

GW - 40

MONITORING REPORTS

DATE:

1991

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FOURTH QUARTER, 1991

RECEIVED

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OIL CONSERVATION DIV.
SANTA FE

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**INTRODUCTION AND SUMMARY
QUARTERLY REPORT
FOURTH QUARTER, 1991**

INTRODUCTION

No significant changes were made to the remediation system during the fourth quarter of 1991. All treated water is being directed toward the infiltration gallery in the old stormwater containment area of the refinery. We continue to monitor its effect on the system. Recovery well SHS-11, part of the offsite recovery well network, has sanded in and is no longer operable. Replacement or repair is on hold pending completion of an offsite report.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevations and product thicknesses, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail on a weekly basis is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FOURTH QUARTER, 1991

STRIPPER INFLUENT	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.28	7.54	7.54
Lab conductivity, umhos/cm	3730.00	3720.00	3720.00
Lab resistivity, ohm-m	2.68	2.69	2.69
Total dissolved solids (180)	2930.00	2830.00	2830.00
Total dissolved solids (calc)	2820.00	2770.00	2770.00
Total alkalinity as CaCO ₃	164.00	267.00	267.00
Total hardness as CaCO ₃	983.00	1050.00	1050.00
Sodium absorption ratio	7.45	6.84	6.84
Bicarbonate as HCO ₃	201.00	326.00	326.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	494.00	413.00	413.00
Sulfate	1310.00	1270.00	1270.00
Calcium	370.00	385.00	385.00
Magnesium	14.60	22.20	22.20
Potassium	2.74	2.69	2.69
Sodium	537.00	510.00	510.00
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	0.50	0.40	0.70
1,2-Dichloroethane	0.50	0.70	0.40
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	3.10	3.20	2.60
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	0.30	0.50	0.20

STRIPPER INFLUENT (continued)

	10/91	11/91	12/91
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	0.20	0.40	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
AROMATICS			
Benzene	17.00	21.00	8.90
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	1.20	2.70	1.50
Toluene	ND	ND	ND
Xylenes	3.40	4.50	1.00
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.68	7.41	7.62
Lab conductivity, umhos/cm	3860.00	4030.00	1360.00
Lab resistivity, ohm-m	2.59	2.48	7.34
Total dissolved solids (180)	2830.00	2840.00	2540.00
Total dissolved solids (calc)	2680.00	2760.00	2670.00
Total alkalinity as CaCO ₃	200.00	144.00	130.00
Total hardness as CaCO ₃	1070.00	983.00	990.00
Sodium absorption ratio	6.32	7.13	6.62
Bicarbonate as HCO ₃	244.00	175.00	159.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	465.00	495.00	521.00
Sulfate	1210.00	1270.00	1200.00
Calcium	381.00	385.00	378.00
Magnesium	28.00	5.65	11.20
Potassium	1.96	2.78	2.44
Sodium	474.00	514.00	479.00
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	0.20	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	0.30	ND
1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

STRIPPER EFFLUENT (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

GRW-1

	10/91	11/91	12/91
AROMATICS			
Benzene		1.70	2.80
Chlorobenzene		ND	ND
1,2-Dichlorobenzene		ND	ND
1,3-Dichlorobenzene		ND	ND
1,4-Dichlorobenzene		ND	ND
Ethylbenzene		6.90	11.00
Toluene		2.60	3.50
Xylenes		6.80	4.90

GRW-3

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.72
Lab conductivity, umhos/cm	4070.00
Lab resistivity, ohm-m	2.46
Total dissolved solids (180)	2770.00
Total dissolved solids (calc)	2850.00
Total alkalinity as CaCO ₃	888.00
Total hardness as CaCO ₃	963.00
Sodium absorption ratio	9.31
Bicarbonate as HCO ₃	1090.00
Carbonate as CO ₃	0.00
Chloride	390.00
Sulfate	897.00
Calcium	329.00
Magnesium	34.70
Potassium	2.35
Sodium	664.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	0.40
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.00
1,2-Dichloroethane	ND
1,1-Dichloroethene	1.00
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	7.00
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	10/91	11/91	12/91
AROMATICS			
Benzene	89.00	21.00	8.60
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	57.00	1.20	6.10
Toluene	ND	4.00	3.70
Xylenes	11.00	ND	ND
PAH			
Acenaphthene	ND		
Acenaphthylene	ND		
Anthracene	ND		
Benzo(a)anthracene	ND		
Benzo(a)pyrene	ND		
Benzo(b)fluoranthene	ND		
Benzo(g,h,i)perylene	ND		
Benzo(k)fluoranthene	ND		
Chrysene	ND		
Dibenzo(a,h)anthracene	ND		
Fluoranthene	ND		
Fluorene	3.10		
Indeno(1,2,3-cd)pyrene	ND		
Naphthalene	ND		
Phenanthrene	1.50		
Pyrene	ND		

GRW-4

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.68		
Lab conductivity, umhos/cm	3800.00		
Lab resistivity, ohm-m	2.63		
Total dissolved solids (180)	2280.00		
Total dissolved solids (calc)	2240.00		
Total alkalinity as CaCO ₃	887.00		
Total hardness as CaCO ₃	720.00		
Sodium absorption ratio	9.16		
Bicarbonate as HCO ₃	1080.00		
Carbonate as CO ₃	0.00		
Chloride	532.00		
Sulfate	339.00		
Calcium	248.00		
Magnesium	24.60		
Potassium	1.17		
Sodium	565.00		
PAH			
Acenaphthene	ND		
Acenaphthylene	ND		
Anthracene	ND		
Benzo(a)anthracene	ND		
Benzo(a)pyrene	ND		
Benzo(b)fluoranthene	ND		
Benzo(g,h,i)perylene	ND		
Benzo(k)fluoranthene	ND		
Chrysene	0.40		
Dibenzo(a,h)anthracene	ND		
Fluoranthene	ND		
Fluorene	4.70		
Indeno(1,2,3-cd)pyrene	ND		
Naphthalene	ND		
Phenanthrene	ND		
Pyrene	ND		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	3.00		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		

GRW-4 (continued)

	10/91	11/91	12/91
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	2.00		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
1,2-Dichloroethene	3.00		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	2.00		
1,1,1-Trichloroethane	2.00		
1,1,2-Trichloroethane	ND		
Trichloroethene	3.00		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	570.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	49.00		
Toluene	3.00		
Xylenes	30.00		

GRW-6

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.73
Lab conductivity, umhos/cm	4530.00
Lab resistivity, ohm-m	2.21
Total dissolved solids (180)	2760.00
Total dissolved solids (calc)	2810.00
Total alkalinity as CaCO ₃	700.00
Total hardness as CaCO ₃	1040.00
Sodium absorption ratio	8.09
Bicarbonate as HCO ₃	854.00
Carbonate as CO ₃	0.00
Chloride	552.00
Sulfate	839.00
Calcium	382.00
Magnesium	19.80
Potassium	1.96
Sodium	598.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.60
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND

GRW-6 (continued)

	10/91	11/91	12/91
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	1.30		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	0.30		
1,2-Dichloroethene	3.70		
1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	1.20		
1,1,1-Trichloroethane	0.70		
1,1,2-Trichloroethane	ND		
Trichloroethene	1.10		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	13.50		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	0.80		
Toluene	0.60		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GRW-13

GENERAL WATER CHEMISTRY

Lab conductivity, umhos/cm

10/91

11/91

12/91

4480.00

4530.00

4343.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	15.50
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GRW-13 (continued)

	10/91	11/91	12/91
PAH			
Acenaphthene	ND		
Acenaphthylene	ND		
Anthracene	ND		
Benzo(a)anthracene	ND		
Benzo(a)pyrene	ND		
Benzo(b)fluoranthene	ND		
Benzo(g,h,i)perylene	ND		
Benzo(k)fluoranthene	ND		
Chrysene	ND		
Dibenzo(a,h)anthracene	ND		
Fluoranthene	ND		
Fluorene	ND		
Indeno(1,2,3-cd)pyrene	ND		
Naphthalene	ND		
Phenanthrene	ND		
Pyrene	ND		

GBR-15

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.41
Lab conductivity, umhos/cm	4650.00
Lab resistivity, ohm-m	2.15
Total dissolved solids (180)	3160.00
Total dissolved solids (calc)	3080.00
Total alkalinity as CaCO ₃	273.00
Total hardness as CaCO ₃	1060.00
Sodium absorption ratio	7.83
Bicarbonate as HCO ₃	333.00
Carbonate as CO ₃	0.00
Chloride	451.00
Sulfate	1460.00
Calcium	381.00
Magnesium	26.70
Potassium	7.43
Sodium	586.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.20
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	2.30
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-15 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	3.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-17

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.21		
Lab conductivity, umhos/cm	2880.00		
Lab resistivity, ohm-m	3.47		
Total dissolved solids (180)	2150.00		
Total dissolved solids (calc)	2160.00		
Total alkalinity as CaCO ₃	240.00		
Total hardness as CaCO ₃	985.00		
Sodium absorption ratio	3.98		
Bicarbonate as HCO ₃	293.00		
Carbonate as CO ₃	0.00		
Chloride	66.20		
Sulfate	1280.00		
Calcium	348.00		
Magnesium	28.60		
Potassium	ND		
Sodium	287.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chlorobenzene	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

GBR-17 (continued)

	10/91	10/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-24-D

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.56		
Lab conductivity, umhos/cm	5010.00		
Lab resistivity, ohm-m	20.00		
Total dissolved solids (180)	3860.00		
Total dissolved solids (calc)	3770.00		
Total alkalinity as CaCO ₃	216.00		
Total hardness as CaCO ₃	1950.00		
Sodium absorption ratio	4.80		
Bicarbonate as HCO ₃	264.00		
Carbonate as CO ₃	0.00		
Chloride	797.00		
Sulfate	1620.00		
Calcium	648.00		
Magnesium	82.20		
Potassium	4.30		
Sodium	488.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	1.00		
& 1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	0.50		
1,2-Dichloroethane	34.00		
1,1-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	0.60		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	0.40		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

GBR-24-D (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	100.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	24.00		
Toluene	10.00		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-30

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.78
Lab conductivity, umhos/cm	4000.00
Lab resistivity, ohm-m	2.50
Total dissolved solids (180)	2890.00
Total dissolved solids (calc)	2870.00
Total alkalinity as CaCO ₃	248.00
Total hardness as CaCO ₃	1040.00
Sodium absorption ratio	7.18
Bicarbonate as HCO ₃	303.00
Carbonate as CO ₃	0.00
Chloride	489.00
Sulfate	1290.00
Calcium	390.00
Magnesium	17.00
Potassium	2.35
Sodium	533.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-30 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

GBR-31

	10/91	11/91	12/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.30		
Lab conductivity, umhos/cm	4240.00		
Lab resistivity, ohm-m	2.36		
Total dissolved solids (180)	2930.00		
Total dissolved solids (calc)	2900.00		
Total alkalinity as CaCO ₃	240.00		
Total hardness as CaCO ₃	1020.00		
Sodium absorption ratio	7.51		
Bicarbonate as HCO ₃	293.00		
Carbonate as CO ₃	0.00		
Chloride	468.00		
Sulfate	1340.00		
Calcium	356.00		
Magnesium	32.70		
Potassium	1.56		
Sodium	552.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.20
1,2-Dichloroethane	ND
1,2-Dichloroethene	2.70
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.50
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-31 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		

GBR-32

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.17
Lab conductivity, umhos/cm	4360.00
Lab resistivity, ohm-m	2.29
Total dissolved solids (180)	3590.00
Total dissolved solids (calc)	3500.00
Total alkalinity as CaCO3	248.00
Total hardness as CaCO3	1140.00
Sodium absorption ratio	8.56
Fluoride	0.88
Nitrate	0.37
Nitrite	0.03
Bicarbonate as HCO3	303.00
Carbonate as CO3	0.00
Chloride	199.00
Sulfate	2050.00
Calcium	407.00
Magnesium	30.30
Potassium	3.78
Sodium	665.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.60
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	49.00
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	5.20
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	2.50
Trichlorofluoromethane	0.30
Vinyl chloride	ND

GBR-48

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.88
Lab conductivity, umhos/cm	6100.00
Lab resistivity, ohm-m	1.64
Total dissolved solids (180)	4680.00
Total dissolved solids (calc)	4470.00
Total alkalinity as CaCO ₃	377.00
Total hardness as CaCO ₃	1570.00
Sodium absorption ratio	10.00
Fluoride	0.71
Nitrate	8.42
Nitrite	0.04
Bicarbonate as HCO ₃	461.00
Carbonate as CO ₃	0.00
Chloride	873.00
Sulfate	1870.00
Calcium	530.00
Magnesium	58.90
Potassium	4.34
Sodium	912.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	0.50
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	2.70
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	140.00
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	11.00
1,1,1-Trichloroethane	0.50
1,1,2-Trichloroethane	ND
Trichloroethene	7.70
Trichlorofluoromethane	0.40
Vinyl chloride	ND

GBR-49

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.88
Lab conductivity, umhos/cm	5290.00
Lab resistivity, ohm-m	1.89
Total dissolved solids (180)	4200.00
Total dissolved solids (calc)	3840.00
Total alkalinity as CaCO ₃	382.00
Total hardness as CaCO ₃	1510.00
Sodium absorption ratio	8.11
Fluoride	0.52
Nitrate	0.72
Nitrite	0.04
Bicarbonate as HCO ₃	465.00
Carbonate as CO ₃	0.00
Chloride	631.00
Sulfate	1840.00
Calcium	121.00
Magnesium	293.00
Potassium	3.81
Sodium	724.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	6.30
1,2-Dichloroethane	ND
1,1-Dichloroethene	0.30
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	120.00
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	17.00
1,1,1-Trichloroethane	0.70
1,1,2-Trichloroethane	ND
Trichloroethene	12.00
Trichlorofluoromethane	0.20
Vinyl chloride	ND

GBR-50

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.15
Lab conductivity, umhos/cm	3260.00
Lab resistivity, ohm-m	3.07
Total dissolved solids (180)	2780.00
Total dissolved solids (calc)	2630.00
Total alkalinity as CaCO ₃	191.00
Total hardness as CaCO ₃	1000.00
Sodium absorption ratio	5.97
Fluoride	0.95
Nitrate	2.51
Nitrite	0.12
Bicarbonate as HCO ₃	233.00
Carbonate as CO ₃	0.00
Chloride	42.20
Sulfate	1650.00
Calcium	367.00
Magnesium	21.90
Potassium	2.42
Sodium	435.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	0.90
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	0.30
Vinyl chloride	ND

*ND - Not detected at specified detection limit

OFFSITE WELLS

SHS-3

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	0.60
cis-1,2-Dichloroethene	ND
1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-6 (continued)

AROMATICS	10/91	11/91	12/91
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-10

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

Bromoform

Bromomethane

Carbon tetrachloride

Chloroethane

2-Chloroethylvinylether

Chloroform

Chloromethane

Dibromochloromethane

1,2-Dichlorobenzene

1,3-Dichlorobenzene

1,4-Dichlorobenzene

1,1-Dichloroethane

1,2-Dichloroethane

1,2-Dichloroethene

cis-1,2-Dichloroethene

trans-1,2-Dichloroethene

1,2-Dichloropropane

cis-1,3-Dichloropropene

trans-1,3-Dichloropropene

Methylene chloride

1,1,2,2-Tetrachloroethane

Tetrachloroethene

1,1,1-Trichloroethane

1,1,2-Trichloroethane

Trichloroethene

Trichlorofluoromethane

Vinyl chloride

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

ND

0.20

ND

ND

ND

ND

ND

SHS-12

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

0.30

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

0.60

1,2-Dichloroethane

ND

1,2-Dichloroethene

3.20

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

0.90

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

0.40

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-10 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	37.00		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-12 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-13

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.90
1,2-Dichloroethane	ND
1,2-Dichloroethene	0.40
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-13 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-15

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	6.50
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

SHS-15 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

10/91

11/91

12/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)

Lab conductivity, umhos/cm

Lab resistivity, ohm-m

Total dissolved solids (180)

Total dissolved solids (calc)

Total alkalinity as CaCO₃Total hardness as CaCO₃

Sodium absorption ratio

Bicarbonate as HCO₃Carbonate as CO₃

Chloride

Sulfate

Calcium

Magnesium

Potassium

Sodium

HALOCARBONS

Bromodichloromethane

ND

Bromoform

ND

Bromomethane

ND

Carbon tetrachloride

ND

Chloroethane

ND

2-Chloroethylvinylether

ND

Chloroform

ND

Chloromethane

ND

Dibromochloromethane

ND

1,2-Dichlorobenzene

ND

1,3-Dichlorobenzene

ND

1,4-Dichlorobenzene

ND

1,1-Dichloroethane

ND

1,2-Dichloroethane

ND

1,2-Dichloroethene

ND

cis-1,2-Dichloroethene

ND

trans-1,2-Dichloroethene

ND

1,2-Dichloropropane

ND

cis-1,3-Dichloropropene

ND

trans-1,3-Dichloropropene

ND

Methylene chloride

ND

1,1,2,2-Tetrachloroethane

ND

Tetrachloroethene

ND

1,1,1-Trichloroethane

ND

1,1,2-Trichloroethane

ND

Trichloroethene

ND

Trichlorofluoromethane

ND

Vinyl chloride

ND

SHS-16 (continued)

	10/91	11/91	12/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

*ND - Not detected at specified detection limit

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: October, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	58.30	58.30	0.00	5336.00
GRW-2	5391.28	41.83	41.82	0.01	5349.46
GRW-3	5388.77	53.70	53.70	0.00	5335.07
GRW-4	5390.02	49.75	49.75	0.00	5340.27
GRW-5	5390.56	49.65	49.65	0.00	5340.91
GRW-6	5390.81	44.20	44.20	0.00	5346.61
GRW-10	5395.02	58.84	50.24	8.60	5343.06
GRW-11	5397.85	63.77	63.77	0.00	5334.08
GRW-12	5397.24	46.64	46.64	0.00	5350.60
GRW-13	5396.90	54.13	54.13	0.00	5342.77
GBR-5	5395.07	28.65	26.36	2.29	5368.25
GBR-6	5395.70	60.55	60.55	0.00	5335.15
GBR-7	5395.85	32.93	30.51	2.42	5364.86
GBR-8	5390.50	41.80	41.80	0.00	5348.70
GBR-9	5389.92	47.19	47.19	0.00	5342.73
GBR-10	5390.57	42.15	42.15	0.00	5348.42
GBR-11	5389.43	42.08	40.85	1.23	5348.33
GBR-13	5393.04	36.20	36.20	0.00	5356.84
GBR-15	5397.99	42.24	42.24	0.00	5355.75
GBR-17	5402.69	34.36	34.36	0.00	5368.33
GBR-18	5421.68	23.04	23.04	0.00	5398.64
GBR-19	5393.83	38.78	38.78	0.00	5355.05
GBR-20	5393.47	41.84	38.00	3.84	5354.70
GBR-21S	5400.65	19.81	19.70	0.11	5380.93
GBR-21D	5400.19	35.12	35.12	0.00	5365.07
GBR-22	5395.91	38.35	35.36	2.99	5359.95
GBR-23	5403.72	22.02	22.02	0.00	5381.70
GBR-24S	5396.08	26.80	26.09	0.71	5369.85
GBR-24D	5396.77	31.25	31.25	0.00	5365.52
GBR-25	5396.72	30.35	30.35	0.00	5366.37
GBR-26	5395.59	36.00	36.00	0.00	5359.59
GBR-30	5396.58	32.62	32.62	0.00	5363.96
GBR-31	5394.86	34.43	34.43	0.00	5360.43
GBR-33	5396.28	37.38	37.37	0.01	5358.91
GBR-34	5394.00	35.20	34.99	0.21	5358.97
GBR-35	5393.66	35.20	34.90	0.30	5358.70
GBR-39	5397.55	35.32	35.32	0.00	5362.23
GBR-40	5400.76	27.74	27.74	0.00	5373.02
GBR-41	5396.35	20.96	20.96	0.00	5375.39
GBR-51	5389.68	40.20	40.20	0.00	5349.48
GBR-52	5387.74	38.58	38.58	0.00	5349.16

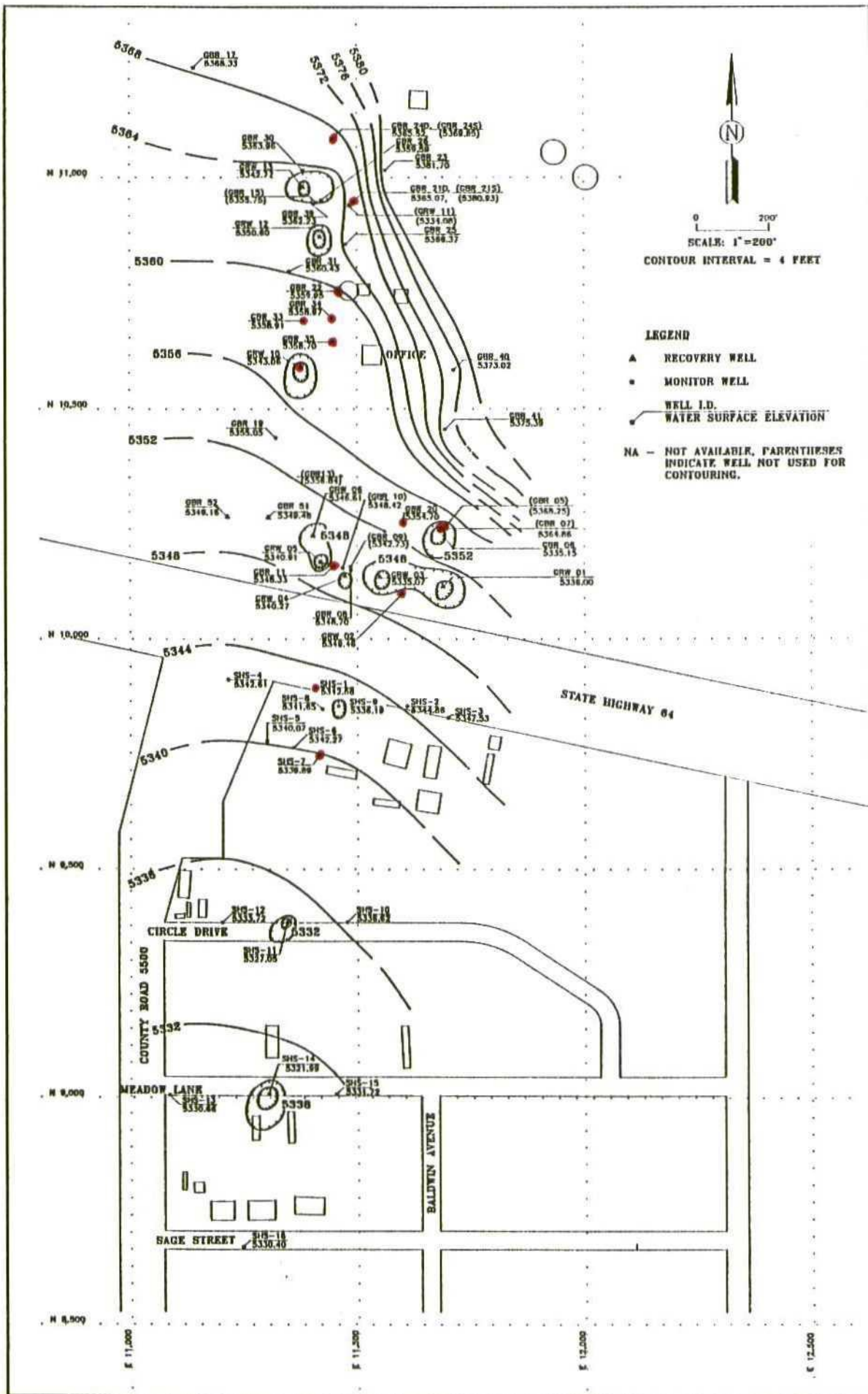
* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: October, 1991
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WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.02	40.94	0.08	5342.58
SHS-2	5381.66	36.80	36.80	0.00	5344.86
SHS-3	5383.33	35.80	35.80	0.00	5347.53
SHS-4	5383.62	41.01	41.01	0.00	5342.61
SHS-5	5378.36	38.29	38.29	0.00	5340.07
SHS-6	5378.17	35.40	35.40	0.00	5342.77
SHS-7	5378.77	39.52	38.72	0.80	5339.89
SHS-8	5380.25	38.60	38.60	0.00	5341.65
SHS-9	5380.79	44.60	44.60	0.00	5336.19
SHS-10	5373.80	37.18	37.18	0.00	5336.62
SHS-11	5373.17	46.12	46.12	0.00	5327.05
SHS-12	5373.94	40.22	40.22	0.00	5333.72
SHS-13	5367.81	37.15	37.15	0.00	5330.66
SHS-14	5367.07	45.08	45.08	0.00	5321.99
SHS-15	5366.21	34.49	34.49	0.00	5331.72
SHS-16	5362.58	32.18	32.18	0.00	5330.40

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

October 1991, Water Surface Contour Map
Giant-Bloomfield Refinery



GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: November, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.10	59.10	0.00	5335.20
GRW-2	5391.28	64.06	64.06	0.00	5327.22
GRW-3	5388.77	53.37	53.37	0.00	5335.40
GRW-4	5390.02	47.93	47.93	0.00	5342.09
GRW-5	5390.56	59.60	59.60	0.00	5330.96
GRW-6	5390.81	48.08	48.08	0.00	5342.73
GRW-10	5395.02	57.25	47.65	9.60	5345.45
GRW-11	5397.85	64.20	64.20	0.00	5333.65
GRW-12	5397.24	46.91	46.91	0.00	5350.33
GRW-13	5396.90	55.18	55.18	0.00	5341.72
GBR-5	5395.07	28.63	26.35	2.28	5368.26
GBR-6	5395.70	60.95	60.95	0.00	5334.75
GBR-7	5395.85	33.34	30.93	2.41	5364.44
GBR-8	5390.50	42.00	42.00	0.00	5348.50
GBR-9	5389.92	47.57	47.57	0.00	5342.35
GBR-10	5390.57	42.18	42.18	0.00	5348.39
GBR-11	5389.43	42.34	40.96	1.38	5348.19
GBR-13	5393.04	39.30	39.30	0.00	5353.74
GBR-15	5397.99	42.42	42.42	0.00	5355.57
GBR-17	5402.69	34.43	34.43	0.00	5368.26
GBR-18	5421.68	23.06	23.06	0.00	5398.62
GBR-19	5393.83	38.90	38.90	0.00	5354.93
GBR-20	5393.47	42.38	38.48	3.90	5354.21
GBR-21S	5400.65	19.80	19.71	0.09	5380.92
GBR-21D	5400.19	35.20	35.20	0.00	5364.99
GBR-22	5395.91	38.37	35.35	3.02	5359.96
GBR-23	5403.72	22.00	22.00	0.00	5381.72
GBR-24S	5396.08	26.76	25.99	0.77	5369.94
GBR-24D	5396.77	31.03	31.03	0.00	5365.74
GBR-25	5396.72	30.13	30.13	0.00	5366.59
GBR-26	5395.59	36.19	36.19	0.00	5359.40
GBR-30	5396.58	32.80	32.80	0.00	5363.78
GBR-31	5394.86	34.42	34.42	0.00	5360.44
GBR-33	5396.28	37.38	37.38	0.00	5358.90
GBR-34	5394.00	35.24	35.00	0.24	5358.95
GBR-35	5393.66	35.32	34.90	0.42	5358.68
GBR-39	5397.55	35.75	35.75	0.00	5361.80
GBR-40	5400.76	28.75	28.75	0.00	5372.01
GBR-41	5396.35	21.54	21.54	0.00	5374.81
GBR-51	5389.68	40.30	40.30	0.00	5349.38
GBR-52	5387.74	38.68	38.68	0.00	5349.06

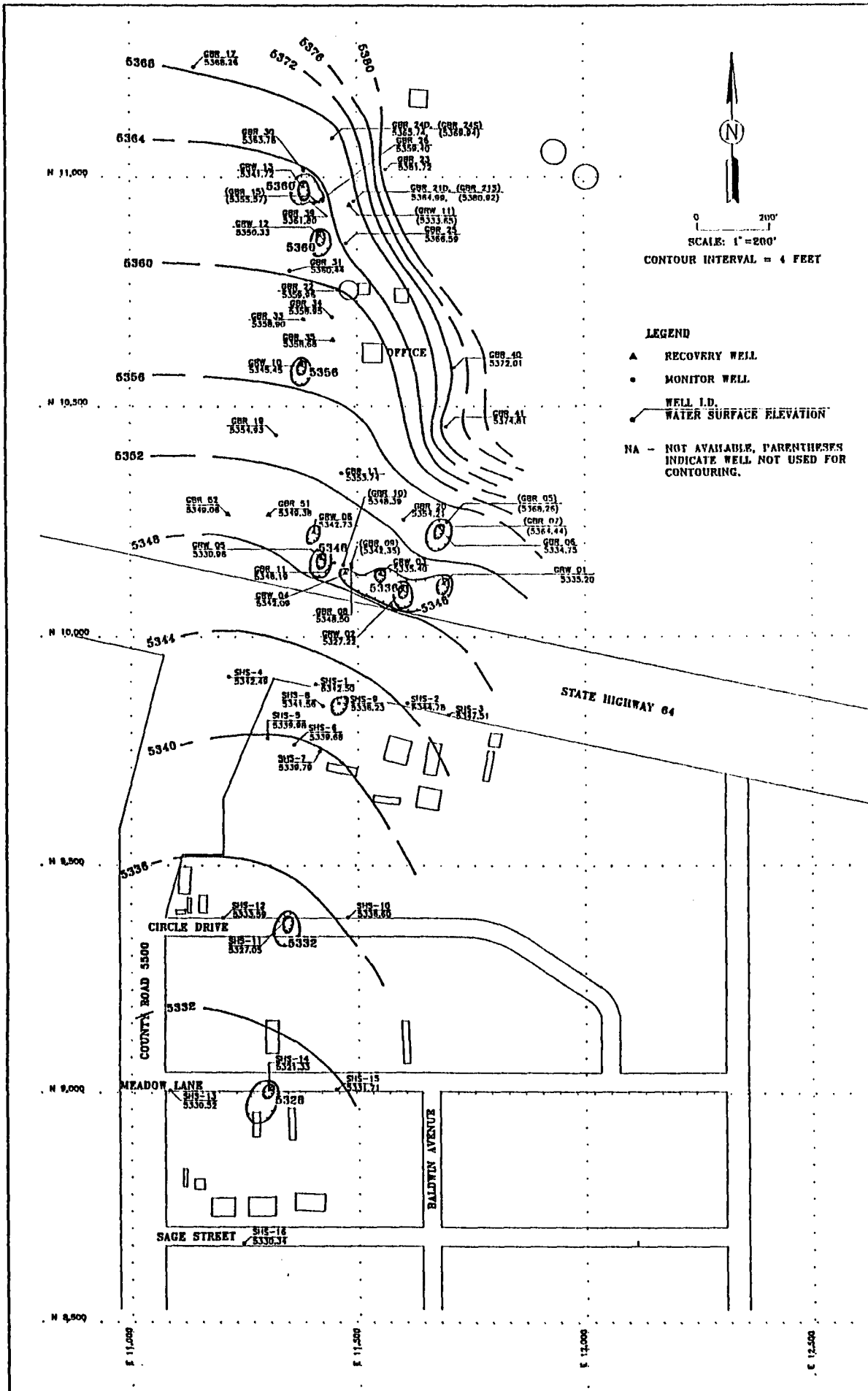
* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: November, 1991
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WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.14	41.02	0.12	5342.50
SHS-2	5381.66	36.88	36.88	0.00	5344.78
SHS-3	5383.33	35.82	35.82	0.00	5347.51
SHS-4	5383.62	41.13	41.13	0.00	5342.49
SHS-5	5378.36	38.38	38.38	0.00	5339.98
SHS-6	5378.17	38.49	38.49	0.00	5339.68
SHS-7	5378.77	39.72	38.80	0.92	5339.79
SHS-8	5380.25	38.69	38.69	0.00	5341.56
SHS-9	5380.79	44.56	44.56	0.00	5336.23
SHS-10	5373.80	37.20	37.20	0.00	5336.60
SHS-11	5373.17	46.12	46.12	0.00	5327.05
SHS-12	5373.94	40.35	40.35	0.00	5333.59
SHS-13	5367.81	37.29	37.29	0.00	5330.52
SHS-14	5367.07	45.74	45.74	0.00	5321.33
SHS-15	5366.21	34.50	34.50	0.00	5331.71
SHS-16	5362.58	32.24	32.24	0.00	5330.34

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

November 1991, Water Surface Contour Map
Giant-Bloomfield Refinery



GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: December, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.17	60.17	0.00	5334.13
GRW-2	5391.28	49.95	49.95	0.00	5341.33
GRW-3	5388.77	52.50	52.50	0.00	5336.27
GRW-4	5390.02	49.70	49.70	0.00	5340.32
GRW-5	5390.56	47.00	47.00	0.00	5343.56
GRW-6	5390.81	46.28	46.28	0.00	5344.53
GRW-10	5395.02	53.20	48.50	4.70	5345.58
GRW-11	5397.85	31.14	31.14	0.00	5366.71
GRW-12	5397.24	46.38	46.38	0.00	5350.86
GRW-13	5396.90	56.48	56.48	0.00	5340.42
GBR-5	5395.07	29.43	27.06	2.37	5367.54
GBR-6	5395.70	61.30	61.30	0.00	5334.40
GBR-7	5395.85	34.03	31.56	2.47	5363.80
GBR-8	5390.50	42.13	42.10	0.03	5348.39
GBR-9	5389.92	49.67	49.67	0.00	5340.25
GBR-10	5390.57	42.19	42.19	0.00	5348.38
GBR-11	5389.43	42.45	41.10	1.35	5348.06
GBR-13	5393.04	39.66	39.66	0.00	5353.38
GBR-15	5397.99	34.62	34.62	0.00	5363.37
GBR-17	5402.69	34.45	34.45	0.00	5368.24
GBR-18	5421.68	22.93	22.93	0.00	5398.75
GBR-19	5393.83	38.86	38.86	0.00	5354.97
GBR-20	5393.47	42.78	38.95	3.83	5353.75
GBR-21S	5400.65	19.76	19.70	0.06	5380.94
GBR-21D	5400.19	30.17	30.17	0.00	5370.02
GBR-22	5395.91	39.10	35.02	4.08	5360.07
GBR-23	5403.72	21.92	21.92	0.00	5381.80
GBR-24S	5396.08	25.90	23.40	2.50	5372.18
GBR-24D	5396.77	28.60	28.60	0.00	5368.17
GBR-25	5396.72	28.13	28.13	0.00	5368.59
GBR-26	5395.59	33.01	33.01	0.00	5362.58
GBR-30	5396.58	32.64	32.64	0.00	5363.94
GBR-31	5394.86	34.44	34.44	0.00	5360.42
GBR-33	5396.28	37.34	37.34	0.00	5358.94
GBR-34	5394.00	35.09	34.94	0.15	5359.03
GBR-35	5393.66	34.96	34.94	0.02	5358.72
GBR-39	5397.55	34.35	34.35	0.00	5363.20
GBR-40	5400.76	29.40	29.40	0.00	5371.36
GBR-41	5396.35	22.15	22.15	0.00	5374.20
GBR-51	5389.68	40.25	40.25	0.00	5349.43
GBR-52	5387.74	38.54	38.54	0.00	5349.20

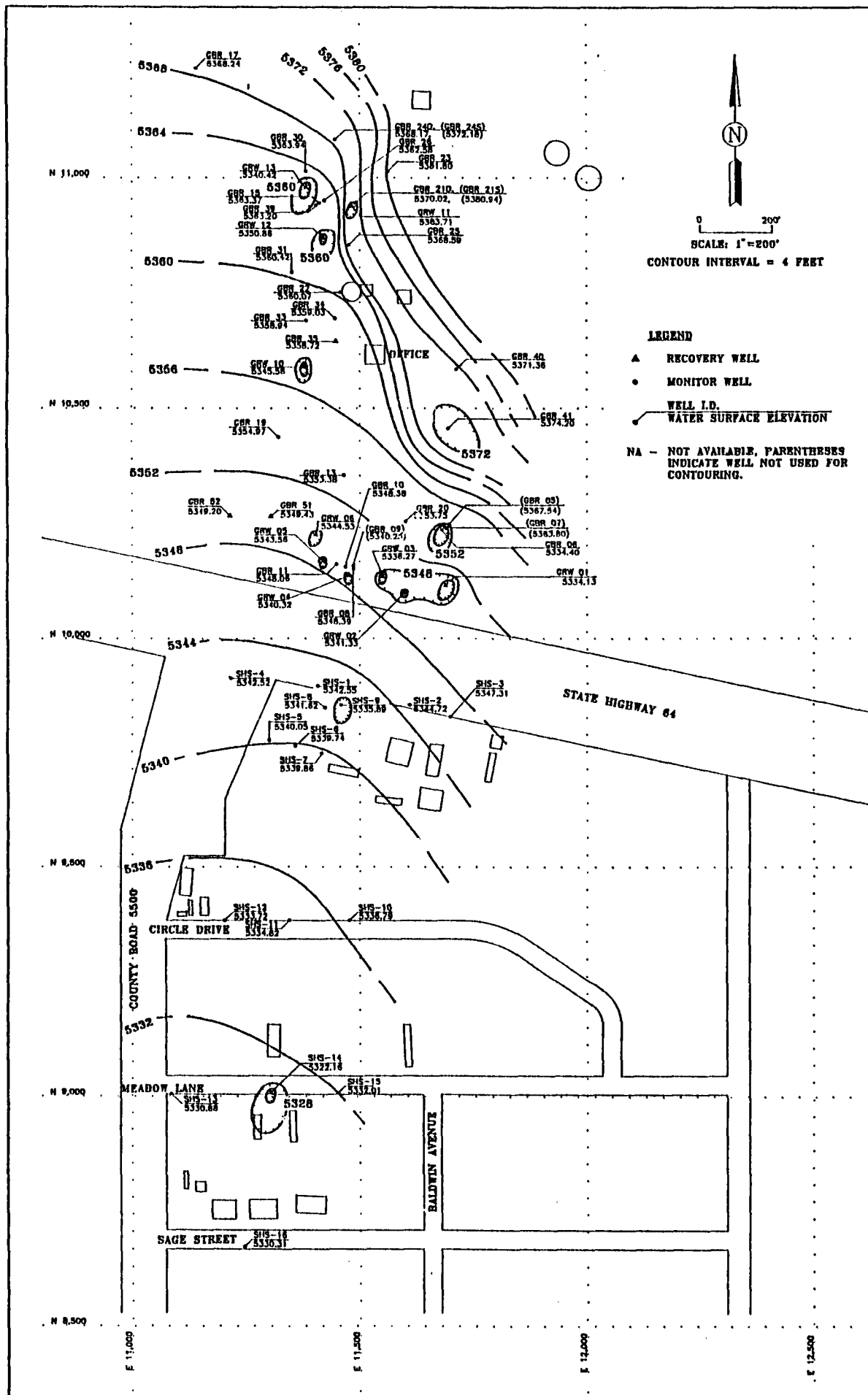
* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: December, 1991
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WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.07	40.97	0.10	5342.55
SHS-2	5381.66	36.94	36.94	0.00	5344.72
SHS-3	5383.33	36.02	36.02	0.00	5347.31
SHS-4	5383.62	41.10	41.10	0.00	5342.52
SHS-5	5378.36	38.31	38.31	0.00	5340.05
SHS-6	5378.17	38.43	38.43	0.00	5339.74
SHS-7	5378.77	39.58	38.74	0.84	5339.86
SHS-8	5380.25	38.63	38.63	0.00	5341.62
SHS-9	5380.79	44.90	44.90	0.00	5335.89
SHS-10	5373.80	37.01	37.01	0.00	5336.79
SHS-11	5373.17	38.35	38.35	0.00	5334.82
SHS-12	5373.94	40.22	40.22	0.00	5333.72
SHS-13	5367.81	37.13	37.13	0.00	5330.68
SHS-14	5367.07	44.91	44.91	0.00	5322.16
SHS-15	5366.21	34.20	34.20	0.00	5332.01
SHS-16	5362.58	32.27	32.27	0.00	5330.31

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

December 1991, Water Surface Contour Map
Giant-Bloomfield Refinery



Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Fourth Quarter, 1991

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Total Volume Of Water Recovered	1877501
Net Change In Storage Volume	-62528

Total Water Pumped To The Infiltration Gallery	1747586
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Difference	-192443
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Comments: The approximately 10% difference
can be accounted for in meter
error.

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Fourth Quarter, 1991

Tank Number	Beginning Volume	Ending Volume	Net Change
102	16763	15073	-1690
106	8010	8010	0
21	218449	247673	29224
22	331759	241697	-90062
27	182470	182470	0
32	88634	88634	0
34	87541	87541	0
35	0	0	0
37	138051	138051	0
Total Net Volume Change			-62528

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Fourth Quarter, 1991

Well	Month #1	Month #2	Month #3	Total
GRW-1	10760	7760	7850	26370
GRW-2	7560	6340	6370	20270
GRW-3	14350	11750	12310	38410
GRW-4	22010	17950	16080	56040
GRW-5	58150	49830	54800	162780
GRW-6	16080	13980	18540	48600
GRW-9	8510	6950	7150	22610
GRW-10	316030	245720	236640	798390
GRW-11	42060	9390	16590	68040
GRW-12	2650	16630	20460	39740
GRW-13	30600	25490	28870	84960
SHS-9	6072	5171	5320	16563
SHS-11	4133	1664	0	5797
SHS-14	181165	148713	159053	488931
Total Volume Pumped In Gallons				1877501

SPECIFIC CONDUCTANCE VALUES

GRW-13

	10/91	11/91	12/91
Lab conductivity, umhos/cm	4480.00	4530.00	4343.00



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11284501

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GEOSCIENCE CONSULTANTS
PROJECT # : C.O.C.4158
PROJECT NAME : GIANT
CLIENT I.D. : 9112161250 GBR 50
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/16/91
DATE RECEIVED : 12/18/91
DATE EXTRACTED : N/A
DATE ANALYZED : 12/20/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.9
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	0.3
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	90
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11284502

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GEOSCIENCE CONSULTANTS
PROJECT # : C.O.C.4158
PROJECT NAME : GIANT
CLIENT I.D. : 9112161400 GBR 32
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/16/91
DATE RECEIVED : 12/18/91
DATE EXTRACTED : N/A
DATE ANALYZED : 12/20/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.6
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	49
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	5.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	2.5
TRICHLOROFLUOROMETHANE	0.3
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	95

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11284503

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GEOSCIENCE CONSULTANTS	DATE SAMPLED	: 12/16/91
PROJECT #	: C.O.C.4158	DATE RECEIVED	: 12/18/91
PROJECT NAME	: GIANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9112161500 GBR 49	DATE ANALYZED	: 12/20/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	6.3
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	0.3
1,2-DICHLOROETHENE (TOTAL)	120 D
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	17
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.7
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	12
TRICHLOROFLUOROMETHANE	0.2
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	95



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11284504

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GEOSCIENCE CONSULTANTS
PROJECT # : C.O.C.4158
PROJECT NAME : GIANT
CLIENT I.D. : 9112161130 GBR 48
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/16/91
DATE RECEIVED : 12/18/91
DATE EXTRACTED : N/A
DATE ANALYZED : 12/20/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.5
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	2.7
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	140 D
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	11
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.5
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	7.7
TRICHLOROFLUOROMETHANE	0.4
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

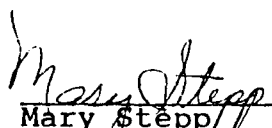
SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	90

CLIENT: Geo Science Consultants DATE REPORTED: 01/02/92
ID: 1250
SITE: GBR - 50 DATE RECEIVED: 12/18/91
LAB NO: F7774 DATE COLLECTED: 12/16/91

Lab pH (s.u.).....	8.15
Lab Conductivity, umhos/cm @ 25C....	3260
Lab Resistivity, ohm-m.....	3.07
Total Dissolved Solids (180C), mg/L.	2780
Total Dissolved Solids (calc), mg/L.	2630
Total Alkalinity as CaCO ₃ , mg/L.....	191
Total Hardness as CaCO ₃ , mg/L.....	1000
Sodium Adsorption Ratio.....	5.97
Fluoride, mg/L.....	0.95
Nitrate, mg/L.....	2.51
Nitrite, mg/L.....	0.12

	mg/L	meq/L
Bicarbonate as HCO ₃	233	3.82
Carbonate as CO ₃	0	0
Chloride.....	42.2	1.19
Sulfate.....	1650	34.4
Calcium.....	367	18.3
Magnesium.....	21.9	1.8
Potassium.....	2.42	0.06
Sodium.....	435	18.9
Major Cations.....		39.1
Major Anions.....		39.6
Cation/Anion Difference.....		0.63 %


Mary Stepp
Lab Director

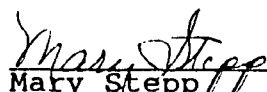

Wanda Orso
Water Lab Supervisor

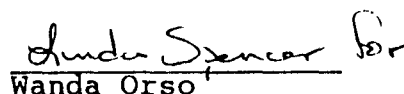
CLIENT: Geo Science Consultants
ID: 1130
SITE: GBR - 48
LAB NO: F7773

DATE REPORTED: 01/02/92
DATE RECEIVED: 12/18/91
DATE COLLECTED: 12/16/91

Lab pH (s.u.).....	7.88
Lab Conductivity, umhos/cm @ 25C....	6100
Lab Resistivity, ohm-m.....	1.64
Total Dissolved Solids (180C), mg/L.	4680
Total Dissolved Solids (calc), mg/L.	4470
Total Alkalinity as CaCO ₃ , mg/L.....	377
Total Hardness as CaCO ₃ , mg/L.....	1570
Sodium Adsorption Ratio.....	10.0
Fluoride, mg/L.....	0.71
Nitrate, mg/L.....	8.42
Nitrite, mg/L.....	0.04

	mg/L	meq/L
Bicarbonate as HCO ₃	461	7.55
Carbonate as CO ₃	0	0
Chloride.....	873	24.6
Sulfate.....	1870	38.9
Calcium.....	530	26.5
Magnesium.....	58.9	4.85
Potassium.....	4.34	0.11
Sodium.....	912	39.7
Major Cations.....		71.1
Major Anions.....		71.7
Cation/Anion Difference.....		0.43 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

CLIENT: Geo Science Consultants
ID: 1400
SITE: GBR - 32
LAB NO: F7772

DATE REPORTED: 01/02/92
DATE RECEIVED: 12/18/91
DATE COLLECTED: 12/16/91

Lab pH (s.u.).....	8.17
Lab Conductivity, umhos/cm @ 25C....	4360
Lab Resistivity, ohm-m.....	2.29
Total Dissolved Solids (180C), mg/L.	3590
Total Dissolved Solids (calc), mg/L.	3500
Total Alkalinity as CaCO ₃ , mg/L.....	248
Total Hardness as CaCO ₃ , mg/L.....	1140
Sodium Adsorption Ratio.....	8.56
Fluoride, mg/L.....	0.88
Nitrate, mg/L.....	0.37
Nitrite, mg/L.....	0.03

	mg/L	meq/L
Bicarbonate as HCO ₃	303	4.96
Carbonate as CO ₃	0	0
Chloride.....	199	5.61
Sulfate.....	2050	42.7
Calcium.....	407	20.3
Magnesium.....	30.3	2.49
Potassium.....	3.78	0.1
Sodium.....	665	28.9
Major Cations.....		51.8
Major Anions.....		53.3
Cation/Anion Difference.....		1.39 %

Mary Stepp
Mary Stepp
Lab Director

Wanda Orsol
Wanda Orsol
Water Lab Supervisor

RECEIVED JAN 13 1992

2506 W. Main Street
Tomball, Tex. 77401

CLIENT: Geo Science Consultants
ID: 1500
SITE: GBR - 49
LAB NO: F7771

DATE REPORTED: 01/02/92
DATE RECEIVED: 12/18/91
DATE COLLECTED: 12/16/91

Lab pH (s.u.).....	7.88
Lab Conductivity, umhos/cm @ 25C....	5290
Lab Resistivity, ohm-m.....	1.89
Total Dissolved Solids (180C), mg/L.	4200
Total Dissolved Solids (calc), mg/L.	3840
Total Alkalinity as CaCO ₃ , mg/L.....	382
Total Hardness as CaCO ₃ , mg/L.....	1510
Sodium Adsorption Ratio.....	8.11
Fluoride, mg/L.....	0.52
Nitrate, mg/L.....	0.72
Nitrite, mg/L.....	0.04

	mg/L	meq/L
Bicarbonate as HCO ₃	465	7.63
Carbonate as CO ₃	0	0
Chloride.....	631	17.8
Sulfate.....	1840	38.2
Calcium.....	121	6.03
Magnesium.....	293	24.1
Potassium.....	3.81	0.10
Sodium.....	724	31.5
Major Cations.....		61.7
Major Anions.....		63.7
Cation/Anion Difference.....		1.58 %

Mary Stepp
Mary Stepp
Lab Director

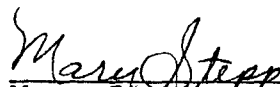
Linda Spencer for
Wanda Orso
Water Lab Supervisor

CLIENT: Giant Refinery
ID: 0835
SITE: Stripper Influent
LAB NO: F7638

DATE REPORTED: 12/02/91
DATE RECEIVED: 11/11/91
DATE COLLECTED: 11/11/91

Lab pH (s.u.).....	7.54
Lab conductivity, umhos/cm.....	3720
Lab resistivity, ohm-m.....	2.69
Total dissolved solids (180), mg/L..	2830
Total dissolved solids (calc), mg/L.	2770
Total alkalinity as CaCO ₃ , mg/L.....	267
Total hardness as CaCO ₃ , mg/L.....	1050
Sodium adsorption ratio.....	6.84

	mg/L	meq/L
Bicarbonate as HCO ₃	326	5.34
Carbonate as CO ₃	0	0
Chloride.....	413	11.6
Sulfate.....	1270	26.6
Calcium.....	385	19.2
Magnesium.....	22.2	1.83
Potassium.....	2.69	0.07
Sodium.....	510	22.2
Major cations.....		43.3
Major anions.....		43.5
Cation/anion difference.....		0.3 %


Mary Stepp
Lab Director

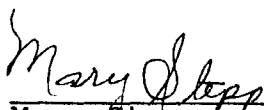

Wanda Orso
Water Lab Supervisor

CLIENT: Giant Refinery
ID: 0810
SITE: Stripper Influent
LAB NO: F7637

DATE REPORTED: 12/02/91
DATE RECEIVED: 11/08/91
DATE COLLECTED: 11/08/91

Lab pH (s.u.).....	7.41
Lab conductivity, umhos/cm.....	4030
Lab resistivity, ohm-m.....	2.48
Total dissolved solids (180), mg/L..	2840
Total dissolved solids (calc), mg/L.	2760
Total alkalinity as CaCO ₃ , mg/L.....	144
Total hardness as CaCO ₃ , mg/L.....	983
Sodium adsorption ratio.....	7.13

	mg/L	meq/L
Bicarbonate as HCO ₃	175	2.87
Carbonate as CO ₃	0	0
Chloride.....	495	14
Sulfate.....	1270	26.4
Calcium.....	385	19.2
Magnesium.....	5.65	0.46
Potassium.....	2.78	0.07
Sodium.....	514	22.4
Major cations.....		42.1
Major anions.....		43.2
Cation/anion difference.....		1.35 %

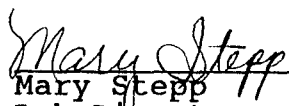

Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

CLIENT: Giant Refinery
ID: 1558
SITE: RW 13
LAB NO: F7625

DATE REPORTED: 12/02/91
DATE RECEIVED: 11/07/91
DATE COLLECTED: 11/06/91

Lab conductivity, umhos/cm..... 4530


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

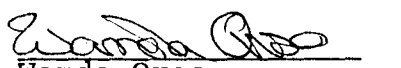
CLIENT: Giant Refinery
ID: 1430
SITE: Stripper Influent
LAB NO: F7624

DATE REPORTED: 12/02/91
DATE RECEIVED: 11/07/91
DATE COLLECTED: 10/31/91

Lab pH (s.u.).....	7.28
Lab conductivity, umhos/cm.....	3730
Lab resistivity, ohm-m.....	2.68
Total dissolved solids (180), mg/L..	2930
Total dissolved solids (calc), mg/L.	2820
Total alkalinity as CaCO ₃ , mg/L.....	164
Total hardness as CaCO ₃ , mg/L.....	983
Sodium adsorption ratio.....	7.45

	mg/L	meq/L
Bicarbonate as HCO ₃	201	3.29
Carbonate as CO ₃	0	0
Chloride.....	494	13.9
Sulfate.....	1310	27.2
Calcium.....	370	18.5
Magnesium.....	14.6	1.2
Potassium.....	2.74	0.07
Sodium.....	537	23.4
Major cations.....		43.1
Major anions.....		44.4
Cation/anion difference.....		1.51 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

CLIENT: Giant Refinery
ID: 911011837
SITE: Stripper Influent
LAB NO: F7519

DATE REPORTED: 10/31/91
DATE RECEIVED: 10/11/91
DATE COLLECTED: 10/11/91

Lab pH (s.u.).....	7.21
Lab conductivity, umhos/cm.....	3850
Lab resistivity, ohm-m.....	2.6
Total dissolved solids (180), mg/L..	2890
Total dissolved solids (calc), mg/L.	2740
Total alkalinity as CaCO ₃ , mg/L.....	225
Total hardness as CaCO ₃ , mg/L.....	1090
Sodium absorption ratio.....	6.47

	mg/L	meq/L
Bicarbonate as HCO ₃	274	4.49
Carbonate as CO ₃	0	0
Chloride.....	422	11.9
Sulfate.....	1270	26.5
Calcium.....	380	19
Magnesium.....	34.6	2.85
Potassium.....	2.74	0.07
Sodium.....	492	21.4
Major cations.....		43.3
Major anions.....		42.9
Cation/anion difference.....		0.38 %


Mary Stepp
Lab Director

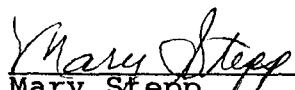

Wanda Orso
Water Lab Supervisor

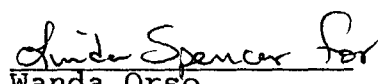
CLIENT: Giant Refinery
ID: 0813
SITE: Stripper Effluent
LAB NO: F7792

DATE REPORTED: 01/03/92
DATE RECEIVED: 12/23/91
DATE COLLECTED: 12/23/91

Lab pH (s.u.).....	7.62
Lab Conductivity, umhos/cm @ 25C....	1360
Lab Resistivity, ohm-m.....	7.34
Total Dissolved Solids (180C), mg/L.	2540
Total Dissolved Solids (calc), mg/L.	2670
Total Alkalinity as CaCO ₃ , mg/L.....	130
Total Hardness as CaCO ₃ , mg/L.....	990
Sodium Adsorption Ratio.....	6.62

	mg/L	meq/L
Bicarbonate as HCO ₃	159	2.61
Carbonate as CO ₃	0	0
Chloride.....	521	14.7
Sulfate.....	1200	25
Calcium.....	378	18.9
Magnesium.....	11.2	0.92
Potassium.....	2.44	0.06
Sodium.....	479	20.8
Major Cations.....		40.7
Major Anions.....		42.3
Cation/Anion Difference.....		1.89 %


Mary Stepp
Lab Director

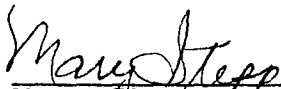

Wanda Orso
Water Lab Supervisor

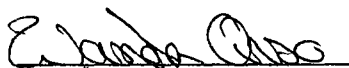
CLIENT: Giant Refinery
ID: 1202
SITE: Stripper Influent
LAB NO: F7724

DATE REPORTED: 12/19/91
DATE RECEIVED: 12/09/91
DATE COLLECTED: 12/09/91

Lab pH (s.u.).....	6.62
Lab conductivity, umhos/cm.....	3660
Lab resistivity, ohm-m.....	2.73
Total dissolved solids (180), mg/L..	2720
Total dissolved solids (calc), mg/L.	2710
Total alkalinity as CaCO ₃ , mg/L.....	263
Total hardness as CaCO ₃ , mg/L.....	1040
Sodium adsorption ratio.....	6.97

	mg/L	meq/L
Bicarbonate as HCO ₃	321	5.26
Carbonate as CO ₃	0	0
Chloride.....	416	11.7
Sulfate.....	1220	25.4
Calcium.....	364	18.2
Magnesium.....	31.4	2.58
Potassium.....	2.69	0.07
Sodium.....	516	22.4
Major cations.....		43.3
Major anions.....		42.4
Cation/anion difference.....		1.05 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11162601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 11/11/91
PROJECT #	: 9834	DATE RECEIVED	: 11/12/91
PROJECT NAME	: REF. REMED.	DATE EXTRACTED	: N/A
CLIENT I.D.	: 911111835 STRIPPER EFFLUENT	DATE ANALYZED	: 11/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	21
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.4
1,2-DICHLOROETHANE	0.7
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	2.7
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	4.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	102



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11160701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 911108810 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 11/08/91
DATE RECEIVED : 11/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 11/13/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.3
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	92

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11268401

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9112091202 STRIPPER INFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/09/91
DATE RECEIVED : 12/11/91
DATE EXTRACTED : N/A
DATE ANALYZED : 12/14/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	8.9
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
1-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.7
1,2-DICHLOROETHANE	0.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	1.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	1.0
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

1-BROMOCHLOROMETHANE (%)	85
BROMOFLUOROBENZENE (%)	80

CLIENT: Giant Refinery
ID: 9110011039
SITE: GBR -17
LAB NO: F7447

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.21
Lab conductivity, umhos/cm.....	2880
Lab resistivity, ohm-m.....	3.47
Total dissolved solids (180), mg/L..	2150
Total dissolved solids (calc), mg/L.	2160
Total alkalinity as CaCO ₃ , mg/L.....	240
Total hardness as CaCO ₃ , mg/L.....	985
Sodium absorption ratio.....	3.98

	mg/L	meq/L
Bicarbonate as HCO ₃	293	4.8
Carbonate as CO ₃	0	0
Chloride.....	66.2	1.87
Sulfate.....	1280	26.7
Calcium.....	348	17.4
Magnesium.....	28.6	2.35
Potassium.....	<0.1	<0.01
Sodium.....	287	12.5
Major cations.....		32.2
Major anions.....		33.4
Cation/anion difference.....		1.82 %


Mary Stepp
Lab Director

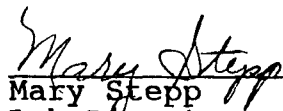

Wanda Orso
Water Lab Supervisor

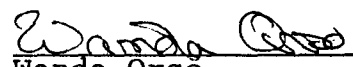
CLIENT: Giant Refinery
ID: 9110011200
SITE: GBR -15
LAB NO: F7448

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.41
Lab conductivity, umhos/cm.....	4650
Lab resistivity, ohm-m.....	2.15
Total dissolved solids (180), mg/L..	3160
Total dissolved solids (calc), mg/L.	3080
Total alkalinity as CaCO ₃ , mg/L.....	273
Total hardness as CaCO ₃ , mg/L.....	1060
Sodium absorption ratio.....	7.83

	mg/L	meq/L
Bicarbonate as HCO ₃	333	5.46
Carbonate as CO ₃	0	0
Chloride.....	451	12.7
Sulfate.....	1460	30.5
Calcium.....	381	19
Magnesium.....	26.7	2.19
Potassium.....	7.43	0.19
Sodium.....	586	25.5
Major cations.....		46.9
Major anions.....		48.6
Cation/anion difference.....		1.8 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

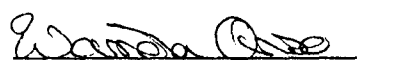
CLIENT: Giant Refinery
ID: 9110011256
SITE: GBR -31
LAB NO: F7449

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.30
Lab conductivity, umhos/cm.....	4240
Lab resistivity, ohm-m.....	2.36
Total dissolved solids (180), mg/L..	2930
Total dissolved solids (calc), mg/L.	2900
Total alkalinity as CaCO ₃ , mg/L.....	240
Total hardness as CaCO ₃ , mg/L.....	1020
Sodium absorption ratio.....	7.51

	mg/L	meq/L
Bicarbonate as HCO ₃	293	4.8
Carbonate as CO ₃	0	0
Chloride.....	468	13.2
Sulfate.....	1340	28
Calcium.....	356	17.8
Magnesium.....	32.7	2.69
Potassium.....	1.56	0.04
Sodium.....	552	24
Major cations.....		44.5
Major anions.....		46
Cation/anion difference.....		1.65 %


Mary Stepp
Lab Director

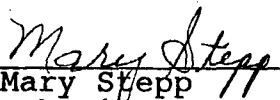

Wanda Orso
Water Lab Supervisor

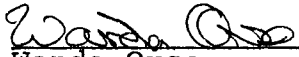
CLIENT: Giant Refinery
ID: 9110011308
SITE: Stripper Effluent
LAB NO: F7450

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.68
Lab conductivity, umhos/cm.....	3860
Lab resistivity, ohm-m.....	2.59
Total dissolved solids (180), mg/L..	2830
Total dissolved solids (calc), mg/L.	2680
Total alkalinity as CaCO ₃ , mg/L.....	200
Total hardness as CaCO ₃ , mg/L.....	1070
Sodium absorption ratio.....	6.32

	mg/L	meq/L
Bicarbonate as HCO ₃	244	4
Carbonate as CO ₃	0	0
Chloride.....	465	13.1
Sulfate.....	1210	25.2
Calcium.....	381	19
Magnesium.....	28	2.3
Potassium.....	1.96	0.05
Sodium.....	474	20.6
Major cations.....		42
Major anions.....		42.3
Cation/anion difference.....		0.39 %


Mary Stepp
Lab Director

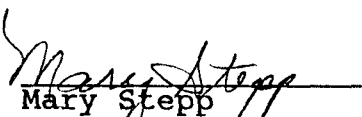

Wanda Orso
Water Lab Supervisor

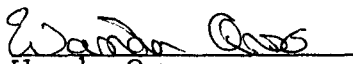
CLIENT: Giant Refinery
ID: 9110011421
SITE: GBR -24D
LAB NO: F7451

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.56
Lab conductivity, umhos/cm.....	5010
Lab resistivity, ohm-m.....	2
Total dissolved solids (180), mg/L..	3860
Total dissolved solids (calc), mg/L.	3770
Total alkalinity as CaCO ₃ , mg/L.....	216
Total hardness as CaCO ₃ , mg/L.....	1950
Sodium absorption ratio.....	4.8

	mg/L	meq/L
Bicarbonate as HCO ₃	264	4.32
Carbonate as CO ₃	0	0
Chloride.....	797	22.5
Sulfate.....	1620	33.8
Calcium.....	648	32.3
Magnesium.....	82.2	6.76
Potassium.....	4.3	0.11
Sodium.....	488	21.2
Major cations.....		60.4
Major anions.....		60.6
Cation/anion difference.....		0.13 %


Mary Stepp
Lab Director

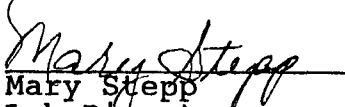

Wanda Orso
Water Lab Supervisor

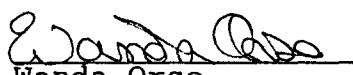
CLIENT: Giant Refinery
ID: 9110011455
SITE: GBR -30
LAB NO: F7452

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.78
Lab conductivity, umhos/cm.....	4000
Lab resistivity, ohm-m.....	2.5
Total dissolved solids (180), mg/L..	2890
Total dissolved solids (calc), mg/L.	2870
Total alkalinity as CaCO ₃ , mg/L.....	248
Total hardness as CaCO ₃ , mg/L.....	1040
Sodium absorption ratio.....	7.18

	mg/L	meq/L
Bicarbonate as HCO ₃	303	4.97
Carbonate as CO ₃	0	0
Chloride.....	489	13.8
Sulfate.....	1290	26.9
Calcium.....	390	19.5
Magnesium.....	17	1.4
Potassium.....	2.35	0.06
Sodium.....	533	23.2
Major cations.....		44.1
Major anions.....		45.6
Cation/anion difference.....		1.72 %


Mary Stepp
Lab Director

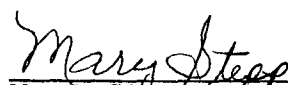

Wanda Orso
Water Lab Supervisor

CLIENT: Giant Refinery
ID: 9110011504
SITE: RW -13
LAB NO: F7453

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.72
Lab conductivity, umhos/cm.....	4480
Lab resistivity, ohm-m.....	2.23
Total dissolved solids (180), mg/L..	3510
Total dissolved solids (calc), mg/L.	3470
Total alkalinity as CaCO ₃ , mg/L.....	219
Total hardness as CaCO ₃ , mg/L.....	1260
Sodium absorption ratio.....	7.99

	mg/L	meq/L
Bicarbonate as HCO ₃	267	4.38
Carbonate as CO ₃	0	0
Chloride.....	483	13.6
Sulfate.....	1710	35.6
Calcium.....	472	23.5
Magnesium.....	20.9	1.72
Potassium.....	4.3	0.11
Sodium.....	653	28.4
Major cations.....		53.8
Major anions.....		53.6
Cation/anion difference.....		0.14 %


Mary Stepp
Lab Director

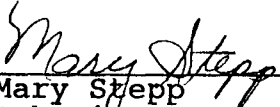

Wanda Orso
Water Lab Supervisor

CLIENT: Giant Refinery
ID: 9110011521
SITE: RW -3
LAB NO: F7454

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.72
Lab conductivity, umhos/cm.....	4070
Lab resistivity, ohm-m.....	2.46
Total dissolved solids (180), mg/L..	2770
Total dissolved solids (calc), mg/L.	2850
Total alkalinity as CaCO ₃ , mg/L.....	888
Total hardness as CaCO ₃ , mg/L.....	963
Sodium absorption ratio.....	9.31

	mg/L	meq/L
Bicarbonate as HCO ₃	1090	17.8
Carbonate as CO ₃	0	0
Chloride.....	390	11
Sulfate.....	897	18.7
Calcium.....	329	16.4
Magnesium.....	34.7	2.85
Potassium.....	2.35	0.06
Sodium.....	664	28.9
Major cations.....		48.2
Major anions.....		47.4
Cation/anion difference.....		0.81 %


Mary Stepp
Lab Director

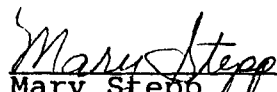

Wanda Orso
Water Lab Supervisor

CLIENT: Giant Refinery
ID: 9110011531
SITE: RW -4
LAB NO: F7455

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.).....	7.68
Lab conductivity, umhos/cm.....	3800
Lab resistivity, ohm-m.....	2.63
Total dissolved solids (180), mg/L..	2280
Total dissolved solids (calc), mg/L.	2240
Total alkalinity as CaCO ₃ , mg/L.....	887
Total hardness as CaCO ₃ , mg/L.....	720
Sodium absorption ratio.....	9.16

	mg/L	meq/L
Bicarbonate as HCO ₃	1080	17.7
Carbonate as CO ₃	0	0
Chloride.....	532	15
Sulfate.....	339	7.07
Calcium.....	248	12.4
Magnesium.....	24.6	2.02
Potassium.....	1.17	0.03
Sodium.....	565	24.6
Major cations.....		39
Major anions.....		39.8
Cation/anion difference.....		1.02 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor

CLIENT: Giant Refinery
ID: 9110011541
SITE: RW.-6
LAB NO: F7456

DATE REPORTED: 11/06/91
DATE RECEIVED: 10/01/91
DATE COLLECTED: 10/01/91

Lab pH (s.u.)..... 7.73
Lab conductivity, umhos/cm..... 4530
Lab resistivity, ohm-m..... 2.21
Total dissolved solids (180), mg/L.. 2760
Total dissolved solids (calc), mg/L. 2810
Total alkalinity as CaCO₃, mg/L..... 700
Total hardness as CaCO₃, mg/L..... 1040
Sodium absorption ratio..... 8.09

	mg/L	meq/L
Bicarbonate as HCO ₃	854	14
Carbonate as CO ₃	0	0
Chloride.....	552	15.6
Sulfate.....	839	17.5
Calcium.....	382	19.1
Magnesium.....	19.8	1.63
Potassium.....	1.96	0.05
Sodium.....	598	26
Major cations.....		46.8
Major anions.....		47
Cation/anion difference.....		0.28 %


Mary Stepp
Lab Director


Wanda Orso
Water Lab Supervisor



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011039 GBR-17
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/04/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	89
BROMOFLUOROBENZENE (%)	83



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051602

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011200 GBR-15
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/04/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	3.0
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	2.3
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	89

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051603

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 10/01/91
PROJECT #	: 9834	DATE RECEIVED	: 10/02/91
PROJECT NAME	: REF. REMED.	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9110011256 GBR-31	DATE ANALYZED	: 10/04/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.7
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	84
BROMOFLUOROBENZENE (%)	85

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051604

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 10/01/91
PROJECT #	: 9834	DATE RECEIVED	: 10/02/91
PROJECT NAME	: REF. REMED.	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9110011308 STRIPPER EFFLUENT	DATE ANALYZED	: 10/04/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	81
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051605

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED. ^{TK}
CLIENT I.D. : 9110011421 GBR-2480
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/05/91
UNITS : UG/L
DILUTION FACTOR : 2

COMPOUNDS

RESULTS

BENZENE	100
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1.0
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	<0.4
DIBROMOCHLOROMETHANE	<0.4
2-CHLOROETHYL VINYL ETHER	<1.0
1,3-DICHLOROBENZENE	<1.0
1,2 & 1,4-DICHLOROBENZENE	1.0
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	0.5
1,2-DICHLOROETHANE	34
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	<0.4
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	24
METHYLENE CHLORIDE	<4.0
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	0.6
TOLUENE	10
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<1.0
VINYL CHLORIDE	<0.4
TOTAL XYLENES	<1.0
TRICHLOROTRIFLUOROETHANE	<4.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051606

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011455 GBR-30
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/04/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	80
BROMOFLUOROBENZENE (%)	81

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051607

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011504 RW-13 (GBR-14)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	15.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051608

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011521 RW-3 (GPR-29)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/05/91
UNITS : UG/L
DILUTION FACTOR : 2

COMPOUNDS	RESULTS
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BENZENE	89
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1.0
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	0.4
DIBROMOCHLOROMETHANE	<0.4
2-CHLOROETHYL VINYL ETHER	<1.0
1,3-DICHLOROBENZENE	<1.0
1,2 & 1,4-DICHLOROBENZENE	<1.0
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	1
1,2-DICHLOROETHANE	<0.4
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	1
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	57
METHYLENE CHLORIDE	<4.0
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	<0.4
TOLUENE	7
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	<0.4
TRICHLOROFLUOROMETHANE	<1.0
VINYL CHLORIDE	<0.4
TOTAL XYLENES	11
TRICHLOROTRIFLUOROETHANE	<4.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	90



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051609

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011531 RW-4 (602-43)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/04/91
UNITS : UG/L
DILUTION FACTOR : 5

COMPOUNDS

RESULTS

BENZENE	570 D
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	3
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	2
1,2-DICHLOROETHANE	<1.0
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	3
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	49
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	2
TOLUENE	3
1,1,1-TRICHLOROETHANE	2
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	3
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	30
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	90
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATTI I.D. : 11051610

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011541 RW-6 (GBR-44)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/04/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	13.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.6
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.3
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	0.3
1,2-DICHLOROETHENE (TOTAL)	3.7
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	0.8
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.2
TOLUENE	0.6
1,1,1-TRICHLOROETHANE	0.7
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.1
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	82

GAS CHROMATOGRAPHY - RESULTS

ATTI I.D. : 11051607

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011504 RW-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : 10/03/91
DATE ANALYZED : 10/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDSRESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051608

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011521 RW-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : 10/03/91
DATE ANALYZED : 10/10/91
UNITS : UG/L
DILUTION FACTOR : 10

COMPOUNDS

RESULTS

NAPHTHALENE	<3.0
ACENAPHTHYLENE	<3.0
ACENAPHTHENE	<5.0
FLUORENE	3.1
PHENANTHRENE	1.5
ANTHRACENE	<0.10
FLUORANTHENE	<0.30
PYRENE	<0.40
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.20
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<1.0
BENZO(g,h,i)PERYLENE	<0.40
INDENO(1,2,3-CD)PYRENE	<0.30

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051609

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011531 RW-4
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : 10/03/91
DATE ANALYZED : 10/10/91
UNITS : UG/L
DILUTION FACTOR : 10

COMPOUNDSRESULTS

NAPHTHALENE	<3.0
ACENAPHTHYLENE	<3.0
ACENAPHTHENE	<5.0
FLUORENE	4.7
PHENANTHRENE	<0.3
ANTHRACENE	<0.10
FLUORANTHENE	<0.30
PYRENE	<0.40
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	0.40
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<1.0
BENZO(g,h,i)PERYLENE	<0.40
INDENO(1,2,3-CD)PYRENE	<0.30



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11051610

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED.
CLIENT I.D. : 9110011541 RW-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/01/91
DATE RECEIVED : 10/02/91
DATE EXTRACTED : 10/03/91
DATE ANALYZED : 10/10/91
UNITS : UG/L
DILUTION FACTOR : 10 *

COMPOUNDS	RESULTS
NAPHTHALENE	<3.0
ACENAPHTHYLENE	<3.0
ACENAPHTHENE	<5.0
FLUORENE	<0.40
PHENANTHRENE	<0.30
ANTHRACENE	<0.10
FLUORANTHENE	<0.30
PYRENE	<0.40
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.20
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<1.0
BENZO(g,h,i)PERYLENE	<0.40
INDENO(1,2,3-CD)PYRENE	<0.30

* A DILUTION WAS REQUIRED DUE TO MATRIX INTERFERENCE.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-27
PROJECT NAME : OFF SITE
CLIENT I.D. : 911002959 SHS-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
DATE RECEIVED : 10/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	93



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-27
PROJECT NAME : OFF SITE
CLIENT I.D. : 9110021050 SHS-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
DATE RECEIVED : 10/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	93



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053903

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-27
PROJECT NAME : OFF SITE
CLIENT I.D. : 9110021135 SHS-10
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
DATE RECEIVED : 10/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/09/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	37
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	106



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053904

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-27
PROJECT NAME : OFF SITE
CLIENT I.D. : 9110021222 SHS-12
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
DATE RECEIVED : 10/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.3
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.6
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.9
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053905

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-27
PROJECT NAME : OFF SITE
CLIENT I.D. : 9110021312 SHS-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
DATE RECEIVED : 10/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.9
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.4
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	85
BROMOFLUOROBENZENE (%)	86

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053906

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 10/02/91
PROJECT #	: 9002-27	DATE RECEIVED	: 10/03/91
PROJECT NAME	: OFF SITE	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9110021431 SHS-15	DATE ANALYZED	: 10/08/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	6.5
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	84



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11053907

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-27
PROJECT NAME : OFF SITE
CLIENT I.D. : 9110021550 SHS-16
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/02/91
DATE RECEIVED : 10/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 10/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	84

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11293801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 911223815 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 12/23/91
DATE RECEIVED : 12/24/91
DATE EXTRACTED : N/A
DATE ANALYZED : 12/26/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	81
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11160701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED. *For Skipp E. Hunt*
CLIENT I.D. : 911108810
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 11/08/91
DATE RECEIVED : 11/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 11/13/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.3
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	92



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11162601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMED. *In Plant*
CLIENT I.D. : 911111835
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 11/11/91
DATE RECEIVED : 11/12/91
DATE EXTRACTED : N/A
DATE ANALYZED : 11/13/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	21
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.4
1,2-DICHLOROETHANE	0.7
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	2.7
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	4.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 11152101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REF. REMEDIA
CLIENT I.D. : 9110311430 STRIPPER INFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 10/31/91
DATE RECEIVED : 11/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 11/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	17
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.5
1,2-DICHLOROETHANE	0.5
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	3.1
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	1.2
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.3
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	3.4
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

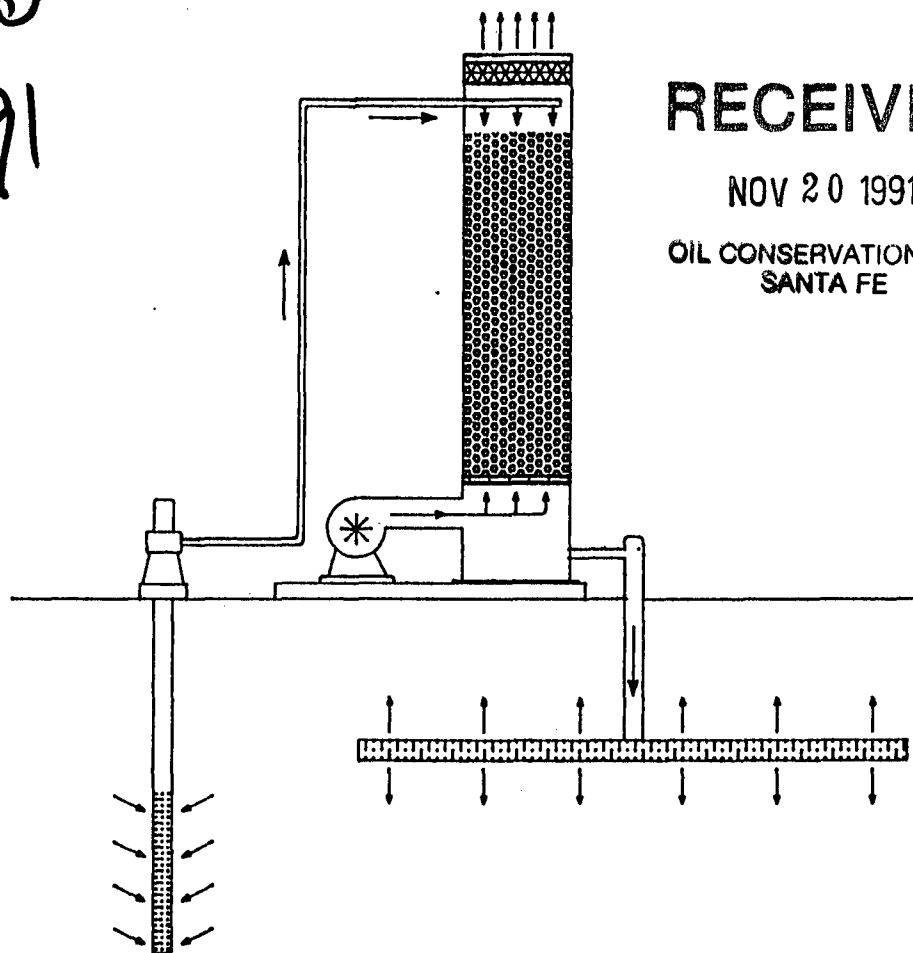
BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	99

GIANT

REFINING CO.

BLOOMFIELD REFINERY
REMEDATION PROJECT

3rd
Quarter
1991



RECEIVED

NOV 20 1991

OIL CONSERVATION DIV.
SANTA FE

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QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
THIRD QUARTER, 1991

Prepared By:

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INTRODUCTION AND SUMMARY
QUARTERLY REPORT
THIRD QUARTER, 1991

INTRODUCTION

No significant changes were made to the remediation system during the third quarter of 1991. All treated water is being directed toward the infiltration gallery in the old stormwater containment area of the refinery. We continue to monitor its effect on the system. Monitor well SHS-7, part of the original proposed offsite recovery well network, has yet to be converted to a recovery well due to land access problems.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Subsequent reports will contain updates revealing historical trends of the analytes. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevations and product thicknesses, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail on a weekly basis is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

SECTION 2

The following pages show the quarterly analytical data for the Giant Refining Remediation Project. The data is broken down into units as described below.

	<u>Unit of Measure</u>
Total dissolved solids (180)	mg/l
Total dissolved solids (calc)	mg/l
Total alkalinity as CaCO ₃	mg/l
Total hardness as CaCO ₃	mg/l
Bicarbonate as HCO ₃	mg/l
Carbonate as CO ₃	mg/l
Chloride	mg/l
Sulfate	mg/l
Calcium	mg/l
Magnesium	mg/l
Potassium	mg/l
Sodium	mg/l

The remainder of the data is measured in ug/l.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
THIRD QUARTER, 1991

STRIPPER INFLUENT	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.37	7.00	6.79
Lab conductivity, umhos/cm	3550.00	4010.00	3840.00
Lab resistivity, ohm-m	2.81	2.50	2.61
Total dissolved solids (180)	2900.00	2740.00	2940.00
Total dissolved solids (calc)	2830.00	2740.00	2770.00
Total alkalinity as CaCO ₃	297.00	331.00	323.00
Total hardness as CaCO ₃	1090.00	1080.00	1080.00
Sodium absorption ratio	6.72	6.35	6.77
Bicarbonate as HCO ₃	363.00	404.00	394.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	423.00	336.00	386.00
Sulfate	1300.00	1310.00	1260.00
Calcium	376.00	383.00	380.00
Magnesium	36.70	31.40	32.50
Potassium	3.03	2.84	2.70
Sodium	510.00	481.00	512.00
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	4.00	ND	ND
1,2-Dichloroethane	9.00	ND	ND
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	14.00	2.80	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	1.00	0.40	ND

	7/91	8/91	9/91
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	2.00	0.40	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND
AROMATICS			
Benzene	303.00	45.70	35.00
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	52.00	2.10	3.00
Toluene	43.00	0.70	ND
Xylenes	156.00	7.50	13.00
Trichlorotrifluoroethane			

STRIPPER EFFLUENT

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	8.21	7.97	7.76
Lab conductivity, umhos/cm	4180.00	4070.00	4020.00
Lab resistivity, ohm-m	2.39	2.46	2.49
Total dissolved solids (180)	2850.00	2900.00	2910.00
Total dissolved solids (calc)	2670.00	2720.00	2680.00
Total alkalinity as CaCO ₃	163.00	203.00	217.00
Total hardness as CaCO ₃	1080.00	1050.00	1040.00
Sodium absorption ratio	6.19	6.53	6.24
Bicarbonate as HCO ₃	198.00	248.00	264.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	481.00	389.00	430.00
Sulfate	1210.00	1320.00	1260.00
Calcium	385.00	374.00	365.00
Magnesium	29.40	28.70	32.30
Potassium	2.96	2.91	2.62
Sodium	468.00	487.00	464.00
HALOCARBONS			
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

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GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.44
Lab conductivity, umhos/cm	4470.00
Lab resistivity, ohm-m	2.24
Total dissolved solids (180)	3320.00
Total dissolved solids (calc)	3120.00
Total alkalinity as CaCO ₃	732.00
Total hardness as CaCO ₃	1230.00
Sodium absorption ratio	7.67
Bicarbonate as HCO ₃	891.00
Carbonate as CO ₃	0.00
Chloride	571.00
Sulfate	1030.00
Calcium	410.00
Magnesium	50.80
Potassium	2.25
Sodium	619.00

PAH

Acenaphthene	3.30
Acenaphthylene	ND
Anthracene	0.50
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	1.30
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	38.00
Phenanthrene	2.70
Pyrene	

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND

	7/91	8/91	9/91
1,1-Dichloroethane	1.50		
1,2-Dichloroethane	2.40		
1,2-Dichloroethene	ND		
1,2-Dichloroethene	4.60		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	0.90		
1,1,1-Trichloroethane	0.30		
1,1,2-Trichloroethane	ND		
Trichloroethene	1.10		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		
AROMATICS			
Benzene	66.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	46.00		
Toluene	2.00		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

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GENERAL WATER CHEMISTRY

Lab conductivity, umhos/cm

7/91

8/91

9/91

4200.00

4750.00

4500.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	25.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND

Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.07
Pyrene	ND

GBR-15

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.69		
Lab conductivity, umhos/cm	4780.00		
Lab resistivity, ohm-m	2.09		
Total dissolved solids (180)	3460.00		
Total dissolved solids (calc)	3260.00		
Total alkalinity as CaCO ₃	277.00		
Total hardness as CaCO ₃	1110.00		
Sodium absorption ratio	8.19		
Bicarbonate as HCO ₃	338.00		
Carbonate as CO ₃	0.00		
Chloride	479.00		
Sulfate	1540.00		
Calcium	422.00		
Magnesium	13.70		
Potassium	4.32		
Sodium	627.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	10.30		
1,1-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

AROMATICS

Benzene	1.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-17

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.78		
Lab conductivity, umhos/cm	2970.00		
Lab resistivity, ohm-m	3.36		
Total dissolved solids (180)	2270.00		
Total dissolved solids (calc)	2120.00		
Total alkalinity as CaCO3	233.00		
Total hardness as CaCO3	932.00		
Sodium absorption ratio	4.21		
Bicarbonate as HCO3	284.00		
Carbonate as CO3	0.00		
Chloride	68.60		
Sulfate	1250.00		
Calcium	343.00		
Magnesium	18.40		
Potassium	0.86		
Sodium	295.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chlorobenzene	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,1-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

GBR-24-D

7/91

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9/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.59
Lab conductivity, umhos/cm	4810.00
Lab resistivity, ohm-m	2.08
Total dissolved solids (180)	3990.00
Total dissolved solids (calc)	3430.00
Total alkalinity as CaCO ₃	217.00
Total hardness as CaCO ₃	1860.00
Sodium absorption ratio	4.53
Bicarbonate as HCO ₃	265.00
Carbonate as CO ₃	0.00
Chloride	777.00
Sulfate	1370.00
Calcium	614.00
Magnesium	80.00
Potassium	5.33
Sodium	450.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	6.00
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	45.00		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	10.00		
Toluene	2.00		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

GBR-30

7/91

8/91

9/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.30
Lab conductivity, umhos/cm	4740.00
Lab resistivity, ohm-m	2.11
Total dissolved solids (180)	3340.00
Total dissolved solids (calc)	3140.00
Total alkalinity as CaCO ₃	219.00
Total hardness as CaCO ₃	1240.00
Sodium absorption ratio	6.53
Bicarbonate as HCO ₃	267.00
Carbonate as CO ₃	0.00
Chloride	517.00
Sulfate	1480.00
Calcium	439.00
Magnesium	36.00
Potassium	2.89
Sodium	529.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		
PAH			
Acenaphthene			
Acenaphthylene			
Anthracene			
Benzo(a)anthracene			
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(g,h,i)perylene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			
Fluoranthene			
Fluorene			
Indeno(1,2,3-cd)pyrene			
Naphthalene			
Phenanthrene			
Pyrene			

GBR-31

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.39		
Lab conductivity, umhos/cm	4140.00		
Lab resistivity, ohm-m	2.41		
Total dissolved solids (180)	3550.00		
Total dissolved solids (calc)	3330.00		
Total alkalinity as CaCO3	302.00		
Total hardness as CaCO3	1270.00		
Sodium absorption ratio	7.02		
Bicarbonate as HCO3	369.00		
Carbonate as CO3	0.00		
Chloride	338.00		
Sulfate	1760.00		
Calcium	416.00		
Magnesium	57.70		
Potassium	2.49		
Sodium	576.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	2.40
1,2-Dichloroethane	ND
1,2-Dichloroethene	57.00
1,1-Dichloroethene	0.20
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	6.00
1,1,1-Trichloroethane	0.50
1,1,2-Trichloroethane	ND
Trichloroethene	4.20
Trichlorofluoromethane	ND
Vinyl chloride	ND

GBR-32

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.58		
Lab conductivity, umhos/cm	4180.00		
Lab resistivity, ohm-m	2.39		
Total dissolved solids (180)	3280.00		
Total dissolved solids (calc)	3300.00		
Total alkalinity as CaCO3	321.00		
Total hardness as CaCO3	1030.00		
Sodium absorption ratio	9.23		
Bicarbonate as HCO3	391.00		
Carbonate as CO3	0.00		
Chloride	275.00		
Sulfate	1750.00		
Calcium	369.00		
Magnesium	27.20		
Potassium	3.96		
Sodium	682.00		

GBR-48

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.16		
Lab conductivity, umhos/cm	6340.00		
Lab resistivity, ohm-m	1.58		
Total dissolved solids (180)	4720.00		
Total dissolved solids (calc)	4640.00		
Total alkalinity as CaCO ₃	425.00		
Total hardness as CaCO ₃	1610.00		
Sodium absorption ratio	10.30		
Bicarbonate as HCO ₃	518.00		
Carbonate as CO ₃	0.00		
Chloride	895.00		
Sulfate	1920.00		
Calcium	576.00		
Magnesium	41.90		
Potassium	5.27		
Sodium	951.00		

GBR-49

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.78		
Lab conductivity, umhos/cm	4180.00		
Lab resistivity, ohm-m	2.39		
Total dissolved solids (180)	3630.00		
Total dissolved solids (calc)	3450.00		
Total alkalinity as CaCO ₃	346.00		
Total hardness as CaCO ₃	1130.00		
Sodium absorption ratio	9.01		
Bicarbonate as HCO ₃	422.00		
Carbonate as CO ₃	0.00		
Chloride	379.00		
Sulfate	1720.00		
Calcium	432.00		
Magnesium	13.20		
Potassium	3.88		
Sodium	697.00		

GBR-50

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.38		
Lab conductivity, umhos/cm	2990.00		
Lab resistivity, ohm-m	3.34		
Total dissolved solids (180)	2770.00		
Total dissolved solids (calc)	2630.00		
Total alkalinity as CaCO3	190.00		
Total hardness as CaCO3	1010.00		
Sodium absorption ratio	5.92		
Bicarbonate as HCO3	232.00		
Carbonate as CO3	0.00		
Chloride	44.40		
Sulfate	1650.00		
Calcium	368.00		
Magnesium	22.30		
Potassium	4.17		
Sodium	432.00		

*ND - Not detected at specified detection limit

OFFSITE WELLS

SHS-3

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.64		
Lab conductivity, umhos/cm	4280.00		
Lab resistivity, ohm-m	2.34		
Total dissolved solids (180)	3800.00		
Total dissolved solids (calc)	3590.00		
Total alkalinity as CaCO3	236.00		
Total hardness as CaCO3	1780.00		
Sodium absorption ratio	4.62		
Bicarbonate as HCO3	288.00		
Carbonate as CO3	0.00		
Chloride	230.00		
Sulfate	2080.00		
Calcium	606.00		
Magnesium	65.50		
Potassium	11.20		
Sodium	449.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-6

7/91

8/91

9/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.72
Lab conductivity, umhos/cm	2890.00
Lab resistivity, ohm-m	3.46
Total dissolved solids (180)	2580.00
Total dissolved solids (calc)	2480.00
Total alkalinity as CaCO ₃	295.00
Total hardness as CaCO ₃	1190.00
Sodium absorption ratio	4.18
Bicarbonate as HCO ₃	360.00
Carbonate as CO ₃	0.00
Chloride	81.20
Sulfate	1450.00
Calcium	375.00
Magnesium	61.90
Potassium	4.95
Sodium	332.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-10

7/91

8/91

9/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.30
Lab conductivity, umhos/cm	2000.00
Lab resistivity, ohm-m	5.01
Total dissolved solids (180)	1440.00
Total dissolved solids (calc)	1380.00
Total alkalinity as CaCO ₃	304.00
Total hardness as CaCO ₃	454.00
Sodium absorption ratio	5.82
Bicarbonate as HCO ₃	371.00
Carbonate as CO ₃	0.00
Chloride	64.30
Sulfate	667.00
Calcium	151.00
Magnesium	18.50
Potassium	7.78
Sodium	285.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	0.50		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	47.00		
Toluene	1.80		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-12

ND

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.45
Lab conductivity, umhos/cm	4010.00
Lab resistivity, ohm-m	2.49
Total dissolved solids (180)	2810.00
Total dissolved solids (calc)	2630.00
Total alkalinity as CaCO ₃	363.00
Total hardness as CaCO ₃	1010.00
Sodium absorption ratio	6.45
Bicarbonate as HCO ₃	443.00
Carbonate as CO ₃	0.00
Chloride	324.00
Sulfate	1220.00
Calcium	367.00
Magnesium	23.70
Potassium	2.96
Sodium	472.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.20
1,2-Dichloroethane	ND
1,2-Dichloroethene	6.90
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.70
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.40
Trichlorofluoromethane	ND
Vinyl chloride	

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-13

	7/91	8/91	9/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.38		
Lab conductivity, umhos/cm	3440.00		
Lab resistivity, ohm-m	2.91		
Total dissolved solids (180)	2050.00		
Total dissolved solids (calc)	1830.00		
Total alkalinity as CaCO ₃	670.00		
Total hardness as CaCO ₃	546.00		
Sodium absorption ratio	8.82		
Bicarbonate as HCO ₃	817.00		
Carbonate as CO ₃	0.00		
Chloride	464.00		
Sulfate	285.00		
Calcium	181.00		
Magnesium	23.30		
Potassium	1.98		
Sodium	474.00		
HALOCARBONS			
Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	0.90		
1,2-Dichloroethane	ND		
1,2-Dichloroethene	ND		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	ND		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	ND		
Vinyl chloride	ND		

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-15

7/91

8/91

9/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.91
Lab conductivity, umhos/cm	1710.00
Lab resistivity, ohm-m	5.86
Total dissolved solids (180)	1300.00
Total dissolved solids (calc)	1150.00
Total alkalinity as CaCO ₃	282.00
Total hardness as CaCO ₃	559.00
Sodium absorption ratio	2.97
Bicarbonate as HCO ₃	344.00
Carbonate as CO ₃	0.00
Chloride	25.50
Sulfate	583.00
Calcium	190.00
Magnesium	20.80
Potassium	2.75
Sodium	161.00

HALOCARBONS

Bromodichloromethane	0.60
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	11.80
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

SHS-16

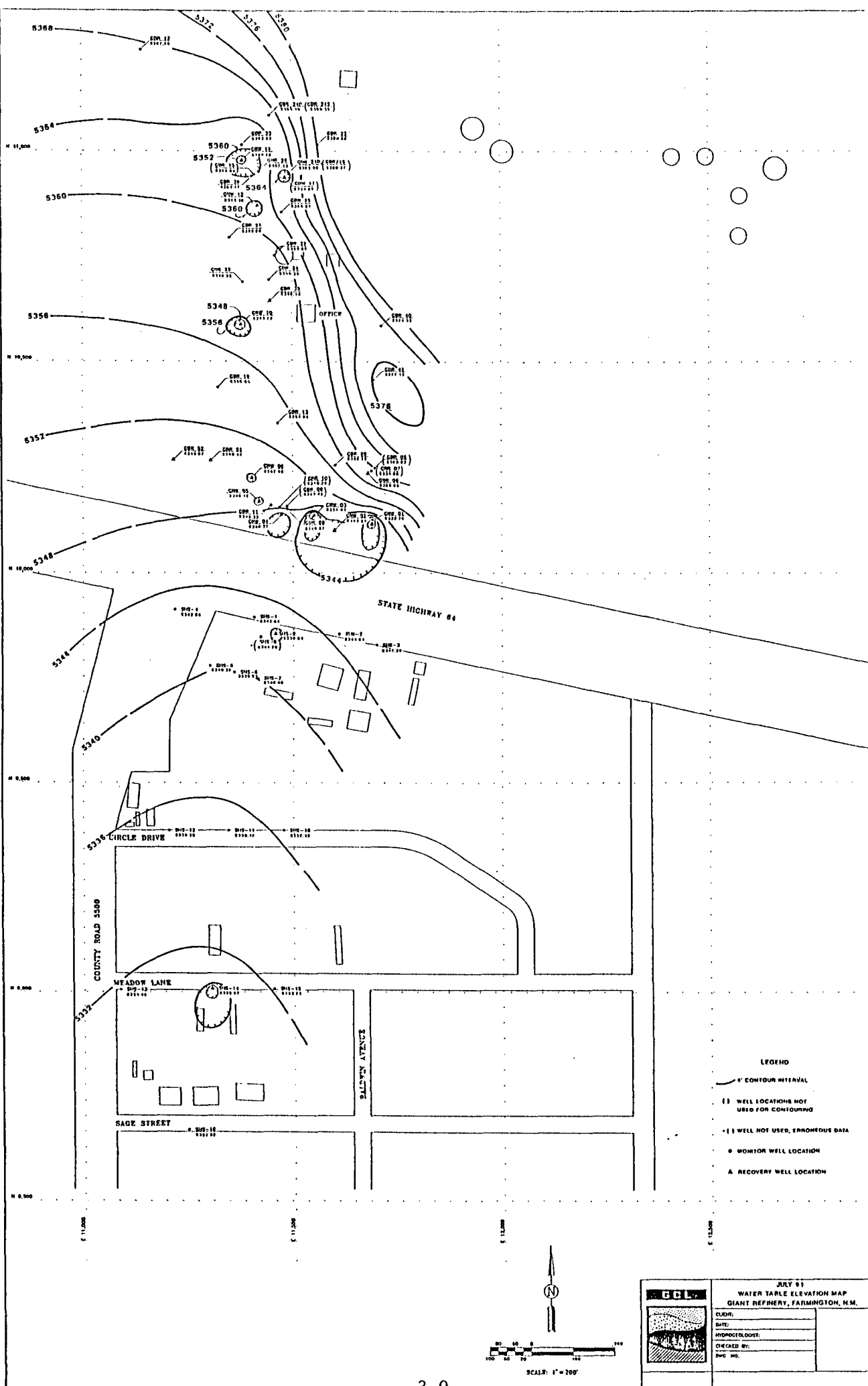
	7.84	8/91	9/91
GENERAL WATER CHEMISTRY	2930.00		
Lab pH (s.u.)	3.41		
Lab conductivity, umhos/cm	2590.00		
Lab resistivity, ohm-m	2270.00		
Total dissolved solids (180)	285.00		
Total dissolved solids (calc)	1250.00		
Total alkalinity as CaCO ₃	2.65		
Total hardness as CaCO ₃	347.00		
Sodium absorption ratio	0.00		
Bicarbonate as HCO ₃	36.20		
Carbonate as CO ₃	1360.00		
Chloride	456.00		
Sulfate	27.70		
Calcium	2.51		
Magnesium	216.00		
Potassium			
Sodium			

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

	7/91	8/91	9/91
AROMATICS			
Benzene	ND		
Chlorobenzene	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
Ethylbenzene	ND		
Toluene	ND		
Xylenes	ND		
Trichlorotrifluoroethane	ND		

*ND - Not detected at specified detection limit



LEGEND

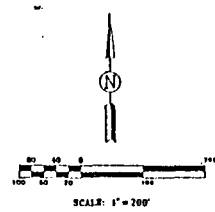
4' CONTOUR INTERVAL

() WELL LOCATIONS NOT USED FOR CONTOURING

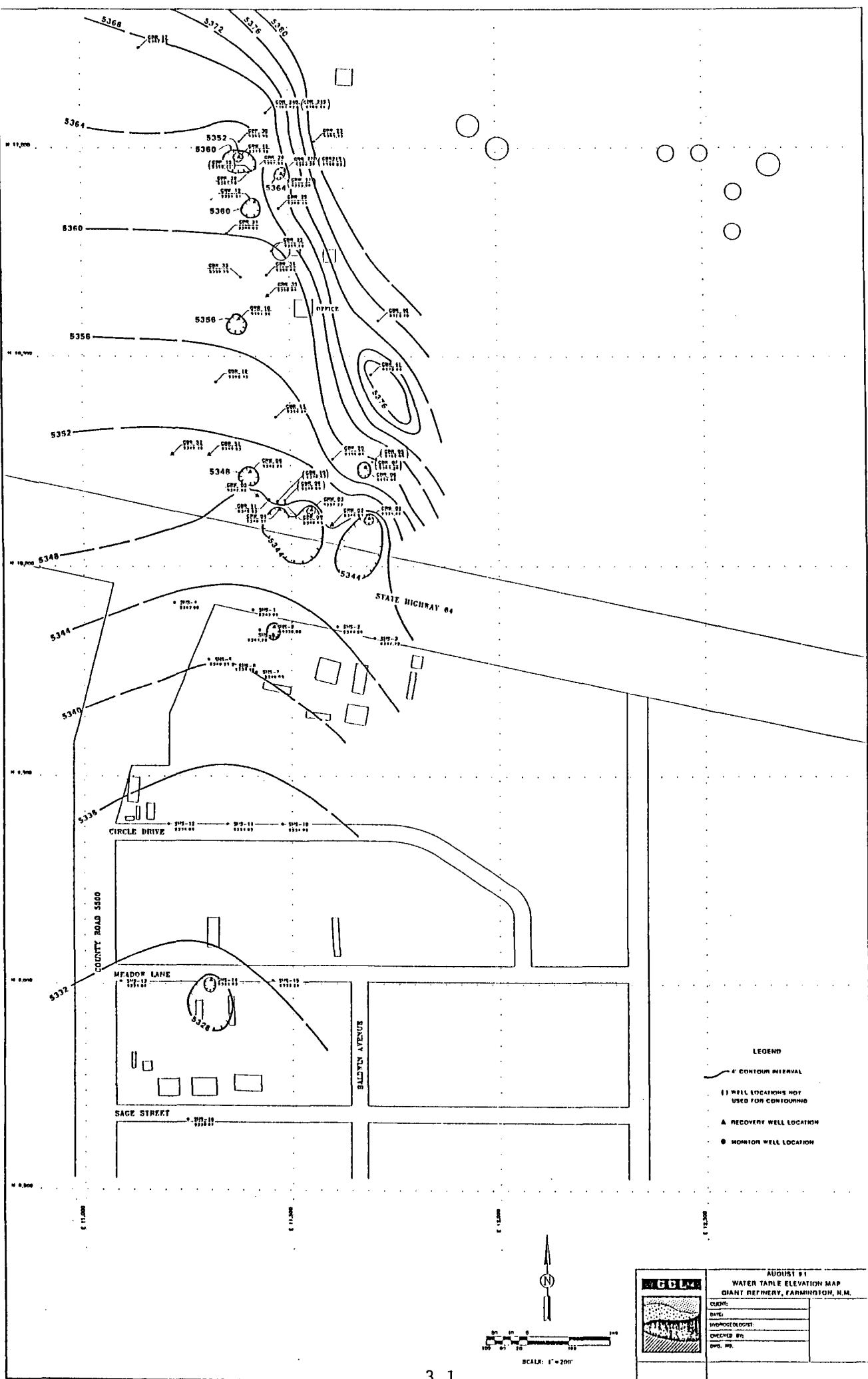
() WELL NOT USED, ERRONEOUS DATA

• MONITOR WELL LOCATION

▲ RECOVERY WELL LOCATION



GCL	
JULY 81 WATER TABLE ELEVATION MAP GIANT REFINERY, FARMINGTON, N.M.	
CUDH: DATE: HYDROLOGIST: CHECKED BY: DWG NO.	



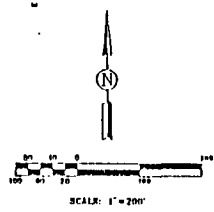
LEGEND

4' CONTOUR INTERVAL

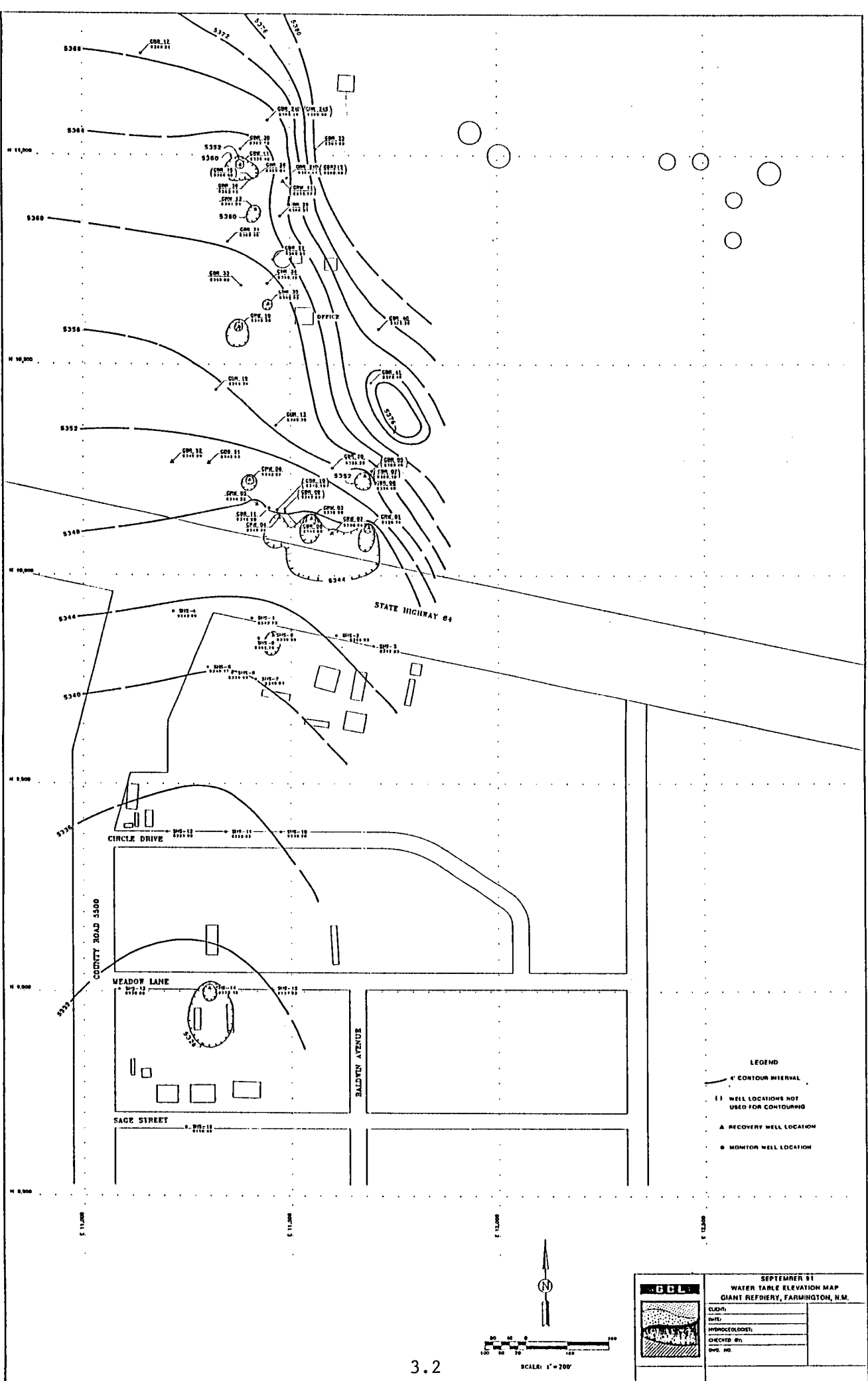
(X) WELL LOCATIONS NOT USED FOR CONTOURING

▲ RECOVERY WELL LOCATION

● MONITOR WELL LOCATION



AUGUST 91	
WATER TABLE ELEVATION MAP	
GIANT REEFERY, FARMINGTON, N.M.	
CLIENT:	
DATE:	
HYDROLOGIST:	
CHECKED BY:	
DWG. NO.	



GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: July, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	61.51	61.51	0.00	5332.79
GRW-2	5391.28	48.80	48.75	0.05	5342.52
GRW-3	5388.77	54.75	54.75	0.00	5334.02
GRW-4	5390.02	49.75	49.75	0.00	5340.27
GRW-5	5390.56	44.10	44.10	0.00	5346.46
GRW-6	5390.81	42.86	42.86	0.00	5347.95
GRW-10	5395.02	59.06	51.80	7.26	5341.77
GRW-11	5397.85	63.00	63.00	0.00	5334.85
GRW-12	5397.24	45.94	45.94	0.00	5351.30
GRW-13	5396.90	56.14	56.14	0.00	5340.76
GBR-5	5395.07	27.87	25.60	2.27	5369.02
GBR-6	5395.70	60.04	60.04	0.00	5335.66
GBR-7	5395.85	32.23	29.82	2.41	5365.55
GBR-8	5390.50	41.93	41.93	0.00	5348.57
GBR-9	5389.92	45.94	45.94	0.00	5343.98
GBR-10	5390.57	42.32	42.32	0.00	5348.25
GBR-11	5389.43	42.15	40.84	1.31	5348.33
GBR-13	5393.04	38.00	38.00	0.00	5355.04
GBR-15	5397.99	43.35	43.35	0.00	5354.64
GBR-17	5402.69	34.94	34.94	0.00	5367.75
GBR-18	5421.68	23.05	23.05	0.00	5398.63
GBR-19	5393.83	38.83	38.82	0.01	5355.01
GBR-20	5393.47	38.55	36.26	2.29	5356.75
GBR-21S	5400.65	20.47	20.36	0.11	5380.27
GBR-21D	5400.19	36.23	36.23	0.00	5363.96
GBR-22	5395.91	38.89	35.55	3.34	5359.69
GBR-23	5403.72	23.07	23.06	0.01	5380.66
GBR-24S	5396.08	28.94	27.65	1.29	5368.17
GBR-24D	5396.77	32.29	32.29	0.00	5364.48
GBR-25	5396.72	29.78	29.78	0.00	5366.94
GBR-26	5395.59	38.46	38.46	0.00	5357.13
GBR-30	5396.58	34.05	34.05	0.00	5362.53
GBR-31	5394.86	35.20	35.20	0.00	5359.66
GBR-33	5396.28	37.99	37.92	0.07	5358.35
GBR-34	5394.00	36.61	35.40	1.21	5358.36
GBR-35	5393.66	36.42	35.30	1.12	5358.14
GBR-39	5397.55	36.08	36.08	0.00	5361.47
GBR-40	5400.76	26.44	26.44	0.00	5374.32
GBR-41	5396.35	19.22	19.22	0.00	5377.13
GBR-51	5389.68	40.24	40.24	0.00	5349.44
GBR-52	5387.74	38.67	38.67	0.00	5349.07

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: July, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.92	40.90	0.02	5342.64
SHS-2	5381.66	37.15	37.15	0.00	5344.51
SHS-3	5383.33	36.08	36.08	0.00	5347.25
SHS-4	5383.62	40.98	40.98	0.00	5342.64
SHS-5	5378.36	38.10	38.10	0.00	5340.26
SHS-6	5378.17	38.24	38.24	0.00	5339.93
SHS-7	5378.77	39.15	38.60	0.55	5340.06
SHS-8	5380.25	36.06	36.05	0.01	5344.20
SHS-9	5380.79	44.18	44.18	0.00	5336.61
SHS-10	5373.80	36.64	36.64	0.00	5337.16
SHS-11	5373.17	38.00	38.00	0.00	5335.17
SHS-12	5373.94	38.59	38.59	0.00	5335.35
SHS-13	5367.81	36.36	36.36	0.00	5331.45
SHS-14	5367.07	46.50	46.50	0.00	5320.57
SHS-15	5366.21	33.50	33.50	0.00	5332.71
SHS-16	5362.58	31.26	31.26	0.00	5331.32

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: August, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	58.65	58.65	0.00	5335.65
GRW-2	5391.28	42.35	42.35	0.00	5348.93
GRW-3	5388.77	51.54	51.54	0.00	5337.23
GRW-4	5390.02	49.75	49.75	0.00	5340.27
GRW-5	5390.56	42.94	42.94	0.00	5347.62
GRW-6	5390.81	48.60	48.60	0.00	5342.21
GRW-10	5395.02	48.51	42.59	5.92	5351.25
GRW-11	5397.85	63.89	63.89	0.00	5333.96
GRW-12	5397.24	46.13	46.13	0.00	5351.11
GRW-13	5396.90	57.35	57.35	0.00	5339.55
GBR-5	5395.07	27.95	25.60	2.35	5369.00
GBR-6	5395.70	61.02	61.02	0.00	5334.68
GBR-7	5395.85	32.51	30.09	2.42	5365.28
GBR-8	5390.50	41.65	41.65	0.00	5348.85
GBR-9	5389.92	49.23	49.23	0.00	5340.69
GBR-10	5390.57	41.95	41.95	0.00	5348.62
GBR-11	5389.43	41.74	40.69	1.05	5348.53
GBR-13	5393.04	38.45	38.45	0.00	5354.59
GBR-15	5397.99	42.88	42.88	0.00	5355.11
GBR-17	5402.69	34.85	34.85	0.00	5367.84
GBR-18	5421.68	23.19	23.19	0.00	5398.49
GBR-19	5393.83	38.70	38.70	0.00	5355.13
GBR-20	5393.47	39.30	36.90	2.40	5356.09
GBR-21S	5400.65	20.10	20.00	0.10	5380.63
GBR-21D	5400.19	35.81	35.81	0.00	5364.38
GBR-22	5395.91	38.62	35.49	3.13	5359.79
GBR-23	5403.72	22.59	22.59	0.00	5381.13
GBR-24S	5396.08	27.34	26.46	0.88	5369.44
GBR-24D	5396.77	31.95	31.95	0.00	5364.82
GBR-25	5396.72	30.57	30.57	0.00	5366.15
GBR-26	5395.59	38.04	38.04	0.00	5357.55
GBR-30	5396.58	33.60	33.60	0.00	5362.98
GBR-31	5394.86	34.85	34.85	0.00	5360.01
GBR-33	5396.28	37.51	37.48	0.03	5358.79
GBR-34	5394.00	35.35	35.14	0.21	5358.82
GBR-35	5393.66	35.25	34.96	0.29	5358.64
GBR-39	5397.55	35.76	35.76	0.00	5361.79
GBR-40	5400.76	26.98	26.98	0.00	5373.78
GBR-41	5396.35	19.51	19.51	0.00	5376.84
GBR-51	5389.68	40.15	40.15	0.00	5349.53
GBR-52	5387.74	38.55	38.55	0.00	5349.19

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: August, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.87	40.85	0.02	5342.69
SHS-2	5381.66	36.80	36.80	0.00	5344.86
SHS-3	5383.33	35.60	35.60	0.00	5347.73
SHS-4	5383.62	40.94	40.94	0.00	5342.68
SHS-5	5378.36	38.13	38.13	0.00	5340.23
SHS-6	5378.17	38.27	38.27	0.00	5339.90
SHS-7	5378.77	39.20	38.60	0.60	5340.05
SHS-8	5380.25	38.47	38.46	0.01	5341.79
SHS-9	5380.79	41.93	41.93	0.00	5338.86
SHS-10	5373.80	38.91	38.91	0.00	5334.89
SHS-11	5373.17	38.34	38.34	0.00	5334.83
SHS-12	5373.94	39.85	39.85	0.00	5334.09
SHS-13	5367.81	36.74	36.74	0.00	5331.07
SHS-14	5367.07	45.44	45.44	0.00	5321.63
SHS-15	5366.21	33.97	33.97	0.00	5332.24
SHS-16	5362.58	31.71	31.71	0.00	5330.87

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: September, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.16	59.16	0.00	5335.14
GRW-2	5391.28	50.34	50.34	0.00	5340.94
GRW-3	5388.77	53.27	53.27	0.00	5335.50
GRW-4	5390.02	49.78	49.78	0.00	5340.24
GRW-5	5390.56	46.34	46.34	0.00	5344.22
GRW-6	5390.81	48.24	48.24	0.00	5342.57
GRW-10	5395.02	55.88	43.31	12.57	5349.20
GRW-11	5397.85	64.08	64.08	0.00	5333.77
GRW-12	5397.24	46.00	46.00	0.00	5351.24
GRW-13	5396.90	57.44	57.44	0.00	5339.46
GBR-5	5395.07	28.39	26.16	2.23	5368.46
GBR-6	5395.70	61.30	61.30	0.00	5334.40
GBR-7	5395.85	32.67	30.27	2.40	5365.10
GBR-8	5390.50	41.70	41.70	0.00	5348.80
GBR-9	5389.92	47.08	47.08	0.00	5342.84
GBR-10	5390.57	41.98	41.98	0.00	5348.59
GBR-11	5389.43	41.83	40.70	1.13	5348.50
GBR-13	5393.04	33.76	33.76	0.00	5359.28
GBR-15	5397.99	42.39	42.39	0.00	5355.60
GBR-17	5402.69	34.48	34.48	0.00	5368.21
GBR-18	5421.68	23.23	23.23	0.00	5398.45
GBR-19	5393.83	38.59	38.59	0.00	5355.24
GBR-20	5393.47	40.50	37.47	3.03	5355.39
GBR-21S	5400.65	19.75	19.75	0.00	5380.90
GBR-21D	5400.19	35.78	35.78	0.00	5364.41
GBR-22	5395.91	35.42	35.40	0.02	5360.51
GBR-23	5403.72	22.20	22.20	0.00	5381.52
GBR-24S	5396.08	26.10	26.10	0.00	5369.98
GBR-24D	5396.77	31.58	31.58	0.00	5365.19
GBR-25	5396.72	30.41	30.41	0.00	5366.31
GBR-26	5395.59	36.55	36.55	0.00	5359.04
GBR-30	5396.58	32.83	32.83	0.00	5363.75
GBR-31	5394.86	34.40	34.40	0.00	5360.46
GBR-33	5396.28	37.20	37.20	0.00	5359.08
GBR-34	5394.00	34.85	34.85	0.00	5359.15
GBR-35	5393.66	37.74	37.74	0.00	5355.92
GBR-39	5397.55	35.14	35.14	0.00	5362.41
GBR-40	5400.76	27.48	27.48	0.00	5373.28
GBR-41	5396.35	20.89	20.89	0.00	5375.46
GBR-51	5389.68	40.05	40.05	0.00	5349.63
GBR-52	5387.74	38.45	38.45	0.00	5349.29

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: September, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	40.84	40.82	0.02	5342.72
SHS-2	5381.66	36.74	36.74	0.00	5344.92
SHS-3	5383.33	35.50	35.50	0.00	5347.83
SHS-4	5383.62	40.93	40.93	0.00	5342.69
SHS-5	5378.36	38.19	38.19	0.00	5340.17
SHS-6	5378.17	38.28	38.28	0.00	5339.89
SHS-7	5378.77	39.26	38.64	0.62	5340.01
SHS-8	5380.25	38.50	38.50	0.00	5341.75
SHS-9	5380.79	43.80	43.80	0.00	5336.99
SHS-10	5373.80	37.10	37.10	0.00	5336.70
SHS-11	5373.17	40.55	40.55	0.00	5332.62
SHS-12	5373.94	40.04	40.04	0.00	5333.90
SHS-13	5367.81	36.96	36.96	0.00	5330.85
SHS-14	5367.07	44.94	44.94	0.00	5322.13
SHS-15	5366.21	34.29	34.29	0.00	5331.92
SHS-16	5362.58	31.98	31.98	0.00	5330.60

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Third Quarter, 1991

=====
Total Volume Of Water Recovered 2073800
Net Change In Storage Volume -92631

Total Water Pumped To The 1724020
Infiltration Gallery

=====
Difference -442411

Comments:

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Third Quarter, 1991

Tank Number	Beginning Volume	Ending Volume	Net Change
102	13735	16763	3028
106	8010	8010	0
21	351419	218449	-132970
22	294448	331759	37311
27	182470	182470	0
32	88634	88634	0
34	87541	87541	0
35	0	0	0
37	138051	138051	0
Total Net Volume Change			-92631

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Third Quarter of 1991

Well	Month #1	Month #2	Month #3	Total
GRW-1	13340	13050	14120	40510
GRW-2	4220	8090	6840	19150
GRW-3	22080	14140	17050	53270
GRW-4	23540	24420	26840	74800
GRW-5	65080	60310	69080	194470
GRW-6	23540	16700	18790	59030
GRW-9	11770	9460	11050	32280
GRW-10	300450	196160	262500	759110
GRW-11	47420	62800	67280	177500
GRW-12	6290	10660	6930	23880
GRW-13	40740	37200	41270	119210
SHS-9	5822	6089	7483	19394
SHS-11	5635	7571	5683	18889
SHS-14	177954	119607	184746	482307
Total Volume Pumped In Gallons				2073800

SPECIFIC CONDUCTANCE VALUES

GRW-13	7/91	8/91	9/91
Lab Conductivity, umhos/cm	4200	4750	4500



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10756901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 910703955 GBR 24D
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/16/91
UNITS : UG/L
DILUTION FACTOR : 4

COMPOUNDS

RESULTS

BENZENE	45
BROMODICHLOROMETHANE	<0.8
BROMOFORM	<0.8
BROMOMETHANE	<0.8
CARBON TETRACHLORIDE	<0.8
CHLOROBENZENE	<2.0
CHLOROETHANE	<0.8
CHLOROFORM	<0.8
CHLOROMETHANE	<0.8
DIBROMOCHLOROMETHANE	<0.8
2-CHLOROETHYL VINYL ETHER	<2.0
1,3-DICHLOROBENZENE	<2.0
1,2 & 1,4-DICHLOROBENZENE	<2.0
DICHLORODIFLUOROMETHANE	<0.8
1,1-DICHLOROETHANE	<0.8
1,2-DICHLOROETHANE	6
1,1-DICHLOROETHENE	<0.8
1,2-DICHLOROETHENE (TOTAL)	<0.8
1,2-DICHLOROPROPANE	<0.8
CIS-1,3-DICHLOROPROPENE	<0.8
TRANS-1,3-DICHLOROPROPENE	<0.8
ETHYLBENZENE	10
METHYLENE CHLORIDE	<8.0
1,1,2,2-TETRACHLOROETHANE	<0.8
TETRACHLOROETHENE	<0.8
TOLUENE	2
1,1,1-TRICHLOROETHANE	<0.8
1,1,2-TRICHLOROETHANE	<0.8
TRICHLOROETHENE	<0.8
TRICHLOROFLUOROMETHANE	<2.0
VINYL CHLORIDE	<0.8
TOTAL XYLENES	<2.0
TRICHLOROTRIFLUOROETHANE	<8.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	76
BROMOFLUOROBENZENE (%)	91

Analytical**Technologies**, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10756902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9107031109 GBR 31
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/15/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	2.4
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	0.2
1,2-DICHLOROETHENE (TOTAL)	57.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	6.0
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.5
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	4.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	93



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10756903

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9107031145 RW-6 (6BR-44)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/15/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	66 D
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.5
1,2-DICHLOROETHANE	2.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	4.6
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	46
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.9
TOLUENE	2.0
1,1,1-TRICHLOROETHANE	0.3
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.1
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	116
BROMOFLUOROBENZENE (%)	95



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10756904

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9107031215 RW-13 (GBR-14)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/15/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	25
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	10
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

DIBROMOCHLOROMETHANE (%)	118
BROMOFLUOROBENZENE (%)	86



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 107569
DATE EXTRACTED : 07/15/91
DATE ANALYZED : 07/15/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	111
BROMOFLUOROBENZENE (%)	91



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107569
PROJECT #	: 9834	DATE EXTRACTED	: 07/16/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 07/16/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	93
BROMOFLUOROBENZENE (%)	97



Analytical Technologies, Inc.

QUALITY CONTROL DATA

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602) ATI I.D. : 107569

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
REF I.D. : 10799803DATE ANALYZED : 07/15/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	20	100	20	100	0
TETRACHLOROETHENE	<0.2	20	19	95	20	100	5
BENZENE	<0.5	20	18	90	16	80	12
BROMODICHLOROMETHANE	<0.2	20	21	105	21	105	0
CHLOROFORM	<0.2	20	22	110	22	110	0
1,1,1-TRICHLOROETHANE	<0.2	20	24	120	23	115	4
TOLUENE	<0.5	20	16	80	17	85	6
CHLOROBENZENE	<0.5	20	18	90	19	95	5
M-XYLENE	<0.5	20	16	80	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GCMS - RESULTS

ATI I.D. : 10756903

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9107031145 RW-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : 07/09/91
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	38
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	3.3
FLUORENE	1.3
PHENANTHRENE	2.7 B
ANTHRACENE	0.50
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

ATI I.D. : 10756904

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9107031215 RW-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : 07/09/91
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.07 B
ANTHRACENE	<0.02
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 107569
DATE EXTRACTED : 07/09/91
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.05
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : SHS 9002
PROJECT NAME : OFF SITE
CLIENT I.D. : 9107051105 SHS-10
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/05/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/15/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	47 D
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	1.8
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	115
BROMOFLUOROBENZENE (%)	105

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757102

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : SHS 9002
PROJECT NAME : OFF SITE
CLIENT I.D. : 9107051222 SHS-12
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/05/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/16/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	6.9
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.7
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	85



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757103

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : SHS 9002
PROJECT NAME : OFF SITE
CLIENT I.D. : 9107051330 SHS-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/05/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/16/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.9
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	86
BROMOFLUOROBENZENE (%)	83



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757104

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : SHS 9002
PROJECT NAME : OFF SITE
CLIENT I.D. : 9107051451 SHS-15
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/05/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/16/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	0.6
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	11.8
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	82
BROMOFLUOROBENZENE (%)	83



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757105

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : SHS 9002
PROJECT NAME : OFF SITE
CLIENT I.D. : 9107051551 SHS-16
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/05/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/16/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	84
BROMOFLUOROBENZENE (%)	87



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GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107571
PROJECT #	: SHS 9002	DATE EXTRACTED	: 07/16/91
PROJECT NAME	: OFF SITE	DATE ANALYZED	: 07/16/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	91



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QUALITY CONTROL DATA

ATI I.D. : 107571

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : SHS 9002

PROJECT NAME : OFF SITE

REF I.D. : 10799918

DATE ANALYZED : 07/16/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED	% SPIKED	DUP.		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	18	90	19	95	5
TRICHLOROETHENE	<0.2	20	22	110	21	105	5
TETRACHLOROETHENE	<0.2	20	22	110	21	105	5
BENZENE	<0.5	20	18	90	17	85	5
BROMODICHLOROMETHANE	<0.2	20	21	105	21	105	0
CHLOROFORM	<0.2	20	21	105	21	105	0
1,1,1-TRICHLOROETHANE	<0.2	20	16	80	20	100	20
TOLUENE	<0.5	20	18	90	18	90	0
CHLOROBENZENE	<0.5	20	21	105	19	95	15
M-XYLENE	<0.5	20	18	90	17	85	5

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10753301

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9107021204 GBR-17
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/02/91
DATE RECEIVED : 07/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	83



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10753302

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9107021334 GBR-15
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/02/91
DATE RECEIVED : 07/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	1.0
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	10.3
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	93
BROMOFLUOROBENZENE (%)	97



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10753303

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9107021412 GBR-30
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/02/91
DATE RECEIVED : 07/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	85



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10753304

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9107021440 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/02/91
DATE RECEIVED : 07/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	89
BROMOFLUOROBENZENE (%)	82



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107533
PROJECT #	: 9834	DATE EXTRACTED	: 07/12/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 07/12/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	90



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 107533

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 07/12/91

PROJECT NAME : REFINERY REM

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10799802

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. %		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	19	95	20	100	5
TETRACHLOROETHENE	<0.2	20	20	100	20	100	0
BENZENE	<0.5	20	17	85	18	90	6
BROMODICHLOROMETHANE	<0.2	20	19	95	19	95	0
CHLOROFORM	<0.2	20	21	105	21	105	0
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	21	105	0
TOLUENE	<0.5	20	16	80	17	85	6
CHLOROBENZENE	<0.5	20	17	85	19	95	11
M-XYLENE	<0.5	20	16	80	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10760101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 07/08/91
PROJECT #	: 9834	DATE RECEIVED	: 07/10/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9107081223 STRIPPER INFLUENT	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 5

COMPOUNDS	RESULTS
BENZENE	303
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	4
1,2-DICHLOROETHANE	9
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	14
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	52
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	1
TOLUENE	43
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	2
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	156
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	102



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107601
PROJECT #	: 9834	DATE EXTRACTED	: 07/17/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 07/17/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	118



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D.

: 107601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : REFINE REMED

REF I.D. : 10799928

DATE ANALYZED : 07/17/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SPIKED SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	24	120	21	105	13
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9
BENZENE	<0.5	20	20	100	21	105	5
BROMODICHLOROMETHANE	<0.2	20	24	120	21	105	13
CHLOROFORM	<0.2	20	22	110	20	100	10
1,1,1-TRICHLOROETHANE	<0.2	20	22	110	19	95	15
TOLUENE	<0.5	20	21	105	21	105	0
CHLOROBENZENE	<0.5	20	23	115	20	100	14
M-XYLENE	<0.5	20	21	105	22	110	5

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : SHS 9002-67
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9107031325 SHS-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	98



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10757002

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : SHS 9002-67
PROJECT NAME : REFINED REMED
CLIENT I.D. : 9107031419 SHS-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 07/03/91
DATE RECEIVED : 07/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 07/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	81



REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 107570
PROJECT #	: SHS 9002-67	DATE EXTRACTED	: 07/12/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 07/12/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	90



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D.

: 107570

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : SHS 9002-67

PROJECT NAME : REFINER REMED

REF I.D. : 10799802

DATE ANALYZED : 07/12/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED	DUP. %	RPD
					SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	19	95	20	100	5
TETRACHLOROETHENE	<0.2	20	20	100	20	100	0
BENZENE	<0.5	20	17	85	18	90	6
BROMODICHLOROMETHANE	<0.2	20	19	95	19	95	0
CHLOROFORM	<0.2	20	21	105	21	105	0
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	21	105	0
TOLUENE	<0.5	20	16	80	17	85	6
CHLOROBENZENE	<0.5	20	17	85	19	95	11
M-XYLENE	<0.5	20	16	80	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

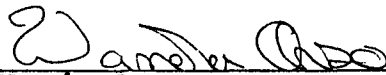
$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

CLIENT: Giant Refinery
ID: 0955
SITE: GBR-24D
LAB NO: F6608

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.59
Lab conductivity, umhos/cm.....	4810
Lab resistivity, ohm-m.....	2.08
Total dissolved solids (180), mg/l..	3990
Total dissolved solids (calc), mg/l.	3430
Total alkalinity as CaCO ₃ , mg/l.....	217
Total hardness as CaCO ₃ , mg/l.....	1860
Sodium absorption ratio.....	4.53

	mg/l	meq/l
Bicarbonate as HCO ₃	265	4.34
Carbonate as CO ₃	0	0
Chloride.....	777	21.9
Sulfate.....	1370	28.6
Calcium.....	614	30.6
Magnesium.....	80	6.58
Potassium.....	5.33	0.14
Sodium.....	450	19.6
Major cations.....		56.9
Major anions.....		54.9
Cation/anion difference.....		1.79 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1109
SITE: GBR-31
LAB NO: F6609

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.39
Lab conductivity, umhos/cm.....	4140
Lab resistivity, ohm-m.....	2.41
Total dissolved solids (180), mg/l..	3550
Total dissolved solids (calc), mg/l.	3330
Total alkalinity as CaCO ₃ , mg/l.....	302
Total hardness as CaCO ₃ , mg/l.....	1270
Sodium absorption ratio.....	7.02

	mg/l	meq/l
Bicarbonate as HCO ₃	369	6.05
Carbonate as CO ₃	0	0
Chloride.....	338	9.55
Sulfate.....	1760	36.7
Calcium.....	416	20.8
Magnesium.....	57.7	4.74
Potassium.....	2.49	0.06
Sodium.....	576	25.1
Major cations.....		50.6
Major anions.....		52.3
Cation/anion difference.....		1.62 %


Wanda Orso
Water Lab Manager



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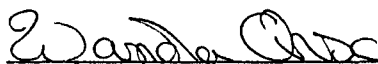
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1145
SITE: RW-6
LAB NO: F6610

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.44
Lab conductivity, umhos/cm.....	4470
Lab resistivity, ohm-m.....	2.24
Total dissolved solids (180), mg/l..	3320
Total dissolved solids (calc), mg/l.	3120
Total alkalinity as CaCO ₃ , mg/l.....	732
Total hardness as CaCO ₃ , mg/l.....	1230
Sodium absorption ratio.....	7.67

	mg/l	meq/l
Bicarbonate as HCO ₃	891	14.6
Carbonate as CO ₃	0	0
Chloride.....	571	16.1
Sulfate.....	1030	21.4
Calcium.....	410	20.5
Magnesium.....	50.8	4.18
Potassium.....	2.25	0.06
Sodium.....	619	26.9
Major cations.....		51.6
Major anions.....		52.2
Cation/anion difference.....		0.51 %


Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 1215
SITE: RW-13
LAB NO: F6611

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.85
Lab conductivity, umhos/cm.....	4200
Lab resistivity, ohm-m.....	2.38
Total dissolved solids (180), mg/l..	3730
Total dissolved solids (calc), mg/l.	3510
Total alkalinity as CaCO ₃ , mg/l.....	214
Total hardness as CaCO ₃ , mg/l.....	1300
Sodium absorption ratio.....	7.59

	mg/l	meq/l
Bicarbonate as HC0 ₃	262	4.29
Carbonate as C0 ₃	0	0
Chloride.....	484	13.7
Sulfate.....	1760	36.6
Calcium.....	473	23.6
Magnesium.....	28.8	2.37
Potassium.....	6.12	0.16
Sodium.....	629	27.4
Major cations.....		53.5
Major anions.....		54.5
Cation/anion difference.....		0.99 %


Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 1325
SITE: SHS-3
LAB NO: F6612

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.64
Lab conductivity, umhos/cm.....	4280
Lab resistivity, ohm-m.....	2.34
Total dissolved solids (180), mg/l..	3800
Total dissolved solids (calc), mg/l.	3590
Total alkalinity as CaCO ₃ , mg/l.....	236
Total hardness as CaCO ₃ , mg/l.....	1780
Sodium absorption ratio.....	4.62

	mg/l	meq/l
Bicarbonate as HC0 ₃	288	4.72
Carbonate as C0 ₃	0	0
Chloride.....	230	6.49
Sulfate.....	2080	43.4
Calcium.....	606	30.3
Magnesium.....	65.5	5.38
Potassium.....	11.2	0.29
Sodium.....	449	19.5
Major cations.....		55.4
Major anions.....		54.6
Cation/anion difference.....		0.77 %


Wanda Orso
Water Lab Manager



2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1419
SITE: SHS-6
LAB NO: F6613

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.72
Lab conductivity, umhos/cm.....	2890
Lab resistivity, ohm-m.....	3.46
Total dissolved solids (180), mg/l..	2580
Total dissolved solids (calc), mg/l.	2480
Total alkalinity as CaCO ₃ , mg/l.....	295
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	4.18

	mg/l	meq/l
Bicarbonate as HCO ₃	360	5.9
Carbonate as CO ₃	0	0
Chloride.....	81.2	2.29
Sulfate.....	1450	30.2
Calcium.....	375	18.7
Magnesium.....	61.9	5.09
Potassium.....	4.95	0.13
Sodium.....	332	14.4
Major cations.....		38.4
Major anions.....		38.3
Cation/anion difference.....		0.02 %


Wanda Orso
Water Lab Manager



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2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 0955
SITE: GBR-24D
LAB NO: F6614 Lab Split

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/03/91
DATE COLLECTED: 07/03/91

Lab pH (s.u.).....	7.80
Lab conductivity, umhos/cm.....	4820
Lab resistivity, ohm-m.....	2.07
Total dissolved solids (180), mg/l..	3920
Total dissolved solids (calc), mg/l.	3600
Total alkalinity as CaCO ₃ , mg/l.....	201
Total hardness as CaCO ₃ , mg/l.....	1870
Sodium absorption ratio.....	4.47

	mg/l	meq/l
Bicarbonate as HC0 ₃	245	4.02
Carbonate as C0 ₃	0	0
Chloride.....	776	21.9
Sulfate.....	1550	32.3
Calcium.....	628	31.3
Magnesium.....	74.5	6.12
Potassium.....	5.25	0.13
Sodium.....	445	19.3
Major cations.....		56.9
Major anions.....		58.2
Cation/anion difference.....		1.13 %


Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 1105
SITE: SHS-10
LAB NO: F6621

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.30
Lab conductivity, umhos/cm.....	2000
Lab resistivity, ohm-m.....	5.01
Total dissolved solids (180), mg/l..	1440
Total dissolved solids (calc), mg/l.	1380
Total alkalinity as CaCO ₃ , mg/l.....	304
Total hardness as CaCO ₃ , mg/l.....	454
Sodium absorption ratio.....	5.82

	mg/l	meq/l
Bicarbonate as HCO ₃	371	6.09
Carbonate as CO ₃	0	0
Chloride.....	64.3	1.81
Sulfate.....	667	13.9
Calcium.....	151	7.56
Magnesium.....	18.5	1.52
Potassium.....	7.78	0.2
Sodium.....	285	12.4
Major cations.....		21.7
Major anions.....		21.8
Cation/anion difference.....		0.26 %


Wanda Orso
Water Lab Manager



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2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1222
SITE: SHS-12
LAB NO: F6622

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.45
Lab conductivity, umhos/cm.....	4010
Lab resistivity, ohm-m.....	2.49
Total dissolved solids (180), mg/l..	2810
Total dissolved solids (calc), mg/l.	2630
Total alkalinity as CaCO ₃ , mg/l.....	363
Total hardness as CaCO ₃ , mg/l.....	1010
Sodium absorption ratio.....	6.45

	mg/l	meq/l
Bicarbonate as HCO ₃	443	7.27
Carbonate as CO ₃	0	0
Chloride.....	324	9.15
Sulfate.....	1220	25.5
Calcium.....	367	18.3
Magnesium.....	23.7	1.95
Potassium.....	2.96	0.08
Sodium.....	472	20.5
Major cations.....		40.8
Major anions.....		41.9
Cation/anion difference.....		1.33 %


Wanda Orso
Water Lab Manager



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2506 West Main Street
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CLIENT: Giant Refinery
ID: 1330
SITE: SHS-13
LAB NO: F6623

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.38
Lab conductivity, umhos/cm.....	3440
Lab resistivity, ohm-m.....	2.91
Total dissolved solids (180), mg/l..	2050
Total dissolved solids (calc), mg/l.	1830
Total alkalinity as CaCO ₃ , mg/l.....	670
Total hardness as CaCO ₃ , mg/l.....	546
Sodium absorption ratio.....	8.82

	mg/l	meq/l
Bicarbonate as HCO ₃	817	13.4
Carbonate as CO ₃	0	0
Chloride.....	464	13.1
Sulfate.....	285	5.93
Calcium.....	181	9.01
Magnesium.....	23.3	1.91
Potassium.....	1.98	0.05
Sodium.....	474	20.6
Major cations.....		31.6
Major anions.....		32.4
Cation/anion difference.....		1.28 %


Wanda Orso
Water Lab Manager



2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1451
SITE: SHS-15
LAB NO: F6624

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.91
Lab conductivity, umhos/cm.....	1710
Lab resistivity, ohm-m.....	5.86
Total dissolved solids (180), mg/l..	1300
Total dissolved solids (calc), mg/l.	1150
Total alkalinity as CaCO ₃ , mg/l.....	282
Total hardness as CaCO ₃ , mg/l.....	559
Sodium absorption ratio.....	2.97

	mg/l	meq/l
Bicarbonate as HCO ₃	344	5.64
Carbonate as CO ₃	0	0
Chloride.....	25.5	0.72
Sulfate.....	583	12.1
Calcium.....	190	9.47
Magnesium.....	20.8	1.71
Potassium.....	2.75	0.07
Sodium.....	161	7.02
Major cations.....		18.3
Major anions.....		18.5
Cation/anion difference.....		0.6 %


Wanda Orso
Water Lab Manager



2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1557
SITE: SHS-16
LAB NO: F6625

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.84
Lab conductivity, umhos/cm.....	2930
Lab resistivity, ohm-m.....	3.41
Total dissolved solids (180), mg/l..	2590
Total dissolved solids (calc), mg/l.	2270
Total alkalinity as CaCO ₃ , mg/l.....	285
Total hardness as CaCO ₃ , mg/l.....	1250
Sodium absorption ratio.....	2.65

	mg/l	meq/l
Bicarbonate as HC03.....	347	5.69
Carbonate as C03.....	0	0
Chloride.....	36.2	1.02
Sulfate.....	1360	28.4
Calcium.....	456	22.7
Magnesium.....	27.7	2.28
Potassium.....	2.51	0.06
Sodium.....	216	9.39
Major cations.....		34.5
Major anions.....		35.1
Cation/anion difference.....		0.98 %


Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 1330
SITE: SHS-13
LAB NO: F6626 Lab Split

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/05/91
DATE COLLECTED: 07/05/91

Lab pH (s.u.).....	7.35
Lab conductivity, umhos/cm.....	3430
Lab resistivity, ohm-m.....	2.92
Total dissolved solids (180), mg/l..	2030
Total dissolved solids (calc), mg/l.	1800
Total alkalinity as CaCO ₃ , mg/l.....	666
Total hardness as CaCO ₃ , mg/l.....	548
Sodium absorption ratio.....	8.77

	mg/l	meq/l
Bicarbonate as HCO ₃	811	13.3
Carbonate as CO ₃	0	0
Chloride.....	451	12.7
Sulfate.....	270	5.62
Calcium.....	189	9.42
Magnesium.....	18.8	1.55
Potassium.....	1.94	0.05
Sodium.....	472	20.5
Major cations.....		31.5
Major anions.....		31.7
Cation/anion difference.....		0.21 %


Wanda Orso
Water Lab Manager



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2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1204
SITE: GBR-17
LAB NO: F6589

DATE REPORTED: 07/18/91
DATE RECEIVED: 07/02/91
DATE COLLECTED: 07/02/91

Lab pH (s.u.).....	7.78
Lab conductivity, umhos/cm.....	2970
Lab resistivity, ohm-m.....	3.36
Total dissolved solids (180), mg/l..	2270
Total dissolved solids (calc), mg/l.	2120
Total alkalinity as CaCO ₃ , mg/l.....	233
Total hardness as CaCO ₃ , mg/l.....	932
Sodium absorption ratio.....	4.21

	mg/l	meq/l
Bicarbonate as HCO ₃	284	4.66
Carbonate as CO ₃	0	0
Chloride.....	68.6	1.94
Sulfate.....	1250	26.1
Calcium.....	343	17.1
Magnesium.....	18.4	1.51
Potassium.....	0.86	0.02
Sodium.....	295	12.8
Major cations.....		31.5
Major anions.....		32.7
Cation/anion difference.....		1.84 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1334
SITE: GBR-15
LAB NO: F6590

DATE REPORTED: 07/18/91
DATE RECEIVED: 07/02/91
DATE COLLECTED: 07/02/91

Lab pH (s.u.).....	7.69
Lab conductivity, umhos/cm.....	4780
Lab resistivity, ohm-m.....	2.09
Total dissolved solids (180), mg/l..	3460
Total dissolved solids (calc), mg/l.	3260
Total alkalinity as CaCO ₃ , mg/l.....	277
Total hardness as CaCO ₃ , mg/l.....	1110
Sodium absorption ratio.....	8.19

	mg/l	meq/l
Bicarbonate as HCO ₃	338	5.54
Carbonate as CO ₃	0	0
Chloride.....	479	13.5
Sulfate.....	1540	32.2
Calcium.....	422	21.1
Magnesium.....	13.7	1.12
Potassium.....	4.32	0.11
Sodium.....	627	27.3
Major cations.....		49.6
Major anions.....		51.2
Cation/anion difference.....		1.65 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1412
SITE: GBR-30
LAB NO: F6591

DATE REPORTED: 07/18/91
DATE RECEIVED: 07/02/91
DATE COLLECTED: 07/02/91

Lab pH (s.u.).....	7.30
Lab conductivity, umhos/cm.....	4740
Lab resistivity, ohm-m.....	2.11
Total dissolved solids (180), mg/l..	3340
Total dissolved solids (calc), mg/l.	3140
Total alkalinity as CaCO ₃ , mg/l.....	219
Total hardness as CaCO ₃ , mg/l.....	1240
Sodium absorption ratio.....	6.53

	mg/l	meq/l
Bicarbonate as HCO ₃	267	4.38
Carbonate as CO ₃	0	0
Chloride.....	517	14.6
Sulfate.....	1480	30.9
Calcium.....	439	21.9
Magnesium.....	36	2.96
Potassium.....	2.89	0.07
Sodium.....	529	23
Major cations.....		48
Major anions.....		49.8
Cation/anion difference.....		1.9 %


Wanda Orso
Water Lab Manager



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2506 West Main Street
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CLIENT: Giant Refinery
ID: 1440
SITE: Stripper Effluent
LAB NO: F6592

DATE REPORTED: 07/18/91
DATE RECEIVED: 07/02/91
DATE COLLECTED: 07/02/91

Lab pH (s.u.).....	8.21
Lab conductivity, umhos/cm.....	4180
Lab resistivity, ohm-m.....	2.39
Total dissolved solids (180), mg/l..	2850
Total dissolved solids (calc), mg/l.	2670
Total alkalinity as CaCO ₃ , mg/l.....	163
Total hardness as CaCO ₃ , mg/l.....	1080
Sodium absorption ratio.....	6.19

	mg/l	meq/l
Bicarbonate as HCO ₃	198	3.25
Carbonate as CO ₃	0	0
Chloride.....	481	13.6
Sulfate.....	1210	25.2
Calcium.....	385	19.2
Magnesium.....	29.4	2.42
Potassium.....	2.96	0.08
Sodium.....	468	20.4
Major cations.....		42.1
Major anions.....		42
Cation/anion difference.....		0.06 %


Wanda Orso
Water Lab Manager



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1223
SITE: Stripper Influent
LAB NO: F6627

DATE REPORTED: 07/31/91
DATE RECEIVED: 07/08/91
DATE COLLECTED: 07/08/91

Lab pH (s.u.).....	7.37
Lab conductivity, umhos/cm.....	3550
Lab resistivity, ohm-m.....	2.81
Total dissolved solids (180), mg/l..	2900
Total dissolved solids (calc), mg/l.	2830
Total alkalinity as CaCO ₃ , mg/l.....	297
Total hardness as CaCO ₃ , mg/l.....	1090
Sodium absorption ratio.....	6.72

	mg/l	meq/l
Bicarbonate as HCO ₃	363	5.95
Carbonate as CO ₃	0	0
Chloride.....	423	11.9
Sulfate.....	1300	27.2
Calcium.....	376	18.8
Magnesium.....	36.7	3.02
Potassium.....	3.03	0.08
Sodium.....	510	22.2
Major cations.....		44
Major anions.....		45
Cation/anion difference.....		1.13 %

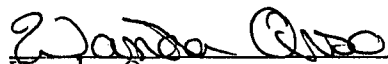

Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 910809850
SITE: Stripper Influent
LAB NO: F6875

DATE REPORTED: 08/29/91
DATE RECEIVED: 08/09/91
DATE COLLECTED: 08/07/91

Lab pH (s.u.).....	7.00
Lab conductivity, umhos/cm.....	4010
Lab resistivity, ohm-m.....	2.5
Total dissolved solids (180), mg/l..	2740
Total dissolved solids (calc), mg/l.	2740
Total alkalinity as CaCO ₃ , mg/l.....	331
Total hardness as CaCO ₃ , mg/l.....	1080
Sodium absorption ratio.....	6.35

	mg/l	meq/l
Bicarbonate as HCO ₃	404	6.62
Carbonate as CO ₃	0	0
Chloride.....	336	9.48
Sulfate.....	1310	27.3
Calcium.....	383	19.1
Magnesium.....	31.4	2.58
Potassium.....	2.84	0.07
Sodium.....	481	20.9
Major cations.....		42.7
Major anions.....		43.4
Cation/anion difference.....		0.86 %

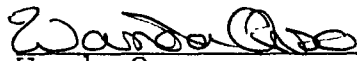

Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 910807805
SITE: Stripper Effluent
LAB NO: F6876

DATE REPORTED: 08/29/91
DATE RECEIVED: 08/09/91
DATE COLLECTED: 08/07/91

Lab pH (s.u.).....	7.97
Lab conductivity, umhos/cm.....	4070
Lab resistivity, ohm-m.....	2.46
Total dissolved solids (180), mg/l..	2900
Total dissolved solids (calc), mg/l.	2720
Total alkalinity as CaCO ₃ , mg/l.....	203
Total hardness as CaCO ₃ , mg/l.....	1050
Sodium absorption ratio.....	6.53

	mg/l	meq/l
Bicarbonate as HCO ₃	248	4.06
Carbonate as CO ₃	0	0
Chloride.....	389	11
Sulfate.....	1320	27.4
Calcium.....	374	18.7
Magnesium.....	28.7	2.36
Potassium.....	2.91	0.07
Sodium.....	487	21.2
Major cations.....		42.3
Major anions.....		42.5
Cation/anion difference.....		0.24 %


Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 910807810
SITE: GRW -13
LAB NO: F6877

DATE REPORTED: 08/29/91
DATE RECEIVED: 08/09/91
DATE COLLECTED: 08/07/91

Lab conductivity, umhos/cm..... 4750


Wanda Orso
Water Lab Manager

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10863101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 08/09/91
PROJECT #	: 9831	DATE RECEIVED	: 08/10/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 910809850 STRIPPER INFLUENT	DATE ANALYZED	: 08/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	45.7
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.8
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	2.1
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.4
TOLUENE	0.7
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	7.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	102

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10863102

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 08/09/91
PROJECT #	: 9831	DATE RECEIVED	: 08/10/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9108091225	DATE ANALYZED	: 08/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	120



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 108631
PROJECT #	: 9831	DATE EXTRACTED	: 08/13/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 08/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	94



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 108631
PROJECT #	: 9831	DATE EXTRACTED	: 08/14/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 08/14/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	86
BROMOFLUOROBENZENE (%)	97



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 108631

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9831
PROJECT NAME : REFINE REMED
REF I.D. : 10899904

DATE ANALYZED : 08/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED		RPD
	RESULT	SPIKED			SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.2	20	22	110	22	110	0
TRICHLOROETHENE	<0.2	20	19	95	20	100	5
TETRACHLOROETHENE	<0.2	20	18	90	18	90	0
BENZENE	<0.2	20	18	90	18	90	0
BROMODICHLOROMETHANE	<0.2	20	20	100	21	105	5
CHLOROFORM	<0.2	20	20	100	20	100	0
1,1,1-TRICHLOROETHANE	<0.2	20	19	95	19	95	0
TOLUENE	<0.5	20	17	85	17	85	0
CHLOROBENZENE	<0.5	20	17	85	17	85	0
M-XYLENE	<0.5	20	16	80	16	80	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10858701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINER REMED
CLIENT I.D. : 910807805 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 08/07/91
DATE RECEIVED : 08/08/91
DATE EXTRACTED : N/A
DATE ANALYZED : 08/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	108



REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 108587
DATE EXTRACTED : 08/08/91
DATE ANALYZED : 08/08/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	89



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 108587

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
REF I.D. : 10899903

DATE ANALYZED : 08/08/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	DUP. % SPIKED		DUP. % SPIKED	RPD
	RESULT	SPIKED		REC.	SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	20	100	5
TRICHLOROETHENE	<0.2	20	21	105	20	100	5
TETRACHLOROETHENE	<0.2	20	20	100	19	95	5
BENZENE	<0.5	20	17	85	16	80	6
BROMODICHLOROMETHANE	<0.2	20	23	115	22	110	4
CHLOROFORM	<0.2	20	22	110	21	105	5
1,1,1-TRICHLOROETHANE	<0.2	20	22	110	21	105	5
TOLUENE	<0.5	20	17	85	16	80	6
CHLOROBENZENE	<0.5	20	19	95	18	90	5
M-XYLENE	<0.5	20	17	85	16	80	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10963101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 910909810 STRIPPER INFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 09/09/91
DATE RECEIVED : 09/10/91
DATE EXTRACTED : N/A
DATE ANALYZED : 09/13/91
UNITS : UG/L
DILUTION FACTOR : 5

COMPOUNDS	RESULTS
BENZENE	35
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	<1.0
1,2-DICHLOROETHANE	<1.0
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	<1.0
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	3
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	<1.0
TOLUENE	<2.5
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	<1.0
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	13
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	90
BROMOFLUOROBENZENE (%)	83



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 109631
PROJECT #	: 9834	DATE EXTRACTED	: 09/13/91
PROJECT NAME	: REFINE REMED	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	88

QUALITY CONTROL DATA

ATI I.D. : 109631

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFINE REMED
 REF I.D. : 10999911

DATE ANALYZED : 09/13/91
 SAMPLE MATRIX : AQUEOUS
 UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	DUP. %		DUP. %	RPD
	RESULT	SPIKED		REC.	SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	18	85	18	85	0
TRICHLOROETHENE	<0.2	20	22	110	22	110	0
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9
BENZENE	<0.5	20	18	85	18	85	0
BROMODICHLOROMETHANE	<0.2	20	23	115	22	110	4
CHLOROFORM	3.5	20	27	118	27	118	0
1,1,1-TRICHLOROETHANE	<0.2	20	23	115	23	115	0
TOLUENE	<0.5	20	18	85	17	80	6
CHLOROBENZENE	<0.5	20	22	110	21	105	5
M-XYLENE	<0.5	20	17	80	17	80	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

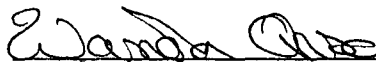
$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

CLIENT: Giant Refinery
ID: 9109041518
SITE: Stripper effluent
LAB NO: F7129

DATE REPORTED: 09/25/91
DATE RECEIVED: 09/05/91
DATE COLLECTED: 09/04/91

Lab pH (s.u.).....	7.76
Lab conductivity, umhos/cm.....	4020
Lab resistivity, ohm-m.....	2.49
Total dissolved solids (180), mg/L..	2910
Total dissolved solids (calc), mg/L.	2680
Total alkalinity as CaCO ₃ , mg/L.....	217
Total hardness as CaCO ₃ , mg/L.....	1040
Sodium absorption ratio.....	6.24

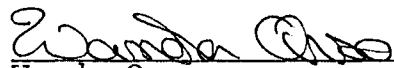
	mg/L	meq/L
Bicarbonate as HCO ₃	264	4.33
Carbonate as CO ₃	0	0
Chloride.....	430	12.1
Sulfate.....	1260	26.2
Calcium.....	365	18.2
Magnesium.....	32.3	2.66
Potassium.....	2.62	0.07
Sodium.....	464	20.2
Major cations.....		41.1
Major anions.....		42.6
Cation/anion difference.....		1.8 %


Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 9109051250
SITE: RW -13
LAB NO: F7130

DATE REPORTED: 09/25/91
DATE RECEIVED: 09/05/91
DATE COLLECTED: 09/04/91

Lab conductivity, umhos/cm..... 4500


Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 910909810
SITE: Stripper influent
LAB NO: F7149

DATE REPORTED: 09/25/91
DATE RECEIVED: 09/09/91
DATE COLLECTED: 09/09/91

Lab pH (s.u.).....	6.79
Lab conductivity, umhos/cm.....	3840
Lab resistivity, ohm-m.....	2.61
Total dissolved solids (180), mg/L..	2940
Total dissolved solids (calc), mg/L.	2770
Total alkalinity as CaCO ₃ , mg/L.....	323
Total hardness as CaCO ₃ , mg/L.....	1080
Sodium absorption ratio.....	6.77

	mg/L	meq/L
Bicarbonate as HCO ₃	394	6.46
Carbonate as CO ₃	0	0
Chloride.....	386	10.9
Sulfate.....	1260	26.3
Calcium.....	380	19
Magnesium.....	32.5	2.67
Potassium.....	2.7	0.07
Sodium.....	512	22.3
Major cations.....		44
Major anions.....		43.6
Cation/anion difference.....		0.45 %


Wanda Orso
Water Lab Manager



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10958001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 09/04/91
PROJECT #	: 9834	DATE RECEIVED	: 09/06/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9109041518 STRIPPER EFFLUENT	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	109



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109580
DATE EXTRACTED : 09/09/91
DATE ANALYZED : 09/09/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	81



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 109580

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

DATE ANALYZED : 09/09/91

PROJECT NAME : REFINE REMED

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10999908

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE		% REC.	RPD
	RESULT	SPIKED			REC.	REC.		
1,1-DICHLOROETHENE	<0.2	20	21	105	21	105	0	
TRICHLOROETHENE	<0.2	20	23	115	21	105	9	
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9	
BENZENE	<0.5	20	20	100	19	95	5	
BROMODICHLOROMETHANE	<0.2	20	23	115	21	105	9	
CHLOROFORM	<0.2	20	23	115	23	115	0	
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	21	105	0	
TOLUENE	<0.5	20	20	100	19	95	5	
CHLOROBENZENE	<0.2	20	21	105	20	100	5	
M-XYLENE	<0.5	20	18	90	17	85	6	

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

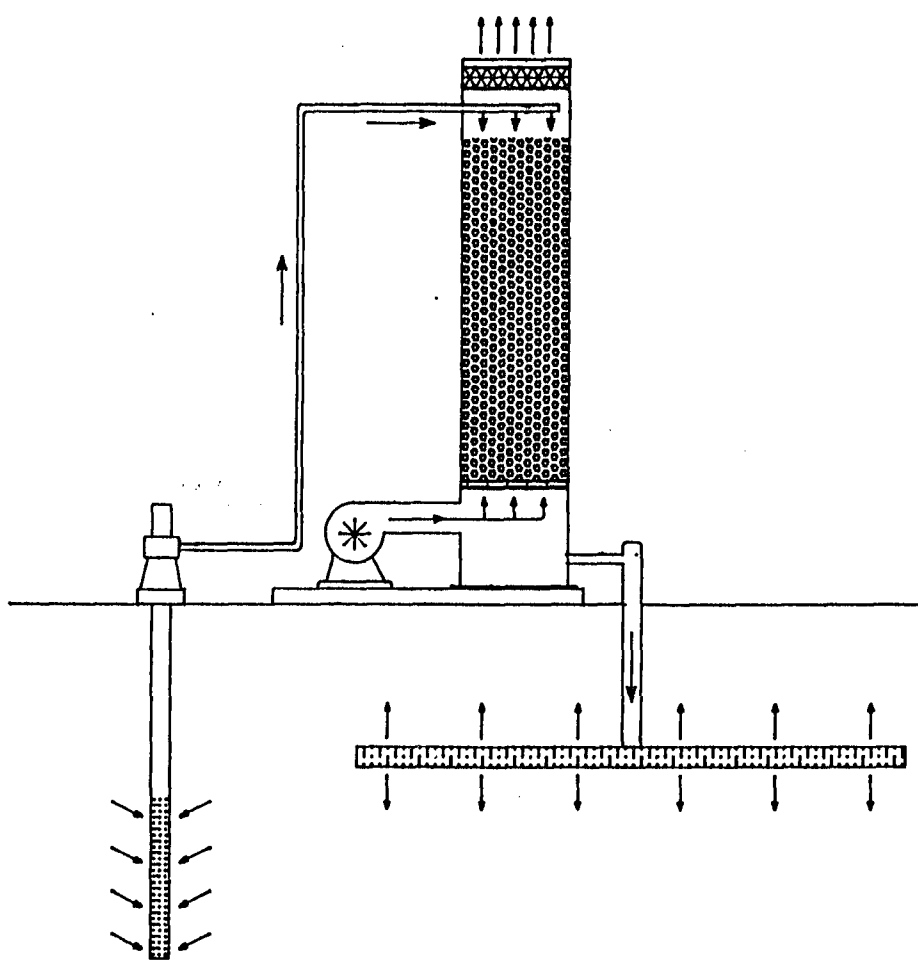
$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

2nd
Quarter
1991



REFINING CO.

BLOOMFIELD REFINERY
REMEDIATION PROJECT



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Farmington, New Mexico 87401

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RECEIVED

AUG 14 1991

**OIL CONSERVATION DIV.
SANTA FE**

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
SECOND QUARTER, 1991

Prepared By:

GIANT REFINING COMPANY
5764 U. S. Highway 64
P. O. Box 256
Farmington, NM 87401
(505)632-3306
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INTRODUCTION AND SUMMARY
QUARTERLY REPORT
SECOND QUARTER, 1991

INTRODUCTION

Changes were made to the remediation system during the second quarter of 1991. An infiltration gallery was constructed in the controlled application area of the refinery. All treated water is being directed toward it. We continue to monitor its effect on the system. Monitor well SHS-7, part of the original proposed offsite recovery well network, has yet to be converted to a recovery well due to land access problems.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Subsequent reports will contain updates revealing historical trends of the analytes. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Potentiometric surface maps, as well as the adjusted water surface elevations and product thicknesses, are included in Section 3.

Section 4

Section 4 illustrates the volume history for the quarter. Total volume pumped from each well, as well as current tank volumes and the reinjection volume, is reported. Additional detail on a weekly basis is also available if desired.

Section 5

Specific conductance tracking for GRW-13 is included in this section.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
SECOND QUARTER, 1991

STRIPPER INFLUENT

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.38	6.74	7.82
Lab conductivity, umhos/cm	4040.00	4110.00	3670.00
Lab resistivity, ohm-m	2.48	2.43	2.73
Total dissolved solids (180)	3150.00	3080.00	2830.00
Total dissolved solids (calc)	3040.00	3030.00	2890.00
Total alkalinity as CaCO ₃	217.00	169.00	271.00
Total hardness as CaCO ₃	1110.00	1130.00	1100.00
Sodium absorption ratio	7.44	7.62	6.89
Bicarbonate as HCO ₃	265.00	206.00	331.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	437.00	499.00	391.00
Sulfate	1460.00	1400.00	1380.00
Calcium	414.00	401.00	391.00
Magnesium	19.40	30.70	30.80
Potassium	2.95	2.94	2.90
Sodium	570.00	588.00	526.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	0.70
1,2-Dichloroethane	0.60	ND	1.20
1,1-Dichloroethene	ND	ND	ND
1,2-Dichloroethene	1.50	ND	2.70
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	0.30

1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	0.30
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	2.90	ND	25.20
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	4.50
Toluene	ND	ND	1.90
Xylenes	3.20	ND	46.00
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	4/91	5/91	6/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	8.31	8.04	7.72
Lab conductivity, umhos/cm	4000.00	4120.00	4100.00
Lab resistivity, ohm-m	2.50	2.43	2.44
Total dissolved solids (180)	3380.00	3130.00	3010.00
Total dissolved solids (calc)	3110.00	3030.00	2890.00
Total alkalinity as CaCO ₃	226.00	146.00	164.00
Total hardness as CaCO ₃	1090.00	1130.00	1090.00
Sodium absorption ratio	7.71	7.04	7.07
Bicarbonate as HCO ₃	275.00	178.00	200.00
Carbonate as CO ₃	0.00	0.00	0.00
Chloride	452.00	503.00	491.00
Sulfate	1500.00	1460.00	1350.00
Calcium	409.00	407.00	389.00
Magnesium	16.50	27.80	29.40
Potassium	2.90	2.78	2.30
Sodium	585.00	544.00	537.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	2.20	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

PAH

Acenaphthene
 Acenaphthylene
 Anthracene
 Benzo(a)anthracene
 Benzo(a)pyrene
 Benzo(b)fluoranthene
 Benzo(g,h,i)perylene
 Benzo(k)fluoranthene
 Chrysene
 Dibenzo(a,h)anthracene
 Fluoranthene
 Fluorene
 Indeno(1,2,3-cd)pyrene
 Naphthalene
 Phenanthrene
 Pyrene

GRW-4

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.36
Lab conductivity, umhos/cm	4160.00
Lab resistivity, ohm-m	2.41
Total dissolved solids (180)	2980.00
Total dissolved solids (calc)	2990.00
Total alkalinity as CaCO ₃	703.00
Total hardness as CaCO ₃	976.00
Sodium absorption ratio	9.47
Bicarbonate as HCO ₃	860.00
Carbonate as CO ₃	0.00
Chloride	462.00
Sulfate	1040.00
Calcium	370.00
Magnesium	12.70
Potassium	1.92
Sodium	680.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	3.30
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	5.20
Fluorene	31.00
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	33.00
Phenanthrene	79.00
Pyrene	4.50

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND

1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	1700.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	450.00
Toluene	ND
Xylenes	680.00

GRW-6

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.57
Lab conductivity, umhos/cm	4840.00
Lab resistivity, ohm-m	2.07
Total dissolved solids (180)	3560.00
Total dissolved solids (calc)	3580.00
Total alkalinity as CaCO ₃	556.00
Total hardness as CaCO ₃	1190.00
Sodium absorption ratio	9.38
Bicarbonate as HCO ₃	677.00
Carbonate as CO ₃	0.00
Chloride	624.00
Sulfate	1410.00
Calcium	435.00
Magnesium	26.00
Potassium	2.27
Sodium	745.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.08
Pyrene	

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND

1,2-Dichloroethane	4.10
1,2-Dichloroethene	ND
1,2-Dichloroethene	11.00
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.90
1,1,1-Trichloroethane	0.22
1,1,2-Trichloroethane	ND
Trichloroethene	2.30
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	9.90
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	3.30
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-15

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.24
Lab conductivity, umhos/cm	4560.00
Lab resistivity, ohm-m	2.19
Total dissolved solids (180)	3480.00
Total dissolved solids (calc)	3450.00
Total alkalinity as CaCO ₃	272.00
Total hardness as CaCO ₃	1130.00
Sodium absorption ratio	9.46
Bicarbonate as HCO ₃	332.00
Carbonate as CO ₃	0.00
Chloride	503.00
Sulfate	1610.00
Calcium	428.00
Magnesium	14.20
Potassium	4.95
Sodium	730.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	14.00
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	5.20
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

GBR-17

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.45
Lab conductivity, umhos/cm	2720.00
Lab resistivity, ohm-m	3.68
Total dissolved solids (180)	2210.00
Total dissolved solids (calc)	2230.00
Total alkalinity as CaCO ₃	268.00
Total hardness as CaCO ₃	926.00
Sodium absorption ratio	5.00
Bicarbonate as HCO ₃	328.00
Carbonate as CO ₃	0.00
Chloride	91.40
Sulfate	1260.00
Calcium	360.00
Magnesium	6.59
Potassium	0.73
Sodium	350.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

GBR-24-D

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.45
Lab conductivity, umhos/cm	4890.00
Lab resistivity, ohm-m	2.04
Total dissolved solids (180)	3850.00
Total dissolved solids (calc)	3730.00
Total alkalinity as CaCO ₃	231.00
Total hardness as CaCO ₃	1830.00
Sodium absorption ratio	5.23
Bicarbonate as HCO ₃	282.00
Carbonate as CO ₃	0.00
Chloride	802.00
Sulfate	1580.00
Calcium	623.00
Magnesium	67.70
Potassium	5.77
Sodium	515.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	26.00
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	190.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	100.00
Toluene	15.00
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	1.70
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.80
Pyrene	ND

GBR-30

4/91

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GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.31
Lab conductivity, umhos/cm	4110.00
Lab resistivity, ohm-m	2.43
Total dissolved solids (180)	3150.00
Total dissolved solids (calc)	3090.00
Total alkalinity as CaCO ₃	265.00
Total hardness as CaCO ₃	1110.00
Sodium absorption ratio	7.71
Bicarbonate as HCO ₃	323.00
Carbonate as CO ₃	0.00
Chloride	528.00
Sulfate	1370.00
Calcium	428.00
Magnesium	9.98
Potassium	2.17
Sodium	590.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	1.10
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	18.00
Fluorene	4.00
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	5.00
Pyrene	ND

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6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.10
Lab conductivity, umhos/cm	4360.00
Lab resistivity, ohm-m	2.30
Total dissolved solids (180)	3360.00
Total dissolved solids (calc)	3210.00
Total alkalinity as CaCO ₃	212.00
Total hardness as CaCO ₃	1180.00
Sodium absorption ratio	7.72
Bicarbonate as HCO ₃	259.00
Carbonate as CO ₃	0.00
Chloride	543.00
Sulfate	1470.00
Calcium	425.00
Magnesium	28.30
Potassium	2.55
Sodium	609.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	0.66
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

*ND - Not detected at specified detection limit

OFFSITE WELLS

SHS-3

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	3.10
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.81
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-10

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	100.00
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-12

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.25
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.44
1,2-Dichloroethane	0.47
1,2-Dichloroethene	7.00
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.20
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.58
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	0.89
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-13

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	0.41
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.83
1,2-Dichloroethane	3.90
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-15

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
 Lab conductivity, umhos/cm
 Lab resistivity, ohm-m
 Total dissolved solids (180)
 Total dissolved solids (calc)
 Total alkalinity as CaCO₃
 Total hardness as CaCO₃
 Sodium absorption ratio
 Bicarbonate as HCO₃
 Carbonate as CO₃
 Chloride
 Sulfate
 Calcium
 Magnesium
 Potassium
 Sodium

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.60
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-16

4/91

5/91

6/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)
Lab conductivity, umhos/cm
Lab resistivity, ohm-m
Total dissolved solids (180)
Total dissolved solids (calc)
Total alkalinity as CaCO₃
Total hardness as CaCO₃
Sodium absorption ratio
Bicarbonate as HCO₃
Carbonate as CO₃
Chloride
Sulfate
Calcium
Magnesium
Potassium
Sodium

HALOCARBONS

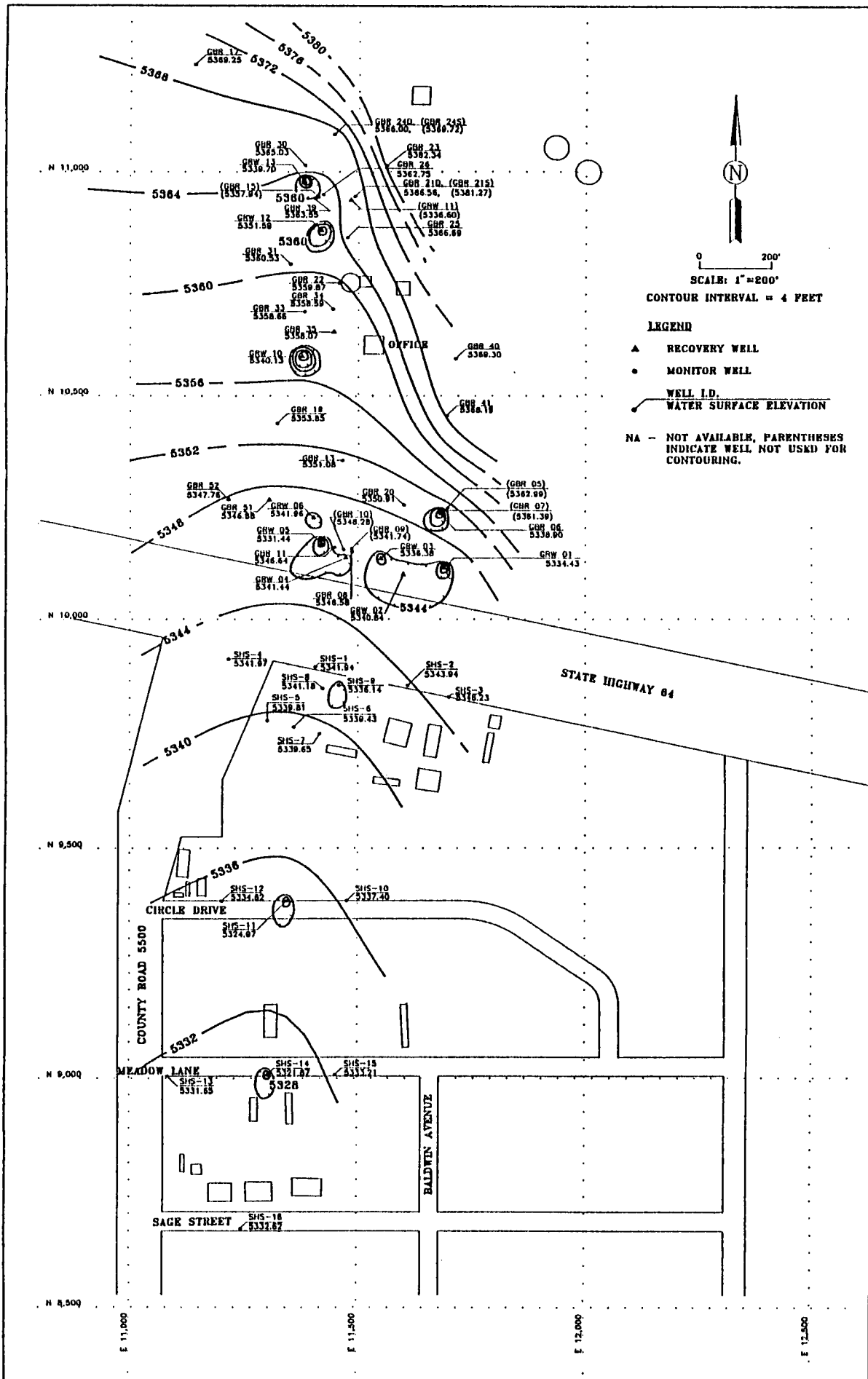
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.40
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

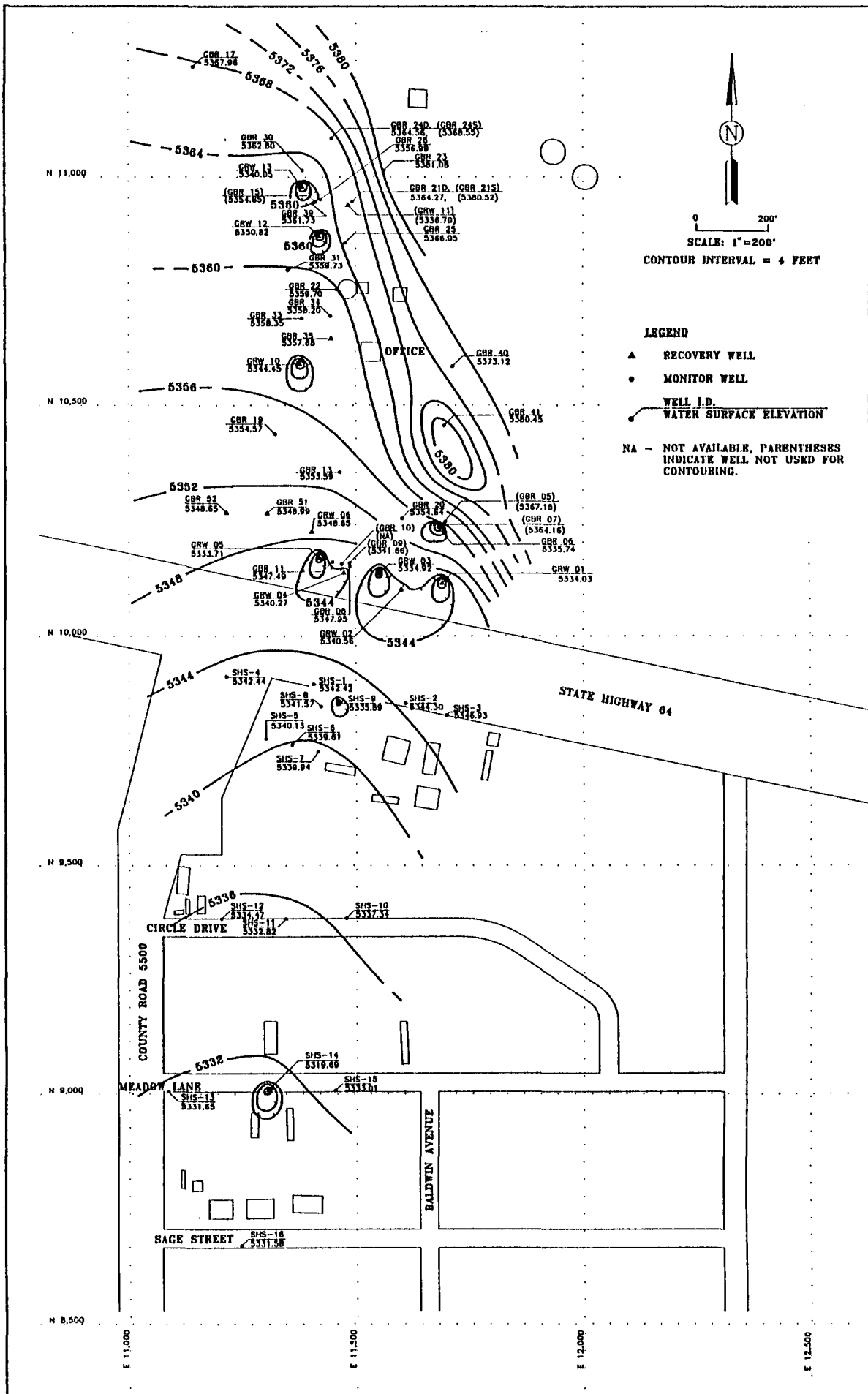
Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

*ND - Not detected at specified detection limit

April Water Surface Contour Map
Giant-Bloomfield Refinery



June Water Surface Contour Map
Giant-Bloomfield Refinery



GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: April, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.87		0.00	5334.43
GRW-2	5391.28	50.44		0.00	5340.84
GRW-3	5388.77	52.40	52.39	0.01	5336.38
GRW-4	5390.02	48.58		0.00	5341.44
GRW-5	5390.56	59.12		0.00	5331.44
GRW-6	5390.81	48.85		0.00	5341.96
GRW-10	5395.02	58.22	54.06	4.16	5340.13
GRW-11	5397.85	61.25		0.00	5336.60
GRW-12	5397.24	45.65		0.00	5351.59
GRW-13	5396.90	57.20		0.00	5339.70
GBR-5	5395.07	34.00	31.60	2.40	5362.99
GBR-6	5395.70	56.80		0.00	5338.90
GBR-7	5395.85	35.67	34.16	1.51	5361.39
GBR-8	5390.50	45.58	43.50	2.08	5346.58
GBR-9	5389.92	48.18		0.00	5341.74
GBR-10	5390.57	42.29		0.00	5348.28
GBR-11	5389.43	44.25	42.42	1.83	5346.64
GBR-13	5393.04	43.20	41.65	1.55	5351.08
GBR-15	5397.99	40.05		0.00	5357.94
GBR-17	5402.69	33.44		0.00	5369.25
GBR-18	5421.68	21.77		0.00	5399.91
GBR-19	5393.83	40.04	39.97	0.07	5353.85
GBR-20	5393.47	44.40	42.10	2.30	5350.91
GBR-21S	5400.65	19.38		0.00	5381.27
GBR-21D	5400.19	33.63		0.00	5366.56
GBR-22	5395.91	38.63	35.39	3.24	5359.87
GBR-23	5403.72	21.38		0.00	5382.34
GBR-24S	5396.08	26.36		0.00	5369.72
GBR-24D	5396.77	30.77		0.00	5366.00
GBR-25	5396.72	30.03		0.00	5366.69
GBR-26	5395.59	32.84		0.00	5362.75
GBR-30	5396.58	31.55		0.00	5365.03
GBR-31	5394.86	34.33		0.00	5360.53
GBR-33	5396.28	37.77	37.58	0.19	5358.66
GBR-34	5394.00	35.85	35.30	0.55	5358.59
GBR-35	5393.66	36.40	35.39	1.01	5358.07
GBR-39	5397.55	34.00		0.00	5363.55
GBR-40	5400.76	31.46		0.00	5369.30
GBR-41	5396.35	28.16		0.00	5368.19
GBR-51	5389.68	42.80		0.00	5346.88
GBR-52	5387.74	39.98		0.00	5347.76

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: April, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.72	41.57	0.15	5341.94
SHS-2	5381.66	38.24	37.59	0.65	5343.94
SHS-3	5383.33	37.10		0.00	5346.23
SHS-4	5383.62	41.65		0.00	5341.97
SHS-5	5378.36	38.55		0.00	5339.81
SHS-6	5378.17	38.74		0.00	5339.43
SHS-7	5378.77	39.90	38.92	0.98	5339.65
SHS-8	5380.25	39.07		0.00	5341.18
SHS-9	5380.79	44.65		0.00	5336.14
SHS-10	5373.80	36.40		0.00	5337.40
SHS-11	5373.17	48.20		0.00	5324.97
SHS-12	5373.94	39.12		0.00	5334.82
SHS-13	5367.81	36.16		0.00	5331.65
SHS-14	5367.07	45.20		0.00	5321.87
SHS-15	5366.21	33.00		0.00	5333.21
SHS-16	5362.58	29.96		0.00	5332.62

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: May, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.35		0.00	5333.95
GRW-2	5391.28	50.78		0.00	5340.50
GRW-3	5388.77	55.35		0.00	5333.42
GRW-4	5390.02	49.75		0.00	5340.27
GRW-5	5390.56	49.70		0.00	5340.86
GRW-6	5390.81	48.90		0.00	5341.91
GRW-10	5395.02	57.14	54.18	2.96	5340.25
GRW-11	5397.85	59.90		0.00	5337.95
GRW-12	5397.24	46.10		0.00	5351.14
GRW-13	5396.90	57.35		0.00	5339.55
GBR-5	5395.07	34.16	31.65	2.51	5362.92
GBR-6	5395.70	58.95		0.00	5336.75
GBR-7	5395.85	36.00	34.62	1.38	5360.95
GBR-8	5390.50	44.26	43.38	0.88	5346.94
GBR-9	5389.92	48.86		0.00	5341.06
GBR-10	5390.57	42.28		0.00	5348.29
GBR-11	5389.43	42.16	42.15	0.01	5347.28
GBR-13	5393.04	41.68	41.45	0.23	5351.54
GBR-15	5397.99	42.92		0.00	5355.07
GBR-17	5402.69	33.92		0.00	5368.77
GBR-18	5421.68	22.16		0.00	5399.52
GBR-19	5393.83	39.35		0.00	5354.48
GBR-20	5393.47	43.96	41.65	2.31	5351.36
GBR-21S	5400.65	19.66		0.00	5380.99
GBR-21D	5400.19	32.90		0.00	5367.29
GBR-22	5395.91	35.01	35.00	0.01	5360.91
GBR-23	5403.72	21.72		0.00	5382.00
GBR-24S	5396.08	26.60		0.00	5369.48
GBR-24D	5396.77	31.71		0.00	5365.06
GBR-25	5396.72	30.15		0.00	5366.57
GBR-26	5395.59	37.44		0.00	5358.15
GBR-30	5396.58	32.44		0.00	5364.14
GBR-31	5394.86	34.27		0.00	5360.59
GBR-33	5396.28	31.28		0.00	5365.00
GBR-34	5394.00	34.98		0.00	5359.02
GBR-35	5393.66	35.02	35.01	0.01	5358.65
GBR-39	5397.55	34.73		0.00	5362.82
GBR-40	5400.76	31.57		0.00	5369.19
GBR-41	5396.35	28.17		0.00	5368.18
GBR-51	5389.68	40.90		0.00	5348.78
GBR-52	5387.74	39.20		0.00	5348.54

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: May, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.28	41.20	0.08	5342.32
SHS-2	5381.66	38.03	37.45	0.58	5344.09
SHS-3	5383.33	36.78		0.00	5346.55
SHS-4	5383.62	41.28		0.00	5342.34
SHS-5	5378.36	38.27		0.00	5340.09
SHS-6	5378.17	38.43		0.00	5339.74
SHS-7	5378.77	39.50	38.70	0.80	5339.91
SHS-8	5380.25	38.76	38.75	0.01	5341.50
SHS-9	5380.79	45.20	45.19	0.01	5335.60
SHS-10	5373.80	36.35		0.00	5337.45
SHS-11	5373.17	46.68		0.00	5326.49
SHS-12	5373.94	39.39		0.00	5334.55
SHS-13	5367.81	36.09		0.00	5331.72
SHS-14	5367.07	41.91		0.00	5325.16
SHS-15	5366.21	32.90		0.00	5333.31
SHS-16	5362.58	30.88		0.00	5331.70

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: June, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.27		0.00	5334.03
GRW-2	5391.28	50.72		0.00	5340.56
GRW-3	5388.77	53.85		0.00	5334.92
GRW-4	5390.02	49.75		0.00	5340.27
GRW-5	5390.56	56.85		0.00	5333.71
GRW-6	5390.81	42.16		0.00	5348.65
GRW-10	5395.02	54.92	49.48	5.44	5344.45
GRW-11	5397.85	61.15		0.00	5336.70
GRW-12	5397.24	46.42		0.00	5350.82
GRW-13	5396.90	56.85		0.00	5340.05
GBR-5	5395.07	29.78	27.46	2.32	5367.15
GBR-6	5395.70	59.96		0.00	5335.74
GBR-7	5395.85	33.54	31.23	2.31	5364.16
GBR-8	5390.50	42.56	42.55	0.01	5347.95
GBR-9	5389.92	48.26		0.00	5341.66
GBR-10	5390.57			0.00	5390.57
GBR-11	5389.43	43.22	41.62	1.60	5347.49
GBR-13	5393.04	39.45		0.00	5353.59
GBR-15	5397.99	43.34		0.00	5354.65
GBR-17	5402.69	34.73		0.00	5367.96
GBR-18	5421.68	22.75		0.00	5398.93
GBR-19	5393.83	39.26		0.00	5354.57
GBR-20	5393.47	40.75	38.35	2.40	5354.64
GBR-21S	5400.65	20.23	20.10	0.13	5380.52
GBR-21D	5400.19	35.92		0.00	5364.27
GBR-22	5395.91	39.04	35.50	3.54	5359.70
GBR-23	5403.72	22.65	22.64	0.01	5381.08
GBR-24S	5396.08	28.36	27.32	1.04	5368.55
GBR-24D	5396.77	32.21		0.00	5364.56
GBR-25	5396.72	30.67		0.00	5366.05
GBR-26	5395.59	38.60		0.00	5356.99
GBR-30	5396.58	33.78		0.00	5362.80
GBR-31	5394.86	35.13		0.00	5359.73
GBR-33	5396.28	38.07	37.90	0.17	5358.35
GBR-34	5394.00	37.00	35.50	1.50	5358.20
GBR-35	5393.66	37.00	35.47	1.53	5357.88
GBR-39	5397.55	35.82		0.00	5361.73
GBR-40	5400.76	27.64		0.00	5373.12
GBR-41	5396.35	15.90		0.00	5380.45
GBR-51	5389.68	40.69		0.00	5348.99
GBR-52	5387.74	39.09		0.00	5348.65

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: June, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.18	41.10	0.08	5342.42
SHS-2	5381.66	37.51	37.32	0.19	5344.30
SHS-3	5383.33	36.40		0.00	5346.93
SHS-4	5383.62	41.18		0.00	5342.44
SHS-5	5378.36	38.23		0.00	5340.13
SHS-6	5378.17	38.56		0.00	5339.61
SHS-7	5378.77	39.42	38.68	0.74	5339.94
SHS-8	5380.25	38.70	38.68	0.02	5341.57
SHS-9	5380.79	44.90		0.00	5335.89
SHS-10	5373.80	36.46		0.00	5337.34
SHS-11	5373.17	40.37	40.35	0.02	5332.82
SHS-12	5373.94	39.47		0.00	5334.47
SHS-13	5367.81	36.16		0.00	5331.65
SHS-14	5367.07	47.38		0.00	5319.69
SHS-15	5366.21	33.20		0.00	5333.01
SHS-16	5362.58	31.00		0.00	5331.58

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

Giant Refining Co. Bloomfield Refinery
Total Volume Summary

Second Quarter, 1991

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Total Volume Of Water Recovered	1878113
Net Change In Storage Volume	-287985
Total Water Pumped To The Infiltration Gallery	1967784

Less April Unplanned Release	53550
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Difference	-144764
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Comments: The approximately 7% difference
can be accounted for in meter
error.

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

Second Quarter, 1991

Tank Number	Beginning Volume	Ending Volume	Net Change
102	8692	13735	5043
106	8010	8010	0
21	311966	351419	39453
22	225523	294448	68925
27	185631	182470	-3161
32	159291	88634	-70657
34	200948	87541	-113407
35	0	0	0
37	352232	138051	-214181
Total Net Volume Change			-287985

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

Second Quarter of 1991

Well	Month #1	Month #2	Month #3	Total
GRW-1	6350	6710	9470	22530
GRW-2	10890	13140	14480	38510
GRW-3	25470	23980	28980	78430
GRW-4	14030	13070	22400	49500
GRW-5	43480	62960	68100	174540
GRW-6	16080	19970	23140	59190
GRW-7	32520	0	0	32520
GRW-9	6990	5850	8690	21530
GRW-10	148910	209590	237480	595980
GRW-11	20340	34050	37510	91900
GRW-12	26680	19060	13770	59510
GRW-13	51920	43870	38510	134300
SHS-9	2338	3885	4105	10328
SHS-11	1442	1839	1126	4407
SHS-14	122829	186574	195535	504938
Total Volume Pumped In Gallons				1878113

SPECIFIC CONDUCTANCE VALUES

GRW-13

	4/91	5/91	6/91
Lab Conductivity, umhos/cm	4720.00	4599.00	4800.00

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINER REMED
CLIENT I.D. : 910408840 STRIPPER INFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/15/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	2.9
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	0.6
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	1.5
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	3.2
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	90



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 910408846 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/15/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	2.2
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	124
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460803

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104081525 RW-4 (GPR-43)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/20/91
UNITS : UG/L
DILUTION FACTOR : 200

COMPOUNDS	RESULTS
BENZENE	1700
BROMODICHLOROMETHANE	<40
BROMOFORM	<40
BROMOMETHANE	<40
CARBON TETRACHLORIDE	<40
CHLOROBENZENE	<100
CHLOROETHANE	<40
CHLOROFORM	<40
CHLOROMETHANE	<40
DIBROMOCHLOROMETHANE	<40
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<100
1,2 & 1,4-DICHLOROBENZENE	<100
DICHLORODIFLUOROMETHANE	<40
1,1-DICHLOROETHANE	<40
1,2-DICHLOROETHANE	<40
1,1-DICHLOROETHENE	<40
1,2-DICHLOROETHENE (TOTAL)	<40
1,2-DICHLOROPROPANE	<40
CIS-1,3-DICHLOROPROPENE	<40
TRANS-1,3-DICHLOROPROPENE	<40
ETHYLBENZENE	450
METHYLENE CHLORIDE	<400
1,1,2,2-TETRACHLOROETHANE	<40
TETRACHLOROETHENE	<40
TOLUENE	<100
1,1,1-TRICHLOROETHANE	<40
1,1,2-TRICHLOROETHANE	<40
TRICHLOROETHENE	<40
TRICHLOROFLUOROMETHANE	<100
VINYL CHLORIDE	<40
TOTAL XYLENES	680
TRICHLOROTRIFLUOROETHANE	<40

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 108
BROMOFLUOROBENZENE (%) 76

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460804

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104081539 RW-6 (GBR-44)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/20/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	9.9
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.2
1,2-DICHLOROETHANE	4.1
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	11
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	3.3
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.9
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.22
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	2.3
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	115
BROMOFLUOROBENZENE (%)	102



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460805

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104081554 RW-13 (GBR-14)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/20/91
UNITS : UG/L
DILUTION FACTOR : 2

COMPOUNDS

RESULTS

BENZENE	16
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLROMETHANE	<0.4
DIBROMOCHLOROMETHANE	<0.4
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<1
1,2 & 1,4-DICHLOROBENZENE	<1
DICHLORODIFLUOROMETHANE	<0.4
1,1-DICHLOROETHANE	<0.4
1,2-DICHLOROETHANE	6.8
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	<0.4
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	<1
METHYLENE CHLORIDE	<4
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	<0.4
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	<0.4
TRICHLOROFLUOROMETHANE	<1
VINYL CHLORIDE	<0.4
TOTAL XYLENES	<2
TRICHLOROTRIFLUOROETHANE	<0.4

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)
BROMOFLUOROBENZENE (%)

83
74



GCMS - RESULTS

ATI I.D. : 10460803

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104081525 RW-4
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : 04/10/91
DATE ANALYZED : 04/17/91
UNITS : UG/L
DILUTION FACTOR : 10

COMPOUNDSRESULTS

NAPHTHALENE	33
ACENAPHTHYLENE	<10
ACENAPHTHENE	<10
FLUORENE	31
PHENANTHRENE	79
ANTHRACENE	3.3
FLUORANTHENE	5.2
PYRENE	4.5
BENZO(A)ANTHRACENE	<1.0
CHRYSENE	<1.0
BENZO(B)FLUORANTHENE	<1.0
BENZO(K)FLUORANTHENE	<1.0
BENZO(A)PYRENE	<1.0
DIBENZ(a,h)ANTHRACENE	<2.0
BENZO(g,h,i)PERYLENE	<1.0
INDENO(1,2,3-CD)PYRENE	<1.0



GCMS - RESULTS

ATI I.D. : 10460804

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104081539 RW-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : 04/12/91
DATE ANALYZED : 04/19/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	0.084
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<0.20
BENZO(g,h,i)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

GCMS - RESULTS

ATI I.D. : 10460805

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104081554 RW-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : 04/12/91
DATE ANALYZED : 04/18/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<0.20
BENZO(g,h,i)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104021030 GBR 17
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
DATE RECEIVED : 04/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/10/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	116
BROMOFLUOROBENZENE (%)	81

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104021205 GBR 15
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
DATE RECEIVED : 04/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/10/91
UNITS : UG/L
DILUTION FACTOR : 2

COMPOUNDS RESULTS

BENZENE	5.2
BROMODICHLOROMETHANE	<0.4
BROMOFORM	<0.4
BROMOMETHANE	<0.4
CARBON TETRACHLORIDE	<0.4
CHLOROBENZENE	<1
CHLOROETHANE	<0.4
CHLOROFORM	<0.4
CHLOROMETHANE	<0.4
DIBROMOCHLOROMETHANE	<1
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<1
1,2 & 1,4-DICHLOROBENZENE	<1
DICHLORODIFLUOROMETHANE	<1
1,1-DICHLOROETHANE	<0.4
1,2-DICHLOROETHANE	14
1,1-DICHLOROETHENE	<0.4
1,2-DICHLOROETHENE (TOTAL)	<0.4
1,2-DICHLOROPROPANE	<0.4
CIS-1,3-DICHLOROPROPENE	<0.4
TRANS-1,3-DICHLOROPROPENE	<0.4
ETHYLBENZENE	<1
METHYLENE CHLORIDE	<4
1,1,2,2-TETRACHLOROETHANE	<0.4
TETRACHLOROETHENE	<0.4
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<0.4
1,1,2-TRICHLOROETHANE	<0.4
TRICHLOROETHENE	<0.4
TRICHLOROFLUOROMETHANE	<1
VINYL CHLORIDE	<0.4
TOTAL XYLENES	<2
TRICHLOROTRIFLUOROETHANE	<0.4

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	119
BROMOFLUOROBENZENE (%)	74

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453803

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINED REMED
CLIENT I.D. : 9104021315 GBR 30
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
DATE RECEIVED : 04/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/10/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	1.1
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	136
BROMOFLUOROBENZENE (%)	89



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453804

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104021414 GBR 240
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
DATE RECEIVED : 04/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/15/91
UNITS : UG/L
DILUTION FACTOR : 20

COMPOUNDS

RESULTS

BENZENE	190
BROMODICHLOROMETHANE	<4
BROMOFORM	<4
BROMOMETHANE	<4
CARBON TETRACHLORIDE	<4
CHLOROBENZENE	<10
CHLOROETHANE	<4
CHLOROFORM	<4
CHLOROMETHANE	<4
DIBROMOCHLOROMETHANE	<6
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<10
1,2 & 1,4-DICHLOROBENZENE	<10
DICHLORODIFLUOROMETHANE	<6
1,1-DICHLOROETHANE	<4
1,2-DICHLOROETHANE	26
1,1-DICHLOROETHENE	<4
1,2-DICHLOROETHENE (TOTAL)	<4
1,2-DICHLOROPROPANE	<4
CIS-1,3-DICHLOROPROPENE	<4
TRANS-1,3-DICHLOROPROPENE	<4
ETHYLBENZENE	100
METHYLENE CHLORIDE	<40
1,1,2,2-TETRACHLOROETHANE	<4
TETRACHLOROETHENE	<4
TOLUENE	15
1,1,1-TRICHLOROETHANE	<4
1,1,2-TRICHLOROETHANE	<4
TRICHLOROETHENE	<4
TRICHLOROFLUOROMETHANE	<10
VINYL CHLORIDE	<4
TOTAL XYLENES	<20
TRICHLOROTRIFLUOROETHANE	<4

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 85
BROMOFLUOROBENZENE (%) 54 *

* Result out of limits due to sample matrix interference



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10453805

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
CLIENT I.D. : 9104021455 GBR 31
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/02/91
DATE RECEIVED : 04/03/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/10/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.5
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	0.66
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	69



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-67
PROJECT NAME : OFF SITE
CLIENT I.D. : 9104081035 SHS-15
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
DATE RECEIVED : 04/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/20/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.6
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	107
BROMOFLUOROBENZENE (%)	85

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10460902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9002-67
 PROJECT NAME : OFF SITE
 CLIENT I.D. : 9104081135 SHS-16
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/08/91
 DATE RECEIVED : 04/09/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 04/20/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.4
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 108
 BROMOFLUOROBENZENE (%) 84

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-67
PROJECT NAME : OFF SITE
CLIENT I.D. : 9104051011 SHS-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
DATE RECEIVED : 04/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/14/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	109
BROMOFLUOROBENZENE (%)	88

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458002

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-67
PROJECT NAME : OFF SITE
CLIENT I.D. : 9104051135 SHS-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
DATE RECEIVED : 04/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/14/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	3.1
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.81
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	107
BROMOFLUOROBENZENE (%)	88



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GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458003

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-67
PROJECT NAME : OFF SITE
CLIENT I.D. : 9104051235 SHS-10
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
DATE RECEIVED : 04/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/15/91
UNITS : UG/L
DILUTION FACTOR : 10

COMPOUNDS

RESULTS

BENZENE	<5.0
BROMODICHLOROMETHANE	<2.0
BROMOFORM	<2.0
BROMOMETHANE	<2.0
CARBON TETRACHLORIDE	<2.0
CHLOROBENZENE	<5.0
CHLOROETHANE	<2.0
CHLOROFORM	<2.0
CHLOROMETHANE	<2.0
DIBROMOCHLOROMETHANE	<2.0
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<5.0
1,2 & 1,4-DICHLOROBENZENE	<5.0
DICHLORODIFLUOROMETHANE	<2.0
1,1-DICHLOROETHANE	<2.0
1,2-DICHLOROETHANE	<2.0
1,1-DICHLOROETHENE	<2.0
1,2-DICHLOROETHENE (TOTAL)	<2.0
1,2-DICHLOROPROPANE	<2.0
CIS-1,3-DICHLOROPROPENE	<2.0
TRANS-1,3-DICHLOROPROPENE	<2.0
ETHYLBENZENE	100
METHYLENE CHLORIDE	<20
1,1,2,2-TETRACHLOROETHANE	<2.0
TETRACHLOROETHENE	<2.0
TOLUENE	<5.0
1,1,1-TRICHLOROETHANE	<2.0
1,1,2-TRICHLOROETHANE	<2.0
TRICHLOROETHENE	<2.0
TRICHLOROFLUOROMETHANE	<5.0
VINYL CHLORIDE	<2.0
TOTAL XYLENES	<10
TRICHLOROTRIFLUOROETHANE	<2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	85



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458004

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-67
PROJECT NAME : OFF SITE
CLIENT I.D. : 9104051330 SHS-12
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
DATE RECEIVED : 04/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/11/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	0.89
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.25
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.44
1,2-DICHLOROETHANE	0.47
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	7.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.58
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	102
BROMOFLUOROBENZENE (%)	78



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10458005

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9002-67
PROJECT NAME : OFF SITE
CLIENT I.D. : 9104051447 SHS-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 04/05/91
DATE RECEIVED : 04/06/91
DATE EXTRACTED : N/A
DATE ANALYZED : 04/15/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	0.41
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.83
1,2-DICHLOROETHANE	3.9
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<1
TRICHLOROTRIFLUOROETHANE	<0.2

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	78



InterMountain
Laboratories, Inc.

2506 West Main Street
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Tel. (505) 326-4737

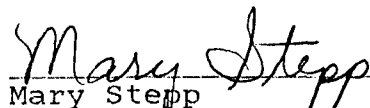
CLIENT: Giant Refinery
ID: 0840
SITE: Strip Infl. Disc.
LAB NO: F6062

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	7.38
Lab conductivity, umhos/cm.....	4040
Lab resistivity, ohm-m.....	2.48
Total dissolved solids (180), mg/l..	3150
Total dissolved solids (calc), mg/l.	3040
Total alkalinity as CaCO ₃ , mg/l.....	217
Total hardness as CaCO ₃ , mg/l.....	1110
Sodium absorption ratio.....	7.44

	mg/l	meq/l
Bicarbonate as HCO ₃	265	4.34
Carbonate as CO ₃	0	0
Chloride.....	437	12.3
Sulfate.....	1460	30.5
Calcium.....	414	20.6
Magnesium.....	19.4	1.59
Potassium.....	2.95	0.08
Sodium.....	570	24.8
Major cations.....		47.1
Major anions.....		47.2
Cation/anion difference.....		0.06 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



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Farmington, New Mexico 87401
Tel. (505) 326-4737

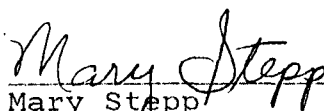
CLIENT: Giant Refinery
ID: 0846
SITE: Strip Infl. Disc.
LAB NO: F6063

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	8.01
Lab conductivity, umhos/cm.....	4000
Lab resistivity, ohm-m.....	2.5
Total dissolved solids (180), mg/l..	3150
Total dissolved solids (calc), mg/l.	3060
Total alkalinity as CaCO ₃ , mg/l.....	203
Total hardness as CaCO ₃ , mg/l.....	1100
Sodium absorption ratio.....	7.61

	mg/l	meq/l
Bicarbonate as HCO ₃	248	4.07
Carbonate as CO ₃	0	0
Chloride.....	457	12.9
Sulfate.....	1470	30.6
Calcium.....	411	20.5
Magnesium.....	18.4	1.52
Potassium.....	3.1	0.08
Sodium.....	580	25.2
Major cations.....		47.3
Major anions.....		47.5
Cation/anion difference.....		0.25 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



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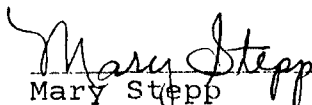
CLIENT: Giant Refinery
ID: 1525
SITE: RW-4
LAB NO: F6064

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	7.36
Lab conductivity, umhos/cm.....	4160
Lab resistivity, ohm-m.....	2.41
Total dissolved solids (180), mg/l..	2980
Total dissolved solids (calc), mg/l.	2990
Total alkalinity as CaCO ₃ , mg/l.....	703
Total hardness as CaCO ₃ , mg/l.....	976
Sodium absorption ratio.....	9.47

	mg/l	meq/l
Bicarbonate as HCO ₃	860	14.1
Carbonate as CO ₃	0	0
Chloride.....	462	13
Sulfate.....	1040	21.7
Calcium.....	370	18.5
Magnesium.....	12.7	1.05
Potassium.....	1.92	0.05
Sodium.....	680	29.6
Major cations.....		49.2
Major anions.....		48.8
Cation/anion difference.....		0.33 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



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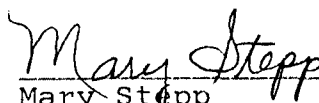
CLIENT: Giant Refinery
ID: 1539
SITE: RW-6
LAB NO: 6065

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	7.57
Lab conductivity, umhos/cm.....	4840
Lab resistivity, ohm-m.....	2.07
Total dissolved solids (180), mg/l..	3560
Total dissolved solids (calc), mg/l.	3580
Total alkalinity as CaCO ₃ , mg/l.....	556
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	9.38

	mg/l	meq/l
Bicarbonate as HCO ₃	677	11.1
Carbonate as CO ₃	0	0
Chloride.....	624	17.6
Sulfate.....	1410	29.4
Calcium.....	435	21.7
Magnesium.....	26	2.14
Potassium.....	2.27	0.06
Sodium.....	745	32.4
Major cations.....		56.3
Major anions.....		58.1
Cation/anion difference.....		1.54 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



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2506 West Main Street
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Tel. (505) 326-4737

CLIENT: Giant Refinery
ID:
SITE: Stripper Effl.
LAB NO: 6067

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	8.31
Lab conductivity, umhos/cm.....	4000
Lab resistivity, ohm-m.....	2.5
Total dissolved solids (180), mg/l..	3380
Total dissolved solids (calc), mg/l.	3110
Total alkalinity as CaCO ₃ , mg/l.....	226
Total hardness as CaCO ₃ , mg/l.....	1090
Sodium absorption ratio.....	7.71

	mg/l	meq/l
Bicarbonate as HCO ₃	275	4.51
Carbonate as CO ₃	0	0
Chloride.....	452	12.7
Sulfate.....	1500	31.3
Calcium.....	409	20.4
Magnesium.....	16.5	1.36
Potassium.....	2.9	0.07
Sodium.....	585	25.4
Major cations.....		47.3
Major anions.....		48.6
Cation/anion difference.....		1.37 %

ND - Analyte "not detected" at the stated detection limit.

Mary Stepp

Mary Stepp
Lab Director



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Tel. (505) 326-4737

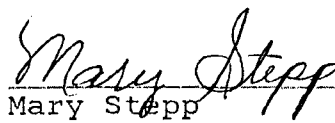
CLIENT: Giant Refinery
ID: 1205
SITE: GBR -15
LAB NO: F6030

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.24
Lab conductivity, umhos/cm.....	4560
Lab resistivity, ohm-m.....	2.19
Total dissolved solids (180), mg/l..	3480
Total dissolved solids (calc), mg/l.	3450
Total alkalinity as CaCO ₃ , mg/l.....	272
Total hardness as CaCO ₃ , mg/l.....	1130
Sodium absorption ratio.....	9.46

	mg/l	meq/l
Bicarbonate as HCO ₃	332	5.44
Carbonate as CO ₃	0	0
Chloride.....	503	14.2
Sulfate.....	1610	33.5
Calcium.....	428	21.4
Magnesium.....	14.2	1.17
Potassium.....	4.95	0.13
Sodium.....	730	31.8
Major cations.....		54.4
Major anions.....		53.1
Cation/anion difference.....		1.19 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



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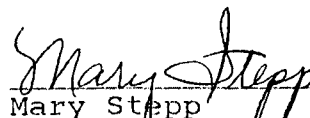
CLIENT: Giant Refinery
ID: 1030
SITE: GBR -17
LAB NO: F6031

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.45
Lab conductivity, umhos/cm.....	2720
Lab resistivity, ohm-m.....	3.68
Total dissolved solids (180), mg/l..	2210
Total dissolved solids (calc), mg/l.	2230
Total alkalinity as CaCO ₃ , mg/l.....	268
Total hardness as CaCO ₃ , mg/l.....	926
Sodium absorption ratio.....	5

	mg/l	meq/l
Bicarbonate as HCO ₃	328	5.37
Carbonate as CO ₃	0	0
Chloride.....	91.4	2.58
Sulfate.....	1260	26.2
Calcium.....	360	18
Magnesium.....	6.59	0.54
Potassium.....	0.73	0.02
Sodium.....	350	15.2
Major cations.....		33.8
Major anions.....		34.1
Cation/anion difference.....		0.51 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



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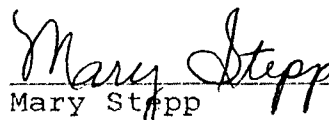
CLIENT: Giant Refinery
ID: 1414
SITE: GBR -24D
LAB NO: F6032

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.45
Lab conductivity, umhos/cm.....	4890
Lab resistivity, ohm-m.....	2.04
Total dissolved solids (180), mg/l..	3850
Total dissolved solids (calc), mg/l.	3730
Total alkalinity as CaCO ₃ , mg/l.....	231
Total hardness as CaCO ₃ , mg/l.....	1830
Sodium absorption ratio.....	5.23

	mg/l	meq/l
Bicarbonate as HCO ₃	282	4.62
Carbonate as CO ₃	0	0
Chloride.....	802	22.6
Sulfate.....	1580	32.9
Calcium.....	623	31.1
Magnesium.....	67.7	5.57
Potassium.....	5.77	0.15
Sodium.....	515	22.4
Major cations.....		59.2
Major anions.....		60.1
Cation/anion difference.....		0.78 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1315
SITE: GBR -30
LAB NO: F6033

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.31
Lab conductivity, umhos/cm.....	4110
Lab resistivity, ohm-m.....	2.43
Total dissolved solids (180), mg/l..	3150
Total dissolved solids (calc), mg/l.	3090
Total alkalinity as CaCO ₃ , mg/l.....	265
Total hardness as CaCO ₃ , mg/l.....	1110
Sodium absorption ratio.....	7.71

	mg/l	meq/l
Bicarbonate as HCO ₃	323	5.3
Carbonate as CO ₃	0	0
Chloride.....	528	14.9
Sulfate.....	1370	28.6
Calcium.....	428	21.3
Magnesium.....	9.98	0.82
Potassium.....	2.17	0.06
Sodium.....	590	25.7
Major cations.....		47.9
Major anions.....		48.8
Cation/anion difference.....		0.99 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



Inter-Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1455
SITE: GBR -31
LAB NO: F6034

DATE REPORTED: 04/11/91
DATE RECEIVED: 04/02/91
DATE COLLECTED: 04/02/91

Lab pH (s.u.).....	7.10
Lab conductivity, umhos/cm.....	4360
Lab resistivity, ohm-m.....	2.3
Total dissolved solids (180), mg/l..	3360
Total dissolved solids (calc), mg/l.	3210
Total alkalinity as CaCO ₃ , mg/l.....	212
Total hardness as CaCO ₃ , mg/l.....	1180
Sodium absorption ratio.....	7.72

	mg/l	meq/l
Bicarbonate as HCO ₃	259	4.24
Carbonate as CO ₃	0	0
Chloride.....	543	15.3
Sulfate.....	1470	30.7
Calcium.....	425	21.2
Magnesium.....	28.3	2.33
Potassium.....	2.55	0.07
Sodium.....	609	26.5
Major cations.....		50.1
Major anions.....		50.3
Cation/anion difference.....		0.16 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID:
SITE: Stripper effluent
LAB NO: F6308

DATE REPORTED: 07/10/91
DATE RECEIVED: 06/04/91
DATE COLLECTED: 06/03/91

Lab pH (s.u.).....	7.72
Lab conductivity, umhos/cm.....	4100
Lab resistivity, ohm-m.....	2.44
Total dissolved solids (180), mg/l..	3010
Total dissolved solids (calc), mg/l.	2890
Total alkalinity as CaCO ₃ , mg/l.....	164
Total hardness as CaCO ₃ , mg/l.....	1090
Sodium absorption ratio.....	7.07

	mg/l	meq/l
Bicarbonate as HCO ₃	200	3.28
Carbonate as CO ₃	0	0
Chloride.....	491	13.9
Sulfate.....	1350	28.1
Calcium.....	389	19.4
Magnesium.....	29.4	2.42
Potassium.....	2.3	0.06
Sodium.....	537	23.3
Major cations.....		45.2
Major anions.....		45.2
Cation/anion difference.....		0.01 %

A handwritten signature in dark ink, appearing to read 'Wanda Orso', is written over a horizontal line.

Wanda Orso
Water Lab Manager

CLIENT: Giant Refinery
ID: 0835
SITE: Stripper Influent
LAB NO: F6456

DATE REPORTED: 07/16/91
DATE RECEIVED: 06/07/91
DATE COLLECTED: 06/07/91

Lab pH (s.u.).....	7.82
Lab conductivity, umhos/cm.....	3670
Lab resistivity, ohm-m.....	2.73
Total dissolved solids (180), mg/l..	2830
Total dissolved solids (calc), mg/l.	2890
Total alkalinity as CaCO ₃ , mg/l.....	271
Total hardness as CaCO ₃ , mg/l.....	1100
Sodium absorption ratio.....	6.89

	mg/l	meq/l
Bicarbonate as HCO ₃	331	5.42
Carbonate as CO ₃	0	0
Chloride.....	391	11
Sulfate.....	1380	28.8
Calcium.....	391	19.5
Magnesium.....	30.8	2.54
Potassium.....	2.9	0.07
Sodium.....	526	22.9
Major cations.....		45
Major anions.....		45.3
Cation/anion difference.....		0.3 %


Wanda Orso
Water Lab Manager



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10662401

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : 910607835 STRIPPER INFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 06/07/91
DATE RECEIVED : 06/08/91
DATE EXTRACTED : N/A
DATE ANALYZED : 06/21/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	25.2
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.7
1,2-DICHLOROETHANE	1.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.7
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	4.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.3
TOLUENE	1.9
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.3
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	46.0
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	110



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID:
SITE: Stripper Influent
LAB NO: F6165

DATE REPORTED: 06/04/91
DATE RECEIVED: 05/01/91
DATE COLLECTED: 05/01/91

Lab pH (s.u.).....	6.74
Lab conductivity, umhos/cm.....	4110
Lab resistivity, ohm-m.....	2.43
Total dissolved solids (180), mg/l..	3080
Total dissolved solids (calc), mg/l.	3030
Total alkalinity as CaCO ₃ , mg/l.....	169
Total hardness as CaCO ₃ , mg/l.....	1130
Sodium absorption ratio.....	7.62

	mg/l	meq/l
Bicarbonate as HCO ₃	206	3.37
Carbonate as CO ₃	0	0
Chloride.....	499	14.1
Sulfate.....	1400	29.3
Calcium.....	401	20
Magnesium.....	30.7	2.52
Potassium.....	2.94	0.08
Sodium.....	588	25.6
Major cations.....		48.1
Major anions.....		46.7
Cation/anion difference.....		1.53 %

Mary Stepp

Mary Stepp
Lab Manager

CLIENT: Giant Refinery
ID:
SITE: Stripper Effluent
LAB NO: F6166

DATE REPORTED: 06/04/91
DATE RECEIVED: 05/01/91
DATE COLLECTED: 05/01/91

Lab pH (s.u.).....		8.04
Lab conductivity, umhos/cm.....		4120
Lab resistivity, ohm-m.....		2.43
Total dissolved solids (180), mg/l..		3130
Total dissolved solids (calc), mg/l.		3030
Total alkalinity as CaCO ₃ , mg/l.....		146
Total hardness as CaCO ₃ , mg/l.....		1130
Sodium absorption ratio.....		7.04
	mg/l	meq/l
Bicarbonate as HCO ₃	178	2.91
Carbonate as CO ₃	0	0
Chloride.....	503	14.2
Sulfate.....	1460	30.4
Calcium.....	407	20.3
Magnesium.....	27.8	2.28
Potassium.....	2.78	0.07
Sodium.....	544	23.7
Major cations.....		46.3
Major anions.....		47.5
Cation/anion difference.....		1.25 %

Mary Stepp

Mary Stepp
Lab Manager

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10553201

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMD
CLIENT I.D. : 910501837 STRIPPER INFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 05/01/91
DATE RECEIVED : 05/02/91
DATE EXTRACTED : N/A
DATE ANALYZED : 05/11/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	113
BROMOFLUOROBENZENE (%)	101

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10553202

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 05/01/91
PROJECT #	: 9834	DATE RECEIVED	: 05/02/91
PROJECT NAME	: REFIN REMD	DATE EXTRACTED	: N/A
CLIENT I.D.	: 910501840 STRIPPER EFFLUENT	DATE ANALYZED	: 05/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	116



Inter-Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

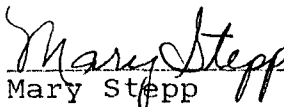
CLIENT: Giant Refinery
ID: 1554
SITE: RW-13
LAB NO: 6066

DATE REPORTED: 04/18/91
DATE RECEIVED: 04/08/91
DATE COLLECTED: 04/08/91

Lab pH (s.u.).....	7.46
Lab conductivity, umhos/cm.....	4720
Lab resistivity, ohm-m.....	2.12
Total dissolved solids (180), mg/l..	3740
Total dissolved solids (calc), mg/l.	3690
Total alkalinity as CaCO ₃ , mg/l.....	203
Total hardness as CaCO ₃ , mg/l.....	1300
Sodium absorption ratio.....	8.57

	mg/l	meq/l
Bicarbonate as HCO ₃	248	4.07
Carbonate as CO ₃	0	0
Chloride.....	528	14.9
Sulfate.....	1810	37.8
Calcium.....	483	24.1
Magnesium.....	22.3	1.83
Potassium.....	6.13	0.16
Sodium.....	710	30.9
Major cations.....		57
Major anions.....		56.8
Cation/anion difference.....		0.21 %

ND - Analyte "not detected" at the stated detection limit.


Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID:
SITE: GRW-13
LAB NO: F6307

DATE REPORTED: 07/10/91
DATE RECEIVED: 06/04/91
DATE COLLECTED: 06/03/91

Lab pH (s.u.).....	7.55
Lab conductivity, umhos/cm.....	4800
Lab resistivity, ohm-m.....	2.08
Total dissolved solids (180), mg/l..	3590
Total dissolved solids (calc), mg/l.	3220
Total alkalinity as CaCO ₃ , mg/l.....	214
Total hardness as CaCO ₃ , mg/l.....	1250
Sodium absorption ratio.....	7.1

	mg/l	meq/l
Bicarbonate as HCO ₃	261	4.28
Carbonate as CO ₃	0	0
Chloride.....	493	13.9
Sulfate.....	1540	32
Calcium.....	464	23.1
Magnesium.....	21.7	1.79
Potassium.....	4.49	0.11
Sodium.....	576	25.1
Major cations.....		50.1
Major anions.....		50.2
Cation/anion difference.....		0.07 %

A handwritten signature in dark ink, appearing to read "Wanda Orso", is written over a horizontal line.

Wanda Orso
Water Lab Manager

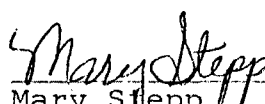


2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 1505
SITE: RW - 13
LAB NO: F6214

DATE REPORTED: 05/14/91
DATE RECEIVED: 05/13/91
DATE COLLECTED: 05/13/91

Lab conductivity, umhos/cm..... 4599

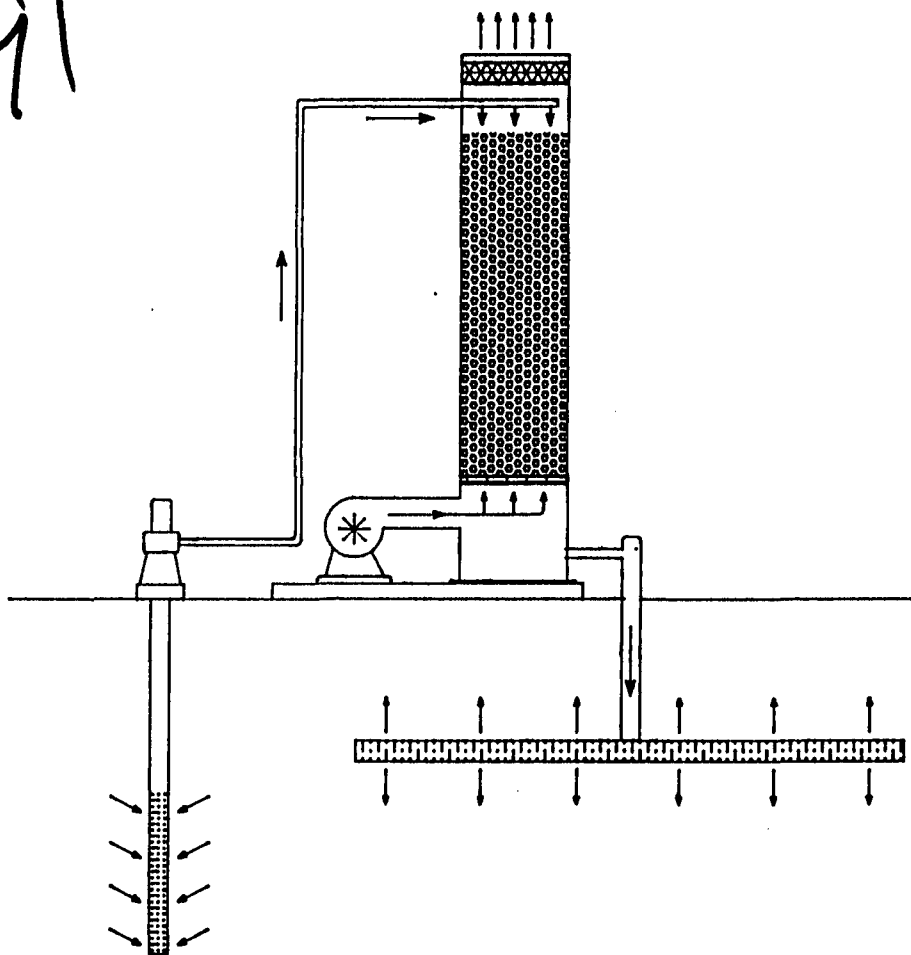


Mary Stepp
Lab Manager

GIANT

REFINING CO.

BLOOMFIELD REFINERY
REMEDIATION PROJECT



Post Office Box 256
606 E. Highway 64
Farmington, New Mexico 87401

(505) 632-3306
FAX (505) 632-2487

1st
Order
1991

QUARTERLY DATA REPORT
GIANT BLOOMFIELD REFINERY
FIRST QUARTER, 1991

RECEIVED

MAY 22 1991

OIL CONSERVATION DIV.
SANTA FE

Prepared by:

GIANT REFINING COMPANY
5764 U. S. Highway 64
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Farmington, NM 87401
(505)632-3306
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Miscellaneous Sampling Data.....	Section 7

INTRODUCTION AND SUMMARY
QUARTERLY REPORT
FIRST QUARTER, 1991

INTRODUCTION

Changes were made to the remediation system during the first quarter of 1991. The basic system for ground water recovery south of the refinery was completed at the end of March. Water recovery has begun. Pumping data will begin to appear in the next quarterly report. The new wells are integrated in the safety and control system located in the refinery. Monitor wells SHS-9, 11, and 14 have been converted to recovery wells. Monitor well SHS-7, part of the original proposed recovery well network, has yet to be converted due to land access problems.

SUMMARY

Section 2

Section 2 contains a summary of the quarterly analytical results. Subsequent reports will contain updates revealing historical trends of the analytes. Data from wells south of the refinery is included for the first time in the quarterly report format. Raw data, as received from the laboratory, is available on request as a supplement to the quarterly report.

Section 3

Section 3 contains the results of the Annual Representative Stream Sampling. Again, the data is tabulated for easy review but is available in raw format on request.

Section 4

Potentiometric surface maps, as well as the adjusted water surface elevations and product thicknesses, are included in Section 4. The maps now include wells south of the refinery.

Section 5

Section 5 illustrates the volume history for the quarter. Total volume pumped from each well as well as current tank volumes and the reinjection volume is reported. Additional detail on a weekly basis is also available if desired.

Section 6

Specific conductance tracking for GRW-13 is included in this section.

Section 7

Periodically, samples in addition to those required in the discharge plan are collected. The results are included in this final section of the report.

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FIRST QUARTER, 1991

STRIPPER INFLUENT

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.54	7.52	7.73
Lab conductivity, umhos/cm	4740.00	4610.00	4440.00
Lab resistivity, ohm-m	2.11	2.17	2.25
Total dissolved solids (180)	3390.00	3410.00	3240.00
Total dissolved solids (calc)	3310.00	3270.00	3120.00
Total alkalinity as CaCO3	265.00	222.00	145.00
Total hardness as CaCO3	1190.00	1200.00	1190.00
Sodium absorption ratio	8.50	7.76	7.07
Bicarbonate as HCO3	323.00	271.00	178.00
Carbonate as CO3	0.00	0.00	0.00
Chloride	602.00	568.00	528.00
Sulfate	1470.00	1480.00	1530.00
Calcium	275.00	461.00	298.00
Magnesium	123.00	12.40	109.00
Potassium	3.30	2.95	3.30
Sodium	675.00	619.00	561.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	1.50	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	ND	ND	ND
Xylenes	1.30	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

STRIPPER EFFLUENT

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	8.09	8.00	7.90
Lab conductivity, umhos/cm	4720.00	4620.00	4460.00
Lab resistivity, ohm-m	2.12	2.17	2.24
Total dissolved solids (180)	3400.00	3430.00	3240.00
Total dissolved solids (calc)	3360.00	3280.00	3110.00
Total alkalinity as CaCO3	239.00	257.00	162.00
Total hardness as CaCO3	1210.00	1180.00	1160.00
Sodium absorption ratio	8.13	7.85	7.35
Bicarbonate as HCO3	292.00	313.00	198.00
Carbonate as CO3	0.00	0.00	0.00
Chloride	607.00	577.00	528.00
Sulfate	1490.00	1480.00	1530.00
Calcium	449.00	395.00	229.00
Magnesium	21.80	47.60	144.00
Potassium	3.05	3.00	4.20
Sodium	650.00	621.00	576.00

HALOCARBONS

Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroethane	ND	ND	ND
2-Chloroethylvinylether	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromochloromethane	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Methylene chloride	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
Vinyl chloride	ND	ND	ND

AROMATICS

Benzene	ND	ND	ND
Chlorobenzene	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND

1,4-Dichlorobenzene	ND	ND	ND
Ethylbenzene	ND	ND	ND
Toluene	1.40	ND	ND
Xylenes	ND	ND	ND
Trichlorotrifluoroethane	ND	ND	ND

PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	0.01
Benzo(a)anthracene	0.34
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	0.29
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.91
Pyrene	ND

GRW-3

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.93
Lab conductivity, umhos/cm	4300.00
Lab resistivity, ohm-m	2.32
Total dissolved solids (180)	3170.00
Total dissolved solids (calc)	3200.00
Total alkalinity as CaCO3	581.00
Total hardness as CaCO3	1050.00
Sodium absorption ratio	8.71
Bicarbonate as HCO3	708.00
Carbonate as CO3	0.00
Chloride	245.00
Sulfate	1550.00
Calcium	380.00
Magnesium	24.00
Potassium	3.84
Sodium	648.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	8.80
Benzo(a)anthracene	82.00
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	112.00
Fluorene	57.00
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	145.00
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND

1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	350.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	160.00
Toluene	ND
Xylenes	80.00
Trichlorotrifluoroethane	ND

GRW-4

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.05
Lab conductivity, umhos/cm	4360.00
Lab resistivity, ohm-m	2.30
Total dissolved solids (180)	3100.00
Total dissolved solids (calc)	3050.00
Total alkalinity as CaCO3	752.00
Total hardness as CaCO3	1100.00
Sodium absorption ratio	8.22
Bicarbonate as HCO3	915.00
Carbonate as CO3	0.00
Chloride	434.00
Sulfate	1100.00
Calcium	411.00
Magnesium	19.40
Potassium	2.04
Sodium	628.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	0.80
Benzo(a)anthracene	7.20
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	5.60
Dibenzo(a,h)anthracene	ND
Fluoranthene	9.40
Fluorene	8.80
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	12.00
Phenanthrene	18.00
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND

trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	600.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	150.00
Toluene	ND
Xylenes	ND

GRW-6

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.97
Lab conductivity, umhos/cm	5040.00
Lab resistivity, ohm-m	1.99
Total dissolved solids (180)	3520.00
Total dissolved solids (calc)	3480.00
Total alkalinity as CaCO3	795.00
Total hardness as CaCO3	1220.00
Sodium absorption ratio	9.31
Bicarbonate as HCO3	970.00
Carbonate as CO3	0.00
Chloride	648.00
Sulfate	1140.00
Calcium	418.00
Magnesium	42.90
Potassium	2.08
Sodium	748.00

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.14
Pyrene	ND

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	3.50
Dibromochloromethane	ND
1,2-Dichlorobenzene	0.60
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	0.60
1,1-Dichloroethane	1.70
1,2-Dichloroethane	4.80
1,2-Dichloroethene	9.00
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND

1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.60
1,1,1-Trichloroethane	0.27
1,1,2-Trichloroethane	ND
Trichloroethene	2.00
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	93.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	24.00
Toluene	0.79
Xylenes	ND
Trichlorotrifluoroethane	ND

GRW-13

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GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.82	
Lab conductivity, umhos/cm	4990.00	4860.00
Lab resistivity, ohm-m	2.00	
Total dissolved solids (180)	3680.00	
Total dissolved solids (calc)	3420.00	
Total alkalinity as CaCO3	368.00	
Total hardness as CaCO3	1310.00	
Sodium absorption ratio	7.72	
Bicarbonate as HCO3	448.00	
Carbonate as CO3	0.00	
Chloride	694.00	
Sulfate	1390.00	
Calcium	391.00	
Magnesium	80.60	
Potassium	4.14	
Sodium	642.00	

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	3.20
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.80
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

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GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.58
Lab conductivity, umhos/cm	5050.00
Lab resistivity, ohm-m	1.98
Total dissolved solids (180)	3760.00
Total dissolved solids (calc)	3730.00
Total alkalinity as CaCO3	248.00
Total hardness as CaCO3	1200.00
Sodium absorption ratio	9.17
Bicarbonate as HCO3	303.00
Carbonate as CO3	0.00
Chloride	482.00
Sulfate	1890.00
Calcium	445.00
Magnesium	21.80
Potassium	6.92
Sodium	731.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	21.40
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	59.40
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	0.80
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

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GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.64
Lab conductivity, umhos/cm	2900.00
Lab resistivity, ohm-m	3.45
Total dissolved solids (180)	2240.00
Total dissolved solids (calc)	2170.00
Total alkalinity as CaCO3	197.00
Total hardness as CaCO3	1040.00
Sodium absorption ratio	4.13
Bicarbonate as HCO3	240.00
Carbonate as CO3	0.00
Chloride	100.00
Sulfate	1280.00
Calcium	287.00
Magnesium	78.10
Potassium	0.52
Sodium	306.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	0.90
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND

1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

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GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.84
Lab conductivity, umhos/cm	5070.00
Lab resistivity, ohm-m	1.97
Total dissolved solids (180)	3800.00
Total dissolved solids (calc)	3630.00
Total alkalinity as CaCO3	231.00
Total hardness as CaCO3	1820.00
Sodium absorption ratio	4.92
Bicarbonate as HCO3	282.00
Carbonate as CO3	0.00
Chloride	702.00
Sulfate	1650.00
Calcium	527.00
Magnesium	123.00
Potassium	4.98
Sodium	482.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	23.90
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	16.60
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	9.10
Toluene	2.40
Xylenes	15.90
Trichlorotrifluoroethane	ND
PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	1.70
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	0.80
Pyrene	ND

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2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.43
Lab conductivity, umhos/cm	4400.00
Lab resistivity, ohm-m	2.27
Total dissolved solids (180)	3070.00
Total dissolved solids (calc)	2960.00
Total alkalinity as CaCO ₃	385.00
Total hardness as CaCO ₃	1150.00
Sodium absorption ratio	7.24
Bicarbonate as HCO ₃	470.00
Carbonate as CO ₃	0.00
Chloride	545.00
Sulfate	1220.00
Calcium	318.00
Magnesium	87.60
Potassium	2.16
Sodium	565.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	25.90
Toluene	5.70
Xylenes	39.90
Trichlorotrifluoroethane	ND

PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	18.00
Fluorene	4.00
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	5.00
Pyrene	ND

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2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.03
Lab conductivity, umhos/cm	4950.00
Lab resistivity, ohm-m	2.02
Total dissolved solids (180)	3620.00
Total dissolved solids (calc)	3170.00
Total alkalinity as CaCO3	231.00
Total hardness as CaCO3	1260.00
Sodium absorption ratio	7.59
Bicarbonate as HCO3	282.00
Carbonate as CO3	0.00
Chloride	704.00
Sulfate	1260.00
Calcium	349.00
Magnesium	94.70
Potassium	2.30
Sodium	619.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	90.00
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	2.10
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	0.50
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.40
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND

1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND

PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

GIANT REFINING COMPANY
OFFSITE REMEDIATION PROJECT
QUARTERLY ANALYTICAL DATA SUMMARY
FIRST QUARTER, 1991

OFFSITE WELLS

SHS-3

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.91		
Lab conductivity, umhos/cm	4550.00		
Lab resistivity, ohm-m	2.20		
Total dissolved solids (180)	3870.00		
Total dissolved solids (calc)	3690.00		
Total alkalinity as CaCO3	248.00		
Total hardness as CaCO3	1730.00		
Sodium absorption ratio	5.05		
Bicarbonate as HCO3	303.00		
Carbonate as CO3	0.00		
Chloride	254.00		
Sulfate	2200.00		
Calcium	445.00		
Magnesium	151.00		
Potassium	7.32		
Sodium	483.00		

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND

1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-6

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.94
Lab conductivity, umhos/cm	3190.00
Lab resistivity, ohm-m	3.14
Total dissolved solids (180)	2580.00
Total dissolved solids (calc)	2460.00
Total alkalinity as CaCO3	316.00
Total hardness as CaCO3	1170.00
Sodium absorption ratio	4.23
Bicarbonate as HCO3	386.00
Carbonate as CO3	0.00
Chloride	120.00
Sulfate	1420.00
Calcium	263.00
Magnesium	125.00
Potassium	6.78
Sodium	333.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
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Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-10

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.14
Lab conductivity, umhos/cm	1980.00
Lab resistivity, ohm-m	5.06
Total dissolved solids (180)	1370.00
Total dissolved solids (calc)	1350.00
Total alkalinity as CaCO3	299.00
Total hardness as CaCO3	494.00
Sodium absorption ratio	5.06
Bicarbonate as HCO3	365.00
Carbonate as CO3	0.00
Chloride	80.00
Sulfate	645.00
Calcium	149.00
Magnesium	29.60
Potassium	8.34
Sodium	259.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
---------	----

Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	106.00
Toluene	4.00
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-12

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.07
Lab conductivity, umhos/cm	3800.00
Lab resistivity, ohm-m	2.63
Total dissolved solids (180)	2780.00
Total dissolved solids (calc)	2670.00
Total alkalinity as CaCO3	333.00
Total hardness as CaCO3	1070.00
Sodium absorption ratio	6.36
Bicarbonate as HCO3	407.00
Carbonate as CO3	0.00
Chloride	368.00
Sulfate	1260.00
Calcium	248.00
Magnesium	109.00
Potassium	3.16
Sodium	477.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	0.80
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.41
1,2-Dichloroethane	0.39
1,2-Dichloroethene	4.70
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	1.30
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	0.74
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
---------	----

Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	1.90
Xylenes	ND
Trichlorotrifluoroethane	

SHS-13

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.96
Lab conductivity, umhos/cm	3190.00
Lab resistivity, ohm-m	3.14
Total dissolved solids (180)	1970.00
Total dissolved solids (calc)	1850.00
Total alkalinity as CaCO3	710.00
Total hardness as CaCO3	571.00
Sodium absorption ratio	8.69
Bicarbonate as HCO3	866.00
Carbonate as CO3	0.00
Chloride	434.00
Sulfate	293.00
Calcium	190.00
Magnesium	23.80
Potassium	3.58
Sodium	478.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	0.96
Carbon tetrachloride	ND
Chloroethane	0.96
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	1.00
1,2-Dichloroethane	3.80
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
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Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.95
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-15

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.14
Lab conductivity, umhos/cm	2860.00
Lab resistivity, ohm-m	3.50
Total dissolved solids (180)	1630.00
Total dissolved solids (calc)	1620.00
Total alkalinity as CaCO3	257.00
Total hardness as CaCO3	872.00
Sodium absorption ratio	2.45
Bicarbonate as HCO3	313.00
Carbonate as CO3	0.00
Chloride	56.20
Sulfate	901.00
Calcium	310.00
Magnesium	24.00
Potassium	3.96
Sodium	167.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
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Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

SHS-16

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	8.04
Lab conductivity, umhos/cm	2170.00
Lab resistivity, ohm-m	4.61
Total dissolved solids (100)	2350.00
Total dissolved solids (calc)	2270.00
Total alkalinity as CaCO3	299.00
Total hardness as CaCO3	1260.00
Sodium absorption ratio	2.70
Bicarbonate as HCO3	365.00
Carbonate as CO3	0.00
Chloride	56.20
Sulfate	1360.00
Calcium	364.00
Magnesium	85.30
Potassium	2.72
Sodium	220.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
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Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

*ND - Not detected at specified detection limit

GIANT REFINING COMPANY
ONSITE REMEDIATION PROJECT
ANNUAL REPRESENTATIVE STREAM SAMPLING
FIRST QUARTER, 1991

TANK 21

	1/91	2/91	3/91
GENERAL WATER CHEMISTRY			
Lab pH (s.u.)	7.48		
Lab conductivity, umhos/cm	4610.00		
Lab resistivity, ohm-m	2.17		
Total dissolved solids (180)	3340.00		
Total dissolved solids (calc)	3320.00		
Total alkalinity as CaCO3	419.00		
Total hardness as CaCO3	1190.00		
Sodium absorption ratio	8.60		
Bicarbonate as HCO3	511.00		
Carbonate as CO3	0.00		
Chloride	465.00		
Sulfate	1490.00		
Calcium	356.00		
Magnesium	73.50		
Potassium	3.12		
Sodium	683.00		

HALOCARBONS

Bromodichloromethane	ND		
Bromoform	ND		
Bromomethane	ND		
Carbon tetrachloride	ND		
Chloroethane	ND		
2-Chloroethylvinylether	ND		
Chloroform	ND		
Chloromethane	ND		
Dibromochloromethane	ND		
1,2-Dichlorobenzene	ND		
1,3-Dichlorobenzene	ND		
1,4-Dichlorobenzene	ND		
1,1-Dichloroethane	0.80		
1,2-Dichloroethane	1.70		
1,1-Dichloroethene	12.00		
cis-1,2-Dichloroethene	ND		
trans-1,2-Dichloroethene	ND		
1,2-Dichloropropane	ND		
cis-1,3-Dichloropropene	ND		
trans-1,3-Dichloropropene	ND		
Methylene chloride	ND		
1,1,2,2-Tetrachloroethane	ND		
Tetrachloroethene	1.00		
1,1,1-Trichloroethane	ND		
1,1,2-Trichloroethane	ND		
Trichloroethene	ND		
Trichlorofluoromethane	1.40		

Vinyl chloride	ND
AROMATICS	
Benzene	86.00
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	12.70
Toluene	2.90
Xylenes	25.60
Trichlorotrifluoroethane	ND
PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	0.12
Benzo(a)anthracene	0.23
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	3.40
Fluorene	1.70
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	3.70
Phenanthrene	2.90
Pyrene	1.80

TANK 27

1/91

2/91

3/91

GENERAL WATER CHEMISTRY

Lab pH (s.u.)	7.88
Lab conductivity, umhos/cm	5290.00
Lab resistivity, ohm-m	1.89
Total dissolved solids (180)	3620.00
Total dissolved solids (calc)	3550.00
Total alkalinity as CaCO3	333.00
Total hardness as CaCO3	1290.00
Sodium absorption ratio	8.80
Bicarbonate as HCO3	407.00
Carbonate as CO3	0.00
Chloride	832.00
Sulfate	1350.00
Calcium	329.00
Magnesium	113.00
Potassium	2.60
Sodium	726.00

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	0.80
1,2-Dichloroethane	2.40
1,2-Dichloroethene	2.80
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	1.70
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
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Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
Trichlorotrifluoroethane	ND

PAH	
Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(g,h,i)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenzo(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: January, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	59.37		0.00	5334.93
GRW-2	5391.28	50.98		0.00	5340.30
GRW-3	5388.77	51.44		0.00	5337.33
GRW-4	5390.02	45.30		0.00	5344.72
GRW-5	5390.56	57.20		0.00	5333.36
GRW-6	5390.81	45.45		0.00	5345.36
GRW-10	5395.02	45.34	43.35	1.99	5351.27
GRW-11	5397.85	63.40		0.00	5334.45
GRW-12	5397.24	36.06		0.00	5361.18
GRW-13	5396.90	57.75		0.00	5339.15
GBR-5	5395.07	33.14	30.76	2.38	5363.83
GBR-6	5395.70	39.33	39.30	0.03	5356.39
GBR-7	5395.85	34.28	33.20	1.08	5362.43
GBR-8	5390.50	45.12	43.45	1.67	5346.72
GBR-9	5389.92	46.82		0.00	5343.10
GBR-10	5390.57	42.98		0.00	5347.59
GBR-11	5389.43	44.18	42.26	1.92	5346.79
GBR-13	5393.04	42.58	41.61	0.97	5351.24
GBR-15	5397.99	29.57		0.00	5368.42
GBR-17	5402.69	33.58		0.00	5369.11
GBR-18	5421.68	20.56		0.00	5401.12
GBR-19	5393.83	39.65	39.64	0.01	5354.19
GBR-20	5393.47	40.37	40.08	0.29	5353.33
GBR-21S	5400.65	19.52	19.40	0.12	5381.23
GBR-21D	5400.19	22.97		0.00	5377.22
GBR-22	5395.91	39.35	35.28	4.07	5359.82
GBR-23	5403.72	21.35		0.00	5382.37
GBR-24S	5396.08	23.69		0.00	5372.39
GBR-24D	5396.77	26.55		0.00	5370.22
GBR-25	5396.72	28.76		0.00	5367.96
GBR-26	5395.59	32.10		0.00	5363.49
GBR-30	5396.58	31.05		0.00	5365.53
GBR-31	5394.86	34.15		0.00	5360.71
GBR-33	5396.28	37.35	37.33	0.02	5358.95
GBR-34	5394.00	35.17	35.15	0.02	5358.85
GBR-35	5393.66	36.08	35.15	0.93	5358.32
GBR-39	5397.55	32.68		0.00	5364.87
GBR-40	5400.76	31.98		0.00	5368.78
GBR-41	5396.35	27.68		0.00	5368.67
GBR-51	5389.68	41.13		0.00	5348.55
GBR-52	5387.74	39.44		0.00	5348.30

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: January, 1991

Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.50	41.37	0.13	5342.14
SHS-2	5381.66	38.20	37.52	0.68	5344.00
SHS-3	5383.33	36.81		0.00	5346.52
SHS-4	5383.62	41.50		0.00	5342.12
SHS-5	5378.36	38.47		0.00	5339.89
SHS-6	5378.17	38.88		0.00	5339.29
SHS-7	5378.77	39.50	38.95	0.55	5339.71
SHS-8	5380.25	38.95	38.93	0.02	5341.32
SHS-9	5380.79	38.40	38.39	0.01	5342.40
SHS-10	5373.80	36.62		0.00	5337.18
SHS-11	5373.17	38.26	37.85	0.41	5335.24
SHS-12	5373.94	39.86		0.00	5334.08
SHS-13	5367.81	36.46		0.00	5331.35
SHS-14	5367.07	34.69	34.68	0.01	5332.39
SHS-15	5366.21	33.45		0.00	5332.76
SHS-16	5362.58	31.40		0.00	5331.18

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: February, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.34		0.00	5333.96
GRW-2	5391.28	50.70		0.00	5340.58
GRW-3	5388.77	54.80		0.00	5333.97
GRW-4	5390.02	49.83		0.00	5340.19
GRW-5	5390.56	43.10		0.00	5347.46
GRW-6	5390.81	43.28		0.00	5347.53
GRW-10	5395.02	53.70	50.20	3.50	5344.12
GRW-11	5397.85	62.15		0.00	5335.70
GRW-12	5397.24	35.62		0.00	5361.62
GRW-13	5396.90	58.25		0.00	5338.65
GBR-5	5395.07	33.95	31.58	2.37	5363.02
GBR-6	5395.70	56.54		0.00	5339.16
GBR-7	5395.85	35.45	33.95	1.50	5361.60
GBR-8	5390.50	44.60	43.35	1.25	5346.90
GBR-9	5389.92	49.20		0.00	5340.72
GBR-10	5390.57	42.28		0.00	5348.29
GBR-11	5389.43	43.75	41.93	1.82	5347.14
GBR-13	5393.04	42.48	41.61	0.87	5351.25
GBR-15	5397.99	42.96		0.00	5355.03
GBR-17	5402.69	33.96		0.00	5368.73
GBR-18	5421.68	20.93		0.00	5400.75
GBR-19	5393.83	39.84	39.76	0.08	5354.05
GBR-20	5393.47	42.98	41.23	1.75	5351.89
GBR-21S	5400.65	19.62		0.00	5381.03
GBR-21D	5400.19	30.32		0.00	5369.87
GBR-22	5395.91	39.25	35.49	3.76	5359.67
GBR-23	5403.72	21.72		0.00	5382.00
GBR-24S	5396.08	26.72		0.00	5369.36
GBR-24D	5396.77	31.96		0.00	5364.81
GBR-25	5396.72	29.91		0.00	5366.81
GBR-26	5395.59	37.93		0.00	5357.66
GBR-30	5396.58	32.28		0.00	5364.30
GBR-31	5394.86	34.58		0.00	5360.28
GBR-33	5396.28	37.96	37.76	0.20	5358.48
GBR-34	5394.00	36.58	35.37	1.21	5358.39
GBR-35	5393.66	37.10	35.44	1.66	5357.89
GBR-39	5397.55	34.73		0.00	5362.82
GBR-40	5400.76	31.32		0.00	5369.44
GBR-41	5396.35	27.87		0.00	5368.48
GBR-51	5389.68	41.10		0.00	5348.58
GBR-52	5387.74	39.42		0.00	5348.32

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: February, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.56	41.43	0.13	5342.08
SHS-2	5381.66	38.21	37.54	0.67	5343.99
SHS-3	5383.33	36.88		0.00	5346.45
SHS-4	5383.62	41.52		0.00	5342.10
SHS-5	5378.36	38.49		0.00	5339.87
SHS-6	5378.17	38.85		0.00	5339.32
SHS-7	5378.77	39.66	38.93	0.73	5339.69
SHS-8	5380.25	38.98	38.97	0.01	5341.28
SHS-9	5380.79	38.36	38.35	0.01	5342.44
SHS-10	5373.80	36.58		0.00	5337.22
SHS-11	5373.17	38.29	37.88	0.41	5335.21
SHS-12	5373.94	39.42		0.00	5334.52
SHS-13	5367.81	36.21		0.00	5331.60
SHS-14	5367.07	34.72	34.71	0.01	5332.36
SHS-15	5366.21	33.40		0.00	5332.81
SHS-16	5362.58	30.88		0.00	5331.70

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE

MONTH/YEAR: March, 1991

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
GRW-1	5394.30	60.07		0.00	5334.23
GRW-2	5391.28	50.55		0.00	5340.73
GRW-3	5388.77	52.75		0.00	5336.02
GRW-4	5390.02	49.73		0.00	5340.29
GRW-5	5390.56	43.65		0.00	5346.91
GRW-6	5390.81	48.05		0.00	5342.76
GRW-10	5395.02	55.21		0.00	5339.81
GRW-11	5397.85	63.28		0.00	5334.57
GRW-12	5397.24	45.65		0.00	5351.59
GRW-13	5396.90	57.48		0.00	5339.42
GBR-5	5395.07	33.94	31.56	2.38	5363.03
GBR-6	5395.70	53.77		0.00	5341.93
GBR-7	5395.85	35.46	34.95	0.51	5360.80
GBR-8	5390.50	45.44	43.42	2.02	5346.68
GBR-9	5389.92	49.13		0.00	5340.79
GBR-10	5390.57	42.28		0.00	5348.29
GBR-11	5389.43	44.15	42.24	1.91	5346.81
GBR-13	5393.04	42.93	41.97	0.96	5350.88
GBR-15	5397.99	43.10		0.00	5354.89
GBR-17	5402.69	33.58		0.00	5369.11
GBR-18	5421.68	21.04		0.00	5400.64
GBR-19	5393.83	40.21	40.11	0.10	5353.70
GBR-20	5393.47	42.93	41.18	1.75	5351.94
GBR-21S	5400.65	19.46	19.45	0.01	5381.20
GBR-21D	5400.19	34.66		0.00	5365.53
GBR-22	5395.91	38.99	35.65	3.34	5359.59
GBR-23	5403.72	21.36		0.00	5382.36
GBR-24S	5396.08	26.60		0.00	5369.48
GBR-24D	5396.77	31.87		0.00	5364.90
GBR-25	5396.72	29.96		0.00	5366.76
GBR-26	5395.59	36.07		0.00	5359.52
GBR-30	5396.58	31.71		0.00	5364.87
GBR-31	5394.86	34.55		0.00	5360.31
GBR-33	5396.28	38.14	37.88	0.26	5358.35
GBR-34	5394.00	36.84	35.49	1.35	5358.24
GBR-35	5393.66	37.34	35.63	1.71	5357.69
GBR-39	5397.55	34.38		0.00	5363.17
GBR-40	5400.76	31.35		0.00	5369.41
GBR-41	5396.35	28.06		0.00	5368.29
GBR-51	5389.68	42.73		0.00	5346.95
GBR-52	5387.74	39.98		0.00	5347.76

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

GIANT REFINING BLOOMFIELD REFINERY
MONTHLY POTENTIOMETRIC SURFACE
MONTH/YEAR: March, 1991
Page 2

WELL #	WELLHEAD ELEVATION IN FEET	DEPTH TO WATER IN FEET	DEPTH TO PRODUCT IN FEET	PRODUCT THICKNESS IN FEET	ADJUSTED WSEL* IN FEET
SHS-1	5383.54	41.53	41.51	0.02	5342.03
SHS-2	5381.66	38.23	37.57	0.66	5343.96
SHS-3	5383.33	36.92		0.00	5346.41
SHS-4	5383.62	41.58		0.00	5342.04
SHS-5	5378.36	38.51		0.00	5339.85
SHS-6	5378.17	38.89		0.00	5339.28
SHS-7	5378.77	39.78	38.92	0.86	5339.68
SHS-8	5380.25	38.99		0.00	5341.26
SHS-9	5380.79	38.38	38.37	0.01	5342.42
SHS-10	5373.80	36.48		0.00	5337.32
SHS-11	5373.17	38.30	37.89	0.41	5335.20
SHS-12	5373.94	39.33		0.00	5334.61
SHS-13	5367.81	36.14		0.00	5331.67
SHS-14	5367.07	34.74	34.73	0.01	5332.34
SHS-15	5366.21	33.28		0.00	5332.93
SHS-16	5362.58	30.17		0.00	5332.41

* WSEL - WATER SURFACE ELEVATION ADJUSTED FOR PRODUCT DEPTH

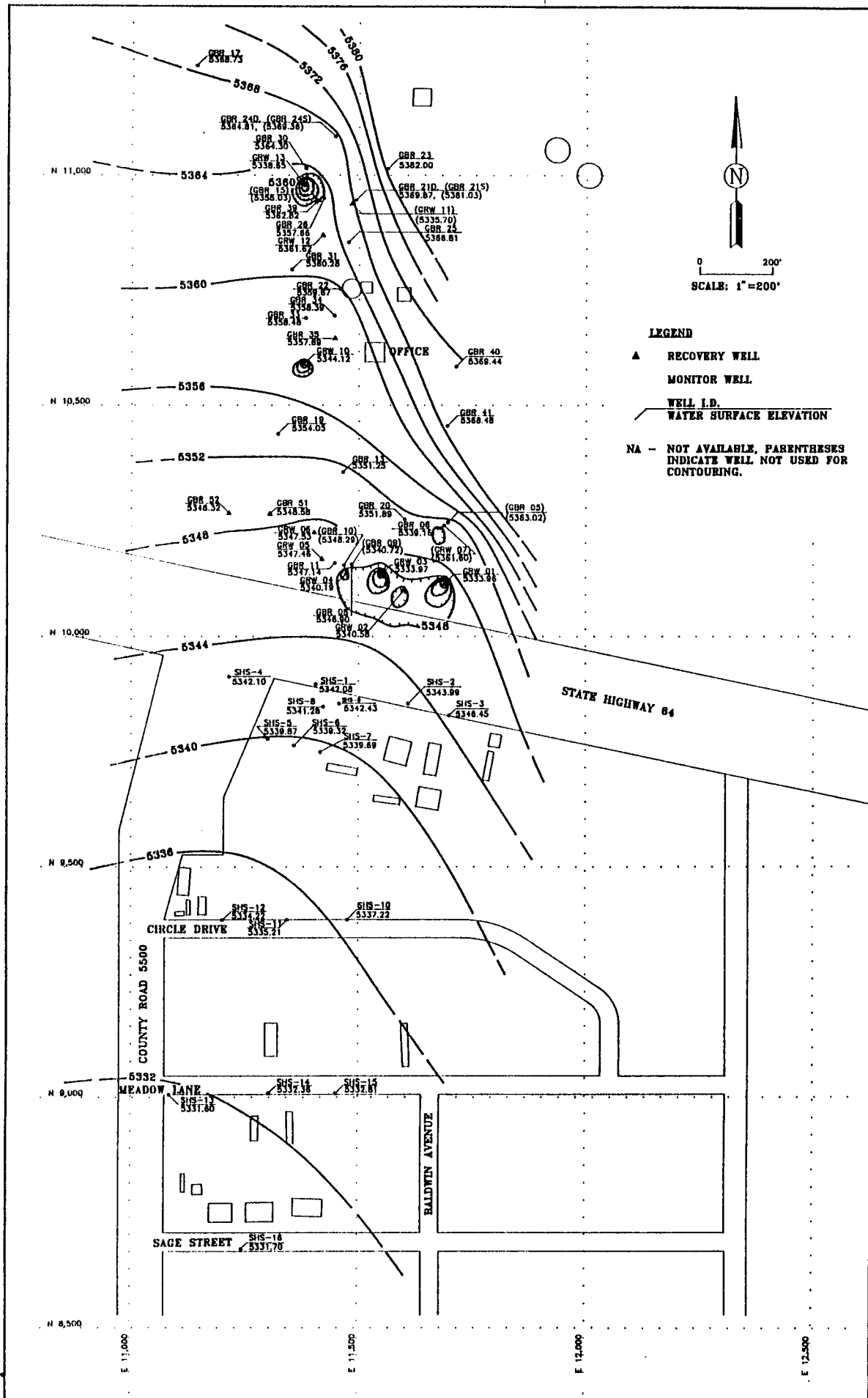
LEGEND

- ▲ RECOVERY WELL
- MONITOR WELL
- WELL I.D. WATER SURFACE ELEVATION
- NA -- NOT AVAILABLE, PARENTHESES INDICATE WELL NOT USED FOR CONTOURING.

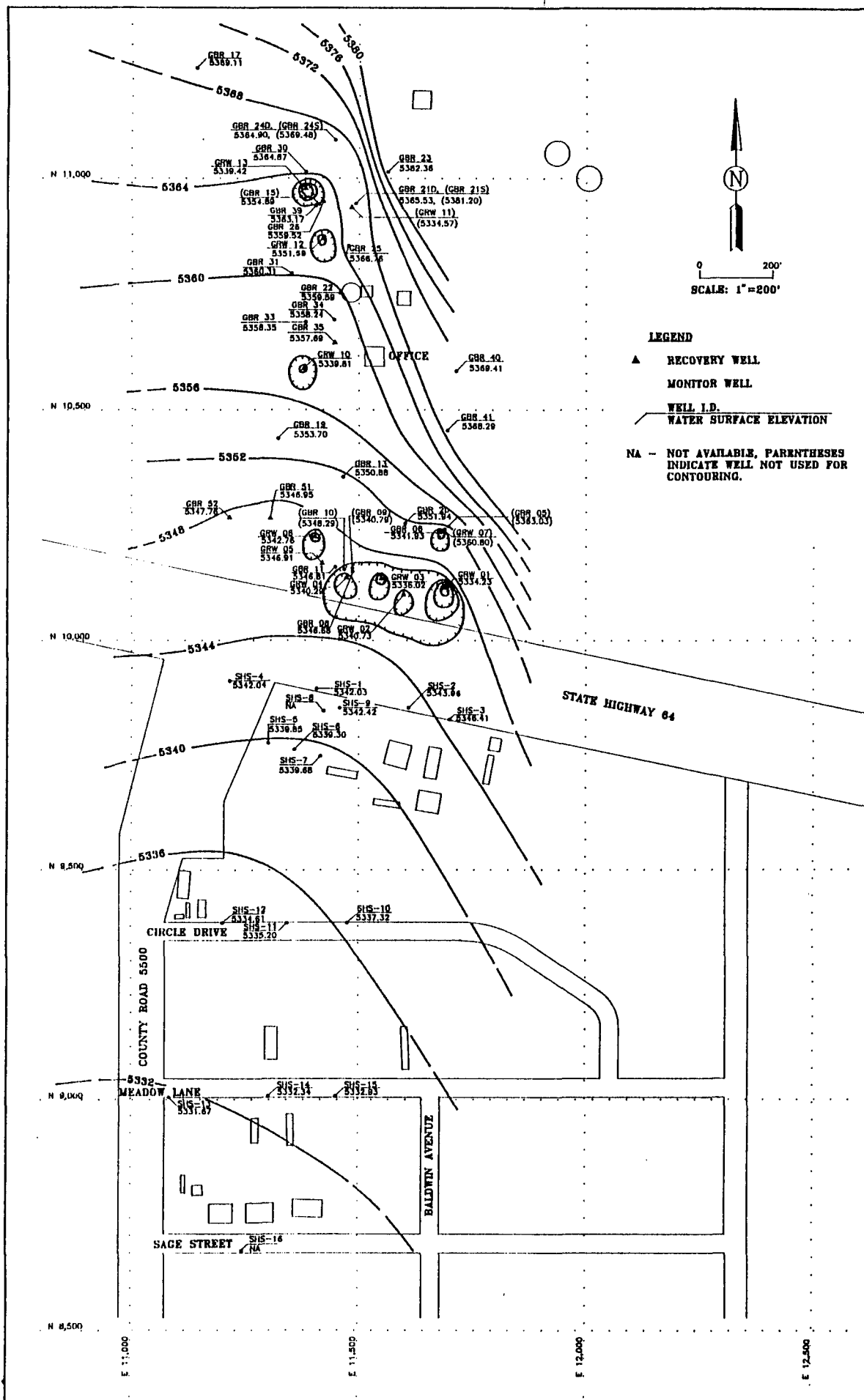
Map Labels:

- State Highway 64
- County Road 5500
- Circle Drive
- Meadow Lane
- Sage Street
- Baldwin Avenue
- Office
- GBR 12 (5369.11)
- GBR 30 (5365.53)
- GBR 13 (5364.23)
- GBR 14 (5364.87)
- GBR 15 (5364.71)
- GBR 22 (5356.82)
- GBR 23 (5362.37)
- GBR 24 (5377.22, 5381.23)
- GBR 25 (5377.22, 5381.23)
- GBR 26 (5387.96)
- GBR 27 (5387.96)
- GBR 28 (5387.96)
- GBR 29 (5387.96)
- GBR 30 (5387.96)
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- GBR 94 (5387.96)
- GBR 95 (5387.96)
- GBR 96 (5387.96)
- GBR 97 (5387.96)
- GBR 98 (5387.96)
- GBR 99 (5387.96)
- GBR 100 (5387.96)

FEBRUARY 1991 WATER SURFACE CONTOUR MAP
GIANT-BLOOMFIELD REFINERY



MARCH 1991 WATER SURFACE CONTOUR MAP
GIANT-BLOOMFIELD REFINERY



Giant Refining Co. Bloomfield Refinery
Total Volume Summary

First Quarter, 1991

=====
Total Volume Of Water Recovered 1419620
Net Change In Storage Volume -107414

Total Water Pumped To The 1057350
Infiltration Gallery

=====
Difference -469684

Comments: The approximately 33% difference
can be accounted for in meter
failure.

Giant Refining Co. Bloomfield Refinery
Quarterly Recovery Well
Volume Tabulation

First Quarter of 1991

	Well	Month #1	Month #2	Month #3	Total
	GRW-1	7660	7160	6550	21370
	GRW-2	11510	11200	9940	32650
	GRW-3	35300	32780	28840	96920
	GRW-4	22050	25460	18860	66370
	GRW-5	42320	8210	25340	75870
	GRW-6	18270	18350	16040	52660
	GRW-7	0	91160	160630	251790
	GRW-9	0	7120	8410	15530
	GRW-10	165710	242100	229320	637130
	GRW-11	6010	20640	21380	48030
	GRW-12	6720	10300	20410	37430
	GRW-13	10130	38650	35090	83870
Total Volume Pumped In Gallons					1419620

Giant Refining Co. Bloomfield Refinery
Quarterly Net Tank
Volume Change

First Quarter, 1991

Tank Number	Beginning Volume	Ending Volume	Net Change
102	19722	8692	-11030
106	8010	8010	0
21	418451	311966	-106485
22	317423	225523	-91900
27	185631	185631	0
32	159291	159291	0
34	200948	200948	0
35	0	0	0
37	250231	352232	102001
Total Net Volume Change			-107414

SPECIFIC CONDUCTANCE VALUES
FOR GRW-13 IN umhos/cm
FIRST QUARTER, 1991

<u>1/91</u>	<u>2/91</u>	<u>3/91</u>
4990	*	4860

*-No data collected

GBR-51

	1/91	2/91	3/91
HALOCARBONS			
Bromodichloromethane		ND	
Bromoform		ND	
Bromomethane		ND	
Carbon tetrachloride		ND	
Chloroethane		ND	
2-Chloroethylvinylether		ND	
Chloroform		ND	
Chloromethane		ND	
Dibromochloromethane		ND	
1,2-Dichlorobenzene		ND	
1,3-Dichlorobenzene		ND	
1,4-Dichlorobenzene		ND	
1,1-Dichloroethane		ND	
1,2-Dichloroethane		ND	
1,1-Dichloroethene		ND	
cis-1,2-Dichloroethene		ND	
trans-1,2-Dichloroethene		ND	
1,2-Dichloropropane		ND	
cis-1,3-Dichloropropene		ND	
trans-1,3-Dichloropropene		ND	
Methylene chloride		ND	
1,1,2,2-Tetrachloroethane		ND	
Tetrachloroethene		0.40	
1,1,1-Trichloroethane		2.10	
1,1,2-Trichloroethane		ND	
Trichloroethene		ND	
Trichlorofluoromethane		ND	
Vinyl chloride		ND	
AROMATICS			
Benzene		ND	
Chlorobenzene		ND	
1,2-Dichlorobenzene		ND	
1,3-Dichlorobenzene		ND	
1,4-Dichlorobenzene		ND	
Ethylbenzene		ND	
Toluene		ND	
Xylenes		ND	
Trichlorotrifluoroethane		ND	

GBR-52

1/91 2/91 3/91

HALOCARBONS

Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND
Carbon tetrachloride	ND
Chloroethane	ND
2-Chloroethylvinylether	ND
Chloroform	ND
Chloromethane	ND
Dibromochloromethane	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Methylene chloride	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Trichlorofluoromethane	ND
Vinyl chloride	ND

AROMATICS

Benzene	ND
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	0.70
Xylenes	ND
Trichlorotrifluoroethane	ND



Analytical Technologies, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101868

February 25, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 01/30/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 610 analyses were performed by ATI, Ft. Collins.

If you have any questions or comments, please do not hesitate to contact us at (602) 438-1530.

M. Barry for

Elizabeth Proffitt
Project Manager

RVW:clf
Enclosure

Robert V. Woods

Robert V. Woods
Laboratory Manager



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED

DATE RECEIVED : 01/30/91

REPORT DATE : 02/20/91

ATI I.D. : 101868

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	910129822 STRIPPER INFLUENT	AQUEOUS	01/29/91
02	910129830 STRIPPER EFFLUENT	AQUEOUS	01/29/91
03	910129925 TANK 21	AQUEOUS	01/29/91
04	9101291050 TANK 27	AQUEOUS	01/29/91
05	TRIP BLANK	AQUEOUS	01/29/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 101868

CLIENT : GIANT REFINING, FARMINGTON

DATE RECEIVED : 01/30/91

PROJECT # : 9834

PROJECT NAME : RIFINE REMED

REPORT DATE : 02/20/91

PARAMETER	UNITS	02	03	04
		STRIP.EFF.	TANK21	TANK27
SILVER	MG/L	<0.010	<0.010	<0.010
ARSENIC	MG/L	<0.005	<0.005	<0.005
BERYLLIUM	MG/L	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.005	<0.005	<0.005
CHROMIUM	MG/L	<0.010	<0.010	<0.010
COPPER	MG/L	<0.010	<0.010	<0.010
MERCURY	MG/L	<0.0002	<0.0002	<0.0002
NICKEL	MG/L	0.087	0.093	0.157
LEAD	MG/L	<0.002	<0.002	0.003
ANTIMONY	MG/L	<0.05	<0.05	<0.05
SELENIUM	MG/L	<0.005	<0.005	<0.005
THALLIUM	MG/L	<0.005	<0.005	<0.005
ZINC	MG/L	0.020	0.014	0.067



Analytical Technologies, Inc.

METALS - QUALITY CONTROL

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED

ATI I.D. : 101868

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10187701	<0.010	<0.010	NA	0.100	0.100	100
ARSENIC	MG/L	10184904	<0.005	<0.005	NA	0.047	0.050	94
ARSENIC	MG/L	10250601	<0.005	<0.005	NA	0.055	0.050	110
BERYLLIUM	MG/L	10187701	<0.005	<0.005	NA	0.098	0.100	98
BERYLLIUM	MG/L	10186804	<0.005	<0.005	NA	0.086	0.100	86
CADMIUM	MG/L	10187701	<0.005	<0.005	NA	0.103	0.100	103
CHROMIUM	MG/L	10184904	<0.010	<0.010	NA	0.106	0.100	106
COPPER	MG/L	10184904	<0.010	<0.010	NA	0.099	0.100	99
MERCURY	MG/L	10250601	<0.0002	<0.0002	NA	0.0051	0.0050	102
NICKEL	MG/L	10184904	<0.020	<0.020	NA	0.086	0.100	86
LEAD	MG/L	10184904	0.003	0.004	28	0.042	0.050	78
ANTIMONY	MG/L	10187701	<0.05	<0.05	NA	0.90	1.00	90
SELENIUM	MG/L	10184904	<0.005	<0.005	NA	0.045	0.050	90
THALLIUM	MG/L	10186704	<0.005	<0.005	NA	0.043	0.050	86
THALLIUM	MG/L	10186804	<0.005	<0.005	NA	STDA	CC=	.995
ZINC	MG/L	10184904	0.733	0.711	3	1.81	1.00	108

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : RIFINE REMED
 CLIENT I.D. : 910129822 STRIPPER INFLUENT
 SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
 DATE RECEIVED : 01/30/91
 DATE EXTRACTED : N/A
 DATE ANALYZED : 02/08/91
 UNITS : UG/L
 DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	1.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	1.3
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 116
 BROMOFLUOROBENZENE (%) 104



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : 910129830 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
DATE RECEIVED : 01/30/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	1.4
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	118
BROMOFLUOROBENZENE (%)	105



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186803

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : 910129925 TANK 21
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
DATE RECEIVED : 01/30/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/08/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	86
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	1.7
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	12.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	12.7
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.0
TOLUENE	2.9
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	25.6
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	101

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186804

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 01/29/91
PROJECT #	: 9834	DATE RECEIVED	: 01/30/91
PROJECT NAME	: RIFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9101291050 TANK 27	DATE ANALYZED	: 02/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.8
1,2-DICHLOROETHANE	2.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.8
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	1.7
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	83

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10186805

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 01/29/91
PROJECT #	: 9834	DATE RECEIVED	: 01/30/91
PROJECT NAME	: RIFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 02/08/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	86



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101868
DATE EXTRACTED : 02/08/91
DATE ANALYZED : 02/08/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	3.2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	110
BROMOFLUOROBENZENE (%)	106



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101868
PROJECT #	: 9834	DATE EXTRACTED	: N/A
PROJECT NAME	: RIFINE REMED	DATE ANALYZED	: 02/11/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	2.8
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	109

QUALITY CONTROL DATA

ATI I.D. : 101868

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : RIFINE REMED

REF I.D. : 10183902

DATE ANALYZED : 02/08/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED %		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	19	95	18	90	5
TRICHLOROETHENE	<0.2	20	19	95	18	90	5
TETRACHLOROETHENE	<0.2	20	18	90	18	90	0
BENZENE	<0.5	20	20	100	19	95	5
BROMODICHLOROMETHANE	<0.2	20	21	105	20	100	5
CHLOROFORM	<0.2	20	20	100	18	90	11
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	20	100	5
TOLUENE	0.8	20	19	91	18	86	5
CHLOROBENZENE	<0.5	20	16	80	17	85	6
M-XYLENE	<0.5	20	18	90	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GCMS - RESULTS

ATI I.D. : 10186802

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : 910129830 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
DATE RECEIVED : 01/30/91
DATE EXTRACTED : 01/31/91
DATE ANALYZED : 02/06/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.91
ANTHRACENE	0.01
FLUORANTHENE	0.29
PYRENE	<0.04
BENZO(A)ANTHRACENE	0.34
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

ATI I.D. : 10186803

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : 910129925 TANK 21
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
DATE RECEIVED : 01/30/91
DATE EXTRACTED : 01/31/91
DATE ANALYZED : 02/06/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	3.7
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	1.7
PHENANTHRENE	2.9
ANTHRACENE	0.12
FLUORANTHENE	3.4
PYRENE	1.8
BENZO(A)ANTHRACENE	0.23
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

ATI I.D. : 10186804

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : 9101291050 TANK 27
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/29/91
DATE RECEIVED : 01/30/91
DATE EXTRACTED : 01/31/91
DATE ANALYZED : 02/06/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101868
DATE EXTRACTED : 01/31/91
DATE ANALYZED : 02/06/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
BENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

TEST : POLYNUCLEAR AROMATICS (EPA 610)

ATI I.D. : 101868

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : RIFINE REMED
REF I.D. : 10299908

DATE ANALYZED : 02/06/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SPIKED SAMPLE	% REC.	
ACENAPHTHYLENE	<0.30	150	86	57	112	75	26
PYRENE	<0.04	20	14	70	15.8	79	12

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

Date: 1-29-91 Page 1 of 1

TELEPHONE (602) 488-1530

SAMPLER'S SIGNATURE

Jeany Orman

[illegible]

PROJECT INFORMATION

SAMPLE RECEIPT

RELINQUISHED BY: (Signature) 1

RELINQUISHED BY: (Signature)

RELINQUISHED BY: (Signature) 3

PROJECT: 12efinerv

TOTAL NO. OF CONTAINERS

James O. Newman

Remediation 9834
PROJECT MANAGER:

CHAIN OF CUSTODY SEALS

(Printed Name) Jeghu Bierman

(Printed Name)

(Printed Name)

Tim Kinner

CHAIN OF CUSTODY SHEET

(Company)	Origin + Refinery

(Company)

(Company)

SHIPPING I.D. NO.

REC'D GOOD CONDITION/COLLECT

DATE AND TIME: 11/1/77

DATE AND TIME:

DATE AND TIME:

957835555

CONFORMS TO RECORD

RECEIVED BY: (Signature) 1-29-91 14:30

RECEIVED BY: (Signature)

RECEIVED BY: (Signature) 3

SHIPPED VIA
Fed Express

LABORATORY NUMBER:
101868

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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3

W. E. C. LABORATORY

SPECIAL INSTRUCTIONS OR COMMENTS
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Please Return Original coc

(Company)

DATE AND TIME:

(Company)

DATE AND TIME:

ATTENTION
(Company)
DATE AND TIME:



Analytical**Technologies**, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 102548

February 25, 1991

Giant Refining Company
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refine Remediation 9834

Attention: Tim Kinney

On 02/05/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINE REMED
ATI I.D. : 102548

DATE RECEIVED : 02/05/91

REPORT DATE : 02/25/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9102041244 GBR-52	AQUEOUS	02/04/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10254801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINED REMED
CLIENT I.D. : 9102041244 GBR-52
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 02/04/91
DATE RECEIVED : 02/05/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/12/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
1,1-DICHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.7
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	120
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 102548
PROJECT #	: 9834	DATE EXTRACTED	: 02/12/91
PROJECT NAME	: REFINER REMED	DATE ANALYZED	: 02/12/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	2.4
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	116
BROMOFLUOROBENZENE (%)	110



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D.

: 102548

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : REFINER REMED

REF I.D. : 10299928

DATE ANALYZED : 02/12/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.		RPD
	RESULT	SPIKED			SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.2	20	18	90	19	95	5
TRICHLOROETHENE	<0.2	20	20	100	20	100	0
TETRACHLOROETHENE	<0.2	20	18	90	19	95	5
BENZENE	<0.5	20	17	85	17	85	0
BROMODICHLOROMETHANE	<0.2	20	18	90	19	95	5
CHLOROFORM	<0.2	20	21	105	20	100	5
1,1,1-TRICHLOROETHANE	<0.2	20	18	90	18	90	0
TOLUENE	<0.5	20	17	85	16	80	6
CHLOROBENZENE	<0.5	20	18	90	19	90	5
M-XYLENE	<0.5	20	16	80	16	80	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GIANT

Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

CHAIN OF CUSTODY

Date: 2-4-91 Page 1 of 2

REQUESTED ANALYSIS

LABORATORY ATI
ADDRESS 2113 S 48th St
Tempe AZ

TELEPHONE () - -

SAMPLER'S SIGNATURE

Geany Overman

SAMPLE NUMBER MATRIX LOCATION

9102041244 Water GBR-52

POLYNUCLEAR AROMATICS 610/8310

HALOGENATED VOLATILES 601/8010

AROMATIC VOLATILES 602/8020

GENERAL WATER CHEMISTRY

NUMBER OF CONTAINERS

2

PROJECT INFORMATION

SAMPLE RECEIPT

PROJECT: Refinery 9834

PROJECT MANAGER: Tim Kinney

SHIPPING I.D. NO. 9578355485

SHIPPED VIA FEDEX

SPECIAL INSTRUCTIONS OR COMMENTS

RELINQUISHED BY: (Signature) Geany Overman

(Printed Name) Geany Overman

(Company) Giant Refinery

DATE AND TIME: 2-4-91 1450

RECEIVED BY: (Signature) [Signature]

(Printed Name)

(Company)

DATE AND TIME:

RELINQUISHED BY: (Signature)

(Printed Name)

(Company)

DATE AND TIME:

RECEIVED BY: (Signature)

(Printed Name)

(Company)

DATE AND TIME:

RELINQUISHED BY: (Signature)

(Printed Name)

(Company)

DATE AND TIME:

RECEIVED BY: (Signature) [Signature]

(Printed Name) Linda Eschman

(Company) ATI-TSC

DATE AND TIME: 2/5/91 141

Please Return Original COC

1004



Analytical Technologies, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101839

February 20, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation

Attention: Tim Kinney

On 01/26/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 610 analyses were performed by ATI, Fort Collins.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

M. Barry for

Elizabeth Proffitt
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
ATI I.D. : 101839

DATE RECEIVED : 01/26/91

REPORT DATE : 02/25/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	910125926 GRW-3	AQUEOUS	01/25/91
02	910125940 GRW-13	AQUEOUS	01/25/91
03	9101251332 SHS-15	AQUEOUS	01/25/91
04	9101251528 SHS-6	AQUEOUS	01/25/91
05	TRIP BLANK	AQUEOUS	01/25/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183901

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : 910125926 GRW-3 (GBR-29)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 25

COMPOUNDS	RESULTS
BENZENE	350
BROMODICHLOROMETHANE	<5.0
BROMOFORM	<5.0
BROMOMETHANE	<5.0
CARBON TETRACHLORIDE	<5.0
CHLOROBENZENE	<12.5
CHLOROETHANE	<5.0
CHLOROFORM	<5.0
CHLOROMETHANE	<5.0
DIBROMOCHLOROMETHANE	<5.0
2-CHLOROETHYL VINYL ETHER	<12.5
3-DICHLOROBENZENE	<12.5
1,2 & 1,4-DICHLOROBENZENE	<12.5
DICHLORODIFLUOROMETHANE	<5.0
1,1-DICHLOROETHANE	<5.0
1,2-DICHLOROETHANE	<5.0
1,1-DICHLOROETHENE	<5.0
1,2-DICHLOROETHENE (TOTAL)	<5.0
1,2-DICHLOROPROPANE	<5.0
CIS-1,3-DICHLOROPROPENE	<5.0
TRANS-1,3-DICHLOROPROPENE	<5.0
ETHYLBENZENE	160
METHYLENE CHLORIDE	<50.0
1,1,2,2-TETRACHLOROETHANE	<5.0
TETRACHLOROETHENE	<5.0
TOLUENE	<12.5
1,1,1-TRICHLOROETHANE	<5.0
1,1,2-TRICHLOROETHANE	<5.0
TRICHLOROETHENE	<5.0
TRICHLOROFLUOROMETHANE	<12.5
VINYL CHLORIDE	<5.0
TOTAL XYLENES	80
TRICHLOROTRIFLUOROETHANE	<50.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 103
BROMOFLUOROBENZENE (%) 83



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183902

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : 910125940 GRW-13 (GAR-14)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	3.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.8
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%) 107
BROMOFLUOROBENZENE (%) 86



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183903

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101251332 SHS-15
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	104
BROMOFLUOROBENZENE (%)	107

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183904

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101251528 SHS-~~8~~ 16 ~~AE~~
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	97



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10183905

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : TRIP BLANK
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	87



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101839
PROJECT #	: (NONE)	DATE EXTRACTED	: 02/09/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 02/09/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	103
BROMOFLUOROBENZENE (%)	92



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101839
PROJECT #	: (NONE)	DATE EXTRACTED	: 02/07/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 02/07/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	110
BROMOFLUOROBENZENE (%)	100



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D.

: 101839

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : (NONE)

DATE ANALYZED : 02/08/91

PROJECT NAME : REFINERY REM

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10183902

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED	% SPIKED	DUP.		RPD
	RESULT	SPIKED			SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	19	95	18	90	5
TRICHLOROETHENE	<0.2	20	19	95	18	90	5
TETRACHLOROETHENE	<0.2	20	18	90	18	90	0
BENZENE	<0.5	20	20	100	19	95	5
BROMODICHLOROMETHANE	<0.2	20	21	105	20	100	5
CHLOROFORM	<0.2	20	20	100	18	90	11
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	20	100	5
TOLUENE	0.8	20	19	91	18	86	5
CHLOROBENZENE	<0.5	20	16	80	17	85	6
M-XYLENE	<0.5	20	18	90	17	85	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GCMS - RESULTS

ATI I.D. : 10183901

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : 910125926 GRW-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 25

COMPOUNDS	RESULTS
NAPHTHALENE	<75
ACENAPHTHYLENE	<75
ACENAPHTHENE	<125
FLUORENE	57
PHENANTHRENE	145
ANTHRACENE	8.8
FLUORANTHENE	112
PYRENE	<10
BENZO(A)ANTHRACENE	82
CHRYSENE	<5.0
BENZO(B)FLUORANTHENE	<2.5
BENZO(K)FLUORANTHENE	<2.5
BENZO(A)PYRENE	<2.5
DIBENZ(a,h)ANTHRACENE	<25
BENZO(g,h,i)PERYLENE	<10
INDENO(1,2,3-CD)PYRENE	<7.5

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

GCMS - RESULTS

ATI I.D. : 10183902

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : 910125940 GRW-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/25/91
DATE RECEIVED : 01/26/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101839
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101839

TEST : POLYNUCLEAR AROMATICS (EPA 610)

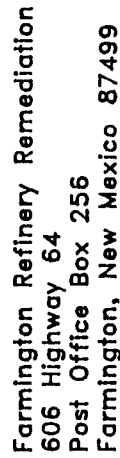
CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINERY REM
REF I.D. : 10299902

DATE ANALYZED : 02/05/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT	SAMPLE SPIKED	SAMPLE SPIKED	% SPIKED REC.	DUP. SAMPLE	% SPIKED REC.	DUP. SAMPLE	RPD
ACENAPHTHYLENE	<0.30	150	101	67	96	64		5
PYRENE	<0.04	20	14.6	73	14.5	73		1

% Recovery = $\frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$

RPD (Relative % Difference) = $\frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$



Date: 1-25-91 Page 1 of 1

LABORATORY ADDRESS
AT I
2113 S 48th St
Tempe Az
TELEPHONE (602) 438-1530

SAMPLER'S SIGNATURE *Jenny Overman*

SAMPLE NUMBER	MATRIX	LOCATION
910125926	Water	GRW-3
910125940	Water	GRW-13
9101251338	Water	SHS-15
9101251528	Water	SHS-16
Trip Blank		

1 2 3 4 5

[illegible]



Analytical Technologies, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101788

February 25, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 01/24/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 610 analyses were performed by ATI, Fort Collins. Sample 9101231433 SHS-10 was analyzed past the EPA 14-day holding time and is provided at no charge.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Project Manager

Robert V. Woods
Laboratory Manager

RVW:dkm
Enclosure



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON

DATE RECEIVED : 01/24/91

PROJECT # : 9834

PROJECT NAME : REFIN REMED

REPORT DATE : 02/15/91

ATI I.D. : 101788

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9101231045 GBR-31	AQUEOUS	01/23/91
02	9101231222 SHS-3	AQUEOUS	01/23/91
03	9101231331 SHS-6	AQUEOUS	01/23/91
04	9101231433 SHS-10	AQUEOUS	01/23/91
05	TRIP BLANK	AQUEOUS	01/23/91

----- TOTALS -----

MATRIX	# SAMPLES
-----	-----
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : 9101231045 GBR-31
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	90
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	2.1
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.5
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.4
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

DIBROMOCHLOROMETHANE (%)	99
DIBROMOFLUOROBENZENE (%)	91



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : 9101231222 SHS-3
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	101
BROMOFLUOROBENZENE (%)	97



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178803

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : 9101231331 SHS-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	83



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178804

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : 9101231433 SHS-10
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/09/91
UNITS : UG/L
DILUTION FACTOR : 5

COMPOUNDS	RESULTS
BENZENE	<2.5
BROMODICHLOROMETHANE	<1.0
BROMOFORM	<1.0
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<1.0
CHLOROBENZENE	<2.5
CHLOROETHANE	<1.0
CHLOROFORM	<1.0
CHLOROMETHANE	<1.0
DIBROMOCHLOROMETHANE	<1.0
2-CHLOROETHYL VINYL ETHER	<2.5
1,3-DICHLOROBENZENE	<2.5
1,2 & 1,4-DICHLOROBENZENE	<2.5
DICHLORODIFLUOROMETHANE	<1.0
1,1-DICHLOROETHANE	<1.0
1,2-DICHLOROETHANE	<1.0
1,1-DICHLOROETHENE	<1.0
1,2-DICHLOROETHENE (TOTAL)	<1.0
1,2-DICHLOROPROPANE	<1.0
CIS-1,3-DICHLOROPROPENE	<1.0
TRANS-1,3-DICHLOROPROPENE	<1.0
ETHYLBENZENE	106
METHYLENE CHLORIDE	<10.0
1,1,2,2-TETRACHLOROETHANE	<1.0
TETRACHLOROETHENE	<1.0
TOLUENE	4
1,1,1-TRICHLOROETHANE	<1.0
1,1,2-TRICHLOROETHANE	<1.0
TRICHLOROETHENE	<1.0
TRICHLOROFLUOROMETHANE	<2.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	<2.5
TRICHLOROTRIFLUOROETHANE	<10.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	103
BROMOFLUOROBENZENE (%)	119



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10178805

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : TRIP BLANK
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	89
BROMOFLUOROBENZENE (%)	84



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101788
PROJECT #	: 9834	DATE EXTRACTED	: 02/05/91
PROJECT NAME	: REFIN REMED	DATE ANALYZED	: 02/05/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	2.2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	112



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101788
DATE EXTRACTED : 02/09/91
DATE ANALYZED : 02/09/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	84
BROMOFLUOROBENZENE (%)	84



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D.

: 101788

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON

PROJECT # : 9834

PROJECT NAME : REFIN REMED

REF I.D. : 10299903

DATE ANALYZED : 02/09/91

SAMPLE MATRIX : AQUEOUS

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	DUP.		RPD
	RESULT	SPIKED		% SPIKED REC.	% SPIKED REC.	
1,1-DICHLOROETHENE	<0.2	20	20	100	20	0
TRICHLOROETHENE	<0.2	20	21	105	18	15
TETRACHLOROETHENE	<0.2	20	19	95	16	17
BENZENE	<0.5	20	19	95	17	11
BROMODICHLOROMETHANE	<0.2	20	20	100	19	5
CHLOROFORM	<0.2	20	20	100	20	0
1,1,1-TRICHLOROETHANE	<0.2	20	20	100	19	5
TOLUENE	<0.5	20	18	90	16	12
CHLOROBENZENE	<0.5	20	20	100	19	5
M-XYLENE	<0.5	20	19	95	16	17

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GCMS - RESULTS

ATI I.D. : 10178801

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : 9101231045 GBR-31
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/23/91
DATE RECEIVED : 01/24/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101788
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101788

TEST : POLYNUCLEAR AROMATICS (EPA 610)

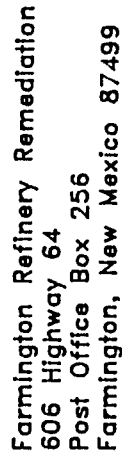
CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMED
REF I.D. : 10299904

DATE ANALYZED : 02/05/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED RESULT	SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED				SPIKED SAMPLE	% REC.	
ACENAPHTHYLENE	<0.30	150	101	67	96	64		5
PYRENE	<0.04	20	14.6	73	14.5	73		1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Date: 1-23-91 Page 1 of 1

LABORATORY ATTITUDE

ADDRESS 2113 S 48th St
Tempe Az

TELEPHONE (602) 438-1530

SAMPLER'S SIGNATURE

Jeany Overman

SAMPLE NUMBER	MATRIX	LOCATION
9101231045	Water	GRR-31
9101231222	Water	SHS-3
9101231331	Water	SHS-6
9101231433	Water	SHS-10
Trip Blank		

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: (Signature)		RELINQUISHED BY: (Signature)	
PROJECT: Refinery		TOTAL NO. OF CONTAINERS		(Printed Name)		(Printed Name)	
Remediation 9834		CHAIN OF CUSTODY SEALS		(Company)		(Company)	
PROJECT MANAGER:		REC'D GOOD CONDITION/COLD		DATE AND TIME:		DATE AND TIME:	
Tim Kinney		CONFORMS TO RECORD		RECEIVED BY: (Signature)		RECEIVED BY: (Signature)	
SHIPPING I.D. NO.		LABORATORY NUMBER:		(Printed Name)		(Printed Name)	
9578355625		101788		(Company)		(Company)	
SHIPPED VIA		SPECIAL INSTRUCTIONS OR COMMENTS		DATE AND TIME:		DATE AND TIME:	
Fed Express		Please Return Original Coc		1-23-91 15:35		1-24-91 9:40	
				Linda Estelmen		Linda Estelmen	
				(Company)		(Company)	
				DATE AND TIME:		DATE AND TIME:	
				1-24-91 9:40		1-24-91 9:40	



Analytical**Technologies**, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101817

February 19, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 01/25/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 601/602 analyses were performed by ATI, Seattle. Method 610 analyses were performed by ATI, Fort Collins.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
ATI I.D. : 101817

DATE RECEIVED : 01/25/91

REPORT DATE : 02/18/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9101241223 SHS-12	AQUEOUS	01/24/91
02	9101241300 SHS-13	AQUEOUS	01/24/91
03	9101241450 GRW-4	AQUEOUS	01/24/91
04	9101241504 GRW-6	AQUEOUS	01/24/91
05	9101241515 GRW-77	AQUEOUS	01/24/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 01/24/91
PROJECT #	: 9834	DATE RECEIVED	: 01/25/91
PROJECT NAME	: REFINERY REM	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9101241223 SHS-12	DATE ANALYZED	: 02/07/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.80
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	0.41 *
1,2-DICHLOROETHANE	0.39
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	4.7 *
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.3
TOLUENE	1.9
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	0.74
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	78
BROMOFLUOROBENZENE (%)	84

* 1,1-DICHLOROETHANE AND 1,2-DICHLOROETHANE (TOTAL) WERE TAKEN FROM A GC RUN ON 02/08/91, ONE DAY PAST HOLDING TIME.



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181702

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101241300 SHS-13
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
DATE RECEIVED : 01/25/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	0.96 *
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	0.96 *
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.0
1,2-DICHLOROETHANE	3.8
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.95
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	76
BROMOFLUOROBENZENE (%)	99

* BROMOMETHANE AND CHLOROETHANE COELUTE. BECAUSE OF THIS BOTH COMPOUNDS ARE REPORTED.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181703

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101241450 GRW-4 (GPR-43)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
DATE RECEIVED : 01/25/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 100

COMPOUNDS

RESULTS

BENZENE	600
BROMODICHLOROMETHANE	<20
BROMOFORM	<20
BROMOMETHANE	<20
CARBON TETRACHLORIDE	<20
CHLOROBENZENE	<50
CHLOROETHANE	<20
CHLOROFORM	<20
CHLOROMETHANE	<20
DIBROMOCHLOROMETHANE	<20
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<50
1,2 & 1,4-DICHLOROBENZENE	<50
DICHLORODIFLUOROMETHANE	<20
1,1-DICHLOROETHANE	<20
1,2-DICHLOROETHANE	<20
1,1-DICHLOROETHENE	<20
1,2-DICHLOROETHENE (TOTAL)	<20
1,2-DICHLOROPROPANE	<20
CIS-1,3-DICHLOROPROPENE	<20
TRANS-1,3-DICHLOROPROPENE	<20
ETHYLBENZENE	150
METHYLENE CHLORIDE	<200
1,1,2,2-TETRACHLOROETHANE	<20
TETRACHLOROETHENE	<20
TOLUENE	<50
1,1,1-TRICHLOROETHANE	<20
1,1,2-TRICHLOROETHANE	<20
TRICHLOROETHENE	<20
TRICHLOROFLUOROMETHANE	<50
VINYL CHLORIDE	<20
TOTAL XYLENES	<50
TRICHLOROTRIFLUOROETHANE	<200

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	106



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181704

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101241504 GRW-6 (GBR-44)
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
DATE RECEIVED : 01/25/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	93 D
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	3.5
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	0.60
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	1.7
1,2-DICHLOROETHANE	4.8
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	9.0
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	24
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	1.6
TOLUENE	0.79
1,1,1-TRICHLOROETHANE	0.27
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	2.0
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	110



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10181705

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101241515 GRW-77
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
DATE RECEIVED : 01/25/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/07/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	0.91
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	80
BROMOFLUOROBENZENE (%)	104



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101817
PROJECT #	: 9834	DATE EXTRACTED	: 02/07/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 02/07/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	107



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101817
PROJECT #	: 9834	DATE EXTRACTED	: 02/07/91
PROJECT NAME	: REFINERY REM	DATE ANALYZED	: 02/07/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLORO BENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	NA
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	77
BROMOFLUOROBENZENE (%)	103



QUALITY CONTROL DATA

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602) ATI I.D. : 101817

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
REF I.D. : 10299911

DATE ANALYZED : 02/07/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SPIKED SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.20	2.0	1.7	85	1.8	90	6
TRICHLOROETHENE	0.74	2.0	2.6	95	2.5	90	5
TETRACHLOROETHENE	1.4	2.0	3.3	95	3.2	90	5
BENZENE	<0.50	2.0	1.8	90	1.8	90	0
BROMODICHLOROMETHANE	<0.20	2.0	2.3	115	1.9	95	19
CHLOROFORM	0.80	2.6	1.8	90	2.6	90	0
1,1,1-TRICHLOROETHANE	<0.20	2.0	1.8	90	1.9	95	5
TOLUENE	1.9	2.0	2.5	30	*2.4	25 *	4
CHLOROBENZENE	<0.50	2.0	1.9	95	1.9	95	0
M-XYLENE	NA	NA	NA	NA	NA	NA	NA

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

* Result out of limits due to sample matrix interference



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101817

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
REF I.D. : 10299912

DATE ANALYZED : 02/07/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SPIKED SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.20	1.7	2.0	85	NA	NA	NA
TRICHLOROETHENE	<0.20	1.7	2.0	85	NA	NA	NA
TETRACHLOROETHENE	<0.20	1.8	2.0	90	NA	NA	NA
BENZENE	<0.50	3.5	4.0	88	NA	NA	NA
BROMODICHLOROMETHANE	<0.20	1.9	2.0	95	NA	NA	NA
CHLOROFORM	<0.20	1.9	2.0	95	NA	NA	NA
1,1,1-TRICHLOROETHANE	<0.20	2.0	2.0	100	NA	NA	NA
TOLUENE	<0.50	3.5	4.0	88	NA	NA	NA
CHLOROBENZENE	<0.50	3.6	4.0	90	NA	NA	NA
M-XYLENE	NA	NA	NA	NA	NA	NA	NA

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GCMS - RESULTS

ATI I.D. : 10181703

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101241450 GRW-4
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
DATE RECEIVED : 01/25/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 25

COMPOUNDS

RESULTS

NAPHTHALENE	12
ACENAPHTHYLENE	<8
ACENAPHTHENE	<13
FLUORENE	8.8
PHENANTHRENE	18
ANTHRACENE	0.8
FLUORANTHENE	9.4
PYRENE	<1.0
BENZO(A)ANTHRACENE	7.2
CHRYSENE	5.6
BENZO(B)FLUORANTHENE	<0.25
BENZO(K)FLUORANTHENE	<0.25
BENZO(A)PYRENE	<0.25
DIBENZ(a,h)ANTHRACENE	<2.5
BENZO(g,h,i)PERYLENE	<1.0
INDENO(1,2,3-CD)PYRENE	<0.75

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

ATI I.D. : 10181704

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : 9101241504 GRW-6
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/24/91
DATE RECEIVED : 01/25/91
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.14
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101817
DATE EXTRACTED : 01/29/91
DATE ANALYZED : 02/05/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101817

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFINERY REM
REF I.D. : 10299904

DATE ANALYZED : 02/05/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SPIKED SAMPLE	% REC.	
ACENAPHTHYLENE	<0.30	150	101	67	96	64	5
PYRENE	<0.04	20	14.6	73	14.5	73	1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Analytical**Technologies**, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 101770

February 25, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 01/23/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Method 610 analyses were performed by ATI, Ft. Collins. This report is being reissued to add your sample locations to the sample I.D.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

M. Barry for

Elizabeth Proffitt
Project Manager

RVW:dkm
Enclosure

Robert V. Woods

Robert V. Woods
Laboratory Manager



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
ATI I.D. : 101770

DATE RECEIVED : 01/23/91

REPORT DATE : 02/25/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9101221045 GBR-17	AQUEOUS	01/22/91
02	9101221225 GBR-15	AQUEOUS	01/22/91
03	9101221342 GBR-30	AQUEOUS	01/22/91
04	9101221450 GBR-24D	AQUEOUS	01/22/91
05	TRIP BLANK	AQUEOUS	01/19/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact sample control department before the scheduled disposal date.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : 9101221045 GBR-17
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/04/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	0.9
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	114
BROMOFLUOROBENZENE (%)	97



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177002

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : 9101221225 GBR-15
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/04/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	59.4
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	21.4
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	0.8
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	110
BROMOFLUOROBENZENE (%)	96



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177003

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 01/22/91
PROJECT #	: 9834	DATE RECEIVED	: 01/23/91
PROJECT NAME	: REFIN REMEDI	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9101221342 GBR-30	DATE ANALYZED	: 02/05/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	25.9
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	5.7
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	39.9
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	82

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177004

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 01/22/91
PROJECT #	: 9834	DATE RECEIVED	: 01/23/91
PROJECT NAME	: REFIN REMEDI	DATE EXTRACTED	: N/A
CLIENT I.D.	: 9101221450 GBR-24D	DATE ANALYZED	: 02/05/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	16.6
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	23.9
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	9.1
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	2.4
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	15.9
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	96
BROMOFLUOROBENZENE (%)	80



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10177005

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : TRIP BLANK
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/19/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/04/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	107
BROMOFLUOROBENZENE (%)	82



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101770
PROJECT #	: 9834	DATE EXTRACTED	: 02/04/91
PROJECT NAME	: REFIN REMEDI	DATE ANALYZED	: 02/04/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	8.9
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	93



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 101770
PROJECT #	: 9834	DATE EXTRACTED	: 02/05/91
PROJECT NAME	: REFIN REMEDI	DATE ANALYZED	: 02/05/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	105
BROMOFLUOROBENZENE (%)	87



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101770

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
REF I.D. : 10299907

DATE ANALYZED : 02/04/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	DUP.		RPD
	RESULT	SPIKED	% REC.	SPIKED SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.2	20	23	115	22	4
TRICHLOROETHENE	<0.2	20	24	120	21	13
TETRACHLOROETHENE	<0.2	20	24	120	24	0
BENZENE	<0.5	20	21	105	21	0
BROMODICHLOROMETHANE	<0.2	20	24	120	23	4
CHLOROFORM	<0.2	20	22	110	22	0
1,1,1-TRICHLOROETHANE	<0.2	20	23	115	22	4
TOLUENE	<0.5	20	20	100	19	5
CHLOROBENZENE	<0.5	20	21	105	21	0
M-XYLENE	<0.5	20	20	100	19	5

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GCMS - RESULTS

ATI I.D. : 10177001

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : 9101221045 GBR-17
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : 01/24/91
DATE ANALYZED : 02/01/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDSRESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

ATI I.D. : 10177003

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : 9101221342 GBR-30
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : 01/24/91
DATE ANALYZED : 02/01/91
UNITS : UG/L
DILUTION FACTOR : 20

COMPOUNDS

RESULTS

NAPHTHALENE	<6
ACENAPHTHYLENE	<6
ACENAPHTHENE	<10
FLUORENE	4
PHENANTHRENE	5
ANTHRACENE	<0.2
FLUORANTHENE	18
PYRENE	<0.8
BENZO(A)ANTHRENE	<0.2
CHRYSENE	<0.4
BENZO(B)FLUORANTHENE	<0.2
BENZO(K)FLUORANTHENE	<0.2
BENZO(A)PYRENE	<0.2
DIBENZ(a,h)ANTHRACENE	<2
BENZO(g,h,i)PERYLENE	<0.8
INDENO(1,2,3-CD)PYRENE	<0.6

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



GCMS - RESULTS

ATI I.D. : 10177004

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : 9101221450 GBR-24D
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 01/22/91
DATE RECEIVED : 01/23/91
DATE EXTRACTED : 01/24/91
DATE ANALYZED : 02/01/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	1.7
PHENANTHRENE	0.8
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA

GCMS - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 101770
DATE EXTRACTED : 01/24/91
DATE ANALYZED : 02/01/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
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NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)

NA



Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 101770

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMEDI
REF I.D. : 10299903

DATE ANALYZED : 02/01/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SPIKED SAMPLE	% REC.	
ACENAPHTHYLENE	<0.30	150	123	82	118	79	3
PYRENE	<0.04	20	19	95	19	95	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GIANT

Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

CHAIN OF CUSTODY

Date: 1-22-91 Page 1 of 1

REQUESTED ANALYSIS

LABORATORY ATI

ADDRESS

2113 S 48th St

Tempe AZ

TELEPHONE

(602) 438-1530

SAMPLER'S SIGNATURE

Jenny Overman

SAMPLE NUMBER

MATRIX

LOCATION

POLYNUCLEAR AROMATICS 610/8310

HALOGENATED VOLATILES 601/8010

AROMATIC VOLATILES 602/8020

GENERAL WATER CHEMISTRY

NUMBER OF CONTAINERS

9101221045 Water GBR-17

✓

✓

✓

3

9101221225 Water GBR-15

✓

✓

✓

2

9101221342 Water GBR-30

✓

✓

✓

3

9101221450 Water GBR-24D

✓

✓

✓

3

Trip Blank Water 1-19-91

✓

✓

✓

1

PROJECT INFORMATION

SAMPLE RECEIPT

PROJECT: Refinery

TOTAL NO. OF CONTAINERS

12

PROJECT MANAGER: Remediation 9834

CHAIN OF CUSTODY SEALS

Y

PROJECT MANAGER: Tim Kinney

RECD GOOD CONDITION/COLD

Y

SHIPPING I.D. NO. 9578355640

CONFORMS TO RECORD

Y

SHIPPED VIA Fed Express

LABORATORY NUMBER: 101770

SPECIAL INSTRUCTIONS OR COMMENTS

Please Return Original CoC

RELINQUISHED BY: (Signature) 1. Jenny Overman

RELINQUISHED BY: (Signature) 2. Jenny Overman

RELINQUISHED BY: (Signature) 3. Linda Estelsson

(Printed Name) Jenny Overman

(Printed Name) Jenny Overman

(Printed Name) Linda Estelsson

(Company) Giant Refinery

(Company) Giant Refinery

(Company) ATI-Temps

DATE AND TIME: 1-22-91

DATE AND TIME: 15:25

DATE AND TIME: 1/23/91

RECEIVED BY: (Signature) 1. ATI-Temps

RECEIVED BY: (Signature) 2. ATI-Temps

RECEIVED BY: (Signature) 3. ATI-Temps

(Printed Name)

(Printed Name)

(Printed Name)

DATE AND TIME:

DATE AND TIME:

DATE AND TIME:

1004



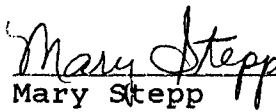
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101221045
SITE: GBR-17
LAB NO: F5644

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.64
Lab conductivity, umhos/cm.....	2900
Lab resistivity, ohm-m.....	3.45
Total dissolved solids (180), mg/l..	2240
Total dissolved solids (calc), mg/l.	2170
Total alkalinity as CaCO ₃ , mg/l.....	197
Total hardness as CaCO ₃ , mg/l.....	1040
Sodium absorption ratio.....	4.13

	mg/l	meq/l
Bicarbonate as HCO ₃	240	3.93
Carbonate as CO ₃	0	0
Chloride.....	100	2.82
Sulfate.....	1280	26.6
Calcium.....	287	14.3
Magnesium.....	78.1	6.42
Potassium.....	0.52	0.01
Sodium.....	306	13.3
Major cations.....		34
Major anions.....		33.4
Cation/anion difference.....		0.96 %



Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101221225
SITE: GBR-15
LAB NO: F5645

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.58
Lab conductivity, umhos/cm.....	5050
Lab resistivity, ohm-m.....	1.98
Total dissolved solids (180), mg/l..	3760
Total dissolved solids (calc), mg/l.	3730
Total alkalinity as CaCO ₃ , mg/l.....	248
Total hardness as CaCO ₃ , mg/l.....	1200
Sodium absorption ratio.....	9.17

	mg/l	meq/l
Bicarbonate as HCO ₃	303	4.96
Carbonate as CO ₃	0	0
Chloride.....	482	13.6
Sulfate.....	1890	39.4
Calcium.....	445	22.2
Magnesium.....	21.8	1.79
Potassium.....	6.92	0.18
Sodium.....	731	31.8
Major cations.....		56
Major anions.....		57.9
Cation/anion difference.....		1.7 %

Mary Stepp

Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101221450
SITE: GBR-24-D
LAB NO: F5646

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.84
Lab conductivity, umhos/cm.....	5070
Lab resistivity, ohm-m.....	1.97
Total dissolved solids (180), mg/l..	3800
Total dissolved solids (calc), mg/l.	3630
Total alkalinity as CaCO ₃ , mg/l.....	231
Total hardness as CaCO ₃ , mg/l.....	1820
Sodium absorption ratio.....	4.92

	mg/l	meq/l
Bicarbonate as HCO ₃	282	4.62
Carbonate as CO ₃	0	0
Chloride.....	702	19.8
Sulfate.....	1650	34.4
Calcium.....	527	26.3
Magnesium.....	123	10.1
Potassium.....	4.98	0.13
Sodium.....	482	21
Major cations.....		57.5
Major anions.....		58.8
Cation/anion difference.....		1.1 %

Mary Stepp

Mary Stepp
Lab Director



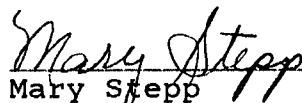
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101221342
SITE: GBR-30
LAB NO: F5647

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.43
Lab conductivity, umhos/cm.....	4400
Lab resistivity, ohm-m.....	2.27
Total dissolved solids (180), mg/l..	3070
Total dissolved solids (calc), mg/l.	2960
Total alkalinity as CaCO ₃ , mg/l.....	385
Total hardness as CaCO ₃ , mg/l.....	1150
Sodium absorption ratio.....	7.24

	mg/l	meq/l
Bicarbonate as HCO ₃	470	7.7
Carbonate as CO ₃	0	0
Chloride.....	545	15.4
Sulfate.....	1220	25.3
Calcium.....	318	15.8
Magnesium.....	87.6	7.2
Potassium.....	2.16	0.06
Sodium.....	565	24.6
Major cations.....		47.7
Major anions.....		48.4
Cation/anion difference.....		0.76 %


Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101221045
SITE: GBR-17 L/S
LAB NO: F5648

DATE REPORTED: 01/28/91
DATE RECEIVED: 01/22/91
DATE COLLECTED: 01/22/91

Lab pH (s.u.).....	7.74
Lab conductivity, umhos/cm.....	2890
Lab resistivity, ohm-m.....	3.46
Total dissolved solids (180), mg/l..	2240
Total dissolved solids (calc), mg/l.	2190
Total alkalinity as CaCO ₃ , mg/l.....	197
Total hardness as CaCO ₃ , mg/l.....	1020
Sodium absorption ratio.....	4.09

	mg/l	meq/l
Bicarbonate as HCO ₃	240	3.93
Carbonate as CO ₃	0	0
Chloride.....	105	2.96
Sulfate.....	1290	26.9
Calcium.....	341	17
Magnesium.....	40.5	3.33
Potassium.....	0.48	0.01
Sodium.....	300	13
Major cations.....		33.4
Major anions.....		33.8
Cation/anion difference.....		0.58 %

Mary Stepp

Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101231045
SITE: GBR-31
LAB NO: F5659

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/23/91
DATE COLLECTED: 01/23/91

Lab pH (s.u.).....	8.03
Lab conductivity, umhos/cm.....	4950
Lab resistivity, ohm-m.....	2.02
Total dissolved solids (180), mg/l..	3620
Total dissolved solids (calc), mg/l.	3170
Total alkalinity as CaCO ₃ , mg/l.....	231
Total hardness as CaCO ₃ , mg/l.....	1260
Sodium absorption ratio.....	7.59

	mg/l	meq/l
Bicarbonate as HCO ₃	282	4.62
Carbonate as CO ₃	0	0
Chloride.....	704	19.9
Sulfate.....	1260	26.3
Calcium.....	349	17.4
Magnesium.....	94.7	7.78
Potassium.....	2.3	0.06
Sodium.....	619	26.9
Major cations.....		52.2
Major anions.....		50.8
Cation/anion difference.....		1.35 %



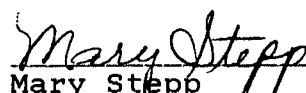
Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101231222
SITE: SHS-3
LAB NO: F5660

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/23/91
DATE COLLECTED: 01/23/91

Lab pH (s.u.).....	7.91
Lab conductivity, umhos/cm.....	4550
Lab resistivity, ohm-m.....	2.2
Total dissolved solids (180), mg/l..	3870
Total dissolved solids (calc), mg/l.	3690
Total alkalinity as CaCO ₃ , mg/l.....	248
Total hardness as CaCO ₃ , mg/l.....	1730
Sodium absorption ratio.....	5.05

	mg/l	meq/l
Bicarbonate as HCO ₃	303	4.96
Carbonate as CO ₃	0	0
Chloride.....	254	7.16
Sulfate.....	2200	45.8
Calcium.....	445	22.2
Magnesium.....	151	12.4
Potassium.....	7.32	0.19
Sodium.....	483	21
Major cations.....		55.9
Major anions.....		57.9
Cation/anion difference.....		1.78 %



Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101231331
SITE: SHS-6
LAB NO: F5661

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/23/91
DATE COLLECTED: 01/23/91

Lab pH (s.u.).....	7.94
Lab conductivity, umhos/cm.....	3190
Lab resistivity, ohm-m.....	3.14
Total dissolved solids (180), mg/l..	2580
Total dissolved solids (calc), mg/l.	2460
Total alkalinity as CaCO ₃ , mg/l.....	316
Total hardness as CaCO ₃ , mg/l.....	1170
Sodium absorption ratio.....	4.23

	mg/l	meq/l
Bicarbonate as HCO ₃	386	6.33
Carbonate as CO ₃	0	0
Chloride.....	120	3.38
Sulfate.....	1420	29.6
Calcium.....	263	13.1
Magnesium.....	125	10.3
Potassium.....	6.78	0.17
Sodium.....	333	14.5
Major cations.....		38.1
Major anions.....		39.4
Cation/anion difference.....		1.64 %

Mary Stepp

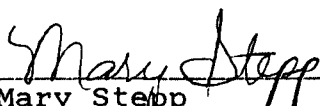
Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101231433
SITE: SHS-10
LAB NO: F5662

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/23/91
DATE COLLECTED: 01/23/91

Lab pH (s.u.).....	8.14
Lab conductivity, umhos/cm.....	1980
Lab resistivity, ohm-m.....	5.06
Total dissolved solids (180), mg/l..	1370
Total dissolved solids (calc), mg/l.	1350
Total alkalinity as CaCO ₃ , mg/l.....	299
Total hardness as CaCO ₃ , mg/l.....	494
Sodium absorption ratio.....	5.06

	mg/l	meq/l
Bicarbonate as HCO ₃	365	5.99
Carbonate as CO ₃	0	0
Chloride.....	80	2.26
Sulfate.....	645	13.4
Calcium.....	149	7.44
Magnesium.....	29.6	2.44
Potassium.....	8.34	0.21
Sodium.....	259	11.2
Major cations.....		21.3
Major anions.....		21.7
Cation/anion difference.....		0.8 %



Mary Stepp
Lab Director



Inter-Mountain
Laboratories, Inc.

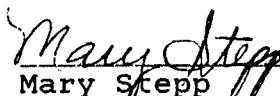
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: N/A
SITE: SHS-12
LAB NO: F5669

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/24/91
DATE COLLECTED: 01/24/91

Lab pH (s.u.).....	8.07
Lab conductivity, umhos/cm.....	3800
Lab resistivity, ohm-m.....	2.63
Total dissolved solids (180), mg/l..	2780
Total dissolved solids (calc), mg/l.	2670
Total alkalinity as CaCO ₃ , mg/l.....	333
Total hardness as CaCO ₃ , mg/l.....	1070
Sodium absorption ratio.....	6.36

	mg/l	meq/l
Bicarbonate as HCO ₃	407	6.67
Carbonate as CO ₃	0	0
Chloride.....	368	10.4
Sulfate.....	1260	26.3
Calcium.....	248	12.4
Magnesium.....	109	8.94
Potassium.....	3.16	0.08
Sodium.....	477	20.7
Major cations.....		42.1
Major anions.....		43.4
Cation/anion difference.....		1.46 %

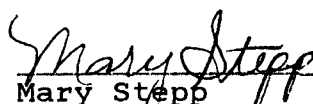

Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101241300
SITE: SHS-13
LAB NO: F5670

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/24/91
DATE COLLECTED: 01/24/91

Lab pH (s.u.).....	7.96
Lab conductivity, umhos/cm.....	3190
Lab resistivity, ohm-m.....	3.14
Total dissolved solids (180), mg/l..	1970
Total dissolved solids (calc), mg/l.	1850
Total alkalinity as CaCO ₃ , mg/l.....	710
Total hardness as CaCO ₃ , mg/l.....	571
Sodium absorption ratio.....	8.69

	mg/l	meq/l
Bicarbonate as HCO ₃	866	14.2
Carbonate as CO ₃	0	0
Chloride.....	434	12.2
Sulfate.....	293	6.11
Calcium.....	190	9.47
Magnesium.....	23.8	1.96
Potassium.....	3.58	0.09
Sodium.....	478	20.8
Major cations.....		32.3
Major anions.....		32.5
Cation/anion difference.....		0.39 %



Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101241450
SITE: GRW-4
LAB NO: F5671

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/24/91
DATE COLLECTED: 01/24/91

Lab pH (s.u.).....	8.05
Lab conductivity, umhos/cm.....	4360
Lab resistivity, ohm-m.....	2.3
Total dissolved solids (180), mg/l..	3100
Total dissolved solids (calc), mg/l.	3050
Total alkalinity as CaCO ₃ , mg/l.....	752
Total hardness as CaCO ₃ , mg/l.....	1100
Sodium absorption ratio.....	8.22

	mg/l	meq/l
Bicarbonate as HCO ₃	915	15
Carbonate as CO ₃	0	0
Chloride.....	434	12.2
Sulfate.....	1100	22.9
Calcium.....	411	20.5
Magnesium.....	19.4	1.59
Potassium.....	2.04	0.05
Sodium.....	628	27.3
Major cations.....		49.4
Major anions.....		50.2
Cation/anion difference.....		0.77 %

Mary Stepp

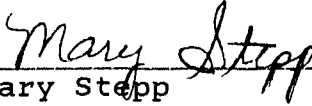
Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101241504
SITE: GRW-6
LAB NO: F5672

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/24/91
DATE COLLECTED: 01/24/91

Lab pH (s.u.).....	7.97
Lab conductivity, umhos/cm.....	5040
Lab resistivity, ohm-m.....	1.99
Total dissolved solids (180), mg/l..	3520
Total dissolved solids (calc), mg/l.	3480
Total alkalinity as CaCO ₃ , mg/l.....	795
Total hardness as CaCO ₃ , mg/l.....	1220
Sodium absorption ratio.....	9.31

	mg/l	meq/l
Bicarbonate as HCO ₃	970	15.9
Carbonate as CO ₃	0	0
Chloride.....	648	18.3
Sulfate.....	1140	23.8
Calcium.....	418	20.9
Magnesium.....	42.9	3.53
Potassium.....	2.08	0.05
Sodium.....	748	32.5
Major cations.....		57
Major anions.....		58
Cation/anion difference.....		0.85 %



Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101250926
SITE: GRW-3
LAB NO: F5678

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/25/91
DATE COLLECTED: 01/25/91

Lab pH (s.u.).....	7.93
Lab conductivity, umhos/cm.....	4300
Lab resistivity, ohm-m.....	2.32
Total dissolved solids (180), mg/l..	3170
Total dissolved solids (calc), mg/l.	3200
Total alkalinity as CaCO ₃ , mg/l.....	581
Total hardness as CaCO ₃ , mg/l.....	1050
Sodium absorption ratio.....	8.72

	mg/l	meq/l
Bicarbonate as HCO ₃	708	11.6
Carbonate as CO ₃	0	0
Chloride.....	245	6.91
Sulfate.....	1550	32.4
Calcium.....	380	18.9
Magnesium.....	24	1.98
Potassium.....	3.84	0.1
Sodium.....	648	28.2
Major cations.....		49.2
Major anions.....		50.9
Cation/anion difference.....		1.7 %



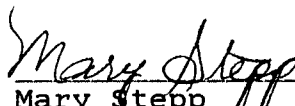
Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101250940
SITE: GRW-13
LAB NO: F5679

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/25/91
DATE COLLECTED: 01/25/91

Lab pH (s.u.).....	7.82
Lab conductivity, umhos/cm.....	4990
Lab resistivity, ohm-m.....	2
Total dissolved solids (180), mg/l..	3680
Total dissolved solids (calc), mg/l.	3420
Total alkalinity as CaCO ₃ , mg/l.....	368
Total hardness as CaCO ₃ , mg/l.....	1310
Sodium absorption ratio.....	7.72

	mg/l	meq/l
Bicarbonate as HCO ₃	448	7.35
Carbonate as CO ₃	0	0
Chloride.....	694	19.6
Sulfate.....	1390	29
Calcium.....	391	19.5
Magnesium.....	80.6	6.63
Potassium.....	4.14	0.11
Sodium.....	642	27.9
Major cations.....		54.2
Major anions.....		55.9
Cation/anion difference.....		1.55 %



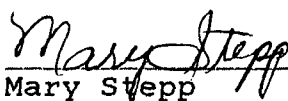
Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101251332
SITE: SHS-15
LAB NO: F5680

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/25/91
DATE COLLECTED: 01/25/91

Lab pH (s.u.).....	8.14
Lab conductivity, umhos/cm.....	2860
Lab resistivity, ohm-m.....	3.5
Total dissolved solids (180), mg/l..	1630
Total dissolved solids (calc), mg/l.	1620
Total alkalinity as CaCO ₃ , mg/l.....	257
Total hardness as CaCO ₃ , mg/l.....	872
Sodium absorption ratio.....	2.45

	mg/l	meq/l
Bicarbonate as HCO ₃	313	5.13
Carbonate as CO ₃	0	0
Chloride.....	56.2	1.58
Sulfate.....	901	18.8
Calcium.....	310	15.5
Magnesium.....	24	1.97
Potassium.....	3.96	0.1
Sodium.....	167	7.25
Major cations.....		24.8
Major anions.....		25.5
Cation/anion difference.....		1.39 %



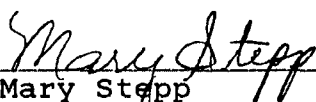
Mary Stepp
Lab Director

CLIENT: Giant Refinery
ID: 9101251528
SITE: SHS-16
LAB NO: F5681

DATE REPORTED: 01/31/91
DATE RECEIVED: 01/25/91
DATE COLLECTED: 01/25/91

Lab pH (s.u.).....	8.04
Lab conductivity, umhos/cm.....	2170
Lab resistivity, ohm-m.....	4.61
Total dissolved solids (180), mg/l..	2350
Total dissolved solids (calc), mg/l.	2270
Total alkalinity as CaCO ₃ , mg/l.....	299
Total hardness as CaCO ₃ , mg/l.....	1260
Sodium absorption ratio.....	2.7

	mg/l	meq/l
Bicarbonate as HCO ₃	365	5.99
Carbonate as CO ₃	0	0
Chloride.....	56.2	1.58
Sulfate.....	1360	28.4
Calcium.....	364	18.2
Magnesium.....	85.3	7.01
Potassium.....	2.72	0.07
Sodium.....	220	9.57
Major cations.....		34.8
Major anions.....		36
Cation/anion difference.....		1.63 %



Mary Stepp
Lab Director



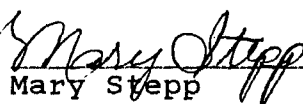
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101291050
SITE: Tank 27
LAB NO: F5691

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	7.88
Lab conductivity, umhos/cm.....	5290
Lab resistivity, ohm-m.....	1.89
Total dissolved solids (180), mg/l..	3620
Total dissolved solids (calc), mg/l.	3550
Total alkalinity as CaCO ₃ , mg/l.....	333
Total hardness as CaCO ₃ , mg/l.....	1290
Sodium absorption ratio.....	8.8

	mg/l	meq/l
Bicarbonate as HCO ₃	407	6.67
Carbonate as CO ₃	0	0
Chloride.....	832	23.5
Sulfate.....	1350	28.1
Calcium.....	329	16.4
Magnesium.....	113	9.33
Potassium.....	2.6	0.07
Sodium.....	726	31.6
Major cations.....		57.4
Major anions.....		58.2
Cation/anion difference.....		0.69 %


Mary Stepp
Lab Director



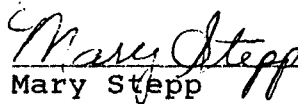
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101290925
SITE: Tank 21
LAB NO: F5690

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	7.48
Lab conductivity, umhos/cm.....	4610
Lab resistivity, ohm-m.....	2.17
Total dissolved solids (180), mg/l..	3340
Total dissolved solids (calc), mg/l.	3320
Total alkalinity as CaCO ₃ , mg/l.....	419
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	8.6

	mg/l	meq/l
Bicarbonate as HCO ₃	511	8.38
Carbonate as CO ₃	0	0
Chloride.....	465	13.1
Sulfate.....	1490	31.1
Calcium.....	356	17.8
Magnesium.....	73.5	6.04
Potassium.....	3.12	0.08
Sodium.....	683	29.7
Major cations.....		53.6
Major anions.....		52.6
Cation/anion difference.....		0.94 %


Mary Stepp
Lab Director



Inter-Mountain
Laboratories, Inc.

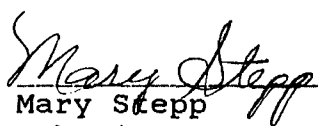
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101290822
SITE: Stripper Influent
LAB NO: F5692

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	7.54
Lab conductivity, umhos/cm.....	4740
Lab resistivity, ohm-m.....	2.11
Total dissolved solids (180), mg/l..	3390
Total dissolved solids (calc), mg/l.	3310
Total alkalinity as CaCO ₃ , mg/l.....	265
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	8.5

	mg/l	meq/l
Bicarbonate as HCO ₃	323	5.3
Carbonate as CO ₃	0	0
Chloride.....	602	17
Sulfate.....	1470	30.7
Calcium.....	275	13.7
Magnesium.....	123	10.1
Potassium.....	3.3	0.08
Sodium.....	675	29.3
Major cations.....		53.3
Major anions.....		53
Cation/anion difference.....		0.25 %


Mary Stepp
Lab Director



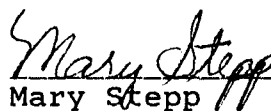
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101290830
SITE: Stripper Effluent
LAB NO: F5693

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	8.09
Lab conductivity, umhos/cm.....	4720
Lab resistivity, ohm-m.....	2.12
Total dissolved solids (180), mg/l..	3400
Total dissolved solids (calc), mg/l.	3360
Total alkalinity as CaCO ₃ , mg/l.....	239
Total hardness as CaCO ₃ , mg/l.....	1210
Sodium absorption ratio.....	8.13

	mg/l	meq/l
Bicarbonate as HCO ₃	292	4.79
Carbonate as CO ₃	0	0
Chloride.....	607	17.1
Sulfate.....	1490	31
Calcium.....	449	22.4
Magnesium.....	21.8	1.79
Potassium.....	3.05	0.08
Sodium.....	650	28.3
Major cations.....		52.6
Major anions.....		52.9
Cation/anion difference.....		0.34 %



Mary Stepp
Lab Director



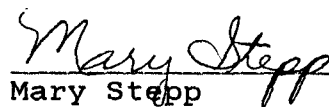
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9101290925
SITE: Tank 21 L/S
LAB NO: F5694

DATE REPORTED: 02/01/91
DATE RECEIVED: 01/29/91
DATE COLLECTED: 01/29/91

Lab pH (s.u.).....	8.07
Lab conductivity, umhos/cm.....	4620
Lab resistivity, ohm-m.....	2.16
Total dissolved solids (180), mg/l..	3310
Total dissolved solids (calc), mg/l.	3290
Total alkalinity as CaCO ₃ , mg/l.....	436
Total hardness as CaCO ₃ , mg/l.....	1180
Sodium absorption ratio.....	8.17

	mg/l	meq/l
Bicarbonate as HCO ₃	532	8.72
Carbonate as CO ₃	0	0
Chloride.....	465	13.1
Sulfate.....	1490	31
Calcium.....	364	18.2
Magnesium.....	66.4	5.46
Potassium.....	3.12	0.08
Sodium.....	645	28.1
Major cations.....		51.8
Major anions.....		52.8
Cation/anion difference.....		0.99 %



Mary Stepp
Lab Director



Analytical**Technologies**, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 103651

March 26, 1991

Giant Refining
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation

Attention: Tim Kinney

On 03/09/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Michael G. Barry
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINE REMED
ATI I.D. : 103651

DATE RECEIVED : 03/09/91

REPORT DATE : 03/27/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	910308845-STRIPPER INFLUENT	AQUEOUS	03/08/91
02	910308850-STRIPPER EFFLUENT	AQUEOUS	03/08/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10365101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	DATE SAMPLED	: 03/08/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/09/91
PROJECT NAME	: REFINE REMED	DATE EXTRACTED	: N/A
CLIENT I.D.	: 910308845-STRIPPER INFLUENT	DATE ANALYZED	: 03/20/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
BENZENE	<5.0
BROMODICHLOROMETHANE	<2.0
BROMOFORM	<2.0
BROMOMETHANE	<2.0
CARBON TETRACHLORIDE	<2.0
CHLOROBENZENE	<5.0
CHLOROETHANE	<2.0
CHLOROFORM	<2.0
CHLOROMETHANE	<2.0
DIBROMOCHLOROMETHANE	<2.0
2-CHLOROETHYL VINYL ETHER	<5.0
1,3-DICHLOROBENZENE	<5.0
1,2 & 1,4-DICHLOROBENZENE	<5.0
DICHLORODIFLUOROMETHANE	<2.0
1,1-DICHLOROETHANE	<2.0
1,2-DICHLOROETHANE	<2.0
1,1-DICHLOROETHENE	<2.0
1,2-DICHLOROETHENE (TOTAL)	<2.0
1,2-DICHLOROPROPANE	<2.0
CIS-1,3-DICHLOROPROPENE	<2.0
TRANS-1,3-DICHLOROPROPENE	<2.0
ETHYLBENZENE	<5.0
METHYLENE CHLORIDE	<20.0
1,1,2,2-TETRACHLOROETHANE	<2.0
TETRACHLOROETHENE	<2.0
TOLUENE	<5.0
1,1,1-TRICHLOROETHANE	<2.0
1,1,2-TRICHLOROETHANE	<2.0
TRICHLOROETHENE	<2.0
TRICHLOROFLUOROMETHANE	<5.0
VINYL CHLORIDE	<2.0
TOTAL XYLENES	<5.0
TRICHLOROTRIFLUOROETHANE	<20.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	115

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10365102

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : (NONE)
PROJECT NAME : REFINE REMED
CLIENT I.D. : 910308850-STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 03/08/91
DATE RECEIVED : 03/09/91
DATE EXTRACTED : N/A
DATE ANALYZED : 03/20/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	113



Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 103651
PROJECT #	: (NONE)	DATE EXTRACTED	: 03/19/91
PROJECT NAME	: REFINER REMED	DATE ANALYZED	: 03/19/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	8.4
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	93
BROMOFLUOROBENZENE (%)	91

QUALITY CONTROL DATA

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602) ATI I.D. : 103651

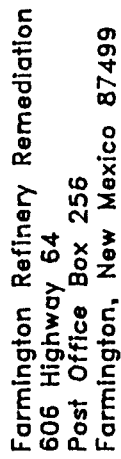
CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : (NONE)
 PROJECT NAME : REFINE REMED
 REF I.D. : 10399926

DATE ANALYZED : 03/20/91
 SAMPLE MATRIX : AQUEOUS
 UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP. SPIKED		RPD
	RESULT	SPIKED			SAMPLE	% REC.	
1,1-DICHLOROETHENE	<0.2	20	19	95	19	95	0
TRICHLOROETHENE	<0.2	20	22	110	23	115	4
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9
BENZENE	<0.5	20	19	95	19	95	0
BROMODICHLOROMETHANE	<0.2	20	24	120	24	120	0
CHLOROFORM	<0.2	20	21	105	22	110	5
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	23	115	9
TOLUENE	<0.5	20	19	95	18	90	5
CHLOROBENZENE	<0.5	20	19	95	18	90	5
M-XYLENE	<0.5	20	17	85	16	80	6

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



Date: 3-8-91 Page 1 of 1

Jean Overman

SAMPLE NUMBER	MATRIX	LOCATION
910308845	Water	Stripper in flume
910308850	Water	Stripper effluent

[illegible]

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT: Refinery	Remediation	TOTAL NO. OF CONTAINERS	4
PROJECT MANAGER:		CHAIN OF CUSTODY SEALS	Y
Tin Kinney	957835513	REC'D GOOD CONDITION/COLD	Y
SHIPPING I.D. NO.		CONFORMS TO RECORD	Y
SHIPPED VIA		LABORATORY NUMBER: 103651	
Fed Express			

SPECIAL INSTRUCTIONS OR COMMENTS

please Return Original/coc

1004

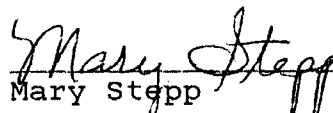


2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 9103061505
SITE: GRW-13
LAB NO: F5874

DATE REPORTED: 03/14/91
DATE RECEIVED: 03/06/91
DATE COLLECTED: 03/06/91

Lab conductivity, umhos/cm..... 4860

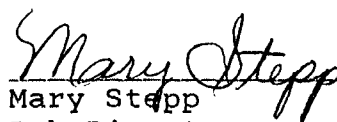

Mary Stepp
Lab Director

CLIENT: GBR
ID: 910308845
SITE: Strip influent
LAB NO: F5890

DATE REPORTED: 03/20/91
DATE RECEIVED: 03/08/91
DATE COLLECTED: 03/08/91

Lab pH (s.u.).....	7.73
Lab conductivity, umhos/cm.....	4440
Lab resistivity, ohm-m.....	2.25
Total dissolved solids (180), mg/l..	3240
Total dissolved solids (calc), mg/l.	3120
Total alkalinity as CaCO ₃ , mg/l.....	145
Total hardness as CaCO ₃ , mg/l.....	1190
Sodium absorption ratio.....	7.07

	mg/l	meq/l
Bicarbonate as HCO ₃	178	2.91
Carbonate as CO ₃	0	0
Chloride.....	528	14.9
Sulfate.....	1530	31.9
Calcium.....	298	14.9
Magnesium.....	109	8.94
Potassium.....	3.3	0.08
Sodium.....	561	24.4
Major cations.....		48.3
Major anions.....		49.7
Cation/anion difference.....		1.4 %


Mary Stepp
Lab Director



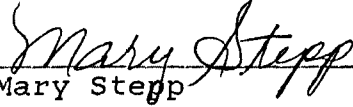
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: 910308850
SITE: Strip effluent
LAB NO: F5891

DATE REPORTED: 03/20/91
DATE RECEIVED: 03/08/91
DATE COLLECTED: 03/08/91

Lab pH (s.u.).....	7.90
Lab conductivity, umhos/cm.....	4460
Lab resistivity, ohm-m.....	2.24
Total dissolved solids (180), mg/l..	3240
Total dissolved solids (calc), mg/l.	3110
Total alkalinity as CaCO ₃ , mg/l.....	162
Total hardness as CaCO ₃ , mg/l.....	1160
Sodium absorption ratio.....	7.35

	mg/l	meq/l
Bicarbonate as HCO ₃	198	3.25
Carbonate as CO ₃	0	0
Chloride.....	528	14.9
Sulfate.....	1530	31.8
Calcium.....	229	11.4
Magnesium.....	144	11.8
Potassium.....	4.2	0.11
Sodium.....	576	25.1
Major cations.....		48.4
Major anions.....		50
Cation/anion difference.....		1.61 %


Mary Stepp
Lab Director



Analytical**Technologies**, Inc.

2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 102586

February 25, 1991

Giant Refining Company
P.O. Box 256
Farmington, NM 87499

Project Name/Number: Refinery Remediation 9834

Attention: Tim Kinney

On 02/07/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

M. Barry for

Elizabeth Proffitt
Project Manager

Jane Fott for RW

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMD
ATI I.D. : 102586

DATE RECEIVED : 02/07/91

REPORT DATE : 02/27/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	910206813 STRIPPER INFLUENT	AQUEOUS	02/06/91
02	910206821 STRIPPER EFFLUENT	AQUEOUS	02/06/91
03	9102061402 GBR-51	AQUEOUS	02/06/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10258601

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMD
CLIENT I.D. : 910206813 STRIPPER INFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 02/06/91
DATE RECEIVED : 02/07/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/13/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	91

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10258602

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMD
CLIENT I.D. : 910206821 STRIPPER EFFLUENT
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 02/06/91
DATE RECEIVED : 02/07/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/13/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	96



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10258603

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
PROJECT # : 9834
PROJECT NAME : REFIN REMD
CLIENT I.D. : 9102061402 GBR-51
SAMPLE MATRIX : AQUEOUS

DATE SAMPLED : 02/06/91
DATE RECEIVED : 02/07/91
DATE EXTRACTED : N/A
DATE ANALYZED : 02/13/91
UNITS : UG/L
DILUTION FACTOR : 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	0.4
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	2.1
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	85



REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: GIANT REFINING, FARMINGTON	ATI I.D.	: 102586
PROJECT #	: 9834	DATE EXTRACTED	: 02/13/91
PROJECT NAME	: REFIN REMD	DATE ANALYZED	: 02/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	3.2
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	88
BROMOFLUOROBENZENE (%)	93

QUALITY CONTROL DATA

ATI I.D. : 102586

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : GIANT REFINING, FARMINGTON
 PROJECT # : 9834
 PROJECT NAME : REFIN REMD
 REF I.D. : 10265102

DATE ANALYZED : 02/14/91
 SAMPLE MATRIX : AQUEOUS
 UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED RESULT	SPIKED SAMPLE	DUP. %		RPD
	RESULT	SPIKED			SPIKED SAMPLE	DUP. REC.	
1,1-DICHLOROETHENE	3.0	20	24	105	25	110	4
TRICHLOROETHENE	<0.2	20	21	105	22	110	5
TETRACHLOROETHENE	<0.2	20	23	115	22	110	4
BENZENE	<0.5	20	18	90	18	90	0
BROMODICHLOROMETHANE	<0.2	20	18	90	20	100	11
CHLOROFORM	<0.2	20	20	100	22	110	10
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	24	120	13
TOLUENE	0.9	20	19	91	18	86	5
CHLOROBENZENE	<0.5	20	22	110	21	105	5
M-XYLENE	2.2	20	22	99	22	99	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GIANT

Farmington Refinery Remediation
606 Highway 64
Post Office Box 256
Farmington, New Mexico 87499

CHAIN OF CUSTODY

Date: 2-6-91 Page 1 of 1

REQUESTED ANALYSIS

LABORATORY ATI
ADDRESS 2113 S 48 St
Tempe AZ
TELEPHONE () - -

SAMPLER'S SIGNATURE
Jenny Overman

SAMPLE NUMBER MATRIX LOCATION

POLYNUCLEAR AROMATICS 610/8310

HALOGENATED VOLATILES 601/8010

AROMATIC VOLATILES 602/8020

GENERAL WATER CHEMISTRY

NUMBER OF CONTAINERS

910206 813 Water Stillpot
910206 821 Water Stillpot
910206 1402 Water GBR-51

2

2

2

PROJECT INFORMATION

SAMPLE RECEIPT

PROJECT: Refinery

TOTAL NO. OF CONTAINERS

RELINQUISHED BY: (Signature) 1.

RELINQUISHED BY: (Signature) 2.

RELINQUISHED BY: (Signature) 3.

Remediation 9834

CHAIN OF CUSTODY SEALS

(Printed Name) Jenny Overman

(Printed Name)

(Printed Name)

PROJECT MANAGER: Tim Kinney

REC'D GOOD CONDITION/COLD

(Company) Giant Refinery

(Company)

(Company)

SHIPPING I.D. NO. 9578355441

CONFORMS TO RECORD

DATE AND TIME: 2-6-91 1450

RECEIVED BY: (Signature) 1.

RECEIVED BY: (Signature) 2.

RECEIVED BY: (Signature) 3.

SHIPPED VIA Fed Express

LABORATORY NUMBER: 102586

(Printed Name)

(Printed Name)

(Printed Name) Linda Eschelman

SPECIAL INSTRUCTIONS OR COMMENTS

Please Return Original COC

1004

20



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: 0830
SITE: Stripper Influent
LAB NO: F5725

DATE REPORTED: 02/11/91
DATE RECEIVED: 02/07/91
DATE COLLECTED: 02/06/91

Lab pH (s.u.).....	7.52
Lab conductivity, umhos/cm.....	4610
Lab resistivity, ohm-m.....	2.17
Total dissolved solids (180), mg/l..	3410
Total dissolved solids (calc), mg/l.	3270
Total alkalinity as CaCO ₃ , mg/l.....	222
Total hardness as CaCO ₃ , mg/l.....	1200
Sodium absorption ratio.....	7.76

	mg/l	meq/l
Bicarbonate as HCO ₃	271	4.45
Carbonate as CO ₃	0	0
Chloride.....	568	16
Sulfate.....	1480	30.8
Calcium.....	461	23
Magnesium.....	12.4	1.02
Potassium.....	2.95	0.08
Sodium.....	619	26.9
Major cations.....		51
Major anions.....		51.2
Cation/anion difference.....		0.21 %



Mary Stepp
Lab Director