GW - 1

WORK PLANS

2005

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
INDEPENDENT ENVIRONMENTAL ENGINEERS, SCIENTISTS & CONSULTANTS

September 9, 2005

Ms. Hope Monzeglio
State of New Mexico Environmental Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Re: Giant Bloomfield Refinery
River Terrace Bioventing System Monitoring Plan

Dear Ms. Monzeglio:

On behalf of Giant Refining Company Bloomfield (GRCB), Malcolm Pirnie, Inc. is pleased to submit to the State of New Mexico Environmental Department (NMED) the Voluntary Corrective Measures Bioventing Monitoring Plan for the River Terrace Sheet Pile Area at the Giant Bloomfield Refinery. This monitoring plan supplements the July 15, 2005 *River Terrace Voluntary Corrective Measures Work Plan* (VCM Work Plan), and includes the additional information requested by NMED in the July 28, 2005 letter to Giant Refining Company.

We are looking forward to receiving your approval of the river terrace monitoring plan. If you have any questions in this matter, please contact me at 505-632-4171.

Sincerely,

MALCOLM PIRNIE, INC.

Dennis L. Tucker

Dennis Tucker, P.E.
Senior Associate

Enclosure

Cc: Wayne Price – OCD
Denny Foust - OCD Aztec Office
Bob Wilkinson – EPA
Ed Riege - Giant
Randy Schmaltz - Giant

MALCOLM PIRNIE

BIOVENTING MONITORING PLAN
RIVER TERRACE VOLUNTARY CORRECTIVE MEASURES

GIANT BLOOMFIELD REFINERY
BLOOMFIELD, NEW MEXICO

September 2005

Prepared for
Giant Bloomfield Refinery
50 Road 4990
Bloomfield, New Mexico 87413

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1.0 INTRODUCTION

This monitoring plan describes monitoring activities developed to assess baseline conditions and provide periodic progress information of the bioventing system located within the Giant Refinery river terrace area in Bloomfield, New Mexico. The purpose of collecting baseline samples is to evaluate the current site conditions prior to remediation activities that will allow for comparison, or measure of progress, once remediation has commenced. Ongoing, or performance, monitoring provides periodic feedback of remediation performance.

2.0 BASELINE MONITORING

Baseline samples of groundwater, soil, and soil gas will be collected from specified TP wells for laboratory analysis to evaluate current site conditions prior to the start of remediation activities. Baseline analytical results will be compared with the results from final samples collected once remedial activities are completed.

Based on previous analytical results, contaminants of concern at the river terrace area are primarily benzene, toluene, ethylbenzene, and xylenes (BTEX). Gasoline range organics (GRO) and diesel range organics (DRO) are also included in the monitoring due to the nature of the fuel hydrocarbons. Methyl tert butyl ether (MTBE) will not be included in sampling due to previously reported non-detectable results. Table 1 summarizes the sampling activities included as part of baseline monitoring. A well location map of wells within the bioventing area is provided (Figure 1). Procedures for collecting baseline monitoring samples are described in Section 4.0. Procedures regarding sample handling are provided in Appendix A.

2.1 GROUNDWATER SAMPLING

Baseline groundwater samples were collected each TP well, except TP-7 since it does not yield sufficient water volumes, during the week of August 8, 2005 as part of the semi-annual sampling event at the refinery. During sample collection, field parameters (pH, temperature, conductivity, and total dissolved solids (TDS)) were recorded prior to sample collection. Table 2 includes a summary of the field parameters collected during baseline groundwater sampling. The groundwater samples were submitted to the laboratory and analyzed for the following parameters:

- Volatile Organic Compounds - BTEX by EPA Method 8021B
- Total Petroleum Hydrocarbons – Gasoline Range Organics (GRO) by EPA Modified Method 8015B
- Total Petroleum Hydrocarbons – Diesel Range Organics (DRO) by EPA Modified Method 8015B

During groundwater sampling activities, depth to water measurements are collected at each TP well and MW-49 prior to sample collection. A copy of the analytical reports is provided in Appendix C.

Additional field parameters (dissolved oxygen (DO), and oxidation-reduction potential (ORP)) will be collected prior to starting the dewatering wells from TP-1, 2, 5, 6, 8, and 9 for baseline monitoring.

2.2 SOIL SAMPLING

A total of 22 subsurface soil samples were collected from the boreholes of 13 bioventing (BV) wells during the week of August 15, 2005. Samples were collected above the water table at discrete intervals to assess baseline fuel hydrocarbon concentrations. The soil samples were submitted to the laboratory and analyzed for the following parameters:

- Volatile Organic Compounds - BTEX by EPA Method 8021B
- Total Petroleum Hydrocarbons – Gasoline Range Organics (GRO) by EPA Modified Method 8015B
- Total Petroleum Hydrocarbons – Diesel Range Organics (DRO) by EPA Modified Method 8015B

During soil sampling activities, headspace readings were recorded from the discrete sample intervals using a hand-held PID. Analytical results of the soil samples collected as part of baseline monitoring will be submitted when available. Confirmatory samples will be collected from the same sample locations at the same depth intervals once remediation has commenced.

2.3 SOIL GAS SAMPLING

Soil gas samples will be collected from TP-1, 2, 5, 6, 8, and 9 after the dewatering system has stabilized, prior to starting the bioventing blower. By allowing the groundwater table to recede, a thicker vadose zone will be exposed and representative soil gas samples can be collected to compare to performance samples collected during system operation. One soil gas sample from each specified sample location will be collected for laboratory analysis and analyzed for the following parameters:

- Volatile Organic Compounds - BTEX by EPA Method 8021B
- Total Petroleum Hydrocarbons – Gasoline Range Organics (GRO) by EPA Modified Method 8015B
- Total Petroleum Hydrocarbons – Diesel Range Organics (DRO) by EPA Modified Method 8015B

During soil gas sampling activities, vapor-phase organics, oxygen, and carbon dioxide concentrations will be collected from TP-1, 2, 5, 6, 8, 9 and from each of the 13 BV wells using a hand-held photoionization detector (PID) and multi-gas meter. PID readings will be collected to assess fuel hydrocarbon concentrations within the exposed vadose zone, and to provide a correlation to vapor samples submitted to the laboratory. Monitoring of oxygen and carbon dioxide concentrations will allow for evaluation of baseline in-situ respiration and microbial activity.

3.0 RFORMANCE MONITORING

The purpose of ongoing, or performance, monitoring is to assess the progress of the treatment system in reducing fuel hydrocarbons. Laboratory analysis of groundwater, treated groundwater, and soil gas will be included as part of the performance monitoring, in addition to the collection of field data using portable gauges and gas meters. Inspection logs to record system readings and field measurements are included in Appendix B. Table 1 summarizes the sampling activities included as part of system performance monitoring. A well location map of wells within the bioventing area is provided (Figure 1). Procedures regarding sample handling are provided in Appendix A.

3.1 ROUTINE SYSTEM MONITORING

3.1.1 Pressure Readings

Pressure readings will be collected from TP-1, 2, 5, 6, 8, and 9 using a hand held magnahelic gauge and sample port at the top of each well. The pressure readings will be recorded weekly during the first month of system operation and monthly thereafter. Positive pressure readings in these sample locations indicate that air from the blower is reaching the intended area. The applied air flowrate at each BV well may be adjusted as needed to maintain an adequate radius of influence.

3.1.2 Groundwater Measurements

Depth to groundwater measurements will be collected from MW-49 and each TP well, with the exception of TP-7, using an electronic level meter. Depth to groundwater measurements will be recorded from the TP wells weekly for the first four weeks and monthly thereafter. Groundwater measurements will be recorded every three months from MW-49. The purpose of the measurements is to monitor the effectiveness of dewatering the subsurface to increase the thickness of the vadose zone.

3.1.3 Groundwater Sampling

Groundwater samples will be collected from TP-1, 2, 5, 6, 8, 9, and MW-49 using a dedicated hand-bailer to monitor groundwater quality during on-going system operations. Groundwater samples will be collected every three months following system start-up. During sample collection, field parameters (pH, temperature, conductivity, dissolved oxygen, and oxidation-reduction potential (ORP)) will be recorded prior to sample collection. The samples will be submitted to the laboratory and analyzed for the following parameters:

- Volatile Organic Compounds - BTEX by EPA Method 8021B
- Total Petroleum Hydrocarbons – Gasoline Range Organics (GRO) by EPA Modified Method 8015B

- Total Petroleum Hydrocarbons – Diesel Range Organics (DRO) by EPA Modified Method 8015B

The procedure for collecting groundwater samples is described in Section 4.1.

3.1.4 Soil Gas Sampling

Soil gas samples will be collected from TP-1, 2, 5, 6, 8, and 9 using a portable vacuum pump and tedlar bag to monitor microbial activity during on-going system operation. One soil gas sample will be collected per sample location during Months 3, 6, 12, 18, and 24 following system start-up. Each sample will be submitted to the laboratory and analyzed for the following parameters:

- Volatile Organic Compounds - BTEX by EPA Method 8021B
- Total Petroleum Hydrocarbons – Gasoline Range Organics (GRO) by EPA Modified Method 8015B
- Total Petroleum Hydrocarbons – Diesel Range Organics (DRO) by EPA Modified Method 8015B

During sampling activities, vapor-phase organics, oxygen, and carbon dioxide concentrations will be measured using a PID and multi-gas meter prior to sample collection. Oxygen and carbon dioxide monitoring will allow for evaluation of in-situ respiration and microbe activity. A decrease in oxygen and increase in carbon dioxide is expected to occur over the course of the remedial treatment as the microorganisms take in oxygen while they degrade the fuel hydrocarbons and respire carbon dioxide. However, since oxygen is being injected into the subsurface continually during routine monitoring, a decrease in oxygen may not be readily measurable. The main indicator of microbial activity will be the level of carbon dioxide detected within the vadose zone. Two respiration tests are planned during the monitoring period that will provide additional biological activity information. These tests are discussed in Section 3.2.

The procedure for collecting subsurface soil samples is described in Section 4.3.

3.1.5 GAC Breakthrough Sampling

Extracted groundwater from the dewatering wells will be treated prior to discharging to the raw water ponds, located within the east portion of the refinery Extracted groundwater is routed through two GAC filters positioned in-series for removal of petroleum hydrocarbons.

GAC breakthrough sampling will include the collection of influent samples from a specified sample port located upstream of the lead GAC filter, and effluent samples collected from ports located after the lead and lag GAC filter. GAC influent samples will

be collected during month 3, 6, 12, 18, and 24 following system start-up. A GAC effluent sample from the lead filter will be collected weekly beginning 4 weeks after the filter has been in the lead position until breakthrough is detected. An effluent sample from the lag filter will be collected monthly. Breakthrough refers to the time at which fuel hydrocarbons are no longer absorbed by the GAC and begin to pass through the vessel. Samples collected during GAC breakthrough monitoring will be submitted to the laboratory and analyzed for the following parameters:

- Volatile Organic Compounds - BTEX by EPA Method 8021B
- Total Petroleum Hydrocarbons – Gasoline Range Organics (GRO) by EPA Modified Method 8015B
- Total Petroleum Hydrocarbons – Diesel Range Organics (DRO) by EPA Modified Method 8015B

Monitoring the performance of the GAC filters is necessary to estimate GAC change-out frequency.

3.2 IN-SITU RESPIRATION TESTS

Following approximately two months of system operation, and in the summer of 2006, the bioventing blower will be shutdown while the dewatering wells remain operational. During in-situ respiration testing, oxygen and carbon dioxide concentrations will be collected from TP-1, 2, 5, 6, 8, 9, and each of the 13 BV wells using a hand-held multi-gas meter. The purpose of the testing is to monitor the level of microbial activity. A decline in oxygen and an increase in carbon dioxide concentrations are expected after the source of oxygen are turned off. The microbes will continue to take in oxygen and produce carbon dioxide while they degrade the fuel hydrocarbons. The rate at which the carbon dioxide rebound occurs will be measured over a 48- to 72-hour time period during each test.

Refer to Table 1 for a complete description of monitoring as it relates to soil gas and the respiration testing. Monitoring during testing will occur every half hour for the first four hours, every hour until hour twelve, then every 10 to 12 hours up to two to four days. Monitoring will cease when parameters stabilize in the two- to four-day period.

4.0 SAMPLING PROCEDURES

4.1 GROUNDWATER SAMPLING PROCEDURE

Each sample well is purged of stagnant groundwater prior to sample collection. A hand bailer is used during well purging and sample collection activities. Field parameters (temperature, pH, conductivity, and total dissolved solids (TDS)) are recorded during well purging activities using a portable field meters.

Purging consists of evacuating at least three casing volumes from each well prior to sample collection. All purged water is containerized in a 55-gallon drum. At the completion of field activities, the drum is transported to refinery's API separator for treatment.

Groundwater samples are contained in sample containers provided by the analytical laboratory and preserved, as needed, for the desired analysis. To avoid volatilization of potential contaminants, the volatile organic analysis vials are completely filled and inspected for air bubbles to achieve zero headspace.

All samples are properly labeled and placed on ice in sample coolers for delivery to the off-site laboratory. Refer to Appendix A for further details regarding sample handling.

4.2 SOIL SAMPLING PROCEDURE

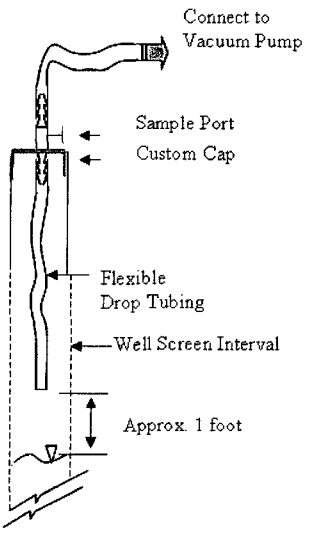
Subsurface soils are collected using a drill rig equipped with a hollow-stem auger drill bit and split spoon sampler. Each soil sample is collected by the following procedure:

- A 4-inch drill auger is used to advance the hole to the specified sample interval below grade.
- Drill cuttings are collected in a brass sleeve using a split spoon sampler.
- The brass sleeve is secured with end caps and labeled with the appropriate information.
- The sample is then placed in a cooler on ice immediately. Refer to Appendix A for procedures regarding sample handling.

Headspace monitoring is performed at each of the sample depth intervals using a photoionization detector (PID). The headspace test consists of filling a sealable plastic gas with approximately two ounces of excess drill cuttings collected using a decontaminated stainless steel spoon. The sealed bag is allowed to sit for approximately 10 minutes to equilibrate and allow for volatilization of vapor organics in the sample. The tip of the PID is then inserted into the bag, and the resulting PID reading is recorded.

4.3 SOIL GAS SAMPLING PROCEDURE

Each TP is equipped with an air-tight well cap for sample extraction through a sample port/opening at the top of the well casing. Flexible poly tubing connects to the underneath side of the cap and extends down into the well casing to approximately 1 foot above the water table. The specific sample depth at each sample location will be determined based on depth to groundwater measurements collected prior to each soil gas sampling event. Flexible tubing from the suction end of the portable vacuum pump connects to the sample port at the well cap.



Typical Set-Up for Soil Gas Sampling

The vacuum pump is operated at a low flow rate (approximately 1 cfs) to purge stagnant air out of the soil gas sampling assembly. Approximately three purge volumes are withdrawn from the well casing prior to sample collection. After the well is purged, a sample tedlar bag is attached to the tubing at the discharge end of the vacuum pump for sample collection. All samples are properly labeled and placed in a sample cooler for delivery to the off-site laboratory. Refer to Appendix A for procedures regarding sample handling.

During sample activities, field measurements of vapor-phase organics, oxygen, and carbon dioxide concentrations are recorded using portable field instruments prior to collecting the sample for laboratory analysis. Once the well has been purged, a field sample is collected using a tedlar bag.

Decontamination procedures include dedicated tubing for each of the wells sampled, and a five-minute purge time of the vacuum pump in ambient air.

Table 1: Bioventing Monitoring Plan
Giant Refinery - Bloomfield, New Mexico

Location	Matrix	Water Level	Temp/pH/Cond	DO/ORP	Pressure w/ magnahelic	PID	BTEX 8021B & GRO/DRO 8015	Oxygen/Carbon Dioxide
MW-49	GW	Baseline, Quarterly	Quarterly	Quarterly			Quarterly	
TP-1	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline and Quarterly	Baseline and Quarterly			Baseline & Quarterly	
TP-2	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline and Quarterly	Baseline and Quarterly			Baseline & Quarterly	
TP-3	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline				Baseline Only	
TP-4	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline				Baseline Only	
TP-5	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline and Quarterly	Baseline and Quarterly			Baseline & Quarterly	
TP-6	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline and Quarterly	Baseline and Quarterly			Baseline & Quarterly	
TP-8	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline and Quarterly	Baseline and Quarterly			Baseline & Quarterly	
TP-9	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline and Quarterly	Baseline and Quarterly			Baseline & Quarterly	
TP-10	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline				Baseline Only	
TP-11	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline				Baseline Only	
TP-12	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline				Baseline Only	
TP-13	GW	Baseline, Weekly x 4, Monthly thereafter	Baseline				Baseline Only	
GAC Inf	W						Baseline, Months 3, 6, 12, 18, 24	
GAC 1 Eff	W						Every 30 Days	
GAC 2 Eff	W						Monthly	
BV-1	S					Baseline Only	Baseline Only	
BV-2	S					Baseline Only	Baseline Only	
BV-3	S					Baseline Only	Baseline Only	
BV-4	S					Baseline Only	Baseline Only	
BV-5	S					Baseline Only	Baseline Only	
BV-6	S					Baseline Only	Baseline Only	
BV-7	S					Baseline Only	Baseline Only	
BV-8	S					Baseline Only	Baseline Only	
BV-9	S					Baseline Only	Baseline Only	
BV-10	S					Baseline Only	Baseline Only	
BV-11	S					Baseline Only	Baseline Only	
BV-12	S					Baseline Only	Baseline Only	
BV-13	S					Baseline Only	Baseline Only	
TP-1	A				Weekly x 4, Monthly Thereafter	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24
TP-2	A				Weekly x 4, Monthly Thereafter	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24
TP-5	A				Weekly x 4, Monthly Thereafter	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24
TP-6	A				Weekly x 4, Monthly Thereafter	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24
TP-8	A				Weekly x 4, Monthly Thereafter	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24
TP-9	A				Weekly x 4, Monthly Thereafter	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24	Baseline, Months 3, 6, 12, 18, 24
BV-1	S					Baseline Only		Baseline Only
BV-2	S					Baseline Only		Baseline Only
BV-3	S					Baseline Only		Baseline Only
BV-4	S					Baseline Only		Baseline Only
BV-5	S					Baseline Only		Baseline Only
BV-6	S					Baseline Only		Baseline Only
BV-7	S					Baseline Only		Baseline Only
BV-8	S					Baseline Only		Baseline Only
BV-9	S					Baseline Only		Baseline Only
BV-10	S					Baseline Only		Baseline Only
BV-11	S					Baseline Only		Baseline Only
BV-12	S					Baseline Only		Baseline Only
BV-13	S					Baseline Only		Baseline Only

AT 60 DAYS AND IN JUNE 2006- PERFORM IN-SITU RESPIRATION TESTING

Shutdown blower and monitor oxygen/carbon dioxide levels in TP-1, 2, 5, 6, 8, 9, and each of the 13 BV wells.

Monitor every 1/2 hour for first 4 hours, then every hour until hour 12. Then monitor every 10 to 12 hours up to 48 to 72 hours.

PID - photoionization detector
GW - groundwater
W - water
A - soil gas
S - soil
temp - temperature
cond - conductivity
DO - dissolved oxygen
turb - turbidity
GRO - gasoline range organics
DRO - diesel range organics
ORP - oxidation-reduction potential

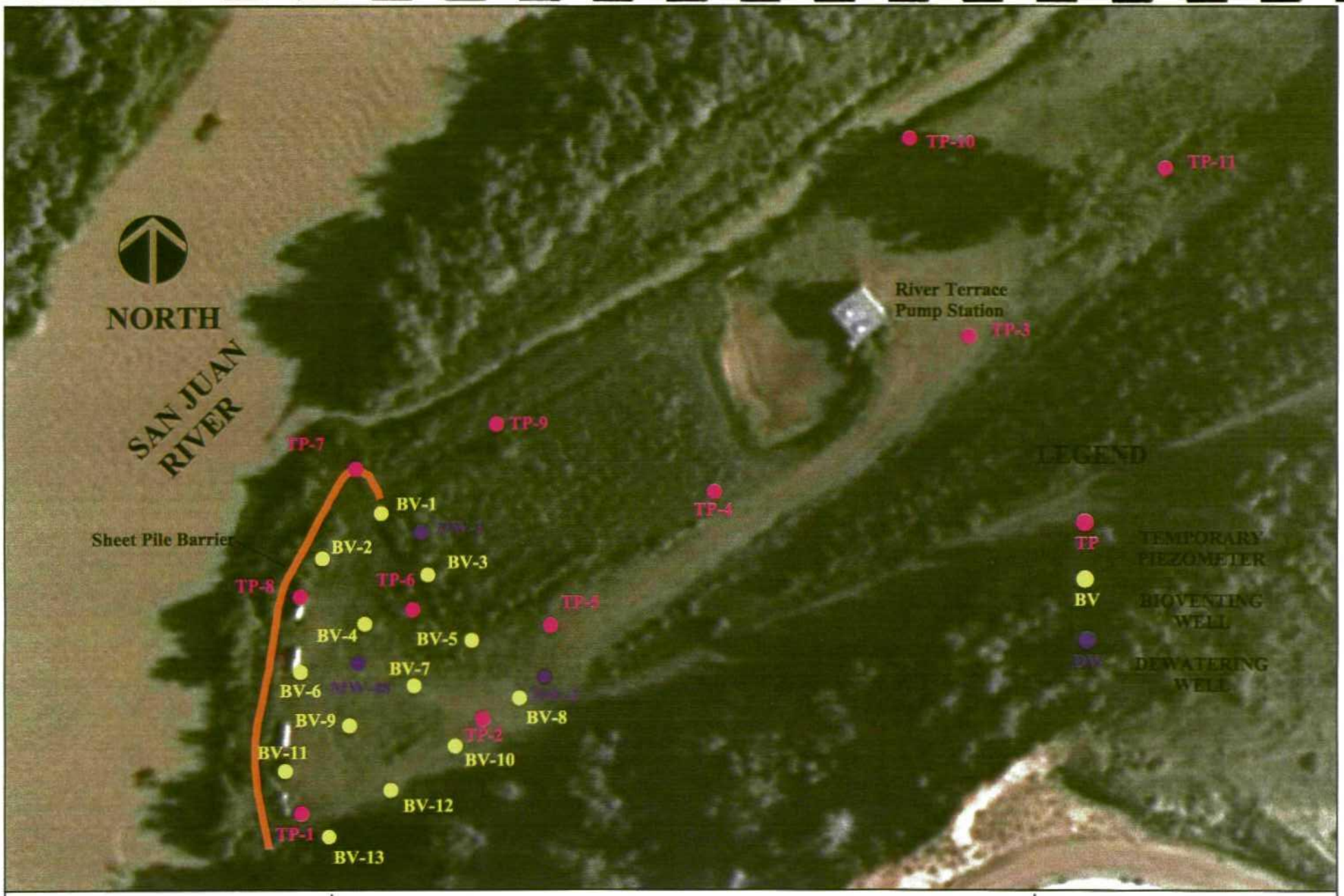
NOTE: MTBE was not detected in previous groundwater samples and has been left off the analysis.

Table 2: Summary of Groundwater Sampling Field Parameters
Giant Refinery - Bloomfield, New Mexico

Date	Well ID	Depth to Groundwater (ft bgs)	Depth to SPH (ft bgs)	Conductivity (uS/cm)	pH (units)	Temperature (°F)	TDS (ppm)
8/8/2005	TP1	5.35	ND	2202	6.9	70.7	1499
				2032	6.92	70.7	1515
				2047	6.93	70.6	1521
8/8/2005	TP2	6.84	ND	2275	6.81	65.5	1707
				2228	6.85	65.1	1667
				2196	6.87	65.1	1642
				2203	6.88	65	1648
8/8/2005	TP3	6.61	ND	1270	6.82	69.2	911
				1304	6.86	68.1	940
				1311	6.88	68.1	943
8/8/2005	TP4	5.00	ND	738	6.86	70.4	517
				703	6.89	70.1	492
				689	6.89	69.9	482
				654	6.9	69.8	457
8/8/2005	TP5	5.91	ND	929	6.91	68.4	660
				917	6.9	68.8	651
				923	6.9	68.9	655
8/8/2005	TP6	5.78	ND	1116	6.91	68.9	798
				1137	6.94	67.9	815
				1131	6.96	67.7	812
8/8/2005	TP7	5.7	ND	1738	6.87	68.8	1265
				1739	6.89	67.3	1273
				1744	6.9	67.2	1275
8/8/2005	TP8	5.83	ND	1932	6.91	73.2	1414
				1934	6.94	72.2	1424
				1935	6.96	71.9	1423
8/8/2005	TP9	5.12	ND	1952	6.95	64.9	1443
				1981	6.92	62.2	1458
				1970	6.9	61.8	1467
8/8/2005	TP10	5.10	ND	376	6.94	72.2	258
				378	6.94	70.7	260
				377	6.95	70.8	259
8/8/2005	TP11	5.67	ND	796	6.92	70	551
				790	6.93	67.5	556
				795	6.93	67.2	560
8/8/2005	TP12	7.43	ND	2100	6.87	65.1	1545
				2145	6.88	63.9	1590
				2185	6.89	63.3	1622
8/8/2005	TP13	6.27	ND	986	6.88	65.1	684
				965	6.89	63.1	683
				969	6.89	61.3	688

NOTES:

ND = Not Detected



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BIOVENTING AREA WELL LOCATION MAP

River Terrace Sheet Pile Area

Giant Refinery - Bloomfield, NM

FIGURE 1

APPENDIX A

Sample Handling

SAMPLE HANDLING PROCEDURES

Sample containers for chemical analysis will be placed in ice-filled coolers immediately following collection, and kept at 4±2° Celsius prior to and during shipment. Sample containers will be packaged to avoid breakage during transportation. Ice will be double-bagged to prevent leakage. Sample possession will be maintained under proper chain-of-custody.

Sample Containers and Preservation Requirements

Pre-cleaned sample containers will be obtained from the laboratory. Sample volumes, container types, and preservation requirements will be followed per specific method requirements.

Sample Identification

Samples collected will be identified with a sample label in addition to an entry on a chain-of-custody form. Each sample will be identified with a unique sample number that designates sample type, sample location, and depth (as applicable) according to the following format:

Sample Type	Example Sample ID
Subsurface Soil	BV1-5
Groundwater	TP-1
Soil Gas	TP-1
GAC Influent/Effluent	GAC Inf, GAC Eff-1, GAC Eff-2

The sample identification will consist of a prefix (e.g., BV1 or TP1) that will identify the sample source and location. For subsurface soil samples, the approximate depth of the sample in feet will also be included in the sample identification (e.g., BV1-5 is equivalent to a sample collected from bioventing well BV1 at a depth of 5 feet bgs). Groundwater and soil gas samples will include the well identification number only, and granular activated carbon (GAC) influent and effluent samples will indicate the stream from which the sample was obtained. For example, a GAC effluent sample collected from a sample port after the lead GAC vessel will be labeled "GAC Eff-1."

Sample Custody

Chain-of-custody forms will be placed in a sealed plastic bag and taped to the inside lid of the cooler with the samples. Signed custody seals will be place on the cooler during storage or transport.

The following information concerning the sample will be documented on the chain-of-custody form:

- unique sample identification;
- date and time of sample collection;
- sample matrix;
- analytical parameters requested;
- number of containers per sample; and
- sampler's name.

Upon receipt of the sample cooler, the laboratory will verify custody and the condition of the samples. Non-conformances in sample receipt (e.g., broken sample containers, samples received out of temperature) will be documented on the sample receipt form and communicated to the project team immediately.

Field Quality Control Samples

Trip blanks are used to evaluate if fuel hydrocarbons may have been introduced to the environmental samples during shipment, handling, or storage. Trip blanks are prepared in the laboratory by pouring deionized, distilled water into 40 millimeter vials. The trip blanks are shipped from the laboratory to the project site and then remain with the field samples back to the laboratory with each cooler containing VOA samples. Trip blanks will be analyzed for BTEX and GRO/DRO only.

Equipment Decontamination

Equipment that may directly or indirectly contact samples will be decontaminated. In addition, care will be taken to prevent the samples from coming into contact with potentially contamination substances, such as tape, engine exhaust, corroded surfaces, and dirt.

To decontaminate sampling devices (such as level probes), surfaces will be scrubbed with a solution of potable water rand Alconox or equivalent laboratory-grade detergent. The equipment will then be rinsed with distilled, potable water. The equipment will air-dry on a clean surface or rack. If the sampling device will not be used immediately after being decontaminated, it will be wrapped in a clean plastic bag. Where possible, disposable sampling equipment will be used in order to minimize decontamination procedures and avoid cross-contamination.

Waste Handling

Investigation-derived waste (IDW) that is generated during field activities will consist of general trash, disposable sampling equipment, and used personal protective equipment (PPE). These waste streams will be managed onsite.

Decontamination water, if generated, will be collected and placed into the onsite treatment system. Any purge water generated will be handled in the same manner.

Record Keeping

Daily activities will be recorded in a bound field logbook. Entries will be made in indelible ink and corrections made by a single stroke through the error with the recorder's initials. Entries to the logbook will include:

- date, start and finish times;
- names of personnel present;
- general weather conditions;
- details of work performed;
- summary of samples collected;
- field measurement readings;
- photograph log; and
- observations.

APPENDIX B

Sampling Forms

GROUNDWATER MONITORING LOG

Well ID: _____ **Date:** _____

Samplers: _____ **Time:** _____

Well Info (Before Purging)

Total Well Depth (ft): _____ Depth to Water (ft): _____

Purging/Sampling Info

Sample Collection Device: [ ] Diposable Bailer [ ] Other _____

Decon Procedures: [ ] Alconox/Water/DI [ ] Other _____

Calculated Purge Volume: Height of Water Column (ft): _____ x 7.83 = _____ gal

Water Quality Parameters

Field Parameters	Initial	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Time (00:00)										
pH (SU)										
Specific Conductivity (µS/cm)										
DO (mg/L)										
Temperature (^{o}F)										
Depth to Water (ft bgs)										
Volume Purged (gal)										
Color										
Odor										

Sample Analysis Info: **[✓] GRO by 8015** **[✓] BTEX by 8021B**

NOTES/COMMENTS: _____

_____

_____

WATER MONITORING LOG

Date:_____

Sampler(s): _____ Time: _____

Location	Container ID	BTEX by 8021B	GRO by 8015AZ
GAC Inf		√	√
GAC 1 Eff		√	√
GAC 2 Eff		√	√

Comments: _____

_____

_____

_____

SOIL VAPOR MONITORING FORM

Sampler(s): _____ Date: _____

Location	Sample Time	Sample ID	Approx. Purge Volume*	Pressure (inches of water)	PID (ppm)	Oxygen (%)	Carbon Dioxide (%)
TP-1	:						
TP-2	:						
TP-5	:						
TP-6	:						
TP-8	:						
TP-9	:						

*

Purge volume = flow rate (ft /min) x time (min)

Sample Analysis Info: [√] **BTEX by 8021B** [√] **GRO by 8015**

NOTES/COMMENTS: _____

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APPENDIX C

Baseline Groundwater Sampling Analytical Reports

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

August 16, 2005

Cindy Hurtado
San Juan Refining
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4161
FAX (505) 632-3911

RE: River Terrace Baseline

Order No.: 0508095

Dear Cindy Hurtado:

Hall Environmental Analysis Laboratory received 13 samples on 8/9/2005 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent.

Reporting limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Business Manager
Nancy McDuffie, Laboratory Manager

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT:	San Juan Refining	**Client Sample ID:**	TP-1
Lab Order:	0508095	**Collection Date:**	8/8/2005 9:45:00 AM
Project:	River Terrace Baseline		
Lab ID:	0508095-01	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	1.9	1.0		mg/L	1	8/12/2005 2:55:17 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 2:55:17 AM
Surr: DNOP	135	58-140		%REC	1	8/12/2005 2:55:17 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	66	1.0		mg/L	20	8/12/2005 5:13:41 PM
Surr: BFB	113	79.7-118		%REC	20	8/12/2005 5:13:41 PM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	ND	50		µg/L	20	8/12/2005 5:13:41 PM
Benzene	1400	100		µg/L	200	8/15/2005 10:11:02 AM
Toluene	49	10		µg/L	20	8/12/2005 5:13:41 PM
Ethylbenzene	3800	100		µg/L	200	8/15/2005 10:11:02 AM
Xylenes, Total	23000	100		µg/L	200	8/15/2005 10:11:02 AM
Surr: 4-Bromofluorobenzene	104	82.2-119		%REC	200	8/15/2005 10:11:02 AM

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT:	San Juan Refining	**Client Sample ID:**	TP-2
Lab Order:	0508095	**Collection Date:**	8/8/2005 9:15:00 AM
Project:	River Terrace Baseline		
Lab ID:	0508095-02	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	1.1	1.0		mg/L	1	8/12/2005 3:28:22 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 3:28:22 AM
Surr: DNOP	133	58-140		%REC	1	8/12/2005 3:28:22 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	84	1.0		mg/L	20	8/12/2005 5:45:11 PM
Surr: BFB	115	79.7-118		%REC	20	8/12/2005 5:45:11 PM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	ND	50		µg/L	20	8/12/2005 5:45:11 PM
Benzene	6100	100		µg/L	200	8/15/2005 10:41:41 AM
Toluene	8700	100		µg/L	200	8/15/2005 10:41:41 AM
Ethylbenzene	4200	100		µg/L	200	8/15/2005 10:41:41 AM
Xylenes, Total	25000	100		µg/L	200	8/15/2005 10:41:41 AM
Surr: 4-Bromofluorobenzene	101	82.2-119		%REC	200	8/15/2005 10:41:41 AM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT:	San Juan Refining	**Client Sample ID:**	TP-3
Lab Order:	0508095	**Collection Date:**	8/8/2005 10:50:00 AM
Project:	River Terrace Baseline		
Lab ID:	0508095-03	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: **SCC**
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	8/12/2005 4:01:10 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 4:01:10 AM
Surr: DNOP	132	58-140		%REC	1	8/12/2005 4:01:10 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	8/12/2005 7:50:36 PM
Surr: BFB	96.6	79.7-118		%REC	1	8/12/2005 7:50:36 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Methyl tert-butyl ether (MTBE)	ND	2.5		µg/L	1	8/12/2005 7:50:36 PM
Benzene	ND	0.50		µg/L	1	8/12/2005 7:50:36 PM
Toluene	ND	0.50		µg/L	1	8/12/2005 7:50:36 PM
Ethylbenzene	ND	0.50		µg/L	1	8/12/2005 7:50:36 PM
Xylenes, Total	1.2	0.50		µg/L	1	8/12/2005 7:50:36 PM
Surr: 4-Bromofluorobenzene	93.1	82.2-119		%REC	1	8/12/2005 7:50:36 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Client Sample ID: TP-4
Lab Order: 0508095
Collection Date: 8/8/2005 10:15:00 AM
Project: River Terrace Baseline
Lab ID: 0508095-04
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	1.1	1.0		mg/L	1	8/12/2005 6:12:22 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 6:12:22 AM
Surr: DNOP	133	58-140		%REC	1	8/12/2005 6:12:22 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	8.2	1.0		mg/L	20	8/12/2005 8:21:40 PM
Surr: BFB	109	79.7-118		%REC	20	8/12/2005 8:21:40 PM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	ND	50		µg/L	20	8/12/2005 8:21:40 PM
Benzene	ND	10		µg/L	20	8/12/2005 8:21:40 PM
Toluene	ND	10		µg/L	20	8/12/2005 8:21:40 PM
Ethylbenzene	420	10		µg/L	20	8/12/2005 8:21:40 PM
Xylenes, Total	220	10		µg/L	20	8/12/2005 8:21:40 PM
Surr: 4-Bromofluorobenzene	103	82.2-119		%REC	20	8/12/2005 8:21:40 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT:	San Juan Refining	**Client Sample ID:**	TP-5
Lab Order:	0508095	**Collection Date:**	8/8/2005 9:30:00 AM
Project:	River Terrace Baseline		
Lab ID:	0508095-05	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: **SCC**
Diesel Range Organics (DRO)	1.2	1.0		mg/L	1	8/12/2005 7:17:59 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 7:17:59 AM
Surr: DNOP	136	58-140		%REC	1	8/12/2005 7:17:59 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	56	1.0		mg/L	20	8/12/2005 8:52:49 PM
Surr: BFB	108	79.7-118		%REC	20	8/12/2005 8:52:49 PM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Methyl tert-butyl ether (MTBE)	ND	50		µg/L	20	8/12/2005 8:52:49 PM
Benzene	350	10		µg/L	20	8/12/2005 8:52:49 PM
Toluene	25	10		µg/L	20	8/12/2005 8:52:49 PM
Ethylbenzene	3500	100		µg/L	200	8/15/2005 11:12:25 AM
Xylenes, Total	21000	100		µg/L	200	8/15/2005 11:12:25 AM
Surr: 4-Bromofluorobenzene	107	82.2-119		%REC	20	8/12/2005 8:52:49 PM

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Lab Order: 0508095
Project: River Terrace Baseline
Lab ID: 0508095-06

Client Sample ID: TP-6
Collection Date: 8/8/2005 10:45:00 AM
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	1.0	1.0		mg/L	1	8/12/2005 7:50:45 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 7:50:45 AM
Surr: DNOP	135	58-140		%REC	1	8/12/2005 7:50:45 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	26	1.0		mg/L	20	8/12/2005 9:23:52 PM
Surr: BFB	113	79.7-118		%REC	20	8/12/2005 9:23:52 PM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	ND	50		µg/L	20	8/12/2005 9:23:52 PM
Benzene	280	10		µg/L	20	8/12/2005 9:23:52 PM
Toluene	ND	10		µg/L	20	8/12/2005 9:23:52 PM
Ethylbenzene	2800	50		µg/L	100	8/15/2005 11:43:08 AM
Xylenes, Total	7500	50		µg/L	100	8/15/2005 11:43:08 AM
Surr: 4-Bromofluorobenzene	106	82.2-119		%REC	20	8/12/2005 9:23:52 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Lab Order: 0508095
Project: River Terrace Baseline
Lab ID: 0508095-07

Client Sample ID: TP-7
Collection Date: 8/8/2005 1:05:00 PM
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	8/12/2005 8:22:04 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 8:22:04 AM
Surr: DNOP	132	58-140		%REC	1	8/12/2005 8:22:04 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	8/12/2005 9:54:54 PM
Surr: BFB	105	79.7-118		%REC	1	8/12/2005 9:54:54 PM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	ND	2.5		µg/L	1	8/12/2005 9:54:54 PM
Benzene	ND	0.50		µg/L	1	8/12/2005 9:54:54 PM
Toluene	ND	0.50		µg/L	1	8/12/2005 9:54:54 PM
Ethylbenzene	0.65	0.50		µg/L	1	8/12/2005 9:54:54 PM
Xylenes, Total	4.9	0.50		µg/L	1	8/12/2005 9:54:54 PM
Surr: 4-Bromofluorobenzene	99.4	82.2-119		%REC	1	8/12/2005 9:54:54 PM

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Client Sample ID: TP-8
Lab Order: 0508095
Collection Date: 8/8/2005 11:00:00 AM
Project: River Terrace Baseline
Lab ID: 0508095-08
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	7.8	1.0		mg/L	1	8/12/2005 8:54:49 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 8:54:49 AM
Surr: DNOP	139	58-140		%REC	1	8/12/2005 8:54:49 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	84	5.0		mg/L	100	8/12/2005 11:27:48 PM
Surr: BFB	107	79.7-118		%REC	100	8/12/2005 11:27:48 PM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	ND	250		µg/L	100	8/12/2005 11:27:48 PM
Benzene	1100	50		µg/L	100	8/12/2005 11:27:48 PM
Toluene	ND	50		µg/L	100	8/12/2005 11:27:48 PM
Ethylbenzene	3200	50		µg/L	100	8/12/2005 11:27:48 PM
Xylenes, Total	25000	100		µg/L	200	8/15/2005 12:13:53 PM
Surr: 4-Bromofluorobenzene	105	82.2-119		%REC	100	8/12/2005 11:27:48 PM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Client Sample ID: TP-9
Lab Order: 0508095
Collection Date: 8/8/2005 1:20:00 PM
Project: River Terrace Baseline
Lab ID: 0508095-09
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	8/12/2005 9:27:34 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 9:27:34 AM
Surr: DNOP	139	58-140		%REC	1	8/12/2005 9:27:34 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	1.1	0.10		mg/L	2	8/12/2005 11:58:41 PM
Surr: BFB	110	79.7-118		%REC	2	8/12/2005 11:58:41 PM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	ND	5.0		µg/L	2	8/12/2005 11:58:41 PM
Benzene	ND	1.0		µg/L	2	8/12/2005 11:58:41 PM
Toluene	ND	1.0		µg/L	2	8/12/2005 11:58:41 PM
Ethylbenzene	20	1.0		µg/L	2	8/12/2005 11:58:41 PM
Xylenes, Total	27	1.0		µg/L	2	8/12/2005 11:58:41 PM
Surr: 4-Bromofluorobenzene	105	82.2-119		%REC	2	8/12/2005 11:58:41 PM

Qualifiers:
- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Lab Order: 0508095
Project: River Terrace Baseline
Lab ID: 0508095-10

Client Sample ID: TP-10
Collection Date: 8/8/2005 1:35:00 PM
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	8/12/2005 10:00:23 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 10:00:23 AM
Surr: DNOP	139	58-140		%REC	1	8/12/2005 10:00:23 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	8/13/2005 12:29:37 AM
Surr: BFB	98.6	79.7-118		%REC	1	8/13/2005 12:29:37 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	ND	2.5		µg/L	1	8/13/2005 12:29:37 AM
Benzene	ND	0.50		µg/L	1	8/13/2005 12:29:37 AM
Toluene	ND	0.50		µg/L	1	8/13/2005 12:29:37 AM
Ethylbenzene	ND	0.50		µg/L	1	8/13/2005 12:29:37 AM
Xylenes, Total	2.5	0.50		µg/L	1	8/13/2005 12:29:37 AM
Surr: 4-Bromofluorobenzene	97.1	82.2-119		%REC	1	8/13/2005 12:29:37 AM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT:	San Juan Refining	Client Sample ID:	TP-11
Lab Order:	0508095	Collection Date:	8/8/2005 2:35:00 PM
Project:	River Terrace Baseline		
Lab ID:	0508095-11	Matrix:	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: **SCC**
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	8/12/2005 10:33:11 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 10:33:11 AM
Surr: DNOP	136	58-140		%REC	1	8/12/2005 10:33:11 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	8/13/2005 1:00:42 AM
Surr: BFB	101	79.7-118		%REC	1	8/13/2005 1:00:42 AM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Methyl tert-butyl ether (MTBE)	ND	2.5		µg/L	1	8/13/2005 1:00:42 AM
Benzene	ND	0.50		µg/L	1	8/13/2005 1:00:42 AM
Toluene	ND	0.50		µg/L	1	8/13/2005 1:00:42 AM
Ethylbenzene	ND	0.50		µg/L	1	8/13/2005 1:00:42 AM
Xylenes, Total	2.8	0.50		µg/L	1	8/13/2005 1:00:42 AM
Surr: 4-Bromofluorobenzene	96.4	82.2-119		%REC	1	8/13/2005 1:00:42 AM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Lab Order: 0508095
Project: River Terrace Baseline
Lab ID: 0508095-12

Client Sample ID: TP-12
Collection Date: 8/8/2005 2:45:00 PM
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: SCC
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	8/12/2005 11:05:58 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/12/2005 11:05:58 AM
Surr: DNOP	133	58-140		%REC	1	8/12/2005 11:05:58 AM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	8/13/2005 1:31:32 AM
Surr: BFB	105	79.7-118		%REC	1	8/13/2005 1:31:32 AM
EPA METHOD 8021B: VOLATILES						Analyst: NSB
Methyl tert-butyl ether (MTBE)	2.8	2.5		µg/L	1	8/13/2005 1:31:32 AM
Benzene	ND	0.50		µg/L	1	8/13/2005 1:31:32 AM
Toluene	ND	0.50		µg/L	1	8/13/2005 1:31:32 AM
Ethylbenzene	0.55	0.50		µg/L	1	8/13/2005 1:31:32 AM
Xylenes, Total	4.2	0.50		µg/L	1	8/13/2005 1:31:32 AM
Surr: 4-Bromofluorobenzene	97.9	82.2-119		%REC	1	8/13/2005 1:31:32 AM

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Lab Order: 0508095
Project: River Terrace Baseline
Lab ID: 0508095-13

Client Sample ID: TP-13
Collection Date: 8/8/2005 3:05:00 PM
Matrix: AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015B: DIESEL RANGE						Analyst: **SCC**
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	8/15/2005 9:40:21 PM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	8/15/2005 9:40:21 PM
Surr: DNOP	188	58-140	S	%REC	1	8/15/2005 9:40:21 PM
EPA METHOD 8015B: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	8/13/2005 3:35:13 AM
Surr: BFB	98.6	79.7-118		%REC	1	8/13/2005 3:35:13 AM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Methyl tert-butyl ether (MTBE)	ND	2.5		µg/L	1	8/13/2005 3:35:13 AM
Benzene	ND	0.50		µg/L	1	8/13/2005 3:35:13 AM
Toluene	ND	0.50		µg/L	1	8/13/2005 3:35:13 AM
Ethylbenzene	ND	0.50		µg/L	1	8/13/2005 3:35:13 AM
Xylenes, Total	3.7	0.50		µg/L	1	8/13/2005 3:35:13 AM
Surr: 4-Bromofluorobenzene	97.0	82.2-119		%REC	1	8/13/2005 3:35:13 AM

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Work Order: 0508095
Project: River Terrace Baseline

QC SUMMARY REPORT

Method Blank

Sample ID **MB-8515** Batch ID: **8515** Test Code: **SW8015** Units: **mg/L** Analysis Date **8/11/2005 8:53:07 PM** Prep Date **8/11/2005**
Client ID: Run ID: **FID(17A) 2_050811A** SeqNo: **387292**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	1									
Motor Oil Range Organics (MRO)	ND	5									
Surr: DNOP	1.196	0	1	0	120	58	140	0			

Sample ID **MB-8520** Batch ID: **8520** Test Code: **SW8015** Units: **mg/L** Analysis Date **8/12/2005 4:33:57 AM** Prep Date **8/11/2005**
Client ID: Run ID: **FID(17A) 2_050811A** SeqNo: **387306**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	1									
Motor Oil Range Organics (MRO)	ND	5									
Surr: DNOP	1.23	0	1	0	123	58	140	0			

Sample ID **Reagent Blank** Batch ID: **R16277** Test Code: **SW8015** Units: **mg/L** Analysis Date **8/12/2005 9:04:34 AM** Prep Date
Client ID: Run ID: **PIDFID_050812A** SeqNo: **387495**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.0192	0.05									J
Surr: BFB	20.37	0	20	0	102	79.7	118	0			

Sample ID **Reagent Blank** Batch ID: **R16309** Test Code: **SW8015** Units: **mg/L** Analysis Date **8/15/2005 8:29:09 AM** Prep Date
Client ID: Run ID: **PIDFID_050815A** SeqNo: **388461**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.0118	0.05									J
Surr: BFB	20.47	0	20	0	102	79.7	118	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

/

CLIENT: San Juan Refining
Work Order: 0508095
Project: River Terrace Baseline

QC SUMMARY REPORT
Method Blank

Sample ID Reagent Blank Batch ID: R16277 Test Code: SW8021 Units: µg/L Analysis Date 8/12/2005 9:04:34 AM Prep Date
Client ID: Run ID: PIDFID_050812A SeqNo: 387493

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	ND	2.5									
Benzene	ND	0.5									
Toluene	ND	0.5									
Ethylbenzene	ND	0.5									
Xylenes, Total	ND	0.5									
Surr: 4-Bromofluorobenzene	19.08	0	20	0	95.4	82.2	119	0			

Sample ID Reagent Blank Batch ID: R16309 Test Code: SW8021 Units: µg/L Analysis Date 8/15/2005 8:29:09 AM Prep Date
Client ID: Run ID: PIDFID_050815A SeqNo: 388351

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	ND	2.5									
Benzene	ND	0.5									
Toluene	ND	0.5									
Ethylbenzene	ND	0.5									
Xylenes, Total	ND	0.5									
Surr: 4-Bromofluorobenzene	19.37	0	20	0	96.9	82.2	119	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Hall Environmental Analysis Laboratory

Date: *16-Aug-05*

CLIENT: San Juan Refining
Work Order: 0508095
Project: River Terrace Baseline

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID LCS-8515	Batch ID: 8515	Test Code: SW8015	Units: mg/L	Analysis Date 8/11/2005 9:26:17 PM	Prep Date 8/11/2005
Client ID:		Run ID: FID(17A) 2_050811A		SeqNo: 387293	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.541	1	5	0	111	81.2	149	0			

Sample ID LCSD-8515	Batch ID: 8515	Test Code: SW8015	Units: mg/L	Analysis Date 8/11/2005 9:59:22 PM	Prep Date 8/11/2005
Client ID:		Run ID: FID(17A) 2_050811A		SeqNo: 387294	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	6.016	1	5	0	120	81.2	149	5.541	8.23	23	

Sample ID LCS-8520	Batch ID: 8520	Test Code: SW8015	Units: mg/L	Analysis Date 8/12/2005 5:06:46 AM	Prep Date 8/11/2005
Client ID:		Run ID: FID(17A) 2_050811A		SeqNo: 387307	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.597	1	5	0	112	81.2	149	0			

Sample ID LCSD-8520	Batch ID: 8520	Test Code: SW8015	Units: mg/L	Analysis Date 8/12/2005 5:39:38 AM	Prep Date 8/11/2005
Client ID:		Run ID: FID(17A) 2_050811A		SeqNo: 387308	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.949	1	5	0	119	81.2	149	5.597	6.11	23	

Sample ID GRO lcs 2.5ug	Batch ID: R16277	Test Code: SW8015	Units: mg/L	Analysis Date 8/13/2005 5:38:43 AM	Prep Date
Client ID:		Run ID: PIDFID_050812A		SeqNo: 388008	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.4526	0.05	0.5	0.0192	86.7	82.6	114	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

I

CLIENT: San Juan Refining
Work Order: 0508095
Project: River Terrace Baseline

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID GRO lcs 2.5ug Batch ID: R16309 Test Code: SW8015 Units: mg/L Analysis Date 8/15/2005 9:34:19 PM Prep Date
Client ID: Run ID: PIDFID_050815A SeqNo: 388462

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.498	0.05	0.5	0.0118	97.2	82.6	114	0			

Sample ID BTEX lcs 100ng Batch ID: R16277 Test Code: SW8021 Units: µg/L Analysis Date 8/13/2005 4:37:07 AM Prep Date
Client ID: Run ID: PIDFID_050812A SeqNo: 387869

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	19.92	2.5	20	0	99.6	64.5	133	0			
Benzene	18.34	0.5	20	0	91.7	88.5	114	0			
Toluene	18.5	0.5	20	0	92.5	87.2	114	0			
Ethylbenzene	18.45	0.5	20	0	92.2	88.6	113	0			
Xylenes, Total	37	0.5	40	0	92.5	83.3	114	0			

Sample ID BTEX lcs 100ng Batch ID: R16309 Test Code: SW8021 Units: µg/L Analysis Date 8/15/2005 10:36:03 PM Prep Date
Client ID: Run ID: PIDFID_050815A SeqNo: 388448

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	19.76	2.5	20	0	98.8	64.5	133	0			
Benzene	18.32	0.5	20	0	91.6	88.5	114	0			
Toluene	18	0.5	20	0	90.0	87.2	114	0			
Ethylbenzene	18.11	0.5	20	0	90.6	88.6	113	0			
Xylenes, Total	35.87	0.5	40	0	89.7	83.3	114	0			

17/18

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Hall Environmental Analysis Laboratory

Sample Receipt Checklist

Client Name SJR | Date and Time Received: 8/9/2005

Work Order Number 0508095 | Received by AT

Checklist completed by Signature [signature] Date 8-10-05

Matrix | Carrier name Greyhound

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐	Not Shipped ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	N/A ☑	
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Water - VOA vials have zero headspace?	No VOA vials submitted ☐	Yes ☑	No ☐	
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑	

Container/Temp Blank temperature? 3° *4° C ± 2 Acceptable* If given sufficient time to cool.

COMMENTS:

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding _____

Comments: _____

Corrective Action _____

CHAIN-OF-CUSTODY RECORD

QA / QC Package:
Std ☐ Level 4 ☐
Other: _____

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite D
Albuquerque, New Mexico 87109
Tel. 505.345.3975 Fax 505.345.4107
www.hallenvironmental.com

Client: San Juan Refinery
Address: #50, Rd 4990
Bloomfield, NM
87413
Phone #: 505-632-4161
Fax #: 505-632-3911

Project Name: River Terrace Baseline
Project #:
Project Manager:
Sampler: Cindy Hurtado / Angela Folk
Sample Temperature: 3°

ANALYSIS REQUEST

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative $HgCl_2$	Preservative HNO_3	Preservative	HEAL No. 0508095	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCB's (8082)	8260B (VOA)	8270 (Semi-VOA)	Air Bubbles or Headspace (Y or N)
8-8-05	9:45am	H_2O	TP-1	2-VOA			HCL	-1	X												
		"	"	2-VOA			HCL	-1			X										
8-8-05	9:15am	H_2O	TP-2	2-VOA			HCL	-2	X												
		"	"	2-VOA			HCL	-2			X										
8-8-05	10:50am	H_2O	TP-3	2-VOA			HCL	-3	X												
		"	"	2 VOA			HCL	-3			X										
8-8-05	10:15am	H_2O	TP-4	2-VOA			HCL	-4	X												
		"	"	2-VOA			HCL	-4			X										

Date	Time	Relinquished By: (Signature)	Received By: (Signature)
8/09/05	930am	Cindy Hurtado	1649 8/9/05
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)

Remarks:

CHAIN-OF-CUSTODY RECORD

QA / QC Package:
Std ☐ Level 4 ☐
Other:

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite D
Albuquerque, New Mexico 87109
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Client: San Juan Refinery
Address: #50, Rd 4990
Bloomfield, NM 87413
Phone #: 505-632-4161
Fax #: 505-632-3911

Project Name: River Terrace Baseline
Project #:
Project Manager:
Sampler: Cindy Hurtado / Angela Folk
Sample Temperature: 3°

ANALYSIS REQUEST

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative: $HgCl_2$	Preservative: HNO_3	Preservative	HEAL No. 0508095	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCB's (8082)	8260B (VOA)	827D (Semi-VOA)					Air Bubbles or Headspace (Y or N)
8-8-05	9:30am	H2O	TP-5	2-VOA			HCL	-5	X																
		1	"	2-VOA			HCL	-5			X														
8-8-05	10:45am	H2O	TP-6	2-VOA			HCL	-6	X																
		1	"	2-VOA			HCL	-6			X														
8-8-05	10:50	H2O	TP-7	2-VOA			HCL	-7	X																
		1	"	2-VOA			HCL	-7			X														
8-8-05	11:00am	H2O	TP-8	2-VOA			HCL	-8																	
		1	"	2-VOA			HCL	-8																	

Remarks:

Date	Time	Relinquished By: (Signature)	Received By: (Signature)
8/09/05	930AM	Cindy Hurtado	1649 8/9/05
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)

CHAIN-OF-CUSTODY RECORD

QA / QC Package:
Std ☐ Level 4 ☐
Other:

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Project Name: River Terrace Baseline
Project #:
Project Manager:
Sampler: Cindy Hurtado / Angela Folk
Sample Temperature: 3°

ANALYSIS REQUEST

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative			HEAL No. 0508095	BTEX + ~~MTBE~~ + ~~TMB's~~ (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCB's (8082)	8260B (VOA)	8270 (Semi-VOA)					Air Bubbles or Headspace (Y or N)
					$HgCl_2$	HNO_3																		
8-8-05	120pm	H_2O	TP-9	2-VOA			HCL	-9	X															
"		"	TP-9	2-VOA			HCL	-9			X													
8-8-05	135pm	H_2O	TP-10	2-VOA			HCL	-10	X															
"		"	TP-10	2-VOA			HCL	-10			X													
8-8-05	235pm	H_2O	TP-11	2-VOA			HCL	-11	X															
"		"	TP-11	2-VOA			HCL	-11			X													
8-8-05	245pm	H_2O	TP-12	2-VOA			HCL	-12	X															
"	"	"	TP-12	2-VOA			HCL	-12			X													
8-8-05	305pm	H_2O	TP-13	2-VOA			HCL	-13	X															
"	"	"	TP-13	2-VOA			HCL	-13			X													

Date	Time	Relinquished By: (Signature)	Received By: (Signature)	
8/9/05	930am	Cindy Hurtado		8/9/05
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)	1649

Remarks: