter (but not the refinery property as a whole) a plume of Methyl-Tert Butyl Ether (MTBE) is known to exist in shallow groundwater within refinery property. This groundwater enters the refinery from the east, and then moves slowly north-west into the Facility property. In three wells, OW-14, OW-29, and OW-30, the MTBE is in the range of 0.05 to 1.3 ppm and at levels that exceed the RRSL (0.012 ppm). In this area volatile hydrocarbons have also been detected in shallow groundwater and benzene (in OW-14 at a level of 0.074 ppm) is at a level that exceeds NMWQS for drinking water (0.005 ppm). There are downgradient wells that have not yet shown more than trace levels of benzene, that is, close to the levels of detection of analytical methods. These wells are within a few hundred feet of OW-14, the well at which benzene has been detected at levels above NMWQS. Therefore, benzene in the groundwater in this region is expected to move approximately 10 feet per year – this is apparent from noting the time it has taken for trace levels to be detected downgradient. The nearest drinking water well in the direction of contaminant movement is probably more than 10,000 feet away and more than 3000 feet deep – while contamination is at shallow depths of 30-50 feet. Within the perimeter of the active refinery in this north-east section, there are also several shallow recovery wells from which separate-phase hydrocarbons have been recovered and still continue to be recovered, of the order of 4 gallons total in 2008.

On the West side, there are shallow groundwater issues likely stemming from the wastewater treatment system of the refinery that consists of aeration lagoons and a series of large evaporation ponds. Immediately downgradient (within 10 feet) of the refinery's oil/water separator, a sample from a shallow groundwater monitoring well (NAPIS-2) had MTBE at a level (0.32 ppm) greater than the RRSL (0.012 ppm), a few hydrocarbons above detection levels, and benzene above the NMWQS (0.91 ppm > 0.005 ppm). Downgradient of the two aeration lagoons, a shallow monitoring well, GWM-1, has also detected benzene above NMWQS, and other hydrocarbons at detectable levels. Some of these include several polycyclic aromatic hydrocarbons (PAHs), which though generally below any regulatory standards, are of concern as they are long-lived and could possibly impact deeper aquifers. Some of these wells have also shown levels of chlorides and sulfates above NMWQS and/or MCL. Elevated levels of arsenic and manganese have also been detected in GWM-1 above the NMWQS.

In this report, we also present data on our aeration lagoons, ponds and outfalls between the lagoons and ponds. We collect these data as a part of our permit GW-032. Groundwater standards do not apply to these surface water bodies. However, these data are of great value in determining compliance with various provisions of the State of New Mexico as well as the EPA regarding hazardous waste treatment. None of the aeration lagoons or ponds has benzene levels greater than 0.5 ppm. (Appendix D presents information on a RCRA-driven sampling activity that studied benzene levels entering Aeration Lagoon 1, in which benzene levels greater than 0.5 ppm were found. However, these levels had fallen to well below 0.5 ppm, before the wastewater left Aeration Lagoon 1, as can be seen by our sampling data.) These data on our surface water treatment ponds also help us understand if the ponds are affecting groundwater. It should be noted that the aeration lagoons and ponds do contain volatile and semi-volatile organic compounds, some of which are also found in shallow wells (GWM-1, and SWM-2).

Finally, there are a series of boundary (BW), observation (OW), monitoring (MW) and shallow monitoring (SWM) wells in the western portions of the facility that are meant to detect any off-site movement of contaminants and also releases to groundwater. One of the OW wells has shown detectable levels of uranium, in one case above NMWQS. Uranium is ubiquitous in groundwater of New Mexico, and the location of this one well (OW-11) makes it unlikely that the uranium should be linked to refinery activity – OW-11 is located so that it is mainly affected by off-refinery groundwater, and also groundwater that is linked to movement through rock.

Among the wells on the far west side are three deep drinking water wells, PW-3, PW-2, and PW-4 – none of these has ever been known to have any contamination at any detectable level. In one event in 2007, we found a semi-volatile hydrocarbon in PW-3, sampled again and found that it was non-detectable – we will continue to monitor this well, and believe the one anomalous reading was a laboratory artifact. Among MW and SWM monitoring wells in the west side, a few have shown traces of hydrocarbons. SMW-2 has shown a level of 1,4-Dioxane at 0.0136 ppm which is greater than the RRSL of 0.0061 ppm. All of the BW wells have shown that no contaminants are leaving the refinery's property.

5.2 Overall recommendations

- Continue monitoring as specified in the current Facility-wide Groundwater Monitoring Plan
- Develop a subsurface hydrogeological map of the refinery
- Collect samples of incoming shallow groundwater at the northern edges of the refinery and sample for metals – this may help establish what metals, if any, are possibly linked to the refinery
- Recognizing that the MTBE and benzene plume in the north-east region is moving towards the north-west, and may have passed by existing wells, establish two new monitoring wells north and west of OW-29 at the Chinle/alluvium interface.

5.3 Conclusions and recommendation on individual wells

5.3.1 Wells with hydrocarbon contamination above standards

OW-14, OW-30, OW-29, OW13

These wells have shown levels of benzene and MTBE, plus OW-14 has shown some VOCs. They were sampled between 8/19/08-8/21/08, and 11/12/08-11/14/08. They are being sampled quarterly starting from the third quarter of 2008. They are sampled for VOCs, BTEX, and MTBE. Figure 24 depicts the situation at these wells.

Among these wells, benzene is only found in OW-14. In the last two quarters of 2008, benzene in OW-14 went up from 0.0035 ppm to 0.0082 ppm, which exceeds the MCL of 0.005 ppm. In the third and fourth quarters, we also found some VOCs in OW-14: 1-methylnapthalene, isopropylbenzene, Sec-butylbenzene, and 1, 2 dichloroethane (only in the fourth quarter). Of these, 1-methylnapthalene (0.012, 0.016), and 1, 2 dichloroethane (0.0018) were at levels greater than the RRSLs of 0.0023 ppm, and 0.00015 ppm respectively.

In the last two quarters of 2008, respectively, MTBE went up, then down in OW-14 (1.3 ppm, 0.91 ppm) and OW-30 (1.1 ppm, 0.88 ppm). MTBE went up in OW-29 (0.0092 ppm, 0.015). These levels are greater than the RRSL of 0.012 ppm. Similarly, MTBE went up in OW-13 (<0.001 ppm, 0.0016 ppm).

Recommendation:

Continue sampling as per current facility-wide groundwater monitoring plan. Drill two new wells to the north-west of OW-29, to better 65-determine the extent of contamination.

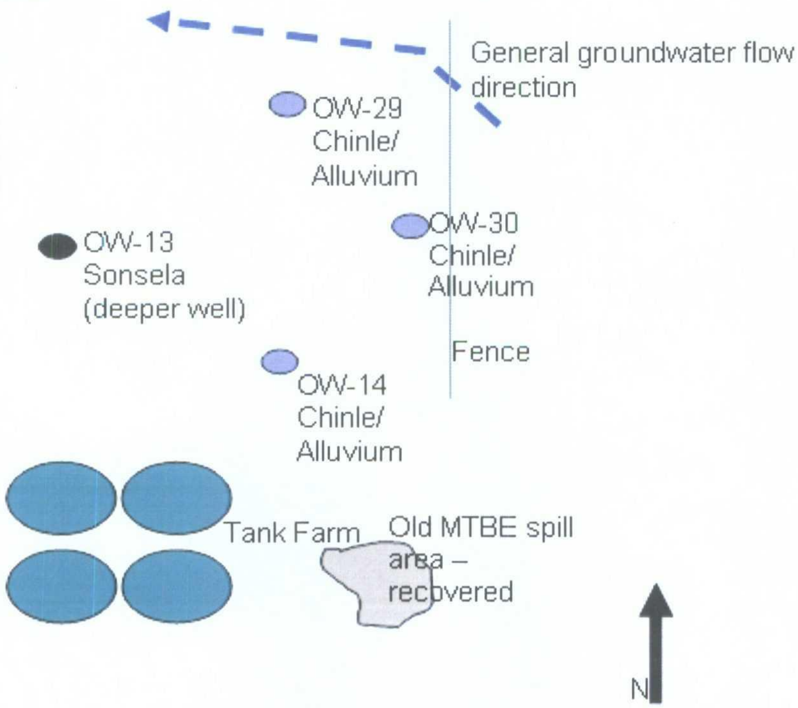

Figure 24: General location and situation around OW-14, OW-30, OW-29, and OW-13

GWM-1 and GWM-2

GWM-1 well was sampled on 7/10/08. It has a level of benzene (0.011 ppm) that exceeds the EPA's MCL of 0.005 ppm, and the NMWQS of 0.01 ppm. MTBE in this well is at 0.12 ppm, which exceeds the RRSL of 0.012 ppm. We have also detected VOCs (1, 2, 4 trimethylbenzene), and SVOCs (2, 4 dimethylphenol, and phenol) – but these are at levels below the NMWQS, MCLs, and RRSLs. This well also has chlorides at a level of 1800 ppm that is greater than the NMWQS drinking water standard of 250 ppm. In February 2008, GWM-2 was found to contain water, and this well was also sampled. GWM-2 had non-detectable levels of hydrocarbon contaminants, except for MTBE which was above the RRSL.

This well is downgradient of the two aeration lagoons, and the levels detected appear to be stemming from their waters. We plan to close the aeration lagoons and permanently remove this potential source. At that time, we will also close GWM-1.

Recommendation:
Continue sampling as per current facility-wide groundwater monitoring plan. Monitor water levels quarterly, and collect annual samples for VOCs, SVOCs, and BTEX plus MTBE. Monitor presence of water in GWM-2 and sample if sufficient quantity available.

SMW-2, SMW-4

These wells are located downgradient of a closed Land Treatment Unit. In SMW-2 we have detected levels of acetone (0.00753 ppm), diethylphtalate (0.000057 ppm), and 1, 4 dioxane (0.0136 ppm). The level of 1, 4 dioxane is greater than the RRSL of 0.0061 ppm. In SMW-4, we have detected levels of diethylphtalate (0.0005 ppm), and phenol (0.00113 ppm). These levels are below the NMWQS, MCLs, and RRSLs.

In 2009, we will be doing soil sampling below the Land Treatment Unit in the vadose zone. Based on these results and if we detect contaminants migrating into the subsurface, we will evaluate the existing annual frequency of monitoring SMW-2 and SMW-4.

Recommendation:
Continue sampling as per current facility-wide groundwater monitoring plan. Based on results of soil tests for possible migration of contaminants into the subsurface, evaluate monitoring frequency.

NAPIS-1, NAPIS-2, NAPIS-3, KA-3

These shallow wells are located around the NAPIS. NAPIS-1 is an upgradient well on the south and east side of the NAPIS. NAPIS-2 is located immediately downgradient on the south and west side of the NAPIS. KA-3 and NAPIS3 are located on the west side at the north end.

NAPIS-1 has no detectable levels of contaminants. NAPIS-2 has shown elevated levels of benzene (dropping over the year from 0.91 ppm to 0.025 ppm, yet above the MCL of 0.005 ppm) and MTBE (dropping over the year from 0.32 ppm to 0.18 ppm, above the RRSL of 0.012 ppm). No contaminants have been detected in NAPIS-3. KA-3 has shown elevated levels of MTBE at 0.13 ppm.

In the third quarter of 2008, NAPIS-3 did not have enough water to collect a sufficient quantity. KA-3 well was then added to the sampling schedule.

Recommendation:
Continue sampling as per current facility-wide groundwater monitoring plan.

5.3.2 Wells without hydrocarbon contamination[12]

<u>OW-11</u>

A grab sample from OW-11 was taken on August 14, 2008. No metals or volatiles were found at levels exceeding applicable MCLs, NM ground water, and NM TPH screening levels. In 2008, the general chemistry results showed that fluoride (2.2 mg/l) and sulfate (940 mg/l) were present at levels greater than the NMWQS for fluoride (1.6 mg/l) and sulfate (600 mg/l).

Recommendation:
Continue sampling as per current facility-wide groundwater monitoring plan.

<u>OW-12</u>

OW-12 was sampled on August 19, 2007 and analyzed for VOCs and SVOCs. The laboratory analyses showed all parameters at non-detectable levels.

Recommendation:
Continue sampling as per current facility-wide groundwater monitoring plan..

<u>BW-1A, BW-1B, BW-3A</u>

BW-1A, BW-1B, and BW-3A are dry wells and therefore were not sampled in 2008.

Recommendation:
Continue sampling as per current facility-wide groundwater monitoring plan
The Gallup Refinery will continue to visually inspect BW-1A and BW-1B annually for any liquids. If liquids are observed, then sampling will occur. All samples will be analyzed for VOC, SVOC, BTEX, MTBE, Metals, and General Chemistry.

<u>BW-1C, BW-2B, BW-2C. BW-3B, BW-3C</u>

BW-1C was sampled on July 31, 2008; BW-2B, BW-2C, BW-3B and BW-3C were sampled on July 30, 2008. The samples were analyzed for VOC, SVOC, BTEX, MTBE, WQCC metals, and

[12] These wells may have other contaminants present at levels greater than applicable standards, such as sulfates.

General Chemistry. Laboratory analysis showed concentrations less than (all non-detect) all applicable standards for benzene, toluene, ethylbenzene, xylene, and MTBE. However, laboratory results showed that fluorides and sulfates were greater than the NMWQS (1.6 ppm, and 250 ppm respectively) for these wells, except that BW-3B had levels of fluorides below the NMWQS.

Recommendation:
Continue sampling as per current facility-wide groundwater monitoring plan..

PW-2, PW-3, PW-4

PW-3 was sampled in 2007. All parameters were less than the applicable standards and MCLs, except for 2-Methylnapthalene which was found at 0.032 mg/l to be greater than the NMWQS of 0.03 mg/l. This well was not scheduled for 2008. However, we collected a sample from this well, as well as a blind duplicate. No detectable 2-Methylnapthalene was found in either of these two samples. PW-2 and PW-4 were scheduled for 2008 and did not show any levels above applicable standards and no hydrocarbons were detected.

Recommendation:
Monitor PW-3 again in 2010; and then revert to the alternate year cycle for PW-2 and PW-4 (to be sampled in 2011), and PW-3 in 2012. Continue sampling as per current facility-wide groundwater monitoring plan..

OW-1 and OW-10

These wells are being visually checked on a quarterly basis starting the 4th quarter of 2004. In 2008, OW-1 was checked on 2/18/2008, 5/21/2008, 9/15/2008, and 11/3/2008. In 2008, OW-10 was checked on 2/18/2008, 5/21/2008, 9/10/2008, and 11/3/2008.

Recommendation:
The Gallup Refinery will continue to visually inspect OW-1 and OW-10 for artesian flow quarterly

MW-1, MW-4, MW-5

MW-1 was sampled on August 8, 2008. MW-4 was sampled on August 5, 2008. MW-5 was sampled on August 13, 2008. MW-4 showed a trace level of Bis (2-ethylhexl) pthlate at 0.000679 ppm, well below any applicable standards. MW-5 had a pH at 9.02 above the NMWQS limit of 6-9.

Recommendation
The Gallup Refinery will sample MW-1, MW-4, and MW-5 annually according to the Facility Site-wide Groundwater Monitoring Plan.

Ponds 1 through 8

Ponds 1 through 8 were sampled quarterly on 3/11/08, 6/17/08, 9/9/08, and 12/2/08. For Ponds 1 and 2, the locations were a significant distance away from the inlets that were sampled as a separate activity. The results for benzene showed no levels above the hazardous waste characteristic of 0.5 ppm. There were volatiles and semi-volatiles contaminants found that are seen to degrade as one progresses along the series of ponds from 1-8.

Recommendation
Western Refining will continue to monitor Ponds 1 through 8 on an annual basis for select General Chemistry parameters, VOCs, SVOCs, and WQCC metals.

Inlets to Pond #1, Pond #2, AL-2 to Pond 1, Boiler water to EP-2, NAPIS effluent, Pilot effluent

These outfalls were sampled annually and quarterly according to the Facility Site-wide Groundwater Monitoring Plan. No benzene levels above 0.5 ppm were found. What is of concern is that effluents entering EP1 had levels of DRO and GRO of approximately 24-160 ppm. This is of concern as the Gallup Refinery has a requirement to ensure no oil to EP-1 which would translate into levels less than 15 ppm – the levels at which a sheen of oil can be discerned. The Gallup Refinery is upgrading its wastewater treatment system to ensure that no oil gets to EP-1.

Recommendation
The Gallup Refinery will continue to monitor these various outfalls on an annual and quarterly basis for select General Chemistry parameters, VOCs, SVOCs, DRO, GRO and WQCC metals. After the wastewater treatment system's upgrades are completed, continue monitoring quarterly for one more year, after which the sampling frequencies could be reevaluated.

Inlets to AL-1 and AL-2

These outfalls were sampled monthly for COD, BOD and SVOCs (Phenols). In most cases, phenols were reduced in concentration from AL-1 to AL-2 and then to EP-1. However, in October 2008, the reverse trend was observed. This may be

Recommendation
The Gallup Refinery will continue to monitor these various outfalls on a monthly basis for COD, BOD and SVOCs (Phenols). After the aeration lagoons are closed, these samples will be discontinued.