

GW – 001

**FACILITY-WIDE
GW
MONITORING
PLAN**

2012

June 28, 2012

John Kieling, Acting Bureau Chief
New Mexico Environmental Department
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Re: Facility-Wide Groundwater Monitoring Plan – June 2012
Giant Refining Company, Bloomfield Refinery Order No. HWB 07-34(CO)
EPA ID#: NMD089416416
NMOCD Discharge Permit #: GW-001

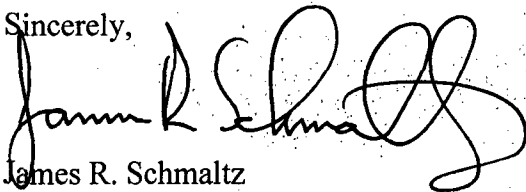
Dear Mr. Kieling and Mr. Chavez:

Western Refining Southwest Inc. - Bloomfield Refinery is submitting the above referenced Facility-Wide Groundwater Monitoring Plan (Plan) pursuant to the July 2007 HWB Order and the Bloomfield Refinery Facility Discharge Permit GW-001. The modifications made to the June 2012 version of the Plan include the following:

- One additional RCRA investigation well that were installed in 2012 as part of the on-going RCRA investigation activities has been added to the monitoring program as previous directed by NMED.
- The collection of field blank and equipment blank samples has been modified to one of each per sampling event.

If you have any questions or would like to discuss the enclosed Facility-Wide Groundwater Monitoring Plan, please contact me at (505) 632-4171 or Randy.Schmaltz@wnr.com.

Sincerely,



James R. Schmaltz
Health, Safety, Environmental, and Regulatory Director
Western Refining Southwest, Inc. - Bloomfield Refinery

cc: D. Cobrain (NMED)
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A. Hains (WNR)

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Western Refining

Bloomfield Refinery • #50 Road 4990 • Bloomfield, NM 87413

Facility-Wide Groundwater Monitoring Plan

June 2012



Report Prepared By:

Western Refining Southwest, Inc.

Bloomfield Refinery

50 Road 4990

Bloomfield, NM 87413

Contents

Executive Summary	4
1. Introduction	1-1
1.1. Facility Ownership and Operation	1-1
2. Background	2-1
2.1. SITE LOCATION AND DESCRIPTION	2-1
2.2. FACILITY OPERATIONS	2-2
2.3. Historic Site-Wide Monitoring	2-2
2.3.1. Refinery Complex Groundwater Monitoring	2-2
2.3.2. North Boundary Barrier Monitoring	2-3
2.3.3. Outfall Monitoring	2-4
2.3.4. River Terrace Area Monitoring	2-4
3. Subsurface Conditions	3-1
3.1. Refinery Site	3-1
3.2. River Terrace Site	3-2
4. Investigation Methods	4-1
4.1. Monitoring and Sampling Methods	4-1
4.1.1. Groundwater Levels	4-1
4.1.2. Groundwater Sampling	4-1
4.1.3. Well Purging	4-1
4.1.4. Groundwater Sample Collection	4-2
4.1.5. Sample Handling	4-2
4.1.6. Decontamination Procedures	4-3
4.1.7. Field Equipment Calibration Procedures	4-3
4.1.8. Collection and Management of Investigation Derived Waste	4-4
4.2. Analytical Methods	4-4
4.2.1. Target Analytes	4-4
4.3. Documentation of Field Activities	4-4
4.3.1. General	4-4
4.3.2. Sample Custody	4-5
4.4. Quality Assurance Procedures	4-5
4.4.1. Equipment Calibration Procedures and Frequency	4-6
4.4.2. Field QA/QC Samples	4-6
4.4.3. Laboratory QA/QC Samples	4-6
4.4.4. Laboratory Deliverables	4-7
4.4.5. Review of Field and Laboratory QA/QC Data	4-9
4.4.6. Blanks, Field Duplicates, Reporting Limits and Holding Times	4-10
4.4.6.1. Blanks	4-10
4.4.6.2. Field Duplicates	4-10
4.4.6.3. Method Reporting Limits	4-10
4.4.6.4. Holding Times	4-10
4.4.7. Representativeness and Comparability	4-10

4.4.7.1.	Representativeness	4-10
4.4.7.2.	Comparability	4-11
4.4.8.	Laboratory Reporting, Documentation, Data Reduction, & Corrective Action	4-11

5. Monitoring and Sampling Program	5-1
---	------------

5.1.	Refinery Complex	5-1
5.1.1.	Sampling Locations	5-1
5.1.2.	Sampling Frequency and Analyses	5-2
5.2.	North Boundary Barrier	5-3
5.2.1.	Sampling Locations	5-3
5.2.2.	Sampling Frequency and Analyses	5-4
5.3.	San Juan River Bluff.....	5-4
5.3.1.	Monitoring and Sampling Locations	5-4
5.3.2.	Sampling Frequency and Analyses	5-5
5.4.	San Juan River Terrace	5-6
5.4.1.	Sampling Locations	5-6
5.4.2.	Sampling Frequency and Analyses	5-6
5.5.	Monitoring Program Revisions	5-8

6. Schedule	6-1
--------------------	------------

7. References	7-1
----------------------	------------

Tables

1. Well Summary
2. Target Analyte List
3. Facility-Wide Monitoring Plan Summary

Figures

1. Site Location Map
2. Site Plan
3. Refinery Complex, North Boundary Barrier and San Juan River Bluff Well Location Map
4. Background Monitoring Well Locations
5. Refinery Complex Concentration Map (August 2011)
6. River Terrace Well Location Map
7. River Terrace Groundwater BTEX Concentration Map (June 2011)
8. Groundwater Elevation Contours (August 2011)
9. Product Thickness Map (August 2011)
10. Refinery Complex Monitoring Well Location Map
11. North Boundary Barrier Monitoring Well Location Map
12. San Juan River Bluff Location Map
13. River Terrace Monitoring Well Location Map
14. River Sampling Points Location Map

Appendices

- A. Facility Well Logs

Executive Summary

This Facility-Wide Groundwater Monitoring Plan (Plan) has been prepared pursuant to the terms and conditions of an Order issued on July 27, 2007 by the New Mexico Environment Department (NMED) to San Juan Refining Company and Giant Industries Arizona, Inc. This Plan also satisfies the requirement as stated in the facility's Discharge Permit GW-001 required by New Mexico Energy, Minerals, and Natural Resources Department Oil Conservation Division (OCD) for the Bloomfield Refinery.

This Plan has been prepared to collect data that will be used to characterize the nature and extent of potential impacts to groundwater at and migrating from the Bloomfield Refinery owned by San Juan Refining Company and operated by Western Refining Southwest, Inc. (Western). This Plan also includes monitoring the effectiveness of interim containment and remediation systems implemented at the Facility, specifically the North Boundary Barrier Wall and the River Terrace Bioventing System. Also included is sampling of San Juan River, existing outfall locations in the east portion of the Facility, and seeps located along the western portion of the Facility.

This Plan divides the Facility into four areas for periodic monitoring: the Refinery Complex, the North Boundary Barrier, San Juan River Bluff, and the San Juan River Terrace. The number of sampling locations, the target analytes, and monitoring frequencies vary by area. With exception of the River Terrace area and sump wells, designated monitoring wells and sample points in these areas will be monitored on a semi-annual frequency, with a more-comprehensive monitoring well network sampled on an annual frequency. Monitoring events following the procedures presented in this Plan will begin with the initial annual event in the third quarter of 2011. Monitoring wells in the River Terrace area will be sampled on a semi-annual or biannual basis as summarized in Table 3 of this Plan. Piping from Tank 38, which receives water from East Outfall #1, has been re-routed to discharge directly to the Refinery wastewater treatment system, upstream of the API; therefore no longer are samples collected at Tank 38.

Groundwater monitoring activities have been conducted at the Facility since the early 1990's in response to various directives issued by NMED and the OCD. It is Western's intent that this Plan be accepted by both agencies as the prevailing document for comprehensive groundwater monitoring at the Bloomfield Refinery.

Effectiveness of the North Boundary Barrier Wall, active pumping systems, and remedial actions at the River Terrace continue to be evaluated. Western will review historic facility-wide monitoring data each year, and assess the monitoring program presented in this Plan. Results of facility-wide monitoring activities, with the exception of the River

Terrace results, are included in the *Groundwater Remediation and Monitoring Annual Report*, which is submitted by April 15th of each year. Results of River Terrace monitoring are submitted separately as part of the *River Terrace Voluntary Corrective Measures Bioventing System Annual Report*, which is submitted by March of each year. Any proposed revisions to the Facility-Wide Groundwater Monitoring Plan will be submitted for agency approval prior to implementing. These revisions may include, but not be limited to, a reduction or change in monitoring locations, monitoring frequency, and/or target analytes.

1. Introduction

This Facility-Wide Groundwater Monitoring Plan (Plan) has been prepared to optimize the on-going groundwater monitoring program at the Bloomfield Refinery in efforts to assess the nature and extent of potential impacts to groundwater from historic refinery operations. The monitoring program also allows assessment of the effectiveness of interim containment and remediation systems implemented at the Refinery.

The Plan follows the requirements of the July 2007 Order issued by the New Mexico Environment Department (NMED) and includes the following information:

- Site description
- Description of facility operations
- Summary of historic monitoring data
- Description of subsurface conditions
- Monitoring and sampling methods
- Monitoring and sampling locations and frequency
- Monitoring and sampling schedule

1.1. Facility Ownership and Operation

A Class I permit modification was approved on June 10, 2008 to reflect the change in operation of the refinery to Western Refining Southwest, Inc. The operator is now Western Refining Southwest, Inc. – Bloomfield Refinery.

Owner: San Juan Refining Company
123 W. Mills Avenue, Suite 200
El Paso, TX 79901

Operator: Western Refining Southwest, Inc. (Postal address)
P.O. Box 159
Bloomfield, New Mexico 87413

Facility Name: Bloomfield Refinery (Physical address)
#50 County Road 4990
Bloomfield, New Mexico 87413
Facility Status: Corrective Action/Compliance

US EPA ID: NMD089416416
SIC Code: 2911

2. Background

2.1. SITE LOCATION AND DESCRIPTION

The Bloomfield Refinery is a crude oil refining facility with a process capacity of 18,000 barrels per day. It is located approximately one mile south of Bloomfield, New Mexico, in San Juan County, latitude N36 41' 87", longitude W107 58' 70". It is further located approximately ½ mile east of State Route 550 on County Road 4990 (a.k.a. Sullivan Road). See Figure 1 for a site location map.

The Facility is located on the south side of the San Juan River and the Hammond Irrigation Ditch (Hammond Ditch) and situated on a bluff approximately 120 feet above the river. The top of the bluff is relatively flat and is at an elevation of 5,540 feet above sea level. Property managed by the Bureau of Land Management (BLM) borders the Facility to the south. Undeveloped company property and the San Juan River border the Facility to the north. Undeveloped private and public lands border the property to the east and several gravel pits border the property to the west. A large portion of the undeveloped land in the vicinity of the refinery is used for oil and gas production and as range for grazing. An unnamed arroyo flows toward the San Juan River on the southern and western edges of the site. East of the site, a well-defined arroyo cuts a small canyon from the bluff to the San Juan River. The Hammond Ditch lies on the bluff between the San Juan River and the Facility.

The portion of the Facility located north of County Road 4990 includes an office area that consists of buildings, warehouse space and a storage yard, parking lots, a heavy oil loading station, the petroleum process area, API separator and wastewater treatment surface impoundments, the raw water ponds, the tank farm, a fenced-in equipment lay-down area utilized to store refinery equipment prior to use, the fire training area, and the solid waste disposal area. The Facility south of County Road 4990 includes the terminal office and parking areas, terminals for loading product and off-loading crude oil and gas, a hazardous waste storage area (less than 90-day), a high-pressure bullet storage tank area, the regional office and parking area, the transportation maintenance facility and truck parking areas, the refinery evaporation ponds, and a Class I injection well. Figure 2 provides a Site Plan of the Facility.

Running southwest through the center of the Facility are four utility pipelines operated by El Paso Natural Gas, Enterprise, Conoco-Phillips, and Giant Industries Arizona, Inc. ("Giant"). The Enterprise and Giant pipelines are currently not in service.

Surface waters in the vicinity of the Facility include the San Juan River and the Hammond Irrigation Ditch. The San Juan River originates in the San Juan Mountains of

Colorado approximately 100 miles northeast of Bloomfield and is located north of the Facility flowing west/southwest. The San Juan River is controlled upstream by the Navajo Dam and is used for potable drinking water for the city of Bloomfield and surrounding areas. Hammond Ditch is located on the bluff between the river and the process area of the Facility, flowing east to west across the site. Hammond Ditch is a man-made canal, lined with concrete in 2002, which transports water used for irrigation and watering livestock only. In addition, manmade surface water features at the Facility includes the refinery evaporation ponds, raw water ponds, and the wastewater treatment surface impoundments.

2.2. FACILITY OPERATIONS

Kimball Campbell Corporation constructed the Facility as a crude topping unit in the late 1950's. Ownership of the refinery has changed hands over the years. The current Facility owner is San Juan Refining Company, a New Mexico corporation. The facility is operated by Western Refining Southwest, Inc., formally known as Giant Industries Arizona, Inc., an Arizona corporation.

The Facility has a capacity to receive and process over 18,000 barrels of crude oil per day (bcpd). The main source of crude oil supply comes from the Four Corners area, and is transported tanker truck. The process area of the Facility includes the following process units: crude distillation, reforming, fluidized catalytic cracking, sulfur recovery, merox treater, catalytic polymerization, and diesel hydrotreating. Current and past operations produce leaded and unleaded gasoline, diesel fuels, Jet-A fuel, JP-4 jet fuel, kerosene, propane, butane, naphtha, residual fuel, heavy fuel oils, and liquefied petroleum gas. Other operations at the Facility include crude and product storage, crude unloading and product loading, waste management (closed and existing facilities), and non-petroleum material storage.

2.3. Historic Site-Wide Monitoring

2.3.1. Refinery Complex Groundwater Monitoring

Groundwater monitoring has occurred at the Facility since the early 1990s in support of various investigations to monitor potential impacts to groundwater quality associated with historic refinery operations. Figure 3 shows the locations of monitoring wells at the Facility within and near the Refinery Complex. In 2012, two monitoring wells were installed outside the Refinery Complex for the intention as serving as background wells for the facility. The wells are located upstream of the Refinery Complex, as shown on Figure 4.

Most of the Facility monitoring wells extend down to the top of the Nacimiento Formation surface. Table 1 provides a summary of the groundwater monitoring network

installed at the Facility to-date, including well construction information. A copy of the wells logs is provided in Appendix A.

Between 2003 and 2007, groundwater samples collected at selected monitoring wells within the Refinery complex were collected on a semi-annual basis. Samples were analyzed for volatile organic compounds (VOCs), dissolved and total metals, and general chemistry parameters. Sample analysis has been performed in compliance with the Corrective Measures Study and Corrective Measures Implementation letter dated January 6, 2003. Concurrently, OCD guidance had been followed per the Site Investigation and Abatement Plan letter dated December 30, 2002.

Between 2008 to present, groundwater samples from selected monitoring wells are collected twice per year. Samples collected in April of each year (as part of the Semi-Annual Monitoring Event) are analyzed for target list VOCs, total petroleum hydrocarbons-diesel range organics (TPH-DRO), and total petroleum hydrocarbons-gasoline range organics (TPH-GRO). Samples collected from selected monitoring wells in August of each year (as part of the Annual Monitoring Event) are analyzed for VOCs (full suite), semi-volatile organic compounds (SVOCs), TPH-DRO, TPH-GRO, dissolved and total metals, carbon dioxide, and general chemistry. Results of each sampling event are reporting as part of the “Groundwater Remediation and Monitoring Annual Report” that is submitted by April 15th of each following year. Figure 5 provides a summary of the target VOCs detected in the Refinery Complex area during the August 2011 Sampling Event.

2.3.2. North Boundary Barrier Monitoring

Between 2005 and 2007 following the installation of the North Boundary Barrier and Collection System in April 2005, groundwater samples have been collected from the collection and observation wells and analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tert butyl ether (MTBE), TPH-DRO, total metals, and general chemistry parameters. Results of groundwater monitoring along the North Boundary Barrier were included in the System Start-Up Six Month Report of the North Boundary Barrier Collection System Phase II (submitted January 5, 2006), and the Annual Report of the North Boundary Barrier Collection System Phase II May 2005 to May 2006 Report (submitted June 28, 2006).

Between 2008 to present, groundwater samples are collected from each of the observation wells and selected collection wells on a semi-annual basis. Samples collected from the selected collection wells are analyzed for target list VOCs and TPH-DRO. Samples collected from the observation wells are analyzed for target list VOCs, TPH-DRO, and TPH-GRO. Analytical results from the Semi-Annual and Annual Sampling Events are reported in the “Groundwater Remediation and Monitoring Annual Report” which is by April 15th of each year.

In February 2006, seven sump wells were installed along the river-side of the North Boundary Barrier. These wells extend several feet into the Nacimiento Formation. Currently groundwater samples are not collected at these wells; however groundwater elevation data is collected following major precipitation events.

Figure 3 shows the locations of monitoring wells along the North Boundary Barrier.

2.3.3. Outfall Monitoring

Near the San Juan River bluff area, groundwater samples have been collected from East Outfall #2 and East Outfall #3 on a semi-annual basis since 2003. Samples have been analyzed for VOCs, total metals, dissolved metals, and general chemistry parameters. Tank 33 (which prior to 2010 received water from East Outfall #1 via Tank 38) was sampled monthly in 2005, and quarterly thereafter. Samples were analyzed for benzene, toluene, ethyl benzene, and total xylenes (BTEX). Results of samples collected following conditional approval of the 2007 Facility-Wide Groundwater Monitoring Plan are submitted each year as part of the “Groundwater Remediation and Monitoring Annual Report.” Since January 2010, Tank 33 no longer receives captured water from Outfall #1, and thus remains out-of-service to-date. At present, recovered water from Outfall #1 is pumped directly to the facility’s wastewater treatment plan via Tank 38.

Figure 2 shows the approximate location of the Outfalls.

2.3.4. River Terrace Area Monitoring

Groundwater samples have been collected from two monitoring wells (MW-48 and MW-49), two dewatering wells (DW-1 and DW-2), and thirteen temporary piezometers (TP-1 thru TP-13) to monitor the River Terrace Sheet Pile Area groundwater quality on both sides of the sheet pile barrier. Figure 6 shows the locations of the wells at the River Terrace. Prior to the start of the Bioventing System in January 2006, groundwater data revealed that the highest impacts were observed in groundwater collected from piezometers installed in the western half of the River Terrace area. After the installation of the Bioventing System, on-going sampling at the River Terrace was conducted in accordance with the approved Bioventing System Monitoring Plan, dated October 28, 2006, and in accordance with an NMED comment letter dated April 18, 2007. Current and on-going River Terrace sampling is being conducted in accordance with the requirements established in NMED’s *Proposals to Modify Monitoring at the River Terrace Area* letter dated March 15, 2011 (NMED, 2011). Figure 7 provides a summary of target VOCs detected at the River Terrace during the June 2011 high flow sampling event.

In addition, San Juan River samples were collected monthly in 2004, and have been collected quarterly thru 2007, and then semi-annually thereafter. The river samples are currently analyzed for target list VOCs, TPH-DRO, TPH-GRO, total and dissolved

metals, and general chemistry. Samples are collected from four locations: one upstream of the Facility, two immediately downstream of the River Terrace, and one downstream of the Facility. Analytical results from historic river sampling events have been reported in the annual groundwater reports submitted to NMED and OCD in April of each year. The San Juan River sample locations are shown on Figure 14.

3. Subsurface Conditions

3.1. Refinery Site

The Bloomfield Refinery is located within the San Juan Basin, a sub-province of the Colorado Plateau physiographic province, about 120 feet above the present San Juan River level and about 500 feet south of the river.

Groundwater at the Facility is present at depths ranging from approximately 6 to 50 feet below ground surface (bgs), increasing in depth from west to east across the site due to the change in surface elevation across the site. Groundwater flow direction is generally from the southeast to the northwest towards the Hammond Ditch. Figure 8 provides groundwater elevation contours recorded during the August 2011 monitoring event. The thickness of SPH detected in 2011 is summarized in Figure 9. The shallow groundwater consists of an aquifer where groundwater migrates through the permeable glacial outwash deposits designated as the Jackson Lake Terrace overlying the nearly impermeable Nacimiento Formation. A permanent shallow aquifer formed above the Nacimiento Formation likely as a result of site development, refinery operations, and leakage from the Hammond Ditch. This shallow aquifer is not currently used for drinking water. Below the Nacimiento Formation is the Ojo Alamo sandstone formation, a water-bearing unit used as a potable water source.

The geologic units that underlie the Facility are as follows: the uppermost unit consists of unconsolidated surface soils, silts, and fine windblown sands forming loess deposits. The silty fine sand is underlain by the Jackson Lake Terrace deposit, approximately 10 to 15 feet thick. The Jackson Lake Terrace consists of well-rounded boulders, cobbles, gravels and sands exhibiting moderate to high permeability. Below the Jackson Lake Terrace is the Nacimiento Formation. The Nacimiento Formation is composed of interbedded, black carbonaceous mudstone, siltstone, and argillaceous sandstones. The Nacimiento Formation has been investigated at the Facility to a depth of approximately 100 feet; however, literature suggests the formation ranges up to 900 feet in total thickness. The Nacimiento Formation demonstrates low permeability and acts as a confining unit for the Jackson Lake Terrace. Below the Nacimiento Formation is the Ojo Alamo Sandstone, a water-bearing unit consisting of tertiary sandstones. Directly below the Ojo Alamo are the Cretaceous Kirtland Shale and the Fruitland Formation.

The Nacimiento Formation acts as a confining layer to vertical migration of groundwater beneath the refinery, which does not infiltrate to the underlying Ojo Alamo Sandstone. The morphology of the contact between the Jackson Lake Terrace and the underlying Nacimiento Formation in the vicinity of the facility is important in that it influences the direction of the perched groundwater flow. Approximately 100 feet of the Nacimiento

Formation is exposed in the precipice (bluff) face north of the Facility adjacent to the San Juan River.

3.2. River Terrace Site

The River Terrace area is located adjacent to the San Juan River approximately 500 feet north of the refinery process areas, and is the location of the pumping station used to deliver river water to the refinery raw water ponds. Surface water in the vicinity of the River Terrace includes the San Juan River to the north and west. The San Juan River level is approximately 120 feet lower than the grade level of the refinery complex.

Recharge of the River Terrace groundwater is predominantly influenced by the flow of the San Juan River, which is typically higher in the summer months due to high irrigation water demands. Groundwater elevations at the River Terrace are typically approximately three to seven feet below ground surface (bgs), depending on the flow rate of the San Juan River and operation of the river terrace dewatering system.

The near surface soils in the River Terrace consist of one to two feet of silt underlain by one to two feet of fine grained sand. In some areas a six-inch clay lens exists beneath the silt layer. Beneath the fine grained sediments are medium to coarse grained sands that extend from approximately three or four feet bgs to approximately ten feet bgs. At ten feet bgs the sand transitions to coarser grained material with some gravel. Boring logs indicate that the Nacimiento Formation is present beneath the River Terrace at approximately 15 to 17 feet bgs.

4. Investigation Methods

4.1. Monitoring and Sampling Methods

4.1.1. Groundwater Levels

Depth-to-groundwater and SPH thickness measurements have been collected quarterly since 2008 to monitor groundwater elevation fluctuations over time. Since February 2010, fluid measurements were collected monthly at 47 monitoring wells for a period of five months per NMED's request to monitor groundwater elevation changes that may be influenced by the suspension of refinery process area operations which went into effect in November 2009. The three year summary data shows no significant change in groundwater elevation over time. Over the past three years, groundwater fluctuated less than one foot, with the exception of three locations within the Refinery Complex (MW-12, MW-40, and MW-39), and eight locations along the north boundary barrier.

Depth-to-groundwater and SPH thickness measurements will continue to be collected on a semi-annual basis as part of the Semi-Annual and Annual Groundwater Monitoring Event activities. The active recovery wells will be turned off and the groundwater allowed to stabilize prior to collecting depth-to-fluid measurements during each sampling event. The depth-to-groundwater and SPH thickness levels will be measured to the nearest 0.01 ft using an oil/water interface probe. The depth to groundwater and SPH thickness will be recorded relative to the surveyed well casing rim or other surveyed datum. A corrected water table elevation will be provided in wells containing SPH by adding 0.8 times the measured SPH thickness to the calculated water table elevation.

4.1.2. Groundwater Sampling

All monitoring wells scheduled for sampling during a groundwater sampling event will be sampled within 15 working days of the start of the monitoring and sampling event. In the event that groundwater sampling activities require additional time to complete, Western will contact NMED upon confirmation of the anticipated extended schedule.

4.1.3. Well Purging

Each monitoring well will be purged by removing groundwater prior to sampling in order to ensure that formation water is being sampled. Groundwater field parameters (temperature, pH, conductivity, dissolved oxygen (DO), oxidation-reduction potential (ORP), and total dissolved solids (TDS)) will be collected after purging one well volume. Total purge volume purged will be determined by monitoring groundwater pH, electrical conductance, and temperature parameters until they have stabilized to within 10 percent for three measurements.

Field parameters will be measured using an YSI hand-held instrument or equivalent, with the exception of dissolved oxygen (DO) which is monitored using a field probe. The volume of groundwater purged, the instruments used, and the readings obtained at each interval will be recorded on the field-monitoring log. Well purging and sampling will be performed using disposable bailers and/or appropriate sampling pumps.

4.1.4. Groundwater Sample Collection

Groundwater samples will be obtained from each well within 24 hours of the completion of well purging. Sample collection methods will be documented in the field monitoring reports. The samples will be transferred to the appropriate, clean, laboratory-prepared containers provided by the analytical laboratory. Sample handling and chain-of-custody procedures are described in Section 4.3. Decontamination procedures for reusable water sampling equipment are described in Section 4.1.6.

All purged groundwater and decontamination water will be disposed in the refinery wastewater treatment system upstream of the API Separator. The procedures for disposable materials are described in Section 4.1.8.

Groundwater samples intended for metals analysis will be submitted to the laboratory as total metals samples, unless otherwise noted on Table 3 of this Plan. Groundwater samples obtained for dissolved metals analysis will be filtered using disposable filters with a 0.45 micrometers mesh size that are provided by the analytical laboratory.

4.1.5. Sample Handling

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

- ❑ Neoprene, nitrile, or other protective gloves will be worn when collecting samples. New disposable gloves will be used to collect each sample.
- ❑ All samples collected for chemical analysis will be transferred into clean sample containers supplied by the analytical laboratory. The sample container will be clearly marked. Sample container volumes and preservation methods will be in accordance with the most recent standard EPA and industry accepted practices for use by accredited analytical laboratories. Sufficient sample volume will be obtained for the laboratory to complete the method-specific QC analyses on a laboratory-batch basis.
- ❑ Sample labels and documentation will be completed for each sample. Immediately after the samples are collected, they will be stored in a cooler with ice or other appropriate storage method until they are delivered to the analytical laboratory. Standard chain-of-custody procedures, as described in Section 4.3 of this Plan, will be followed for all samples collected. All samples will be submitted to the laboratory to allow the laboratory to conduct the analyses within the method holding times. At a minimum, all samples will be submitted to the laboratory within 48 hours after their collection.

The following shipping procedures will be performed during each sampling event:

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

4.1.6. Decontamination Procedures

The objective of the decontamination procedures is to minimize the potential for cross-contamination. The majority of field equipment used for groundwater sampling will be disposable and, therefore, not require decontamination. In order to prevent cross-contamination, field equipment that comes into contact with water or soil will be decontaminated between each sampling location. The decontamination procedure will consist of washing the equipment with a non-phosphate detergent solution (examples include Fantastik™, Liqui-Nox®), followed by two rinses of distilled water and air dried. Decontamination water and rinsate will be contained and disposed of the same way as purge water, as described in Section 4.1.8. Decontamination procedures and the cleaning agents used will be documented in the daily field log.

4.1.7. Field Equipment Calibration Procedures

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

If field equipment becomes inoperable, its use will be discontinued until the necessary repairs are made. Instrumentation used during sampling events will be recorded in the daily field logs.

4.1.8. Collection and Management of Investigation Derived Waste

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

4.2. Analytical Methods

Groundwater and surface water samples collected during the monitoring events will be analyzed for one or more of the following constituents:

- Volatile Organic Compounds (VOCs) by EPA Method 8260B and EPA Method 8021B;
- Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270C;
- Total and Dissolved Metals by EPA Method 6010, except mercury which will be analyzed by EPA Method 7470.
- Total Petroleum Hydrocarbons (TPH) – Gasoline Range Organics (GRO) by EPA Method 8015B;
- TPH – diesel range organics (DRO) extended (which includes TPH-DRO and TPH-MRO) by EPA Method 8015B;
- Total Dissolved Solids (TDS) by EPA Method 160.1 or field measurement;
- Electrical Conductance by EPA Method 120.1 or field measurement;
- Carbon Dioxide by EPA Method 310.1;
- General Chemistry by EPA Method 310.1 and EPA Method 300.0.

4.2.1. Target Analytes

Table 2 provides a summary of target analytes for each analytical method.

4.3. Documentation of Field Activities

4.3.1. General

Daily field activities, including observations and field procedures, will be recorded using indelible ink on field sampling forms. The original field forms will be maintained at the Bloomfield Refinery. The daily record of field activities will include the following information:

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

4.3.2. Sample Custody

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

4.4. Quality Assurance Procedures

Contract analytical laboratories will maintain internal quality assurance programs in accordance with EPA and industry accepted practices and procedures. At a minimum, the laboratories will use a combination of standards, blanks, surrogates, duplicates, matrix spike/matrix spike duplicates (MS/MSD), blank spike/blank spike duplicates (BS/BSD), and laboratory control samples to demonstrate analytical QA/QC. The laboratories will establish control limits for individual chemicals or groups of chemicals based on the long-term performance of the test methods. In addition, the laboratories will establish internal QA/QC that meets EPA's laboratory certification requirements. The specific procedures to be completed are identified in the following sections.

4.4.1. Equipment Calibration Procedures and Frequency

The laboratory's equipment calibration procedures, calibration frequency, and calibration standards will be in accordance with the EPA test methodology requirements and documented in the laboratory's quality assurance and SOP manuals. All instruments and equipment used by the laboratory will be operated, calibrated, and maintained according to manufacturers' guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance will be kept on file at the laboratory.

4.4.2. Field QA/QC Samples

Field duplicates, field blanks, equipment rinsate blanks, and trip blanks will be obtained for quality assurance during sampling activities. The samples will be handled as described in Section 4.1.5.

Field duplicate water samples will be obtained at a frequency of ten percent of the total number of samples submitted for analysis. At a minimum, one duplicate sample per sampling event will be obtained.

Field blanks will be obtained at a frequency of one per sampling event. Field blanks will be generated by filling sample containers in the field with deionized water and submitting the samples, along with the groundwater samples, to the analytical laboratory for the appropriate analyses.

Equipment rinsate blanks will be obtained for chemical analysis at the rate of one per sampling event. Rinsate samples will be generated by rinsing deionized water through unused or decontaminated sampling equipment. The rinsate sample then will be placed in the appropriate sample container and submitted with the groundwater samples to the analytical laboratory for the appropriate analyses.

Trip blanks will accompany laboratory sample bottles and shipping and storage containers intended for VOC analyses. Trip blanks will consist of a sample of analyte-free deionized water prepared by the laboratory and placed in an appropriate sample container. The trip blank will be prepared by the analytical laboratory prior to the sampling event and will be kept with the shipping containers and placed with other water samples obtained from the site each day. Trip blanks will be analyzed at a frequency of one for each shipping container of samples.

4.4.3. Laboratory QA/QC Samples

Analytical procedures will be evaluated by analyzing reagent or method blanks, surrogates, matrix spike/matrix spike duplicates (MS/MSDs), blank spike/blank spike duplicates (BS/BSDs) and/or laboratory duplicates, as appropriate for each method. The

laboratory QA/QC samples and frequency of analysis to be completed will be documented in the cited EPA or other test methodologies. At a minimum, the laboratory will analyze laboratory blanks, MS/MSDs, BS/BSDs and laboratory duplicates at a frequency of one in twenty for all batch runs requiring EPA test methods and a frequency of one in ten for non-EPA test methods. Laboratory batch QA/QC samples will be project specific.

4.4.4. Laboratory Deliverables

The analytical data package will be prepared in accordance with EPA-established Level II analytical support protocol. As stated in the Order, the following will be included in the analytical laboratory reports:

- ❑ Transmittal letter, including information about the receipt of samples, the testing methodology performed, any deviations from the required procedures, any problems encountered in the analysis of the samples, any data quality exceptions, and any corrective actions taken by the laboratory relative to the quality of the data contained in the report;
- ❑ Sample analytical results, including sampling date; date of sample extraction or preparation; date of sample analysis; dilution factors and test method identification; water sample results in consistent units (milligrams per liter or micrograms per liter ($\mu\text{g/L}$)); and detection limits for undetected analytes. Results will be reported for all field samples, including field duplicates and blanks, submitted for analysis;
- ❑ Method blank results, including reporting limits for undetected analytes;
- ❑ Surrogate recovery results and corresponding control limits for samples and method blanks (organic analyses only);
- ❑ MS/MSD and/or BS/BSD spike concentrations, percent recoveries, relative percent differences (RPDs), and corresponding control limits;
- ❑ Laboratory duplicate results for inorganic analyses, including relative percent differences and corresponding control limits;
- ❑ Sample chain-of-custody documentation;
- ❑ Holding times and conditions;
- ❑ Conformance with required analytical protocol(s);
- ❑ Instrument calibration;
- ❑ Blanks;
- ❑ Detection/quantitation limits;
- ❑ Recoveries of surrogates and/or matrix spikes (MS/MSDs);
- ❑ Variability for duplicate analyses;

- ☐ Completeness;
- ☐ Data report formats;

Data deliverables provided by the laboratory that include analysis of organic compounds will also include the following:

- ☐ A cover letter referencing the procedure used and discussing any analytical problems, deviations, and modifications, including signature from authority representative certifying to the quality and authenticity of data as reported;
- ☐ A report of sample collection, extraction, and analysis dates, including sample holding conditions,
- ☐ Tabulated results for samples in units as specified, including data qualification in conformance with EPA protocol, and definition of data descriptor codes;
- ☐ Reconstructed ion chromatograms for gas chromatograph/mass spectrometry (GC/MS) analyses for each sample and standard calibration;
- ☐ Selected ion chromatograms and mass spectra of detected target analytes (GCMS) for each sample and calibration with associated library/reference spectra;
- ☐ Gas Chromatograph/electron capture device (GC/ECD and/or gas chromatograph/flame ionization detector (GC/FID) chromatograms for each sample and standard calibration;
- ☐ Raw data quantification reports for each sample and calibrations, including areas and retention times for analytes, surrogates, and internal standards;
- ☐ A calibration data summary reporting calibration range used and a measure of linearity [include decafluorotriphenylphosphine (DFTPP) and p-bromofluorobenzene (BFB) spectra and compliance with tuning criteria for GC/MS],
- ☐ Final extract volumes (and dilutions required), sample size, wet-to-dry weight ratios, and instrument practical detection/quantitation limit for each analyte,
- ☐ Analyte concentrations with reporting units identified, including data qualification in conformance with the contract laboratory program Statement of Work (SOW) (include definition of data descriptor codes),
- ☐ Quantification of analytes in all blank analyses, as well as identification of method blank associated with each sample,
- ☐ Recovery assessments and a replicate sample summary, including all surrogate spike recovery data with spike levels/concentrations for each sample and all MS/MSD results (recoveries and spike amounts), and
- ☐ Report of tentatively identified compounds with comparison of mass spectra to library/reference spectra.

Data deliverables provided by the laboratory that include analysis of inorganic compounds will include the following:

- A cover letter referencing the procedure used and discussing any analytical problems, deviations, and modifications; including signature from authority representative certifying to the quality and authenticity of data as reported,
- Report of sample collection, digestion, and analysis dates, with sample holding conditions,
- Tabulated results for samples in units as specified, including data qualification in conformance with the contract laboratory program (CLP) statement of work (including definition of data descriptor codes),
- Results of all method QA/QC checks, including inductively coupled plasma (ICP) Interference Check Sample and ICP serial dilution results,
- Tabulation of instrument and method practical detection/quantitation limits,
- Raw data quantification report for each sample,
- A calibration data summary reporting calibration range used and a measure of linearity, where appropriate,
- Final digestate volumes (and dilutions required), sample size, and wet-to-dry weight ratios,
- Quantification of analytes in all blank analyses, as well as identification of method blank associated with each sample, and
- Recovery assessments and a replicate sample summary, including post-digestate spike analysis; all MS data (including spike concentrations) for each sample, if accomplished; all MS results (recoveries and spike amounts); and laboratory control sample analytical results).

Bloomfield Refinery will present summary tables of these data in the formats described in Section X of the NMED July 2007 Order. The raw analytical data, including calibration curves, instrument calibration data, data calculation work sheets, and other laboratory support data for groundwater monitoring samples, will be compiled and kept on file locally at Bloomfield Refinery for reference. The data will be available to NMED upon request.

4.4.5. Review of Field and Laboratory QA/QC Data

The sample data, field, and laboratory QA/QC results will be evaluated for acceptability with respect to the data quality objectives (DQOs). Each group of samples will be compared with the DQOs and evaluated using data validation guidelines contained in EPA guidance documents: *Guidance Document for the Assessment of RCRA Environmental Data Quality*, *National Functional Guidelines for Organic Data Review*, and *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, and the most recent version of SW-846, and industry-accepted QA/QC methods and procedures. The laboratory will notify the Bloomfield Refinery Project

Manager of data quality exceptions within one business day of identifying the data quality exception in order to allow for sample re-analysis, if possible.

4.4.6. Blanks, Field Duplicates, Reporting Limits and Holding Times

4.4.6.1. Blanks

The analytical results of field blanks and field rinsate blanks will be reviewed to evaluate the adequacy of the equipment decontamination procedures and the possibility of cross-contamination caused by decontamination of sampling equipment. The analytical results of trip blanks will be reviewed to evaluate the possibility for contamination resulting from the laboratory-prepared sample containers or the sample transport containers. The analytical results of laboratory blanks will be reviewed to evaluate the possibility of contamination caused by the analytical procedures. If contaminants are detected in field or laboratory blanks, the sample data will be qualified, as appropriate.

4.4.6.2. Field Duplicates

Field duplicates will consist of two samples either split from the same sample device or collected sequentially. Field duplicate samples will be collected at a minimum frequency of ten percent of the total number of samples submitted for analysis. Relative percent differences for field duplicates will be calculated. The analytical DQO for precision will be used for water duplicates.

4.4.6.3. Method Reporting Limits

Method reporting limits for sample analyses will be established at the lowest level practicable for the method and analyte concentrations and will not exceed groundwater or surface water cleanup standards and screening levels. Detection limits that exceed established standards or screening levels and are reported as “not detected” will be considered data quality exceptions and an explanation for the exceedance and its acceptability for use will be provided.

4.4.6.4. Holding Times

The sampling, extraction, and analysis dates will be reviewed to confirm that extraction and analyses were completed within the recommended holding times, as specified by EPA protocol. Appropriate data qualifiers will be noted if holding times were exceeded.

4.4.7. Representativeness and Comparability

4.4.7.1. Representativeness

Representativeness is a qualitative parameter related to the degree to which the sample data represent the relevant specific characteristics of the media sampled. Procedures will be implemented to assure representative samples are collected and analyzed, such as repeated measurements of the same parameter at the same location over several distinct

sampling events. Any procedures or variations that may affect the collection or analysis of representative samples will be noted and the data will be qualified.

4.4.7.2. Comparability

Comparability is a qualitative parameter related to whether similar sample data can be compared. To assure comparability, analytical results will be reported in appropriate units for comparison with other data (past studies, comparable sites, screening levels, and cleanup standards), and standard collection and analytical procedures will be implemented. Any procedure or variation that may affect comparability will be noted and the data will be qualified.

4.4.8. Laboratory Reporting, Documentation, Data Reduction, and Corrective Action

Upon receipt of each laboratory data package, data will be evaluated against the criteria outlined in the previous sections. Any deviation from the established criteria will be noted and the data will be qualified. A full review and discussion of analytical data QA/QC and all data qualifiers will be submitted as appendices or attachments to the groundwater monitoring reports. Data validation procedures for all samples will include checking the following, when appropriate:

- ☐ Holding times
- ☐ Detection limits
- ☐ Field equipment rinsate blanks
- ☐ Field blanks
- ☐ Field Duplicates
- ☐ Trip blanks
- ☐ Reagent blanks
- ☐ Laboratory duplicates
- ☐ Laboratory blanks
- ☐ Laboratory matrix spikes
- ☐ Laboratory matrix spike duplicates
- ☐ Laboratory blank spikes
- ☐ Laboratory blank spike duplicates
- ☐ Surrogate recoveries

If significant quality assurance problems are encountered, appropriate corrective action will be implemented. All corrective action will be reported and the corrected data will be qualified.

5. Monitoring and Sampling Program

The primary objective of groundwater monitoring is to collect data which will be used to assess groundwater quality at and near the Facility. Groundwater elevation data will also be collected to evaluate groundwater flow conditions. The groundwater monitoring program for the Facility will consist of sample collection and analysis from a series of monitoring wells, sump wells, recovery wells, piezometers, seeps, outfalls, and river locations. The monitoring network is divided into four investigation areas (Refinery Complex; North Boundary Barrier Wall; San Juan River Bluff; and San Juan River Terrace). The sampling frequency, analyses and target analytes will vary for each investigation area. The combined data from these investigation areas will be used to assess groundwater quality beneath and immediately downgradient of the Facility, and evaluate local groundwater flow conditions.

In February 2012, Western installed two monitoring wells located upgradient of the Bloomfield Refinery Complex (Figure 4). The purpose of the wells is to collect groundwater samples that would be used to evaluate naturally occurring constituents within the groundwater in the vicinity of the Refinery. The sampling activities with respect to these background wells is part of a Background Investigation Study for the facility, and therefore is not included in this Plan.

Samples will not be collected from monitoring wells that have measurable SPH. For wells that are purged dry, samples will be collected if recharge volume is sufficient for sample collection within 24 hours. Wells not sampled due to insufficient recharge will be documented in the field log. A summary of the Facility-Wide Monitoring Plan is provided in Table 3.

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

5.1. Refinery Complex

5.1.1. Sampling Locations

The following wells will be sampled within the Refinery Complex (NMED, 2007):

Background Wells

MW-3, MW-5, and MW-6

Cross-gradient Wells

MW-1, MW-13, MW-26, MW-27, MW-32, and MW-33

Refinery Area Wells

RW-1, MW-4, MW-8, RW-9, RW-15, RW-18, MW-20, MW-21, RW-23, RW-28, MW-29, MW-30, MW-31, MW-40, RW-42, RW-43, and MW-44

Downgradient Wells

MW-11, MW-12, MW-34, MW-35, MW-37, and MW-38

RCRA Investigation Wells

MW-50, MW-51, MW-52, MW-53, MW-54, MW-55, MW-56, MW-57, MW-58, MW-59, MW-60, MW-61, MW-62, MW-63, MW-64, MW-65, MW-66, MW-67, MW-68, MW-69, and MW-70

The RCRA Investigation wells will be sampled for two years annual as required by NMED (NMED, 2009). After two years, Western may propose adjusting the network of monitoring wells based on the data collected during the two sampling events. The location of the Refinery Complex monitor wells are shown in Figure 10. Information regarding the construction details of the monitor wells, including total well depth, screen interval, and top-of-casing elevation, is provided in Table 1.

Depth-to-groundwater and SPH thickness measurements will be collected from the seven sump wells (SW-1 through SW-7) following every major precipitation event. Any sump well where SPH is present will be equipped with an absorbent sock to prevent releases along the river bluff. Sump well monitoring activities will be included in the annual groundwater monitoring reports (NMED, 2008).

5.1.2. Sampling Frequency and Analyses

During each Annual Sampling Event (conducted in August of each year), groundwater samples will be collected from each selected well and analyzed for the following chemical constituents:

- ☐ VOCs;
- ☐ SVOCs (*RCRA Investigation Wells Only for two years*)
- ☐ TPH-DRO extended;
- ☐ TPH-GRO;
- ☐ Dissolved and Total Metals;
- ☐ Carbon Dioxide;
- ☐ Alkalinity (total, bicarbonate, and carbonate);
- ☐ Anions

In addition to the annual groundwater sampling, SVOCs will be collected from selected Facility perimeter wells (MW-38, MW-11, and MW-12) every two years. Analyses and target analytes are listed in Table 2. The list of sample locations and monitoring frequency is provided in Table 3.

As part of each Semi-Annual Sampling Event (conducted in April of each year), groundwater samples will be collected from monitoring well MW-1, MW-6, MW-8, MW-12, MW-13, MW-20, MW-30, MW-33, MW-35, MW-37, and MW-38. Samples will be analyzed for the target VOCs (target list). In addition, samples collected from MW-1, MW-33, MW-12, MW-37, and MW-38 will be analyzed for TPH-GRO and TPH-DRO extended.

During each sampling event, field parameters will be collected and recorded on the field data sheets. Field parameters will collected include the following:

- ☐ Electrical Conductivity
- ☐ Temperature
- ☐ pH
- ☐ Oxidation Reduction Potential
- ☐ Total dissolved solids
- ☐ Dissolved Oxygen

5.2. North Boundary Barrier

5.2.1. Sampling Locations

The following wells will be sampled within the North Boundary Barrier area:

Collection Wells

CW 0+60 and CW 25+95.

Observation Wells

OW 0+60, OW 1+50, OW 3+85, OW 5+50, OW 6+70, OW 8+10, OW 11+15, OW 14+10, OW 16+60, OW 19+50, OW 22+00, OW 23+10, OW 23+90, and OW 25+70.

Data collected from collection wells CW 0+60 and CW 25+95 will be used to monitor groundwater quality at each end of the barrier wall. The remaining collection wells along the refinery side of the North Boundary Barrier will be monitored for change in groundwater elevation and the presence of SPH, but will not be sampled. Sample collection from the observation wells eliminates the need for sampling at MW-45, MW-46, and MW-47. These wells will continue to be monitored for groundwater elevation

data and the presence of SPH. Figure 11 shows the monitoring well network for the North Boundary Barrier. Information regarding the construction details of the monitor wells, including total well depth, screen interval, and top-of-casing elevation, is provided in Table 1.

5.2.2. Sampling Frequency and Analyses

On a semi-annual basis, groundwater samples collected from collection wells CW 0+60 and CW 25+95, and from each observation well will be analyzed for the following chemical constituents, unless otherwise noted:

- VOCs (target list);
- TPH – DRO;
- TPH – GRO (Observation wells only)

Analyses and target analytes are listed in Table 2.

During each sampling event, field parameters will be collected and recorded on the field data sheets. Field parameters will collected include the following:

- Electrical Conductivity
- Temperature
- pH
- Oxidation Reduction Potential
- Total Dissolved Solids
- Dissolved Oxygen

5.3. San Juan River Bluff

5.3.1. Monitoring and Sampling Locations

Groundwater and surface water samples will be collected from the following locations along the Bluff, if water is present:

Outfalls

East Outfall #2, and East Outfall #3

Seeps

Seep 1, Seep 2, Seep 3, Seep 4, Seep 5, Seep 6, Seep 7, Seep8, and Seep 9

By February 2010, piping modifications were completed that now allows total fluid from East Outfall #1 via Tank 38 to discharge directly to the Refinery Wastewater Treatment System upstream of the API separator. Since fluids from East Outfall #1 no longer

discharge into the Raw Water Ponds, quarterly monitoring at Tank 33 is not longer needed. If in the future Western requests and receives NMED approval to return to normal operation of Tank 38 (i.e. routing the tank discharge to the Raw Water ponds), Western will follow the required sampling activities set by NMED. Figure 12 and Figure 2 show the locations of the outfalls and seeps, respectively.

Seep North of MW-45, Seep North of MW-46, and Seep North of MW-47 are general locations identified during the initial discovery of hydrocarbon releases to the river bluff several years prior. Since remedial activities began, nine specific locations have been identified as Seep 1 through Seep 9. Seep 3 and Seep 4 are secondary catchments to Seep 1. Seep 2 and Seep 5 have had historic flows, but groundwater discharge at these locations has ceased since the installation of the north boundary barrier. Currently, Seep 2, 3, 4 and Seep 5 have no current discharges of groundwater. All seep location will be visually inspected weekly to monitor active groundwater discharge along the bluff (NMED, 2008). Groundwater will be removed from any seep where analytical BTEX results exceed any of the respective screening levels.

5.3.2. Sampling Frequency and Analyses

On a semi-annual basis, samples will be collected from East Outfall #2 and East Outfall #3, and analyzed for the following chemical constituents:

- ☐ VOCs (target list);
- ☐ Total and Dissolved Metals (target list);
- ☐ Carbon Dioxide;
- ☐ Alkalinity (total, bicarbonate, and carbonate);
- ☐ Anions.

In addition, samples will be collected from Seep 1, 6, 7, 8, and 9, if sufficient water is present, on a semi-annual basis and analyzed for the following chemistry constituents:

- ☐ VOCs (target list);
- ☐ Carbon Dioxide;
- ☐ Alkalinity (total, bicarbonate, and carbonate);
- ☐ Anions.

If active discharges are present at Seep 2, 3, 4, or 5, a sample will be collected during the semi-annual sampling event and analyzed for the above parameters (NMED, 2008).

During each sampling event, field parameters will be collected and recorded on the field data sheets. Field parameters will collected include the following:

- ☐ Electrical Conductivity

- Temperature
- pH
- Oxidation Reduction Potential
- Total Dissolved Solids

Analyses and target analytes are listed in Table 2.

5.4. San Juan River Terrace

5.4.1. Sampling Locations

Groundwater and surface water samples will be collected from the following locations in the vicinity of the River Terrace and along the San Juan River:

River Terrace Monitoring Wells and Piezometers

MW-49, DW-1, TP-1, TP-2, TP-3, TP-5, TP-6, TP-7, TP-8, TP-9, TP-10, TP-11, TP-12, and TP-13.

Figure 13 shows the groundwater sampling locations at the River Terrace.

San Juan River

Upstream (approximately 1,000 feet upstream of the River Terrace), River Bank north of MW-45, River Bank north of MW-46, and Downstream (approximately 300 feet downstream of the River Terrace). Figure 14 shows the sample locations for the San Juan River.

Information regarding the construction details of the monitor wells, including total well depth, screen interval, and top-of-casing elevation, is provided in Table 1.

5.4.2. Sampling Frequency and Analyses

The sampling program detailed below has been developed to be compliant with the Final July 2007 NMED Order and is consistent with the Bioventing Monitoring Plan (Revised) River Terrace Voluntary Corrective Measures dated October 28, 2005 and the *Proposals to Modify Monitoring at the River Terrace Area* letter from NMED dated March 15, 2011 (NMED, 2011). If modifications to the Bioventing Monitoring Plan are approved by NMED that result in a change to the groundwater sampling frequency or analysis, then those approved changes will supersede the following specified activities.

Groundwater samples will be collected from MW-49, TP-1, TP-2, TP-5, TP-6, TP-8, and TP-9 during high flow and low flow operating conditions of the San Juan River. On a biannual basis (i.e. every two years), groundwater samples will be collected from DW-1, TP-3, TP-7, TP-10, TP-11, TP-12, and TP-13. Biannual samples will be collected

starting in 2011 during San Juan River low flow operating conditions. Groundwater samples will be analyzed for the following chemical constituents:

- ☐ VOCs (target list)
- ☐ TPH-GRO
- ☐ TPH-DRO extended
- ☐ Total Recoverable Metals (target list)

On a semi-annual basis (twice per year), samples will be collected from the San Juan River and analyzed for the following chemical constituents:

- ☐ VOCs (target list)
- ☐ TPH-GRO
- ☐ TPH-DRO extended
- ☐ Total and Dissolved Metals (target list)
- ☐ Alkalinity (total, carbonate and bicarbonate)
- ☐ Anions (target list).

Analyses and target analytes for the River Terrace and San Juan River samples are listed in Table 2. The analytes and sample frequency for the River Terrace monitoring wells is in compliance with NMED's letter "*Proposals to Modify Monitoring at the River Terrace Area*" dated March 15, 2011 (NMED, 2011).

During each sampling event, field parameters will be collected and recorded on the field data sheets. Field parameters that will be collected from the river terrace monitoring wells and piezometer wells include the following:

- ☐ Conductivity
- ☐ Temperature
- ☐ pH
- ☐ Oxidation Reduction Potential
- ☐ Dissolved Oxygen

Field parameters collected from the San Juan River samples include the following:

- ☐ Total Dissolved Solids
- ☐ Conductivity

Refer to Table 3 for the list of sample locations and analyses.

5.5. Monitoring Program Revisions

Upon review of the analytical results, historic facility-wide monitoring data, available soil boring data, and Nacimiento Formation elevation data, Western Refining will assess the monitoring program presented in this Plan. Revisions to the Plan, as necessary, will then be presented for agency review and approval on an annual basis prior to June 30th of each year. These revisions may include, but not be limited to, a reduction or change in monitoring locations, monitoring frequency, and/or target analytes.

6. Schedule

As discussed in Section 5.0, groundwater and surface water sampling events at the Facility have been assigned varying sampling frequencies including quarterly, semi-annual and annual. Sampling events within each site investigation area (i.e., Refinery Complex, North Boundary Barrier, Bluff Outfalls, and River Terrace) will be completed within 15 working days of the start of the event.

7. References

- NMED, 2007. New Mexico Environment Department (NMED) Hazardous Waste Bureau, *Notice of Disapproval Facility-Wide Groundwater Monitoring Plan dated October 22, 2007*.
- NMED, 2008. New Mexico Environment Department (NMED) Hazardous Waste Bureau, *Approval with Direction Facility-Wide Groundwater Monitoring Plan dated March 25, 2008*.
- NMED, 2009. New Mexico Environment Department (NMED) Hazardous Waste Bureau, *SPH Recovery at Observation Wells and Routine Facility-Wide Groundwater Monitoring dated December 21, 2009*.
- NMED, 2011. New Mexico Environment Department (NMED) Hazardous Waste Bureau, *Proposals to Modify Monitoring at the River Terrace Area dated March 15, 2011*.

Table 1
Facility-Wide Monitoring Program
Bloomfield Refinery- Bloomfield, New Mexico

Well Type	Well ID	Installation Date	Well Diameter (in)	Measuring Point Elevation (Before 2006) (ft)	Measuring Point Elevation (After 2006) (ft)	Grade Elevation ⁽¹⁾ (before 2006) (ft)	Grade Elevation ⁽¹⁾ (after 2006) (ft)	Total Well Depth (ft bgs)	Screened Interval (ft bgs)	Depth to Nacimiento Formation (ft bgs)	Elevation of Nacimiento Surface (ft above msl)
Refinery Complex											
Monitoring Well	MW-BCK1	2/1/12	2	NA	5620.14	NA	5617.508	79	60-75	See Log	See Log
Monitoring Well	MW-BCK2	2/13/12	2	NA	5517.8	NA	5516.131	60	40-60	See Log	See Log
Refinery Complex											
Monitoring Well	MW-1	2/8/84	4	5515.78	5519.21	5514.08	5517.54	22.95	2.9-22.9	22	5492.08
Monitoring Well	MW-3	2/9/84	4	5535.88	5539.27	5534.88	5538.61	38.35	18.4-38.4	40	5494.88
Monitoring Well	MW-4	2/9/84	6	5524.46	5527.78	5523.06	5526.56	31.1	11.1-31.1	32	5491.06
Monitoring Well	MW-5	2/6/84	4	5545.13	5548.56	5544.13	5547.97	50.61	30.6-50.6	47	5497.13
Monitoring Well	MW-6	2/7/84	4	5551.20	5554.61	5549.6	5553.32	48.03	28-48	49	5500.6
Monitoring Well	MW-7	2/25/86	6	5524.25	5527.66	5523.15	5526.34	61.01	49-59	32	5491.15
Monitoring Well	MW-8	2/28/86	6	5531.17	5534.58	5530.17	5533.84	33.94	11.9-31.9	34	5496.17
Monitoring Well	MW-11	7/31/87	4	5506.89	5510.31	5503.29	5507.12	21.13	6.1-16.1	10	5493.29
Monitoring Well	MW-12	8/1/87	4	5498.42	5501.61	5495.92	5499.5	11.72	1.7-11.7	10	5485.92
Monitoring Well	MW-13	9/3/88	4	5538.54	5542.04	5535.24	5539.12	49.7	28.7-44.5	45	5490.24
Monitoring Well	MW-20	9/13/91	4	5516.46	5519.9	5514.66	5517.91	25.38	8.4-23.4	24	5490.66
Monitoring Well	MW-21	9/16/91	4	5518.62	5521.99	5517.02	5520.75	29.33	12.3-27.3	24.5	5492.52
Monitoring Well	MW-25	5/11/94	6	5530.45	5533.99	5527.35	5530.92	21.31	22-36	35	5492.35
Monitoring Well	MW-26	5/12/94	6	5514.54	5517.88	5512.44	5515.73	23.15	7-21	20	5492.44
Monitoring Well	MW-27	5/18/94	4	5515.26	5518.67	5512.46	5515.78	21.69	5-20	17	5495.46
Monitoring Well	MW-29	5/12/94	4	5521.55	5524.97	5518.55	5522.07	25.74	10-24	23	5495.55
Monitoring Well	MW-30	5/13/94	4	5533.42	5536.83	5531.42	5534.81	38.16	21-36	35	5496.42
Monitoring Well	MW-31	5/15/94	4	5532.17	5536.24	5530.57	5534.66	37.62	21-35	34	5496.57
Monitoring Well	MW-32	2/23/95	4	5522.22	5525.64	5521.42	5524.95	26.74	10.7-24.7	25	5496.42
Monitoring Well	MW-33	2/23/95	4	5518.46	5521.79	5515.86	5519.85	22.95	6.9-20.9	20	5495.86
Monitoring Well	MW-34	2/23/95	4	5508.23	5511.63	5505.53	5509.21	18.32	2.3-16.3	14	5491.53
Monitoring Well	MW-35	4/29/97	2	5512.39	5518.95	N/A	5516.25	23.1	13.1-23.1	21.5	5494.75
Monitoring Well	MW-36	4/29/97	2	5510.56	5516.95	N/A	5514.16	21	11-21.2	21.5	5492.66
Monitoring Well	MW-37	5/1/97	2	5513.04	5519.62	N/A	5516.89	25	15-25	22	5494.89
Monitoring Well	MW-38	4/29/97	2	5512.87	5519.19	N/A	5516.65	23.5	13.5-23.5	22	5494.65
Monitoring Well	MW-39	9/28/98	2	5522	5520.83	N/A	5519.1	36	N/A	22	5497.1
Monitoring Well	MW-40	3/11/97	2	5526.21	5527.31	5521.45	5527.86	34.5	N/A	31.5	5496.36
Monitoring Well	MW-41	3/12/97	2	5525.13	5526.41	5529.88	5527.07	33.00	N/A	30.00	5497.07
Monitoring Well	MW-44	10/1/98	2	5536.00	5535.44	5535.94	5532.27	47.50	N/A	33.50	5498.77
Monitoring Well	MW-45	1/15/03	4	5506.36	5506.36	5496.33	5504.40	17.80	4.0-14.0	N/A	N/A
Monitoring Well	MW-46	1/16/03	4	5504.65	5504.65	5496.43	5503.03	10.39	3.2-8.2	10.50	5492.53
Monitoring Well	MW-47	3/6/03	2	5506.77	5506.77	5501.30	5504.15	12.80	6.1-11.1	11.30	5492.85
Piezometers	P-01	8/30/88	4	5524.49	N/A	5523.69	N/A	41.65	20.5-36.5	36.50	5487.19
Piezometers	P-02	8/29/88	4	5523.86	N/A	5523.06	N/A	37.53	16.9-32.2	31.50	5491.56
Piezometers	P-03	9/1/88	4	5507.31	5510.77	5506.51	5510.34	22	6.2-16.6	14	5492.51
Recovery Well	RW-1	8/31/88	4	5526.01	5529.34	5524.61	5527.93	39.58	17.4-33	32.6	5492.01
Recovery Well	RW-2	8/29/88	4	5523.61	5526.94	5523.11	5526.42	25.4	16.5-32.2	32	5491.11
Recovery Well	RW-3	3/4/86	6	5516.96	5520.35	5515.56	5519.28	32.53	10.5-30.5	23	5492.56
Recovery Well	RW-9	3/3/86	6	5519.77	5523.21	5518.07	5521.23	32.29	10.3-30.3	28.3	5489.77
Recovery Well	RW-14	8/6/90	4	5534.13	5537.5	5532.23	5535.19	41.1	21.1-39.1	38.5	5493.73
Recovery Well	RW-15	8/7/90	4	5533.44	5536.83	5531.74	5534.56	41.7	21.7-39.7	35	5496.74
Recovery Well	RW-16	8/7/90	4	5532.09	5535.45	5530.29	5533.22	41.3	21.3-39.3	37.5	5492.79
Recovery Well	RW-17	8/7/90	4	5530.46	5533.84	5528.86	5532.01	39.95	19.9-35.3	35.3	5493.56
Recovery Well	RW-18	8/9/90	4	5526.08	N/A	5523.48	N/A	N/A	17.3-35.3	29	5494.48

Table 1
Facility-Wide Monitoring Program
Bloomfield Refinery- Bloomfield, New Mexico

Well Type	Well ID	Installation Date	Well Diameter (in)	Measuring Point Elevation (Before 2006) (ft)	Measuring Point Elevation (After 2006) (ft)	Grade Elevation ⁽¹⁾ (before 2006) (ft)	Grade Elevation ⁽¹⁾ (after 2006) (ft)	Total Well Depth (ft bgs)	Screened Interval (ft bgs)	Depth to Nacimiento Formation (ft bgs)	Elevation of Nacimiento Surface (ft above msl)
Recovery Well	RW-19	8/8/90	4	5527.27	5530.51	5525.77	5528.75	35.2	15.2-33.2	33	5492.77
Recovery Well	RW-22	7/19/93	6	5521.06	5524.44	5518.05	5521.44	35.6	14.7-30.7	27	5491.05
Recovery Well	RW-23	7/19/93	6	5517.74	5521.38	5515.74	5519.13	35.53	15.4-31.4	29	5486.74
Recovery Well	RW-28	5/13/94	4	5524.52	5527.93	5522.52	5525.69	35.15	18-33	32	5490.52
Recovery Well	RW-42	3/11/97	2	5527.48	5527.48	5529.80	5526.98	35.00	25-35	31.50	5495.98
Recovery Well	RW-43	9/25/98	2	NA	5515.74	5522.18	5519.44	25.00	15-25	22.80	5492.94
Monitoring Well	MW-50	9/25/08	4	NA	5518.79	NA	5515.87	20.00	8-18	18.50	5497.37
Monitoring Well	MW-51	9/25/08	4	NA	5515.58	NA	5512.88	20.00	8-18	18.50	5494.38
Monitoring Well	MW-52	10/14/08	4	NA	5538.63	NA	5535.91	41.00	23-38	38.00	5497.91
Monitoring Well	MW-53	9/23/08	4	NA	5541.32	NA	5538.46	41.50	25-40	39.00	5499.46
Monitoring Well	MW-54	9/26/08	4	NA	5530.08	NA	5527.35	38.00	22-37	34.00	5493.35
Monitoring Well	MW-55	4/2/09	4	NA	5519.84	NA	5519.94	27.25	11-26	26.00	5493.94
Monitoring Well	MW-56	4/1/09	4	NA	5519.31	NA	5516.74	23.75	7-22	20.00	5496.74
Monitoring Well	MW-57	3/31/09	4	NA	5521.17	NA	5518.46	24.25	8-23	23.00	5495.46
Monitoring Well	MW-58	4/3/09	4	NA	5520.29	NA	5520.47	27.00	10.75-25.75	25.75	5494.72
Monitoring Well	MW-59	4/6/09	4	NA	5545.20	NA	5542.37	44.25	28-43	42.50	5499.87
Monitoring Well	MW-60	4/5/09	4	NA	5543.71	NA	5544.01	45.50	28.75-43.75	43.75	5500.26
Monitoring Well	MW-61	4/15/09	4	NA	5539.41	NA	5539.59	10.25	24-39	38.00	5501.59
Monitoring Well	MW-62	4/21/09	4	NA	5561.32	NA	5558.56	58.25	42-57	55.50	5503.06
Monitoring Well	MW-63	4/14/09	4	NA	5547.26	NA	5544.49	46.00	29.75-44.75	44.75	5499.74
Monitoring Well	MW-64	4/7/09	4	NA	5552.29	NA	5549.11	50.25	34-49	48.00	5501.11
Monitoring Well	MW-65	4/16/09	4	NA	5539.52	NA	5539.90	44.25	28-43	42.00	5497.90
Monitoring Well	MW-66	4/20/09	4	NA	5544.63	NA	5541.98	43.25	27-42	41.00	5500.98
Monitoring Well	MW-67	8/26/10	4	NA	5523.31	NA	5520.54	23.00	12-22	21.25	5499.29
Monitoring Well	MW-68	8/27/10	4	NA	5517.37	NA	5514.30	18.00	7-17	17.00	5497.30
Monitoring Well	MW-69	8/31/10	4	NA	5508.51	NA	5505.20	9.75	3.5-8.5	8.00	5497.20
Monitoring Well	MW-70	01/30/12	2	NA	5527.96	NA	5524.78	26.25	15-25	23.80	5500.98
North Barrier Wall											
Observation Well	OW 0+60	4/2005	2	5508.75	5506.62	5505.97	5506.75	12	4-12	12	5494.62
Observation Well	OW 1+50	4/2005	2	5508	5508.03	5504.6	5505.63	12	7-12	12	5496.03
Observation Well	OW 3+85	4/2005	2	5506.81	5507.31	5503.87	5505.09	14	7.5-12.5	12.5	5494.81
Observation Well	OW 5+50	4/2005	2	5507.14	5507.59	5503.87	5504.84	10.7	5.7-10.7	9.5	5498.09
Observation Well	OW 6+70	4/2005	2	5504.23	5504.78	5501.32	5502.14	13.5	7.5-13.5	13	5491.78
Observation Well	OW 8+10	4/2005	2	5506	5506.53	5503.15	5504.27	13	7-13	7	5499.53
Observation Well	OW 11+15	4/2005	2	5506.77	5506.7	5503.67	5504.07	13.5	6-13.5	9	5497.7
Observation Well	OW 14+10	4/2005	2	5507.36	5508.14	5504.51	5505.73	10	5-10	9	5499.14
Observation Well	OW 16+60	4/2005	2	5507.8	5508.43	5504.21	5505.42	12.5	7.5-12.5	12	5496.43
Observation Well	OW 19+50	4/2005	2	5507.24	5508.03	5504.14	5505.25	10	5-10	10	5498.03
Observation Well	OW 22+00	4/2005	2	5506.32	5506.91	5506.32	5506.97	14	9-14	12	5494.91
Observation Well	OW 23+10	4/2005	2	5510.66	5514.12	5510.16	5511.24	15	5-15	14	5500.12
Observation Well	OW 23+90	4/2005	2	5511.15	5515.18	5511.15	5512.17	15	10-15	13.5	5501.68
Observation Well	OW 25+70	4/2005	2	5508.56	5509	5508.01	5506.88	11	6-11	10	5499
Collection Well	CW 0+60	4/2005	6	5507.04	5506.68	5506.08	5507.01	14	4-14	12	5494.68
Collection Well	CW 1+50	4/2005	6	5505	5505.13	5504.4	5505.47	13	3-13	11	5494.13
Collection Well	CW 3+85	4/2005	6	5504.94	5503.87	5503.25	5504.11	13.5	3.5-13.5	11	5492.87
Collection Well	CW 5+50	4/2005	6	5503.23	5503.76	5504.17	5503.16	12.5	3.5-12.5	10	5493.76
Collection Well	CW 6+70	4/2005	6	5504.21	5503.84	5503.26	5504.11	12	4-12	9	5494.84
Collection Well	CW 8+10	4/2005	6	5503.96	5504.02	5503.33	5504.14	12	4-12	9.5	5494.52

Table 1
Facility-Wide Monitoring Program
Bloomfield Refinery- Bloomfield, New Mexico

Well Type	Well ID	Installation Date	Well Diameter (in)	Measuring Point Elevation (Before 2006) (ft)	Measuring Point Elevation (After 2006) (ft)	Grade Elevation ⁽¹⁾ (before 2006) (ft)	Grade Elevation ⁽¹⁾ (after 2006) (ft)	Total Well Depth (ft bgs)	Screened Interval (ft bgs)	Depth to Nacimiento Formation (ft bgs)	Elevation of Nacimiento Surface (ft above msl)
Collection Well	CW 8+45	4/2005	6	5504.77	5503.8	5503.67	5504.09	13.3	3.3-13.3	9.5	5494.3
Collection Well	CW 11+15	4/2005	6	5504.69	5503.95	5503.73	5504.34	12.5	2.5-12.5	9	5494.95
Collection Well	CW 14+10	4/2005	6	5505.68	5504.39	5503.97	5504.69	13.5	3.5-13.5	9.5	5494.89
Collection Well	CW 16+60	4/2005	6	5505.72	5504.32	5504.02	5504.59	13.5	3.5-13.5	10	5494.32
Collection Well	CW 19+50	4/2005	6	5507.48	5504.52	5509.23	5504.75	11	3-11	8	5496.52
Collection Well	CW 22+00	4/2005	6	5510.82	5508.04	5510.16	5508.26	13.5	3.5-13.5	8	5500.04
Collection Well	CW 23+10	4/2005	6	5507.65	5510.04	5506.72	5510.27	15	5-15	13	5497.04
Collection Well	CW 23+90	4/2005	6	5507.65	5507.32	5506.72	5507.71	12	4-12	13	5494.32
Collection Well	CW 25+95	4/2005	6	5507	5505.9	5505.19	5505.89	11	3-11	13	5492.9
San Juan River Bluff											
Sump Well	SW1-0206	2/20/06	4	N/A	5508.27	N/A	5505.87	53	21-51	13.5	5494.77
Sump Well	SW2-0206	2/6/06	4	N/A	5507.75	N/A	5505.25	27	5-25	10	5497.75
Sump Well	SW3-0206	2/17/06	4	N/A	5505.29	N/A	5503.18	51.5	20-50	7.75	5497.54
Sump Well	SW4-0206	2/16/06	4	N/A	5504.45	N/A	5502.13	42	9.5-39.5	11	5493.45
Sump Well	SW5-0206	2/15/06	4	N/A	5514.34	N/A	5511.94	52	19-49	27.25	5487.09
Sump Well	SW6-0206	2/13/06		N/A	5519.72	N/A	5517.63	40	15-45	31.75	5487.97
Sump Well	SW7-0206	2/22/06	4	N/A	5508.42	N/A	5505.78	30	4-24	11	5497.42
San Juan River Terrace											
Monitoring Well	MW-48	10/28/04	4	5421.37	5424.83	5418.48	5422.21	15	5-15	N/A	N/A
Monitoring Well	MW-49	10/28/04	4	5421.22	5425.2	5418.07	5422.52	15	4-14	N/A	N/A
Dewatering Well	DW-1	8/16/05	4	5423.80	5422.97	N/A	5420.73	15.62	5-14	N/A	N/A
Dewatering Well	DW-2	8/18/05	4	N/A	5423.81	N/A	5422.67	14	4-14	N/A	N/A
Temporary Piezometer	TP-1	10/28/04	2	5422.03	5422.03	5421.13	N/A	9	4-9	N/A	N/A
Temporary Piezometer	TP-2	10/28/04	2	N/A	N/A	N/A	N/A	9	4-9	N/A	N/A
Temporary Piezometer	TP-3	10/28/04	2	5423.88	5423.88	5422.66	N/A	9	4-9	N/A	N/A
Temporary Piezometer	TP-5	10/28/04	2	5422.83	5422.83	5422.00	N/A	8	N/A	N/A	N/A
Temporary Piezometer	TP-6	10/28/04	2	5422.56	5422.55	5421.40	N/A	10	5-10	N/A	N/A
Temporary Piezometer	TP-7	10/28/04	2	5422.00	5421.99	5420.90	N/A	10	5-10	N/A	N/A
Temporary Piezometer	TP-8	10/28/04	2	5422.52	5422.52	5421.13	N/A	10	5-10	N/A	N/A
Temporary Piezometer	TP-9	4/5/05	2	5422.14	5422.14	5421.55	N/A	10	5-10	N/A	N/A
Temporary Piezometer	TP-10	4/5/05	2	5422.56	5422.56	5422.56	N/A	8.5	3.5-8.5	N/A	N/A
Temporary Piezometer	TP-11	4/5/05	2	N/A	N/A	N/A	N/A	9.5	4.5-9.5	N/A	N/A
Temporary Piezometer	TP-12	4/5/05	2	5424.97	5424.97	5424.97	N/A	12	7-12	N/A	N/A
Temporary Piezometer	TP-13	4/5/05	2	5423.88	5423.88	5423.88	N/A	14.5	4.5-14.5	N/A	N/A

Notes:

ft = feet

in = inches

bgs = below grade surface

msl = mean sea level

N/A = not available

(1) Top of casing elevations well resurveyed in 2006

TABLE 2
Analytical Methods and Target Analytes
Facility-Wide Groundwater Monitoring Plan - June 2012
Western Refining Southwest, Inc. - Bloomfield Refinery

VOCs (EPA Method 8260B) ⁽¹⁾
- Target List
<i>Benzene</i>
<i>Toluene</i>
<i>Ethylbenzene</i>
<i>Xylenes</i>
<i>Methyl tert butyl ether (MTBE)</i>
SVOCs - (EPA Method 8270)
- Method List
TPH-GRO (EPA Method 8015B)
- Gasoline Range Organics
TPH-DRO (EPA Method 8015B)
- Diesel Range Organics
- Motor Oil Range Organics
Total Carbon Dioxide (Laboratory Calculated)
- Dissolved CO ₂
Specific Conductivity (EPA Method 120.1 or field measurement)
- Specific conductance
TDS (EPA Method 160.1 or field measurement)
- Total dissolved solids
General Chemistry - Anions (EPA Method 300.0)
<i>Fluoride</i>
<i>Chloride</i>
<i>Bromide</i>
<i>Nitrogen, Nitrite (as N)</i>
<i>Nitrogen, Nitrate (as N)</i>
<i>Phosphorous, Orthophosphate (As P)</i>
<i>Sulfate</i>
General Chemistry - Alkalinity (EPA Method 310.1)
<i>Alkalinity, Total</i>
<i>Carbonate</i>
<i>Bicarbonate</i>

Total Recoverable Metals (EPA Method 6010B/7470)
- Target List (not applicable to River Terrace Sampling Events)

<i>Arsenic</i>	<i>Lead</i>
<i>Barium</i>	<i>Mercury</i>
<i>Cadmium</i>	<i>Selenium</i>
<i>Chromium</i>	<i>Silver</i>

- Target List (for River Terrace Sampling Events Only)

Lead
Mercury (DW-I ONLY)

Dissolved Metals (EPA Method 6010B / 7470)

- Target List (for Refinery Complex, Outfalls, and River)

<i>Arsenic</i>	<i>Manganese</i>
<i>Barium</i>	<i>Mercury</i>
<i>Cadmium</i>	<i>Potassium</i>
<i>Calcium</i>	<i>Selenium</i>
<i>Chromium</i>	<i>Silver</i>
<i>Copper</i>	<i>Sodium</i>
<i>Iron</i>	<i>Uranium</i>
<i>Lead</i>	<i>Zinc</i>
<i>Magnesium</i>	

TPH = total petroleum hydrocarbons

GRO = gasoline range organics

VOCs = volatile organic compounds

DRO = diesel range organics

TDS = total dissolved solids

NOTES:

- (1) VOCs Target List for River Terrace samples are analyzed by EPA Method 8021B per NMED's letter Approval with Direction dated June 16, 2009.
- (2) Target List for San Juan River Terrace Monitoring Wells and Piezometer Wells only, per the River Terrace Bioventing System Monitoring Plan.

TABLE 3
Facility-Wide Monitoring Plan - June 2012
Western Refining Southwest, Inc. - Bloomfield Refinery

Well ID	Sampling Event	VOCs (EPA Method 8260)	VOCs - Target List ⁽¹⁾⁽²⁾ (EPA Method 8260)	SVOCs (EPA Method 8270)	TPH - Diesel Range Organics Extended (EPA Method 8015B)	TPH - Gasoline Range Organics (EPA Method 8015B)	Total Recoverable Metals - Target List (EPA Method 6010/7470)	Total Dissolved Metals - Target List (EPA Method 6010/7470)	General Chemistry - Alkalinity (EPA Method 310.1)	General Chemistry - Anions (EPA Method 300.0)	Carbon Dioxide (EPA Method 310.1)	Total Dissolved Solids (TDS) (EPA Method 180.1 or Field Measurement)	Specific Conductance (EPA Method 120.1 or Field Measurement)	Temperature, pH, ORP (Field Measurement)	Dissolved Oxygen (Field Measurement)
REFINERY COMPLEX															
Background Wells															
MW-3	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-5	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-6	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
Refinery Wells															
RW-1	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-4	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-8	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-9	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-15	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-18	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-20	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-21	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-23	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-28	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-29	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-30	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-31	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-40	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-42	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-43	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-44	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
Cross-Gradient Wells															
MW-1	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-13	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-26	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-27	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-32	Semi-Annual Event (April)														
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-33	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X

TABLE 3
Facility-Wide Monitoring Plan - June 2012
Western Refining Southwest, Inc. - Bloomfield Refinery

Well ID	Sampling Event	VOCs (EPA Method 8260)	VOCs - Target List ⁽¹⁾⁽²⁾ (EPA Method 8260)	SVOCs (EPA Method 8270)	TPH - Diesel Range Organics Extended (EPA Method 8015B)	TPH - Gasoline Range Organics (EPA Method 8015B)	Total Recoverable Metals - Target List (EPA Method 6010/7470)	Total Dissolved Metals - Target List (EPA Method 6010/7470)	General Chemistry - Alkalinity (EPA Method 310.1)	General Chemistry - Anions (EPA Method 300.0)	Carbon Dioxide (EPA Method 310.1)	Total Dissolved Solids (TDS) (EPA Method 160.1 or Field Measurement)	Specific Conductance (EPA Method 120.1 or Field Measurement)	Temperature, pH, ORP (Field Measurement)	Dissolved Oxygen (Field Measurement)
Downgradient Wells															
MW-11	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X***	X	X	X	X	X	X	X	X	X	X	X
MW-12	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X		X***	X	X	X	X	X	X	X	X	X	X	X
MW-34	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-35	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-37	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-38	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X		X***	X	X	X	X	X	X	X	X	X	X	X
RCRA Investigation Wells															
MW-50 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-51 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-52 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-53 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-54 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-55 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-56 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-57 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-58 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-59 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-60 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-61 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-62 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-63 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-64 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-65 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-66 *	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-67 **	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-68 **	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-69 **	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-70 ****	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X

TABLE 3
Facility-Wide Monitoring Plan - June 2012
Western Refining Southwest, Inc. - Bloomfield Refinery

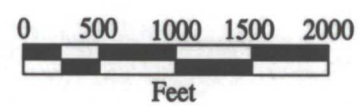
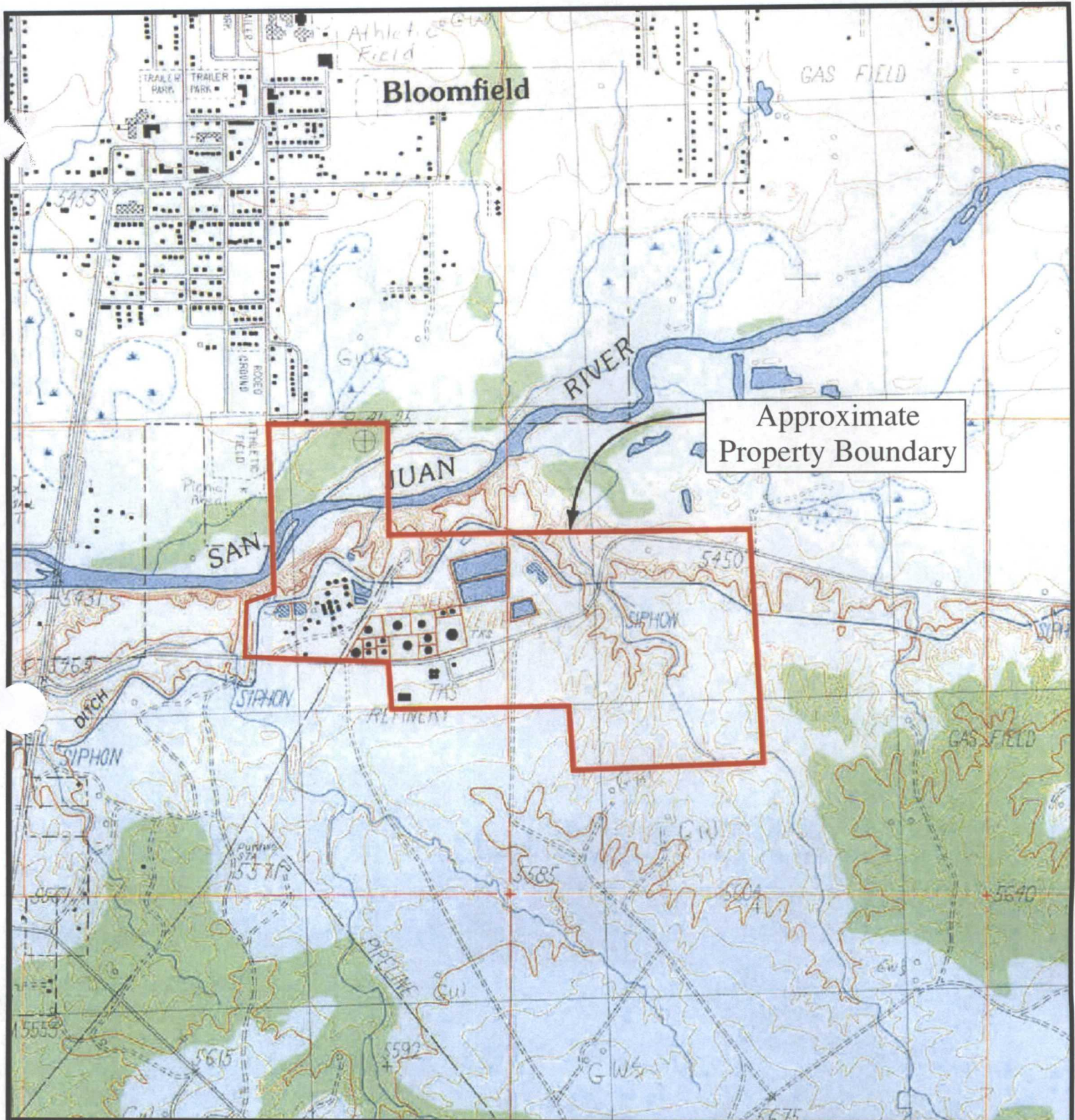
Well ID	Sampling Event	VOCs (EPA Method 8260)	VOCs - Target List ⁽¹⁾⁽²⁾ (EPA Method 8260)	SVOCs (EPA Method 8270)	TPH - Diesel Range Organics Extended (EPA Method 8015B)	TPH - Gasoline Range Organics (EPA Method 8015B)	Total Recoverable Metals - Target List (EPA Method 6010/7470)	Total Dissolved Metals - Target List (EPA Method 6010/7470)	General Chemistry - Alkalinity (EPA Method 310.1)	General Chemistry - Anions (EPA Method 300.0)	Carbon Dioxide (EPA Method 310.1)	Total Dissolved Solids (TDS) (EPA Method 160.1 or Field Measurement)	Specific Conductance (EPA Method 120.1 or Field Measurement)	Temperature, pH, ORP (Field Measurement)	Dissolved Oxygen (Field Measurement)
NORTH BOUNDARY BARRIER															
Collection Wells															
CW 0+60	Semi-Annual Event (April)		X		X							X	X	X	X
	Annual Event (August)		X		X							X	X	X	X
CW 25+95	Semi-Annual Event (April)		X		X							X	X	X	X
	Annual Event (August)		X		X							X	X	X	X
Observation Wells															
OW 0+60	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 1+50	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 3+85	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 5+50	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 6+70	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 8+10	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 11+15	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 14+10	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 16+60	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 19+50	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 22+00	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 23+10	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 23+90	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 25+70	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
Sump Wells ⁽³⁾															
SW-1	Major Precipitation Event	(No Sampling; Collection of Groundwater and SPH Levels Only)													
SW-2	Major Precipitation Event	(No Sampling; Collection of Groundwater and SPH Levels Only)													
SW-3	Major Precipitation Event	(No Sampling; Collection of Groundwater and SPH Levels Only)													
SW-4	Major Precipitation Event	(No Sampling; Collection of Groundwater and SPH Levels Only)													
SW-5	Major Precipitation Event	(No Sampling; Collection of Groundwater and SPH Levels Only)													
SW-6	Major Precipitation Event	(No Sampling; Collection of Groundwater and SPH Levels Only)													
SW-7	Major Precipitation Event	(No Sampling; Collection of Groundwater and SPH Levels Only)													
SAN JUAN RIVER BLUFF															
Outfalls															
East Outfall #2	Semi-Annual Event (April)		X				X	X	X	X	X	X	X	X	
	Annual Event (August)		X				X	X	X	X	X	X	X	X	
East Outfall #3	Semi-Annual Event (April)		X				X	X	X	X	X	X	X	X	
	Annual Event (August)		X				X	X	X	X	X	X	X	X	
Seeps															
Seep 1	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 2 ⁽⁴⁾	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 3 ⁽⁴⁾	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	

TABLE 3
Facility-Wide Monitoring Plan - June 2012
Western Refining Southwest, Inc. - Bloomfield Refinery

Well ID	Sampling Event	VOCs (EPA Method 8260)	VOCs - Target List ⁽¹⁾⁽²⁾ (EPA Method 8260)	SVOCs (EPA Method 8270)	TPH - Diesel Range Organics Extended (EPA Method 8015B)	TPH - Gasoline Range Organics (EPA Method 8015B)	Total Recoverable Metals - Target List (EPA Method 6010/7470)	Total Dissolved Metals - Target List (EPA Method 6010/7470)	General Chemistry - Alkalinity (EPA Method 310.1)	General Chemistry - Anions (EPA Method 300.0)	Carbon Dioxide (EPA Method 310.1)	Total Dissolved Solids (TDS) (EPA Method 160.1 or Field Measurement)	Specific Conductance (EPA Method 120.1 or Field Measurement)	Temperature, pH, ORP (Field Measurement)	Dissolved Oxygen (Field Measurement)
Seep 4 ⁽⁴⁾	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 5 ⁽⁴⁾	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 6	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 7	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 8	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 9	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
SAN JUAN RIVER TERRACE															
Monitoring Wells															
MW-49 ⁵	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
DW-1	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
Piezometers															
TP-1 ⁵	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-2 ⁵	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-3 ⁶	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-5 ⁵	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-6 ⁵	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-7 ⁶	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-8 ⁵	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-9 ⁵	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-10 ⁶	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-11 ⁶	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-12 ⁶	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-13 ⁶	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
San Juan River															
Upstream	Semi-Annual Event (April)		X		X	X	X	X	X	X		X	X		
	Annual Event (August)		X		X	X	X	X	X	X		X	X		
North of MW#46	Semi-Annual Event (April)		X		X	X	X	X	X	X		X	X		
	Annual Event (August)		X		X	X	X	X	X	X		X	X		
North of MW#45	Semi-Annual Event (April)		X		X	X	X	X	X	X		X	X		
	Annual Event (August)		X		X	X	X	X	X	X		X	X		
Downstream	Semi-Annual Event (April)		X		X	X	X	X	X	X		X	X		
	Annual Event (August)		X		X	X	X	X	X	X		X	X		

Notes:

1. Refer to Table 2 for respective Target Analyte Lists.
 2. VOC target list analytes for River Terrace sample are analyzed by EPA Method 8021B, as stated in Table 1 of NMED's letter dated April 18, 2007.
 3. Groundwater and SPH levels are monitored in each sump well following each major precipitation event (NMED, 2008).
 4. A sample will be collected at this location during a semi-annual sampling event if an active groundwater discharge is present (NMED, 2008).
 5. Samples will be collected during San Juan River low flow and high flow conditions.
 6. Biannual sampling events (occurring once every two years) will be conducted during San Juan River low flow conditions.
- * = Wells were recently installed and therefore require sampling for two years on an annual basis (i.e. included in the 2010 and 2011 annual sampling event).
 ** = Wells were installed in 2010 and therefore require sampling for two years on an annual basis (i.e. included in the 2011 and 2012 annual sampling events).
 *** = Samples for SVOC analysis will be collected every two years.
 **** = Well was installed in 2012 and therefore requires sampling for two years on an annual basis.



Site Location Map

Bloomfield Refinery
Facility-Wide Groundwater
Monitoring Plan

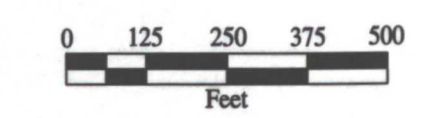
June 2012

Figure 1



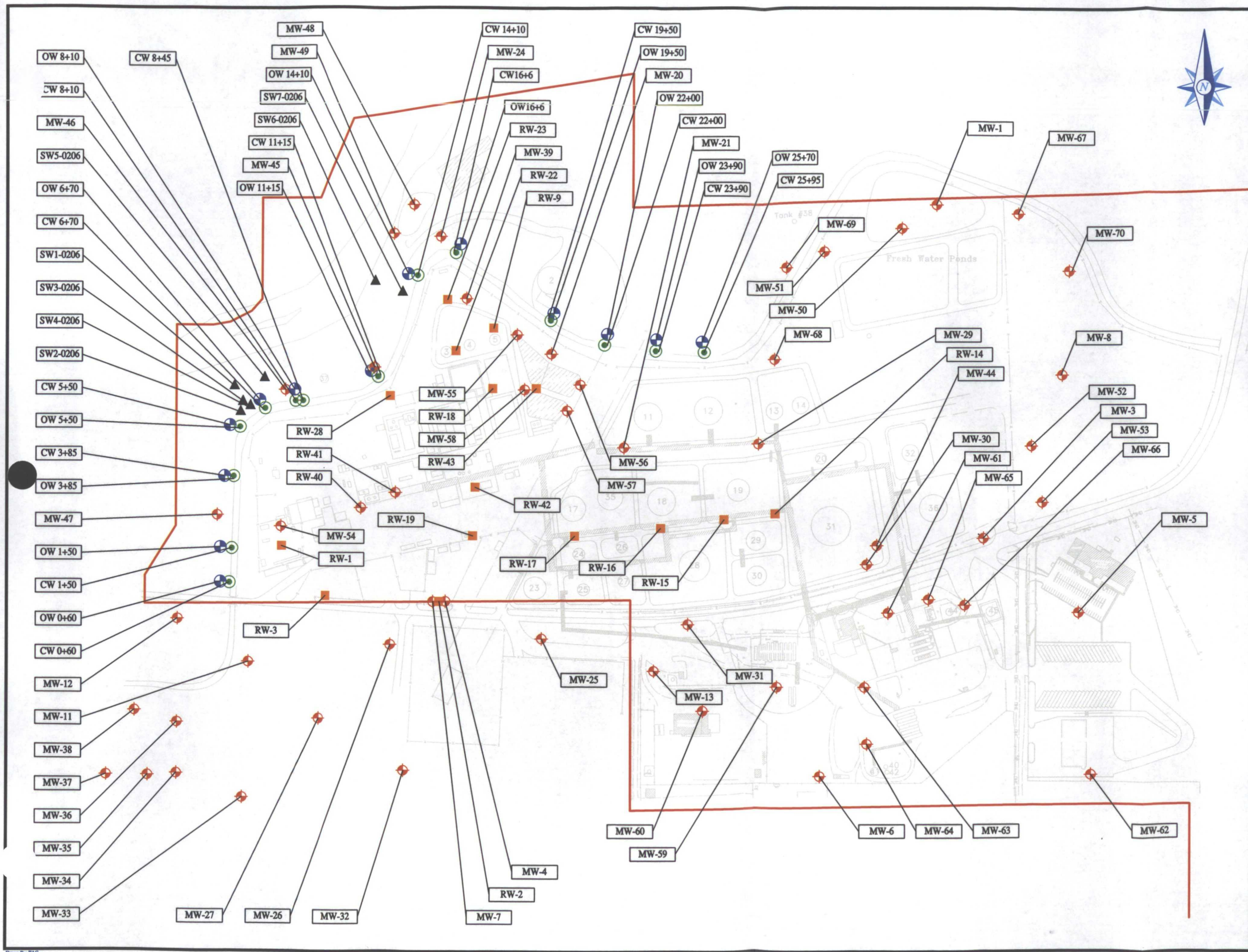
Legend

- Site Well
- Injection Well
- ▲ Seep
- ⊕ Temporary Piezometer
- Discharge Location
- Approximate Property Line

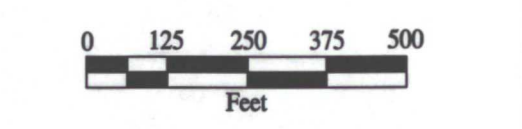


Site Plan

Bloomfield Refinery Facility-Wide Groundwater Monitoring Plan



- Legend
- Monitoring Well
 - Observation Well
 - Recovery Well
 - Collection Well
 - Sump Well
 - Site
 - Approximate Property Line
- Well ID



Refinery Complex, North Boundary Barrier, and San Juan River Bluff
Well Location Map
Bloomfield Refinery
Facility-Wide Groundwater Monitoring Plan



Aerial Map Source: Google Maps, 2008 DigitalGlobe.

0 500
SCALE IN FEET

LEGEND

MW-BCK1 X BACKGROUND MONITORING WELL LOCATION AND IDENTIFICATION NUMBER

--- WESTERN PROPERTY BOUNDARY

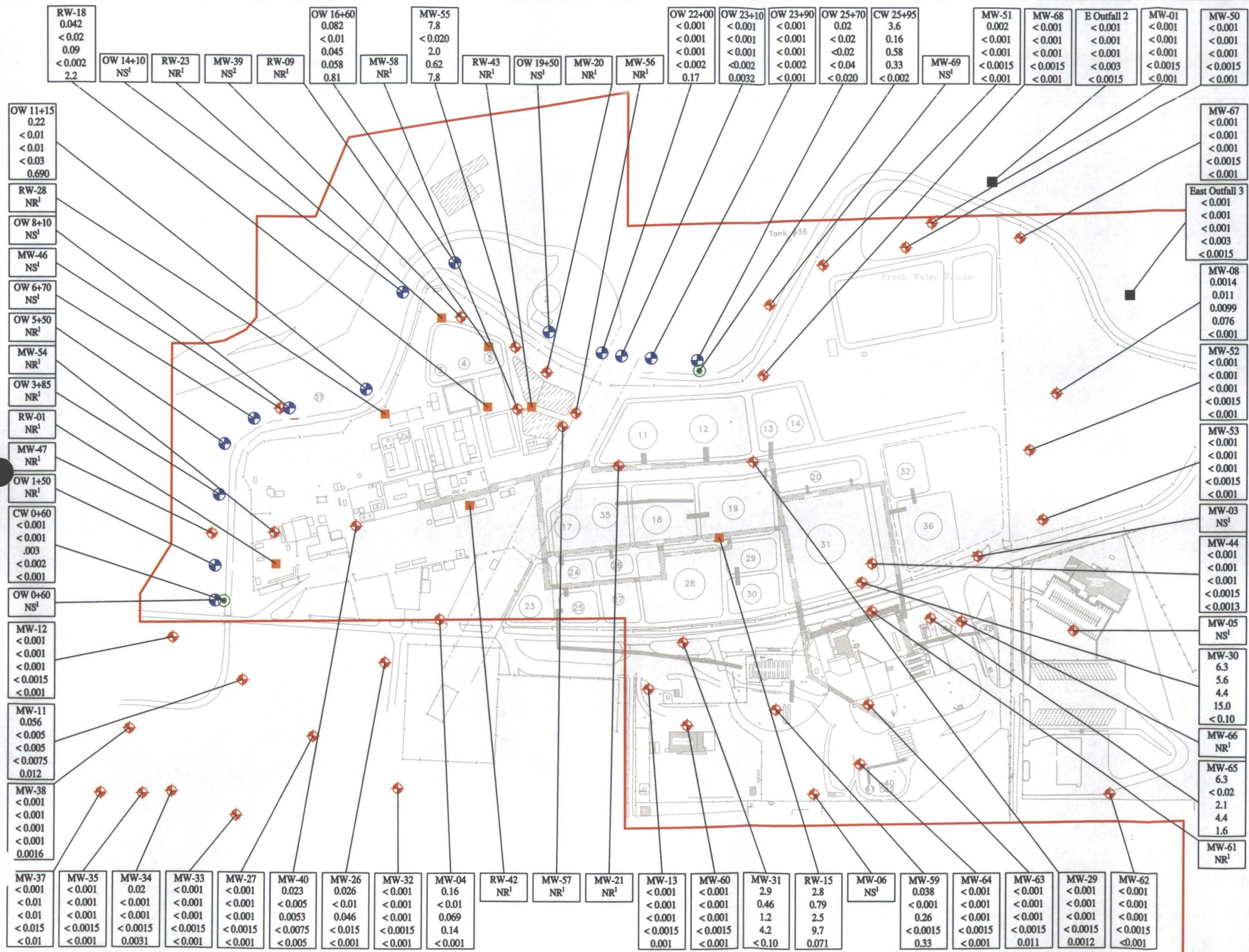
Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 06/27/12 | FILE: WestRefB150

FIGURE 4
BACKGROUND MONITORING WELL LOCATIONS
BLOOMFIELD REFINERY
FACILITY-WIDE MONITORING PLAN
JUNE 2012

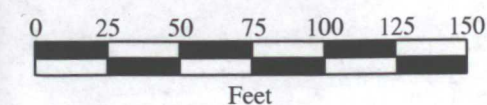
RPS Cielo Center
1250 S. Capital of Texas Highway
Building 3, Suite 200
Austin, Texas 78746
TBPE No. 1298

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© Google Maps 2011



LEGEND

- MW-1 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- DW-1 ○ DEWATERING WELL LOCATION AND IDENTIFICATION NUMBER
- TP-1 ⊕ TEMP PIEZOMETER LOCATION AND IDENTIFICATION NUMBER
- ~~~~~ SLURRY BARRIER WALL
- +—+—+— FENCE



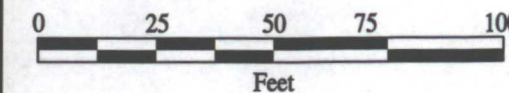
Area Location Map



River Terrace Well
Location Map
Bloomfield Refinery
Facility-Wide Groundwater
Monitoring Plan

June 2012

Figure 6



LEGEND

MW - Monitoring Well
TP - Temporary Piezometer
DW - Dewatering Well

B - Benzene
T - Toluene
E - Ethylbenzene
X - Xylene

All Concentrations in Milligrams
per liter (mg/l)

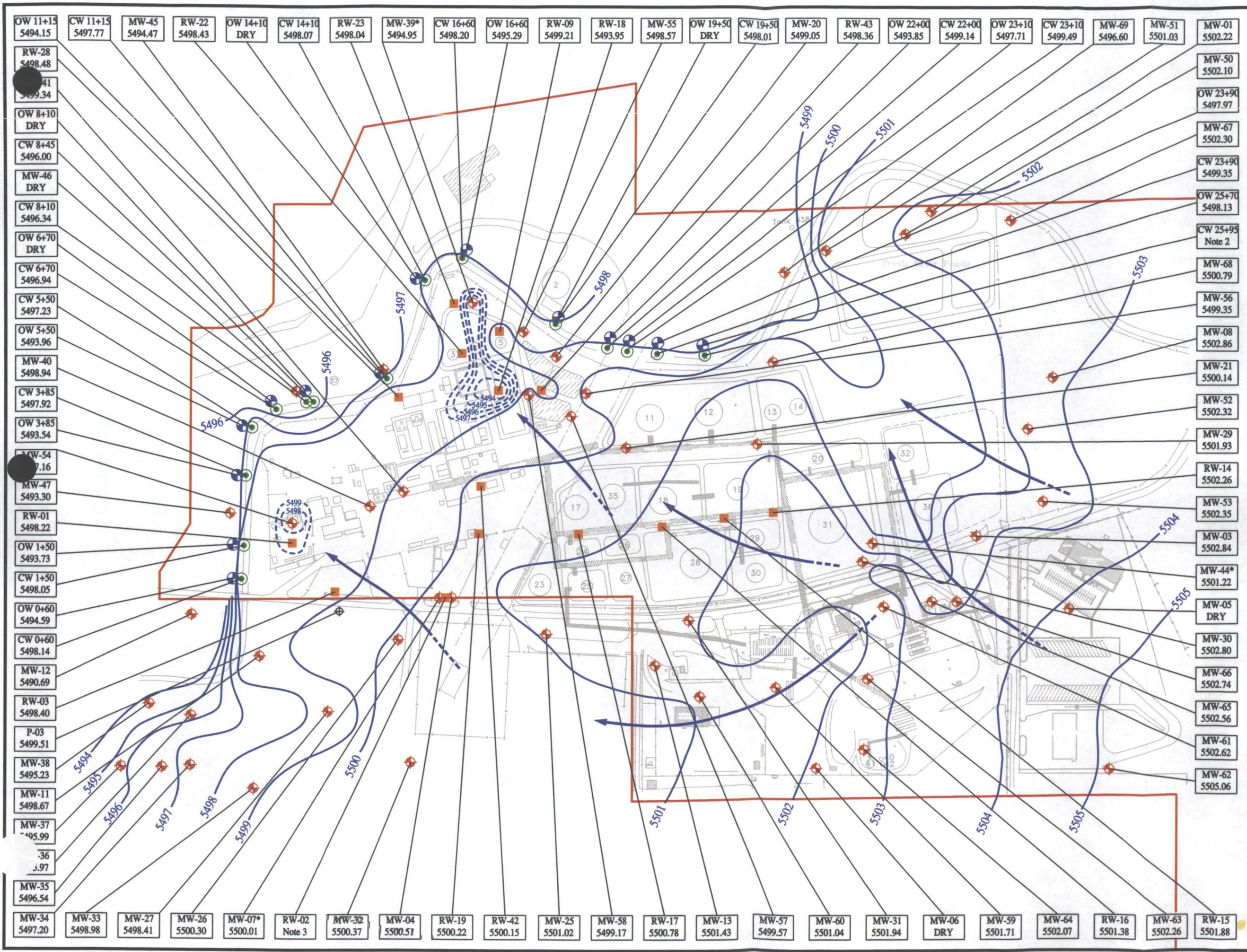


River Terrace Groundwater BTEX
Concentration Map
June 2011 (High Flow)
Bloomfield Refinery Facility-Wide
Groundwater Monitoring Plan

June 2012

Figure 7





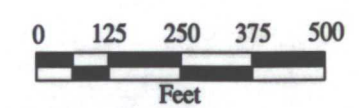
Legend

- Monitoring Well
- Observation Well
- Recovery Well
- Collection Well
- Piezometer
- Seep
- Site
- Approximate Property Line
- Groundwater Elevation Contours
- Inferred Groundwater Elevation
- Groundwater Flow Direction - Dashed where inferred

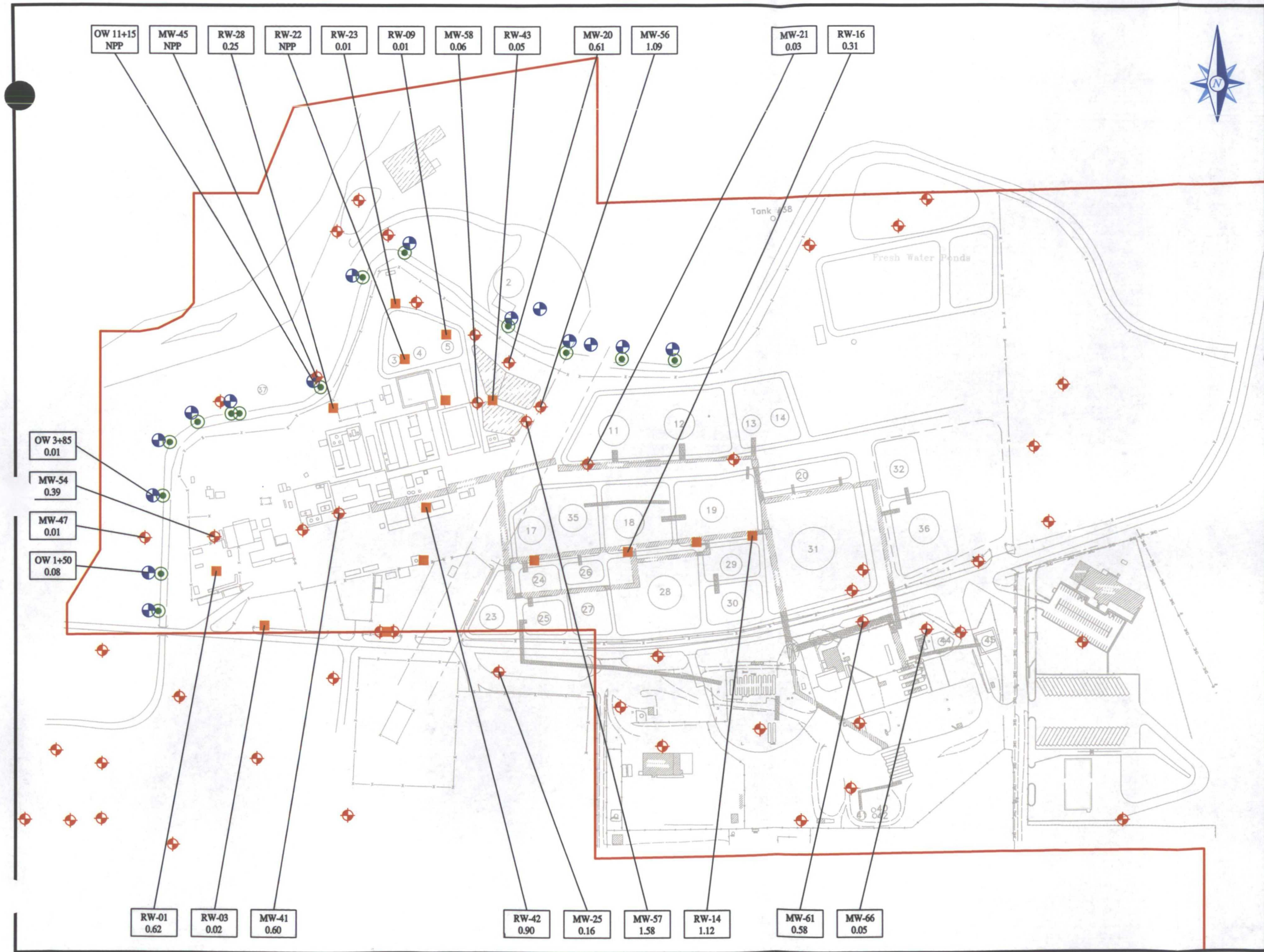
MW-47
5493.30
-Well ID
-Groundwater Elevation (ft amsl)

- Notes:
- * Deeper Well; data not used to contour.
 - 1. MW-65 thru MW-69 are not part of facility wide monitoring plan.
 - 2. CW 25+95 is being pumped.
 - 3. Data not used to contour due to screen interval.

August 2011



Groundwater Elevation Contours
August 2011
Bloomfield Refinery
Facility-Wide Groundwater
Monitoring Plan



Legend

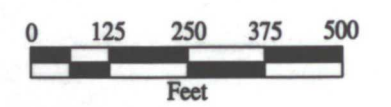
- Monitoring Well
- Observation Well
- Recovery Well
- Collection Well

- Site
- Approximate Property Line

RW-14
0.20
-Well ID
-Product Thickness (feet)

NPP -No Product Present

August 2011



Product
Thickness Map August 2011
Bloomfield Refinery

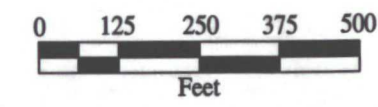
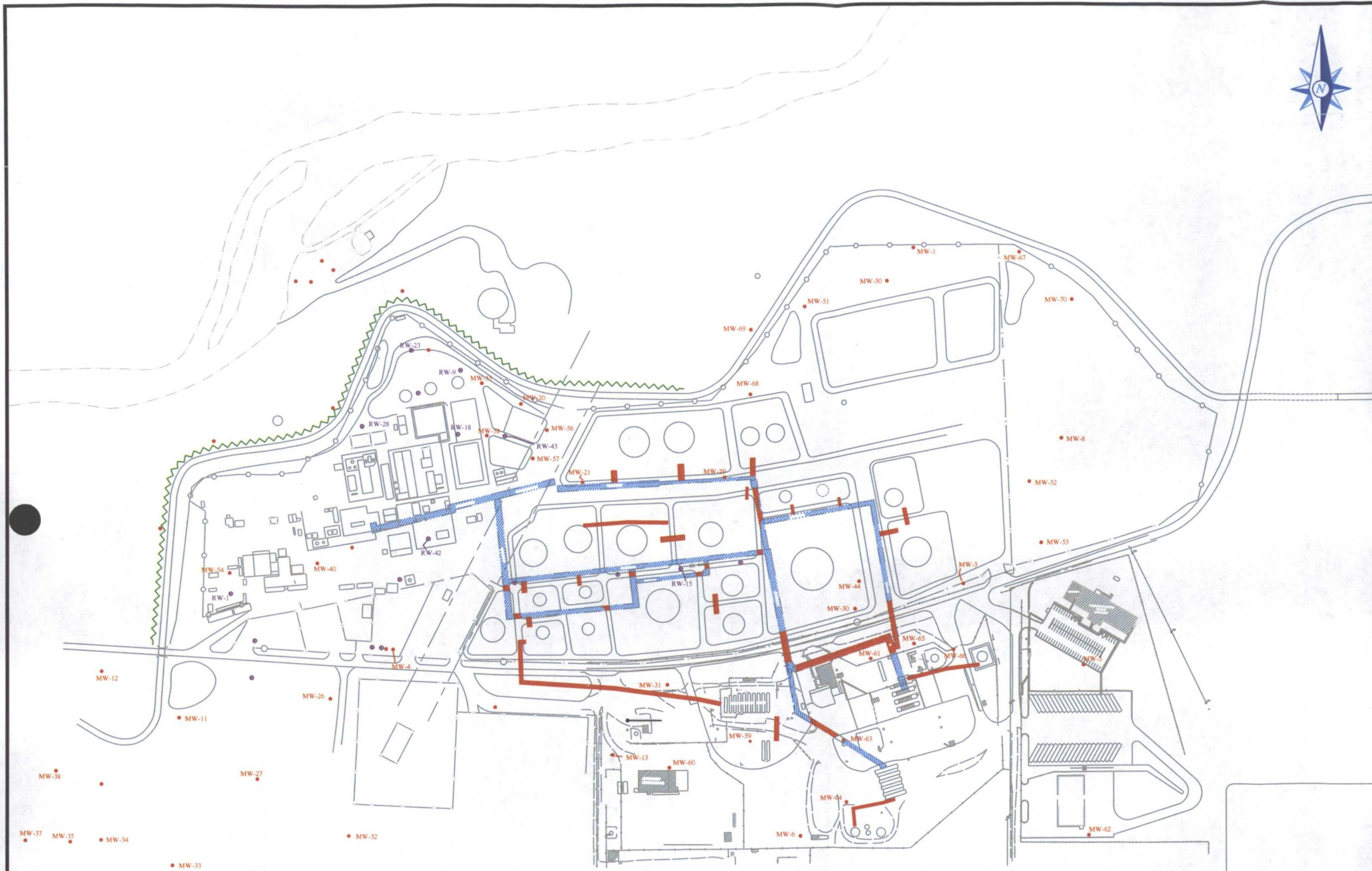
June 2012

Figure 9

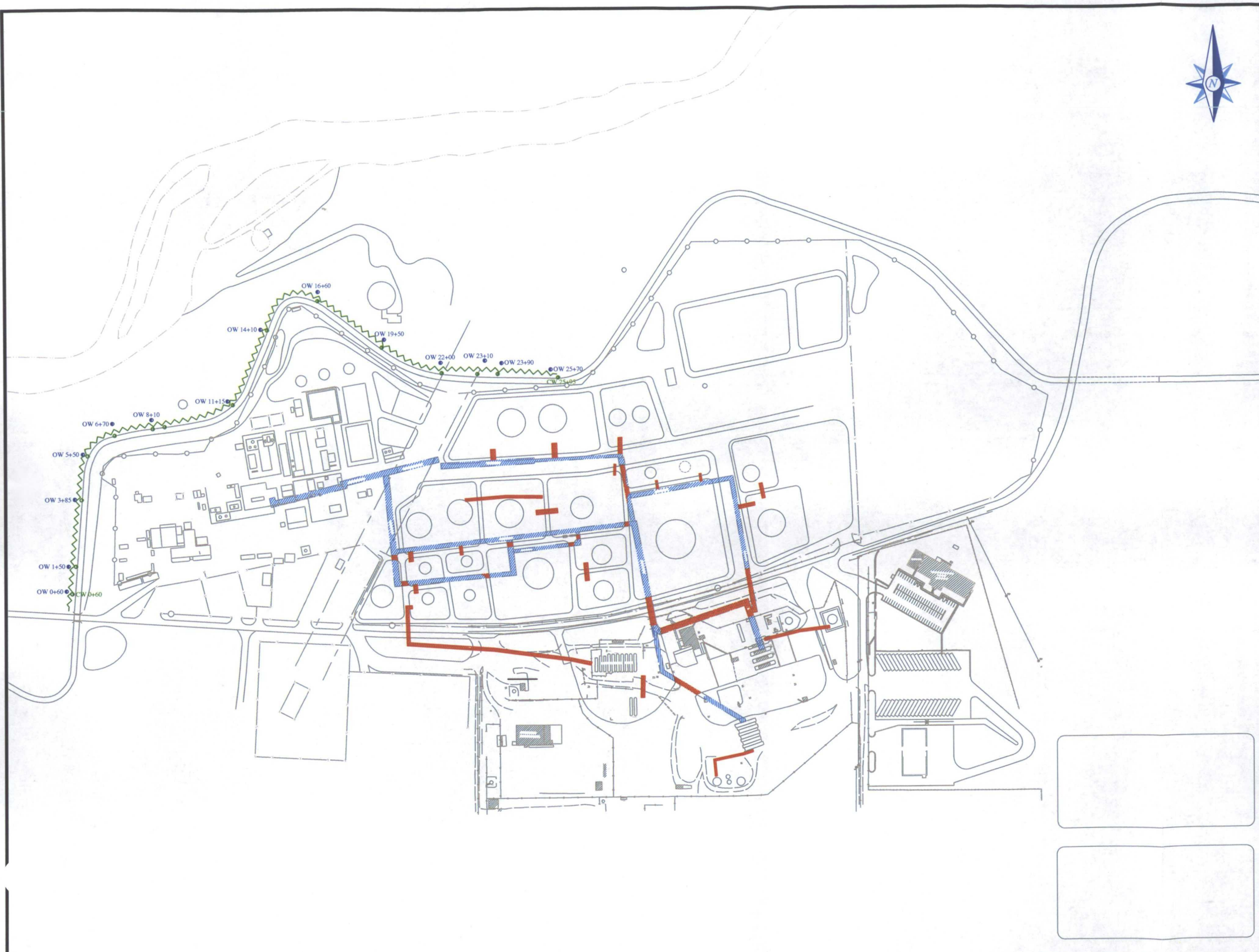


Legend

- Monitor Well
- Recovery Well
- Underground Pipeway
- Above Ground Pipeway
- Slurry Wall Barrier
- Fence

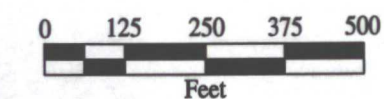


Refinery Complex Monitoring Well Location Map Bloomfield Refinery Facility-Wide Groundwater Monitoring Plan

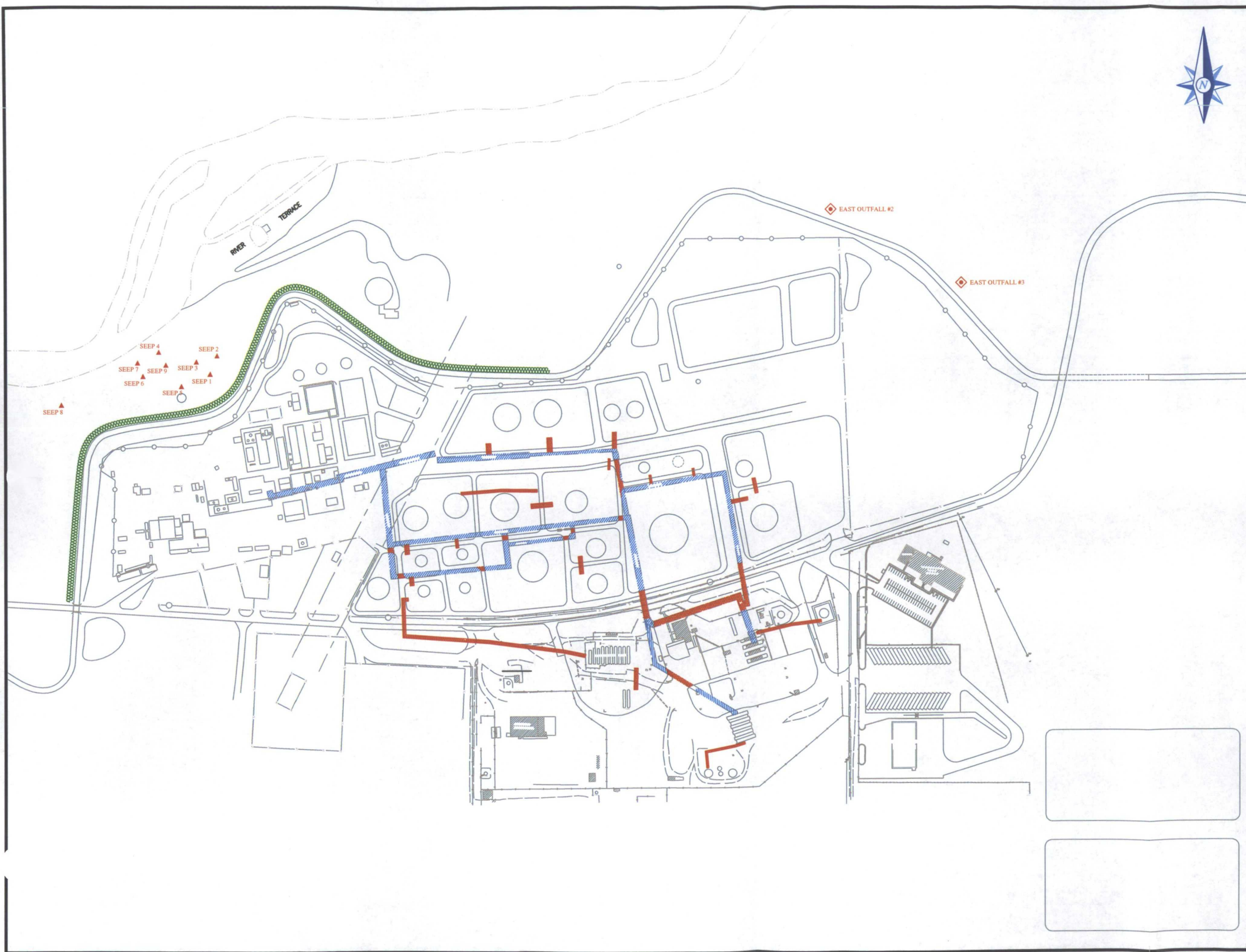


Legend

- OW 0+60 ● Observation Well
- CW 0+60 ● Collection Well
- Underground Pipeway
- Above Ground Pipeway
- Slurry Wall Barrier
- Fence

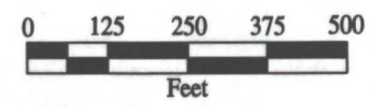


North Boundary Barrier
Monitoring Well Location Map
Bloomfield Refinery
Facility-Wide Groundwater
Monitoring Plan

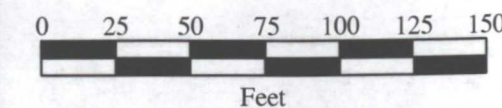


Legend

- Outfall Location
- Seep
- Underground Pipeway
- Above Ground Pipeway
- Slurry Wall Barrier
- Fence

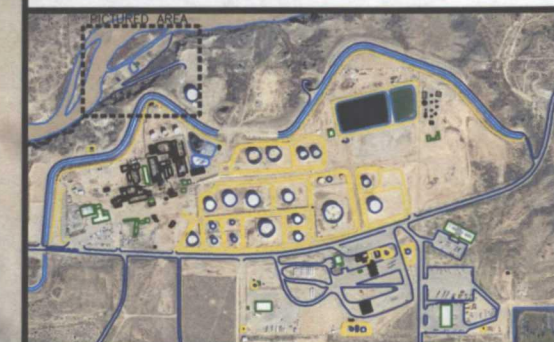


San Juan River Bluff
Location Map
Bloomfield Refinery
Facility-Wide Groundwater
Monitoring Plan



LEGEND

- MW-1 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- DW-1 ○ DEWATERING WELL LOCATION AND IDENTIFICATION NUMBER
- TP-1 ⊕ TEMP PIEZOMETER LOCATION AND IDENTIFICATION NUMBER
- ~~~~~ SLURRY BARRIER WALL
- FENCE



Area Location Map



River Terrace Monitoring Well
Location Map
Bloomfield Refinery
Facility-Wide Groundwater
Monitoring Plan

SAN JUAN RIVER

HAMMOND DITCH





UPSTREAM

NORTH OF MW-45

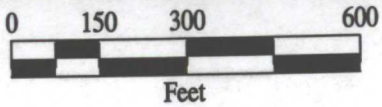
DOWNSTREAM

MW-45

MW-46

NORTH OF MW-46

SULLY ROAD CR 4900



LEGEND

- MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- SLURRY BARRIER WALL
- FENCE



River Sampling Points
Location Map
Bloomfield Refinery
Facility-Wide Groundwater
Monitoring Plan

mw-1

WELL NUMBER: 1
DATE: 8 February 1984
LOCATION: 29.11.27.24221

DEPTH IN FEET	DESCRIPTION
0-5	Light brown clayey sand, coarse, poorly sorted, quartzose and slightly calcareous
5-10	Yellowish gray sandy pebbles and cobbles, poorly sorted, rounded to subrounded
10-12	Yellowish gray pebbly sand, very coarse, poorly sorted, feldspathic and noncalcareous
12-22	Dark gray pebbly and sandy cobbles, some quartz pebbles, most are volcanic, subrounded cobbles and pebbles, some clay, a little water at about 18 feet
22-25	Gray-green clayey sand becoming light yellow clayey sandstone and sandy claystone

MW-3

WELL NUMBER: 3
DATE: 8 February 1984
LOCATION: 29.11.27.24442

DEPTH IN FEET	DESCRIPTION
0-5	Yellow brown sandy silt and clay, very calcareous, quartzose
5-10	yellow brown sand, calcareous, silty and clayey, quartzose
10-15	Yellow brown sand, silty and clayey, fine-grained, very calcareous, quartzose
15-27	Light brown clay, sandy, very calcareous, becoming pebbly with depth
27-35	Gray yellow brown cobbly sand, coarse, poorly sorted, silty and clayey, volcanic pebbles small amount of water at about 35 feet
35-40	Gray cobbles, pebbly and sandy, coarse sand, yellow gray clayey sandstone at about 40 feet

mw-4

WELL NUMBER: 4
DATE: 9 February 1984
LOCATION: 29.11.27.23344

O = 5522.90

Sand 15 =

DEPTH IN FEET	DESCRIPTION
0-5	Yellow gray-brown sandy silt and clay, calcareous
5-10	Yellow brown silty sandy clay and clayey silt, very slightly calcareous
10-15	Reddish yellow-brown clayey sandy silt, silty clay, fine-grained quartzose sand, noncalcareous
15-19	Light brown coarse sand with clay and pebbles, calcareous
19-25	Gray pebbly sand, very coarse, poorly sorted, some clay and silt, subrounded to subangular, quartzose, pebbles rounded, slightly calcareous
25-30	Gray cobbles and pebbles, subrounded to rounded, volcanic; at about 28 feet, hydrocarbon smell and color
30-32	Gray cobbly sand, with hydrocarbon smell and color, coarse grained, sand is quartzose and feldspathic, subrounded and subangular quartz grains are clear
32	Yellow gray clayey sandstone

WELL NUMBER:

mw-5
5

DATE:

6 February 1934

LOCATION:

29.11.26.31112

DEPTH
IN FEET

DESCRIPTION

0-5	Pale yellow brown clay, silty, some sand, calcareous
5-10	Pale yellow brown clayey sand and quartzose silt, poorly sorted, calcareous.
10-15	Yellow brown sand, subrounded quartzose sand slightly calcareous
15-20	Yellow brown sand, clayey, moderately coarse grained, very slightly calcareous
20-25	Yellow brown sand, clayey, silty, fine to medium grained, moderately sorted, noncalcareous
25-35	Yellow brown sand, silty and slightly clayey, fine-to-medium grained, well sorted, subangular, noncalcareous, becoming more clayey with depth
35-37	Yellow brown pebbly and cobbly sand, clayey, calcareous
37-47	Dark gray sandy and clayey cobbles and pebbles, water at 42 feet
47-50	Dark gray cobbles with greenish clay
50-54	Green-gray pebbly clay

TABLE 3.1

WELL LOG FOR MONITORING WELL NUMBER 7

Drilling Date: February 25 1986

<u>Depth in Feet</u>	<u>Description</u>
0-1	Gravel fill
1-5	Brown sandy silt and clay with small gravels
5-10	Brown sandy silt and clay, more firm and sticky
10-15	Lighter brown sandy silt and sticky clay
15-20	Lighter brown sandy silt and clay, larger cobbles and pebbles
20-25	Sand with cobbles and pebbles
25-30	Sand
30-35	Greenish clay with pebbles, top of Nacimiento estimated at 32 feet
35-40	Greenish clay, few pebbles
40-45	Green to gray clay, smooth drilling
45-50	Green to gray clay, smooth drilling
50-65	Sticky gray to green clay

Elevation of Top of Pipe: 5524.09 feet

Total Depth of Casing: 62.11 feet

Description of Casing: Bottom of casing has a 2 foot stainless steel blank section for a silt trap, followed by a 10 foot section of 6" I.D. stainless steel screen, in turn followed by 6" I.D. schedule 40 PVC casing to the top of pipe. Sand was added to 45 feet below grade, bentonite to 41 feet below grade, and grout to the surface.

MW-6

WELL NUMBER: 6
DATE: 7 February 1984
LOCATION: 29.11.27.42144 or 42233

DEPTH IN FEET	DESCRIPTION
0-15	Pale yellow brown sand, clayey and silty, subangular, poorly sorted, quartzose, very calcareous, becoming more clayey with depth
15-20	Pale yellow brown silt, sandy and clayey, silt is coarse, sand is very fine, moderate sorting, quartzose and calcareous
20-25	Pale yellow sand, slightly clayey, subrounded, well sorted, quartzose, noncalcareous
25-35	Pale yellow sand, coarse to medium grained, quartzose, noncalcareous
35-41	Pale yellow sand, clayey, fine grained, silty, quartzose, slightly calcareous
41-49	Gray-black cobbles and pebbles, volcanic
49-52	Gray-green clayey sandstone and sandy claystone

TABLE 3.2
WELL LOG FOR MONITORING WELL NUMBER 8

Drilling Date: February 28, 1986

<u>Depth in Feet</u>	<u>Description</u>
0-20	Light brown sandy clay, similar to that found on the ground surface
20-34	Cobbles and pebbles
34	Green-gray clay and sandstone, intermixed with small pebbles and sand. Top of Nacimiento.

Elevation of Top of Casing: 5531.12 feet

Total Depth of Casing: 34.94 feet

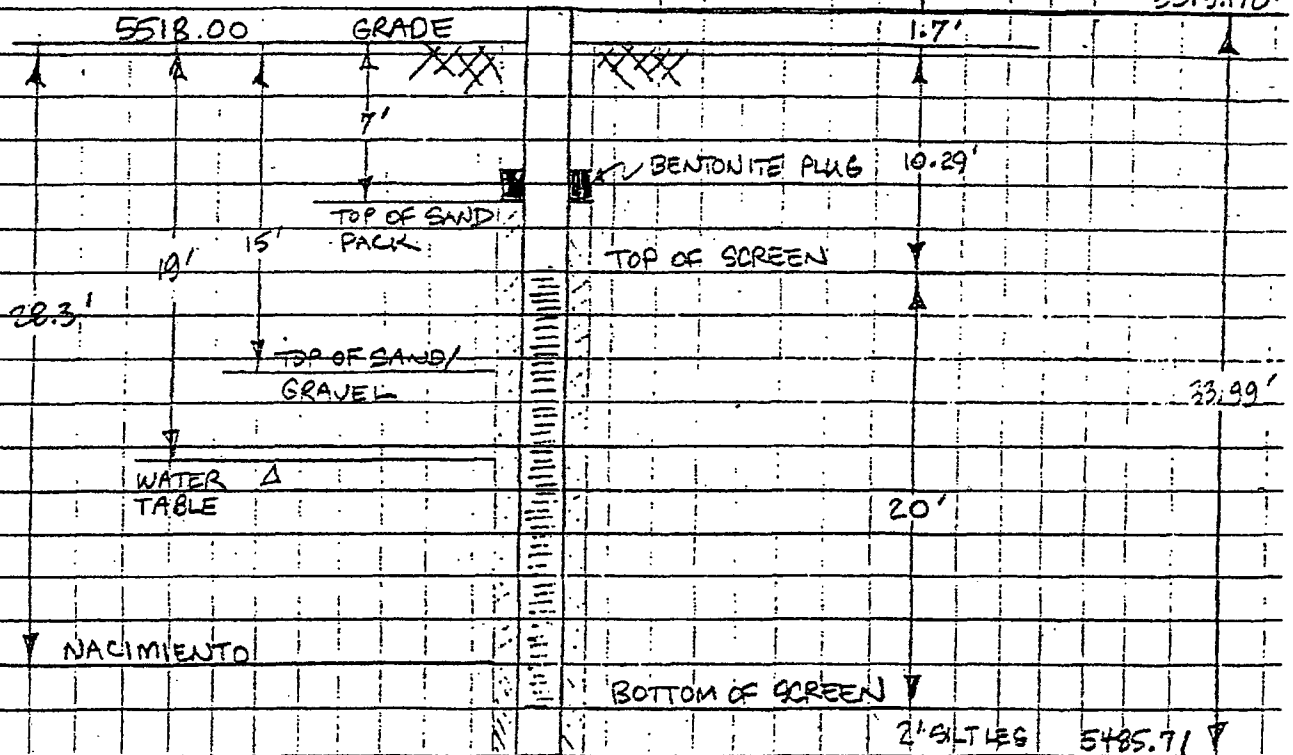
Description of Casing: Bottom of casing has a 2 foot stainless steel blank section for a silt trap, followed by 20 feet of 6" I.D. stainless steel screen, followed by 6" I.D. schedule 40 PVC to the surface. The screened section of the hole was sanded to within 7 feet of the surface, a bentonite seal (1/2 bucket) was added and concrete was used for a surface seal.

CALCULATION SHEET

MW-9

CONSTRUCTION COMMENTS: DRILLED UTILIZING DRILLING MUD THEN THOROUGHLY DEVELOPED. BOTTOM OF CASING TO THE TOP OF SCREEN IS 6" I.D. STAINLESS STEEL, REST OF CASING TO SURFACE IS 6" SCH. 40 PVC. TOP OF CASING HAS CONCRETE SURFACE SEAL AND STEEL PIPE WITH LOCKING WD, CASING PROTECTOR (NOT SHOWN).

LOCATION: NEAR TANK 5,
NORTHWEST OF
NOWP.



INITIALS CH PROJECT No. GROUNDWATER MONITORING - SOWP & NOWP
DATE 9-17-91 SUBJECT MW-9
DATE OF INSTALLATION: 3-3-86 SHEET 1 OF 1

TABLE 3.3

WELL LOG FOR MONITORING WELL NUMBER 9

Drilling Date: March 3, 1986

<u>Depth in Feet</u>	<u>Description</u>
0-5	Fill material, some rock
5-10	Sticky reddish brown silty clay
10-15	Lighter color silty clay, some pebbles
15-20	Lighter color silty clay, some pebbles
20-25	Cobbles, pebbles, sand
25-30	Cobbles, greenish clay, top of Nacimiento

Elevation of Top of Casing: 5519.70 feet

Total Depth of Casing: 33.99 feet

Description of Casing: Bottom of casing has a 2 foot stainless steel blank section for a silt trap followed by 20 feet of 6" I.D. stainless steel screen, followed by 6" I.D. schedule 40 PVC to the surface. The screened section of the hole was sanded to within 7 feet of the surface, a bentonite seal (1/2 bucket) was added and concrete was used for a surface seal.

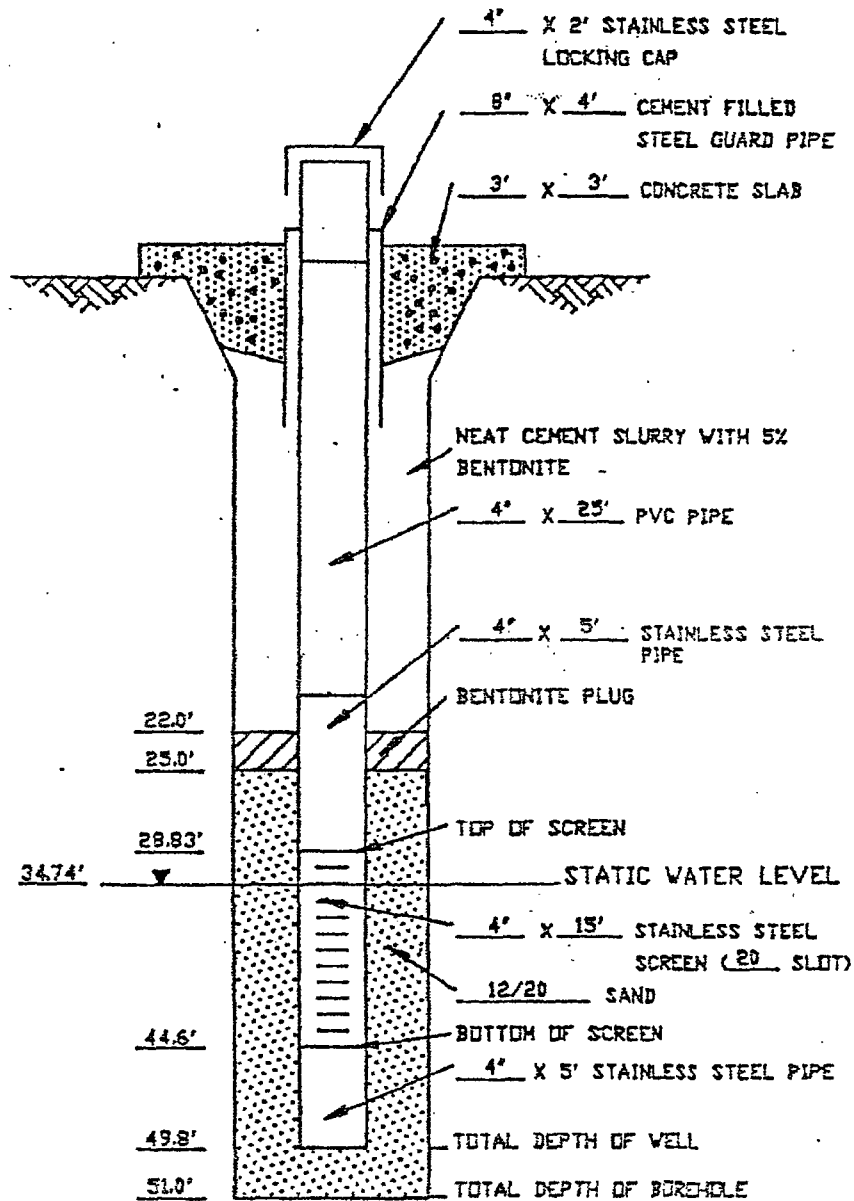


FIGURE B-7

COMPLETION DIAGRAM
PIEZOMETER P-4

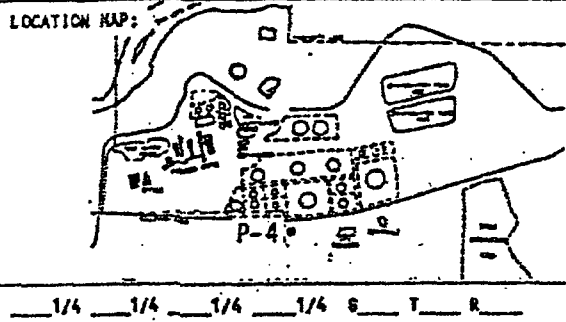
(MW-13)

FIGURE B-14

LITHOLOGIC LOG (SOIL)

PIEZOMETER P-4 (MW-13)

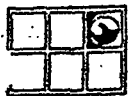
Page 1 of 1



SITE ID: BRC LOCATION ID: P-4 (MW-13)
 SITE COORDINATES (ft.):
 N E
 GROUND ELEVATION (ft. MSL): 5538.42
 STATE: New Mexico COUNTY: San Juan
 DRILLING METHOD: Casing Driver
 DRILLING CONTR.: Beeman Brothers
 DATE STARTED: 2 September 1988 DATE COMPLETED: 3 September 1988
 FIELD REP.: V.S. Dubyk
 COMMENTS: Static on September 9, 1988; 37.91' from TOC.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5					0'-27' Silt and Clay - Moderate brown (5 YR 4/4) to light brown (5 YR 5/6).
10					
15					
20					
25			1233		27'-30' Sand - Very pale or (5 YR 8/2) fine to coarse grained, angular to subangular predominantly quartz.
30					30'-40' Gravel and Sand - Light gray (N7). Sand is medium to coarse grained, subrounded to rounded. Gravel is subangular to rounded, up to 3" diameter.
35					
40			1415		41'-43' Clay - Pale olive (10 Y 6/2), plastic.
					43'-45' Gravel and Sand - As above.
45			1420		45'-51' Sand; Maciamento Formation - light bluish grey (5B7/1) Fine grained, silty.
50			1455		
		T.D. 51'			



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-25

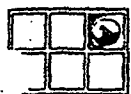
Project BRC Owner Bloomfield Refining Co.
Location 50 County Road 4990, Bloomfield, New Mexico Proj. No. 023353014
Surface Elev. 5527.45 Total Hole Depth 38 ft. Diameter 11 in.
Top of Casing 5530.45 Water Level Initial 28 ft. Static _____
Screen: Dia 6 in. Length 14 ft. Type/Size FRE 0.020 in.
Casing: Dia 6 in. Length 24 1/2 ft. Type FRE
Fill Material 10/20 Co. Silica Rig/Core Drill Systems 180
Drill Co. Layne Method Air Percussion
Driller Gabby Rodriguez Log By Jerry May Date 05/11/94 Permit # _____
Checked By _____ License No. _____

See Site Map
For Boring Location

COMMENTS:

Start @ 1000 hrs. 2 ft. silty log installed
from 36 feet to 38 feet.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure)
						Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						Brown clayey SILT (dry-moist)
2					ML	
4						
6		0				
8					SM SC	Brown fine poorly-graded silty/clayey SAND (moist)
10		0				
12						Tan fine poorly-graded SAND (moist)
14						
16		0				
18					SP	
20		0				
22						
24						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-25

Project BRC

Owner Bloomfield Refining Co.

Location 50 County Road 4990, Bloomfield, New Mexico

Proj. No. 023353014

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ X Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						SP	
26		120				SP GM	Tan fine-coarse, poorly-graded SAND with gravel and cobbles (moist)
28							Dark gray-stained at 28 feet. Groundwater encountered at 28 feet 5/11/94
30		550				GP	Dark gray-stained cobbles (little fines)
32							
34						CL SP	Brown silty clay lens at 34 feet (moist)
36							Tan very fine poorly-graded SAND (dry) Encountered weathered limestone at 35 feet (dry)
38							End of boring at 38 feet (1110 hrs.). Installed well screened from 22 to 36 feet on 5/11/94.
40							
42							
44							
46							
48							
50							
52							
54							
56							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-26

Project BAC Owner Bloomfield Refining Co.
Location 50 County Road 4990, Bloomfield, New Mexico Proj. No. 023353014
Surface Elev. 5512.54 Total Hole Depth 23 ft. Diameter 15 in.
Top of Casing 5514.54 Water Level Initial 15 ft. Static _____
Screen: Dia 6 in. Length 14 ft. Type/Size FRE 0.020 in.
Casing: Dia 6 in. Length 9/2 ft. Type FRE
Fill Material 10/20 Co. Silica Rig/Core Drill Systems 180
Drill Co. Layne Method Air Percussion
Driller Gabby Rodriguez Log By Jerry May Date 05/12/94 Permit # _____
Checked By _____ License No. _____

See Site Map
For Boring Location

COMMENTS:

Start @ 0730 hrs. Silt leg installed from
21 feet to 23 feet.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0							Tan fine poorly-graded silty SAND (moist)
2						SM	
4							
6		22				SP	Tan fine poorly-graded SAND (moist)
8							Tan fine-coarse SAND with a little pea gravel and cobbles (dry)
10		37				SP	
12						GP	Cobbles with some fines (dry)
14						SP	Tan fine-coarse poorly-graded SAND (dry)
15							Gray-stained cobbles with some fines dry-wet Groundwater encountered at 15 feet on 5/12/94
16							Dark gray-stained silty clay lens at 16 feet
18						GP	
20							Dark gray-stained silty clay lens at 19 feet Encountered weathered limestone (moist)
22							Dry at 22 feet
24							End of boring at 23 feet (0820 hrs.). Installed well screened from 7 to 21 feet on 5/12/94.



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-28

Project BRC Owner Bloomfield Refining Co.
Location 50 County Road 4990, Bloomfield, New Mexico Proj. No. 023353014
Surface Elev. 5521.52 Total Hole Depth 33 ft. Diameter 10 in.
Top of Casing 5514.52 Water Level Initial 25 ft. Static _____
Screen: Dia 4 in. Length 15 ft. Type/Size FRE 0.020 in.
Casing: Dia 4 in. Length 20/2 ft. Type FRE
Fill Material 10/20 Co. Silica Rig/Core Drill Systems 180
Drill Co. Layne Method Air Percussion
Driller Gabby Rodriguez Log By Jerry May Date 05/13/94 Permit # _____
Checked By _____ License No. _____

See Site Map
For Boring Location

COMMENTS:

Start @ 1020 hrs. Installed silt leg from
33 to 35 feet.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0							Tan fine poorly-graded silty SAND (dry-moist)
2						SH	
4							
6		124				SH	Gray-stained/tan fine poorly-graded silty SAND (moist)
8							
10		452				CL	Black-stained silty CLAY (moist)
12							
14						SH	Tan fine poorly-graded silty SAND (moist)
16		365					
18							Tan fine-coarse poorly-graded SAND with gravel and cobbles
20		333				GP SH	
22							
24		2507					



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-28

Project BRC Owner Bloomfield Refining Co.
Location 50 County Road 4990, Bloomfield, New Mexico Proj. No. 023353014

Depth (ft.)	Well Completion	PTD (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure)
						Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		2507			SP GM	(Dark gray-stained at 24 feet)
25		3226				Groundwater encountered at 25 feet on 5/13/94
26						
28						
30					SP GM	
32						Encountered weathered limestone
34		174				
35						End of boring at 35 feet (1100 hrs). Installed well screened from 18 to 33 feet on 5/13/94.
36					SP GM	
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-29

Project BRC Owner Bloomfield Refining Co.
Location 50 County Road 4990, Bloomfield, New Mexico Proj. No. 023353014
Surface Elev. 5518.55 Total Hole Depth 28 ft. Diameter 10 in.
Top of Casing 5521.55 Water Level Initial 20 ft. Static _____
Screen: Dia 4 in. Length 14 ft. Type/Size FRE 0.020 in.
Casing: Dia 4 in. Length 12/2 ft. Type FRE
Fill Material 10/20 Co. Silica Rig/Core Drill Systems 180
Drill Co. Layne Method Air Percussion
Driller Gabby Rodriguez Log By Jerry May Date 05/12/94 Permit # _____
Checked By _____ License No. _____

See Site Map
For Boring Location

COMMENTS:

Start @ 1445 hrs. Installed silt leg 24 to 26 feet.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ x Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0						SM	Tan fine poorly-graded silty SAND (moist)
2						CL	Tan silty CLAY (moist)
4							Tan fine poorly-graded SAND (moist)
6		0					
8						SP	
10		0					
12							Tan fine-coarse poorly-graded SAND with gravel and cobbles
14		9					
16						SP GM	
18							
20		38					Groundwater encountered at 20 feet on 5/12/94
22						GP	Cobbles with some fines (wet)
24							Encountered weathered limestone (dry)



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-29

Project BRC

Owner Bloomfield Refining Co.

Location 50 County Road 4990, Bloomfield, New Mexico

Proj. No. 023353014

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24							
26							End of boring at 26 feet (1510 hrs). Installed well screened from 10 to 24 feet.
28							
30							
32							
34							
36							
38							
40							
42							
44							
46							
48							
50							
52							
54							
56							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-30

Project BRC Owner Bloomfield Refining Co.
Location 50 County Road 4890, Bloomfield, New Mexico Proj. No. 023353014
Surface Elev. 5530.42 Total Hole Depth 38 ft. Diameter 10 in.
Top of Casing 5533.42 Water Level Initial 31 ft. Static _____
Screen: Dia 4 in. Length 15 ft. Type/Size FRE 0.020 in.
Casing: Dia 4 in. Length 23 1/2 ft. Type FRE
Fill Material 10/20 Co. Silica Rig/Core Drill Systems 180
Drill Co. Layne Method Air Percussion
Driller Gabby Rodriguez Log By Jerry May Date 05/13/94 Permit # _____
Checked By _____ License No. _____

See Site Map
For Boring Location

COMMENTS:

Start @ 0720 hrs. Installed silt leg from
36 to 38 feet.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 60%
-2						
0						Tan fine poorly-graded silty SAND (moist)
2						
4						
6		22				(Same as above)
8						
10		15				(Same as above)
12					SM	
14						
16		30				(Same as above)
18						
20						
22						
24					GP	Tan fine-coarse poorly-graded SAND with pea gravel and cobbles



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-30

Project BRC

Owner Bloomfield Refining Co.

Location 50 County Road 4990, Bloomfield, New Mexico

Proj. No. 023353014

Depth (ft.)	Well Completion	PTO (ppm)	Sample ID Blow Count/ X Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24		62				(Same as above)
26						
28					SP SM	
30		620				Dark gray-stained cobbles with some fines (moist-very moist) Assume groundwater encountered at 31 feet on 5/13/94
32					GP	
34						(Some clay and silt at 34 feet) Encountered weathered limestone (dry)
36		203				
38						End of boring at 38 feet (0800 hrs). Installed well screened from 21 to 36 feet.
40						
42						
44						
46						
48						
50						
52						
54						
56						



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-31

Project BRC Owner Bloomfield Refining Co.
Location 50 County Road 4990, Bloomfield, New Mexico Proj. No. 023353014
Surface Elev. 5530.17 Total Hole Depth 37 ft. Diameter 10 in.
Top of Casing 5532.17 Water Level Initial 30 ft. Static _____
Screen: Dia 4 in. Length 14 ft. Type/Size FRE 0.020 in.
Casing: Dia 4 in. Length 23 1/2 ft. Type FRE
Fill Material 10/20 Co. Silica Rig/Core Drill Systems 180
Drill Co. Layne Method Air Percussion
Driller Gabby Rodriguez Log By Jerry May Date 05/12/94 Permit # _____
Checked By _____ License No. _____

See Site Map
For Boring Location

COMMENTS:

Start @ 1200 hrs.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0							Tan fine poorly-graded silty SAND (moist)
2							
4							
6		NA					
8						SM	
10		0					
12							
14		0					Tan fine poorly-graded SAND (moist)
16							
18							
20		119				SP	
22							
24							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-31

Project BRC

Owner Bloomfield Refining Co.

Location 50 County Road 4990, Bloomfield, New Mexico

Proj. No. 023353014

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ X Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24							
26		85				SP	Fine-coarse poorly-graded SAND with gravel and cobbles (moist)
28							
30		91				SP GM	Groundwater encountered at 30 feet on 5/12/94
32		2028				GP	Gray-stained cobbles with a little fines (wet) (Dark gray-stained at 32 feet)
34							Encountered weathered limestone (moist-dry)
36		539					
38							End of boring at 37 feet (1225 hrs). Installed well screened from 21 to 35 feet on 5/12/94.
40							
42							
44							
46							
48							
50							
52							
54							
56							



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-32

Project Bloomfield Refining Company Owner Bloomfield Refining Company
 Location 50 County Road 4990, Bloomfield, NM Proj. No. 023353014
 Surface Elev. 5524.42 Total Hole Depth 27.5 ft. Diameter 9 in.
 Top of Casing 5522.22 Water Level Initial 23 ft. Static _____
 Screen: Dia 4 in. Length 14 ft. Type/Size FRE/0.020 in.
 Casing: Dia 4 in. Length 13.9 ft. Type FRE
 Fill Material 10/20 Silica Sand Rig/Core Drill Systems 180
 Drill Co. Layne Method Air Hammer Percussion
 Driller B. Morris Log By E. Shannon Date 02/23/85 Permit # _____
 Checked By ELS 3-14-95 License No. _____

See Site Map
For Boring Location

COMMENTS:

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ X Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%. Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						
2					SH	0-7 ft.: Brown medium to fine poorly-graded SAND, little coarse to fine gravel, occasional rounded cobbles (up to 4" dia.), dry.
4						
6						
8					SH	7-10 ft.: Grades to grayish brown coarse to fine well-graded SAND, trace silt, little coarse to fine grained gravel, occasional rounded cobbles.
10						
12						10-18 ft.: Brown coarse to fine SAND, and coarse to fine GRAVEL/COBBLES (up to 8" dia.), little silt.
14					SH	
16						
18						18-25 ft.: Coarse to fine GRAVEL/COBBLES and coarse to fine SAND, trace silt.
20					SH	
22						
24						Damp at 23 feet.



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-32

Project Bloomfield Refining Company

Owner Bloomfield Refining Company

Location 50 County Road 4990, Bloomfield, NM

Proj. No. 023353014

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ x Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24					SP	
26						25-28 ft.: Yellowish brown weathered silty LIMESTONE.
28						28-27.5 ft.: Gray LIMESTONE.
30						End of boring at 27.5 feet.
32						
34						
36						
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						

Set MW-32 with screened interval from 11-25 feet below grade.



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-33

Project Bloomfield Refining Company Owner Bloomfield Refining Company
Location 50 County Road 4990, Bloomfield, NM Proj. No. 023353014
Surface Elev. 5515.86 Total Hole Depth 23 ft. Diameter 9 in.
Top of Casing 5518.46 Water Level Initial 19 ft. Static Dry ft.
Screen: Dia 4 in. Length 14 ft. Type/Size FRE/0.020 in.
Casing: Dia 4 in. Length 11.6 ft. Type FRE
F# Material 10/20 Silica Sand Rig/Core Drill Systems 120
Drill Co. Layne Method Air Hammer Percussion
Driller G. Rodriguez Log By E. Shannon Date 02/23/95 Permit #
Checked By ES 3-14-95 License No.

See Site Map
For Boring Location

COMMENTS:

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						
2						
4					SM	0-7 ft.: Brown medium to fine SAND, little silt, little coarse to fine gravel, occasional cobbles, dry.
6						
8						7-20 ft.: Coarse to fine GRAVEL/COBBLES, some coarse to fine well graded sand, trace silty, dry.
10					GR	
12						
14						
16						
18						
20						Cuttings damp at 19'
22						20-22.8 ft.: Tanish brown SILT/weathered LIMESTONE, dry.
24						22.8-23 ft.: Gray LIMESTONE, weathered, dry. End of boring at 23 feet. Set MW-33 with screened interval from 6.9-20.9 feet below grade.



GROUNDWATER
TECHNOLOGY

Drilling Log

Monitoring Well MW-34

Project Bloomfield Refining Company Owner Bloomfield Refining Company
Location 50 County Road 4990, Bloomfield, NM Proj. No. 023353014
Surface Elev. 5505.53 Total Hole Depth 19 ft. Diameter 10 in.
Top of Casing 5508.23 Water Level Initial 12 ft. Static _____
Screen: Dia 4 in. Length 14 ft. Type/Size FRE/0.020 in.
Casing: Dia 4 in. Length 7.8 ft. Type FRE
Fill Material 10/20 Silica Sand Rig/Core Drill Systems 180
Drill Co. Layne Method Air Hammer Percussion
Driller G. Rodriguez Log By E. Shannon Date 02/23/95 Permit # _____
Checked By ES 3-14-95 License No. _____

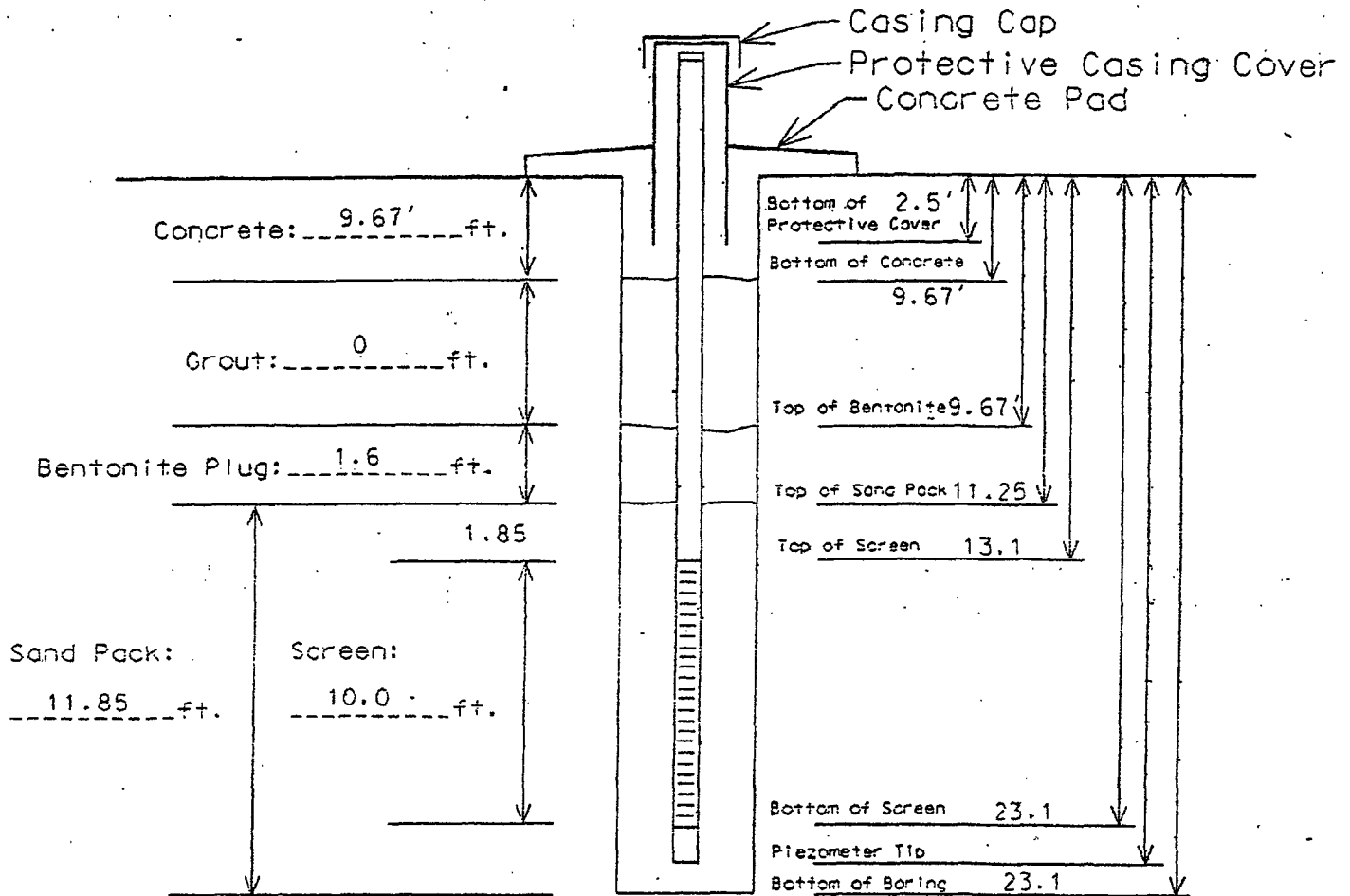
See Site Map
For Boring Location

COMMENTS:

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ x Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure)
							Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0							
2							0-8 ft.: Brown coarse to fine poorly graded SAND, little coarse to fine gravel, little silt, occasional cobbles.
4						SM	
6							
8							
10							9-14 ft.: Coarse to fine GRAVEL/COBLES, some coarse to fine sand, trace silt, dry.
12						GP	Wet at 12', gray-staining.
14							Yellowish brown SILT/weathered LIMESTONE, dry.
16							14.7-19 ft.: Gray LIMESTONE.
18							
20							End of boring at 19 feet.
22							Set MW-34 with screened interval from 2.5-16.5 feet below grade
24							

Installation Diagram

Monitoring Well No. MW-35



Boring Diameter: 8-5/8"

Sand Type: 16-40

Ballards, Type/Size: 3" STEEL

Bentonite: 3/8 CHIPS

Screen Type/Size: 0.010

Cement/Grout:

Riser Type/Size: 2" SCH 40, PVC

Water:

Locking Expandable Casing Plug? YES

Other:

Bottom Cap Used? YES

Project #: 97-028

Project Name: BLOOMFIELD REFINING

Elevation: 5512.39



505-523-7674

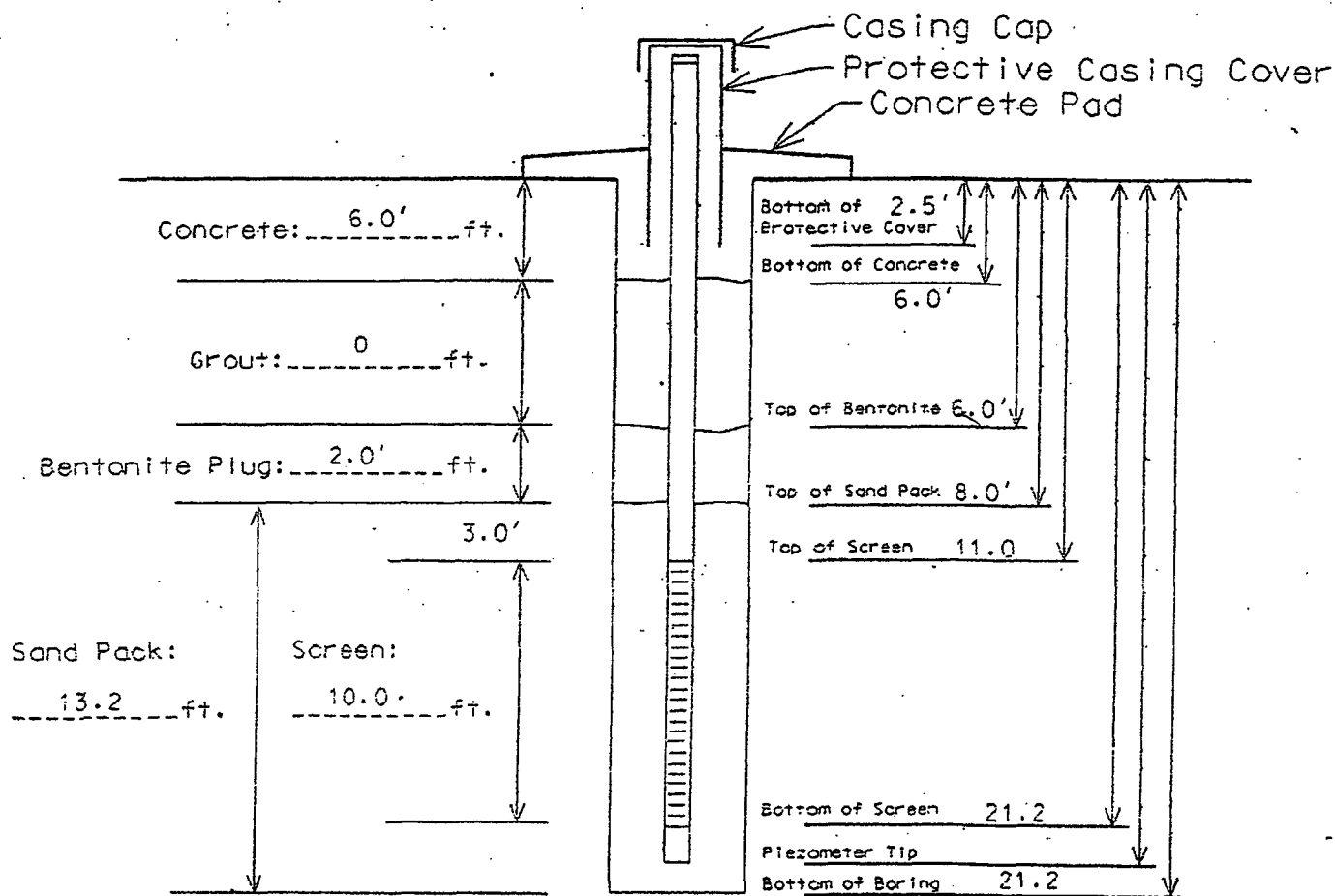
Site Northing: 4392.54

Site Easting: 1723.01

AND TYPE OF BORING: 4 1/4" ID CONTINUOUS FLIGHT HSA

Installation Diagram

Monitoring Well No. MW-36



Boring Diameter: 8-5/8"

Sand Type: 16-40

Bollards, Type/Size: 3" STEEL

Bentonite: 3/8 CHIPS

Screen Type/Size: 0.010

Cement/Grout:

Riser Type/Size: 2" SCH 40, PVC

Water:

Locking Expandable Casing Plug? YES

Other:

Bottom Cap Used? YES



505-523-7674

Site Northing: 4652.99

Site Easting: 1779.57

Project #: 97-028

Project Name: BLOOMFIELD REFINING

Elevation: 5510.56

PRECISION ENGINEERING, INC.

LOG OF TEST BORINGS

FILE #: 97-028
ELEVATION: 5510.56
TOTAL DSPTH: 21.0'
LOGGED BY: TM
DATE: 4-29-97
STATIC WATER: 19.5
BORING ID: MW-36
PAGE: 1

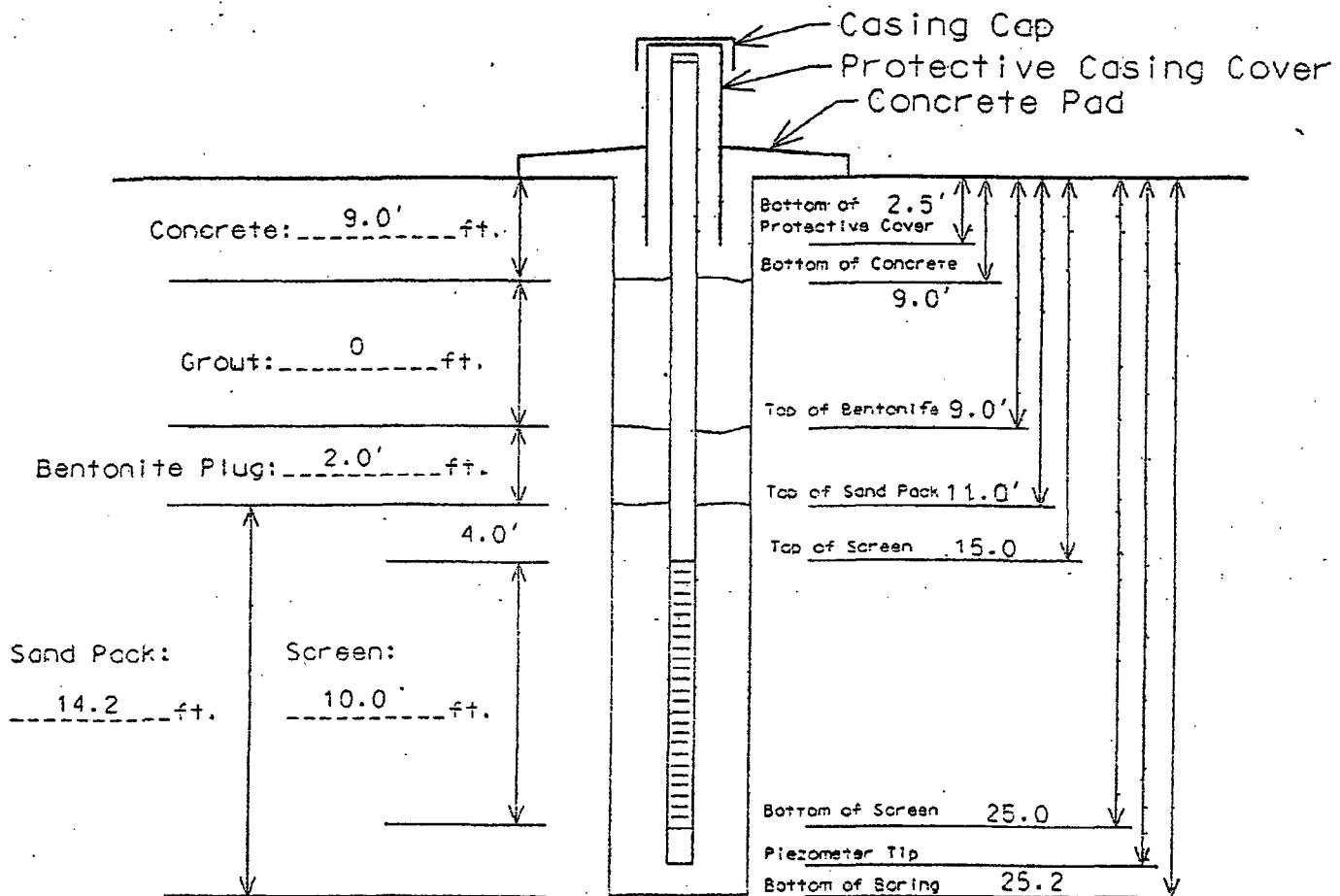
[illegible]

LOGGED BY: TM

AND TYPE OF BORING: 4 1/4" ID CONTINUOUS FLIGHT USA

Installation Diagram

Monitoring Well No. MW-37



Boring Diameter: 8-5/8"

Sand Type: 16-40

Ballards, Type/Size: 3" STEEL

Bentonite: 3/8 CHIPS

Screen Type/Size: 0.010

Cement/Grout: _____

Riser Type/Size: 2" SCH 40, PYC

Water: _____

Lacking Expandable Casing Plug? YES

Other: _____

Bottom Cap Used? YES

Project #: 97-028

Project Name: BLOOMFIELD REFINING



505-523-7674

Site Northing: 4413.84

Site Easting: 1496.01

Elevation: 5513.04

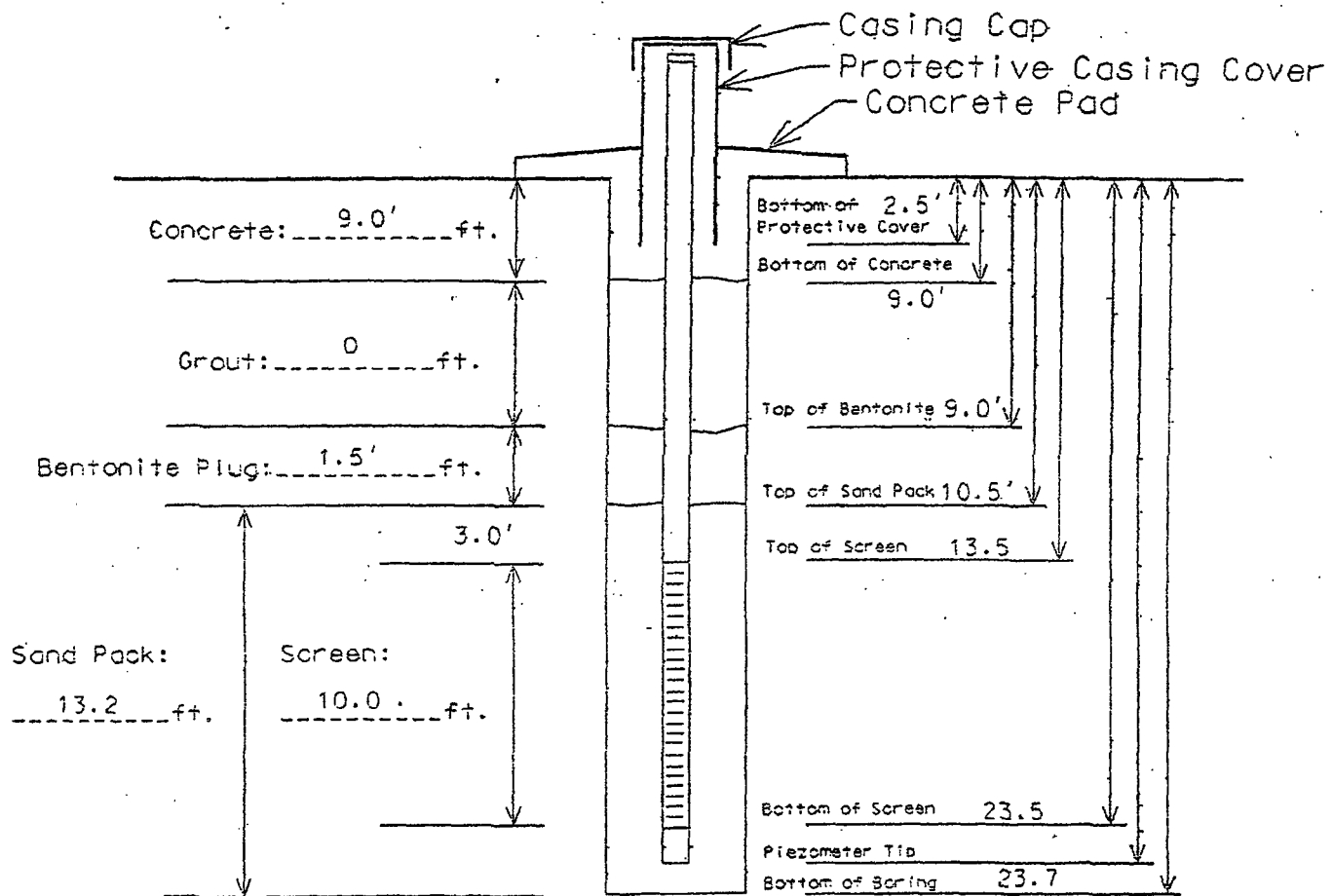
FILE #: 97-028
ELEVATION: 5513.04
TOTAL DEPTH: 25.0'
LOGGED BY: TM
DATE: 5-1-97
STATIC WATER: 21.0
BORING ID: WH-37
PAGE: 1

[illegible]

AND TYPE OF BORING: 4 1/4" ID CONTINUOUS FLIGHT HSA

Installation Diagram

Monitoring Well No. MW-38



Boring Diameter: 8-5/8"

Sand Type: 16-40

Bollards, Type/Size: 3" STEEL

Bentonite: 3/8 CHIPS

Screen Type/Size: 0.010

Cement/Grout: _____

Riser Type/Size: 2" SCH 40, PVC

Water: _____

Locking Expandable Casing Plug? YES

Other: _____

Bottom Cap Used? YES

Project #: 97-028

Project Name: BLOOMFIELD REFINING

Elevation: 5512.87



505-523-7674

Site Northing: 4674.24

Site Easting: 1587.4

AND TYPE OF BORING: 4 1/4" ID CONTINUOUS FLIGHT HSA

PROJECT: Bloomfield Refinery
CMS Wells & Borings

PRECISION ENGINEERING, INC.

LOG OF TEST BORINGS

FILE #: 98-149
ELEVATION: 5522 ft
TOTAL DEPTH: 36 ft
LOGGED BY: WEK
DATE: 9-28-98
STATIC WATER: 18 ft
BORING ID: MW-19
PAGE: 1 of 5

DEPTH	P L O T	S C A L E	S A M P L E	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	PID (ppm)
0.0 - 1.5	*-+*-+*-+			Sand, fine, silty, BOLIAN	
1.5 - 3.0	0*00*00*0 0*00*00*0			Gravel, sandy	
3.0 - 4.5	*-+*/+*-+ *-+*/+*-+ *-+*/+*-+ *-+*/+*-+	5.0		Sand, silty, clayey, moist, loose, brown more clayey, soft, wet, black	
7.0					
	0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0	10 15 20		Gravel, sandy, moist, moderately dense, gray-black, JACKSON LAKE more cobbly at 14' water bearing at 18', sandier from 18-20' gravel & cobbles, moist, very dense, black	
22.0					
	SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS SSS*S*SSS	25 30 35		Sandstone, slightly sandy, moist, dense, NACIMIENTO	
35.0					
total depth					
		40 45			
SIZE AND TYPE OF BORING: 4.25" ID SSA					
LOGGED BY: WEK					

LOCATION: SEE SITE PLAN

PRECISION ENGINEERING, INC.

LOG OF TEST BORINGS

FILE #: 97-028

ELEVATION: 5526.21

TOTAL DEPTH: 34.5'

LOGGED BY: TM

DATE: 8-11-97

STATIC WATER: NOT FOUND

BORING ID: MW-40

PAGE: 1

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PRECISION ENGINEERING, INC.

LOG OF TEST BORINGS.

FILE #: 97-028

ELEVATION: 5526.21

TOTAL DEPTH: 34.5'

LOGGED BY: TM

DATE 3-11-97

STATIC WATER: NOT FOUND

BORING ID: MW-40

PAGE: 2

DATE:		3-11-97	
STATIC WATER:		NOT FOUND	
BORING ID:		MW-40	
PAGE:		2	
DEPTH		MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	
			PID (ft)
	000000000	C	COBBLES, GRAVELLY, (FINE TO COARSE), SOME SMALL BOULDERS, NO ODOR, VERY SLOW
	000000000	C	DRILLING
	000000000	C	
	000000000	25	C
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	EASIER DRILLING, LESS AUGER SCRAPING
	000000000	C	
	000000000	C	
31.5	000000000	30	C
31.5-33.5	SSSSSSSSS	C	NACIMIENTO FORMATION
	SSSSSSSSS	C	DENSE, AUGER NOT SCRAPING
	SSSSSSSSS	C	
	SSSSSSSSS	C	
	SSSSSSSSS	C	
	SSSSSSSSS	C	
	SSSSSSSSS	C	
33.5-34.5	SSSSSSSSS	S	NACIMIENTO FORMATION
	SSSSSSSSS	S	BLACKISH COLOR, TURNING MORE WHITE 36.0 FEET, NO WATER IN HOLE OR SAMPLE AS OF
34.5	SSSSSSSSS	35	S 4:40 PM, SLIGHT ODOR IN SAMPLE
TOTAL DEPTH			10-12-97 DISCOVERED 2.5 FEET OF WATER IN HOLE AFTER PULLING AUGER

LOGGED BY: IM

1. SIZE AND TYPE OF BORING: 4 1/4" ID CONTINUOUS FLIGHT HSA

PRECISION ENGINEERING, INC.

LOG OF TEST BORINGS

FILE #: 97-028

ELEVATION: 5525.13

TOTAL DEPTH: 33.0'

LOGGED BY: . TM

DATE: 3-12-97

STATIC WATER: NOT FOUND

BORING ID: MW-41-2

PAGE: 1

[illegible]

LOGGED BY: IM

SIZE AND TYPE OF BORING: 4 1/4" ID CONTINUOUS FLIGHT HSA

FILE #: 97-028
ELEVATION: 5525.13
TOTAL DEPTH: 33.0'
LOGGED BY: TM
DATE: 3-12-97
STATIC WATER: NOT FOUND
BORING ID: MW-41
PAGE: 2

LOG OF TEST BORINGS

LOGGED BY:		TH	
DATE:		3-12-97	
STATIC WATER:		NOT FOUND	
BORING ID:		MW-41	
PAGE:		2	
DEPTH		MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	
	000000000	C	COBBLES, VERY SLOW DRILLING, SOME SMALL BOULDERS
	000000000	C	
	000000000	C	
	000000000 25	C	
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	
	000000000	C	
30.0	000000000	30	C
30.0-33.0	SSSSSSSSS	C	MACIMIENTO, GREYISH BROWN, DAMP, VERY SLIGHT ODOR
	SSSSSSSSS	C	
	SSSSSSSSS	C	
	SSSSSSSSS	C	
	SSSSSSSSS	C	
33.0	SSSSSSSSS	C	
TOTAL DEPTH			

LOGGED BY: IM

151/1 AND TYPE OF BORING- 4 1/4" TO CONTINUOUS FLIGHT USA

PRECISION ENGINEERING, INC.

LOCATION: SEE SITE PLAN

LOG OF TEST BORINGS

FILE #: 97-028
 ELEVATION: 5525.91
 TOTAL DEPTH: 35.5'
 LOGGED BY: TM
 DATE: 3-11-97
 STATIC WATER: 30.0'
 BORING ID: MW-42
 PAGE: 1

DEPTH	T	F	E	S S P L O I L	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	PTD (GPM)
0.0-6.5	---	---	---	C	SILT, SANDY, VERY FINE, FINE GRAVEL, DAMP TO MOIST, SOFT, BROWN, SLIGHTLY CLAYEY	
	---	---	---	C		
	---	---	---	C		
	---	---	---	C		
	---	---	---	C		
	---	---	---	C		
	---	---	---	C		
	---	---	---	C		
	---	---	---	C		
	---	---	---	C		
	---	---	---	C		
6.5	---	---	---	C		
6.5-15.0	***	***	---	C	SAND, FINE, DAMP, RED BROWN, SLIGHTLY SILTY, MODERATELY DENSE	
	***	***	---	C		
	***	***	---	C		
	***	***	---	C		
	***	***	---	C		
	***	***	---	C		
	***	***	---	C		
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	***	***	---	C		
	***	***	---	C		
	***	***	---	C		
15.0	***	***	---	C		
15.0-17.5	///	///	---	C	CLAY, SANDY, FINE, SILTY, DAMP, FIRM, RED BROWN	
	///	///	---	C		
	///	///	---	C		
	///	///	---	C		
17.5	///	///	---	C		
17.5-21.0	*****	*****	---	C	SAND, FINE, DAMP, MODERATELY DENSE, RED BROWN, NO ODOR	
	*****	*****	---	C		
	*****	*****	---	C	18.5-20.0 SAND MORE GREYISH, NO ODOR	
	*****	*****	---	C		
	*****	*****	---	C		
	*****	*****	---	C		
	*****	*****	---	C		
21.0	*****	*****	---	C		
21.0-25.5	00000000	00000000	---	C	GRAVEL, FINE TO COARSE, SLIGHTLY COBBLEY FROM 22.5-24.2 FEET	
	00000000	00000000	---	C		
	00000000	00000000	---	C		
	00000000	00000000	---	C		

LOGGED BY: TM

SIZT AND TYPE OF BORING: 4 1/4" ID CONTINUOUS FLIGHT HSA

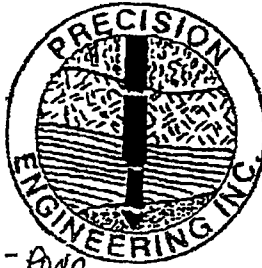
PRECISION ENGINEERING, INC

LOCATION: SEE SITE PLAN

LOG OF TEST BORINGS

FILE #: 97-028
 ELEVATION: 5525.91
 TOTAL DEPTH: 35.5'
 LOGGED BY: TM
 DATE: 3-11-97
 STATIC WATER: 30.0'
 BORING ID: MW-42
 PAGE: 2

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SHEET ____ OF ____

Boring location: _____

Hole Number: 3MW-43File No. N 56 62.87Location E 33 46.15Surface Elevation 5522Water Level 18.0 Date 9-25

			FLUSH		MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAIN SIZE, ETC.)		IN	LL	PI	CLASS
LAB #	SAC#	DEPTH	BLOWS/N							
		0-5			CLAY, SILTY, WET, BROWN No odor * SOFT					
		5.0-6.5			CLAY → SAND FINE Grey No odor(?) MOIST, SOFT					
		7.5								
		7.5 90			GRAVEL 8.0 PUMICE, Silty Medium. Dense Dry					JACKSON LAKE TERRACE
		9.0-10.5			SAND GRAVEL COARSE SAND Dense Slight odor Dry Grey (faint)					
		10.5-11.5			SAND, coarse, SMALL GRAVEL Damp Dense Slight odor Grey (Discolored)					
		11.0			COBBLY					
		14.5-16.0			SAND, MEDIUM → COARSE, Dry GRAVEL, Grey (Discolored) med Dense No odor					
		19-20.5			GRAVEL SAND, COARSE, WATER Bearing, Dark Grey, odor med Dense					
		22.8								
		23.8			NACIMIENTO ! - SS, Dense, Poorly sorted, light to yellow					
		25.0								
		TD								

JACOBSON LAKE
TERRACE

PROJECT: Bloomfield Refinery
CNS Wells & Borings

PRECISION ENGINEERING, INC.

LOG OF TEST BORINGS

FILE #: 98-149
ELEVATION: 5522 ft
TOTAL DEPTH: 25 ft
LOGGED BY: NS
DATE: 9-25-98
STATIC WATER: 18 ft
BORING ID: NW-43
PAGE: 2 of 5

DEPTH	P L O T	S C A L E	S A M P L E	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAIN SIZE, ETC.)	BID (pgm)
0.0-5.0	/-//--//-/			Clay, silty, wet, soft, brown	
5.0-6.5	/-//--//-/	5.0		sandy(fine), moist, soft, grey	
7.5	/-//--//-/				
9.0-10.5	000000000	10		Gravel, dry, medium dense, purple, silicified, JACKSON LAKE TERRACE	
10.5-11.5	0*0*0*0*			Sand-Gravel, coarse sand, dry, dense, grey(natural)	
	0*0*0*0*			Sand(coarse), gravelly, damp, dense, grey	
	0*0*0*0*			cobbly at 11'	
14.5-16.0	0*0*0*0*	15			
	+++++			Sand(medium to coarse), dry, medium dense, grey	
	+++++				
	+++++			water bearing at 18'	
19.0-20.5	0*0*0*0*	20		Gravel, sandy(coarse), medium dense, dark grey	
	0*0*0*0*				
	0*0*0*0*				
22.5	0*0*0*0*				
25.0	SSSSSSSSS	25		Sandstone, dense, poorly consolidated, poorly sorted, grey to yellow, FACIMIX70	
total depth					
		30			
		35			
		40			
		45			

LOGGED BY: NS

SIZE AND TYPE OF BORING: 4.25" ID HSA

PROJECT: Bloomfield Refinery
CMS Wells & Borings

PRECISION ENGINEERING, INC.

LOG OF TEST BORINGS

FILE #: 98-149
ELEVATION: 5536 ft
TOTAL DEPTH: 47.5 ft
LOGGED BY: WHK
DATE: 10-01-98
STATIC WATER: 34 ft
BORING ID: MW-44*
PAGE: 3 of 5

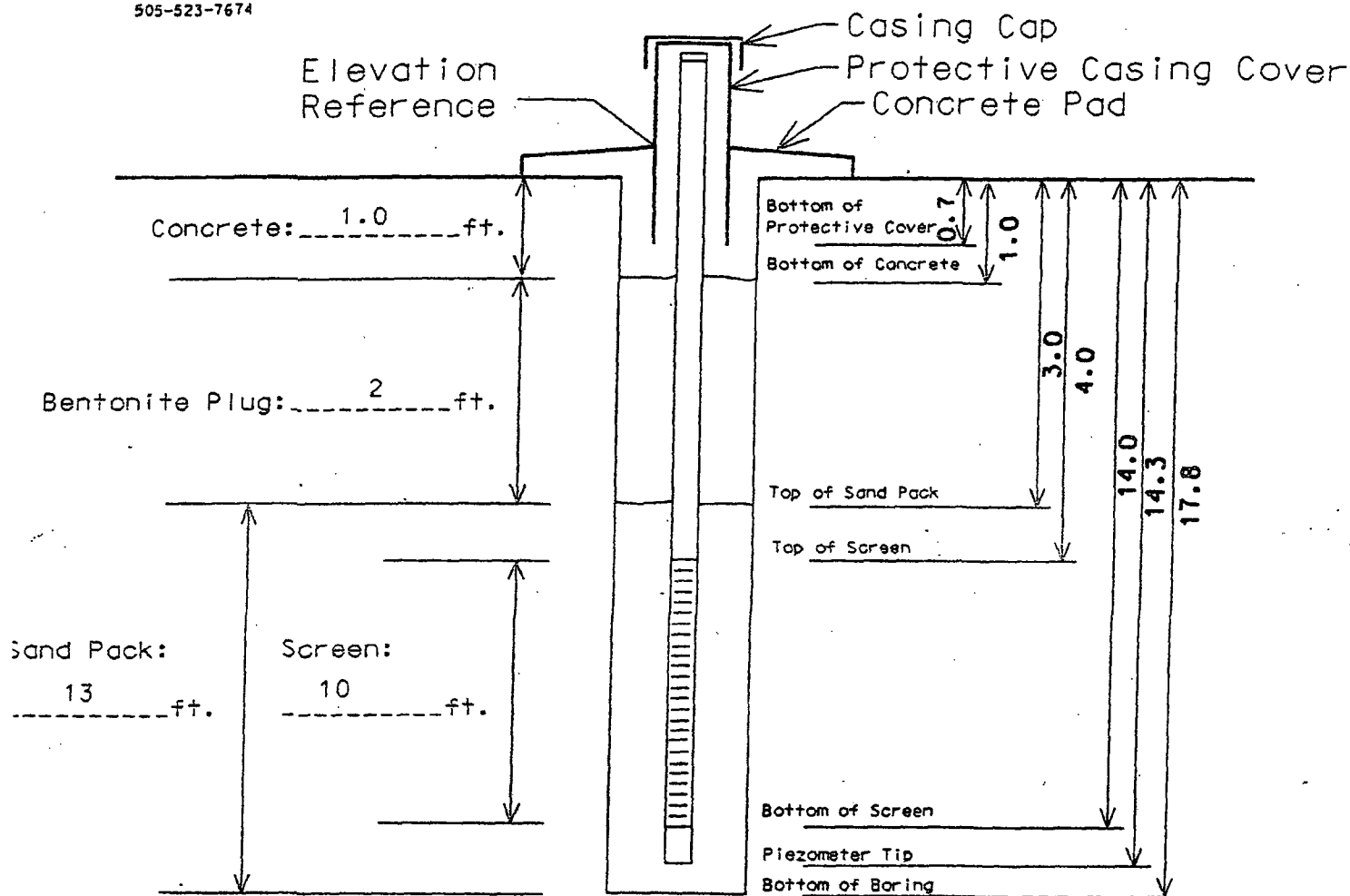
				DATE: 10-01-98 STATIC WATER: 34 ft BORING ID: WH-44 PAGE: 3 of 5	
		S A M P L E			
		P L O T			
		S C A L E			
				MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAIN SIZE, ETC.)	
				PID (ppm)	
DEPTH					
0.0 - 5.0		+-/+-/++ +-/+-/++ +-/+-/++ +-/+-/++ +-/+-/++ +-/+-/++ +-/+-/++ +-/+-/++ +-/+-/++ +-/+-/++		5.0	
9.0					
9.0-10.0		/-/-/-/-		10	
10.0-15.0		+-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+		15	
20.2				20	
		0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0 0*00*00*0		25 30	
33.5					
		SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS SSSSSSSSS		35 40 45	
47.5					
total depth					
SIZE AND TYPE OF BORING: 4.25" FSA				LOGGED BY: WHK	



505-523-7674

Installation Diagram

Monitoring Well No. MW - 45



Boring Diameter: 11-5/8" $R = 5.8125$

Sand Type: 10-20 Silica

Bollards, Type/Size: Steel, 3" min.

Bentonite: 3/8" Chip

Screen Type/Size: 4" PVC Sch. 40, 0.010" Slotted

Cement/Grout: -----

Riser Type/Size: 4" PVC Sch. 40 = 1.9745

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: 5790.85

Other: N/A

Bottom Cap Used? Yes

Site Easting: 2837.78

Project #: 03-015

Project Name: Bloomfield Wells

Elevation: 5496.33

Boiling No.: NH 45

LOG OF TEST BORINGS

PRECISION ENGINEERING, INC.

File #: 03-015

Site: Giant Refinery
Bloomfield, NM
Elevation: 5496.33

Date: 1-15-03

Boring No.: NW 45		Elevation: 9.54'		Date: 1-15-03	
LAB #	DEPTH	BLOW COUNT	GRAV	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAIN SIZE, ETC.)	
	0-1.0			GRAVEL, TO 12", SANDY, DENSE, DAMP	
	1.0-5.0				
	5.0-6.5	6-14-32	5.0		
	6.5-7.0	7-60			
	7.0-8.5	37-27-31	7.5	MUDSTONE, SANDY, DENSE, WET, DARK GREEN	
	9.0-10.0	14-65		SAME, HYDROCARBON ODOOR (GASOLINE)	
	10.0-11.0	16-60-60(4)	10.0		
	14.0-14.7	54-50(1*)	15.0	SOME LAMINATION, LIGHTER IN COLOR	
	17.0-17.8	36-50(3*)		SANDSTONE, WAX, SILTY, MUDDY, WHITE/LIGHT BROWN, VERY DENSE, WET-MOIST	
	TOTAL DEPTH		20.0		

Logged By: WHX

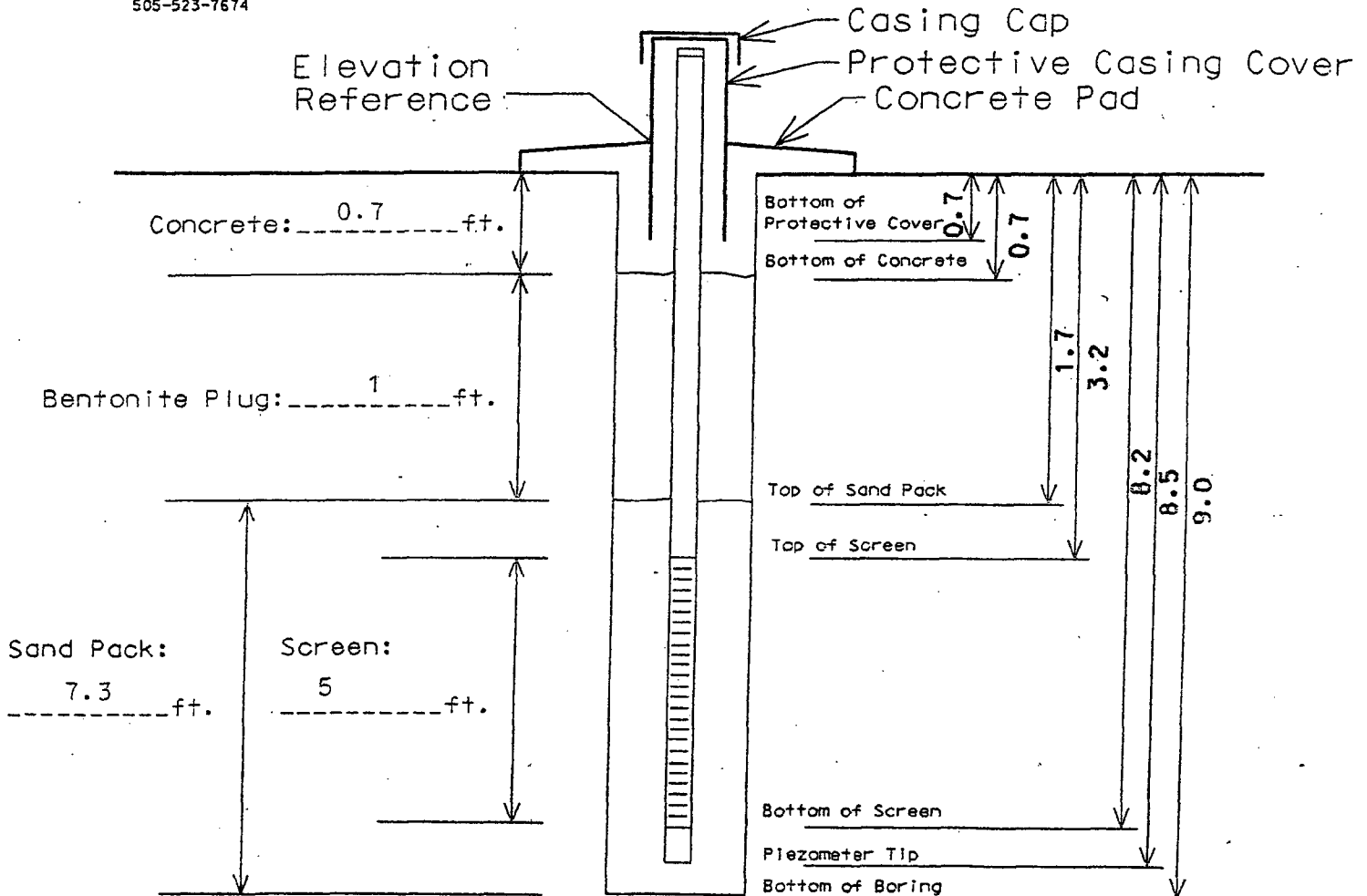
Size & Type of Boring: 4 1/4" ID HOLLOW STEELWELD AUGER



505-523-7674

Installation Diagram

Monitoring Well No. MW - 46



Boring Diameter: 11-5/8"

Sand Type: 10-20 Silica

Bollards, Type/Size: Steel, 3" min.

Bentonite: 3/8" Chip

Screen Type/Size: 4" PVC Sch. 40, 0.010" Slotted

Cement/Grout:

Riser Type/Size: 4" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: 5560.48

Other: N/A

Bottom Cap Used? Yes

Site Easting: 2576.06

Project #: 03-015

Project Name: Bloomfield Wells

Elevation: 5496.43

Sheet: 1 of 1

PRECISION ENGINEERING, INC.

File #:03-015

Bore Point: N5560.48'

LOG OF TEST BORINGS

Site: Giant Refinery

Bloomfield, NM

Water Elev: 82576.06

Elevation: 5496.43

Boring No.: MW 46

Date: 1-16-03

LAB #	DEPTH	BLOW COUNT	P L O T	S C A L E	S A M P L E	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	%M	L	PI	CLASS.
	0-1.0	Grab	**0**0		G	SAND, VERY GRAVELLY, COBBLY, LIGHT BROWN,				
			00		G	LOOSE				
			00							
			00	2.5						
			00							
			00							
			00							
			00							
			00	5.0						
	5.0-6.5	3-4-4	**0**0		S	SAME				
			00		S					
			00		S	NACIMIENTO FORMATION				
	6.5-8.0	13-18-18	--- --	7.5	S	MUDSTONE, SILTY, HARD, DRY, LIGHT GREEN				
			--- --		S					
			--- --		S					
	9.0		--- --							
	TOTAL DEPTH			10.0						
				15.0						
				20.0						
Size & Type of Boring: 4 1/4" ID HOLLOW STEMMED AUGER						Logged By: WHX				

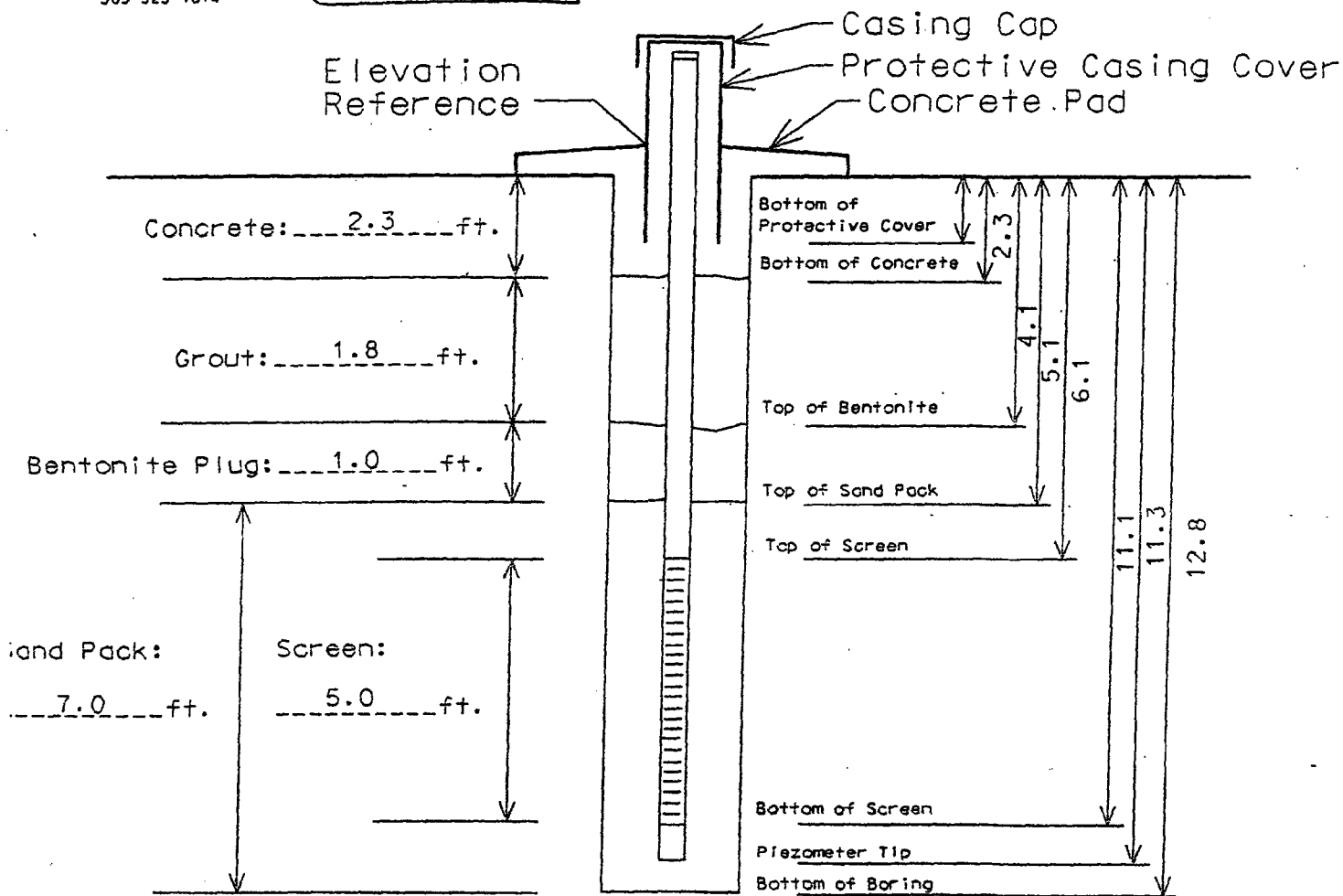


505-523-7674

Installation Diagram

Monitoring Well No. Seep 5

STA 4+25



Sand Type: 10-20 Silica

Bollards. Type/Size: Steel. 3"

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: 6% Bentonite

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: 5413.57

Other: N/A

Bottom Cap Used? Yes

Site Easting: 2220.90

Project #: 03-015

Project Name: Giant Refining Co. Bloomfield Wells

Elevation: TBD

Bore Point: PLANT COORDINATES
N5413.7 E2220.90
Water Elev: 7.49'

LOG OF TEST BORINGS

Site: Bloomfield
Refinery
Elevation: TO BE DETERMINED

Date: 3-6-03

Log No.: Seep 5

LAB #	DEPTH	BLOW COUNT	P L O T	S C A L E	S A M P L E	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, GRAINSIZE, ETC.)	%M	LL	PI	CLASS.
	0.0-5.0	GRAB	00**00		G	GRAVEL, MEDIUM SANDY, LIGHT BROWN, SOME COBBLES TO BOULDER SIZE, DENSE				
			00**00		G					
			00**00		G					
			00**00		G					
			00**00	2.5	G					
			00**00		G					
			00**00		G					
			00**00		G					
			00**00		G					
			00**00	5.0	G					
	5.0-6.5	8-18-18	00**00		S	GRAVEL, MEDIUM SANDY, LIGHT BROWN, SOME COBBLES TO BOULDER SIZE, DENSE				
			00**00		S					
			00**00		S					
			00**00		S					
			00**00	7.5						
			00**00							
			00**00							
			00**00							
			00**00							
			00**00	10						
	9.0-9.7	9-100(1)								
	10.7-11.3		-----		S	MACINIENTO FORMATION MUDSTONE, SILTSTONE, FISSILE, BLACK, HARD, WET				
			-----		S					
			-----		S					
	11.3-12.8	13-37-60	-----							

	12.8		-----							
	TOTAL DEPTH									
				15						
				20						

Size & Type of Boring: 4-1/4" ID Hollow Stemmed Auger

Logged By: WEX

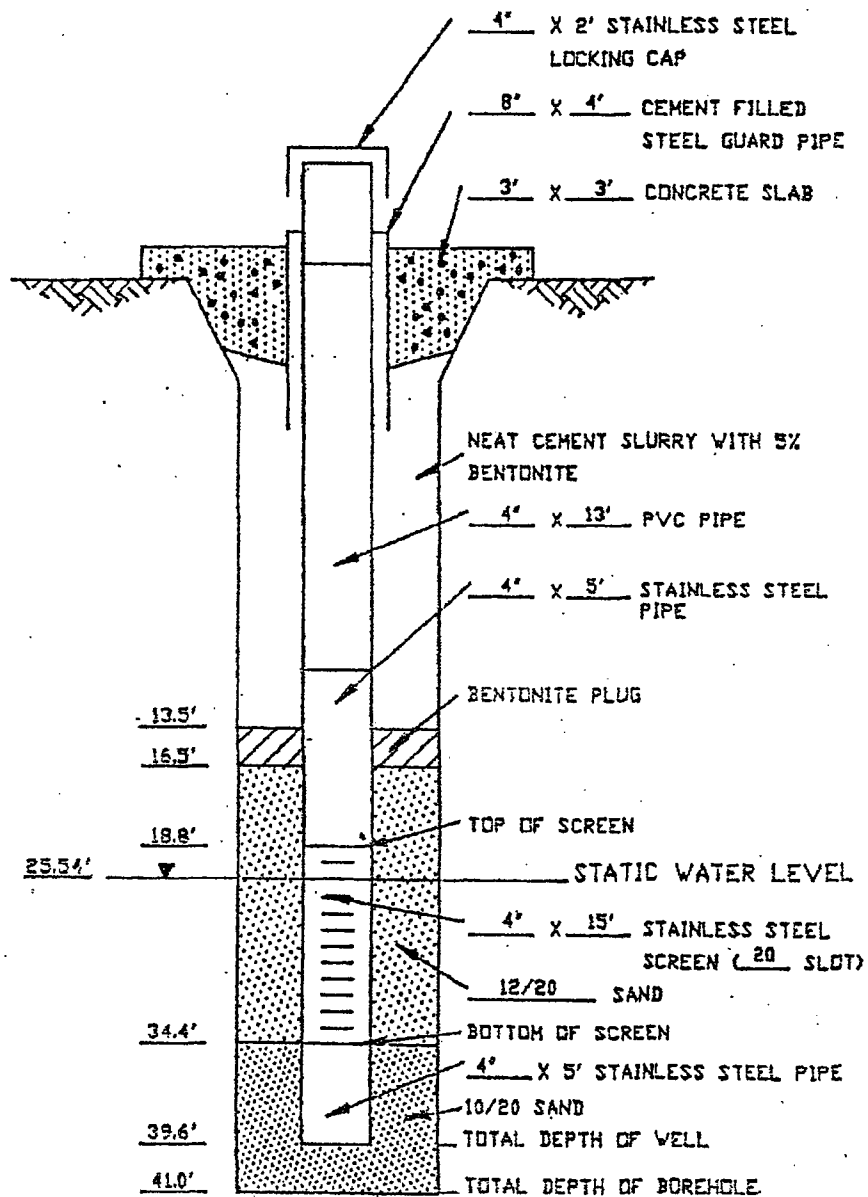


FIGURE B-1

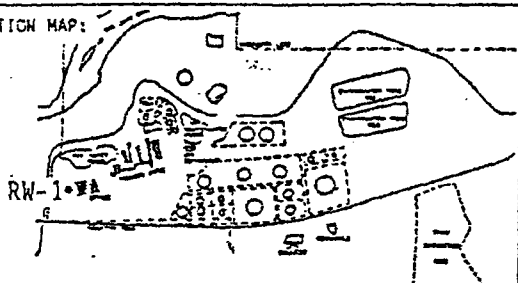
COMPLETION DIAGRAM
RECOVERY WELL RW-1

FIGURE B-8

LITHOLOGIC LOG (SOIL) RECOVERY WELL RW-1

Page 1 of 1

LOCATION MAP:

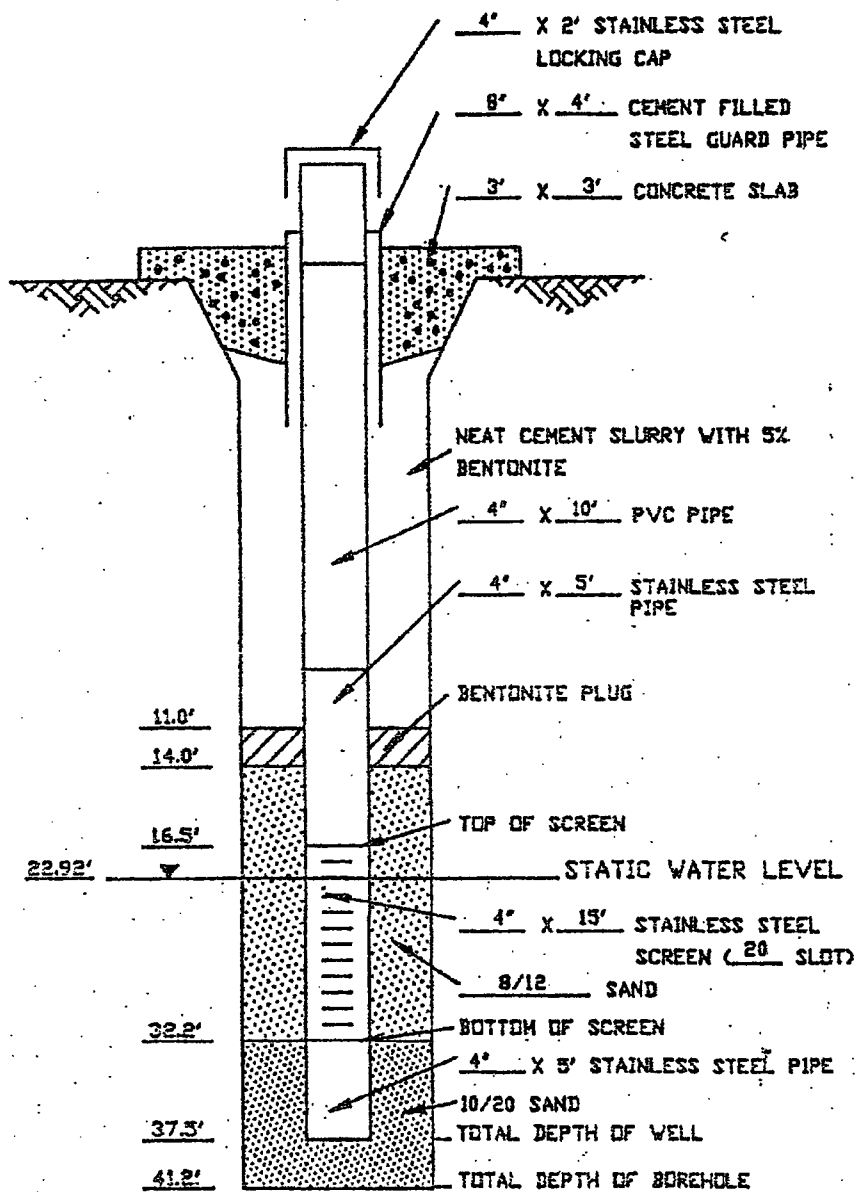


SITE ID: BRC LOCATION ID: RW-1
 SITE COORDINATES (ft.): _____
 N _____ E _____
 GROUND ELEVATION (ft. MSL): 5524.52
 STATE: New Mexico COUNTY: San Juan
 DRILLING METHOD: Casing Driver
 DRILLING CONTR.: Beeman Brothers
 DATE STARTED: 30 August 1988 DATE COMPLETED: 31 August 1988
 FIELD REP.: W.S. Dubyk
 COMMENTS: Static on September 2, 1988: 26.65 from TOC.

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

LOCATION DESCRIPTION:

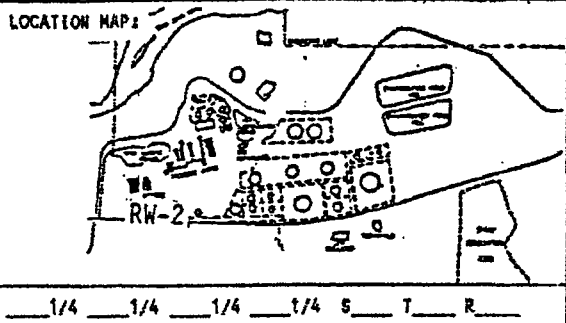
Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5			1642		0'-18' <u>Silt and Sand</u> - Dark yellowish brown (10 YR 4/2) to grayish brown (5 YR 3/2). Minor to strong hydrocarbon odor.
10			1646		
15			1710		
20			1720		18'-34' <u>Sand and Gravel</u> - Medium dark gray (N4). Sand is medium to very coarse grained, subangular to subrounded. Gravel is subrounded to well rounded, to 2" diameter. Strong hydrocarbon odor.
25			1725		
30			1730		
35			1738		34'-41' <u>Shale</u> - <u>Nacimiento Formation</u> - Dusky yellow (5 YR 6/4) to light olive gray (5 Y 6/1) shale.
40			1758		
45		T.D. 41'			
50					



COMPLETION DIAGRAM
RECOVERY WELL RV-2

LITHOLOGIC LOG (SOIL)

Page 1 of 1



SITE ID: BRC LOCATION ID: RW-2
 SITE COORDINATES (ft.): N E
 GROUND ELEVATION (ft. MSL): 5523.48
 STATE: New Mexico COUNTY: San Juan
 DRILLING METHOD: Casing Driver
 DRILLING CONTR.: Seeman Brothers
 DATE STARTED: 29 August 1988 DATE COMPLETED: 29 August 1988
 FIELD REP.: W.S. Dubyk
 COMMENTS: Static on September 2, 1988; 23.42 from TOC.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5			0948		0'-10' Silt and Clay - Medium dark gray (M4) to brownish gray (5 YR 4/1). Slightly effervescent in HCl. Faint hydrocarbon odor.
10			0953		10'-15' Sand and Silt - Moderate brown (5 YR 4/4), very fine grained and well sorted.
15			0958		15'-32' Sand and Gravel - Olive gray (5 Y 4/1) to brownish gray (5 YR 4/1). Sand is medium to very coarse grained, subangular to subrounded. Gravel is subangular to well rounded, to 2" diameter. Noticeable hydrocarbon odor below 25'.
20			1024		
25			1029		
30			1033		32'-41.2' Shale - <u>Macimiento Formation</u> - Dusky yellow (5 Y 6/4) to olive gray (5 Y 3/2).
35			1050		
40			1100		
45		T.D. 41.2'			
50					

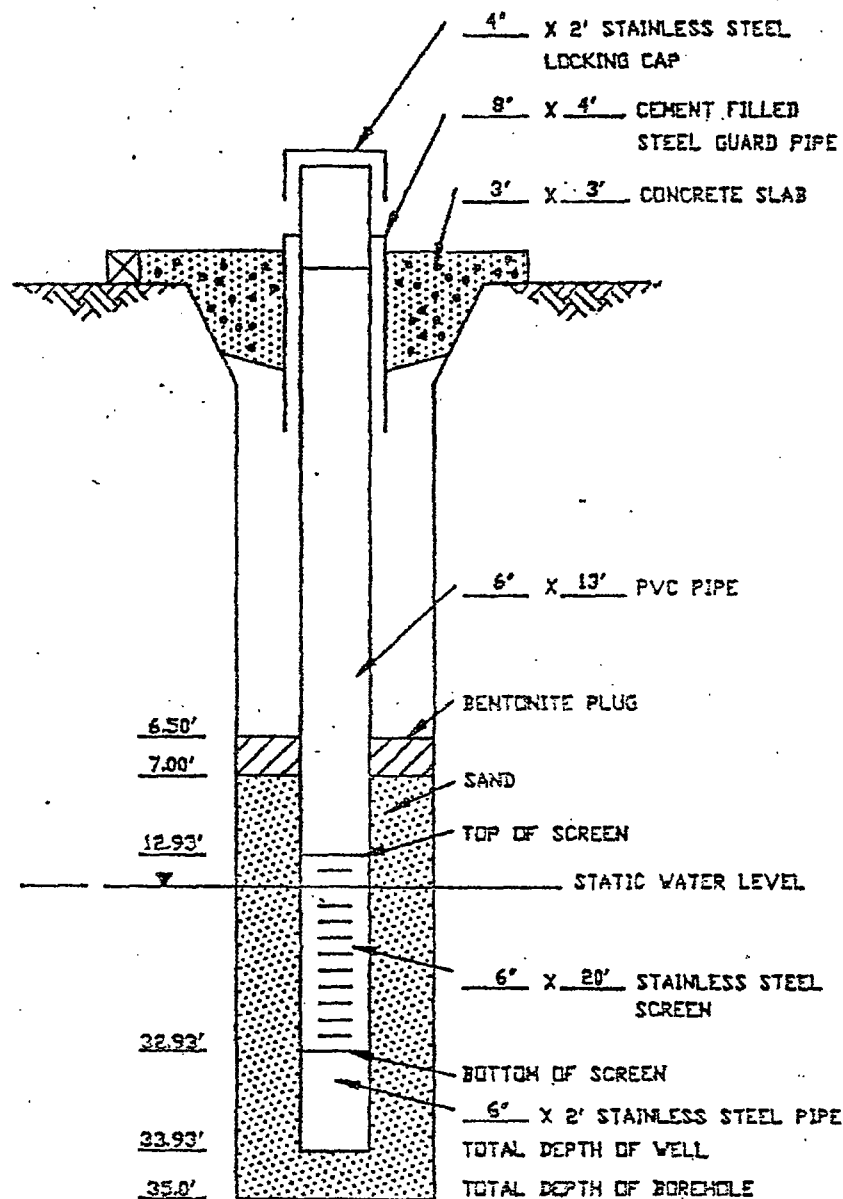


FIGURE B-3

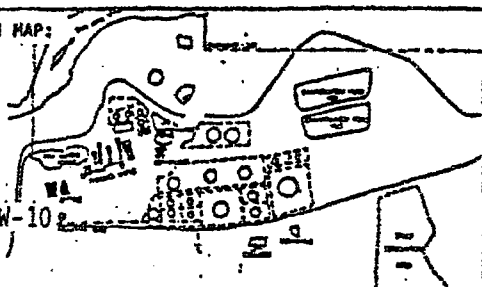
COMPLETION DIAGRAM
RECOVERY WELL MV-19 (RV-3)
(RECONSTRUCTED FROM VERBAL DESCRIPTION
SUPPLIED BY ENGINEERING-SCIENCE, 1967)

← Currently Constructed
as RW-3

LITHOLOGIC LOG (SOIL)

Page 1 of 1

LOCATION MAP:



SITE ID: BRC LOCATION ID: MW-10 (RH-3)
 SITE COORDINATES (ft.): E
 GROUND ELEVATION (ft. MSL): -5516
 STATE: New Mexico COUNTY: San Juan
 DRILLING METHOD: Auger
 DRILLING CONTR.: Earl & Sons, Inc.
 DATE STARTED: 4 March 1986 DATE COMPLETED: 4 March 1986
 FIELD REP.: Engineering Science, Inc.
 COMMENTS:

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

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
0					0'-5' <u>Topsoil, Roadbase, Sandy Clay</u>
5					5'-10' <u>Silty, Sandy Clay</u>
10					10'-15' <u>Cobbles and Pebbles</u>
15					15'-20' <u>Gravel, Cobbles, and Pebbles</u>
20					20'-30' <u>Green Clay: Macimiento Formation</u>
25					30'-35' <u>Macimiento Formation</u> - Yellow-green to blue-gray.
30					
35					
40					
45					
50					

TABLE 3.4

WELL LOG FOR MONITORING WELL NUMBER 10

(RW-3)

Drilling Date: March 4, 1986

<u>Depth in Feet</u>	<u>Description</u>
0-5	Topsoil, roadbase, reddish brown sandy clay
5-10	Reddish brown silty, sandy clay
10-15	Cobbles, pebbles
15-20	Gravel, cobbles, pebbles
20-25	Greenish clay at 23 feet, top of Nacimiento
25-30	Greenish clay, Nacimiento
30-35	Nacimiento, color changed from yellow-green to blue-gray

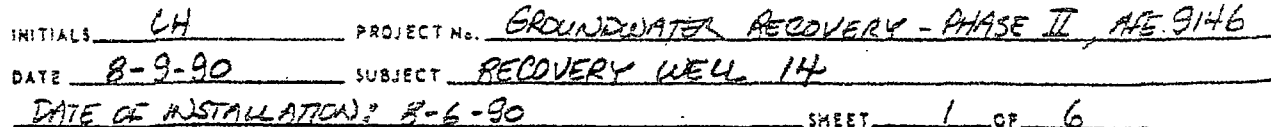
Elevation of Top of Casing: 5516.86 feet

Total Depth of Casing: 33.93 feet

Description of Casing: Bottom of casing has a 2 foot stainless steel blank section for a silt trap, followed by 20 feet of 6" I.D. stainless steel screen, followed by 6" I.D. schedule 40 PVC to the surface. The screened section of the hole was sanded to within 7 feet of the surface, a bentonite seal (1/2 bucket) was added and concrete was used for a surface seal.

RW-14

LOCATION: END OF ROAD
BETWEEN TANKS
13 & 29.

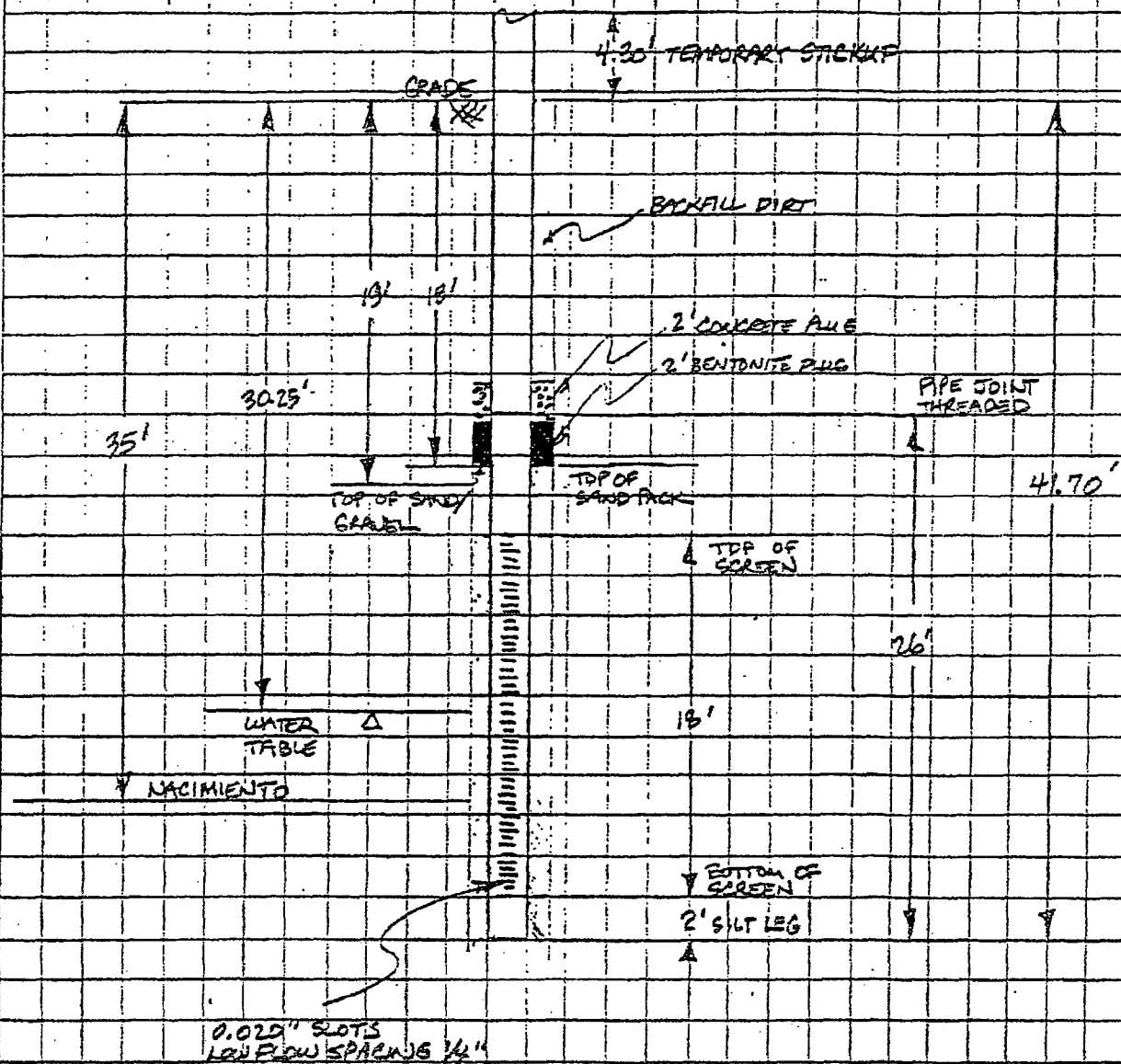


CALCULATION SHEET

RW-15

CONSTRUCTION COMMENTS: SAME AS RW-14

LOCATION: ROADWAY BETWEEN TANKS 18 & 28



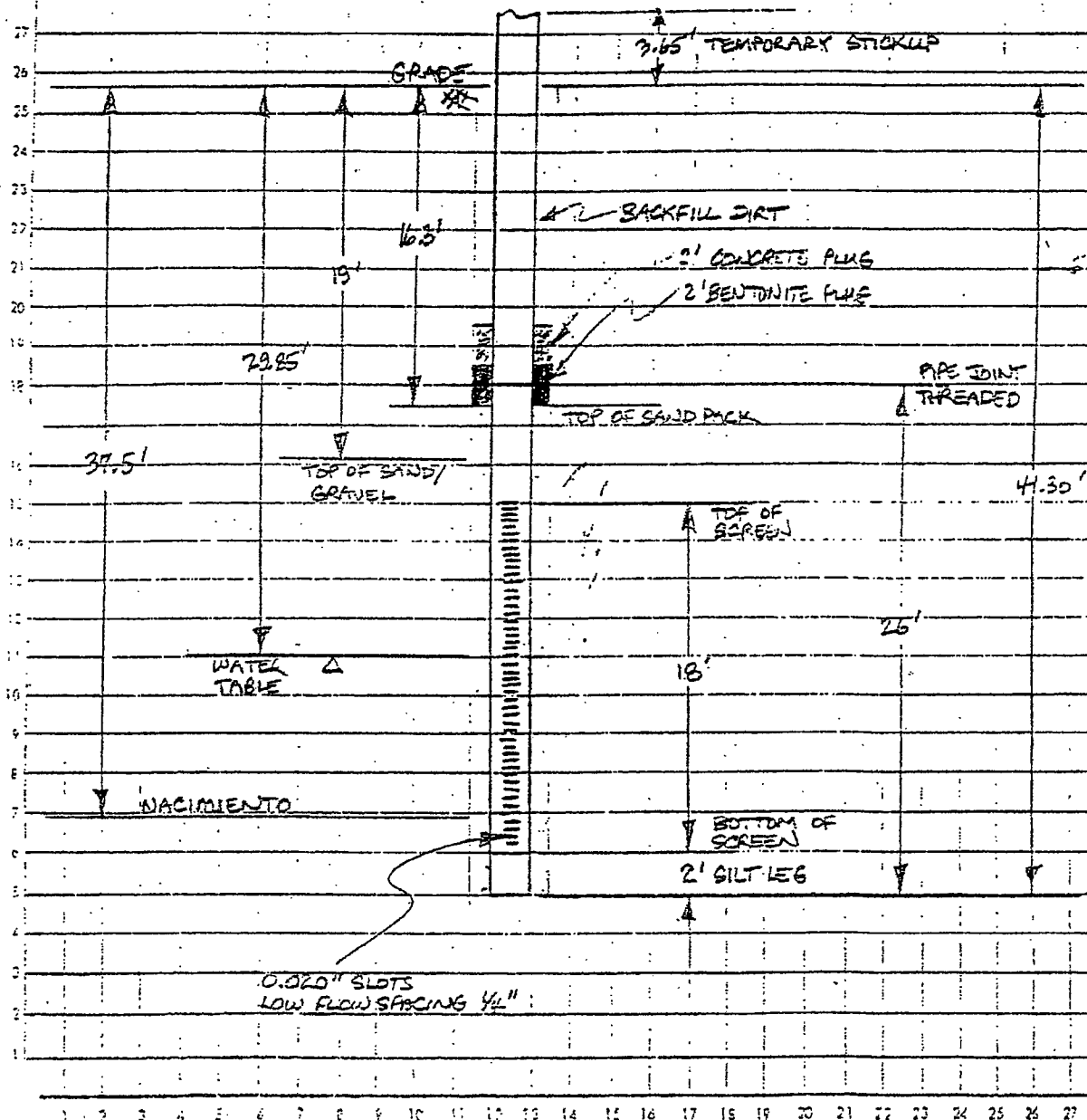
INITIALS CH PROJECT NO. GROUNDWATER RECOVERY-PHASE II, AFE 9146
 DATE 8-9-90 SUBJECT RECOVERY WELL 15
 DATE OF INSTALLATION: 8-7-90 SHEET 2 OF 6

RW-16

CALCULATION SHEET

CONSTRUCTION COMMENTS: SAME AS RW-14

LOCATION: ROADWAY BETWEEN TANKS 26 & 18



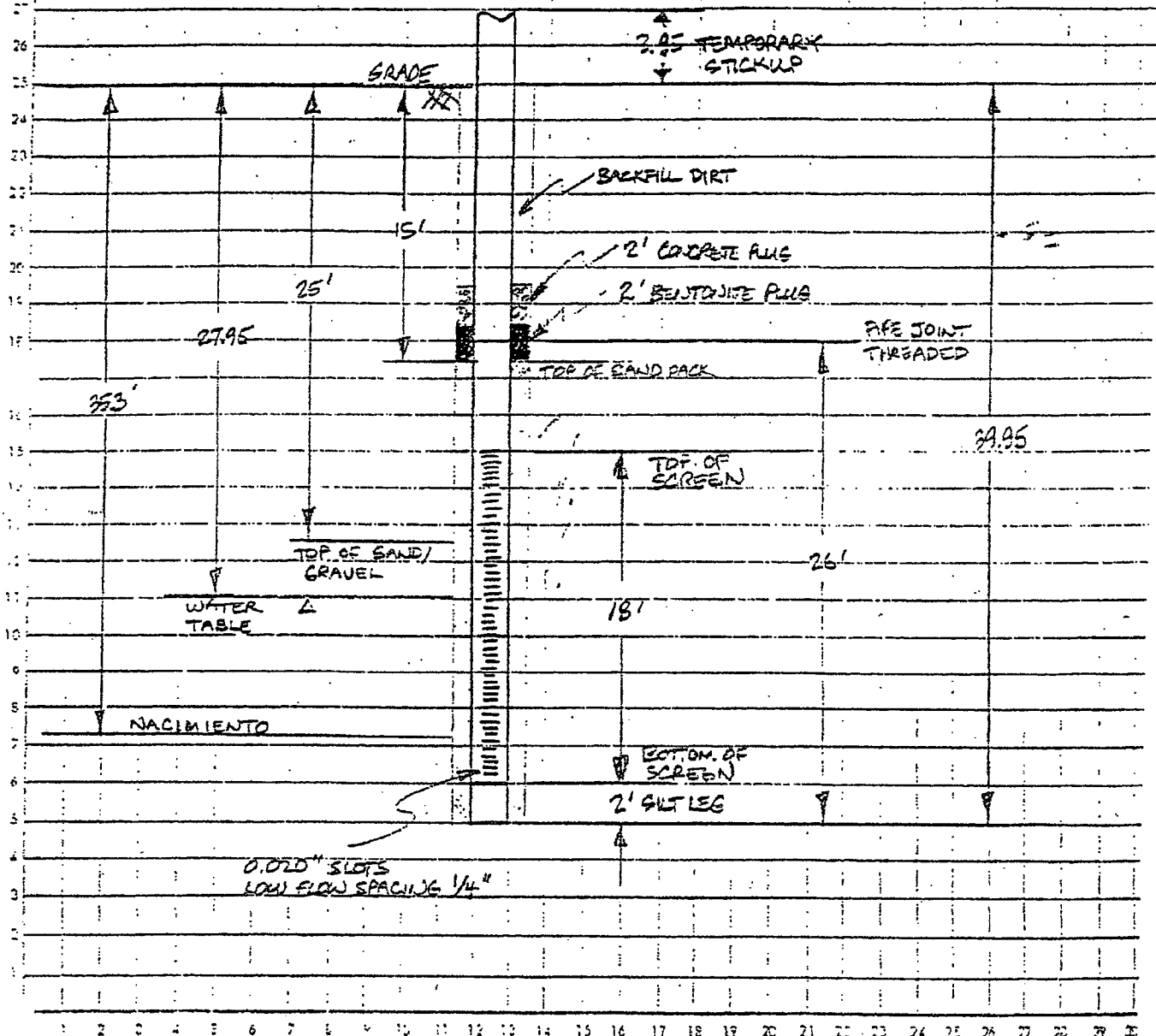
INITIALS GH PROJECT NO. GROUNDWATER RECOVERY - PHASE II, AFE 9146
 DATE 8-8-90 SUBJECT RECOVERY WELL 16
 DATE OF INSTALLATION: 8-7-90 SHEET 3 OF 6

RW-17

CALCULATION SHEET

CONSTRUCTION COMMENTS: SAME AS RW-14

LOCATION: ROAD BETWEEN TANK 17 & 24



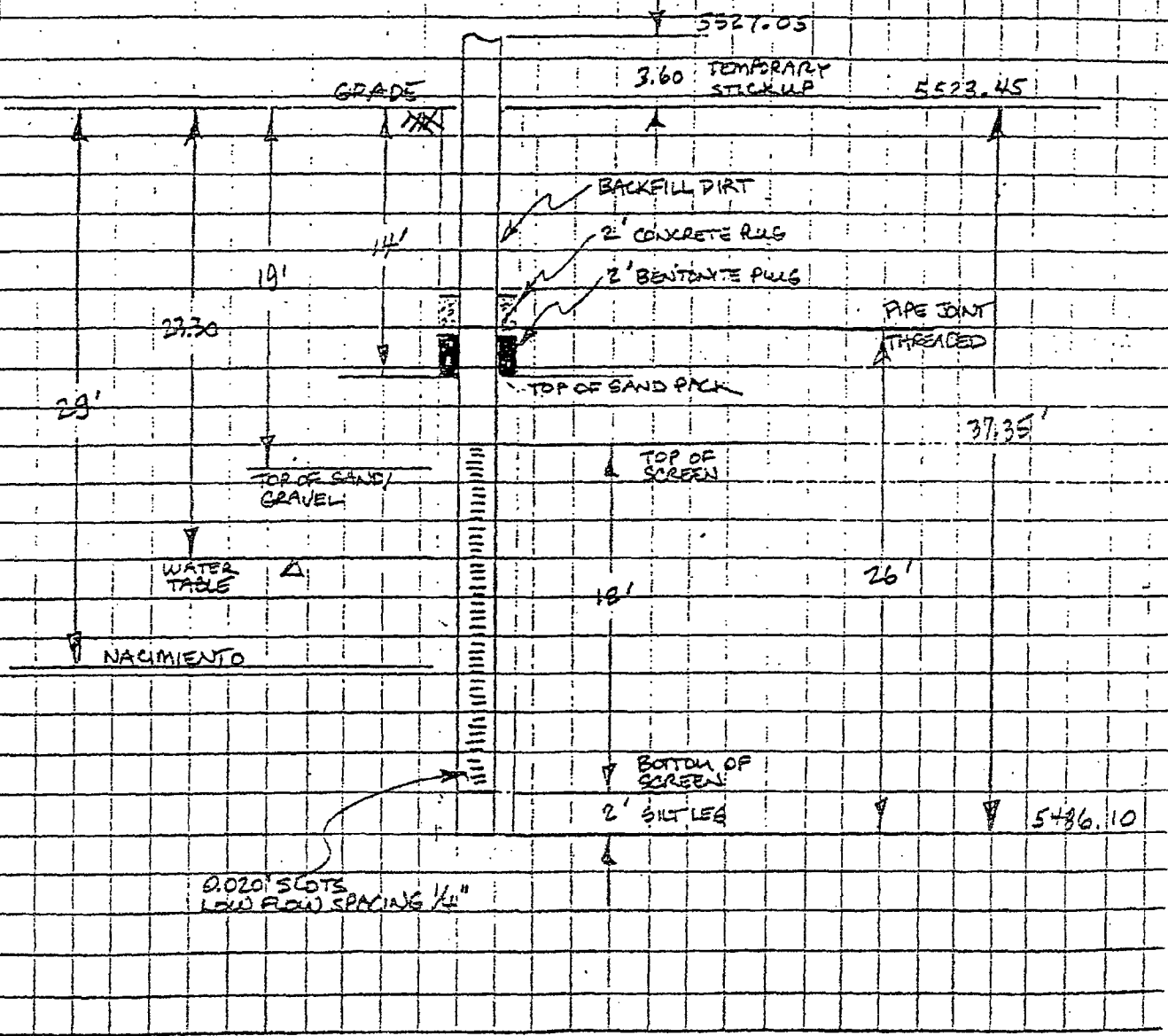
INITIALS CH PROJECT NO. GROUNDWATER RECOVERY - PHASE II, AFE 914
 DATE 2-9-90 SUBJECT RECOVERY WELL 17
 DATE OF INSTALLATION: 8-7-90 SHEET 4 OF 6

CALCULATION SHEET

RW-18

CONSTRUCTION COMMENTS: DRILLED BY CASING DRIVER, 8" BIT, 4.5" O.D. FIBERGLASS CASING SET TO DEPTH INSIDE DRIVEN CASINGS. ANNUAL SPACE FILLED WITH 10/20 SAND AS DRIVE CASING REMOVED. 50 LBS OF BENTONITE DRILLING MUD & 100 LBS OF CONCRETE PLACED ON TOP OF SAND PACK. BACKFILLED WITH DIRT TO SURFACE. CONCRETE PAD SURFACE SEAL (NOT SHOWN)

LOCATION: WEST OF SOUP & NOUNP, NORTH OF CAT/POLY



INITIALS: CH

PROJECT NO.

GROUNDWATER MONITORING - SOUP & NOUNP
GROUNDWATER RECOVERY - OVERALL FACILITY

DATE: 8-9-90

SUBJECT: RECOVERY WELL 18

DATE OF INSTALLATION: 8-8-90

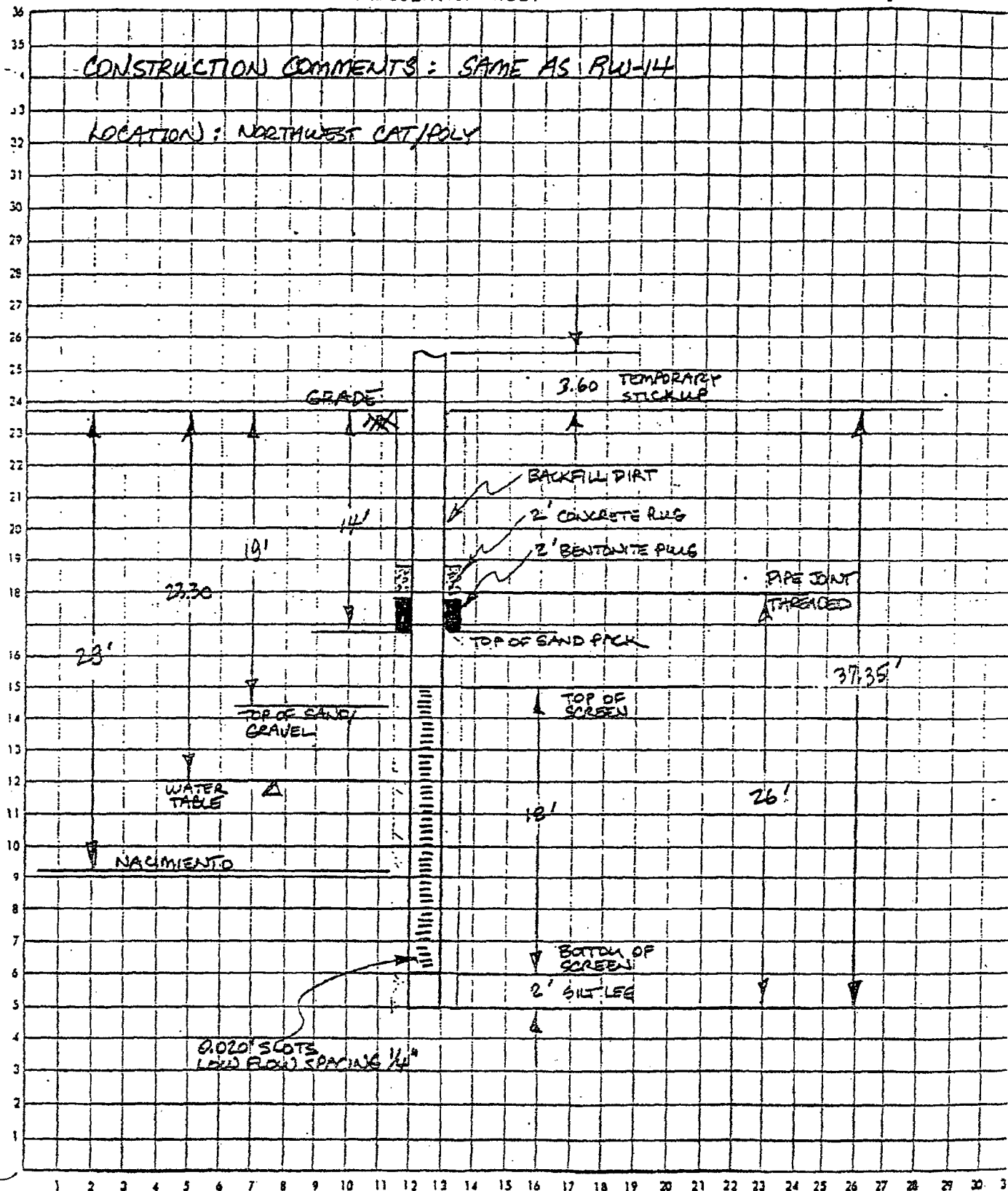
SHEET 5 OF 6

CALCULATION SHEET

RW-18

CONSTRUCTION COMMENTS: SAME AS RW-14

LOCATION: NORTHWEST CAT/POLY



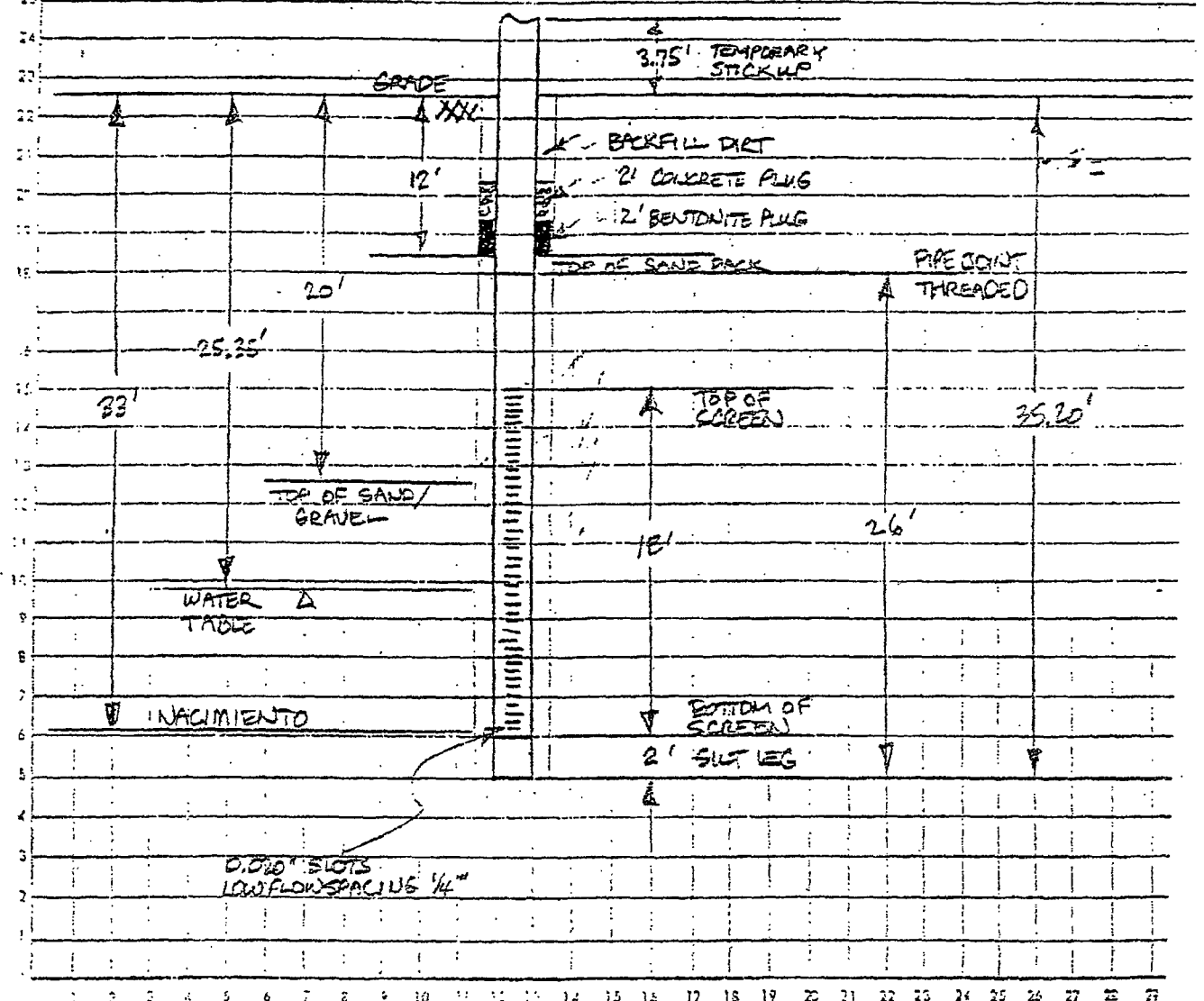
INITIALS CH PROJECT NO. GROUNDWATER RECOVERY-PHASE II, AFE 9146
 DATE 8-9-90 SUBJECT RECOVERY WELL 18
 DATE OF INSTALLATION: 8-8-90 SHEET 5 OF 6

CALCULATION SHEET

RW-19

CONSTRUCTION COMMENTS: SAME AS RW-14

LOCATION: NE CORNER FIRE EQUIP. BLDG.



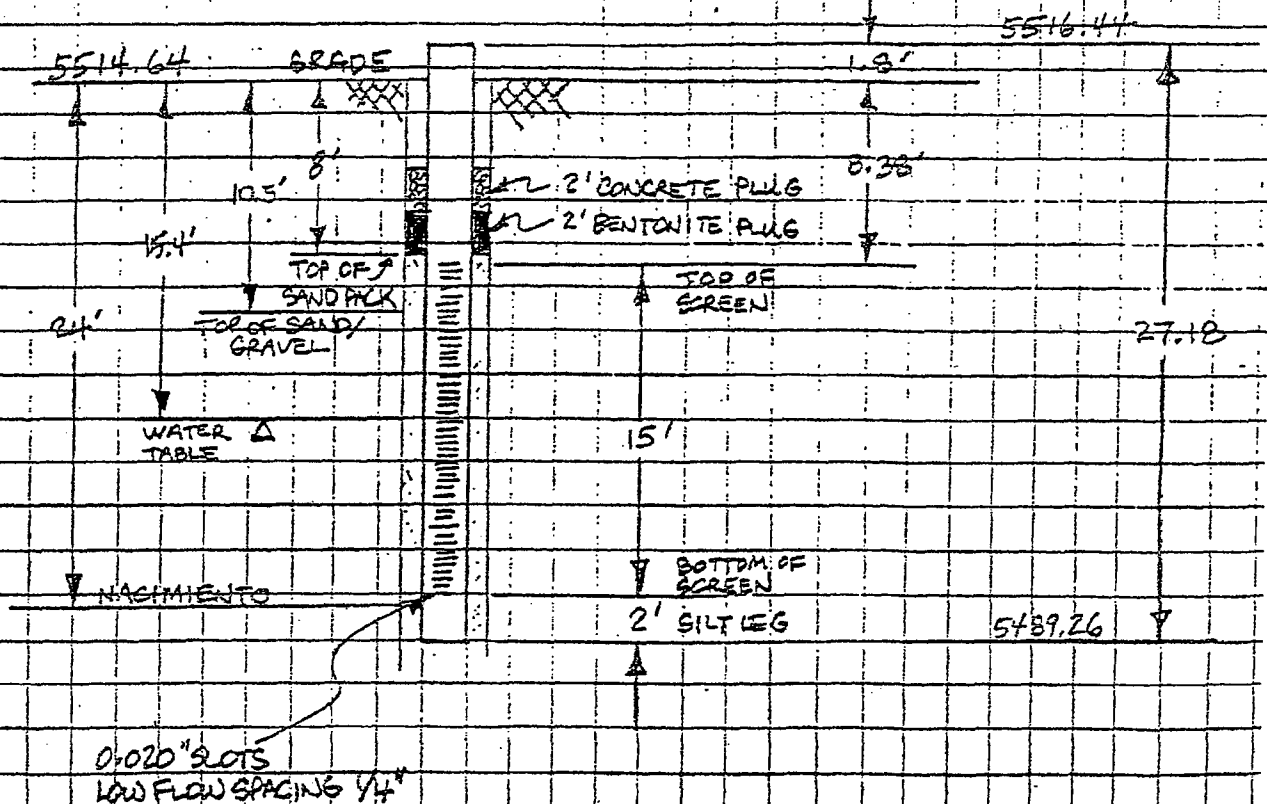
INITIALS: CMT PROJECT NO. GROUNDWATER RECOVERY - PHASE II, AFE 9146
 DATE: 8-9-90 SUBJECT: RECOVERY WELL 19
 DATE OF INSTALLATION: 8-8-90 SHEET 10 OF 10

CALCULATION SHEET

MW-20

CONSTRUCTION COMMENTS: DRILLED BY CASING DRIVER 8" BIT. 4.5" O.I.
FIBERGLASS CASING SET TO DEPTH INSIDE DRIVE
LOCATION: NORTH SIDE OF CASING; ANNULAR SPACE FILLED WITH 30/40 S.
NOWP-CENTERED AS DRIVEN CASING REMOVED. 50 LBS OF BENTON
DRILLING MUD & 100 LBS OF CONCRETE PLUG
ON TOP OF SAND PACK; BACKFILLED WITH
DIRT TO SURFACE.

CONCRETE PAD SURFACE SEAL (NOT SHOWN)



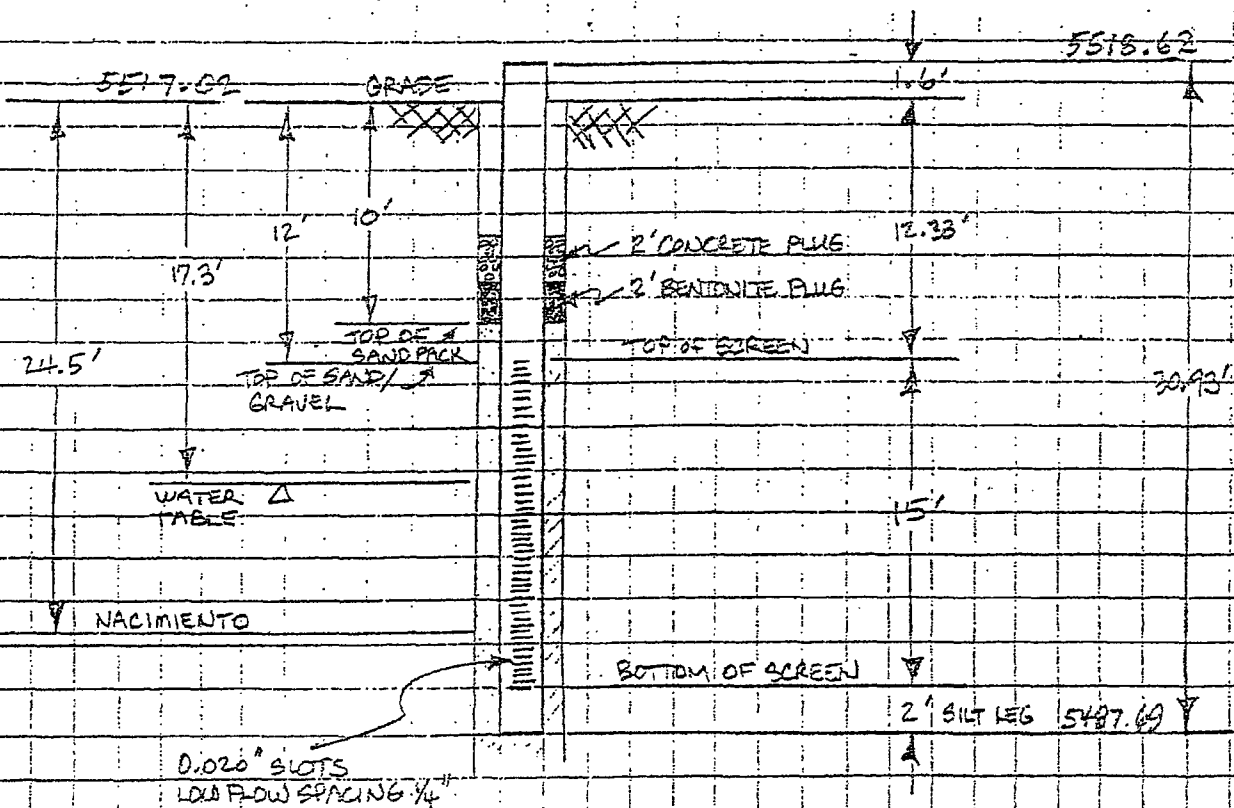
INITIALS MA PROJECT NO. GROUNDWATER MONITORING - SOWP & NOWP
DATE 9-16-91 SUBJECT MW-20
DATE OF INSTALLATION: 9-13-91 SHEET 1 OF 2

CALCULATION SHEET

MW-21

CONSTRUCTION COMMENTS: DRILLED BY CASING DRIVER, 8" BIT, 4.5" O.D. FIBERGLASS CASING SET TO DEPTH INSIDE DRIVEN CASING; ANNULAR SPACE FILLED WITH 30/40 SAND AS DRIVEN CASING REMOVED. 50 LBS OF BENTONITE DRILLING MUD & 100 LBS OF CONCRETE PLACED ON TOP OF SAND PACK; BACKFILLED WITH DIRT TO SURFACE.

CONCRETE PAD SURFACE SEAL (NOT SHOWN)



INITIALS: CA PROJECT NO. GROUNDWATER MONITORING - SOWP & NOWP
 DATE: 9-16-91 SUBJECT: MW-21, UPGRADIENT FROM SOWP & NOWP
 DATE OF INSTALLATION: 9-16-91 SHEET: 2 OF 2



GROUNDWATER
TECHNOLOGY

Drilling Log

Recovery Well RW-22

Project Bloomfield/50 CR4990 Owner Bloomfield Refining Co.
Location Bloomfield, New Mexico Proj. No. 023353014
Surface Elev. 5518.05 ft. Total Hole Depth 34 ft. Diameter 10 in.
Top of Casing 5521.05 ft. Water Level Initial 19 ft. Static _____
Screen: Dia 6 in. Length 16 ft. Type/Size FRE/0.020 in.
Casing: Dia 6 in. Length 17/2 ft. Type FRE
Fill Material 12/20 Co. Silica Rig/Core Speedstar 15-TMH
Drill Co. Beeman Bros. Method Air Percussion
Driller Leo Beeman Log By Jerry May Date 07/19/93 Permit # _____
Checked By _____ License No. _____

See Site Map
For Boring Location

COMMENTS:

Start @ 1230 hrs. 2 ft silt leg installed
from 31 to 33 feet

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0							
2							Tan SILT (moist)
4							Same as above
6		214				ML	
8							
10		46					Same as above
12							Gray COBBLES (trace or no fines)
14						GW	
16		NA					
18							Light gray-stained poorly-graded fine SAND with trace of gravel (moist-wet)
20		1450				SP	Groundwater encountered at 19' on 7/19/93
22						GW	
24							Dark-gray-stained COBBLES with trace fines (moist)



GROUNDWATER
TECHNOLOGY

Drilling Log

Recovery Well RW-22

Project Bloomfield/50 CR4990

Owner Bloomfield Refining Co.

Location Bloomfield, New Mexico

Proj. No. 023353014

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%			
24		1,146			GW	Encountered weathered limestone (moist) (Dry at 28 feet)			
26									
28		853				End of boring at 34 feet (1355 hrs.). Installed recovery well screened from 15 to 31 feet on 7/19/93.			
30									
32	96								
34									
36									
38									
40									
42									
44									
46									
48									
50									
52									
54									
56									



GROUNDWATER
TECHNOLOGY

Drilling Log

Recovery Well RW-23

Project Bloomfield/50 CR4990 Owner Bloomfield Refining Co.
Location Bloomfield, New Mexico Proj. No. 023353014
Surface Elev. 5515.74 ft. Total Hole Depth 33 ft. Diameter 10 in.
Top of Casing 5517.74 ft. Water Level Initial 19 ft. Static _____
Screen: Dia 6 in. Length 18 ft. Type/Size FRE/0.020 in.
Casing: Dia 6 in. Length 15/2 ft. Type FRE
Fill Material 12/20 Co. Silica Rig/Core Speedstar 15-TMH
Drill Co. Beeman Bros. Method Air Percussion
Driller Leo Beeman Log By Jerry May Date 07/19/93 Permit # _____
Checked By _____ License No. _____

See Site Map
For Boring Location

COMMENTS:

Start @ 1630 hrs. 2 ft. silt leg installed
from 31 to 33 feet

Depth (ft.)	Well Completion	PTD (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0						GW	Gravel with fines (dry)
2							Brown silty CLAY (moist, medium plasticity)
4						CL	
6		0					Gravel and COBBLES (no fines)
8							
10		32					Same as above with little fines
12						GW	
14							Gravel and COBBLES with trace of fines (dry)
16		54 74					Gray-stained, same as above
18		2,914					Black-stained GRAVEL with some fines (moist)
20							Groundwater encountered at 19 feet on 7/19/93
22						GM	
24		105					

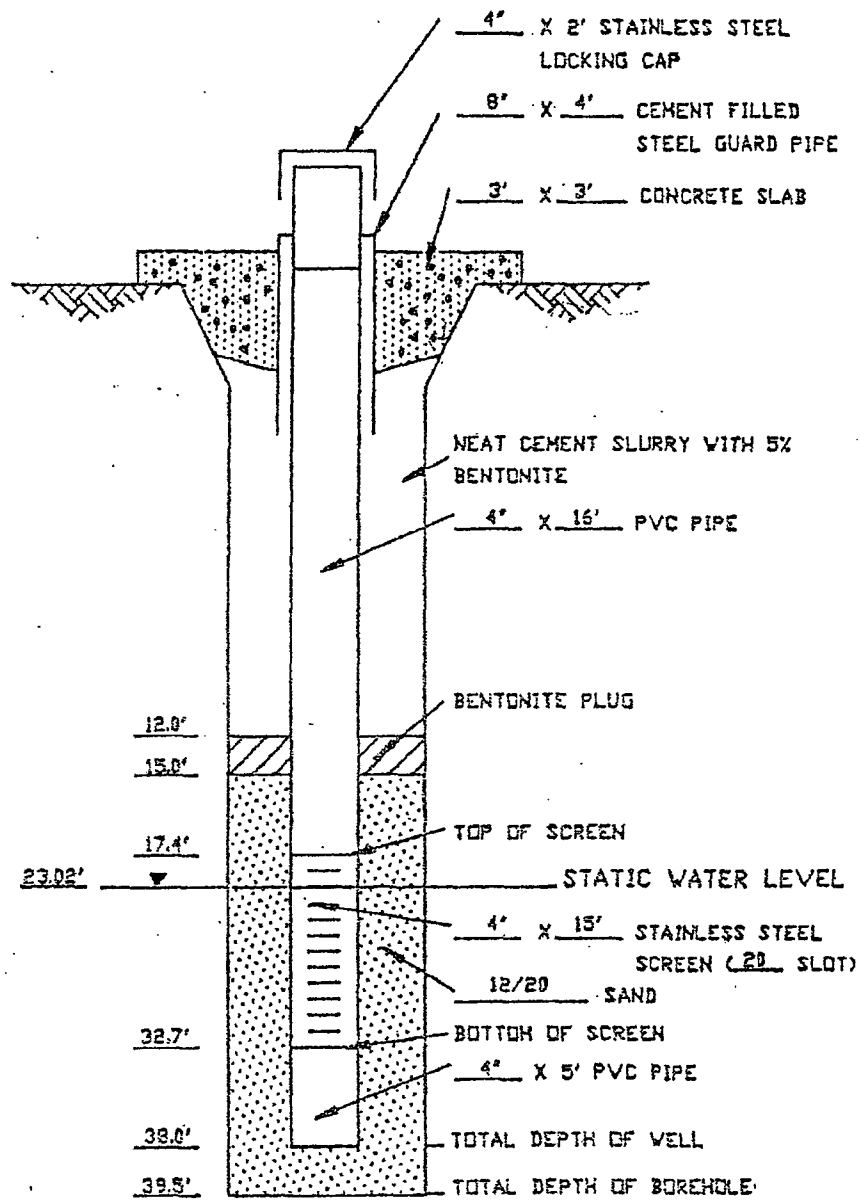


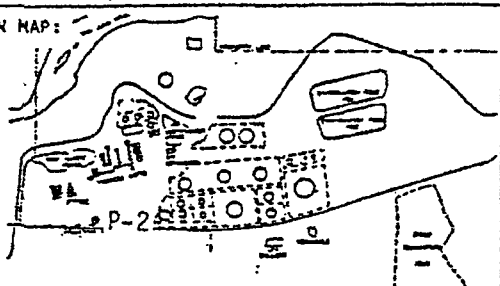
FIGURE B-5
COMPLETION DIAGRAM
PIEZOMETER P-2

LITHOLOGIC LOG (SOIL)

PIEZOMETER P-2

Page 1 of 1

LOCATION MAP:



SITE ID: BRC LOCATION ID: P-2
 SITE COORDINATES (ft.):
 N E
 GROUND ELEVATION (ft. MSL): 5522.93
 STATE: New Mexico COUNTY: San Juan
 DRILLING METHOD: Casing Driver
 DRILLING CONTR.: Seeman Brothers
 DATE STARTED: 29 August 1988 DATE COMPLETED: 29 August 1988
 FIELD REP.: W.S. Dubyk
 COMMENTS: This well replaced by P-2a. Static on September 2, 1988; 23.75 from TOC.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5			1650		0'-13' Silty and Clay - Dark gray (N3) to grayish black (N2) to dark yellowish brown (10 YR 4/2). Intense hydrocarbon odor.
10			1656		
15			1710		13'-31.5' Sand and Gravel - Moderate yellowish brown (10 YR 5/4) to medium gray (N3). Sand is medium to very coarse grained, subangular to subrounded. Gravel is subangular to well rounded, to 2" diameter. Strong hydrocarbon odor below 25'.
20			1720		
25			1730		
30			1734		
35			1752		31.5'-39.5' Shale - Macimiento Formation - Dusky yellow (5 Y 6/4) to olive gray (5 Y 3/2).
40		T.D. 39.5'	1808		
45					
50					

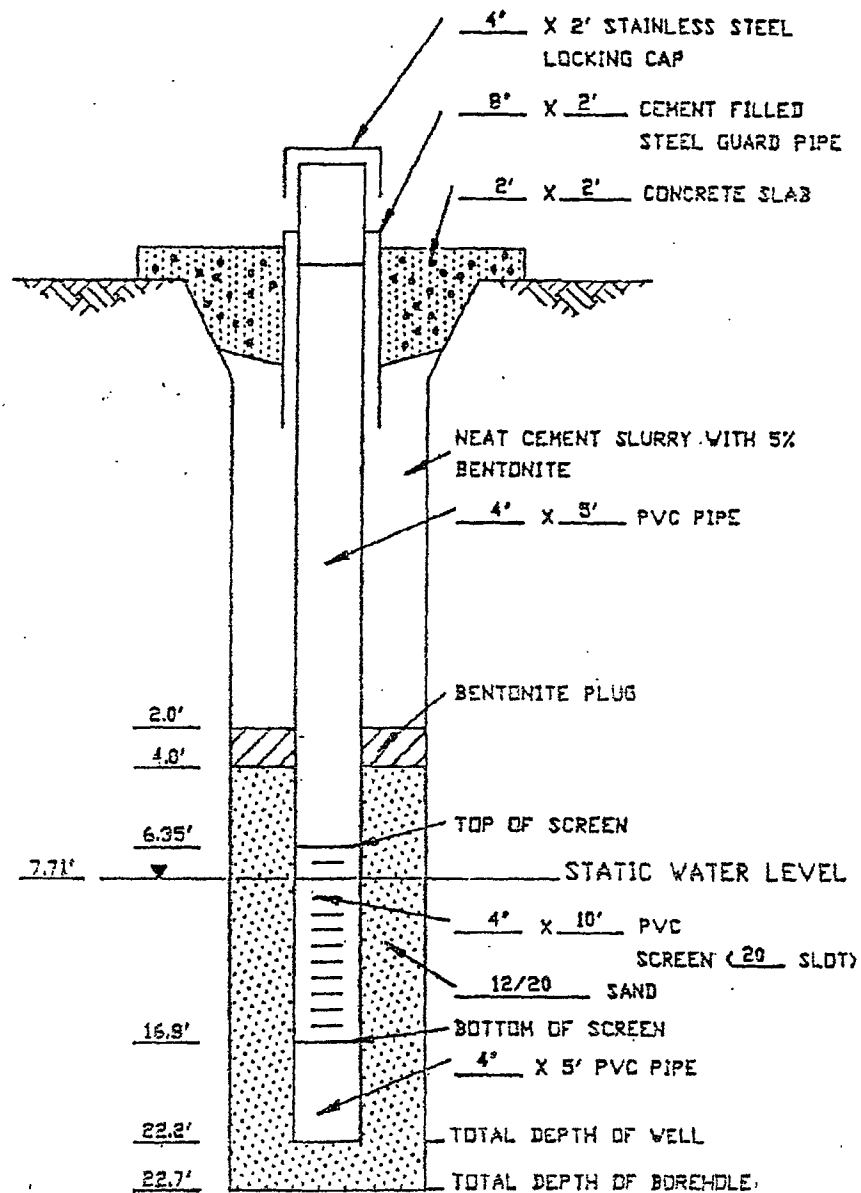


FIGURE B-6
COMPLETION DIAGRAM
PIEZOMETER P-3

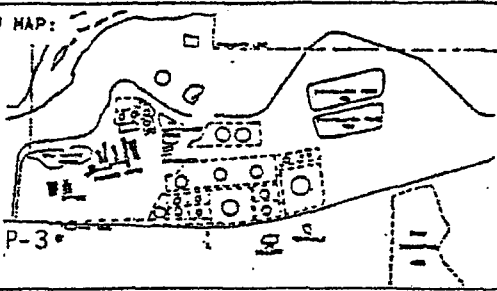
FIGURE D-13

LITHOLOGIC LOG (SOIL)

PIEZOMETER P-3

Page 1 of 1

LOCATION MAP:

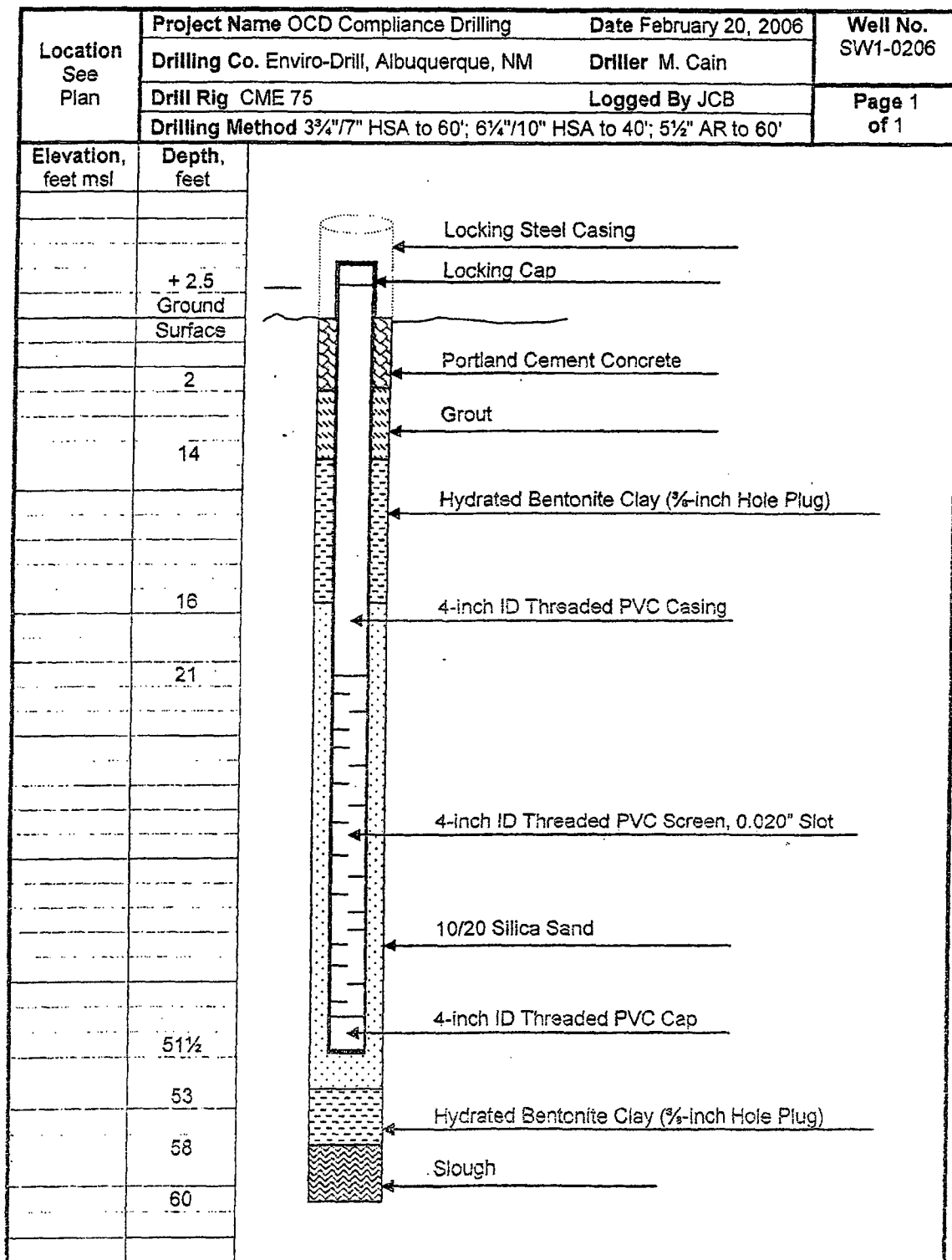


SITE ID: BRC LOCATION ID: P-3
 SITE COORDINATES (ft.): _____
 N _____ E _____
 GROUND ELEVATION (ft. MSL): 5506.40
 STATE: New Mexico COUNTY: San Juan
 DRILLING METHOD: Casing Driver
 DRILLING CONTR.: Seeman Brothers
 DATE STARTED: 1 September 1988 DATE COMPLETED: 1 September 1988
 FIELD REP.: U.S. Dubyk
 COMMENTS: Static on September 2, 1988; 8.30' from TOC.

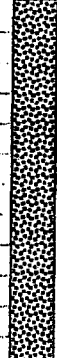
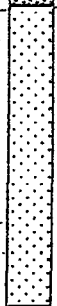
LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5	100		0902		0'-14' Sand and Gravel - Medium gray (N5) to dark gray (N3). Sand is medium to coarse grained, subangular to subrounded. Gravel is subrounded to rounded, to 2" diameter. Strong hydrocarbon odor.
10	100		0913		
15	100		0920		
20	100		0925		
25	100	T.D. 22.7'	1000		14'-22.7' Shale: <u>Nacimiento formation</u> - Dusky yellow (5 YR 6/4) to light olive gray (5 Y 6/1) shale.
30	100				
35	100				
40	100				
45	100				
50	100				

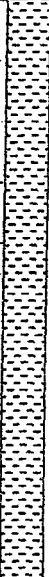
Well Installation Summary



Log of SW1-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 3/4"/7" HSA to 60'; 6 1/4"/10" HSA to 40'; 5 1/2" AR to 60'			Date February 20, 2006 Driller M. Cain Logged By JCB		Page 1 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
					Surface Condition: Fill Soil		
1						Sand Fill	fine to medium, trace coarse, little fine to coarse gravel, few clayey silt, brown, medium dense, dry
2							
3	S-1 Grab	—	—	0.0			
4						Gravel Jackson Lake Terrace	fine to coarse, some fine to coarse sand, trace clayey silt, scattered cobbles, gray-brown, very dense, dry
5							
6							
7							
8							
9						Sand	fine to medium, trace coarse, few fine gravel, trace clayey silt, brown, dense, dry
10	S-2 SPT	12 17 12	0	—			
11							
12							
13						Claystone Nacimiento Formation	Silty Clay; medium plasticity, brown, very hard, dry, faint laminated bedding, silt partings on approx. 1" to 2" spacing, oxidized reddish-brown 1/8" to 1/4" nodules, lightly fractured, moderately cemented
14							
15	S-3 SPT	13 26 46	100	0.0			
16							
17							
18							
19							
20							

Log of SW1-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3¾"/7" HSA to 60'; 6¼"/10" HSA to 40'; 5½" AR to 60'		Date February 20, 2006 Driller M. Cain Logged By JCB		Page 2 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description	
20	S-4	18	100	>10		Claystone continued, laminated bedding, highly fractured
21	SPT	19				
		50				
22		5½"				
23						
24						
25	S-5	29	100	0.0		laminated with gray-brown clayey silt
26	SPT	50				
		4"				
27						
28						
29						
30	S-6	50	0	—		Silty Clay; medium plasticity, light gray, very hard, brown, very hard, dry, fissured bedding, moderately cemented
31	SPT	4"				
32						
33						
34						
35	S-7	31	100	0.0		Silty Clay; medium plasticity, dark gray, very hard, dry, highly fractured, slickensides on fractures, moderately cemented
36	SPT	49				
37						
38						
39						Siltstone Clayey Silt; trace fine sand, low plasticity, light gray, very hard, moist, laminated bedding, laminated with gray-brown clayey silt, moderately cemented
40						

Log of SW1-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 3/4"/7" HSA to 60'; 6 1/4"/10" HSA to 40'; 5 1/2" AR to 60'			Date February 20, 2006 Driller M. Cain Logged By JCB		Page 3 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
40	S-8	50	100	0.0		Siltstone	continued
41	SPT	5"					
42							
43						Sandstone	Sand; fine, few clayey silt, light gray, very dense, moist, faint laminated bedding, weakly cemented
44							
45	S-9	50	100	0.0			
46	SPT	5"					
47							
48							
49							
50	S-10	40	20	0.0			
51	SPT	50					
52		5"					
53							
54							
55	S-11	35	100	0.0			little clayey silt, laminated bedding
56	SPT	50					
57		5"					
58							
59							
60							

Log of SW1-0206

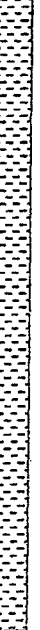
Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 1/4"/17" HSA to 60'; 6 1/4"/10" HSA to 40'; 5 1/2" AR to 60'			Date February 20, 2006 Driller M. Cain Logged By JCB		Page 4 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
60	S-12	36	100	0.0	Sandstone continued, few clayey silt		
61	SPT	50 4"					
62					Bottom of boring at approximately 60 1/4 feet. Boring completed on February 20, 2006. No groundwater observed during drilling. No groundwater measured in well on March 2, 2006.		
63							
64							
65							
66							
67							
68							
69							
70							
71							
72							
73							
74							
75							
76							
77							
78							
79							
80							

Well Installation Summary

Location See Plan	Project Name OCD Compliance Drilling		Date February 16, 2006	Well No. SW2-0206
	Drilling Co. Enviro-Drill, Albuquerque, NM		Driller M. Cain	
	Drill Rig CME 75		Logged By JCB	Page 1 of 1
	Drilling Method 3 3/4"/7" HAS to 35'			

Elevation, feet msl	Depth, feet	
	+ 2.4 Ground Surface	
	1	
	4	
	5	
	25 1/2	
	27	
	32	
	35 1/2	

Log of SW2-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3¾"/7" HAS to 35'			Date February 16, 2006 Driller M. Cain Logged By JCB		Page 1 of 2 Elevation			
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description					
Surface Condition: Soil, Shoulder of Hammond Ditch Road										
1	S-1 Grab	—	—	1.3		Sand Fill	fine to coarse, little fine to coarse gravel, trace clayey silt, brown, medium dense, dry			
2						Sand Jackson Lake Terrace	fine to coarse, little fine to coarse gravel, trace clayey silt, scattered cobbles, brown, dense, dry			
3										
4										
5						Gravel	fine to coarse, some fine to coarse sand, trace clayey silt, scattered cobbles, gray-brown, dense, dry			
6										
7										
8										
9	S-2 SPT	11	100	>10		Sand	fine to medium, trace coarse, trace clayey silt, gray-brown, medium dense, moist, dark gray/black petroleum staining			
10		17								
11		22								
12	S-3 SPT					Claystone Nacimienta Formation	Silty Clay; trace fine sand, medium plasticity, brown, very hard, moist, faint laminated bedding, silt partings on approx. 1" spacing, lightly fractured with occasional reddish-brown oxidization on fractures, moderately cemented, 10' to 10.1' dark gray/black petroleum staining			
13										
14										
15								20	100	3.5
16								21		
17								30		
18										
19										
20										
						laminated bedding				

Log of SW2-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 1/4" / 7" HAS to 35'			Date February 16, 2006 Driller M. Cain Logged By JCB		Page 2 of 2 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
20	S-4	18	100	0.3		Claystone continued	
21	SPT	33					
22		50					
23		3"					
24							
25	S-5	30	100	0.6		Silty Clay; low plasticity, medium gray, laminated bedding, occasional laminations of clayey silt, moderately fractured, faint slickensides on fractures, moderately cemented	
26	SPT	50					
27		4"					
28							
29							
30	S-6	40	25	0.3			
31	SPT	50				occasional silt partings	
32		5"					
33							
34							
35	S-7	50	100	0.4		Bottom of boring at approximately 35 1/2 feet. Boring completed on February 16, 2006. No groundwater observed during drilling. No groundwater measured in well on March 2, 2006.	
36	SPT	5 1/2"					
37							
38							
39							
40							

Log of SW3-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 1/4" / 7" HSA to 60'; 6 1/4" / 10" HSA to 58'		Date February 17, 2006 Driller M. Cain Logged By JCB		Page 1 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description	
Surface Condition: Soil, Shoulder of Hammond Ditch Road						
1					Sand Fill	fine to medium, trace coarse, few fine gravel, trace clayey silt, brown, medium dense, moist
2						
3						
4						
5	S-1	--	--	0.1		
6	Grab					
7						
8					Claystone Nacimiento Formation	Silty Clay; trace fine sand, medium plasticity, brown, hard, dry, laminated bedding, silt partings on approx. 1" to 2 1/2" spacing, moderately cemented moderately fractured with reddish-brown oxidization on fractures
9	S-2 SPT	7 8 10	100	0.2		
10						
11						
12						
13						
14						
15	S-3 SPT	11 12 11	100	0.2		
16						
17						
18						
19						
20						

Log of SW3-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3¾"/7" HSA to 60'; 6¼"/10" HSA to 58'			Date February 17, 2006 Driller M. Cain Logged By JCB		Page 2 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
20					Claystone continued Silty Clay; medium plasticity, dark gray, laminated bedding, highly fractured, slickensided fractures, moderately cemented Siltstone Clayey Silt; trace fine sand, low plasticity, light gray, very hard, dry, laminated bedding, laminated with medium gray clayey silt, moderately cemented		
21							
22							
23							
24							
25							
26							
27							
28							
29							
30	S-4	38	100	0.2			
31	SPT	50 3"					
32							
33							
34							
35	S-5	13	100	0.2			
36	SPT	33 50 4"					
37							
38							
39							
40							

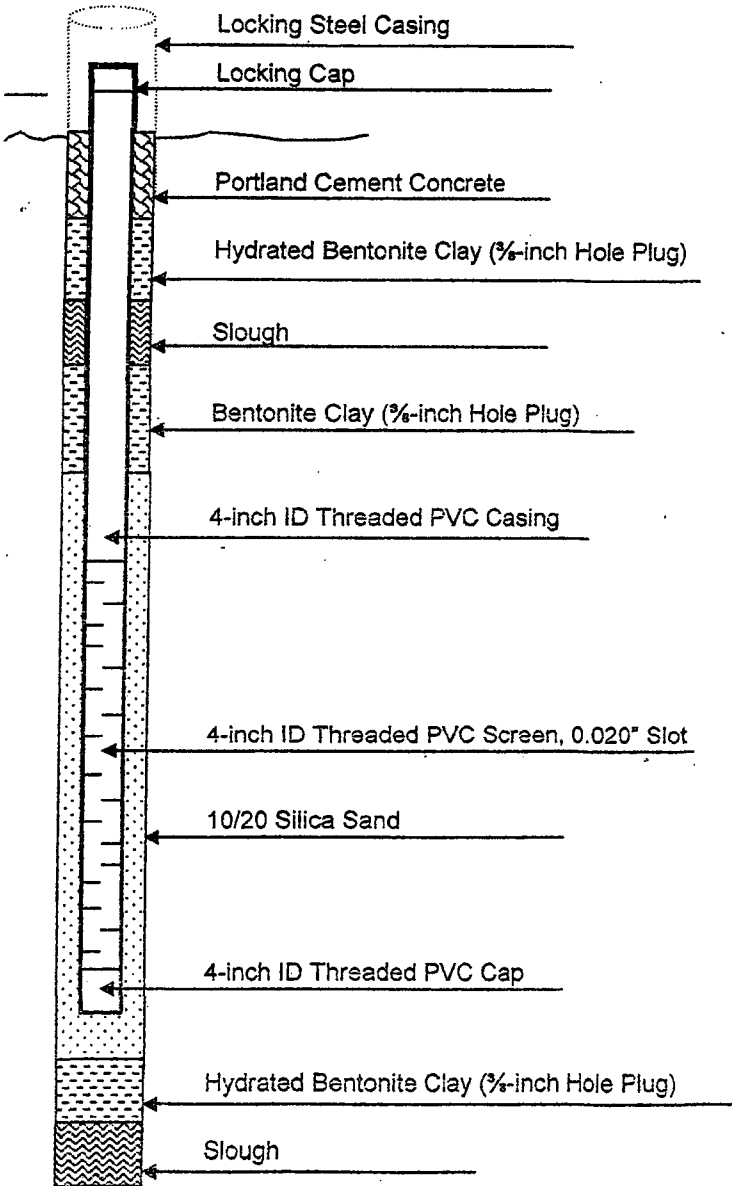
Log of SW3-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3¾"/7" HSA to 60'; 6¼"/10" HSA to 58'			Date February 17, 2006 Driller M. Cain Logged By JCB		Page 3 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
40	S-6	34	100	0.7		Siltstone	continued
41	SPT	50 4"					
42							
43							
44						Sandstone	Clayey Sand; fine, low plasticity, light gray, very dense, moist, faint laminated bedding, laminated with medium gray clayey silt, moderately cemented
45							
46							
47							
48							
49							
50	S-7	50	100	0.2			
51	SPT	5" 5"					
52							
53							
54							
55							
56							
57							
58							
59							
60							

Log of SW3-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 1/4"/7" HSA to 60'; 6 1/4"/10" HSA to 58'			Date February 17, 2006 Driller M. Cain Logged By JCB		Page 4 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
60	S-8	50	100	0.2	 Sandstone continued		
61	SPT	3"			Bottom of boring at approximately 60 1/4 feet. Boring completed on February 17, 2006. No groundwater observed during drilling. No groundwater measured in well on March 2, 2006.		
62							
63							
64							
65							
66							
67							
68							
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79							
80							

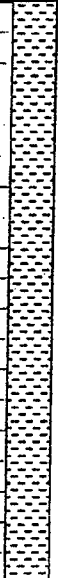
Well Installation Summary

Location See Plan	Project Name OCD Compliance Drilling		Date February 16, 2006	Well No. SW4-0206
	Drilling Co. Enviro-Drill, Albuquerque, NM		Driller M. Cain	
	Drill Rig CME 75		Logged By JCB	Page 1 of 1
	Drilling Method 3¾"/7" HSA to 60'; 6¼"/10" HSA to 10'; 5½" AR to 60'			
Elevation, feet msl	Depth, feet			
	+ 2.3 Ground Surface			
	2½			
	4			
	5			
	8			
	9½			

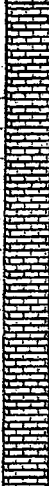
Log of SW4-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 3/4"/7" HSA to 60'; 6 1/4"/10" HSA to 10'; 5 1/2" AR to 60'			Date February 16, 2006 Driller M. Cain Logged By JCB		Page 1 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
					Surface Condition: Soil, Shoulder of Hammond Ditch Road		
1					Sand Fill	fine to medium, trace coarse, few fine gravel, few clayey silt, brown, loose, moist	
2							
3							
4	S-1 Grab	—	—	0.1			
5							
6							
7							
8							
9							
10	S-2 SPT	3	50	3.6	Claystone Nacimiento Formation	Silty Clay; trace fine sand, medium plasticity, brown, soft, moist, faint laminated bedding, silt partings on approx. 1" to 2" spacing, moderately cemented	
11		4					
12		4					
13							
14							
15	S-3 SPT	17	100	0.4			
16		24					
17		50 5"					
18							
19							
20							

Log of SW4-0206

Location See Plan		Project Name OCD Compliance Drilling. Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3¾"/7" HSA to 60'; 6¼"/10" HSA to 10'; 5½" AR to 60'			Date February 16, 2006 Driller M. Cain Logged By JCB		Page 2 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
20	S-4	14	100	0.0		Claystone continued	
21		34 38					
22							
23							
24							
25	S-5	24	100	0.2			
26		50 4"					
27							
28							
29							
30	S-6 SPT	50 4"	50	0.0		Silty Clay, medium plasticity, light gray, very hard, dry, laminated bedding, silt partings on approx. 1" spacing, moderately cemented	
31							
32							
33							
34							
35	S-7 SPT	18 38	100	0.8		Silty Clay: medium plasticity, dark gray, very hard, dry, faint laminated bedding, highly fractured, slickensided fractures, moderately cemented	
36		50 5½"					
37							
38							
39							
40						Siltstone Clayey Silt; low plasticity, light gray, very hard, dry, laminated bedding, silt partings on approx. ¾" to 5/8" spacing, moderately cemented	

Log of SW4-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 3/4"/7" HSA to 60'; 6 1/4"/10" HSA to 10'; 5 1/2" AR to 60'			Date February 16, 2006 Driller M. Cain Logged By JCB		Page 3 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
40	S-8	50	100	0.2		Siltstone	continued
41	SPT	6"					
42							
43						Sandstone	Clayey Sand; fine, low plasticity, light gray, very dense, moist, faint laminated bedding, laminated with medium gray clayey silt, moderately cemented
44							
45	S-9	46	80	0.0			
46	SPT	50					
47		4"					
48							
49							
50	S-10	50	100	0.0			
51	SPT	5 1/2"					
52							
53							laminated bedding, little clayey silt
54							
55	S-11	50	100	0.0			
56	SPT	5 1/2"					
57							
58							
59							
60							

Log of SW4-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3¾"/7" HSA to 60'; 6¼"/10" HSA to 10'; 5½" AR to 60'		Date February 16, 2006 Driller M. Cain Logged By JCB		Page 4 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description	
60	S-12	50	100	0.0	 Sandstone continued	
61	SPT	5"				
62					Bottom of boring at approximately 60½ feet. Boring completed on February 16, 2006. No groundwater observed during drilling. No groundwater measured in well on March 2, 2006.	
63						
64						
65						
66						
67						
68						
69						
70						
71						
72						
73						
74						
75						
76						
77						
78						
79						
80						

Well Installation Summary

Location See Plan	Project Name OCD Compliance Drilling		Date February 15, 2006	Well No. SW5-0206
	Drilling Co. Enviro-Drill, Albuquerque, NM		Driller M. Cain	
	Drill Rig CME 75		Logged By JCB	Page 1 of 1
	Drilling Method 6¼"/10" HSA to 14'; 5½" AR 14' to 60'			
Elevation, feet msl	Depth, feet			
	+ 2.3			
	Ground Surface			
	2½			
	10			
	14			
	19			
	49½			
	52			
	60			

Locking Steel Casing

Locking Cap

Portland Cement Concrete

Slough

Hydrated Bentonite Clay (¾-inch Hole Plug)

4-inch ID Threaded PVC Casing

4-inch ID Threaded PVC Screen, 0.020" Slot

10/20 Silica Sand

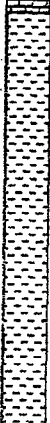
4-inch ID Threaded PVC Cap

Hydrated Bentonite Clay (¾-inch Hole Plug)

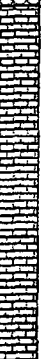
Log of SW5-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 6 1/4"/10" HSA to 14'; 5 1/2" AR 14' to 60'			Date February 15, 2006 Driller M. Cain Logged By JCB		Page 1 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
					Surface Condition: Fill Soil		
1					Sand <i>Fill</i>	fine to coarse, little fine to coarse gravel, trace clayey silt, brown, loose, dry	
2							
3						scattered cobbles	
4							
5						medium dense	
6							
7							
8					Gravel <i>Jackson Lake Terrace</i>	fine to coarse, some fine to coarse sand, trace clayey silt, scattered cobbles, gray-brown, medium dense, dry	
9					Sand	fine to coarse, some fine to coarse gravel, trace clayey silt, brown, dense, dry	
10	S-1 Grab	—	—	0.3			
11					Gravel	some cobbles, few fine to coarse sand, trace clayey silt, dense, dry	
12							
13							
14							
15					Sand	fine to medium, trace coarse, few clayey silt, yellowish brown, very dense, dry, oxidized 1/4" lenses	
16							
17							
18	S-2 SPT	50 5"	100	0.3			
19							
20							

Log of SW5-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 6 1/4"/10" HSA to 14'; 5 1/2" AR to 60'			Date February 15, 2006 Driller M. Cain Logged By JCB		Page 2 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
20	S-3	38	50	0.3		Sand	continued
21		29 < 1"					
22							
23	S-4	27	100	0.2			
24		44 45					
25						Sandstone <i>Nacimienta</i> <i>Formation</i>	laminated bedding stratified with 1" to 1 1/2" thick light gray clayey fine sand
26	S-5	15	100	0.1			
27		24					
28		27					
29							
30	S-6	11	100	0.0		Claystone	Silty Clay; fine, low plasticity, light gray, very dense, moist, moderately cemented
31	SPT	26 29					
32							
33							
34							
35	S-7	24	100	0.1		Silty Clay; trace fine sand, medium plasticity light gray, very hard, dry, faint laminated bedding, silt partings on approx. 1/4" to 1/2" spacing, moderately cemented	
36	SPT	50 5"					
37							
38							
39							
40							

Log of SW5-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 6 1/4"/10" HSA to 14'; 5 1/2" AR to 60'			Date February 15, 2006 Driller M. Cain Logged By JCB		Page 3 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
40	S-8	40	100	0.3		Claystone continued	Silty Clay; medium plasticity, dark gray, very hard, moist, laminated bedding, highly fractured, faint slickensides on fractures, moderately cemented
41	SPT	50 5"					
42							
43							
44							
45	S-9	21	80	0.3			
46	SPT	50 2"					
47							
48							
49							
50	S-10	50	100	0.2		Siltstone	Clayey Silt; trace fine sand, low plasticity, light gray, very hard, moist, laminated bedding, laminated with medium gray clayey silt, moderately cemented
51	SPT	5 1/2"					
52							
53							
54							
55	S-11	50	100	0.3		Sandstone	Sand; fine, few clayey silt, light gray, very dense, moist, faint laminated bedding, laminated with medium gray clayey silt, weakly cemented
56	SPT	5"					
57							
58							
59							
60							

Log of SW5-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 6¼"/10" HSA to 14'; 5½" AR to 60'			Date February 15, 2006 Driller M. Cain Logged By JCB		Page 4 of 4 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
60	S-12	50	100	0.3	Sandstone continued		
61	SPT	4"			Bottom of boring at approximately 60¼ feet. Boring completed on February 15, 2006. No groundwater observed during drilling. Perched groundwater measured in well at approximately 33¼ feet on March 2, 2006.		
62							
63							
64							
65							
66							
67							
68							
69							
70							
71							
72							
73							
74							
75							
76							
77							
78							
79							
80							

Well Installation Summary

Location See Plan	Project Name OCD Compliance Drilling		Date February 15, 2006	Well No. SW6-0206
	Drilling Co. Enviro-Drill, Albuquerque, NM		Driller M. Cain	
	Drill Rig CME 75		Logged By JCB	Page 1 of 1
	Drilling Method 3¾"/7" HAS to 60'; 6¼"/10" HAS to 30'; 5½" AR to 60'			

Elevation, feet msl	Depth, feet	
	+ 2.3	
	Ground Surface	
	3	
	7	
	10	
	12	
	15	
	20	
	22	
	45½	
	40	
	60	

Locking Steel Casing

Locking Cap

Portland Cement Concrete

Cuttings Backfill

Grout

Hydrated Bentonite Clay (⅝-inch Hole Plug)

4-inch ID Threaded PVC Casing

10/20 Silica Sand

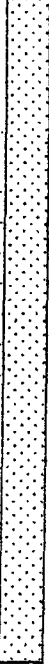
4-inch ID Threaded PVC Screen, 0.020" Slot

Native Sand Cave-in

4-inch ID Threaded PVC Cap

Hydrated Bentonite Clay (¾-inch Hole Plug)

Log of SW6-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 3/4"/7" HAS to 60'; 6 1/4"/10" HAS to 30'; 5 1/2" AR to 60'			Date February 13 & 14, 2006 Driller M. Cain Logged By JCB		Page 1 of 3 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Graphic	Description	
						Surface Condition: Fill Soil, Weeds	
1						Sand Fill	fine to coarse, little fine to coarse gravel, trace clayey silt, gray-brown, loose, dry medium dense
2							
3							
4							
5							
6							
7							
8						Silt Loess	little fine sand, brown, loose, dry
9							
10						Sand Jackson Lake Terrace	fine to coarse, some fine to coarse gravel, trace clayey silt, scattered cobbles, gray-brown, medium dense, dry, stratified with 2" to 12" thick fine to coarse sand, few clayey silt, trace fine to coarse gravel very dense
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Log of SW6-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3¼"/7" HAS to 60'; 6¼"/10" HAS to 30'; 5½" AR to 60'			Date February 13 & 14, 2006 Driller M. Cain Logged By JCB		Page 2 of 3
							Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Graphic	Description	
20						Sand continued	
21							
22						Sand; fine, few clayey silt, yellowish brown, very dense, moist, stratified with ¼" to ½" thick clayey fine sand dark gray/black petroleum staining, petroleum odor PID reading of >10 on slough	
23	S-1 MC	39 50 4"	100	0.8			
24							
25							
26							
27							
28	S-2 MC	21 50 4"	100	>10 5.2			
29							
30							
31							
32						Sandstone Nacimiento Formation Clayey Sand; fine, low plasticity, light gray, very dense, moist, moderately cemented	
33	S-3 MC	50 4"	0	—			
34							
35							
36							
37							
38	S-4 SPT	26 51	100	4.7			
39							
40							

Log of SW6-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 3/4"/7" HAS to 60'; 6 1/4"/10" HAS to 30'; 5 1/2" AR to 60'			Date February 13 & 14, 2006 Driller M. Cain Logged By JCB		Page 3 of 3 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Graphic	Description	
40						Sandstone continued	
41							
42							
43	S-5 SPT	31 50 4"	100	0.8		Sand; fine, few clayey silt, light gray, very dense, moist, laminated with medium gray clayey silt, moderately cemented	
44							
45							
46						Claystone Silty Clay; trace fine sand, medium plasticity, light gray, very hard, moist, faint laminated bedding, laminated with medium gray clayey silt, moderately cemented	
47							
48	S-6 SPT	40 50 2"	100	0.9			
49							
50							
51							
52						Siltstone Silt; few fine sand, light gray, very dense, moist, laminated bedding, laminated with medium gray clayey silt, weakly cemented	
53	S-7 SPT	50 5"	100	0.7			
54							
55							
56						Sandstone Clayey Sand; fine, low plasticity, light gray, very dense, moist, laminated bedding, laminated with medium gray clayey silt, moderately cemented	
57							
58	S-8 SPT	20 50 5"	100	4.4		PID reading of 4.4 on slough	
59						Bottom of boring at approximately 58 1/2 feet. Boring completed on February 14, 2006. No groundwater observed during drilling. No groundwater measured in well on March 2, 2006.	
60							

Well Installation Summary

Location See Plan	Project Name OCD Compliance Drilling		Date February 22, 2006	Well No. SW7-0206
	Drilling Co. Enviro-Drill, Albuquerque, NM		Driller M. Cain	
	Drill Rig CME 75		Logged By JCB	Page 1 of 1
	Drilling Method 3¾"/7" HSA			

Elevation, feet msl	Depth, feet
	+ 2.5
	Ground Surface
	2
	4
	4
	24
	29½
	35

Locking Steel Casing

Locking Cap

Portland Cement Concrete

Hydrated Bentonite Clay (3/8-inch Hole Plug)

4-inch ID Threaded PVC Casing

10/20 Silica Sand

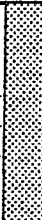
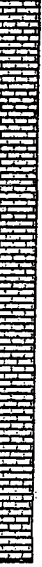
4-inch ID Threaded PVC Screen, 0.020" Slot

Hydrated Bentonite Clay (3/8-inch Hole Plug)

4-inch ID Threaded PVC Cap

Slough

Log of SW7-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 3/4" / 7" HSA			Date February 22, 2006 Driller M. Cain Logged By JCB		Page 1 of 2 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Graphic	Description	
Surface Condition: Soil, Shoulder of Hammond Ditch Road							
1						Sand Fill fine to medium, few clayey silt, brown, loose, moist	
2							
3	S-1 Grab	—	—	5.1			
4						Gravel Jackson Lake Terrace fine to coarse, little fine to coarse sand, trace clayey silt, scattered cobbles, gray-brown, very dense, dry	
5							
6							
7							
8							
9	S-2 Grab	—	—	>10			
10	S-3	27	80	>10		10' to 11' dark gray petroleum staining, petroleum odor	
11	SPT	50					
		5 1/2"				Sandstone Nacimiento Formation Sand; fine to medium, little clayey silt, light gray, very dense, moist, laminated with medium gray clayey silt, dark gray petroleum stained layers approx. 1/2" to 1 1/2" thick, weakly cemented	
12							
13							
14							
15	S-4	18	100	>10		Clayey Sand; fine, low plasticity, yellowish gray-brown, very dense, moist, moderately cemented	
16	SPT	50					
		5"				Clayey Sand; fine, low plasticity, light gray, very dense, moist, faint laminated bedding, moderately cemented	
17							
18							
19							
20							

∇ 3.2.06

Log of SW7-0206

Location See Plan		Project Name OCD Compliance Drilling Drilling Co. Enviro-Drill, Albuquerque, NM Drill Rig CME 75 Drilling Method 3 1/2" / 7" HSA			Date February 22, 2006 Driller M. Cain Logged By JCB		Page 2 of 2 Elevation
Depth, feet	Sample No./Type	Blow Counts	Recovery, %	PID, ppm	Description		
20	S-5 SPT	45	25	>10		Sandstone	continued
21		50					
22		5 1/2"					
23							
24							
25	S-6 SPT	29	90	>10		Sandstone	Clayey Sand; fine, low plasticity, light gray, very dense, moist, laminated bedding, laminated with medium gray silty clay, moderately cemented
26		50					
27		5"					
28						Claystone	Clay; high plasticity, medium gray, very hard, moist, moderately cemented
29							
30	S-7 SPT	50	90	>10		Sandstone	
31		5"					
32							
33							
34							
35	S-8 SPT	35	90	>10			
36		25					
37		1"					Bottom of boring at approximately 35 1/2 feet. Boring completed on February 22, 2006. Perched groundwater observed at approximately 15 feet during drilling.
38							Perched groundwater measured in well at approximately 15 1/2 feet on March 2, 2006.
39							
40							



505 523-7674

Temporary Piezometer Installation - Typical See Logs for Depth Details

Elevation Reference
(Top of Pipe)

Ground Surface

Casing Cap

Screen:

5.0 ft.

Top of Screen

Bottom of Screen

Piezometer Tip

Bottom of Boring

Boring Diameter: $8\frac{5}{8}"$

Soil Type: Native Backfill

Ballards, Type/Size: None

Grout: None

Screen Type/Size: 2" PVC Sch. 40, 0.060" mand
Slotted @ 3" Intervals

Grout/Ground: None

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? No

Site No (Ring):

(Slip Cap)

Other: N/A

Bottom Cap Used? Yes

Site No (Cap):

Giant Refining Co.

Project #: 03-122

Project Name: Bloomfield Wells

Elevation:

File #: 03-122
Site: Bloomfield
Giant Refining
Elevation: unsurveyed
Date: 10/27/2004

File #: 03-122
Site: Bloomfield
Giant Refining
Elevation: unsurveyed
Date: 10/27/2004

Log of Test Borings

[illegible]

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C:\bill\Projects\2004\hammond ditch correspondence\ditchlogsasof11105\TF

File #: 03-122
Site: Bloomfield
Giant Refining
Elevation: unsurveyed
Date: 10/28/2004

Log of Test Borings

[illegible]

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LOGGED BY: KM

C:\bill\Projects\2004\hammond ditch correspondence\ditchlogsasof11105\TF

File #: 03-122
Site: Bloomfield
Giant Refining
Elevation: unsurveyed
Date: 10/28/2004

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Sheet: 1 of 1
 Bore Point: See plan
 Water Elevation: 5.7' below ground surface
 Boring No.: TP7-1004

Precision Engineering, Inc.
 P.O. Box 422
 Las Cruces, NM 88004
 505-523-7674

File #: 03-122
 Site: Bloomfield
 Giant Refining
 Elevation: unsurveyed
 Date: 10/28/2004

Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0-2		O*--O* O*--O* O*--O* O*--O*		<u>Silt</u> , sand, very fine to fine, cobbles, gravel, brown, moist				
	2-5.0		*--O* *--O* *--O* *--O* *--O* *--O*	2.5 5.0	<u>Sand</u> , silty, very fine, cobbly, brown				
	5-10.0		***** ***** ***** ***** ***** ***** ***** *****	7.5 10.0	<u>Sand</u> , fine to medium, dark brown, moist slight hydrocarbon odor, black				
				15.0 20.0	T.D. 10.0 Placed 2" PVC, 5' hand slotted screen Backfilled with clean cuttings				
SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER						LOGGED BY: KM			

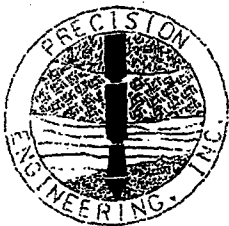
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File #: 03-122
Site: Bloomfield
Glant Refining
Elevation:
Date: 10/28/2004

Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0-1		O°-O° O°-O°		Silt, sand, very fine to fine, cobbles, gravel, brown, moist				
	1-3.5		++++○+++ ++++○+++ ++++○+++ ++++○+++ ++++○+++	2.5	Sand, silty, very fine, cobbly, brown				
	3.5-10.0		+++++ +++++ +++++ +++++ +++++ +++++ +++++ +++++ +++++ +++++	5.0 7.5 10.0	Sand, silty, fine to medium, cobbly, gray, Hydrocarbon odor, moist, black				
					T.D. 10.0 Placed 2" PVC, 5' machine, slotted screen Backfilled with clean cuttings				
				15.0					
				22.0					

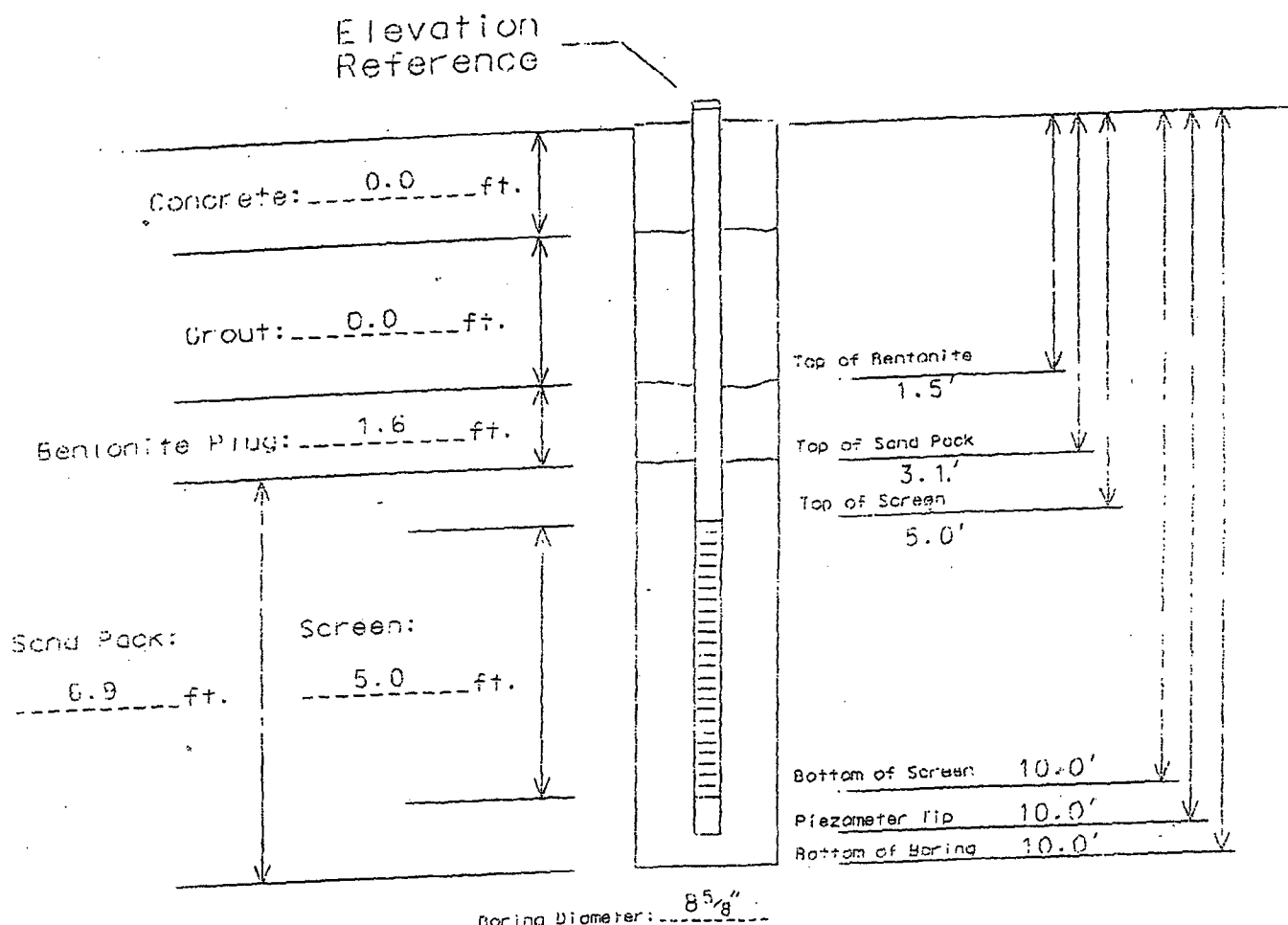
SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER
LOGGED BY: KM



505-523-7674

Installation Diagram

Monitoring Well No. IP 9



Sand Type: 10-20 Silica

Bentonite: 3/8" Chips

Grout/Grout: NA

Water: Potable

Ballards, Type/Size: NA

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Pipe Type/Size: 2" PVC Sch. 40

Locking Expandable Casing Plug? Yes Site North of: 185

Bottom Cap Used? Yes Site East of: 185

Date: _____

Project #: 05-038 Project Name: Bloomfield Refinery Elevation: 185

File #: 05-038
Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 4/5/2005

Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0.0-7.5		 * * * * * * * * * * * *	2.5 5.0	Clay, Slightly Sandy, Very Fine, Brown, Moist, Gravel, Cobbles				
	7.0		* *	7.5	Water				
	7.5-10.0		***** ***** ***** ***** *****	10.0	Sand, Very Fine, Grey, Water Bearing				
	10.0			15.0 20.0	TD Set 2" Well @ 10.0' 5' of Screen, 6' of Riser Top of Sand 3.1' Top of Bentonite 1.5'				
SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER					LOGGED BY: KMM				

LOGGED BY: KMM

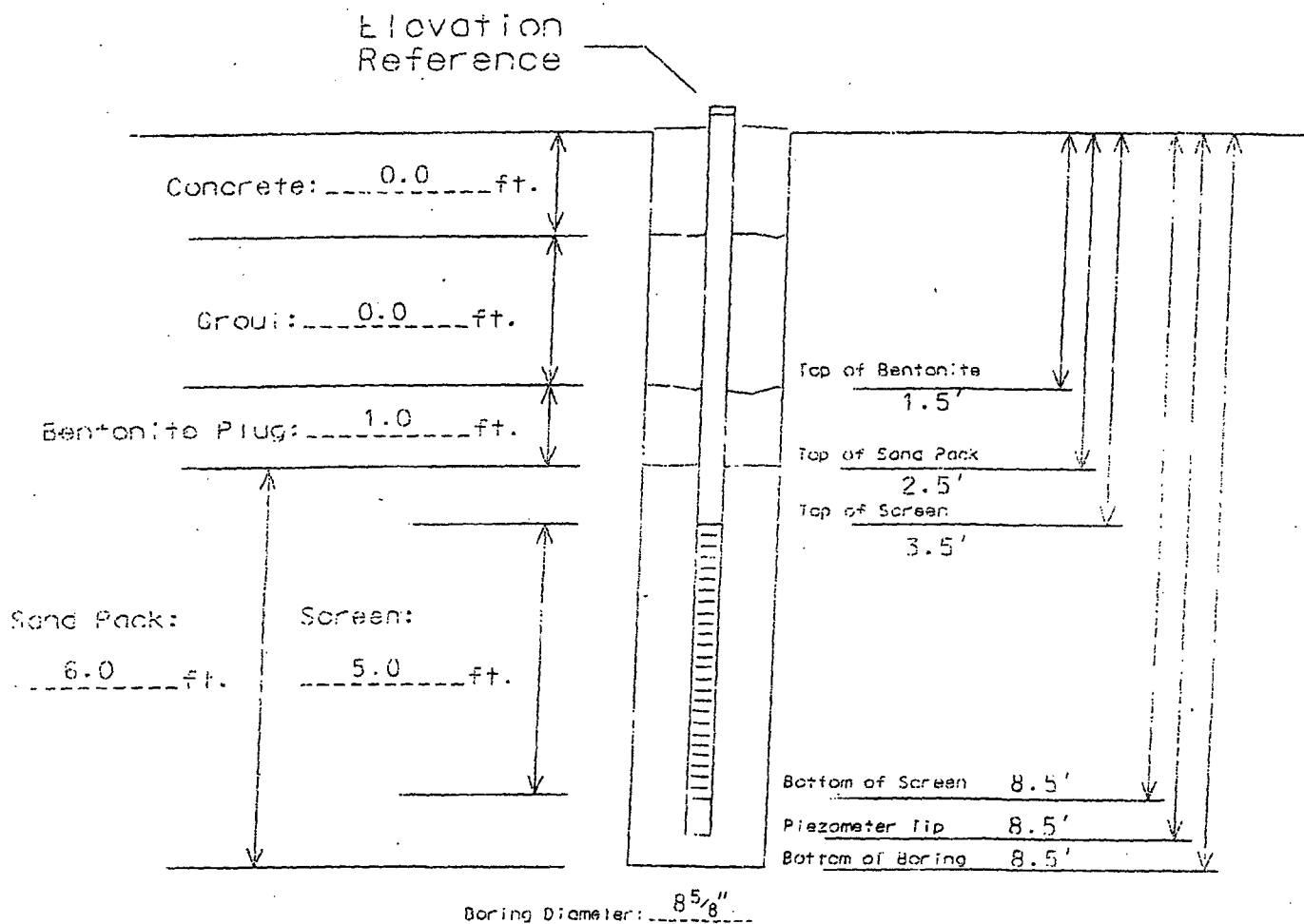
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505-523-7674

Installation Diagram

Monitoring Well No. TP 10



Soil Type: 10-20 Silica

Ballards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Grout/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Naming: IRS

Bottom Cap Used? Yes

Site Location: IRS

Notes:

Project #: 05-038

Project Name: Brownfield Refinery

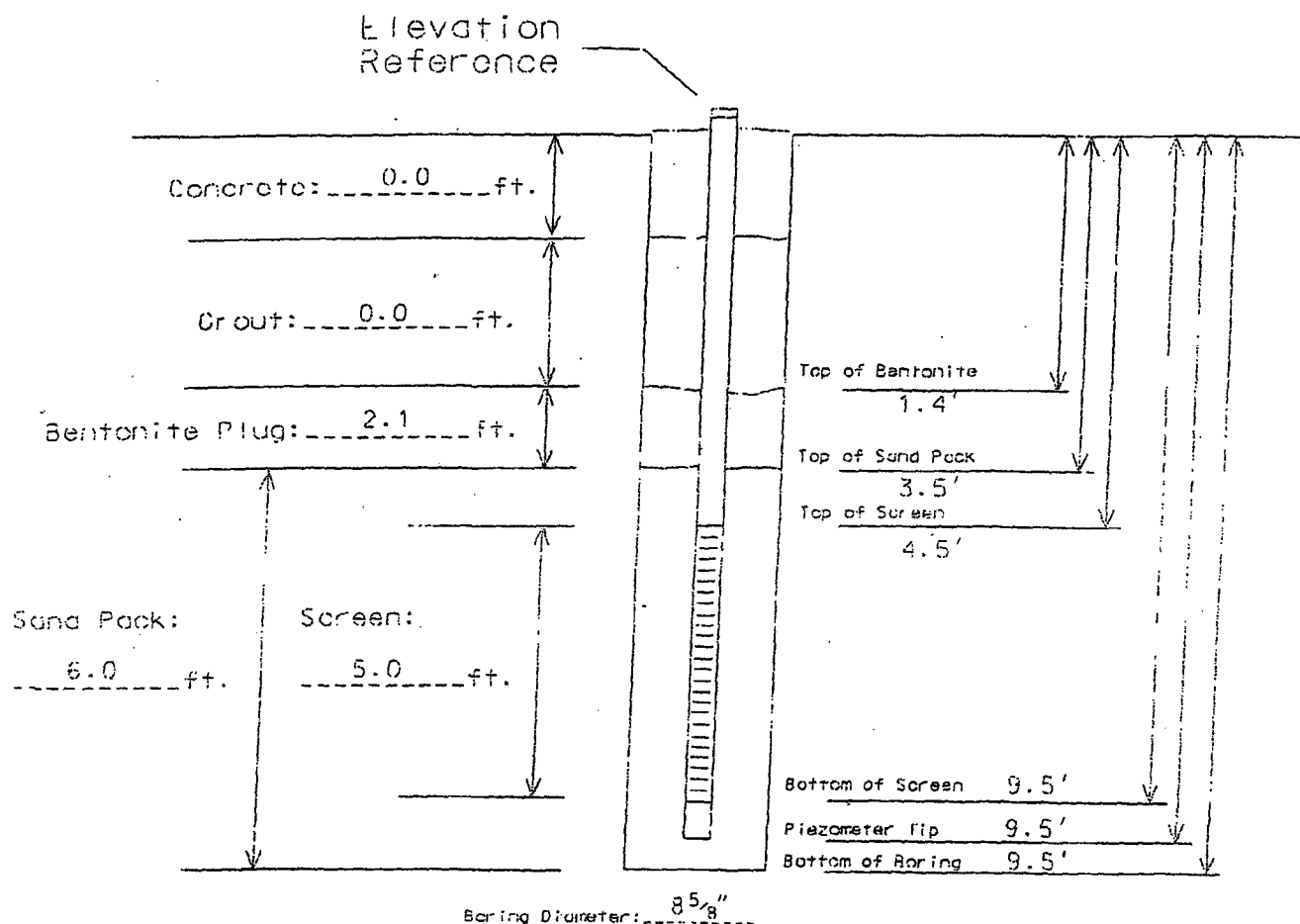
Elevation: IRS

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Installation Diagram

Monitoring Well No. TP 11



Sand Type: 10-20 Silica

Boulders, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Grout/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Marking: 125

Other: _____

Bottom Cap Used? Yes

Site Labeling: 105

Project #: 06-038

Project Name: Bloomfield Refinery

Elevation: 125

Sheet: 3 OF 5
 Bore Point: River Terrace
 Water Elevation: 5.3'
 Boring No.: TP-11

Precision Engineering, Inc.
 P.O. Box 422
 Las Cruces, NM 88004
 505-523-7674

File #: 05-038
 Site: Bloomfield
 Giant Refining
 Elevation: EXISTING
 Date: 4/5/2005

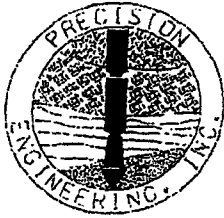
Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0.0-2.0		////// ////// //////		Clay, Brown, Moist, Gravel, Cobbles				
	2.0-3.5		***//*** ***//***	2.5	Sand, Clayey, Brown, Moist, Gravel, Cobbles				
	3.5-5.0		***_*** ***_*** ***_***	5.0	Sand, Silty, Brown, Damp, Gravel, Cobbles				
	5.0-9.5		*****		Sand, Fine to Coarse, Tan, Damp, Wet				
	5.3'		***** ***** ***** ***** ***** *****	7.5	Water				
	9.5			10.0	TD Set 2" Well @ 9.5' 5' of Screen, 5' of Riser Top of Sand 3.5' Top of Bentonite 1.4'				
				15.0					
				20.0					

SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER

LOGGED BY: KMM

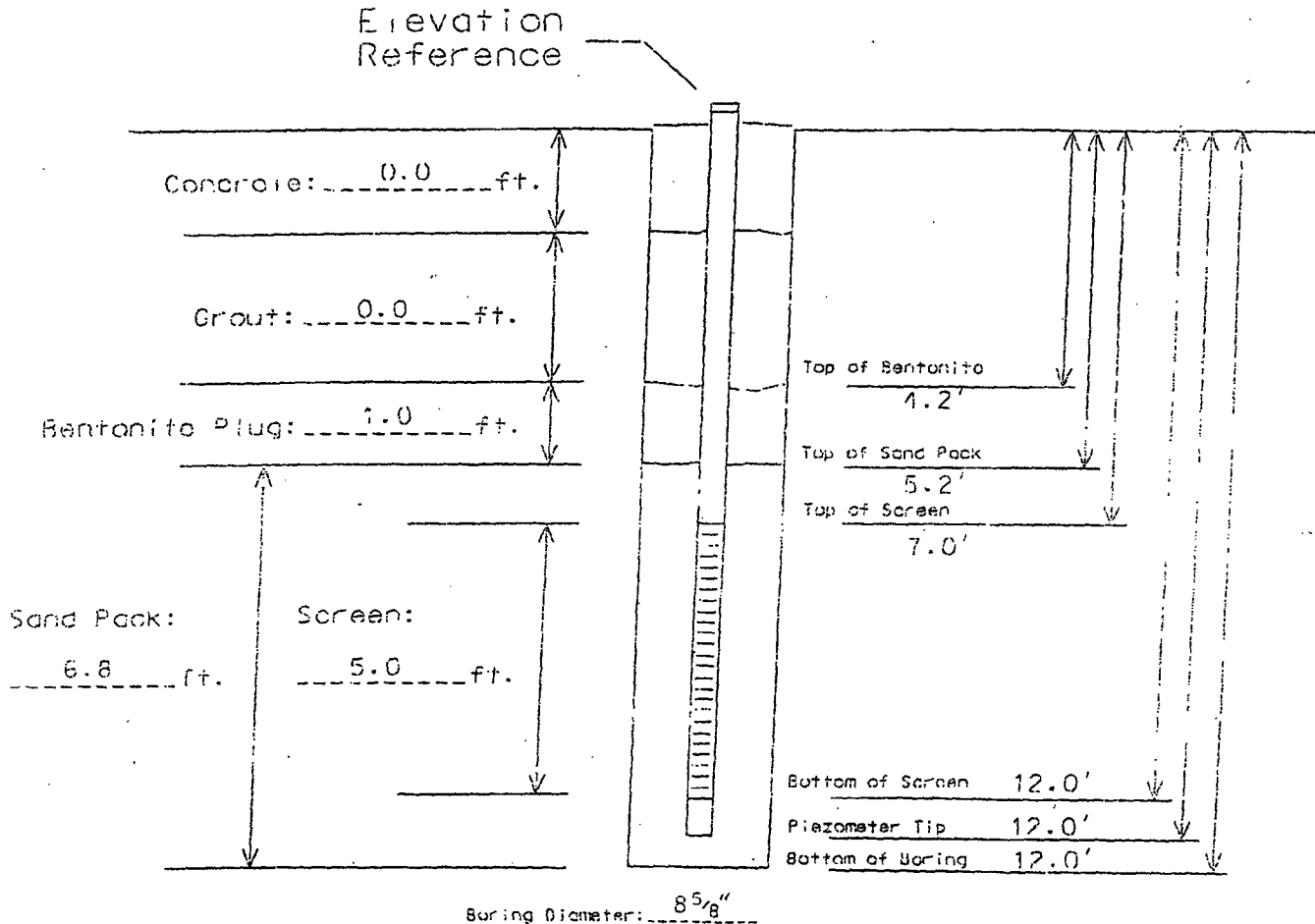
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505-523-7674

Installation Diagram

Monitoring Well No. TP 12



Sand Type: 10-20 Silica

Ballards, Type/Size: NA

Bentonite: 3/8" chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Grout/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Monitoring: Yes

Bottom Cap Used? Yes

Site Elevation: Yes

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: Yes

Sheet: 4 OF 5
 Bore Point: River Terrace
 Water Elevation: 7.5'
 Boring No.: TP-12

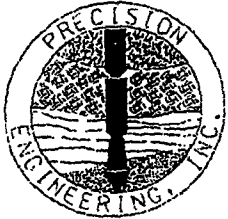
Precision Engineering, Inc.
 P.O. Box 422
 Las Cruces, NM 88004
 505-523-7674

File #: 05-038
 Site: Bloomfield
 Giant Refining
 Elevation: EXISTING
 Date: 4/5/2005

Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0.0-3.0		***_*** ***_*** ***_*** ***_*** ***_***	2.5	<u>Sand</u> , Very Fine to Fine, Slightly Silty, Brown, Gravel, Cobbles, Moist				
	3.0-4.5		///**/// ///**/// ///**///		<u>Clay</u> , Sandy, Very Fine, Brown, Some Gravel/ Cobbles, Moist				
	4.5-9.0		***//*** ***//*** ***//*** ***//*** ***//*** ***//***	5.0 7.5	<u>Sand</u> , Very Fine to Fine, Clayey, Brown, Moist, Some Gravel				
	9.0-13.0		***** ***** ***** ***** ***** ***** ***** ***** ***** *****	10.0	Water <u>Sand</u> , Fine to Coarse, Tan, Water Bearing				
	13.0			15.0 20.0	TD Set 2" Well @ 12.0' 5' of Screen, 8' of Riser Top of Sand 5'2" Top of Bentonite 4'2"				
SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER						LOGGED BY: KMM			

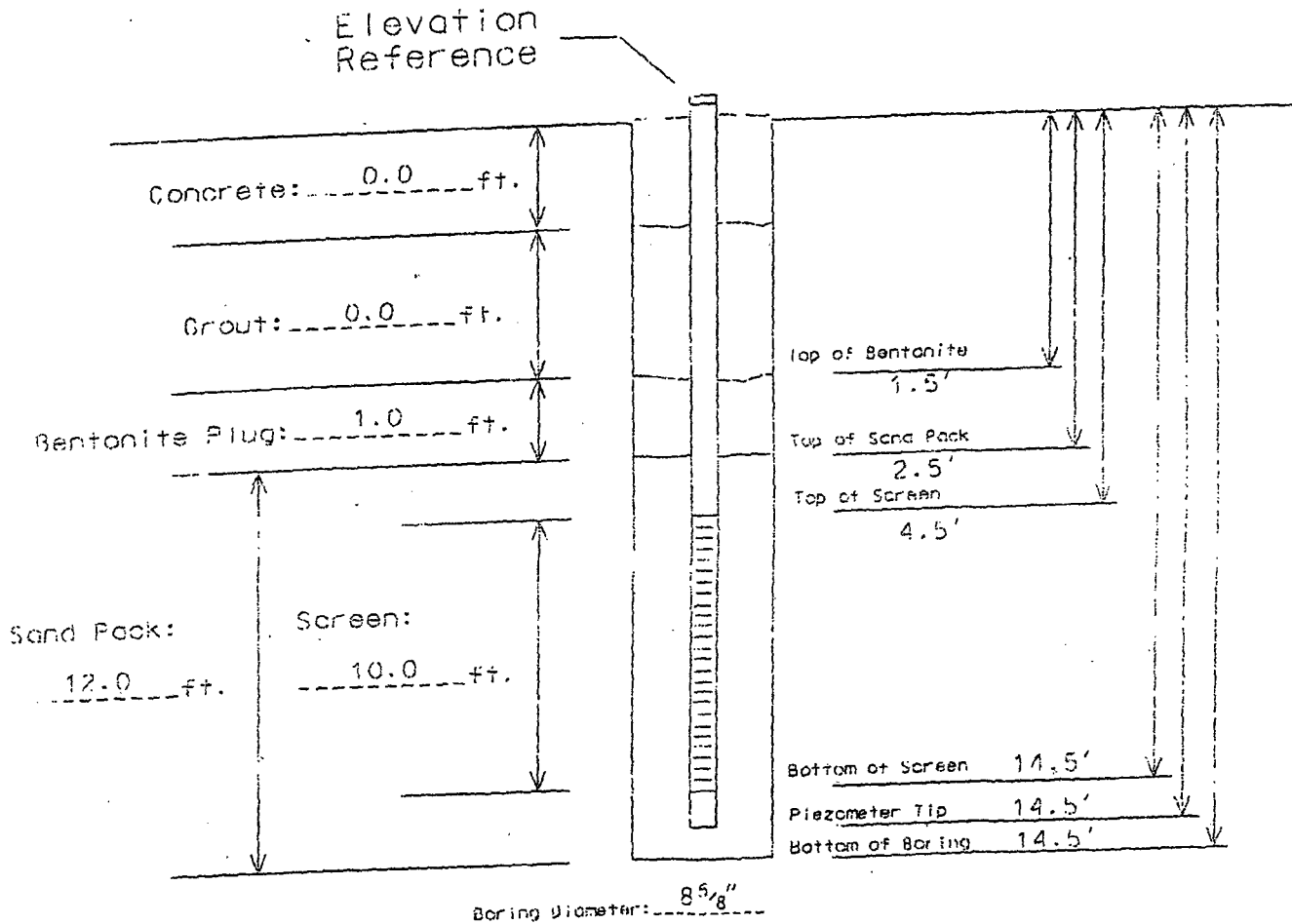
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505-523-7674

Installation Diagram

Monitoring Well No. TP 13



Sand Type: 10-20 Silica

Ballards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes Size and Depth: 185

Bottom Cap Used? Yes

Size and Depth: 185

Order: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: 185

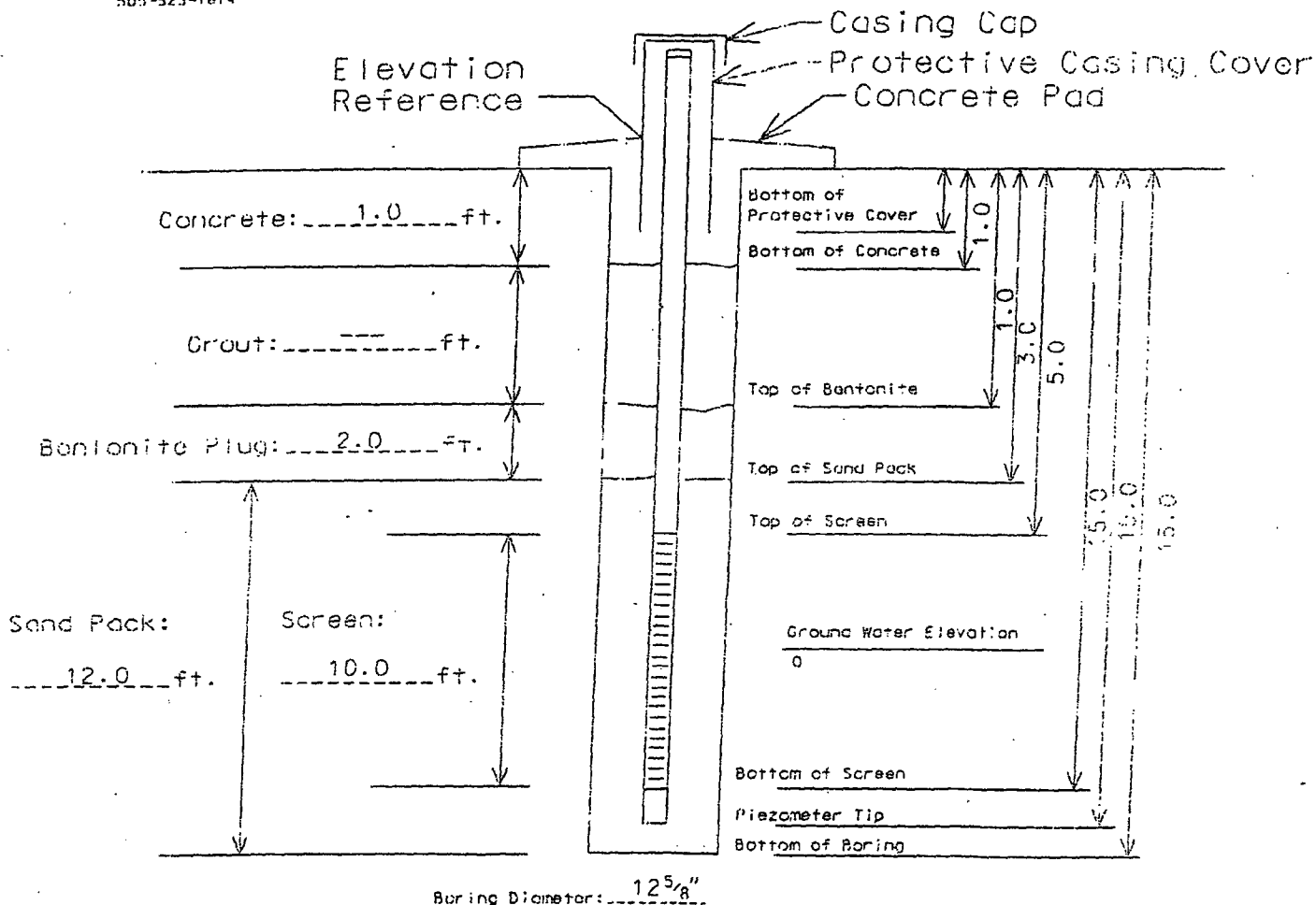
SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER
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505-523-1674

Installation Diagram

Monitoring Well No. MW 48



Boring Diameter: 12 5/8"

Sand Type: 8-12 Silica

Ballards, Type/Size: Steel, 3"

Bentonite: 3/8" Chips

Screen Type/Size: 4" PVC Sch. 40, 0.020" Slotted

Cement/Grout:

Riser Type/Size: 4" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: 6204.63

Other: N/A

Bottom Cap Used? Yes

Site Easting: 2700.70

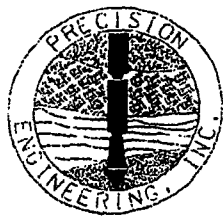
Giant Refining Co.

Project #: 03-122

Project Name: Bloomfield Wells

Elevation: NOT SURVEYED

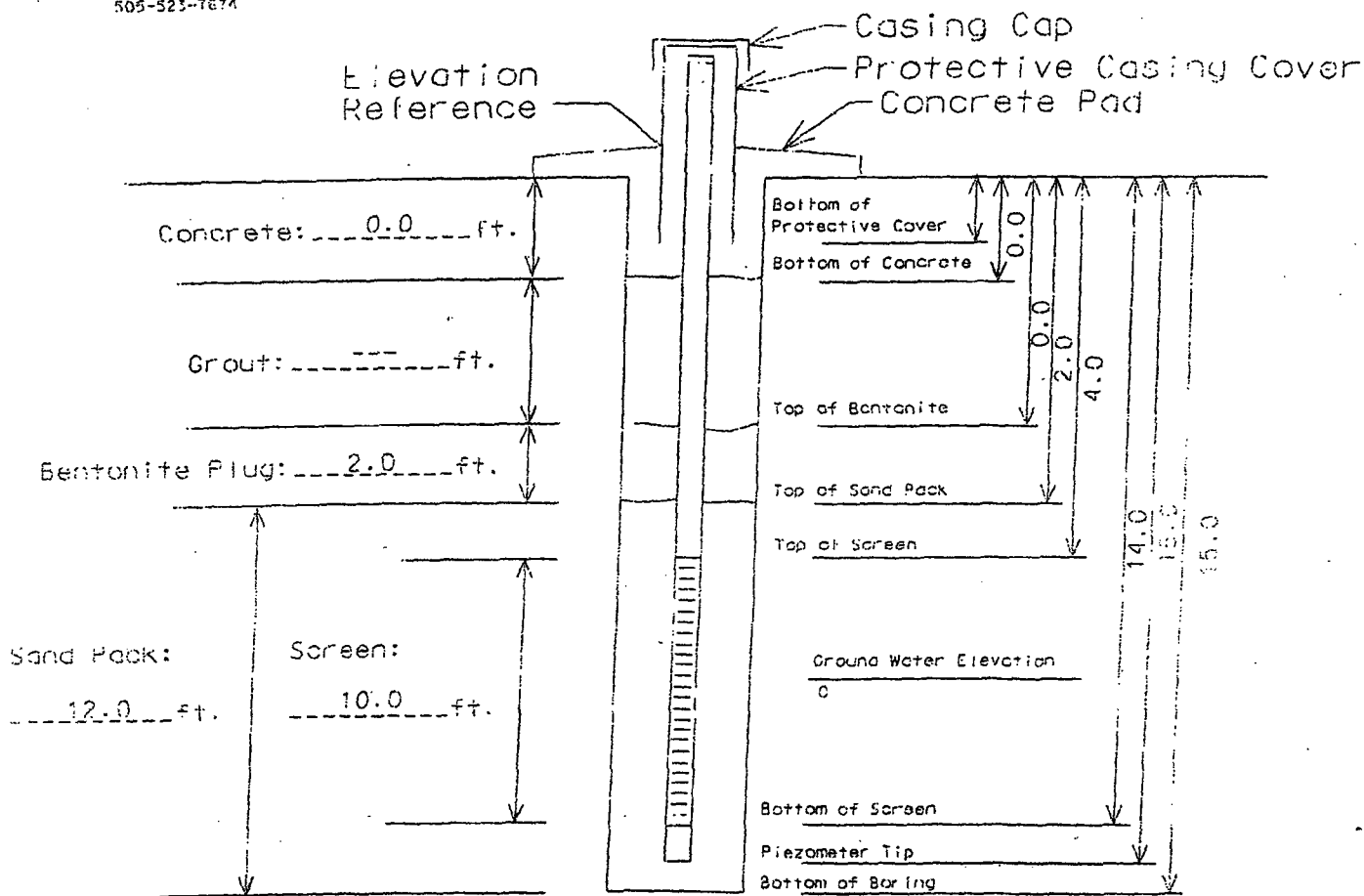
File #: 03-122
Site: Bloomfield
Giant Refining
Elevation: Not Surveyed
Date: 10/28/2004



505-523-7674

Installation Diagram

Monitoring Well No. MW-49



Boring Diameter: 12⁵/₈"

Sand Type: 8-12 Silica

Bollards, Type/Size: Steel, 3"

Bentonite: 3/4" Chips

Screen Type/Size: 4" PVC Sch. 40, 0.020" Slotted

Cement/Grout: ---

Riser Type/Size: 4" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northings: 6136.16

Other: N/A

Bottom Cap Used? Yes

Site Eastings: 2653.14

Project #: 03-122

Project Name: Giant Refining Co. Bloomfield Wells

Elevation: Not Surveyed

File #: 03-122
Site: Bloomfield
Giant Refining
Elevation: Not Surveyed
Date: 10/28/2004

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**MALCOLM
PIRNIE**

GIANT
INDUSTRIES, INC.

Boring Log and Construction for Dewatering Well DW-1

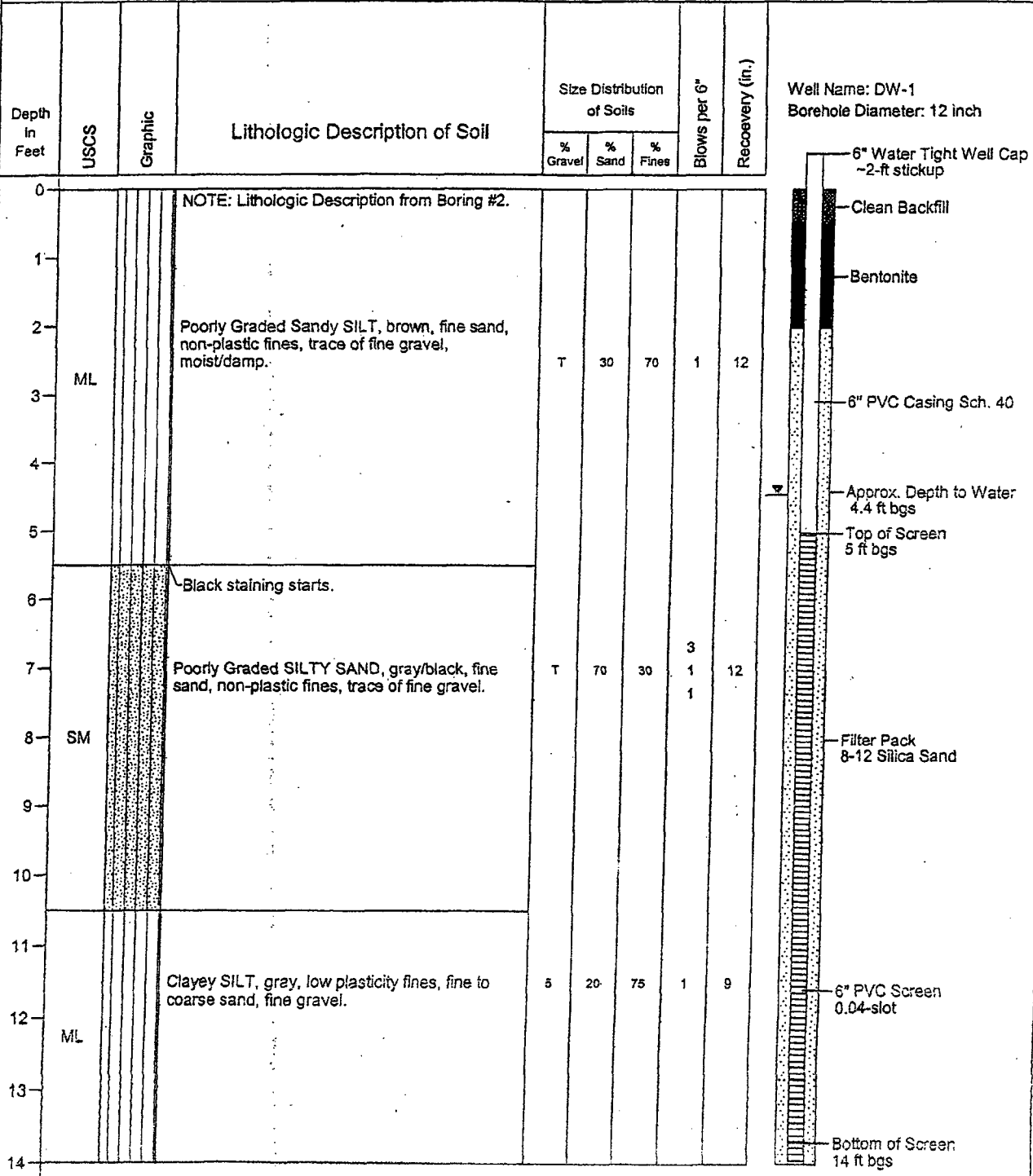
(Page 1 of 1)

Giant Refining Company
Bloomfield Refinery
Well Installation
Bloomfield, New Mexico

Start Date : Aug. 16, 2005
Finish Date : Aug. 16, 2005
Location : Bloomfield Refinery
Logged By : Brian Sperrazza
Drilling Subcontractor : Envirotech

Drill Rig : Hollow Stem Auger
Driller, Helpers : Kelly, Kimo
Sampling Method : Split-Spoon
Northing : NA
Easting : NA

Project No. 5127-003



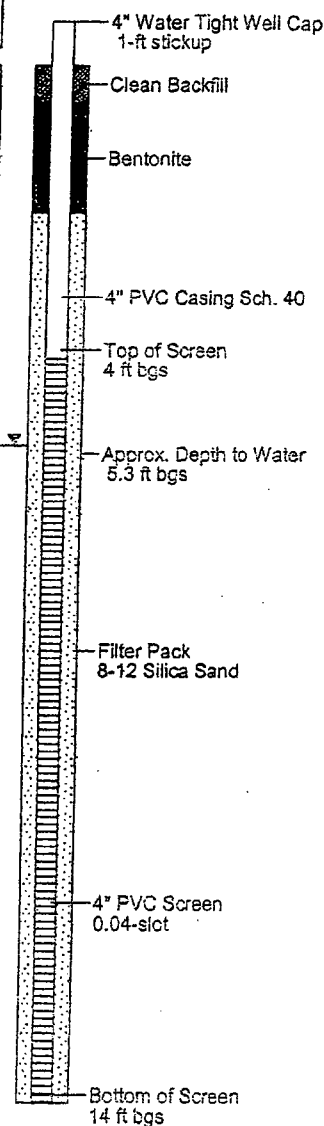
**MALCOLM
PIRNIE****GIANT**
INDUSTRIES, INC.**Boring Log and Construction for Dewatering Well DW-2**

(Page 1 of 1)

Giant Refining Company
Bloomfield Refinery
Well Installation
Bloomfield, New MexicoStart Date : Aug. 18, 2005
Finish Date : Aug. 18, 2005
Location : Bloomfield Refinery
Logged By : Brian Sperrazza
Drilling Subcontractor : EnvirotechDrill Rig : Hollow Stem Auger
Driller, Helpers : Kelly, Kimo
Sampling Method : Split-Spoon
Northing : NA
Easting : NA

Project No. 5127-003

Depth in Feet	USCS	Graphic	Lithologic Description of Soil	Size Distribution of Soils			Blows per 6"	Recovery (in.)
				% Gravel	% Sand	% Fines		
0								
1								
2								
3	ML		SILT, brown, non-plastic fines, fine sand, fine gravel. Clay 2" thick.	5	35	60	1 2 2	10
4								
5								
6								
7	SM		Poorly Graded SILTY SAND, black, med. sand, non-plastic fines. Clay 3" thick.	5	70	25	1 2 5	12
8								
9								
10								
11	SP-SM		POORLY GRADED SAND WITH SILT, coarse sand, fine gravel, non-plastic fines.	10	75	15		
12								
13								
14	SW		WELL GRADED Gravelly SAND, black, fine to med. gravel, fine to coarse sand, non-plastic fines.	25	70	5	10 17 23	24
15								
16								

Well Name: DW-2
Borehole Diameter: 12 inch



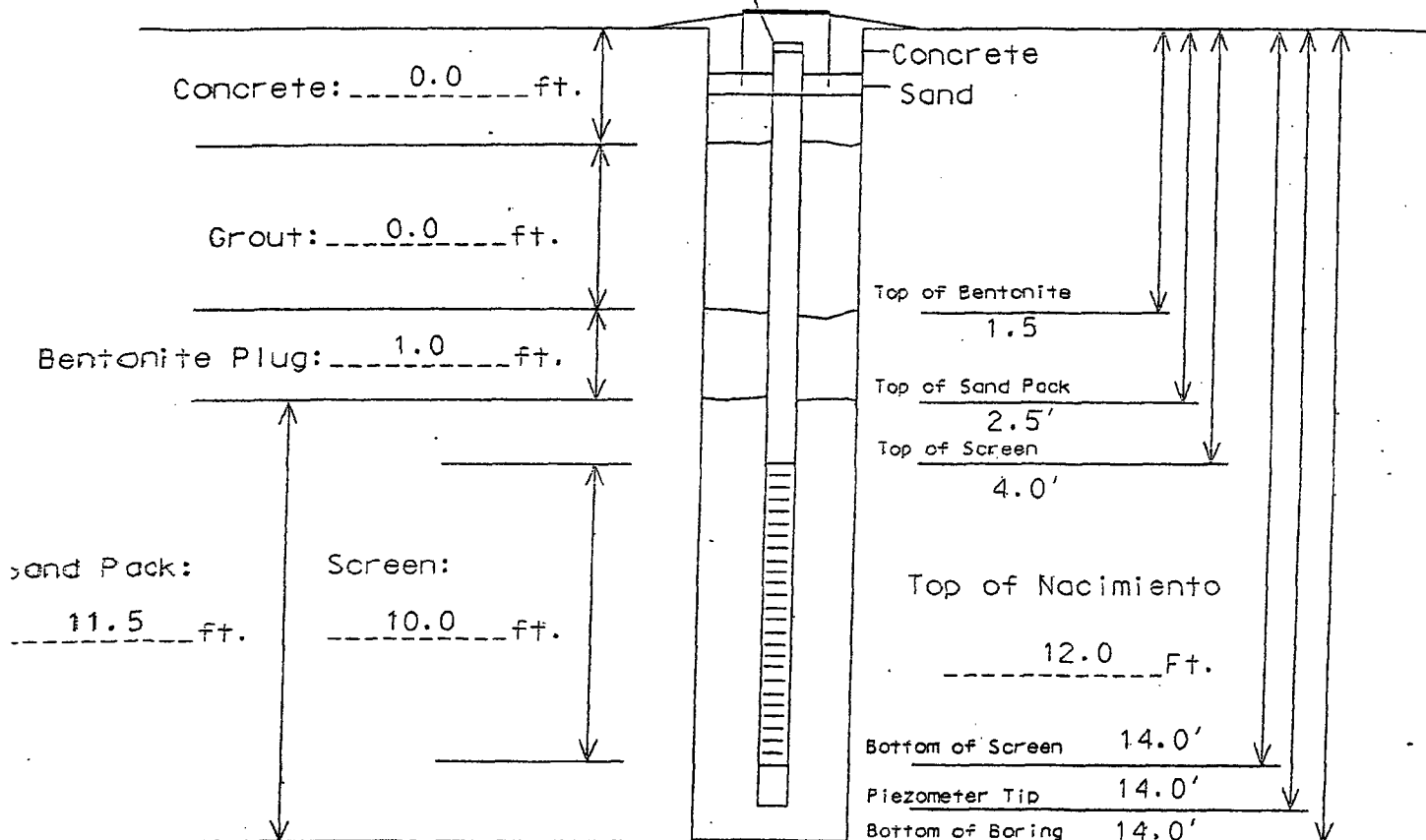
505523-7674

Installation Diagram

Monitoring Well No. CW 0+60

Elevation
Reference

Steel Vault - Flush Mount



Boring Diameter: 13 "

Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Other: _____

Bottom Cap Used? Yes

Site Easting: TBS

Project #: 05-038

Project Name: Bloomfield Refinery

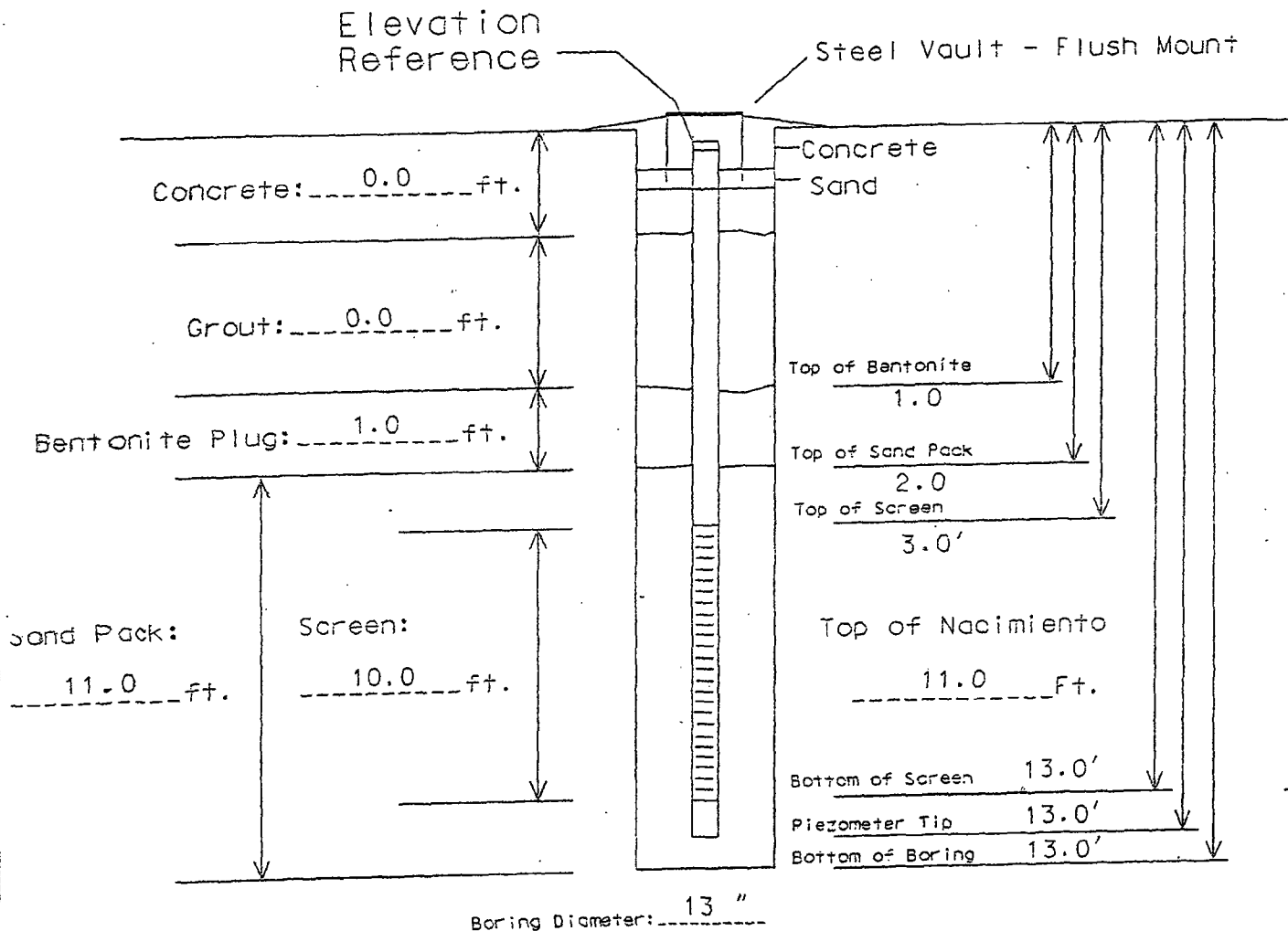
Elevation: TBS



505-523-7674

Installation Diagram

Monitoring Well No. CW 1+50



Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Marking: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

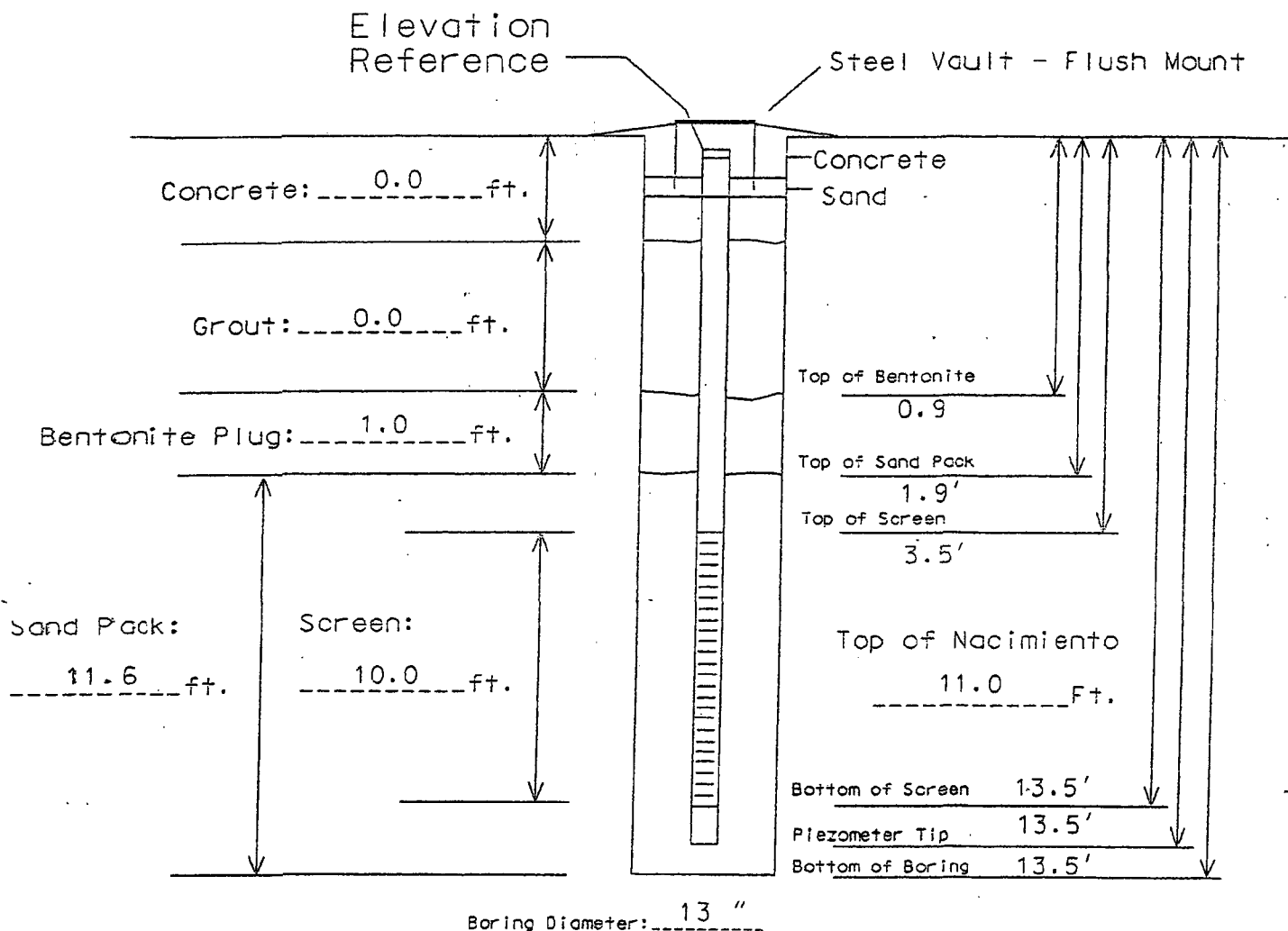
Project Name: Bloomfield Refinery

Elevation: TBS



SC5523-7674

Installation Diagram

Monitoring Well No. CW 3+85Sand Type: 10-20 SilicaBollards, Type/Size: NABentonite: 3/8" ChipsScreen Type/Size: 6" PVC Sch. 40, 0.40" SlottedCement/Grout: NARiser Type/Size: 6" PVC Sch. 40Water: PotableLocking Expandable Casing Plug? YesSite Northing: TBS

Other: _____

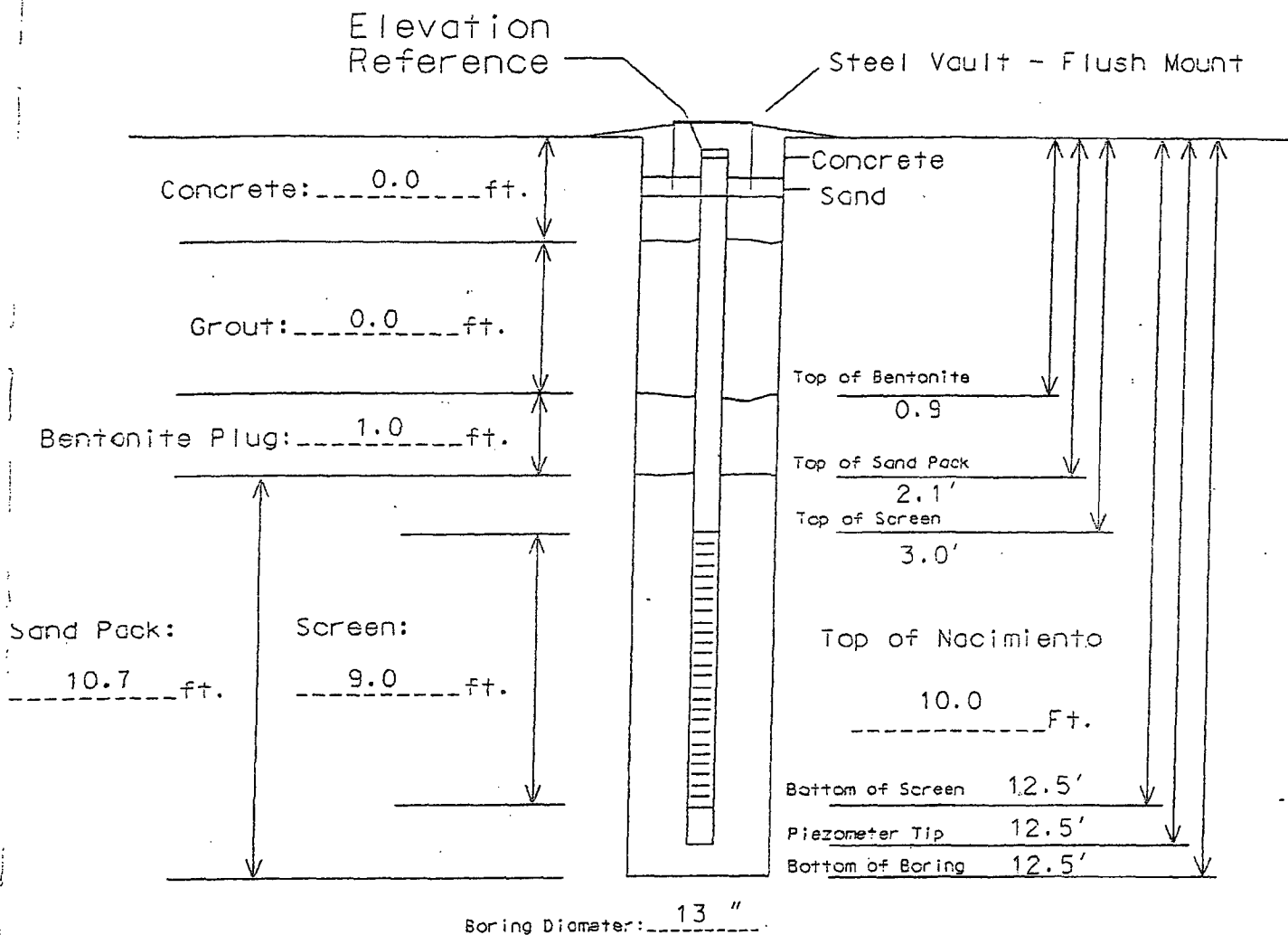
Bottom Cap Used? YesSite Easting: TBSProject #: 05-038Project Name: Bloomfield RefineryElevation: TBS



545-523-7674

Installation Diagram

Monitoring Well No. CW 5+50



Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

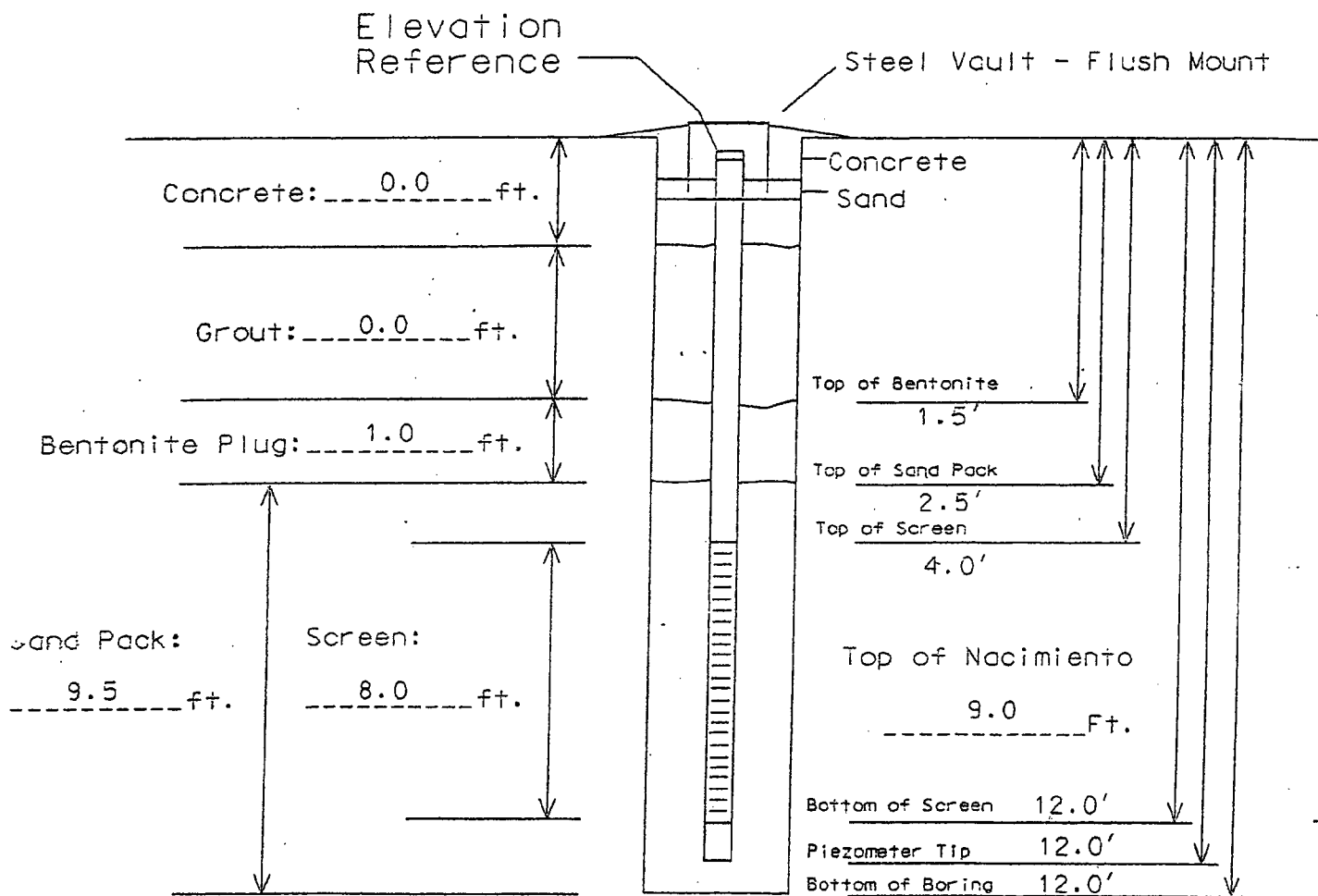
Elevation: TBS



205-523-7674

Installation Diagram

Monitoring Well No. CW 6+70



Boring Diameter: 13 "

Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Other:

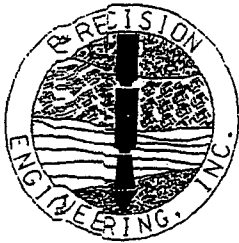
Bottom Cap Used? Yes

Site Easting: TBS

Project #: 05-038

Project Name: Bloomfield Refinery

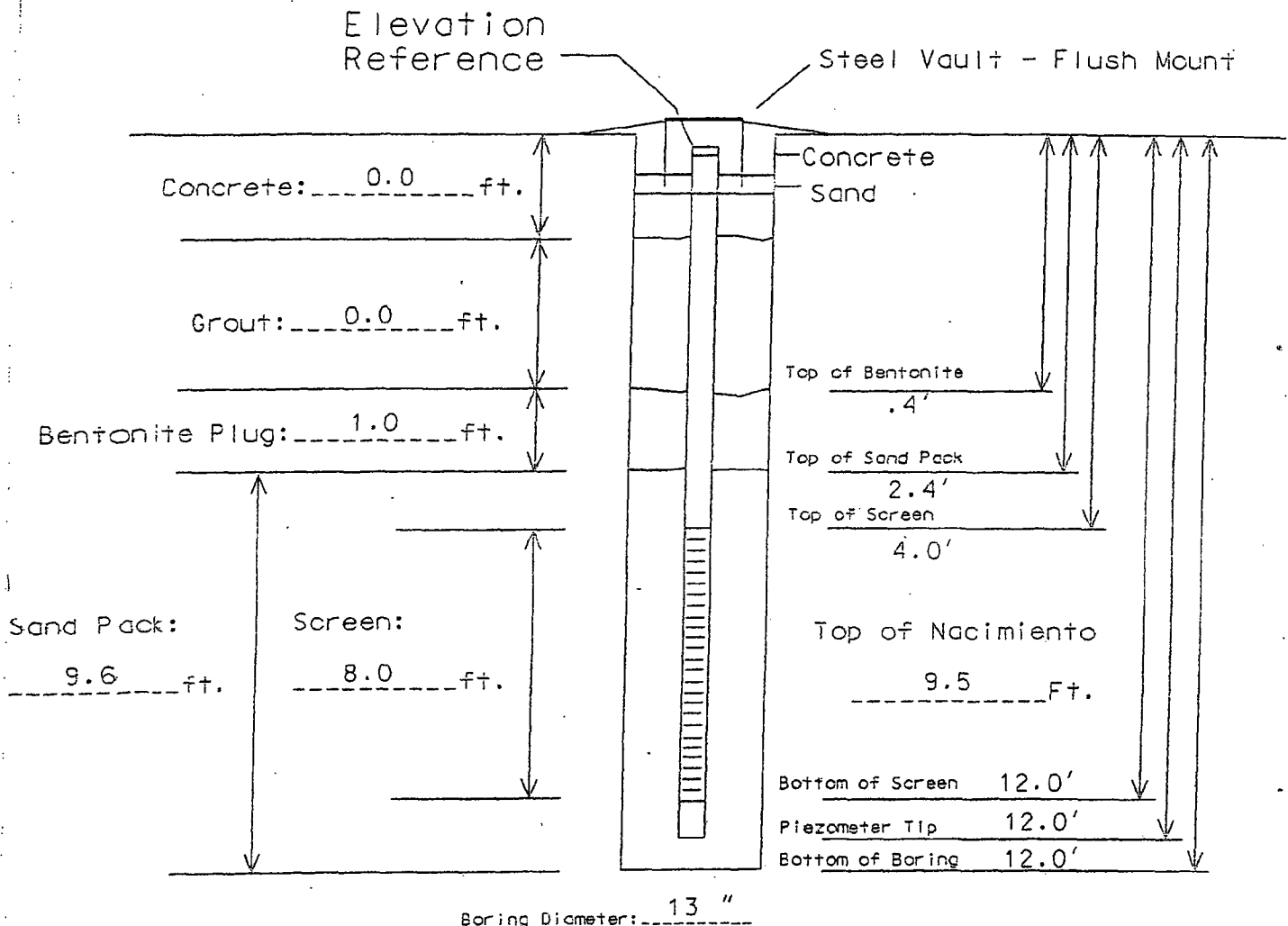
Elevation: TBS



505-23-7674

Installation Diagram

Monitoring Well No. CW 8+10



Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

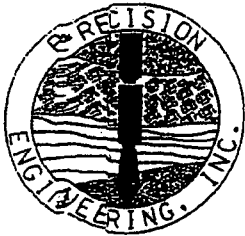
Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

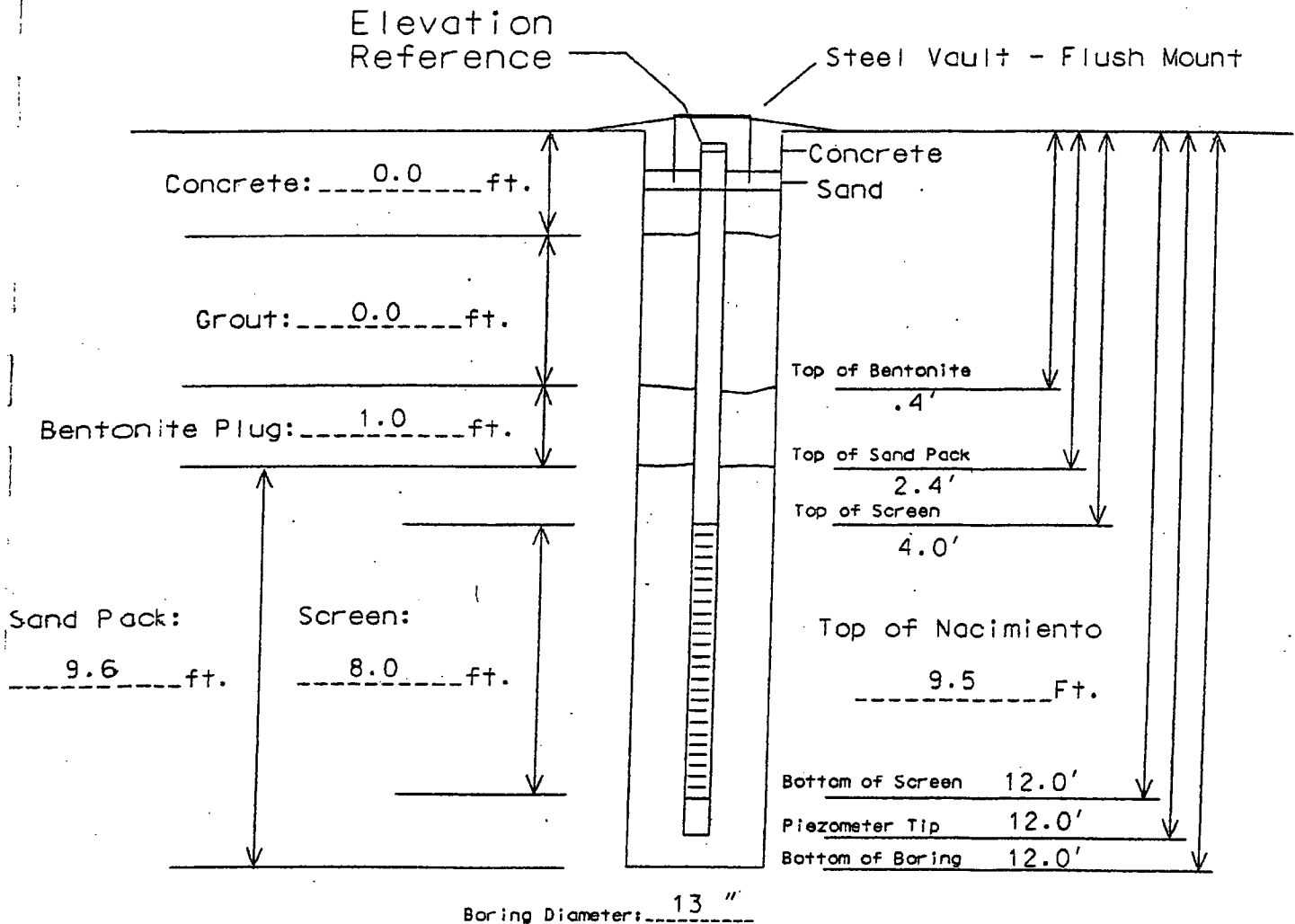
Elevation: TBS



505-23-7674

Installation Diagram

Monitoring Well No. CW 8+10



Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

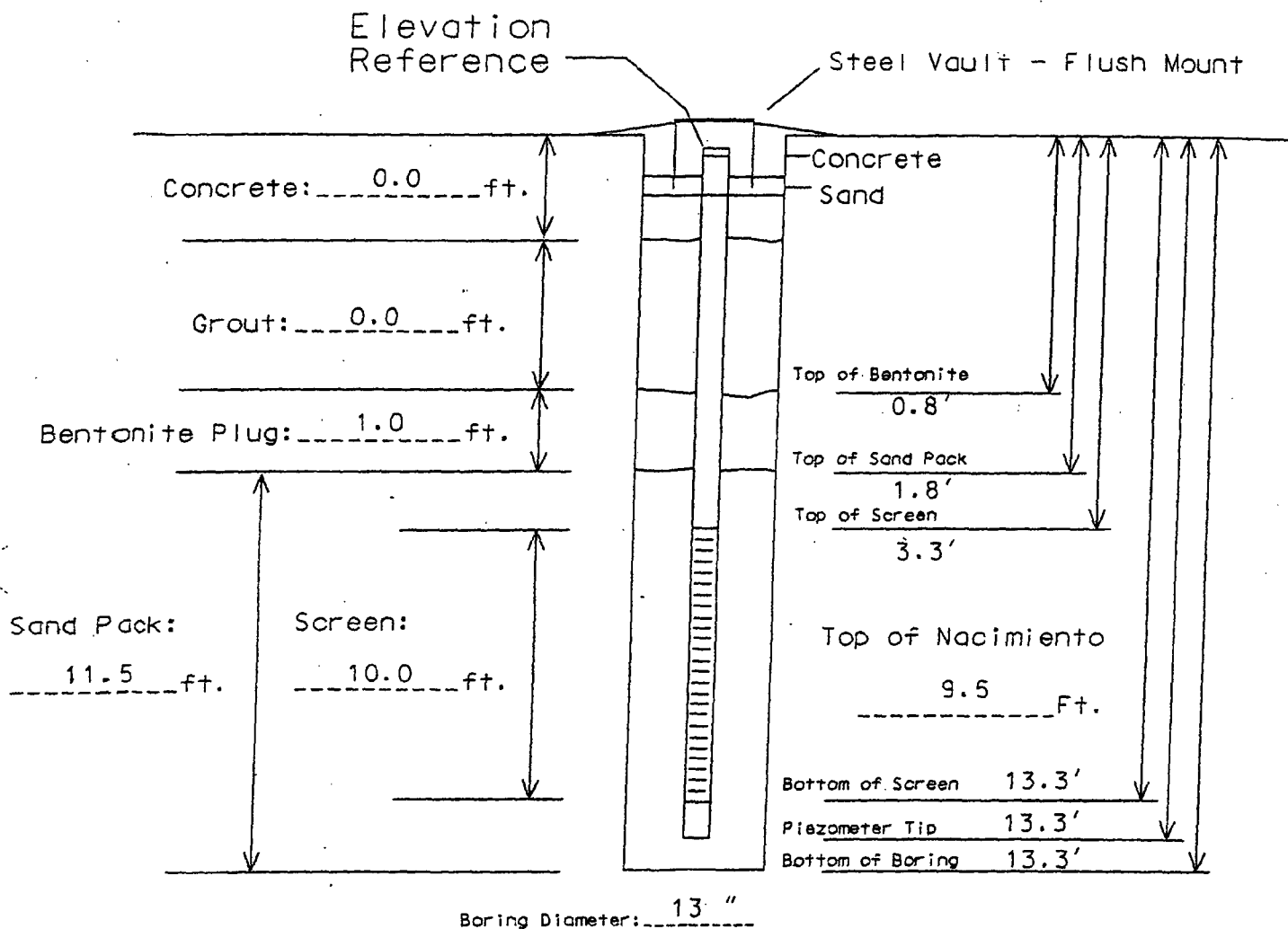
Elevation: TBS



505-523-7674

Installation Diagram

Monitoring Well No. CW 8+45



Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

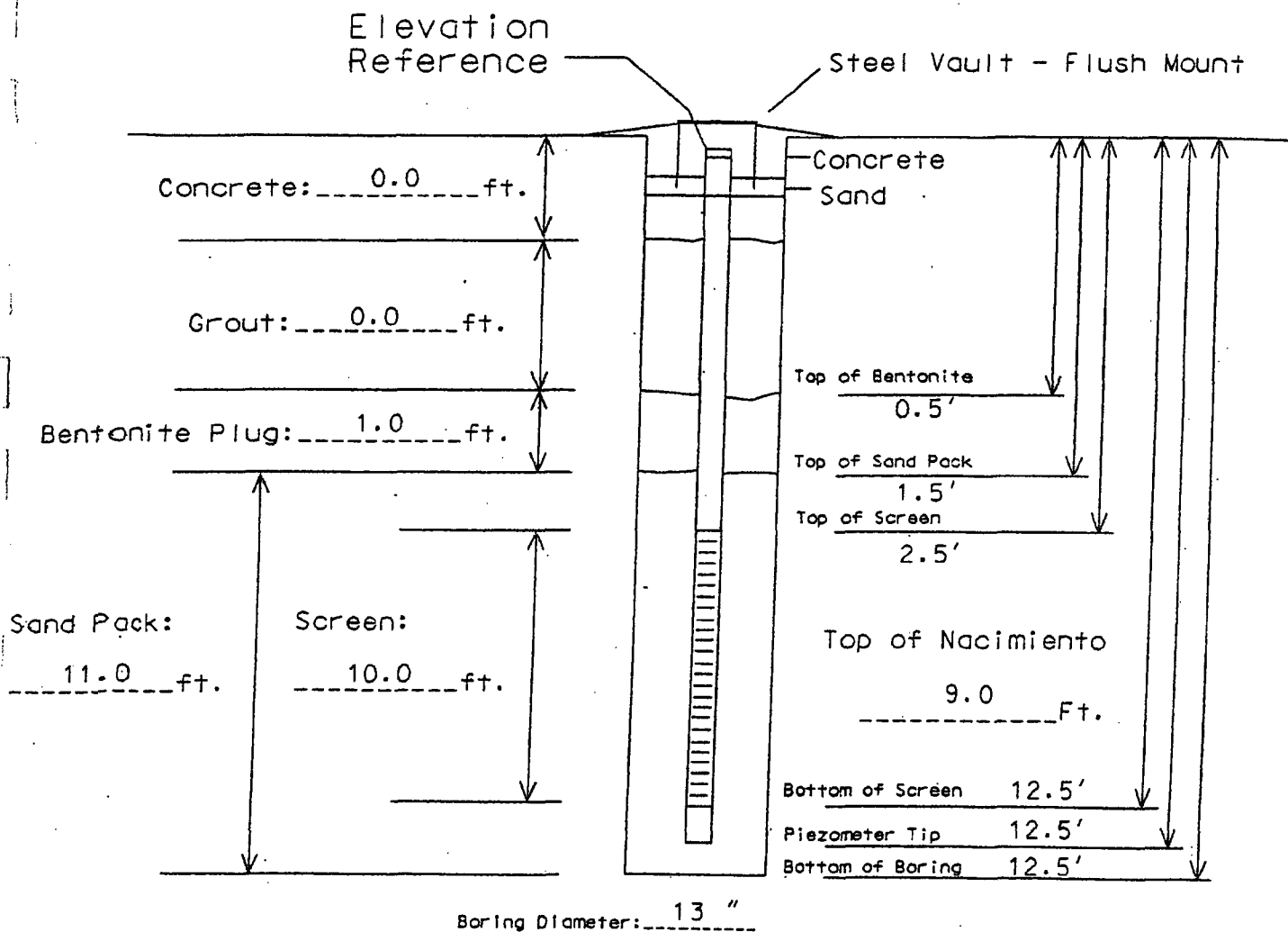
Elevation: TBS



505523-7674

Installation Diagram

Monitoring Well No. CW 11+15



Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40. 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

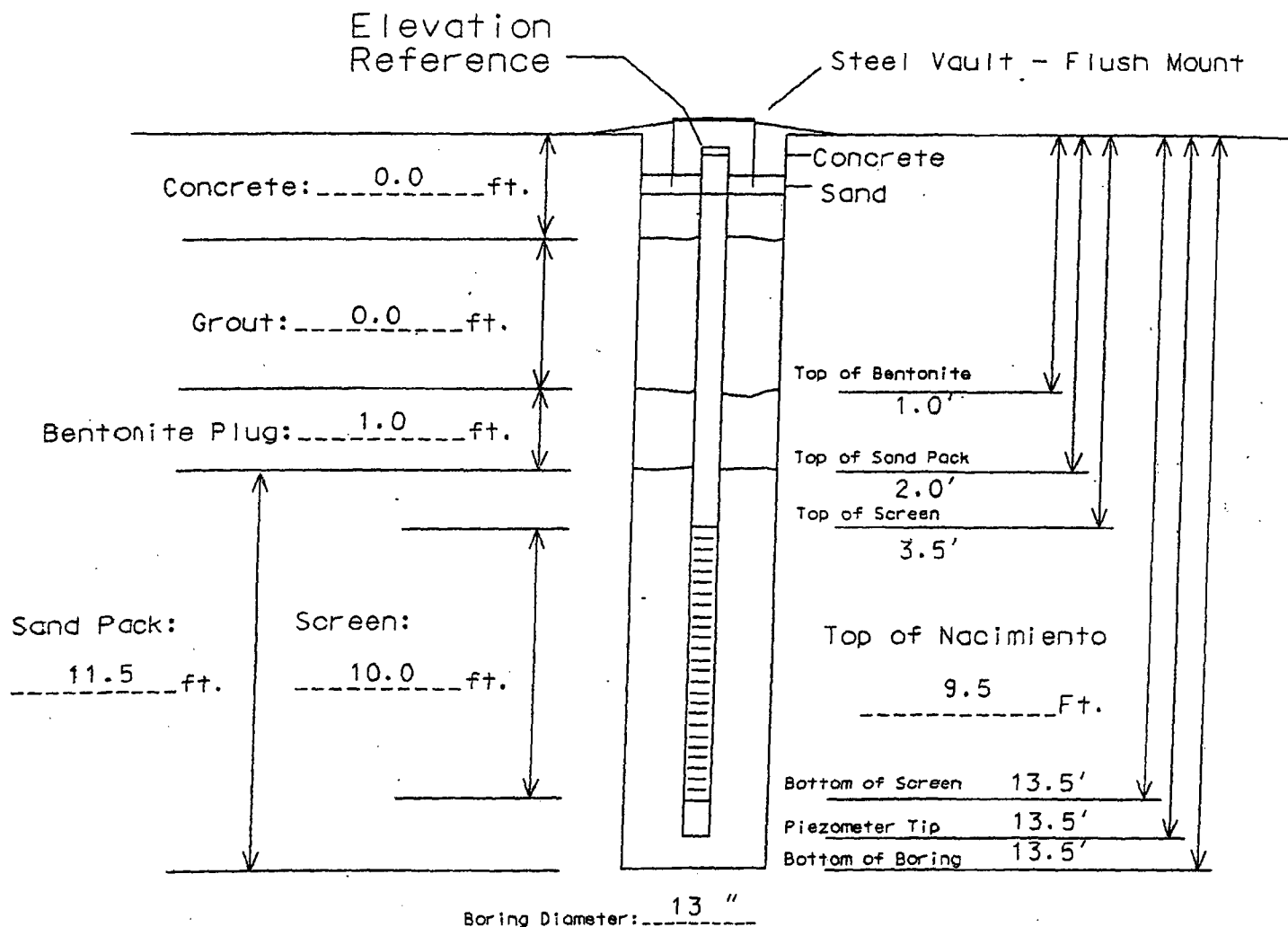
Elevation: TBS



501-523-7674

Installation Diagram

Monitoring Well No. CW 14+10



Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS



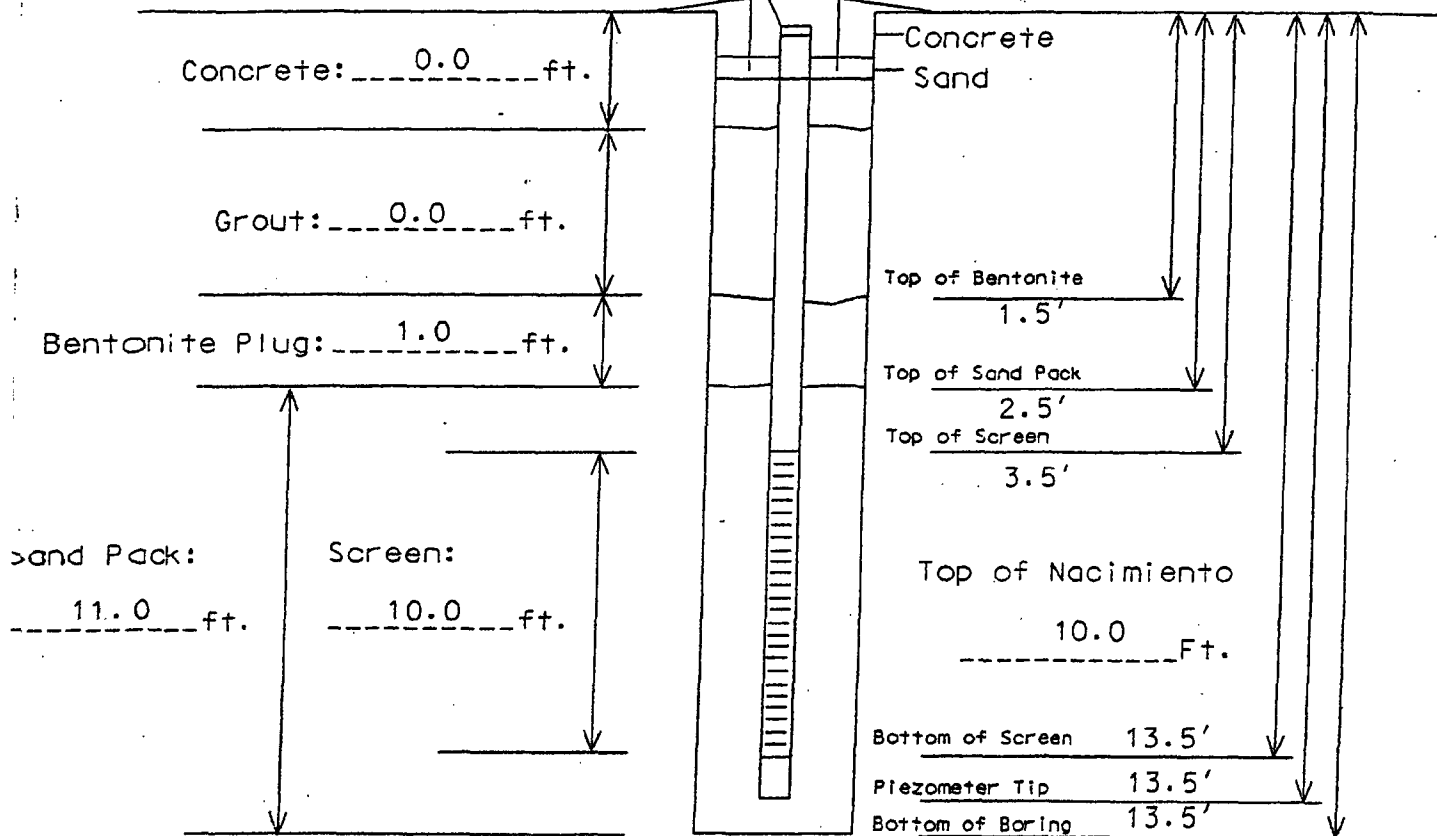
5 05-523-7674

Installation Diagram

Monitoring Well No. CW 16+60

Elevation
Reference

Steel Vault - Flush Mount



Boring Diameter: 13 "

Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Other: _____

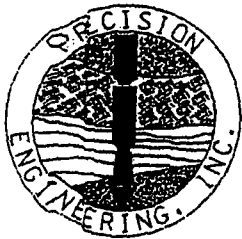
Bottom Cap Used? Yes

Site Easting: TBS

Project #: 05-038

Project Name: Bloomfield Refinery

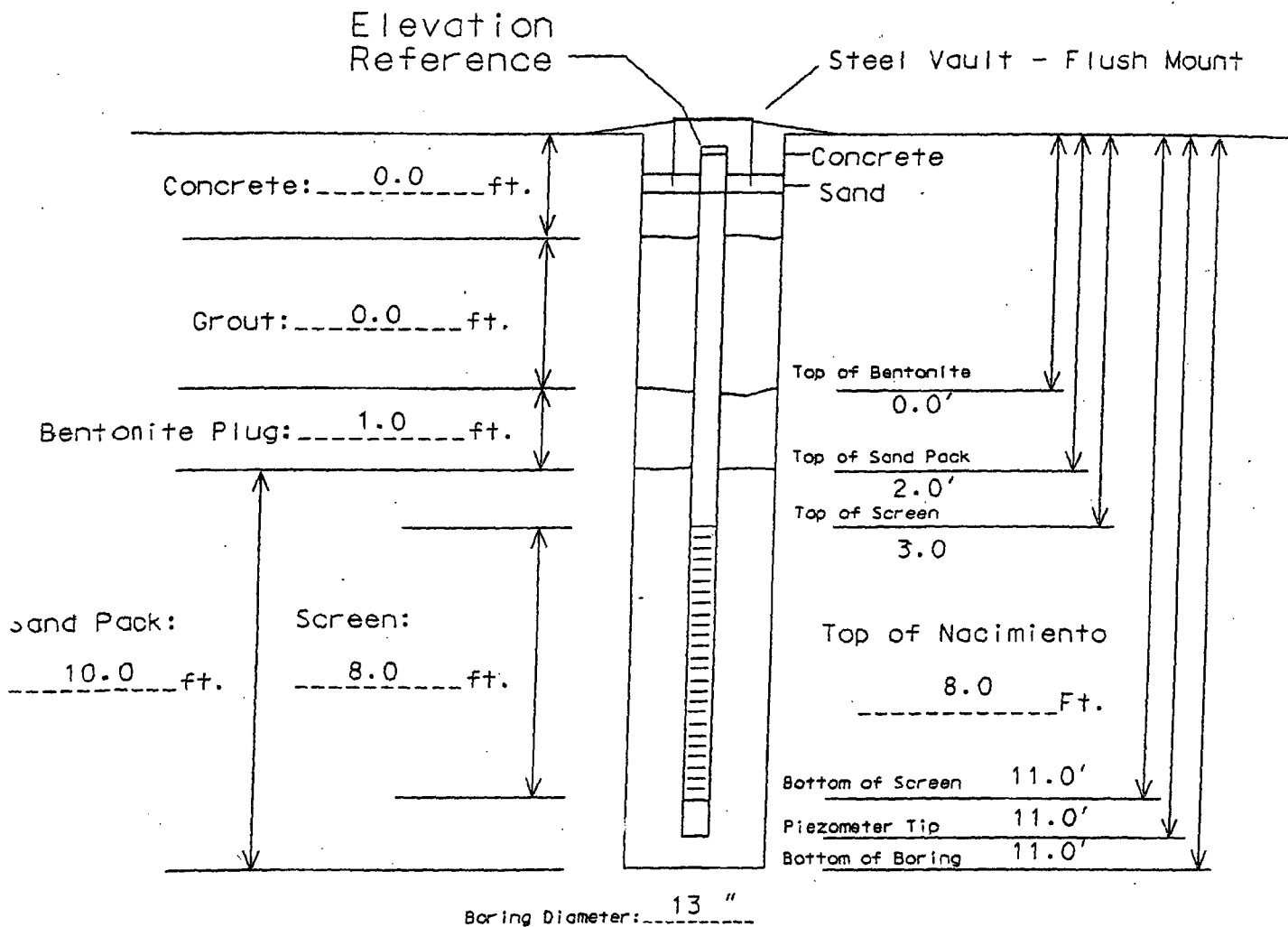
Elevation: TBS



501-523-7674

Installation Diagram

Monitoring Well No. CW 19+50



Sand Type: 10-20 Silica

Ballards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40. 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS



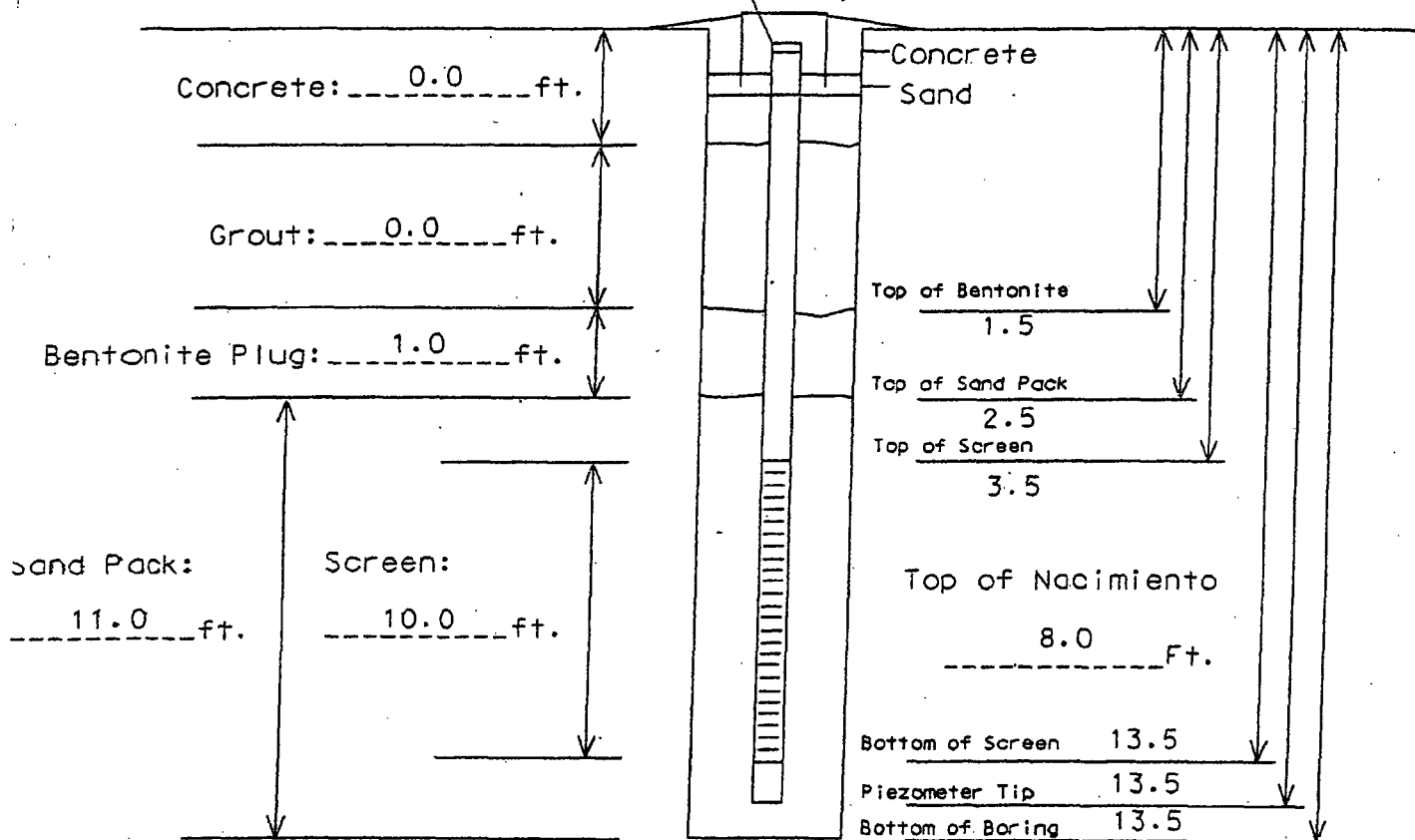
505-523-7674

Installation Diagram

Monitoring Well No. CW 22+00

Elevation
Reference

Steel Vault - Flush Mount



Boring Diameter: 13 "

Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

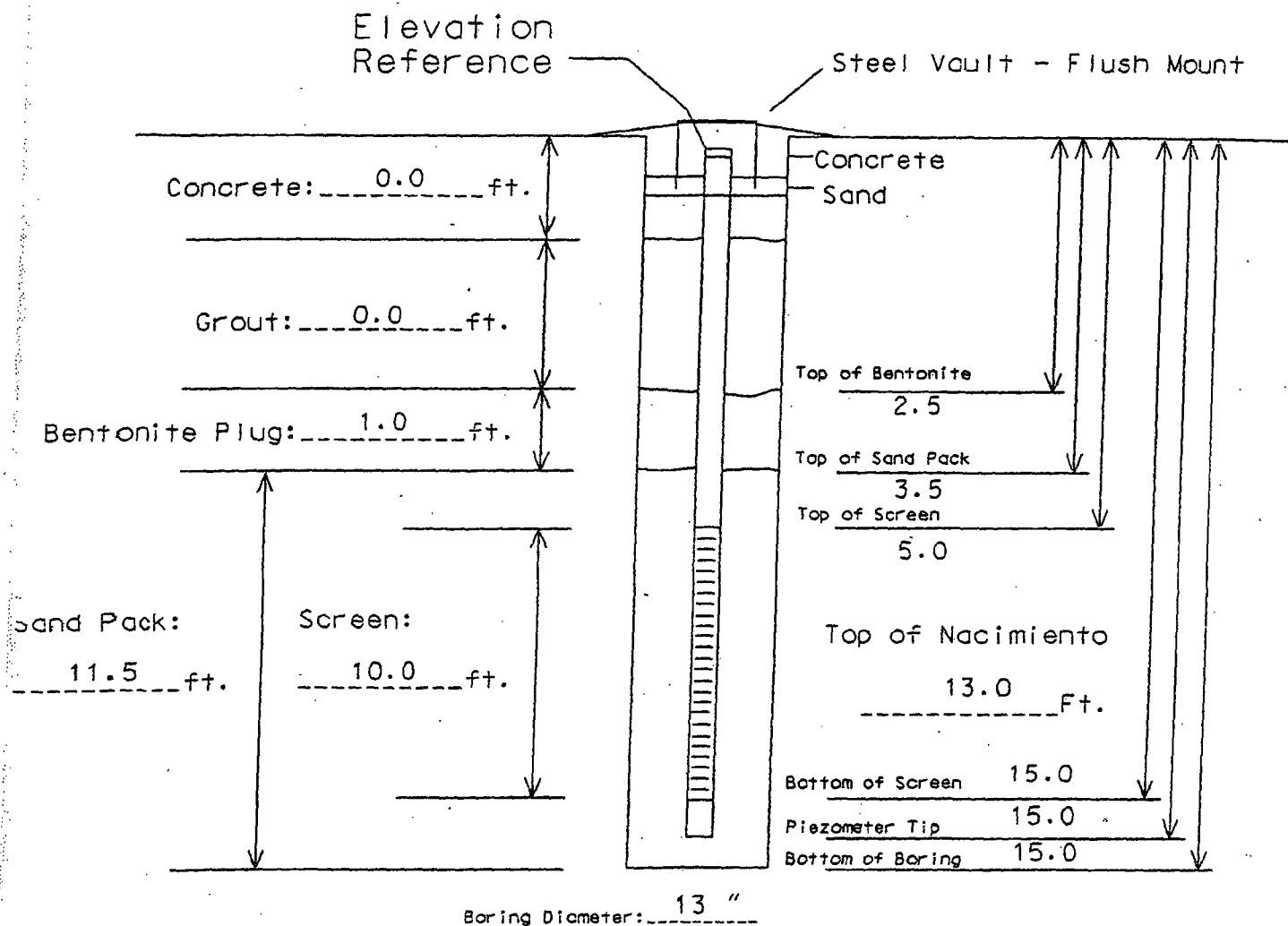
Project Name: Bloomfield Refinery

Elevation: TBS



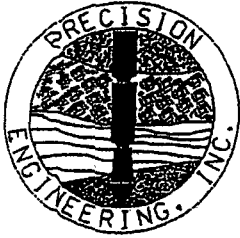
S05523-7674

Installation Diagram

Monitoring Well No. CW 23+10Sand Type: 10-20 SilicaBollards, Type/Size: NABentonite: 3/8" ChipsScreen Type/Size: 6" PVC Sch. 40, 0.40" SlottedCement/Grout: NARiser Type/Size: 6" PVC Sch. 40Water: PotableLocking Expandable Casing Plug? YesSite Northing: TBSBottom Cap Used? YesSite Easting: TBS

Other: _____

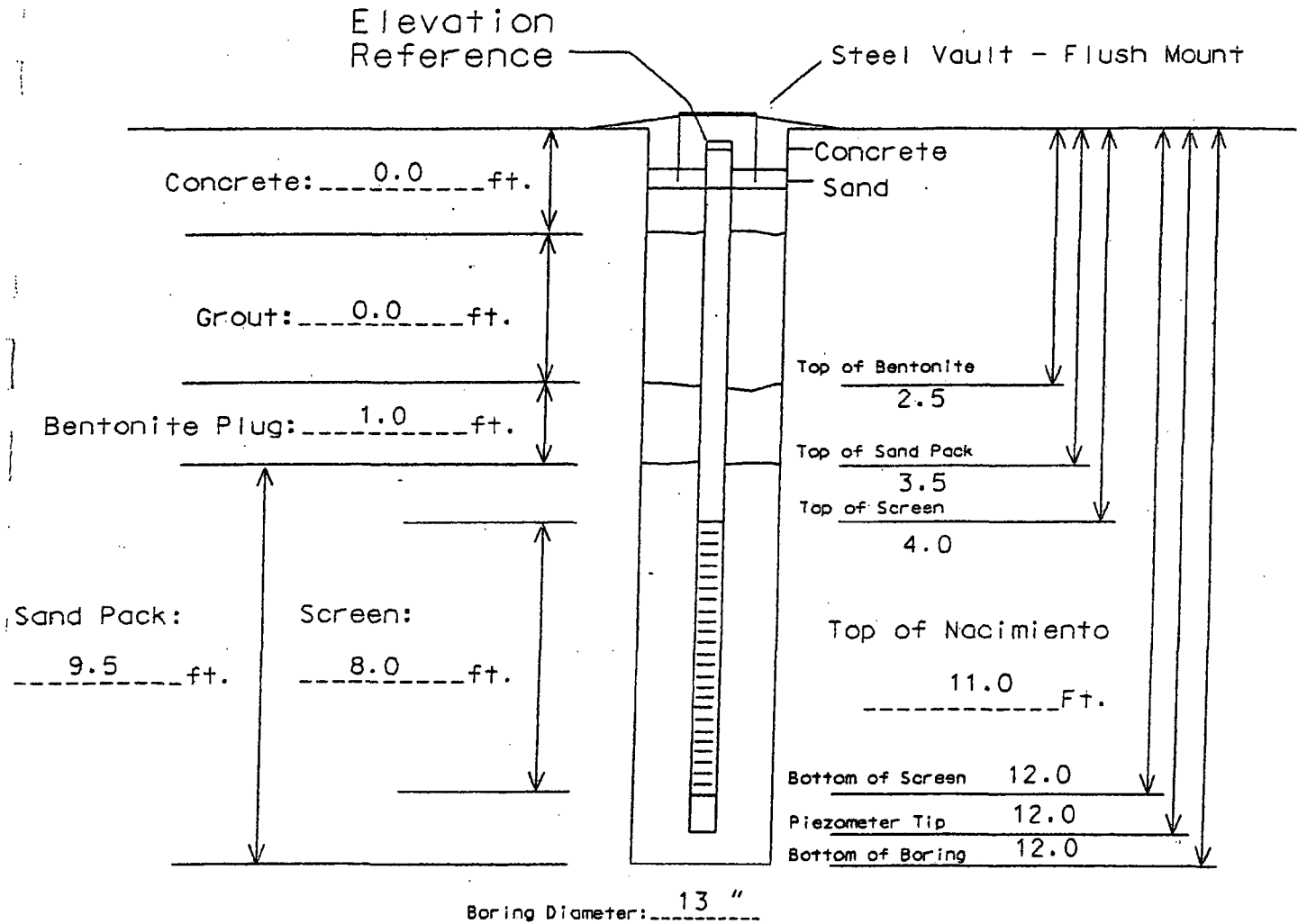
Project #: 05-038Project Name: Bloomfield RefineryElevation: TBS



505-523-7674

Installation Diagram

Monitoring Well No. CW 23+90



Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

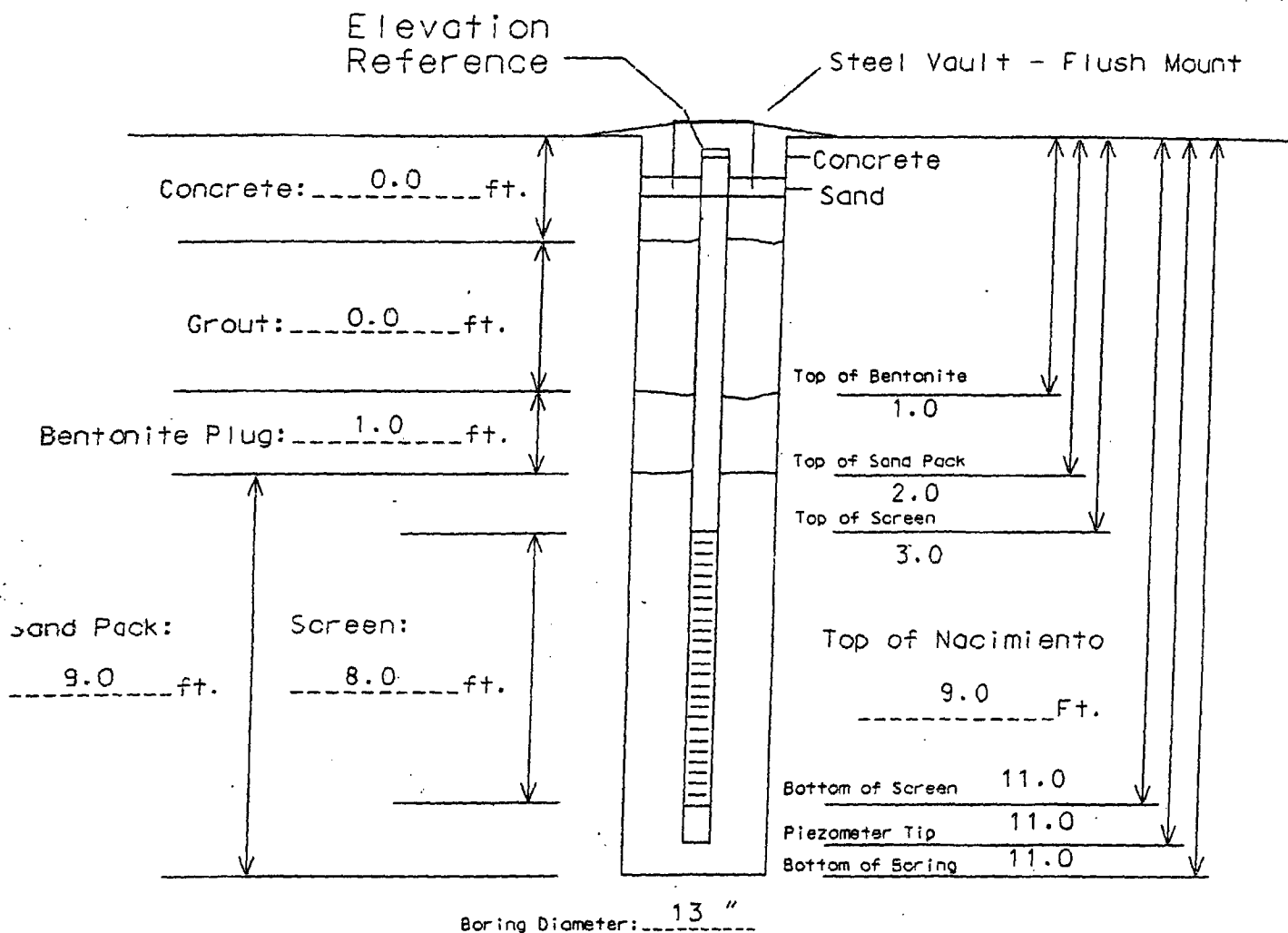
Elevation: TBS



SE-523-7674

Installation Diagram

Monitoring Well No. CW 25+95



Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 6" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 6" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

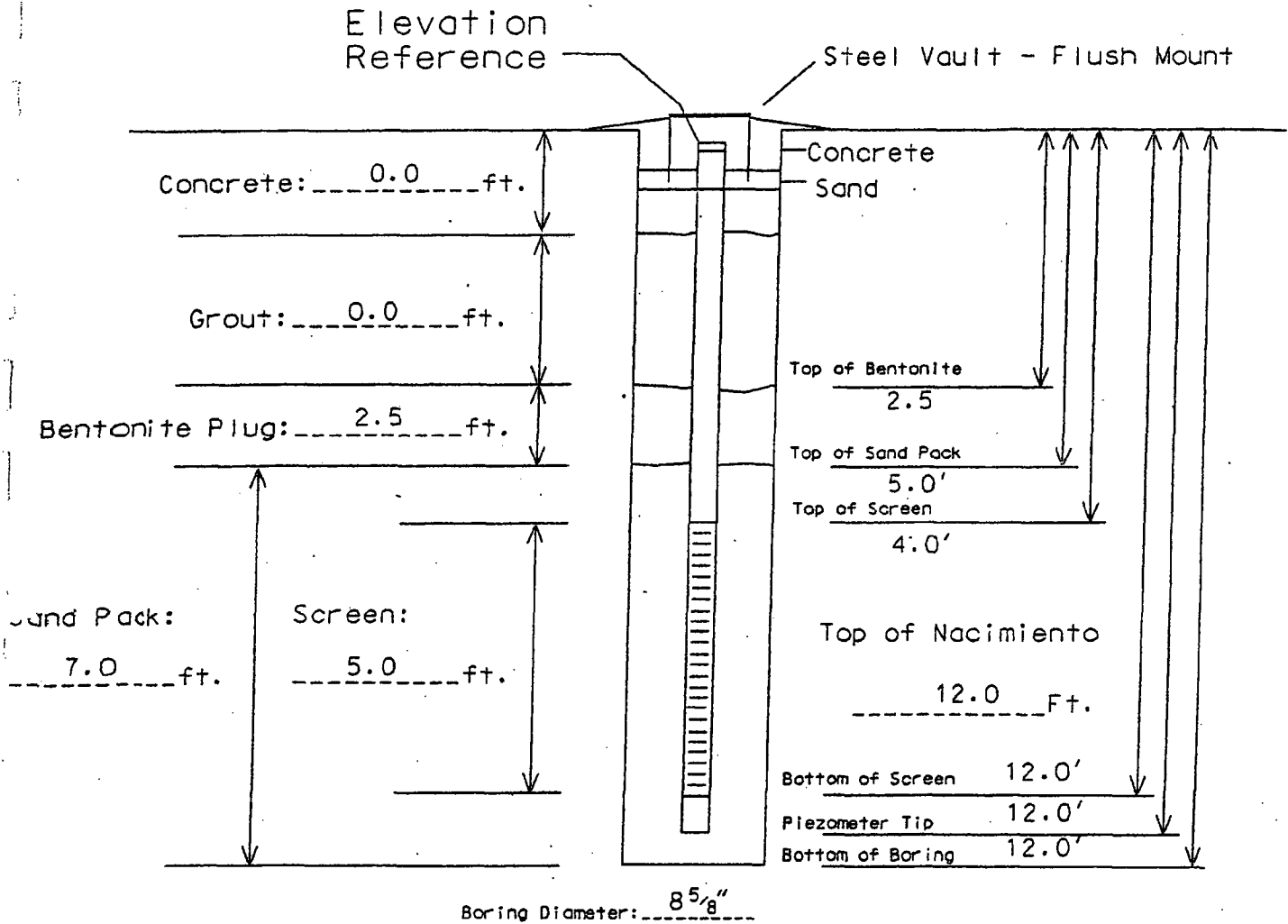
Elevation: TBS



505523-7674

Installation Diagram

Monitoring Well No. OW 0+60



Sand Type: 10-20 Silica

Boulders, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other:

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

Sheet: 1 OF 15
B on Point: See Plan
Water Elevation: 10.7'
B orig No.: OW0+60

Precision Engineering, Inc.
P.O. Box 422
Las Cruces, NM 88004
505-523-7674

File #: 05-038
Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 4/20/2005

Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0-2.0		***//*** ***//*** ***//***		Sand, very fine to fine, brown, moist				
	20-3.5		***oo*** ***oo*** ***oo*** ***oo***	2.5	Gravel, cobbles, to boulder size, grey, moist very dense,				
	15-8.0		***** ***** ***** ***** ***** ***** ***** *****	5.0 7.5	Sand, silty, clayey, yellow-brown, damp, moderately dense				
	60-11.5		***** ***** ***** ***** ***** ***** *****	10.0	Sand, silty, grey-black, hydrocarbon odor, dense, moist, Water Level 10.7'				
	12.0		*****						
	12.5		= = = = = = = = = = = =		Nacimiento Formation Friable Sandstone, silty, yellow-brown, dense, damp, no odor				
	14.0			15.0 20.0	TD Set 2" Well @ 12.0' 5' of Screen, 7' of Riser Top of Sand 5.0' Top of Bentonite 2.5'				

C:\unzipped\Observation Well Logs\OW0+60.xls]Sheet1

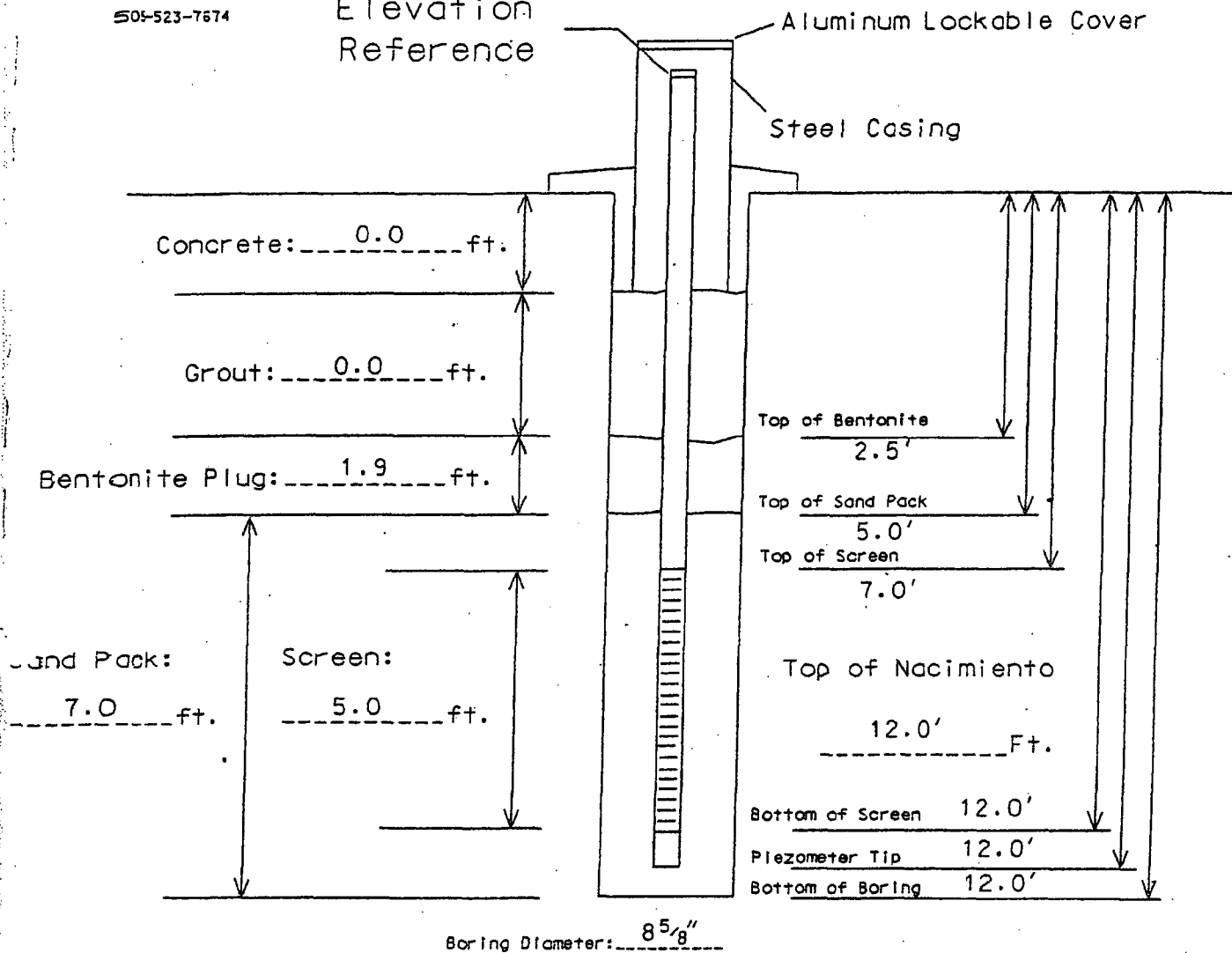


505-523-7674

Installation Diagram

Monitoring Well No. DW 1+50

Elevation
Reference



Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

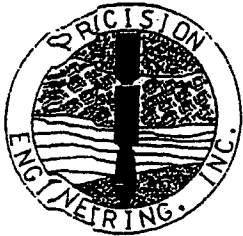
Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

File #: 03-038
Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 4/20/2005

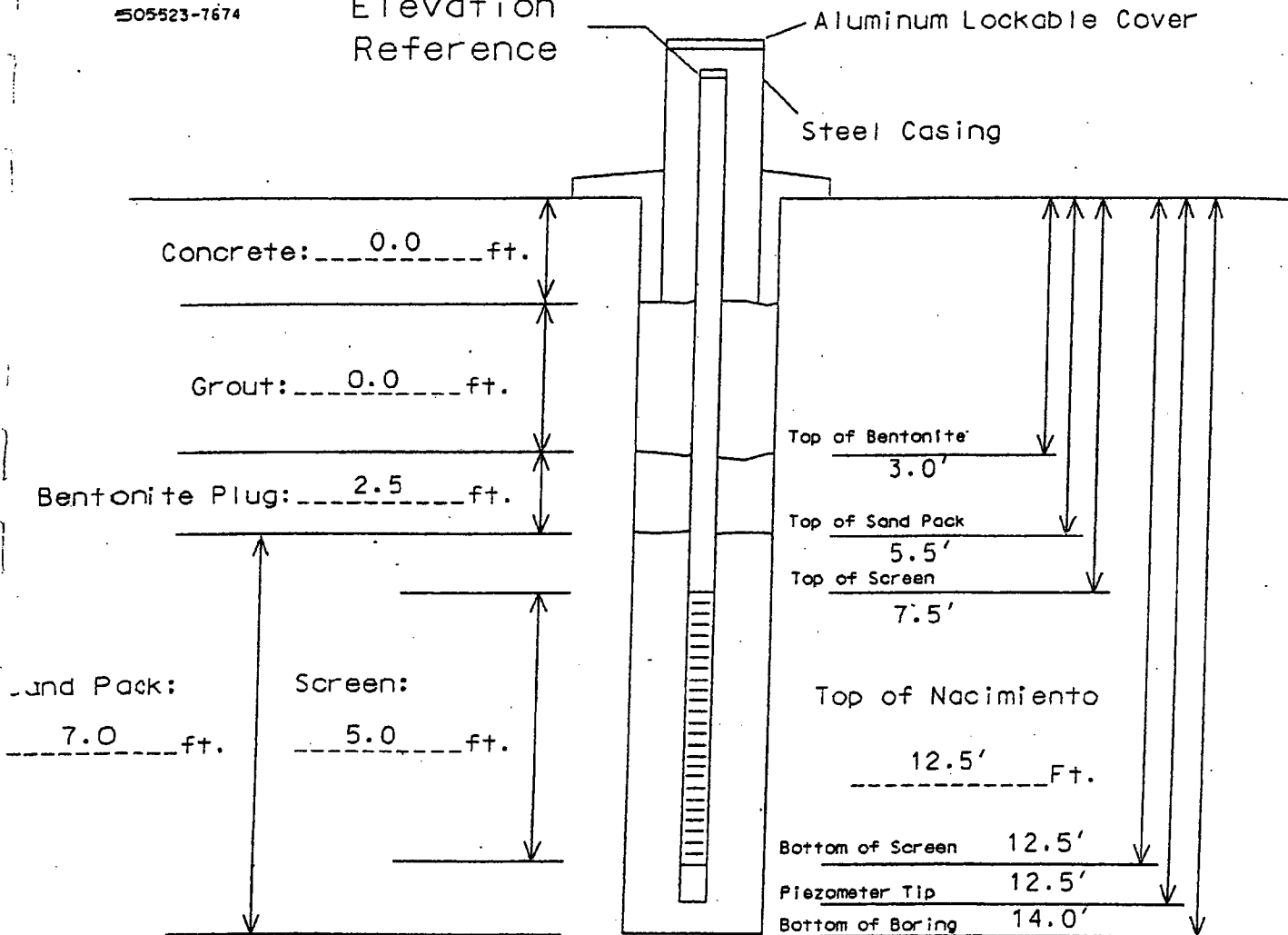


505523-7674

Installation Diagram

Monitoring Well No. OW 3+85

Elevation
Reference



Boring Diameter: 8 5/8"

Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 4/20/2005

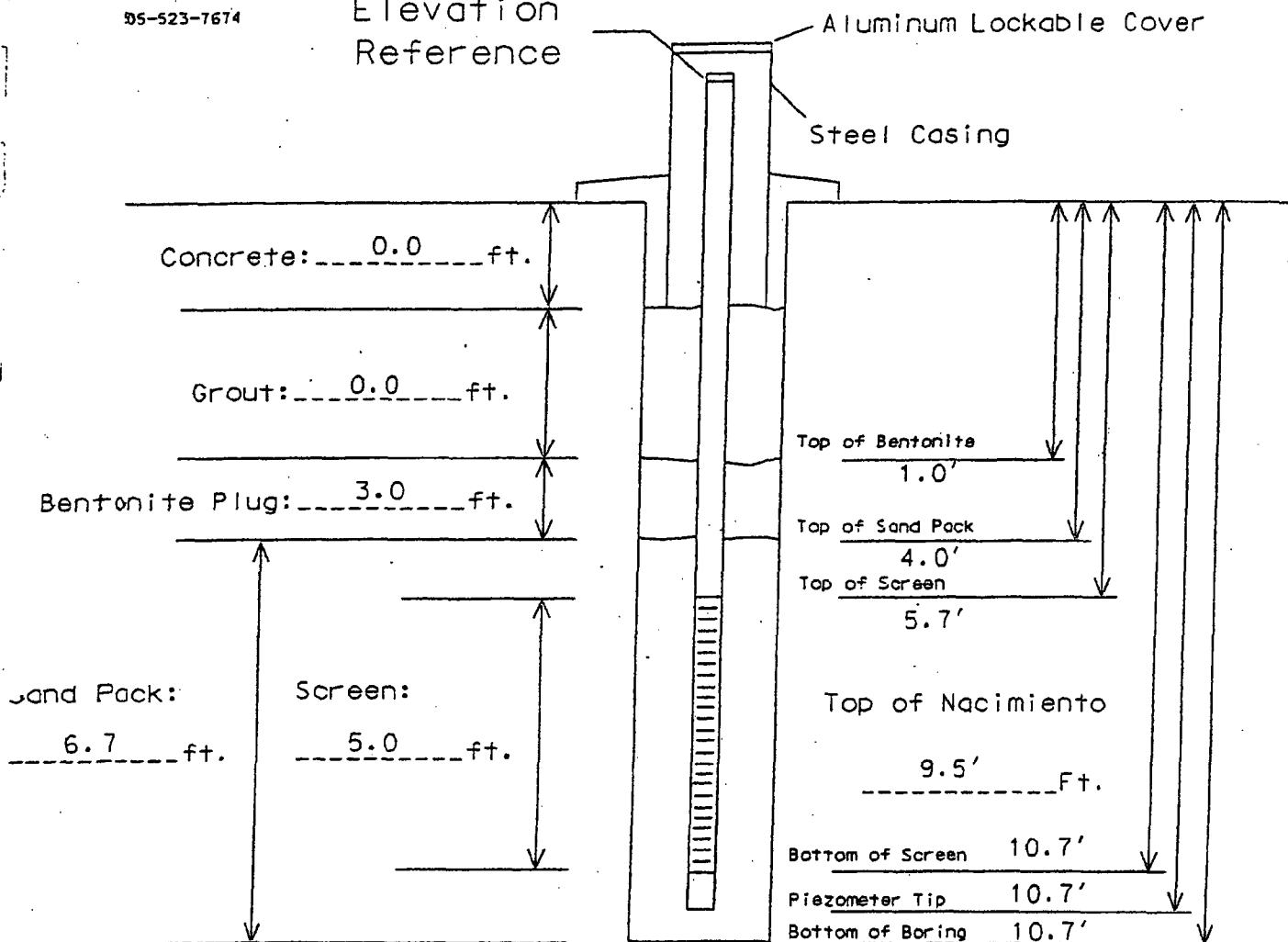


95-523-7674

Installation Diagram

Monitoring Well No. DW 5+50

Elevation
Reference



Boring Diameter: 8 5/8"

Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40. 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

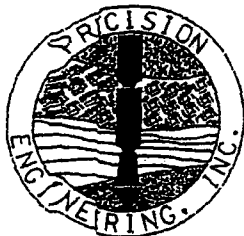
Other: -----

Project #: 05-038

Project Name: Bloomfield Refinery

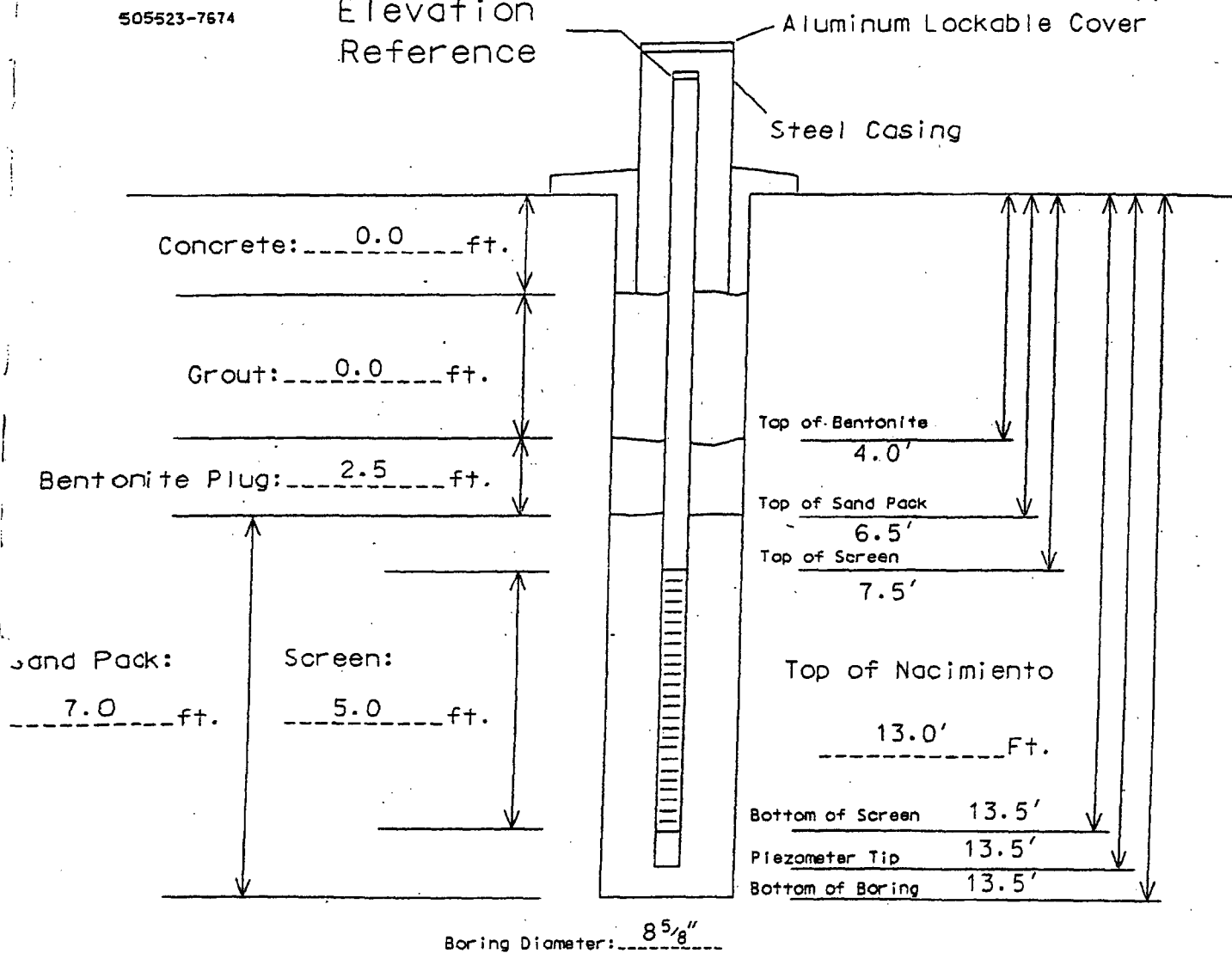
Elevation: TBS

Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 5/1/2005



505523-7674

Installation Diagram

Monitoring Well No. OW 6+70Elevation
ReferenceSand Type: 10-20 SilicaBollards, Type/Size: NABentonite: 3/8" ChipsScreen Type/Size: 2" PVC Sch. 40, 0.010" SlottedCement/Grout: NARiser Type/Size: 2" PVC Sch. 40Water: PotableLocking Expandable Casing Plug? YesSite Northing: TBS

Other: _____

Bottom Cap Used? YesSite Easting: TBSProject #: 05-038Project Name: Bloomfield RefineryElevation: TBS

Sheet: 5 OF 15
 Bore Point: See Plan
 Water Elevation: Not Encountered
 Boring No.: OW6+70

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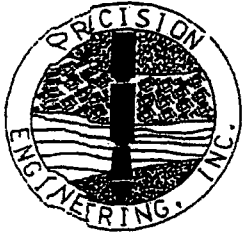
File #: 00-030
 Site: Bloomfield
 Giant Refining
 Elevation: EXISTING
 Date: 4/6/2005

Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0.0-5.5		***_*** ***_*** ***_*** ***_*** ***_*** ***_*** ***_*** ***_*** ***_***	2.5 5.0	<u>Sand</u> , Very Fine to Fine, Silty, Brown, Moist, Gravel, Cobbles				
	5.5-13.0		*o*-o* *o*-o* *o*-o* *o*-o* *o*-o* *o*-o* *o*-o* *o*-o* *o*-o* *o*-o* *o*-o* *o*-o* *o*-o*	7.5 10.0	<u>Sand</u> , Fine, Silty, Light Brown, Damp, Some Small Gravel, (Cobbles @ 12.0')				
	13.0'		==== ==== ==== ====	15.0	<u>Nacimiento Formation</u>				
	15.0			20.0	TD 1.5' of Bentonite (Bottom of Hole) Set 2" Well @ 13.5' 5' of Screen 12.5' of Riser Top of Sand 6.5' Top of Bentonite 4.0'				

SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER

LOGGED BY: KMM

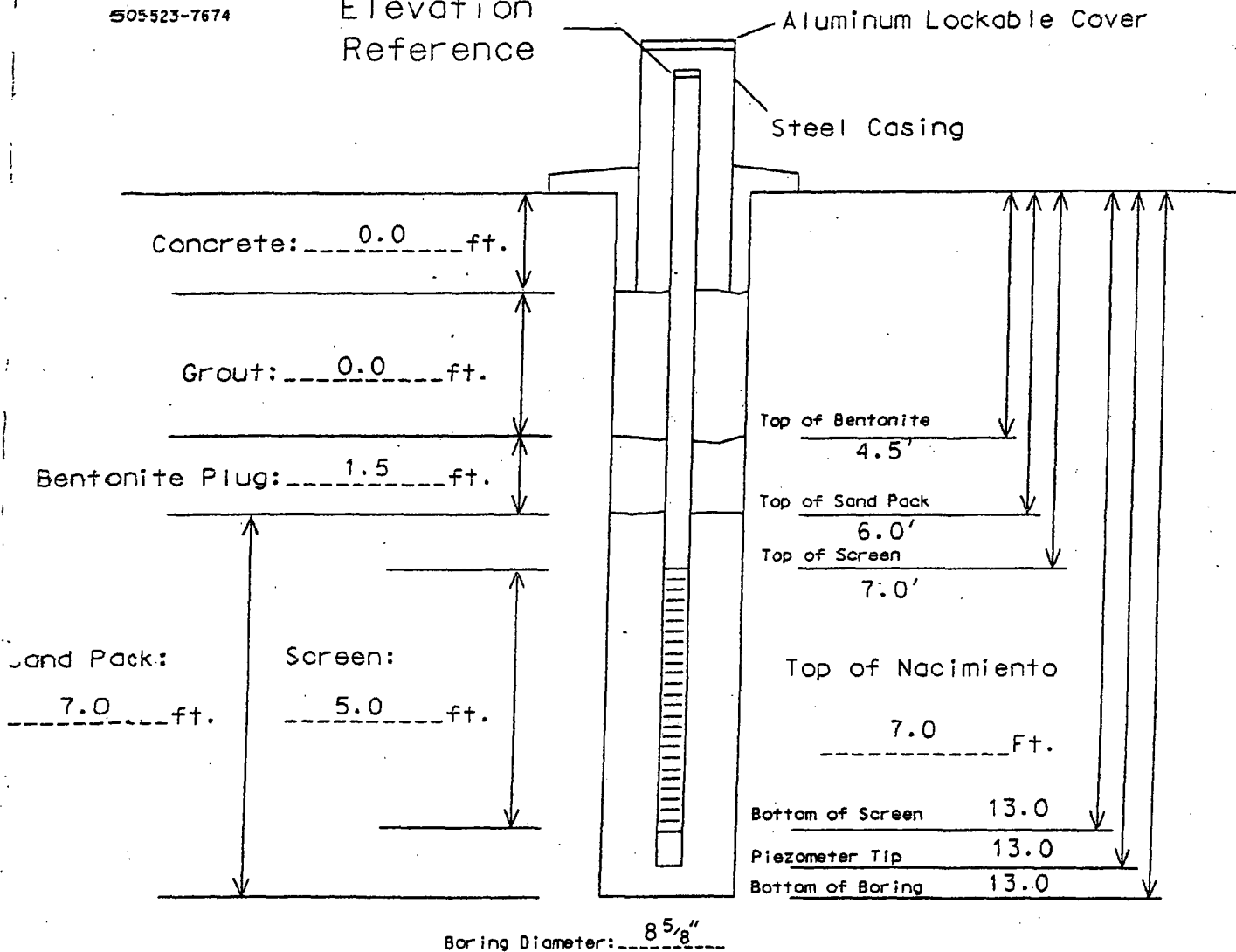


505523-7674

Installation Diagram

Monitoring Well No. DW 8+10

Elevation
Reference



Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

File #: 00-030
Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 4/6/2005

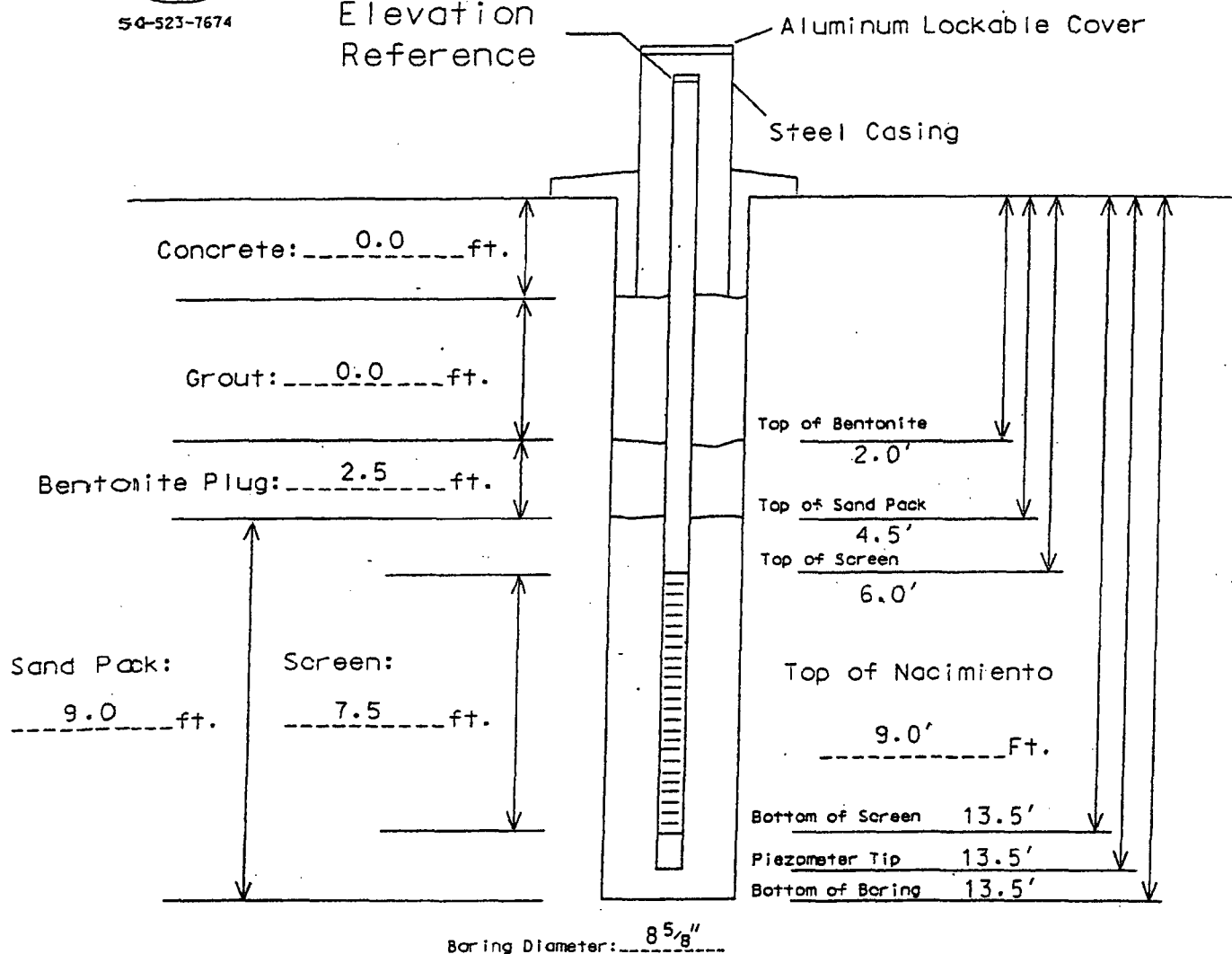


54-523-7674

Installation Diagram

Monitoring Well No. DW 11+15

Elevation
Reference



Boring Diameter: 8 5/8"

Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

Sheet: 7 OF 15
 Bore Point: See Plan
 Water Elevation: 9.4'
 Boring No.: OW11+15

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 P.O. Box 422
 Las Cruces, NM 88004
 505-523-7674

File #. 00 000
 Site: Bloomfield
 Giant Refining
 Elevation: EXISTING
 Date: 4/7/2005

Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0.0-9.0		**o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o** **o**o**	2.5 5.0 7.5	Sand, Very Fine to Medium, Brown, Damp, Gravel, Cobbles, Hydrocarbon Odor @ 5.0'				
	9.0-13.5 9.4		***** ***** ***** ***** ***** ***** ***** *****	10.0	Sand, Very Fine to Medium, Black/Grey, Damp, Strong Hydrocarbon Odor, Water 9.4'				
			=====		Nacimiento				
	13.5			15.0 20.0	TD Set 2" Well @ 13.5' 7.5' of Screen, 9' of Riser Top of Sand 4.5' Top of Bentonite 2.0'				

SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER

LOGGED BY: KMM

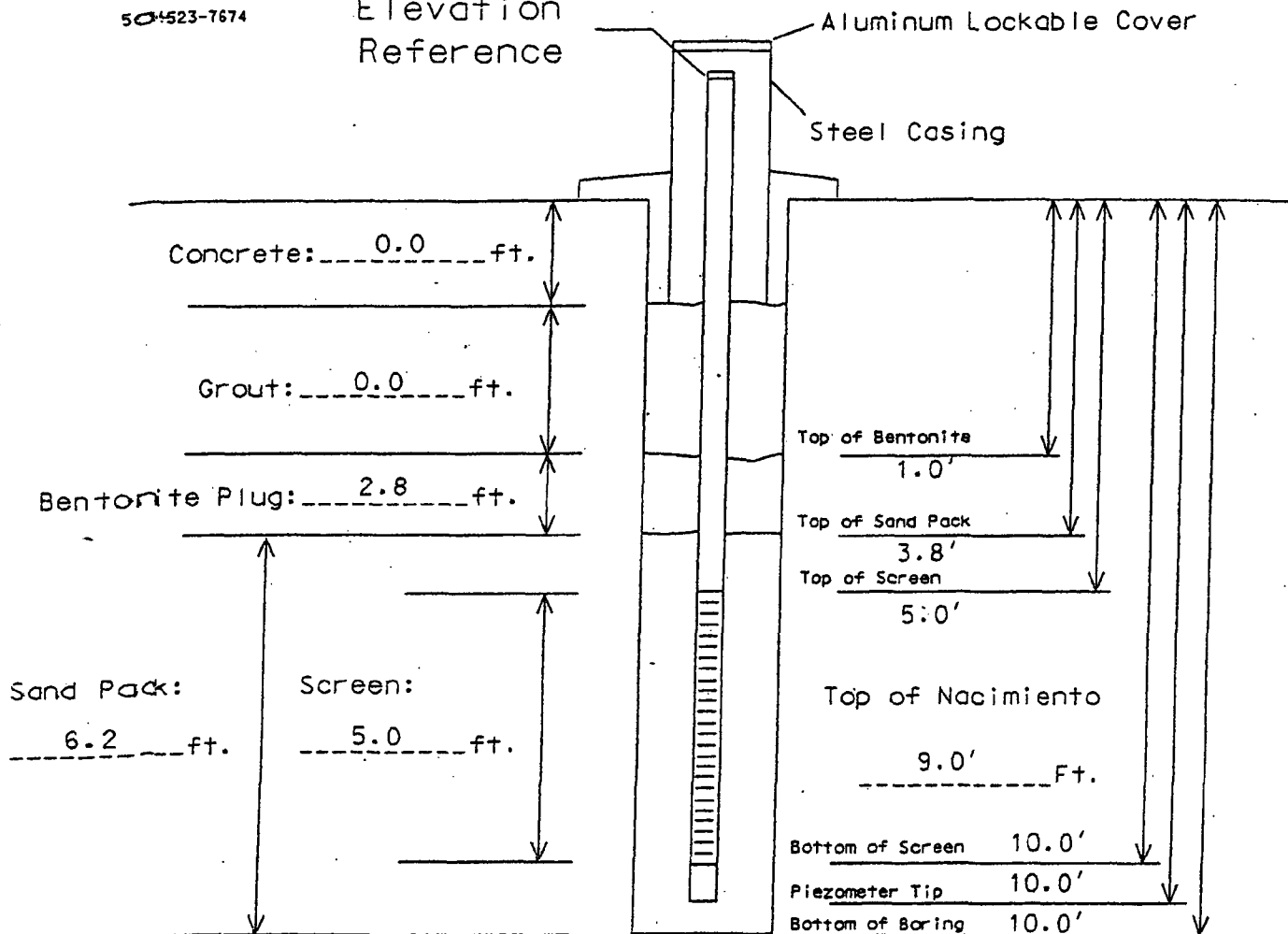


504-523-7674

Installation Diagram

Monitoring Well No. OW 14+10

Elevation
Reference



Boring Diameter: 8 5/8"

Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Other: _____

Bottom Cap Used? Yes

Site Easting: TBS

Project #: 05-038

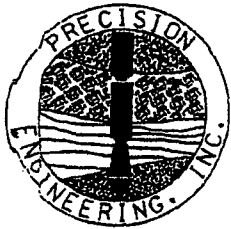
Project Name: Bloomfield Refinery

Elevation: TBS

Log of Test Borings

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR, ETC.)	%M	LL	PI	CLASS.
	0.0-8.5		OoO*Oo OoO*Oo OoO*Oo OoO*Oo <u>2.5</u> OoO*Oo OoO*Oo OoO*Oo OoO*Oo <u>5.0</u> OoO*Oo OoO*Oo OoO*Oo OoO*Oo <u>7.5</u> OoO*Oo OoO*Oo		Gravel, cobbles, to boulder size, sand fine to coarse, damp dense				
	8.5		***** *****		Sand, fine to coarse, some gravel, grey, moist				
	9.0		=====		Nacimiento Formation				
	10.0				TD				
				<u>15.0</u>	Set 2" Well @ 10.0 5' of Screen, 8' of Riser Top of Sand 3.8' Top of Bentonite 1.5'				
				<u>20.0</u>					

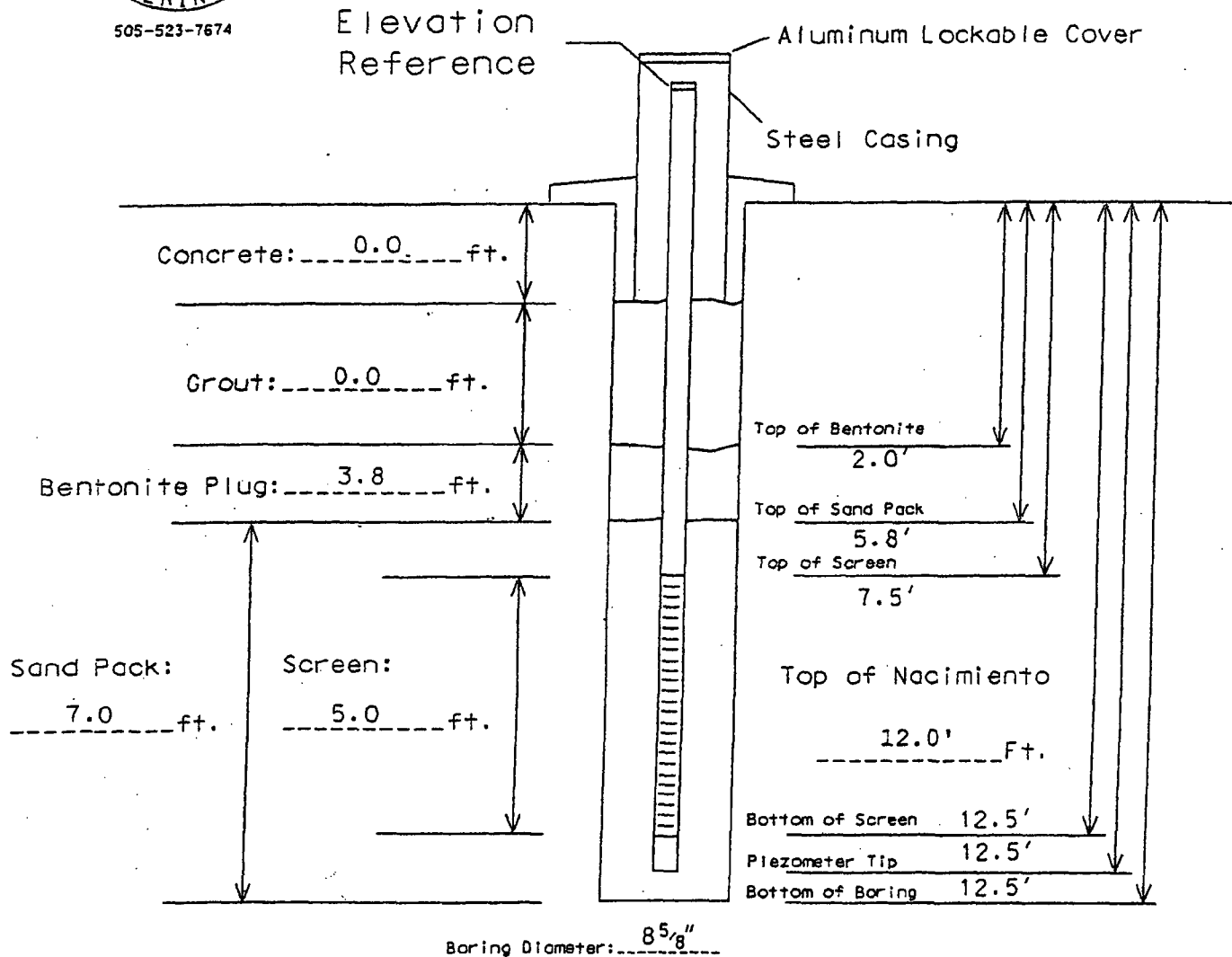
SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER
LOGGED BY: WHK



505-523-7674

Installation Diagram

Monitoring Well No. DW 16+60



Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

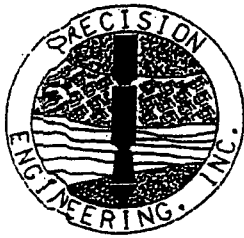
Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 4/7/2005

C:\unzipped\Observation Well Logs\OW16+60.xls]Sheet1

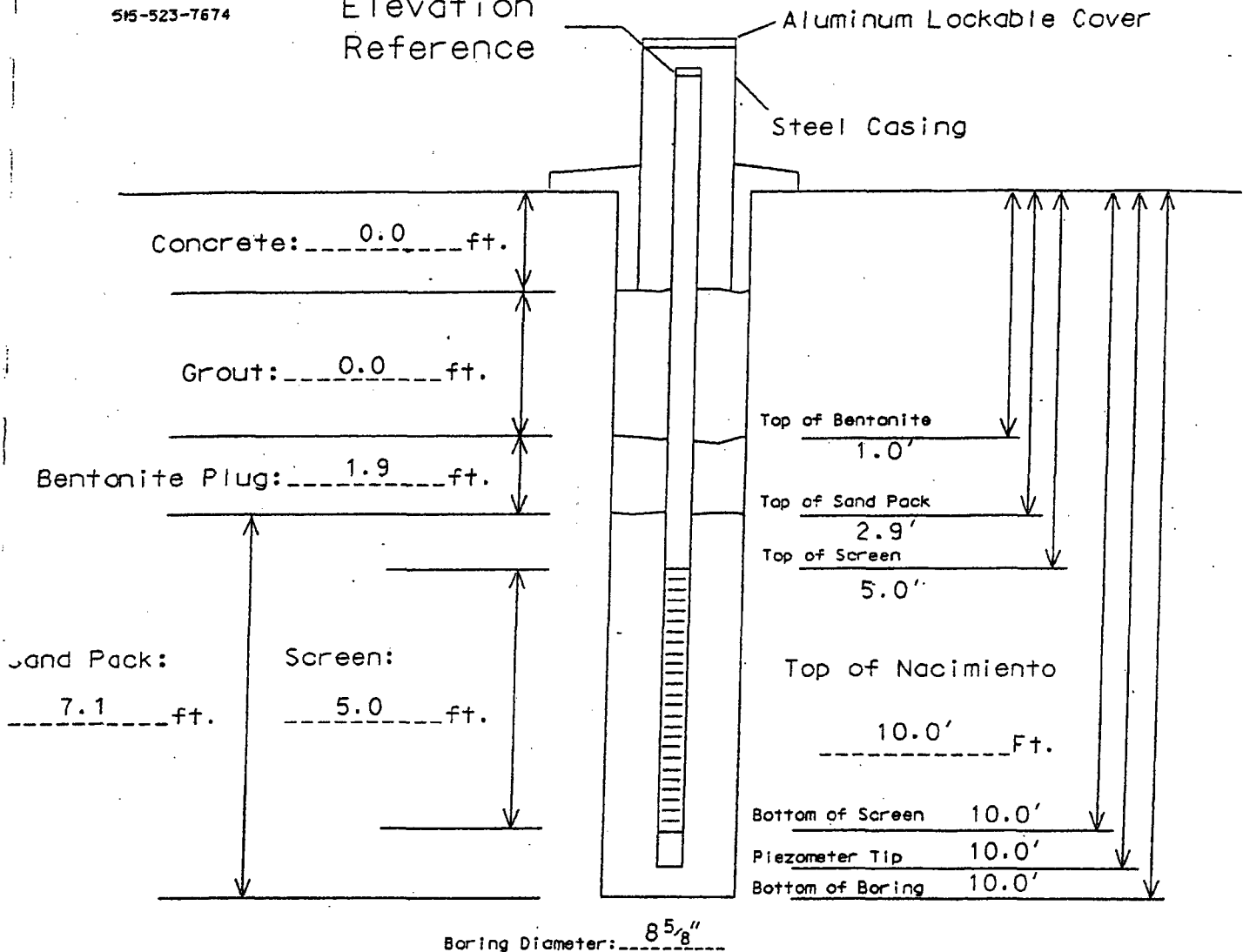


515-523-7674

Installation Diagram

Monitoring Well No. OW 19+50

Elevation
Reference



Boring Diameter: 8 5/8"

Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40; 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 5/7/2005

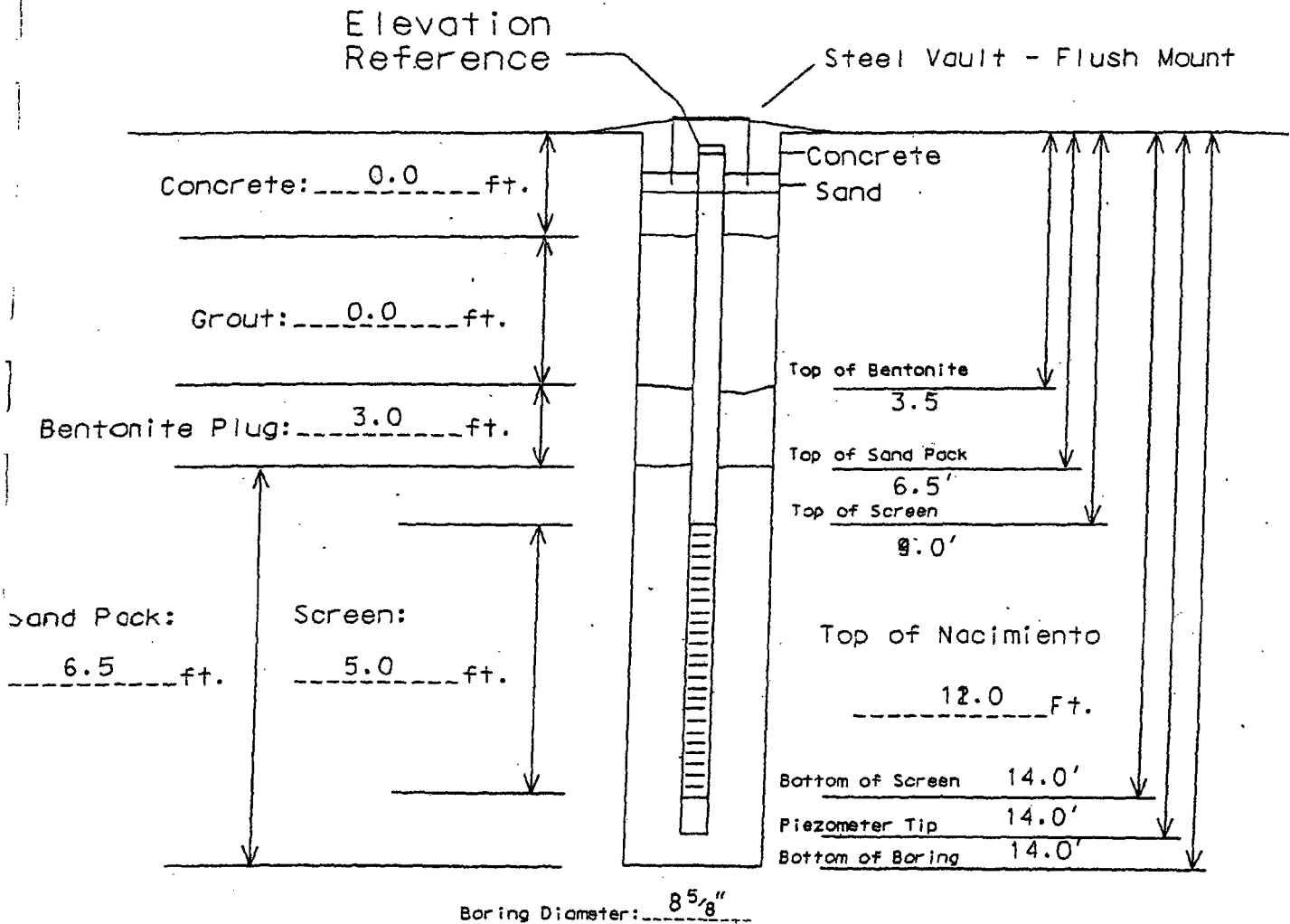
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58-523-7674

Installation Diagram

Monitoring Well No. OW 22+00



Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.40" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

File #: 05-038
Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 5/6/2005



905-523-7674

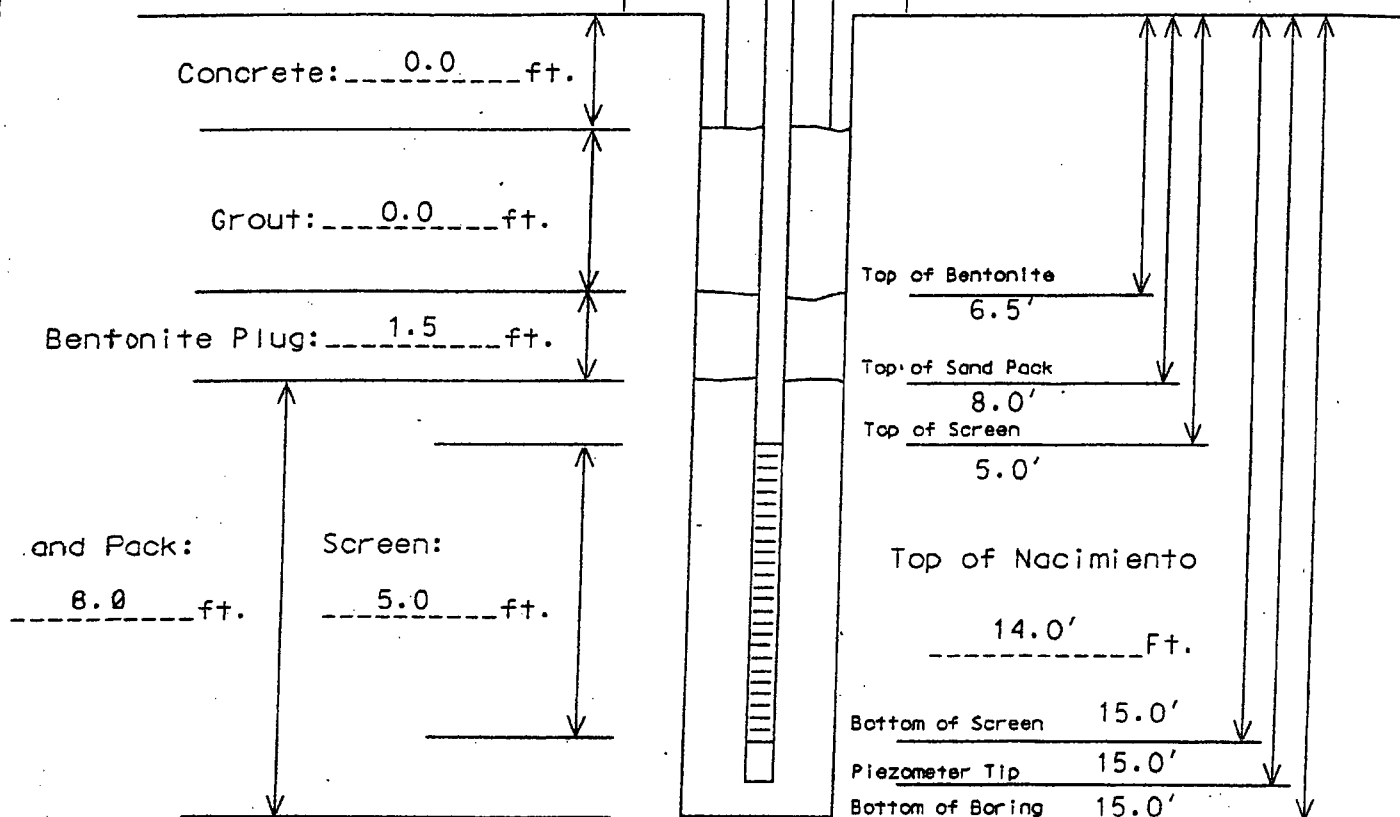
Installation Diagram

Monitoring Well No. OW 23+10

Elevation
Reference

Aluminum Lockable Cover

Steel Casing



Boring Diameter: 8⁵/₈"

Sand Type: 10-20 Silica

Bollards, Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

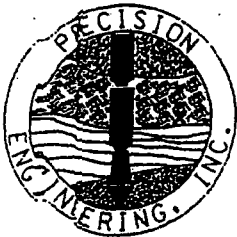
Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

File #: 00-000
Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 5/6/2005

LOGGED BY: KMM

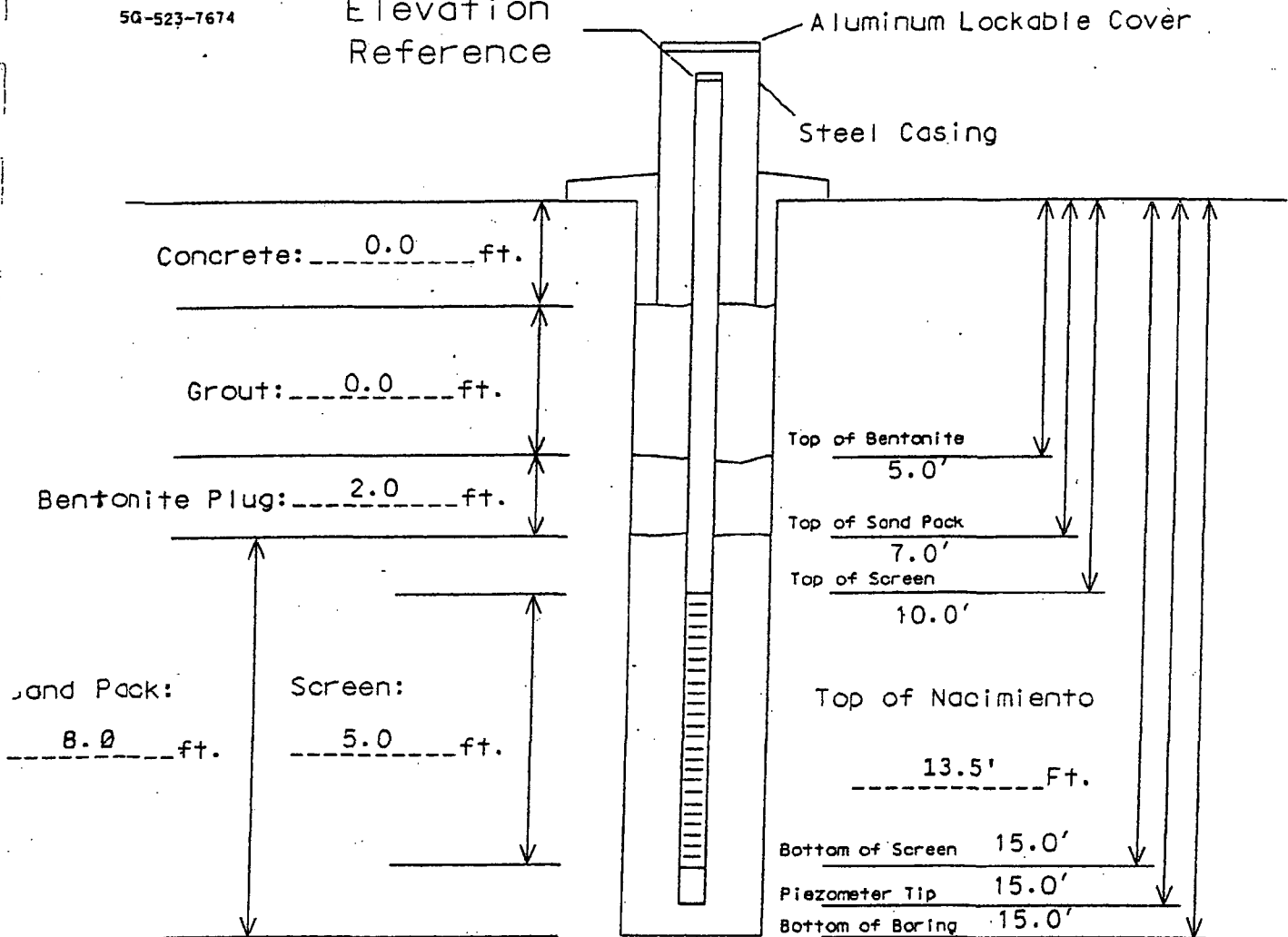


5G-523-7674

Installation Diagram

Monitoring Well No. OW 23+90

Elevation
Reference



Boring Diameter: 8⁵/₈"

Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40, 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

Project Name: Bloomfield Refinery

Elevation: TBS

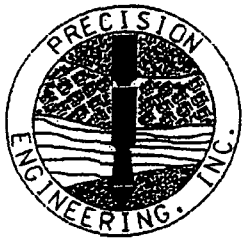
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Bore Point: See Plan
Water Elevation: Not Encountered
Boring No.: OW23+90

Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 5/6/2005

[illegible]

SIZE & TYPE OF BORING: 4 1/4" ID HOLLOW STEMMED AUGER

LOGGED BY: KMM

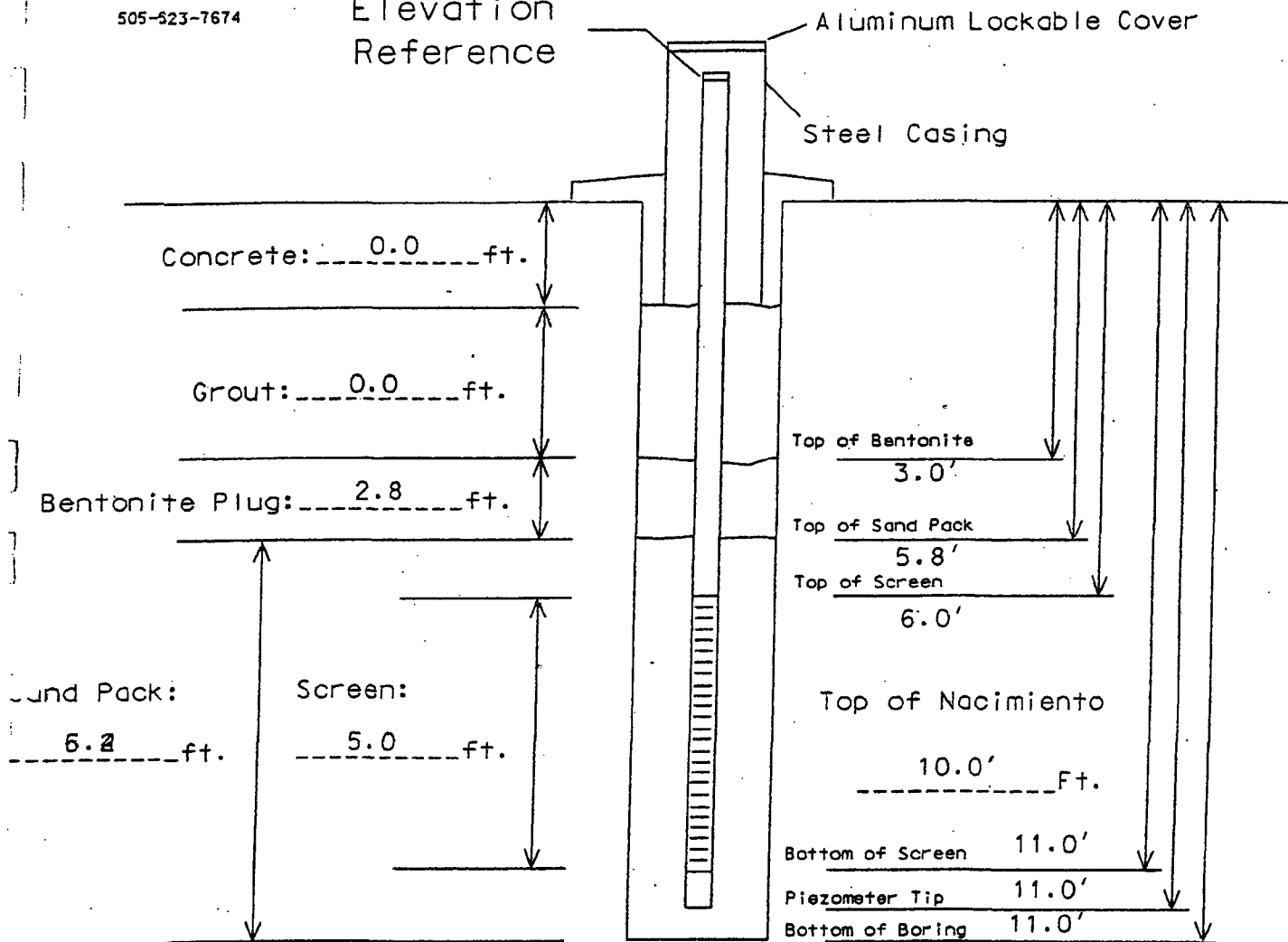


505-523-7674

Installation Diagram

Monitoring Well No. OW 25+70

Elevation
Reference



Boring Diameter: 8 5/8"

Sand Type: 10-20 Silica

Bollards. Type/Size: NA

Bentonite: 3/8" Chips

Screen Type/Size: 2" PVC Sch. 40. 0.010" Slotted

Cement/Grout: NA

Riser Type/Size: 2" PVC Sch. 40

Water: Potable

Locking Expandable Casing Plug? Yes

Site Northing: TBS

Bottom Cap Used? Yes

Site Easting: TBS

Other: _____

Project #: 05-038

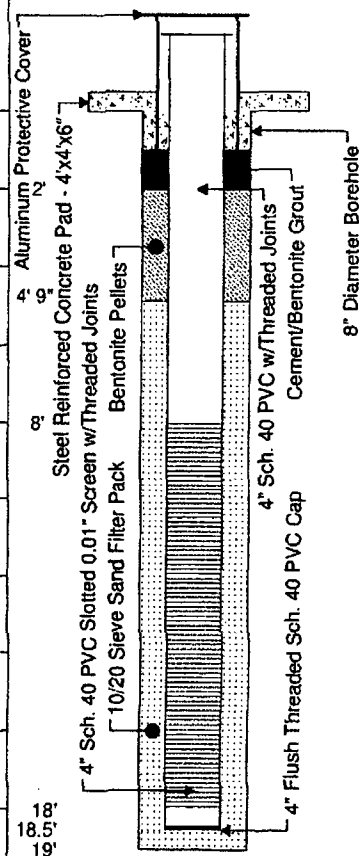
Project Name: Bloomfield Refinery

Elevation: TBS

File #: 00-000
Site: Bloomfield
Giant Refining
Elevation: EXISTING
Date: 4/6/2005

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** SWMU Group #2, Bloomfield Refinery**Job No.:** 354 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow-Stem Auger/ODEX**Sampling Method:** Split Spoon**Comments:** 0-10 Interval (9/25/08, 81°F (0-6), 82°F (6-10)); 10-20 Interval (10/15/08 44°F).**Total Depth:** 20 bgl**Ground Water:** 16.65' BTOC 10/28/08**Elev., TOC (ft. msl):** 5518.794**Elev., PAD (ft. msl):** 5516.157**Elev., GL (ft. msl):** 5515.872**Site Coordinates:****N 50484.517 E 52377.344****Well No.:** MW-50 (SWMU2-5)**Start Date:** 9/25 & 10/15/2008**Finish Date:** 9/25 & 10/15/2008

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-3								Ground Surface	
-1									
1	0-0.5'	1030	G/2V/ 2E/2J		0.4		90	Silty Clay/Clayey Silt (CL/ML) Low plasticity, firm, damp, brown	
3	1-1.5'	1045	G/2V/ 2E/2J		0.3		20	Clayey Silt (ML) Similar to above	
5					0.4		60	Gravelly Sand (SW) Fine to medium grain, loose, dry, brownish gray, gravel present throughout	
7					0.3		80	Gravelly Sand (SW) Similar to above	
9					0.5		80	Gravelly Sand (SW) Similar to above	
11					0.8		60	Gravelly Sand (SW) Fine to medium grain, loose, dry, brownish gray, gravel present throughout	
13	13-14'	1015	G/2V/ 2E/3J	14'	0.8		80	Gravelly Sand (SW) Similar to above, damp to moist	
15							50	Gravelly Sand (SW) Similar to above, saturated, trace clay, medium to coarse grain sand	
17							90	Gravelly Sand (SW) Similar to above, saturated, dark brown	
19	FB101508 EB101508	1115 1130					60	Sand/Sandstone (SP/SS) Fine grain, compact, damp, light brown to tan Nacimiento Formation	
Total Depth = 20' BGL									



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Sheet: 1 of 1

361/855-7335
361/855-7410 fax

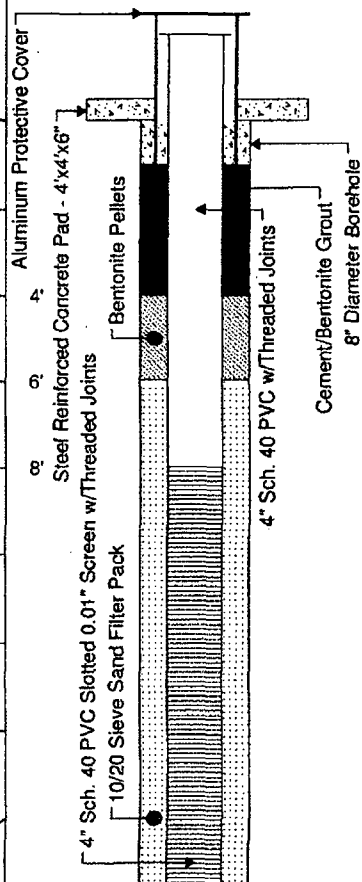
RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #2, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: 0-10 Interval (9/25/08, 85°F); 10-20 Interval (10/1/08 80°F).

Total Depth: 20 bgl
Ground Water: 14.58' BTOC 10/28/08
Elev., TOC (ft. msl): 5515.583
Elev., PAD (ft. msl): 5513.098
Elev., GL (ft. msl): 5512.877
Site Coordinates:
N 50401.208 **E** 52102.539

Well No.: MW-51 (SWMU2-9)
Start Date: 9/25 & 10/1/2008
Finish Date: 9/25 & 10/1/2008

Depth (ft.)	Sampling					Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)			
0	0-0.5'	1530	G/2V/ 2E/2J			60	Ground Surface Clayey Silt (ML) Very fine grain, compact, dry, brown	
1.5-2'		1545	G/2V/ 2E/2J			-	No Recovery	
2						60	Gravelly Sand (SW) Very fine to medium grain, loose, dry, brown, gravel present	
3						60	Gravelly Sand (SW) Similar to above	
4						80	Gravelly Sand (SW) Similar to above, damp to moist at base	
5						30	Gravelly Sand (SW) Medium grained, loose, dry to damp, brown, gravel throughout	
6						30	Gravelly Sand (SW) Similar to above, saturated at 14' bgl	
7						80	Sand (SP) Medium to coarse grain, loose, grayish brown, saturated, trace gravel and trace clay nodules, clayey sand at base	
8						20		



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 3833 S. Staples, Suite N-229
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Sheet: 1 of 2

361/855-7335
 361/855-7410 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #2, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: 0-10 Interval (9/25/08, 85°F); 10-20 Interval (10/1/08 80°F).

Total Depth: 20 bgl

Ground Water: 14.58' BTOC 10/28/08

Elev., TOC (ft. msl): 5515.583

Elev., PAD (ft. msl): 5513.098

Elev., GL (ft. msl): 5512.877

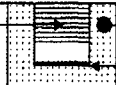
Site Coordinates:

N 50401.208 **E** 52102.539

Well No.: MW-51 (SWMU2-9)

Start Date: 9/25 & 10/1/2008

Finish Date: 9/25 & 10/1/2008

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
19							90	Gravelly Sand (SW) Medium to coarse grain, compact, brownish gray, saturated, clayey from 16-16.5' bgl	 18' 18.5' 19' 4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 4" Flush Threaded Sch. 40 PVC Cap 10/20 Sieve Sand Filter Pack
21								Sand/Weathered Sandstone (SP/SS) Fine grained, compact to dense, damp, greenish gray to light brown Nacimiento Formation	
23								Total Depth = 20' BGL	
25									
27									
29									
31									
33									
35									
37									

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Sheet: 2 of 2

361/855-7335
361/855-7410 fax

WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #2, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: 0-10 Interval (10/13/08, 40°F); 10-41 Interval (10/14/08, 40°F-42°F). SWMU8-6A is 42'W 10°S of SWMU8-6.

Well No.: MW-52 (SWMU8-6A)

Start Date: 10/13/2008**Finish Date:** 10/14/2008

Total Depth: 41' bgl

Ground Water: 36.03' BTOC 10/28/08

Elev., TOC (ft. msl): 5538.626

Elev., PAD (ft. msl): 5536.148

Elev., GL (ft. msl): 5535.908

Site Coordinates:

N 49828.227 E 52839.886

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2									
0								Ground Surface	
2								Silt (ML) Fine grain, loose, dry, brown	
4									
6									
8									
10					0.3		80	Silt (ML) Fine grain, loose, dry to damp, brown	
12					0.4		100	Silt (ML) Similar to above	
14					0.5		100	Silt (ML) Similar to above	
16					0.4		100	Silt (ML) Similar to above	
18					0.5		100	Silt (ML) Similar to above	17' 6"
20								Clayey Silt/Silty Clay (ML/CL) Low plasticity, soft, damp, brown	19' 9"

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Sheet: 1 of 2

361/855-7335
361/855-7410 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #2, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: 0-10 Interval (10/13/08, 40°F); 10-41 Interval (10/14/08, 40°F-42°F). SWMU8-6A is 42°W 10°S of SWMU8-6.

Total Depth: 41' bgl

Ground Water: 36.03' BTOC 10/28/08

Elev., TOC (ft. msl): 5538.626

Elev., PAD (ft. msl): 5536.148

Elev., GL (ft. msl): 5535.908

Site Coordinates:

N 49828.227 **E** 52839.886

Well No.: MW-52 (SWMU8-6A)

Start Date: 10/13/2008

Finish Date: 10/14/2008

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
22					0.4		100	Clayey Silt/Silty Clay (ML) Similar to above	
24					0.5		100	Clayey Silt/Silt (ML) Similar to above, except decrease in clay content	
26					0.4		60	Clayey Silt/Silt (ML) Similar to above	
28					0.5		70	Gravelly Sand (SW) Fine grain, loose, damp, brown, gravel throughout	
30					0.4		70	Gravelly Sand (SW) Similar to above	
32					0.5		70	Gravelly Sand (SW) Similar to above	
34	33'-34'	0915	G/2V/ 2E/3J	34'	0.5		60	Gravelly Sand (SW) Similar to above, moist to saturated at base	
36							60	Gravelly Sand (SW) Fine to medium grain, loose to compact, saturated, brown	
38							60	Gravelly Sand (SW) Similar to above, trace sandstone at base, very light reddish brown to tan	
40							--	Sand/Sandstone (SP/SS) Fine grain, compact, moist to saturated at base, yellowish brown Nacimiento Formation	
42							--	Sand/Sandstone (SP/SS) Similar to above	
Total Depth = 41' BGL									38' 38.5' 39'

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Sheet: 2 of 2

361/855-7335
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RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #2, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: 0-10 Interval (9/23/08, 80°F); 10-41.5 Interval (9/24/08, (10-28) 60°F, (28-30) 66°F, (30-39) 70°F).

Total Depth: 41.5' bgl

Ground Water: 38.67' BTOC 10/28/08

Elev., TOC (ft. msl): 5541.322

Elev., PAD (ft. msl): 5538.7

Elev., GL (ft. msl): 5538.46

Site Coordinates:

N 49628.129 **E** 52879.301

Well No.: MW-53 (SWMU8-12)

Start Date: 9/23/2008

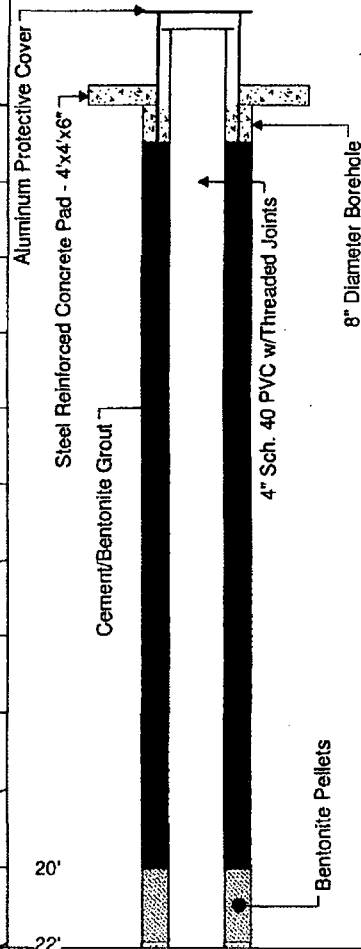
Finish Date: 9/24/2008

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2								Ground Surface	
0	0-0.5'	1630	G/2V/ 2E/2J				70	Silt (ML) Very fine grain, compact, dry, brown	
2	1.5-2'	1645	G/2V/ 2E/2J				70	Silt (ML) Similar to above	
4							70	Silt (ML) Similar to above	
6							90	Silt (ML) Similar to above, damp, trace quartz sand	
8							90	Silt (ML) Similar to above	
10							90	Sandy Silt (ML) Very fine grain, compact, dry, brown, with fine grain sand	
12							90	Sandy Silt (ML) Similar to above	
14							90	Sandy Silt (ML) Similar to above	
16							90	Clayey Silt (ML) Very fine grain, compact, dry, brown, calcareous	
18							90	Clayey Silt (ML) Similar to above	
20							100	Sandy Silt (ML) Very fine grain, compact to loose, dry, brown, with fine grain sand	

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Sheet: 1 of 2

361/855-7335
 361/855-7410 fax



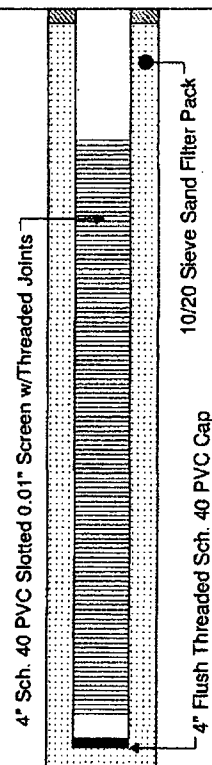
RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #2, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: 0-10 Interval (9/23/08, 80°F); 10-41.5 Interval (9/24/08, (10-28) 60°F, (28-30) 66°F, (30-39) 70°F).

Total Depth: 41.5' bgl
Ground Water: 38.67' BTOC 10/28/08
Elev., TOC (ft. msl): 5541.322
Elev., PAD (ft. msl): 5538.7
Elev., GL (ft. msl): 5538.46
Site Coordinates:
N 49628.129 **E** 52879.301

Well No.: MW-53 (SWMU8-12)
Start Date: 9/23/2008
Finish Date: 9/24/2008

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
23					0.1		100	Sandy Silt (ML) Similar to above	22'
25					0.1		100	Sandy Silt (ML) Similar to above, damp, calcareous	25'
27					0.1		70	Silty Sand/Gravelly Sand (SM/SW) Fine grain, loose, dry, light brown to brown, gravelly at base	
29					0.1		60	Gravelly Sand (SW) Similar to above	
31					0.1		50	Gravelly Sand/Sandy Gravel (SW) Similar to above, cobble size	
33					0.1		60	Gravelly Sand/Sandy Gravel (SW) Similar to above	
35					0.1		10	Gravelly Sand/Sandy Gravel (SW) Similar to above	
37					0.1		20	Gravelly Sand (SW) Similar to above	
38.5	37-38.5'	1430	G/2V/ 2E/2J		0.1		90	Clayey Sand (SC) Fine to medium grain, compact, moist to very moist, yellowish brown	
39							90	Sand/Sandstone (SP/SS) Fine grain, very dense, dry, light brown to reddish brown Nacimiento Formation	
41							90	Clayey Sand (SC) Fine grained, very dense, damp, greenish gray	40' 40.5' 41'
43									
45									
Total Depth = 41.5' BGL									



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #2, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: 0-10 Interval (9/26/08, 62°F); 10-38 Interval (10/15/08, (10-22) 65°F, (22-38) 62°F).

Total Depth: 38' bgl

Ground Water: 32.49' BTOC 10/28/08

Elev., TOC (ft. msl): 5530.077

Elev., PAD (ft. msl): 5527.564

Elev., GL (ft. msl): 5527.346

Site Coordinates:

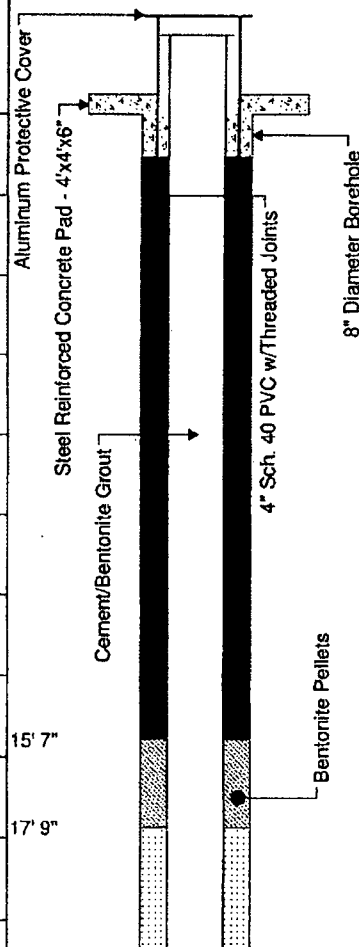
N 49528.406 **E** 50218.954

Well No.: MW-54 (SWMU18-2)

Start Date: 9/26 & 10/15/2008

Finish Date: 9/26 & 10/17/2008

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2								Ground Surface	
0	0-0.5'	0830	G/2V/2E/2J				60	Clayey Silt/Gravel (ML) Very fine grain, compact, dry, brown, slight black staining at 0-0.5' bgl, faint odor	
2	1.5-2'	0845	G/2V/2E/2J				60	Silt (ML) Very fine grain, compact, damp, brown	
4							70	Silt (ML) Similar to above	
6							80	Silt (ML) Similar to above, except trace of very fine grain sand	
8							80	Sandy Silt (ML) Very fine grain, compact, damp, brown	
10							90	Sandy Silt/Silty Sand (ML/SM) Similar to above, damp	
12							90	Silty Sand (SM) Very fine grain, loose, damp, brown	
14							90	Silty Sand (SM) Similar to above	
16							80	Silty Sand (SM) Similar to above	
18	18-20'	1630	G/2V/2E/3J				80	Silty Sand (SM) Similar to above, damp, black discoloration, odor	
20									



RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #2, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: 0-10 Interval (9/26/08, 62°F); 10-38 Interval (10/15/08, (10-22) 65°F, (22-38) 62°F).

Well No.: MW-54 (SWMU18-2)

Start Date: 9/26 & 10/15/2008

Finish Date: 9/26 & 10/17/2008

Total Depth: 38' bgl

Ground Water: 32.49' BTOC 10/28/08

Elev., TOC (ft. msl): 5530.077

Elev., PAD (ft. msl): 5527.564

Elev., GL (ft. msl): 5527.346

Site Coordinates:

N 49528.406 **E** 50218.954

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
22					8.5		60	Gravelly Sand (SW) Fine to medium grain, loose, damp, gray, faint odor, gravel present throughout	22' 4" Sch. 40 PVC w/Threaded Joints 10/20 Sieve Sand Filter Pack 4" Flush Threaded Sch. 40 PVC Cap 37.5' 38' 4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints
24					12.9		20	Gravelly Sand (SW) Similar to above	
26					16.1		40	Gravelly Sand (SW) Similar to above	
28					58.5		40	Gravelly Sand (SW) Similar to above	
30	28-29'	1645	G/2V/ 2E/3J	30'	400		50	Gravelly Sand (SW) Similar to above, moist to very moist at 29' bgl, hydrocarbon odor	
32							40	Gravelly Sand (SW) Medium to coarse grain, loose, saturated, hydrocarbon odor, black	
34							50	Gravelly Sand (SW) Similar to above, saturated, black, hydrocarbon odor	
36							60	Sand/Sandstone (SP/SS) Fine grain, compact, dense, moist to saturated, hydrocarbon odor, dark gray to black Nacimiento Formation	
38							40	Sand/Sandstone (SP/SS) Similar to above, becomes very dense, damp	
40								Total Depth = 38' BGL	

RPS
 3833 S. Staples, Suite N-229
 Corpus Christi, Texas 78411

Sheet: 2 of 2

361/855-7335
 361/855-7410 fax



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.

Site: SWMU Group #1, Bloomfield Refinery

Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: N36°41.964 W107°58.552

Total Depth: 27.25' bgl

Ground Water: Saturated @.22' bgl

Elev., TOC (ft. msl): --

Elev., PAD (ft. msl): --

Elev., GL (ft. msl): --

Site Coordinates:

N E

Well No.: MW-55 (IM1-1)

Start Date: 4/2/2009**Finish Date:** 4/2/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-1								Ground Surface	
1					0.0 49°F		70	Fill/Clay (CL) Low plasticity, soft, damp, brown	
3					0.2 49°F		50	Fill/Clay (CL) Similar to above	
5					434 49°F		70	Fill/Clay (CL) Low plasticity, soft, damp, brown and gray, hydrocarbon odor	
7					623 49°F		70	Fill/Clay (CL) Similar to above, grayish brown, hydrocarbon odor	
9	8-10'		G/2V/ 10452E/3J		891 49°F		60	Fill/Sand (SP) Fine grain, loose, damp, brown to dark brown, hydrocarbon odor	
11					630 48°F		90	Fill/Sand (SP) Similar to above, hydrocarbon odor	
13					518 48°F		90	Gravelly Sand (SW) Fine to coarse grain, loose, damp, dark gray, hydrocarbon odor	
15					806 48°F		50	Gravelly Sand (SW) Similar to above, hydrocarbon odor, black discoloration, not oily	
17					432 48°F		50	Gravelly Sand (SW) Similar to above, damp, odor, black discoloration, not oily	

Flush Mount Cover

Steel Reinforced Concrete Pad - 4'x4'x6"

Cement

4" Sch. 40 PVC w/Threaded Joints

Bentonite Pellets

4" Sch. 40 PVC w/Threaded Joints

8" Diameter Borehole

10/20 Sieve Sand Filter Pack

RPS
404 Camp Craft Road
Austin, Texas 78746

Sheet: 1 of 2

512/347-7588
512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.964 W107°58.552

Total Depth: 27.25' bgl
Ground Water: Saturated @ 22' bgl
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): --
Site Coordinates:
 N E

Well No.: MW-55 (IM1-1)
Start Date: 4/2/2009
Finish Date: 4/2/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
18-20'	18-20'	1100	G/2V/ 2E/3J		1085 48°F		50 Gravelly Sand (SW) Similar to above, damp, black discoloration, odor, not oily	4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 10/20 Sieve Sand Filter Pack 4" Flush Threaded Sch. 40 PVC Cap 6" Sand Bed Saturated @ 22' bgl
20-22'	20-22'	1115	G/2V/ 2E/3J	22'	1047 48°F		50 Gravelly Sand (SW) Fine to coarse grain, loose, damp, gray, black discoloration, hydrocarbon odor	
23'							50 Gravelly Sand (SW) Similar to above, oily, saturated	
25'							90 Gravelly Sand (SW) Similar to above, saturated, black, hydrocarbon odor	
27'							Weathered Sandstone/Sand (SS) Fine to medium grain, soft, damp, greenish gray, faint odor	
Total Depth = 27.25' BGL								26' 27.25'

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 2 of 2

512/347-7588
 512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: N36°41.935 W107°58.507; Hydroexcavated to 8'

Total Depth: 23.75' bgl

Ground Water: Saturated @ 19' bgl

Elev., TOC (ft. msl): --

Elev., PAD (ft. msl): --

Elev., GL (ft. msl): --

Site Coordinates:

N E

Well No.: MW-56 (IM1-2)

Start Date: 4/1/2009 13:40

Finish Date: 4/1/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2									
0								Ground Surface	
2					1.1 51°F		60	Fill/Clay (CL) Low plasticity, soft, damp, brown	
4	4-6'	1615	G/2V/ 2E/3J		1.8 51°F		80	Fill/Clay (CL) Similar to above	
6					116 51°F		70	Fill/Clay (CL) Similar to above, brown to dark gray, hydrocarbon odor, sand/gravel at base	
8					40 51°F		60	Gravelly Sand (SW) Fine to coarse, loose, damp, light gray, no odor	
10					0.4 53°F		60	Gravelly Sand (SW) Fine to coarse, loose, damp, light gray, no odor	
12					1.3 53°F		80	Gravelly Sand (SW) Similar to above	
14					10.8 53°F		80	Gravelly Sand (SW) Similar to above	
16					13.2 53°F		80	Gravelly Sand (SW) Similar to above	

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 1 of 2

512/347-7588
 512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: N36°41.935 W107°58.507; Hydroexcavated to 8'

Well No.: MW-56 (IM1-2)

Start Date: 4/1/2009 13:40

Finish Date: 4/1/2009

Total Depth: 23.75' bgl

Ground Water: Saturated @ 19' bgl

Elev., TOC (ft. msl): --

Elev., PAD (ft. msl): --

Elev., GL (ft. msl): --

Site Coordinates:

N

E

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
16-18'	16-18'	1630	G/2V/ 2E/3J		50 53°F		80	Gravelly Sand (SW) Similar to above, fine to coarse, loose, moist at base, light gray, hydrocarbon odor	4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 10/20 Sieve Sand Filter Pack 6" Sand Bed 4" Flush Threaded Sch. 40 PVC Cap Total Depth = 23.75' Saturated @ 19' bgl
18-20'							30	Gravelly Sand (SW) Medium to coarse, loose, saturated, black, hydrocarbon odor, coarse gravel	
20-22'							70	Weathered Sandstone/Sand (SS) Loose, damp to moist, faint odor, gray to brown, trace gray clay	
22-24'								Total Depth = 23.75' BGL	

RPS
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Sheet: 2 of 2

512/347-7588
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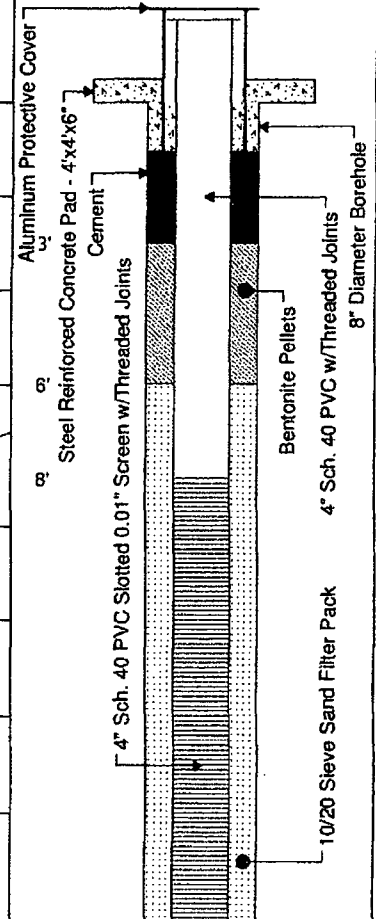
RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.925 W107°58.516; Hydroexcavated to 7'

Total Depth: 24.25' bgl
Ground Water: Saturated @ 19' bgl
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): --
Site Coordinates:
N **E**

Well No.: MW-57 (IM1-3)
Start Date: 3/31/2009
Finish Date: 3/31/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2									
0								Ground Surface	
2					1.1 57°F		40	Fill/Clay (CL) Damp, brown	
4					237 57°F		60	Fill/Clay (CL) Damp, brown to dark gray, hydrocarbon odor	
6	4-6'	1645	G/2V/ 2E/3J		567 57°F		80	Fill/Clay (CL) Dark gray	
8							0	Fill/Clay (CL) Similar to above, no recovery	
10					415 46°F		20	Gravelly Sand (SW) Fine to coarse grain, loose, damp, gray, fine to coarse gravel, odor	
12					35.9 46°F		70	Gravelly Sand (SW) Similar to above, odor	
14					107 46°F		70	Gravelly Sand (SW) Similar to above, odor	
16					14.7 46°F		10	Gravelly Sand (SW) Similar to above, odor	
17	15-17'	1615	G/2V/ 2E/3J		10.8 48°F		70	Gravelly Sand (SW) Similar to above, moist to very moist	



RPS
 404 Camp Craft Road
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Sheet: 1 of 2

512/347-7588
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RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery

Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: N36°41.925 W107°58.516; Hydroexcavated to 7'

Total Depth: 24.25' bgl

Ground Water: Saturated @ 19' bgl

Elev., TOC (ft. msl): --

Elev., PAD (ft. msl): --

Elev., GL (ft. msl): --

Site Coordinates:

N

E

Well No.: MW-57 (IM1-3)

Start Date: 3/31/2009

Finish Date: 3/31/2009

Depth (ft.)	Sampling					Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)			
18				19'			Gravelly Sand (SW) Fine to coarse grain, loose, moist to saturated, dark gray, strong hydrocarbon odor	4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 10/20 Sieve Sand Filter Pack 6" Sand Bed 4" Flush Threaded Sch. 40 PVC Cap Saturated @ 19' bgl
20						90	Gravelly Sand (SW) Similar to above, saturated, strong hydrocarbon odor	
22						100	Gravelly Sand (SW) Similar to above	
24						100	Clay (CH) High plasticity, very stiff, damp, gray and light yellowish orange	
26							Total Depth = 24.25' BGL	
28								
30								
32								
34								
36								

RPS
404 Camp Craft Road
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Sheet: 2 of 2

512/347-7588
512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.930 W107°58.548

Total Depth: 27' bgl
Ground Water: Saturated @ 19.5' bgl
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): --
Site Coordinates:
N **E**

Well No.: MW-58 (IM1-4)
Start Date: 4/3/2009
Finish Date: 4/3/2009

Depth (ft.)	Sampling					Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)			
0							Ground Surface	
1.1					57°F	80	Fill/Clay (CL) Low plasticity, soft, damp, brown	
3.95	2-4'	1215	G/2V/ 2E/3J		57°F	80	Fill/Clay (CL) Similar to above, hydrocarbon odor, gray discoloration	
3.80					57°F	80	Fill/Clay (CH) High plasticity, firm, damp, gray and brown, hydrocarbon odor, black discoloration	
5.8					57°F	80	Fill/Clay (CH) Similar to above, hydrocarbon odor, black discoloration	
8.0					57°F	80	Fill/Clay (CH) Similar to above	
10.43					70°F	60	Gravelly Sand (SW) Medium to coarse grain, compact, damp, dark gray, faint hydrocarbon odor, trace clay, coarse gravel	
12.29					70°F	80	Gravelly Sand (SW) Similar to above, hydrocarbon odor, damp to slightly moist, dark gray	
17.17					70°F	80	Gravelly Sand (SW) Similar to above, damp, to slightly moist	
							Gravelly Sand (SW) Similar to above	

RPS
 404 Camp Craft Road
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Sheet: 1 of 2

512/347-7588
 512/347-8243 fax

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** SWMU Group #1, Bloomfield Refinery**Job No.:** 354 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow-Stem Auger/ODEX**Sampling Method:** Split Spoon**Comments:** N36°41.930 W107°58.548**Total Depth:** 27' bgl**Ground Water:** Saturated @ 19.5' bgl**Elev., TOC (ft. msl):** --**Elev., PAD (ft. msl):** --**Elev., GL (ft. msl):** --**Site Coordinates:****N E****Well No.:** MW-58 (IM1-4)**Start Date:** 4/3/2009**Finish Date:** 4/3/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
18	18-19.5'	1230	G/2V/ 2E/3J	19.5'	312 70°F		90	Gravelly Sand (SW) Medium to coarse grain, compact, damp to moist, gray, hydrocarbon odor	4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 10/20 Sieve Sand Filter Pack 6" Sand Bed 4" Flush Threaded Sch. 40 PVC Cap Saturated @ 19.5' bgl
20							90	Sand (SP) Medium grain, compact, moist to very moist, black, strong hydrocarbon odor	
22							90	Sand (SP) Similar to above, saturated, strong hydrocarbon odor	
24							-	Sand/Clay (SP/CH) No recovery	
26							90	Clay (CH) High plasticity, firm, damp, moist in sand seams, olive brown, odor	
28								Total Depth = 27' BGL	25.75'
30									27'
32									
34									
36									

RPS
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Sheet: 2 of 2

512/347-7588
512/347-8243 fax



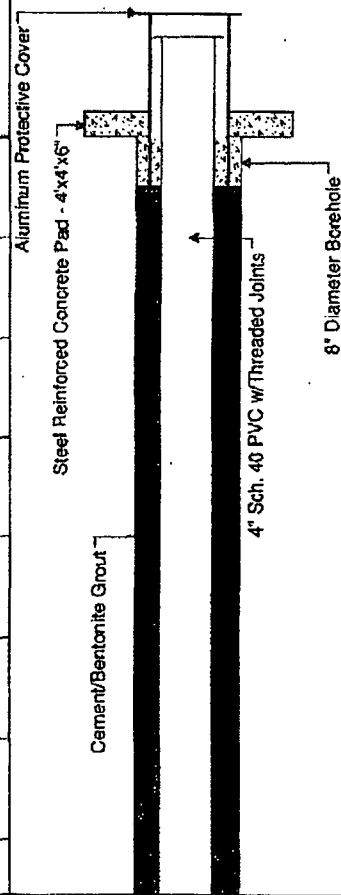
WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.767' W107°58.370'

Total Depth: 44.25' bgl
Ground Water: Saturated @ 40' bgl
Elev., TOC (ft. msl): 5545.196
Elev., PAD (ft. msl): 5542.365
Elev., GL (ft. msl): 5542.373
Site Coordinates:
N 36°41'45.92938" W 107°58'22.20599"

Well No.: MW-59 (SWMU 4-1)
Start Date: 4/6/2009
Finish Date: 4/6/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2									
0	0-0.5'	0845	G/2V/ 2E/3J					Ground Surface	
1.5	1.5-2'	0930	G/2V/ 2E/3J		0.2 38°F		100	Clayey Silt (ML) Low plasticity, firm, damp, brown	
2					2.9 37°F		80	Clayey Silt (ML) Similar to above	
4					50.8 37°F		80	Clayey Silt (ML) Similar to above, mixed with soft black sticky sludge, odor	
6	6-8'	1130	G/2V/ 2E/3J		214 37°F		80	Clayey Silt/Sludge (ML) Gray silt mixed with sludge	
8					9.7 49°F		90	Clayey Silt (ML) Low plasticity, soft, damp, brown to light gray, 8.5-9' faint odor	
10					41 49°F		80	Clayey Silt (ML) Similar to above, light gray/brown	
12					9.5 49°F		60	Silty Sand (SM) Very fine grain, compact, damp, brown	
14								Silty Sand (SM) Similar to above	





WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.

Site: SWMU Group #3, Bloomfield Refinery

Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: N36°41.767' W107°58.370'

Total Depth: 44.25' bgl

Ground Water: Saturated @ 40' bgl

Elev., TOC (ft. msl): 5545.196

Elev., PAD (ft. msl): 5542.365

Elev., GL (ft. msl): 5542.373

Site Coordinates:

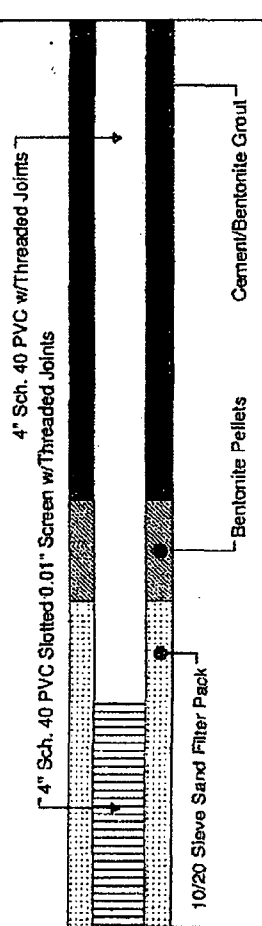
N 36°41'45.92938"

W 107°58'22.20599"

Well No.: MW-59 (SWMU 4-1)

Start Date: 4/6/2009

Finish Date: 4/6/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
16					8.0 50°F		50		
18					8.1 50°F		60	Silty Sand (SM) Similar to above	
20					7.3 50°F		80	Silty Sand (SM) Similar to above, gypsum crystals	
22					6.4 50°F		80	Silty Sand (SM) Very fine to fine grain, loose to compact, light brown to tan	
24					6.6 50°F		80	Silty Sand (SM) Similar to above	
26					5.5 50°F		80	Silty Sand (SM) Similar to above	
28					6.3 50°F		90	Silty Sand (SM) Similar to above	
30					4.2 50°F		90	Silty Sand (SM) Similar to above	
32					3.9 50°F		80	Clayey Silt (ML) Low plasticity, soft to firm, damp, brown	

RPS
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Sheet: 2 of 3

512/347-7588
512/347-8243 fax



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.

Site: SWMU Group #3, Bloomfield Refinery

Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: N36°41.767' W107°58.370'

Total Depth: 44.25' bgl

Ground Water: Saturated @ 40' bgl

Elev., TOC (ft. msl): 5545.196

Elev., PAD (ft. msl): 5542.365

Elev., GL (ft. msl): 5542.373

Site Coordinates:

N 36°41'45.92938"

W 107°58'22.20599"

Well No.: MW-59 (SWMU 4-1)

Start Date: 4/6/2009

Finish Date: 4/6/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
33					2.8		Gravelly Sand (SW) Fine to coarse grain, compact, damp, brown, medium to coarse gravel	15' of 4" Sch. 40 PVC Slotted 0.01" Screen w/ Threaded Joints 4" Flush Threaded Sch. 40 PVC Cap 6" Sand Bed 10/20 Sieve Sand Filter Pack 8" Well Sump Saturated @ 40' bgl
35					3.1		Sand (SP) Fine grain, loose, damp, brown	
					50°F		Sand (SP) Similar to above	
37	36-38'	1700	G/2V/ 2E/3J		3.8		Gravelly Sand (SW) Fine to coarse grain, compact, damp, brown, medium to coarse gravel	
					70°F		Sand (SP) Fine grain, loose, damp, brown	
39							Gravelly Sand (SW) Fine to coarse grain, compact, damp, brown, medium to coarse gravel	
41							Gravelly Sand (SW) Similar to above, moist	
							Sand (SP) Fine grain, loose, damp to moist, brown	
43							Gravelly Sand (SW) Fine to coarse grain, compact, saturated, brown, medium to coarse gravel	
							Gravelly Sand (SW) Similar to above	
45							Nacimlento Formation Sandstone (SS) Dense, damp, yellowish brown	
47							Total Depth = 44.25' BGL	
49								

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.816' W107°58.256'

Well No.: AOC 22-12 / TW-01
Start Date: 4/13/2009
Ground Water: Saturated @ 37.75' bgl
Finish Date: 4/13/2009
Elev., TOC (ft. msl): 5543.607
Elev., PAD (ft. msl): 5540.336
Elev., GL (ft. msl): 5540.449
Site Coordinates:
N 36°41'48.82442" W 107°58'16.02512"

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2								Ground Surface	
0	0.5'	0915	G/4V/4E/6J		0.9		100	Silt (ML) Very fine grain, compact, damp, brown	
2	1.5'	0930	G/2V/2E/3J		3.4		80	Clayey Silt (ML) Similar to above	
4					4.9		80	Clayey Silt (ML) Similar to above	
6					5.6		90	Clayey Silt (ML) Similar to above	
8					5.2		100	Clayey Silt (ML) Similar to above, trace fine grain sand	
10					4.9		100	Sandy Silt (ML) Very fine grain, loose to compact, damp, light brown	
12					4.2		90	Sandy Silt (ML) Similar to above	
14					6.3		60	Clayey Silt (ML) Low plasticity, soft, very fine grain, compact, damp, brown	
16					6.0		100	Clayey Silt (ML) Similar to above	
18					5.2		100	Sandy Silt (ML) Very fine grain, loose to compact, damp, light brown	
20					5.1		90	Silty Sand (SM) Very fine to fine grain, loose, damp, light brown	
22					4.4				

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 1 of 2

512/347-7588
 512/347-8243 fax



WELL CONSTRUCTION

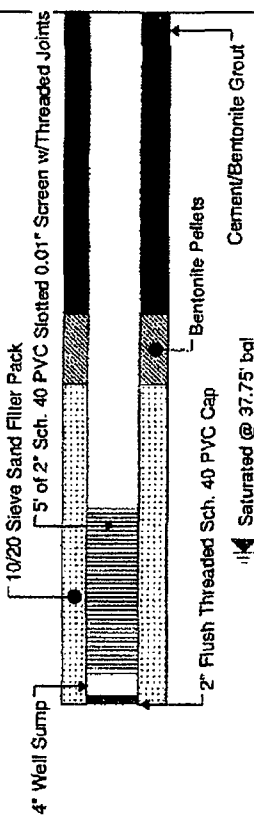
Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.816' W107°58.256'

Total Depth: 42' bgl
Ground Water: Saturated @ 37.75' bgl
Elev., TOC (ft. msl): 5543.607
Elev., PAD (ft. msl): 5540.336
Elev., GL (ft. msl): 5540.449
Site Coordinates:
N 36°41'48.82442" W 107°58'16.02512"

Well No.: AOC 22-12 / TW-01

Start Date: 4/13/2009

Finish Date: 4/13/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
24					4.3 60°F		Silty Sand (SM) Very fine to fine grain, loose, damp, light brown	
26					5.7 60°F		Silty Sand (SM) Similar to above, faint odor	
28					5.2 60°F		Silty Sand (SM) Similar to above, clayey sand at base, dark brown, odor	
30					22.7 60°F		Sandy Clay (CL) Low plasticity, soft, damp, dark brown, odor	
32					35 60°F		Silty Sand (SM/SP) Fine grain, loose, damp to very damp, dark gray, odor	
34	32-35		G/2V/ 11502E/3J		25 60°F		Gravelly Sand (SW) Fine to medium grain, loose, damp, gray, coarse gravel, odor	
36	36-37.75		G/2V/ 12102E/3J	37.75'	68 60°F		Gravelly Sand (SW) Similar to above	
38							No Recovery - similar to above	
40							Gravelly Sand (SW) Similar to above, saturated at 37.37' bgl	
42							Sand (SW) Fine to coarse grain, loose, saturated, gray, odor	
44							Sand (SW) Similar to above, saturated, gray, odor	
46							Nacimiento Formation Clayey Sand/Weathered Sandstone (SC/SS) Dense, damp, yellowish brown	
Total Depth = 42' BGL								



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.

Site: SWMU Group #3, Bloomfield Refinery

Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: Hydroexcavated to 8' bgl. N36°41.754' W107°58.434'

Total Depth: 45.5' bgl

Ground Water: Not Encountered

Elev., TOC (ft. msl): 5543.711

Elev., PAD (ft. msl): 5544.003

Elev., GL (ft. msl): 5544.007

Site Coordinates:

N 36°41'45.37028"

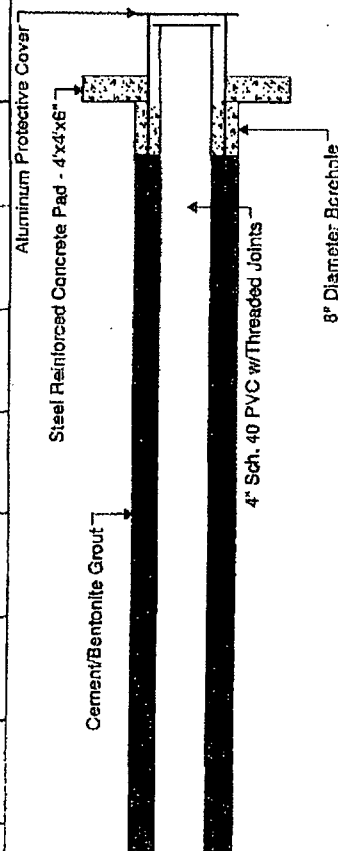
W 107°58'25.98617"

Well No.: MW-60 (AOC 25 -2)

Start Date: 4/5/2009

Finish Date: 4/5/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
0	0-0.5' 8 Dup	1645	G/4V/4E/6J		0.1	100	Ground Surface	
1	1-1.5' 2'	1700	G/2V/2E/3J		53°F	100	Clayey Silt (ML) Low plasticity, very soft, damp, brown	
2					0.1	100	Clayey Silt (ML) Similar to above	
3					53°F	0	Clayey Silt (ML) Similar to above, no recovery	
4					0.1	100	Clayey Silt (ML) Similar to above	
5					53°F	90	Clayey Silt (ML) Low plasticity, very soft, damp, brown	
6					0.0	80	Clayey Silt (ML) Similar to above	
7					43°F	100	Silty Sand (SM) Very fine grain, loose to compact, damp, brown	
8					0.1			
9					43°F			
10								
11								
12								
13								
14								



RPS
404 Camp Craft Road
Austin, Texas 78746

Sheet: 1 of 3

512/347-7588
512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: Hydroexcavated to 8' bgl. N36°41.754' W107°58.434'

Total Depth: 45.5' bgl

Ground Water: Not Encountered

Elev., TOC (ft. msl): 5543.711

Elev., PAD (ft. msl): 5544.003

Elev., GL (ft. msl): 5544.007

Site Coordinates:

N 36°41'45.37028" W 107°58'25.98617"

Well No.: MW-60 (AOC 25 -2)

Start Date: 4/5/2009

Finish Date: 4/5/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
16					0.0 43°F		90	Silty Sand (SM) Very fine grain, loose to compact, damp, brown	4" Sch. 40 PVC w/Threaded Joints 4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints Cement/Bentonite Grout Bentonite Pellets 10/20 Sieve Sand Filter Pack
18					0.2 43°F		90	Silty Sand (SM) Similar to above	
20					0.4 43°F		100	Silty Sand (SM) Similar to above	
22					0.1 43°F		100	Silty Sand (SM) Similar to above	
24					0.3 44°F		100	Silty Sand (SM) Similar to above	
26					0.4 44°F		100	Silty Sand (SM) Similar to above	
28					0.3 44°F		100	Silty Sand (SM) Similar to above	
30					0.2 44°F		100	Silty Sand (SM) Similar to above	
					0.1 44°F		100	Silty Sand (SM) Similar to above	

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 2 of 3

512/347-7588
 512/347-8243 fax

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** SWMU Group #3, Bloomfield Refinery**Job No.:** 354 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow-Stem Auger/ODEX**Sampling Method:** Split Spoon**Comments:** Hydroexcavated to 8' bgl. N36°41.754' W107°58.434'**Total Depth:** 45.5' bgl**Ground Water:** Not Encountered**Elev., TOC (ft. msl):** 5543.711**Elev., PAD (ft. msl):** 5544.003**Elev., GL (ft. msl):** 5544.007**Site Coordinates:**

N 36°41'45.37028"

W 107°58'25.98617"

Well No.: MW-60 (AOC 25 -2)**Start Date:** 4/5/2009**Finish Date:** 4/5/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
33					3.6		100	Silty Sand (SM) Very fine grain, loose to compact, damp, brown	
35					2.5		100	Sand (SP) Fine to medium grain, loose, damp, brown	
					4.2		80	Gravelly Sand (SW) Medium to coarse grain, compact, damp, brown, coarse to fine gravel	
37	36-38'	1715G/2V/ 2E/3J						Gravelly Sand (SW) Similar to above	
39							10	Gravelly Sand (SW) Similar to above	
							0	Gravelly Sand (SW) Similar to above, no recovery	
41							50	Gravelly Sand (SW) Similar to above	
							0	Gravelly Sand (SW) Similar to above, no recovery	
43								Nacimiento Formation Weathered Sandstone/Sandstone (SS) Fine grain, dense, damp, light yellowish brown	
45							100		
47								Total Depth = 45.5' BGL	

RPS
404 Camp Craft Road
Austin, Texas 78746

Sheet: 3 of 3

512/347-7568
512/347-8243 fax

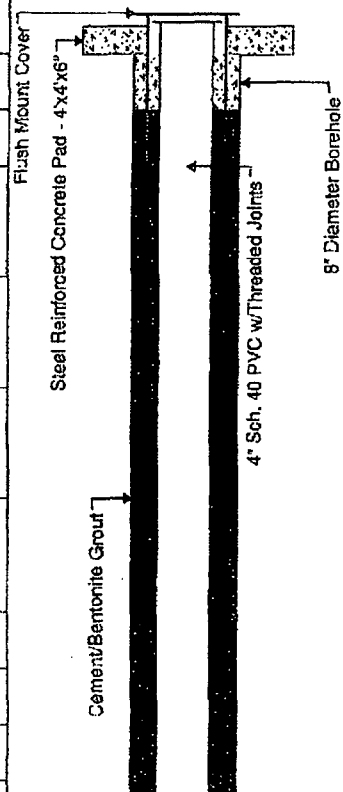
RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.813' W107°58.287'

Total Depth: 40.25' bgl
Ground Water: Saturated @ 36' bgl
Elev., TOC (ft. msl): 5539.411
Elev., PAD (ft. msl): 5539.613
Elev., GL (ft. msl): 5539.588
Site Coordinates:
N 36°41'48.82131" W 107°58'17.15514"

Well No.: MW-61 (AOC 22 -15)**Start Date:** 4/15/2009**Finish Date:** 4/15/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2									
0								Ground Surface	
1	1-1.5'		G/2V/1135		2.8		100	Asphalt/Base	
1.5	1.5-2'	1135	2E/3J		63°F			Clayey Silt (ML) Low plasticity, stiff, damp, brown	
2	1.5-2' & Dup	1155	G/2V/2E/3J		29.5			Clayey Silt (ML) Similar to above, soft	
2					63°F				
4					23.4		60		
4					66°F				
6					5.5		50	Clayey Silt (ML) Similar to above	
6					68°F				
8							0	Clayey Silt (ML) Similar to above - no recovery	
8									
10					13.1		10	Clayey Silt (ML) Similar to above	
10					68°F				
12					18.1		80	Clayey Silt (ML) Similar to above, trace very fine grain sand	
12					68°F			Silty Sand (SM) Very fine grain, loose, damp, brown	
							70	Silty Sand (SM) Similar to above	



RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 1 of 3

512/347-7588
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RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.813' W107°58.287'

Total Depth: 40.25' bgl
Ground Water: Saturated @ 36' bgl
Elev., TOC (ft. msl): 5539.411
Elev., PAD (ft. msl): 5539.613
Elev., GL (ft. msl): 5539.588
Site Coordinates:
 N 36°41'48.82131" W 107°58'17.15514"

Well No.: MW-61 (AOC 22 -15)**Start Date:** 4/15/2009**Finish Date:** 4/15/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
15					16.6 68°F			Clayey Silt (ML) Low plasticity, very fine grain, compact, damp, brown	4" Sch. 40 PVC w/Threaded Joints 4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 10/20 Sieve Sand Filter Pack Cement/Bentonite Grout Bentonite Pellets
15					11.2 68°F		70	Clayey Silt (ML) Similar to above	
17					6.5 68°F		80	Clayey/Silty Sand (SC/SM) Very fine grain, compact, damp, brown	
19					13.2 68°F		90	Silty Sand (SM) Similar to above, less clay	
21					13.2 68°F		80	Silty Sand (SM) Similar to above	
23					21.5 67°F		60	Silty Sand (SM) Very fine grain, loose to compact, damp, brown to light brown	
25					12.9 67°F		60	Clayey Silty Sand (SC/SM) Similar to above, increase in clay content	
27					16.0 67°F		90	Clayey Silty Sand (SC/SM) Similar to above	

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 2 of 3

512/347-7588
 512/347-8243 fax



WELL CONSTRUCTION

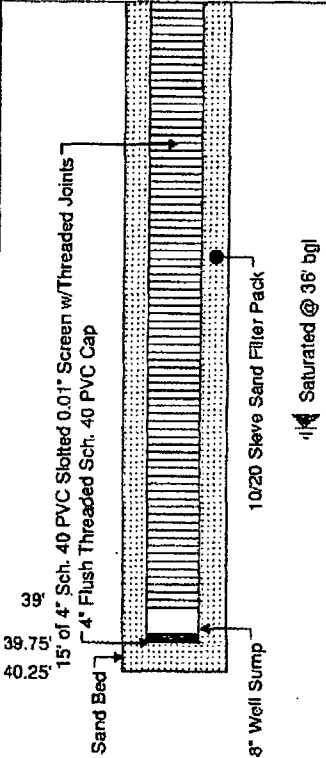
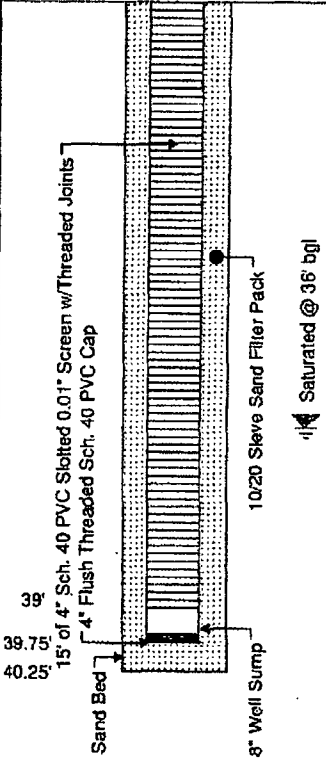
Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payna
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 76
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.813' W107°58.287'

Total Depth: 40.25' bgl
Ground Water: Saturated @ 36' bgl
Elev., TOC (ft. msl): 5539.411
Elev., PAD (ft. msl): 5539.613
Elev., GL (ft. msl): 5539.588
Site Coordinates:
N 36°41'48.82131" W 107°58'17.15514"

Well No.: MW-61 (AOC 22 -15)

Start Date: 4/15/2009

Finish Date: 4/15/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
30					17.1 67°F		90	Clayey Silty Sand (SC/SM) Similar to above, trace tan sand seams present	
32					22 67°F		80	Silty Sand (SM) Very fine grain sand, compact, brown to gray, moist, odor	
								Gravelly Sand (SW) Very fine to medium grain, compact to loose, brown to gray, odor, coarse gravel	
34					165 67°F		60	Gravelly Sand (SW) Similar to above, fine to coarse sand, odor, stained	
36	34- 36'	1340	G/2V/ 2E/3J	36'	510 67°F		70	Gravelly Sand (SW) Similar to above, odor	
38							10	Gravelly Sand (SW) Similar to above.	
40							10	Nacimiento Formation Silty Sandy Clay (CL) Low plasticity, firm, dry to damp, yellow brown to greenish gray, no odor	
42								Total Depth = 40.25' BGL	
44									



Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.717' W107°58.123'

WELL CONSTRUCTION

Well No.: MW-62 (AOC 23 -1)

Start Date: 4/21/2009

Finish Date: 4/21/2009

Total Depth: 58.25' bgl

Ground Water: Saturated @ 55' bgl

Elev., TOC (ft. msl): 5561.322

Elev., PAD (ft. msl): 5558.703

Elev., GL (ft. msl): 5558.555

Site Coordinates:

N 36°41'43.02125"

W 107°58'07.46590"

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
0	0	1115	G/2V/ 2E/3J		3.1		100	Ground Surface	
0.5	0.5				71°F			Silt (ML) Very fine grain, loose, dry, brown	
1.5	1.5	1130	G/2V/ 2E/3J		3.3		40	Silt (ML) Similar to above, damp	
2	2				71°F				
4					14.5			Silt (ML) Similar to above	
6					74°F		90	Sand (SP) Fine grain, loose, damp, dark brown	
8					14.4			Sand (SP) Similar to above, brown to light brown	
10					74°F		100	Gravelly Sand (SW) Fine to coarse grain, loose, dry, brown, coarse gravel	
12					14.8		60	Gravelly Sand (SW) Similar to above, no recovery	
14					74°F		0	Silty Sand (SM) Fine grain, loose to compact, damp, light grayish tan	
					7.1		100	Silty Sand (SM) Similar to above, compact	
					77°F				
					17.6		90		
					77°F				

RPS
404 Camp Craft Road
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Sheet: 1 of 4

512/347-7588
512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.717' W107°58.123'

Total Depth: 58.25' bgl
Ground Water: Saturated @ 55' bgl
Elev., TOC (ft. msl): 5561.322
Elev., PAD (ft. msl): 5558.703
Elev., GL (ft. msl): 5558.555
Site Coordinates:
 N 36°41'43.02125" W 107°58'07.46590"

Well No.: MW-62 (AOC 23 -1)
Start Date: 4/21/2009
Finish Date: 4/21/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
16					8.7		0	Silty Sand (SM) Similar to above, sandstone present, yellowish brown	4" Sch. 40 PVC w/Threaded Joints Cement/Bentonite Grout
					78°F		60	Silty Sand (SM) Similar to above, no recovery	
18							0	Clayey Silty Sand (SC/SM) Fine grain, very dense, damp, tan	
					2.2		100	Clayey Silty Sand (SC/SM) Similar to above, no recovery	
20					78°F			Clayey Silty Sand (SC/SM) Similar to above, grayish tan, organics at 18.5' bgl, pinkish tan 18.25 to 18.75' bgl	
					3.9		100	Clayey Silty Sand (SC/SM) Fine grain, very dense, damp, grayish tan	
22					78°F			Clayey Silty Sand (SC/SM) Similar to above, compact	
					2.4		100		
24					78°F			Clayey Silty Sand (SC/SM) Similar to above	
					1.6		90	Clayey Silty Sand (SC/SM) Similar to above, no recovery	
26					78°F		0	Clayey Silty Sand (SC/SM) Similar to above, no recovery	
					4.0		90	Silty Sand (SM) Fine grain, compact, damp, light brown	
28					77°F		0	Silty Sand (SM) Similar to above, no recovery	
					3.6		90	Silty Sand (SM) Similar to above, clay/silt lenses present	
30					77°F			Silty Sand (SM) Similar to above, no recovery	
					5.4		90	Silty Sand (SM) Similar to above, increase in silt content	
32					77°F				

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 2 of 4

512/347-7588
 512/347-8243 fax

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** SWMU Group #3, Bloomfield Refinery**Job No.:** 354 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow-Stem Auger/ODEX**Sampling Method:** Split Spoon**Comments:** N36°41.717' W107°58.123'**Total Depth:** 58.25' bgl**Ground Water:** Saturated @ 55' bgl**Elev., TOC (ft. msl):** 5561.322**Elev., PAD (ft. msl):** 5558.703**Elev., GL (ft. msl):** 5558.555**Site Coordinates:****N 36°41'43.02125"****W 107°58'07.46590"****Well No.:** MW-62 (AOC 23 -1)**Start Date:** 4/21/2009**Finish Date:** 4/21/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
33					3.2 58°F		50	Sandy Silt (ML) Very fine grain, compact, dry, greenish gray, no plasticity	
35					3.3 58°F		50	Sandy Silt (ML) Similar to above, dense, fine grain sand lenses present, rusty brown and tan	
37					4.4 62°F		50	Silty Sand (SM) Fine grain, compact, damp, light greenish gray	
39					5.3 63°F		90	Silty Sand (SM) Similar to above, slightly cemented, black organics present, gray sand	
41					3.3 71°F		90	Silty Sand (SM) Similar to above, trace clay	
43							0	Silty Sand (SM) Similar to above	
45					3.3 73°F		20	Silty Sand (SM) Similar to above	
47							0	Silty Sand (SM) Similar to above	
49					2.3 84°F		50	Silty Sand (SM) Fine grain, poorly cemented, damp, light greenish gray	

RPS
404 Camp Craft Road
Austin, Texas 78746

Sheet: 3 of 4

512/347-75
512/347-82 fax



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.717' W107°58.123'

Total Depth: 58.25' bgl
Ground Water: Saturated @ 55' bgl
Elev., TOC (ft. msl): 5561.322
Elev., PAD (ft. msl): 5558.703
Elev., GL (ft. msl): 5558.555
Site Coordinates:
N 36°41'43.02125" W 107°58'07.46590"

Well No.: MW-62 (AOC 23 -1)
Start Date: 4/21/2009
Finish Date: 4/21/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
51					3.8		90	Silty Sand (SM) Similar to above, trace clay, poorly cemented, sandstone present	
52	52-53	1510G/2V/	2E/3J		4.4		90	Silty Sand (SM) Similar to above	
53					83°F		10	Silty Sand (SM) Similar to above	
55				55'			0	Silty Sand/Sand (SM/SW) Medium to coarse grain, loose, moist to saturated at 55' bgl	
57							90	Silty Sand (SM) Similar to above, saturated, brown to yellowish brown	
57.75							90	Nacimiento Formation Silt/Shale (ML) Very dense, dry, black, no odor	
58.25								Total Depth = 58.25' BGL	
59									
61									
63									
65									

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.771' W107°58.305'

Total Depth: 46' bgl
Ground Water: Saturated @ 39' bgl
Elev., TOC (ft. msl): 5547.255
Elev., PAD (ft. msl): 5544.482
Elev., GL (ft. msl): 5544.488
Site Coordinates:
 N 36°41'46.17547" W 107°58'18.22906"

Well No.: MW-63 (AOC 22 -16)**Start Date:** 4/13/2009**Finish Date:** 4/14/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
0	0	1325	G/2V/ 2E/3J		1.6		100	Silt (ML) Very fine grain, compact, damp, brown	
0.5	0.5								
1.5	1.5	1335	G/2V/ 2E/3J		0.9		50	Clayey Silt (ML) Similar to above	
2	2				4.5		60	Clayey Silt (ML) Similar to above	
4					5.8		70	Clayey Silt (ML) Similar to above	
6					5.8		80	Clayey Silt (ML) Similar to above	
8					7.3		10	Clayey Silt (ML) Similar to above	
10					3.2		90	Clayey Silt (ML) Similar to above, trace sand	
12					3.8			Clayey Silt (ML) Similar to above	
14									

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 1 of 3

512/347-7588
 512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.771' W107°58.305'

Total Depth: 46' bgl
Ground Water: Saturated @ 39' bgl
Elev., TOC (ft. msl): 5547.255
Elev., PAD (ft. msl): 5544.482
Elev., GL (ft. msl): 5544.488
Site Coordinates:
N 36°41'46.17547" **W** 107°58'18.22906"

Well No.: MW-63 (AOC 22-16)**Start Date:** 4/13/2009**Finish Date:** 4/14/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
16					6.2 68°F			
18					5.8 68°F		Clayey Silt (ML) Similar to above	
20					5.7 68°F		Clayey Silt/Silt (ML) Similar to above, trace light brown to tan sand in partings	
22					5.8 68°F		Silty Sand (SM) Very fine grain, loose, damp, light brown to tan	
24					6.8 68°F		Silty Sand (SM) Similar to above, tan	
26					4.9 68°F		Silty Sand (SM) Very fine grain, loose, damp, tan	
28					7.5 68°F		Silty Sand (SM) Similar to above	
30					7.9 68°F		Silty Sand (SM) Similar to above	
32					6.0 68°F		Silty Sand (SM) Similar to above	

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 2 of 3

512/347-7588
 512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.771' W107°58.305'

Total Depth: 46' bgl
Ground Water: Saturated @ 39' bgl
Elev., TOC (ft. msl): 5547.255
Elev., PAD (ft. msl): 5544.482
Elev., GL (ft. msl): 5544.488
Site Coordinates:
 N 36°41'46.17547" W 107°58'18.22906"

Well No.: MW-63 (AOC 22 -16)**Start Date:** 4/13/2009**Finish Date:** 4/14/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
33					6.5 68°F		50	Gravelly Sand (SW) Medium to coarse grain, loose, damp, brown, coarse gravel	15' of 4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 4" Flush Threaded Sch. 40 PVC Cap 6" Sand Bed 8" Well Sump 10/20 Sieve Sand Filter Pack Saturated @ 39' bgl
35					10.9 70°F		60	Gravelly Sand (SW) Similar to above	
37	36-38'	1230	G/2V/ 2E/3J		12.2 70°F		70	Gravelly Sand (SW) Similar to above	
39							0	No recovery - similar to above	
41							40	Sand (SW) Medium to coarse grain, loose, saturated, brown, trace gravel	
43							40	Sand (SW) Similar to above	
45							20	Sand (SW) Similar to above	
47							0	No recovery - similar to above	
49							50	Nacimienta Formation Weathered Sandstone/Sandstone (SS) Dense to fine grain, dry, greenish gray	
								Total Depth = 46' BGL	

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 3 of 3

512/347-7588
 512/347-8243 fax



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.736' W107°58.304'

Total Depth: 50.25' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 5552.285
Elev., PAD (ft. msl): 5549.043
Elev., GL (ft. msl): 5549.111
Site Coordinates:
N 36°41'44.02863" W 107°58'18.35629"

Well No.: MW-64 (AOC 24 -7)
Start Date: 4/7/2009
Finish Date: 4/7/2009

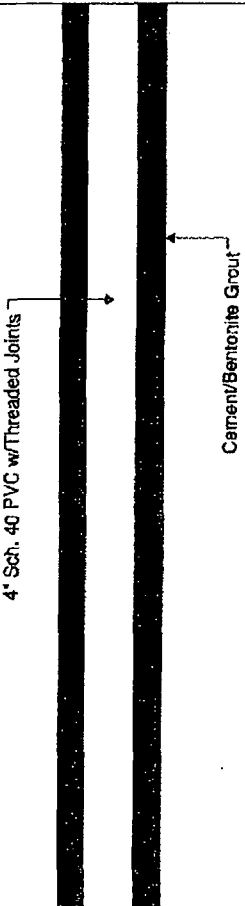
Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
-2								
0	0-0.5'	1130	G/2V/ 2E/3J				Ground Surface	
1.5	1.5-2'	1145	G/2V/ 2E/3J		0.4 57°F	100	Clayey Silt (ML) Low plasticity, stiff, damp, brown	
2					0.4 57°F	60	Clayey Silt (ML) Similar to above	
4					0.2 57°F	90	Sandy Silt (ML) Low plasticity, fine grain sand, compact, damp, brown	
6					0.3 57°F	60	Sandy Silt (ML) Similar to above	
8					0.4 57°F	70	Sandy Silt (ML) Similar to above	
10					0.3 57°F	90	Clayey Silt (ML) Low plasticity, firm, damp, brown	
12								

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.736' W107°58.304'

Total Depth: 50.25' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 5552.285
Elev., PAD (ft. msl): 5549.043
Elev., GL (ft. msl): 5549.111
Site Coordinates:
N 36°41'44.02863" W 107°58'18.35629"

Well No.: MW-64 (AOC 24 -7)**Start Date:** 4/7/2009**Finish Date:** 4/7/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
14					0.4 57°F		80	Sandy Silt (ML) Low plasticity, fine grain sand, compact, damp, brown, trace gravel	
16					0.4 57°F		20	Sandy Silt (ML) Similar to above	
18					0.1 57°F		100	Sandy Silt (ML) Similar to above	
20					0.5 57°F		100	Sandy Silt (ML) Similar to above, loose, more sand	
22					0.3 57°F		100	Silty Sand (SM) Very fine grain, loose, damp, brown	
24					0.1 57°F		100	Silty Sand (SM) Similar to above, light brown/tan	
26					0.1 57°F		100	Silty Sand (SM) Similar to above	
								Silty Sand (SM) Similar to above	

RPS
404 Camp Craft Road
Austin, Texas 78746

Sheet: 2 of 4

512/347-7588
512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.736' W107°58.304'

Total Depth: 50.25' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 5552.285
Elev., PAD (ft. msl): 5549.043
Elev., GL (ft. msl): 5549.111
Site Coordinates:
 N 36°41'44.02863" W 107°58'18.35629"

Well No.: MW-64 (AOC 24 -7)**Start Date:** 4/7/2009**Finish Date:** 4/7/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
28					0.1 57°F		100		
								Silty Sand (SM) Very fine grain, loose, damp, tan	28.5'
30					0.3 57°F		100		
								Silty Sand (SM) Similar to above, decrease in silt	
32					0.2 57°F		100		
								Silty Sand (SM) Similar to above	31.75'
34					0.4 57°F		100		
								Silty Sand (SM) Similar to above	34'
36					0.9 57°F		100		
								Silty Sand (SM) Fine grain, compact, damp, brown, trace gravelly sand at base	
38					3.4 57°F		100		
							0	Gravelly Sand (SW)	
40					4.4 68°F		50	Gravelly Sand (SW) Medium to coarse grain, loose, damp, brown, coarse gravel	
	39-42'	1815	G/2V/ 2E/3J		1.2 68°F		50	Gravelly Sand (SW) Similar to above	

RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 3 of 4

512/347-7588
 512/347-8243 fax



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N36°41.736' W107°58.304'

Total Depth: 50.25' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 5552.285
Elev., PAD (ft. msl): 5549.043
Elev., GL (ft. msl): 5549.111
Site Coordinates:
 N 36°41'44.02863" W 107°58'18.35629"

Well No.: MW-64 (AOC 24 -7)
Start Date: 4/7/2009
Finish Date: 4/7/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
43					3.1	68°F	80	Gravelly Sand (SW) Similar to above, sand lenses present	
45					3.1	68°F	20	Gravelly Sand (SW) Medium to coarse grain, loose, damp, brown, coarse gravel	
47					3.6	68°F	50	Gravelly Sand (SW) Similar to above	
49							90	Nacimiento Formation Sandy Clay (CH) Dense, very stiff, dry to damp, yellowish brown	
51								Total Depth = 50.25' BGL	49' 48.75' 50.25'



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.

Site: SWMU Group #3, Bloomfield Refinery

Job No.: 354 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow-Stem Auger/ODEX

Sampling Method: Split Spoon

Comments: N36°41.826' W107°58.244'

Total Depth: 44.25' bgl

Ground Water: Saturated @ 36' bgl

Elev., TOC (ft. msl): 5539.517

Elev., PAD (ft. msl): 5539.941

Elev., GL (ft. msl): 5539.902

Site Coordinates:

N 36°41'49.18120"

W 107°58'15.39107"

Well No.: MW-65 (AOC 26-8)

Start Date: 4/16/2009

Finish Date: 4/16/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
0	0-1'	0900	G/2V/ 2E/4J		1.8		Silt/Gravel Six inches of asphalt	
1	1'-1.5'				50°F		Clayey Silt (ML) Low plasticity, soft, damp, brown	
2	1.5'-2'	0920	G/2V/ 2E/4J		1.0		Clayey Silt (ML) Similar to above	
					50°F			
					2.3		Clayey Silt (ML) Similar to above	
					50°F			
					2.0		Clayey Silt (ML) Similar to above	
					50°F			
					1.2		Clayey Silt (ML) Similar to above	
					50°F			
					1.0		Clayey Silt (ML) Similar to above	
					50°F			
					1.9		Sandy Silt (ML) Very fine grain, compact to loose, damp, brown, trace clay	
					46°F			
					2.5		Sandy Silt (ML) Similar to above	
					46°F			



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.826' W107°58.244'

Total Depth: 44.25' bgl
Ground Water: Saturated @ 36' bgl
Elev., TOC (ft. msl): 5539.517
Elev., PAD (ft. msl): 5539.941
Elev., GL (ft. msl): 5539.902
Site Coordinates:
 N 36°41'49.18120" W 107°58'15.39107"

Well No.: MW-65 (AOC 26-8)
Start Date: 4/16/2009
Finish Date: 4/16/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
15					2.1 46°F	70	Sandy Silt (ML) Very fine grain, compact to loose, damp, brown, trace clay	4" Sch. 40 PVC w/Threaded Joints 4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints Sieve Sand Filter Pack Bentonite Pellets Cement/Bentonite Grout
17					2.1 46°F	80	Sandy Silt (ML) Similar to above	
19					1.8 45°F	90	Silty Sand (SM) Very fine grain, loose, damp, light brown	
21					1.2 44°F	80	Silty Sand (SM) Similar to above, tan sand in seams, calcareous	
23					1.1 44°F	80	Silty Sand (SM) Similar to above	
25					1.3 44°F	80	Silty Sand (SM) Similar to above	
27					2.4 45°F	80	Clayey Silty Sand (SC/SM) Very fine grain, compact, damp, brown, calcareous	
29					11 46°F	80	Clayey Silty Sand (SC/SM) Similar to above, faint odor	
							Sand (SW) Fine to medium grain, loose, damp, brown, faint odor	



WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #3, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.826' W107°58.244'

Total Depth: 44.25' bgl
Ground Water: Saturated @ 36' bgl
Elev., TOC (ft. msl): 5539.517
Elev., PAD (ft. msl): 5539.941
Elev., GL (ft. msl): 5539.902
Site Coordinates:
 N 36°41'49.18120" W 107°58'15.39107"

Well No.: MW-65 (AOC 26-B)
Start Date: 4/16/2009
Finish Date: 4/16/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
32					20.8 44°F		Gravelly Sand (SW) Fine to coarse grain, gravelly at base, damp to moist, odor, gray	
34	32-36'	1430	G/2V/ 2E/4J		58.7 48°F		Gravelly Sand (SW) Fine to coarse grain, damp, gravelly, gray, strong odor, trace dark to black clay	
36					145 47°F		Gravelly Sand (SW) Similar to above, odor	
38							Gravelly Sand (SW) Similar to above, moist to saturated, strong hydrocarbon odor	
40							Gravelly Sand (SW) Similar to above, saturated, black	
42							Sand (SW) Fine to coarse grain, compact, saturated, dark gray, odor	
44							Sandy Clay/Clayey Sand (CL/SC) Fine grain, very stiff, damp, yellowish brown	
46							Nacimiento Formation Sandy Clay/Clayey Sand (CL/SC) Similar to above, becomes very dense, greenish gray	
Total Depth = 44.25' BGL								

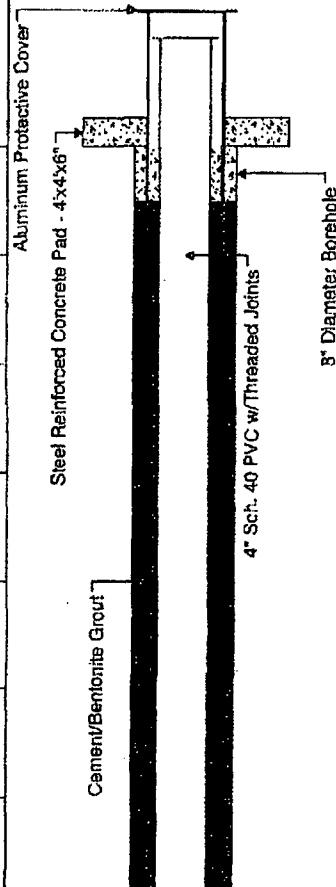
RPS
 404 Camp Craft Road
 Austin, Texas 78746

Sheet: 3 of 3

512/347-7588
 512/347-8243 fax

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** SWMU Group #3, Bloomfield Refinery**Job No.:** 354 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow-Stem Auger/ODEX**Sampling Method:** Split Spoon**Comments:** N36°41.818' W107°58.234'**Total Depth:** 43.25' bgl**Ground Water:** Saturated @ 38' bgl**Elev., TOC (ft. msl):** 5544.625**Elev., PAD (ft. msl):** 5542.030**Elev., GL (ft. msl):** 5541.979**Site Coordinates:****N 36°41'48.97462"****W 107°58'14.05858"****Well No.:** MW-66 (AOC 26-9)**Start Date:** 4/16/2009**Finish Date:** 4/20/2009

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
0	0-0.5'	0955	G/2V/ 2E/4J				Ground Surface	
0.5					8.6		Clayey Silt (ML) Low plasticity, firm, damp, brown	
1.5		1000	G/2V/ 2E/4J		66°F	100		
2	1.5-2'				10.5		Clayey Silt (ML) Similar to above	
					66°F	100		
4					10.5		Clayey Silt (ML) Similar to above	
					66°F	60		
6					9.0		Clayey Silt (ML) Similar to above	
					66°F	70		
8					10.0		Sandy Silt (ML) Very fine grain, compact to loose, damp, brown	
					66°F	90		
10					8.3		Sandy Silt (ML) Similar to above	
					66°F	10		
12					8.2		Sandy Silt (ML) Similar to above	
					66°F	70		



RPS
404 Camp Craft Road
Austin, Texas 78746

Sheet: 1 of 3

512/347-7588
512/347-8243 fax

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** SWMU Group #3, Bloomfield Refinery**Job No.:** 354 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow-Stem Auger/ODEX**Sampling Method:** Split Spoon**Comments:** N36°41.818' W107°58.234'**Total Depth:** 43.25' bgl**Ground Water:** Saturated @ 38' bgl**Elev., TOC (ft. msl):** 5544.625**Elev., PAD (ft. msl):** 5542.030**Elev., GL (ft. msl):** 5541.979**Site Coordinates:****N 36°41'48.97462"****W 107°58'14.05858"****Well No.:** MW-66 (AOC 26-9)**Start Date:** 4/16/2009**Finish Date:** 4/20/2009

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
15					9.6 66°F		80	Sandy Silt (ML) Very fine grain, compact to loose, damp, brown	4" Sch. 40 PVC w/Threaded Joints 4" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 10/20 Sieve Sand Filter Pack Bentonite Pellets Cement/Bentonite Grout
17					9.5 66°F		90	Sandy Silt (ML) Similar to above	
19					8.8 66°F		90	Sandy Silt (ML) Similar to above, tan and brown	
21					10.9 66°F		80	Sandy Silt (ML) Similar to above, increase in sand	
23					10.4 68°F		90	Silty Sand (SM) Very fine grain, compact to loose, damp, light brown	
25					10.0 68°F		100	Silty Sand (SM) Similar to above	
27					9.5 68°F		80	Silty Sand (SM) Similar to above	
29					7.9 68°F		70	Silty Sand (SM) Fine to medium grained, compact, damp, brown, trace gravel, clayey	

RPS
404 Camp Craft Road
Austin, Texas 78746

Sheet: 2 of 3

512/347-7588
512/347-8243 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #4, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36°42.029' W107°58.194'

Total Depth: 23' bgl
Ground Water: Saturated @ 18' bgl
Elev., TOC (ft. msl): 5523.312
Elev., PAD (ft. msl): 5520.676
Elev., QL (ft. msl): 5520.542
Site Coordinates:
N 36°42'01.73369"
W 107°58'11.54409"

Well No.: MW-67 (SWMU10-9)
Start Date: 8/26/2010 1230
Finish Date: 8/26/2010 1630

Depth (ft.)	Sampling					Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)			
15					0.5	80	Gravelly Sand (SW) Fine to medium grain, loose, damp, gray, no odor	 4" Sch 40 PVC Slotted 0.01" Screen w/Threaded Joints 10/20 Sieve Sand Filter Pack 4" Flush Threaded Sch. 40 PVC Cap Saturated @ 18' bgl 7" Sand Bed
17	16'-18'	1410	G/2V/ 2E/3J	18'	1.0	10	Gravelly Sand (SW) Similar to above, no odor	
19					1	20	Gravelly Sand (SW) Similar to above, clayey, saturated, no odor	
21						20	Gravelly Sand (SW) Similar to above, saturated, no odor	
23							Clay (CH) High plasticity, very stiff, damp to dry, yellowish brown, no odor	
25							Total Depth = 23' BGL	
27								
29								

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36°41.957' W107°58.374'

Total Depth: 18' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 5517.372
Elev., PAD (ft. msl): 5514.291
Elev., GL (ft. msl): 5514.304
Site Coordinates:
N 36°41'57.46756"
W 107°58'22.47236"

Well No.: MW-68 (SWMU 15-18)
Start Date: 8/27/2010 0845
Finish Date: 8/27/2010 1100

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-3									
-1									
1	1.5-2'	1030	G/2V/ 2E/3J		0.1 72°F		90	Silty Sand (SM) Fine grain, loose, damp, brown, no odor	
3					0.2 72°F		80	Silty Sand (SM) Similar to above, no odor	
5					0.5 72°F				
7					0.1 72°F		10	Gravelly Sand (SW) Fine grain, loose, gray, damp, no odor	
9					0.1 72°F		10	Gravelly Sand (SW) Similar to above, no odor	
11								Gravelly Sand (SW) No recovery, similar to above	
13	12-14'	1040	G/2V/ 2E/3J		2.0 75°F		60	Gravelly Sand (SW) Similar to above, no odor	
					1.5 75°F		50	Gravelly Sand (SW) Similar to above, no odor	
					1.3 79°F		80	Gravelly Sand (SW) Similar to above, no odor, very moist to saturated at 14' bgl	

RPS
 3833 S. Staples, Suite N-229
 Corpus Christi, Texas 78411

Sheet: 1 of 2

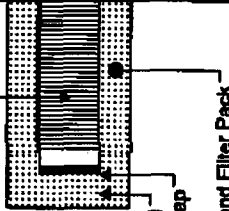
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 361/855-7410 fax

RPS**WELL CONSTRUCTION**

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36°41.957' W 107°58.374'

Total Depth: 18' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 5517.372
Elev., PAD (ft. msl): 5514.291
Elev., GL (ft. msl): 5514.304
Site Coordinates:
N 36°41'57.46756"
W 107°58'22.47236"

Well No.: MW-68 (SWMU 15-18)
Start Date: 8/27/2010 0845
Finish Date: 8/27/2010 1100

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
16							30	Gravelly Sand (SW) Similar to above, saturated, no odor	 4" Sch 40 PVC Slotted 0.01" Screen w/Threaded Joints 7" Sand Bed 4" Flush Threaded Sch. 40 PVC Cap 10/20 Sieve Sand Filter Pack
17							80	Gravelly Sand (SW) Similar to above, saturated, no odor	
18							100	Weathered Sandstone (SS) Fine to medium grain, dense, friable, damp, light brown to tan	
18.25'								Total Depth = 18' BGL	
20									
22									
24									
26									
28									
30									

RPS
3833 S. Staples, Suite N-229
Corpus Christi, Texas 78411

Sheet: 2 of 2

361/855-7335
361/855-7410 fax

RPS

WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36°41.987' W 107°58.372'

Total Depth: 12' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 5508.513
Elev., PAD (ft. msl): 5505.487
Elev., GL (ft. msl): 5505.201
Site Coordinates:
N 36°41'59.30045"
W 107°58'22.33410"

Well No.: MW-89 (SWMU15-22)
Start Date: 8/31/2010 0830
Finish Date: 8/31/2010 1130

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
0								Ground Surface	
0.5	0.5'	1005	G/2V/ 2E/3J		1.3 70°F		80	Gravelly Sand (SW) Fine grain, loose, damp, gray, no odor	
1.7	2'				1.7 71°F			Gravelly Sand (SW) Similar to above, no odor, gravel 1/4-inch to 1-inch	
2.2	2.4'	1015	G/2V/ 2E/3J		2.2 73°F		60	Gravelly Sand (SW) Similar to above, no odor	
2.2					2.2 74°F		50	Gravelly Sand (SW) Similar to above, no odor	
2.8					2.8 74°F		10	Gravelly Sand (SW) Similar to above, no odor	
2.9					2.9 79°F		100	Weathered Sandstone (SS) Fine grain, compact/dense, damp, light tan, no odor	
2.7					2.7 79°F		100	Weathered Sandstone (SS) Similar to above	
Total Depth = 12' BGL									

RPS
 3833 S. Staples, Suite N-229
 Corpus Christi, Texas 78411

Sheet: 1 of 1

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 361/855-7410 fax

RPS

Client: Western Refining Southwest, Inc.
Site: SWMU Group #4, Bloomfield Refinery
Job No.: UEC01120 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36°41.984' W107°58.146'

WELL CONSTRUCTION

Well No.: MW-70
Start Date: 1/30/2012 1300
Finish Date: 1/30/2012 1600

Total Depth: 26.25' bgl
Ground Water: Saturated @ 20' bgl
Elev., TOC (ft. msl): 5527.96
Elev., PAD (ft. msl): 5525.398
Elev., GL (ft. msl): 5524.776
Site Coordinates:
N 2074039.6 **E** 2683303.847

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-3									
-1									
1					1.1 57°F		80	Ground Surface Fill (Silty Sand/Gravel) Trace process sulfur, faint sulfur odor	
3					7.5 57°F		90	Fill (Silty Sand/Gravel) Trace process sulfur, faint sulfur odor	
5					8.2 57°F		90	Fill (Silty Sand/Gravel) Process sulfur/catalyst, sulfur odor	
7							0	No Recovery	
9					20.2 54°F		90	Fill (Silty Sand/Gravel) Process sulfur/catalyst, sulfur odor	
11					6.2 54°F		90	Fill (Silty Sand/Gravel) Process sulfur/catalyst, sulfur odor	
13					8.4 54°F		100	Fill (Silty Sand/Gravel) Process sulfur/catalyst, sulfur odor	

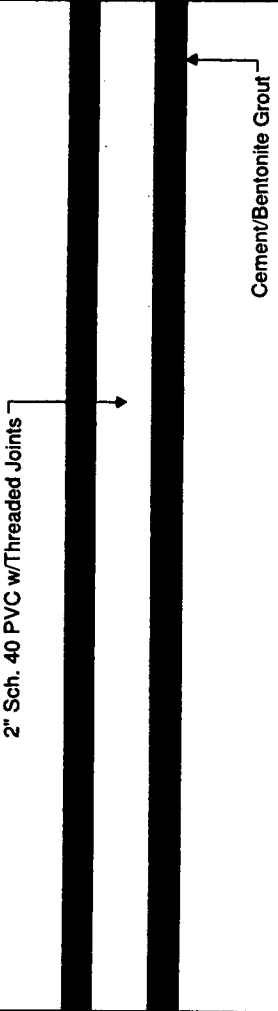
RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** Background Investigation, Bloomfield Refinery**Job No.:** UEC01318 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow Stem Augers**Sampling Method:** Split Spoon**Comments:** Refusal at 72' in gravel @ 0730 1/24/12, ran ODEX casing to 70' @0730 1/25/2012, resumed sampling @ 0715 2/1/12**Total Depth:** 79' bgl**Ground Water:** Saturated @ 73.5' bgl**Elev., TOC (ft. msl):** 5620.140**Elev., PAD (ft. msl):** 5617.952**Elev., GL (ft. msl):** 5617.508**Site Coordinates:****N** 2070898.1 **E** 2683704.928**Well No.:** BK-9 (MW-BCK1)**Start Date:** 1/24/2012 1100**Finish Date:** 2/1/2012 1425

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2									
0								Ground Surface	
2					0.0 48°F		70	Silty Sand (SM) Very fine grain, compact, brown, moist to damp, no odor	
4					0.0 44°F		90	Silty Sand (SM) Similar to above, light brown to tan	
6	5- 5.5'	1125	G/4oz/ 3J		0.0 44°F		90	Silty Sand (SM) Similar to above	
8					0.0 44°F		90	Sand (SP) Fine grain, loose, damp, brown, no odor	
					0.0 44°F		90	Sandy Clay (CL) Moderate plasticity, firm, damp, gray, fine grain sand in partings, no odor, calcareous	
10					0.0 39°F		90	Sand (SP) Fine grain, loose, damp, light brown, no odor	
12					0.0 38°F		80	Sand (SP) Similar to above	
14					0.0 38°F		80	Sand (SP) Similar to above	
								Sand (SP) Similar to above	

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** Background Investigation, Bloomfield Refinery**Job No.:** UEC01318 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow Stem Augers**Sampling Method:** Split Spoon**Comments:** Refusal at 72' in gravel @ 0730 1/24/12, ran ODEX casing to 70' @0730 1/25/2012, resumed sampling @ 0715 2/1/12**Total Depth:** 79' bgl**Ground Water:** Saturated @ 73.5' bgl**Elev., TOC (ft. msl):** 5620.140**Elev., PAD (ft. msl):** 5617.952**Elev., GL (ft. msl):** 5617.508**Site Coordinates:****N** 2070898.1 **E** 2683704.928**Well No.:** BK-9 (MW-BCK1)**Start Date:** 1/24/2012 1100**Finish Date:** 2/1/2012 1425

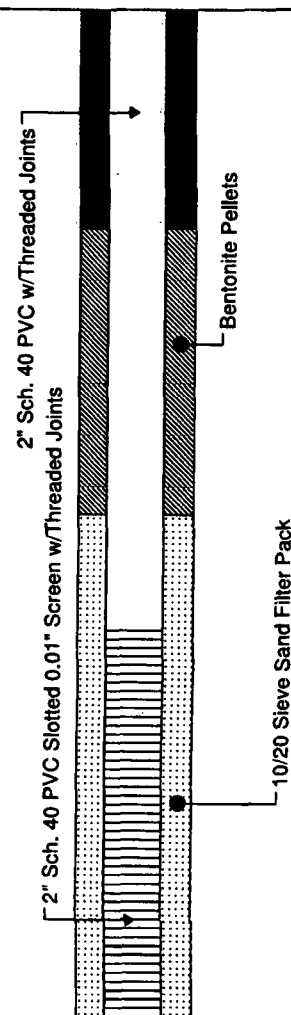
Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
16					0.0 38°F		90		
18					0.0 41°F		90	Sand (SP) Fine grain, loose, damp, light brown, no odor	
20					0.0 41°F		80	Sand (SP) Similar to above	
22					0.0 41°F		90	Sand (SP) Similar to above	
24					0.0 45°F		90	Sand (SP) Similar to above	
26					0.0 45°F		90	Sand (SP) Similar to above	
28					0.0 50°F		90	Sand (SP) Similar to above	
30					0.0 50°F		90	Silty Clay (CL) Low plasticity, firm, damp, brown, trace fine grain sand	
								Silty Clay/Clayey Silt (CL) Low to moderate plasticity, firm, damp, brown, trace fine grain sand	
32					0.0 50°F		90	Clayey Silt (ML) Low plasticity, firm to soft, brown, clay lense at base	

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** Background Investigation, Bloomfield Refinery**Job No.:** UEC01318 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow Stem Augers**Sampling Method:** Split Spoon**Comments:** Refusal at 72' in gravel @ 0730 1/24/12, ran ODEX casing to 70' @0730 1/25/2012, resumed sampling @ 0715 2/1/12**Total Depth:** 79' bgl**Ground Water:** Saturated @ 73.5' bgl**Elev., TOC (ft. msl):** 5620.140**Elev., PAD (ft. msl):** 5617.952**Elev., GL (ft. msl):** 5617.508**Site Coordinates:****N** 2070898.1 **E** 2683704.928**Well No.:** BK-9 (MW-BCK1)**Start Date:** 1/24/2012 1100**Finish Date:** 2/1/2012 1425

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
33					0.0 53°F		90	Clayey Silt/Silt (ML) Similar to above, clay content decreases with depth, light brown	
35					0.0 53°F		70	Silty Sand (SM) Very fine grain, loose, brown, damp	
37					0.0 53°F		90	Sand (SP) Very fine to medium grained, subrounded, loose to compact, brown to gray, no odor, damp	
39					0.0 53°F		80	Silty Sand (SM) Very fine grain, loose, brown, damp, no odor	
41					0.0 54°F		90	Silty Sand (SM) Similar to above	
43					0.0 51°F		90	Silty Sand (SM) Similar to above	
45					0.0 46°F		90	Silty Sand (SM) Similar to above	
47					0.0 46°F		90	Silty Sand (SM) Similar to above	
49					0.0		90	Silty Sand (SM) Similar to above	

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Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
51					44°F				
					0.0		70	Silty Sand (SM) Very fine grain, loose, brown, damp, no odor, trace fine to medium grain subrounded sand	
					43°F				
53					0.0		70	Silty Sand (SM) Similar to above	
					43°F				
55	54-56'	1500	G/4oz/3J		0.0		95	Clay (CH) High plasticity, stiff, damp, dark brown	
					44°F				
57					0.0		90	Clay (CH) Similar to above	
					44°F				
59					0.0		70	Clay/Gravel (CH/GW) Refusal with split spoon, gravel chips in spoon	
					44°F		10	Gravel (GW) Gravel chips in spoon	
					44°F		10	Gravel (GW) Split spoon from 62-62.5' bgl	
61					0.0		10	Gravel (GW) Split spoon from 64-64.5' bgl	
					42°F				
63					0.0		10	Gravel (GW) Split spoon from 66.0-66.5' bgl	
					42°F				
65					0.0		10	Gravel (GW) Split spoon from 66.0-66.5' bgl	
					42°F				



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Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
68							5	Gravel (GW) Sampled from 70-70.5'	2" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 2" Flush Threaded Sch. 40 PVC Cap 6" Sand Bed 8" Well Sump 10/20 Sieve Sand Filter Pack Saturated @ 73.5' bgl
70					0.0 41°F			Gravel (GW) Similar to above	
72							10	Gravel (GW) Similar to above, moist to saturated at base	
74	73-73.5	0900	G/4oz 1J	73.5'				Clay/Shale (CL) Very dense, dry, yellowish brown, Nacimiento Formation	
76								Clay/Shale (CL) Similar to above	
78							80	Clay/Shale (CL) Low plasticity, very dense, very stiff, dry, gray	Total Depth = 79' BGL
80									
82									

RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** Background Investigation, Bloomfield Refinery**Job No.:** UEC01318 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow Stem Augers**Sampling Method:** Split Spoon**Comments:** N 36°41.873' W 107°57.845'**Total Depth:** 60' bgl**Ground Water:** Not Encountered**Elev., TOC (ft. msl):** 5517.800**Elev., PAD (ft. msl):** 5516.522**Elev., GL (ft. msl):** 5516.131**Site Coordinates:****N 2073370.61 E 2684757.931****Well No.:** BK-10 (MW-BCK2)**Start Date:** 2/7/2012 1740**Finish Date:** 2/13/2012 1400

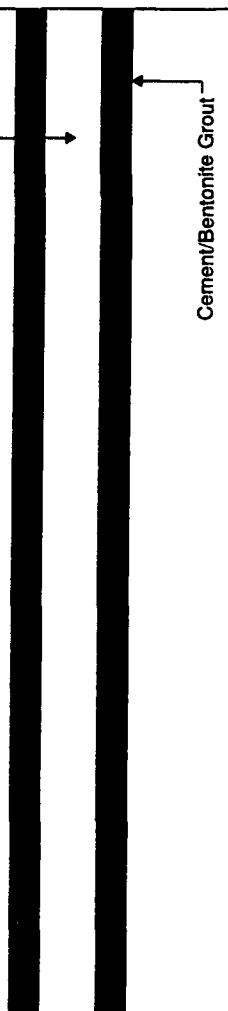
Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2									
0								Ground Surface	
2					0.0 33°F		100	Silt (ML) Very fine grain, loose, dry, brown, no odor	
4					0.0 33°F		90	Silt (ML) Similar to above	
6	5-6' & Dup	0753	G/4oz 4J		0.0 33°F		80	Silt (ML) Similar to above, gravel at base	
8					0.0 33°F		10	Sandy Gravel (GW) Fine gravel sand in 1/2" to >3" size gravel, damp, gray, no odor	
10					0.0 33°F		30	Sandy Gravel (GW) Similar to above	
12								No Recovery	
14					0.0 33°F		95	Silt/Sand/Clay (CL) Very fine grain, compact to dense, dry/crumbly, light gray/tan	
								Silty Clay (CL) Similar to above, gray, no odor, very dense	

RPS
404 Camp Craft Road
Austin, Texas 78746

Sheet: 1 of 4

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RPS**WELL CONSTRUCTION****Client:** Western Refining Southwest, Inc.**Site:** Background Investigation, Bloomfield Refinery**Job No.:** UEC01318 - Bloomfield, NM**Geologist:** Tracy Payne**Driller:** Enviro-Drill, Inc.**Drilling Rig:** CME 75**Drilling Method:** Hollow Stem Augers**Sampling Method:** Split Spoon**Comments:** N 36°41.873' W 107°57.845'**Total Depth:** 60' bgl**Ground Water:** Not Encountered**Elev., TOC (ft. msl):** 5517.800**Elev., PAD (ft. msl):** 5516.522**Elev., GL (ft. msl):** 5516.131**Site Coordinates:****N** 2073370.61 **E** 2684757.931**Well No.:** BK-10 (MW-BCK2)**Start Date:** 2/7/2012 1740**Finish Date:** 2/13/2012 1400

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
16					0.0 33°F		80		 2" Sch. 40 PVC w/Threaded Joints Cement/Bentonite Grout
18					0.0 33°F		80	Silty Clay (CL) Similar to above, gray, very dense, calcite crystals present	
20					0.0 33°F		60	Clayey Silt (ML) Very low plasticity, firm, dry, grayish brown, no odor	
22					0.0 33°F		80	Clayey Silt (ML) Similar to above, dry, firm	
24					0.0 35°F		80	Silty Clay (CL) Low plasticity, very stiff/compact, dry, gray, no odor, calcite crystals	
26					0.0 35°F		90	Silty Clay (CL) Similar to above	
28					0.0 35°F		70	Silty Sand/Sandstone (SP/SS) Very fine grain, compact to cemented, damp, greenish gray, no odor	
30					0.0 39°F		50	Silty Sand/Sandstone (SP/SS) Similar to above, no odor	
32					0.0 41°F		50	Silty Sand/Sandstone (SP/SS) Similar to above, cemented, no odor, gray	

RPS

WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.

Site: Background Investigation, Bloomfield Refinery

Job No.: UEC01318 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow Stem Augers

Sampling Method: Split Spoon

Comments: N 36°41.873' W 107°57.845'

Total Depth: 60' bgl

Ground Water: Not Encountered

Elev., TOC (ft. msl): 5517.800

Elev., PAD (ft. msl): 5516.522

Elev., GL (ft. msl): 5516.131

Site Coordinates:

N 2073370.61 E 2684757.931

Well No.: BK-10 (MW-BCK2)

Start Date: 2/7/2012 1740

Finish Date: 2/13/2012 1400

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
33					0.0		80	Clayey Silt (ML) Very low plasticity, firm, slightly cemented, dry, gray, no odor	
35					0.0		80	Clayey Silt (ML) Similar to above	
37					0.0		50	Clayey Silt (ML) Similar to above	
39					0.0		50	Clayey Silt (ML) Similar to above, trace sand	
41	40-42'	1043	G/4oz SJ		0.0		50	Clayey Silt (ML) Similar to above, trace sand, compact to cemented	
43					0.0		50	Clayey Silt/Sand (ML/SC) Low plasticity, firm, damp, gray, no odor, core saturated outside, poorly cemented	
45					0.0		25	Clayey Silt/Sand (ML/SC) Similar to above	
47					0.0		75	Silty Sand (SM) Fine grain, compact to poorly cemented, damp, greenish gray, no odor	
49					0.0		50	Silty Sand (SM) Similar to above	

RPS

WELL CONSTRUCTION

Client: Western Refining Southwest, Inc.

Site: Background Investigation, Bloomfield Refinery

Job No.: UEC01318 - Bloomfield, NM

Geologist: Tracy Payne

Driller: Enviro-Drill, Inc.

Drilling Rig: CME 75

Drilling Method: Hollow Stem Augers

Sampling Method: Split Spoon

Comments: N 36°41.873' W 107°57.845'

Total Depth: 60' bgl

Ground Water: Not Encountered

Elev., TOC (ft. msl): 5517.800

Elev., PAD (ft. msl): 5516.522

Elev., GL (ft. msl): 5516.131

Site Coordinates:

N 2073370.61 E 2684757.931

Well No.: BK-10 (MW-BCK2)

Start Date: 2/7/2012 1740

Finish Date: 2/13/2012 1400

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
51					47°F				2" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints 60' 10/20 Sieve Sand Filter Pack 8" Well Sump
					0.0		50	Silty Sand (SM) Similar to above, fine grain, compact to poorly cemented, damp, greenish gray, no odor	
53					47°F				
					0.0		50	Silty Sand (SM) Similar to above	
55					49°F				
					0.0		60	Silty Sand (SM) Similar to above, trace clayey sand	
57					49°F				60'
					0.0		60	Silty Sand (SM) Similar to above, trace clayey sand	
59					49°F				
					0.0		60	Silty Sand (SM) Similar to above	60'
61					49°F				
								Total Depth = 60' BGL	
63									
65									