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WORK PLANS

Investigation Work Plan Group 6 12/2009

Western Refining
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2012 OCT 12 A 10:55

October 9, 2012

John E. Kieling, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, NM 87505

Certified Mail #: 7009 0820 0000 0482 9238 (Delivery to NMED)
Certified Mail #: 7010 1870 0002 6760 0139 (Delivery to OCD)

RE: Response to NMED's Approval
Investigation Report Group 6 (AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47)
Western Refining Southwest, Inc., Bloomfield Refinery
EPA ID# NMD089416416

Dear Mr. Kieling:

Pursuant to your approval letter dated July 5, 2012 for the Group 6 Investigation Report, Western Refining Southwest, Inc. - Bloomfield Refinery ("Western") has prepared the following letter Investigation Work Plan in response to your comment No. 2 (shown below).

NMED Comment 2:
Section 7.2 (Recommendations), page 34, states that "[a]dditional soil samples should be collected at the locations with the highest concentrations of chromium at AOC 19 [e.g., AOC 19-13 (0-0.5'), AOC 19-14 (0-0.5'), and AOC 19-18 (0-0.5')]. The samples should be analyzed for chromium VI to determine if the chromium detected in soils at AOC 19 is present as chromium III or chromium VI." Western must collect at least three additional soil samples from soils within AOC 19 at locations where contaminants are not detected at high concentrations to determine if chromium is typically present as chromium III and not present only as a result of local reducing conditions in areas containing petroleum contamination. Western must submit a letter work plan to propose the additional investigation activities to collect these soil samples.

If you have questions regarding the proposed investigation presented in the attached Investigation Work Plan, please contact me at (505) 632-4171.

Sincerely,

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

Enclosure

cc: Dave Cobrain – NMED HWB
Leona Tsinnajinnie – NMED HWB
✓Carl Chavez - NMOCD
Allen Hains – Western Refining El Paso

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GROUP 6 (AOC No. 19 – SEEP NORTH OF MW-45) INVESTIGATION WORK PLAN ADDENDUM

Introduction

The Bloomfield Refinery is located immediately south of Bloomfield, New Mexico in San Juan County. The physical address is #50 Road 4990, Bloomfield, New Mexico 87413. The Bloomfield Refinery is located on approximately 263 acres. Bordering the facility is a combination of federal and private properties. Public property managed by the Bureau of Land Management lies to the south. The majority of undeveloped land in the vicinity of the facility is used extensively for oil and gas production and, in some instances, grazing. U.S. Highway 550 is located approximately one-half mile west of the facility. The topography of the main portion of the site is generally flat with steep bluffs to the north where the San Juan River intersects Tertiary terrace deposits.

The Bloomfield Refinery is a crude oil refinery currently owned by Western Refining Southwest, Inc., which is a wholly owned subsidiary of Western Refining Company, and it is operated by Western Refining Southwest, Inc. – Bloomfield Refinery. The Bloomfield Refinery has an approximate refining capacity of 18,000 barrels per day. Various process units operated at the facility, including crude distillation, reforming, fluidized catalytic cracking, sulfur recovery, merox treater, catalytic polymerization, and diesel hydrotreating. Past operations produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, naphtha, residual fuel, fuel oils, and LPG.

On July 27, 2007, the New Mexico Environment Department (NMED) issued an Order to San Juan Refining Company and Giant Industries Arizona, Inc. ("Western") requiring investigation and corrective action at the Bloomfield Refinery. This Investigation Work Plan has been prepared for the Areas of Concern (AOC) designated as Group 6 in the Order. Group 6 includes AOC No. 19 (Seep North of MW-45), AOC No. 20 (Seep North of MW-46), and AOC No. 21 (Seep North of MW-47). The location of AOC Nos. 19, 20 and 21 are shown on Figure 1. This Investigation Work Plan focuses on only AOC No. 19, as a follow up to the previous investigation recently conducted in August 2011 for all three AOCs in Group 6.

The purpose of this site investigation is to evaluate the presence of chromium recently found in soils at AOC No. 19. This is consistent with the overall goal to determine and evaluate the presence, nature, and extent of releases of contaminants in accordance with 20.4.1.500 New

Mexico Administrative Code (NMAC) incorporating 40 Code of Federal Regulations (CFR) Section 264.101. The investigation activities will be conducted in accordance with Section IV of the Order.

Scope of Services

Anticipated Activities

Pursuant to Section IV of the Order, a scope of services has been developed to evaluate the presence of chromium in soils at AOC No. 19. To accomplish this objective, surface soil samples will be collected at AOC No. 19 (Seep North of MW-45). Hand augured soil borings will be installed at the specified locations along the arroyos (drainage pathways) and samples will be collected from 0-6" below grade surface.

Three soil samples are proposed at locations in the drainage pathways where the highest chromium concentrations were found in soil samples collected in August 2011 [AOC 19-13 (0-0.5'), AOC 19-14 (0-0.5'), and AOC 19-18 (0-0.5')] and at three additional locations within AOC No. 19 where contaminants were not detected at high concentration during the recent investigation.

Soil samples will be collected at AOC No. 19 from the following locations:

- One surface soil sample will be collected near Seep No. 4 at the center of the natural basin where the seep daylighted and previous sample AOC 19-13 was collected;
- One surface soil sample will be collected near Seep No. 9 from along the margin of the drainage pathway where previous sample AOC 19-14 was collected;
- One surface soil sample will be collected from the center of the major drainage pathway between Seep No. 5 and Seep No. 9 where previous sample AOC 19-18 was collected; and
- Three surface soil samples will be collected from locations east of the major drainage pathway that extends from Seep No. 5 to Seep No. 9.

The soil samples will be analyzed for chromium using EPA methods 6010B and 3060A/7196A. EPA method 3060A/7196A is specifically designed to determine the presence and concentration of chromium VI in soils/sediments. EPA method 6010B reports the total chromium concentration (e.g., chromium III plus chromium VI).

Background Information Research

Documents containing the results of previous investigations[1] and routine groundwater monitoring data[2] from monitoring wells and the seeps were reviewed to facilitate development of this work plan. The previously collected data provide detailed information on the overall subsurface conditions, including hydrogeology and contaminant distribution within groundwater on a site-wide basis. The data collected under this scope of services will supplement the existing soil and groundwater information and provide specific information regarding contaminant occurrence and distribution within soils near the seeps.

Collection and Management of Investigation Derived Waste

It is not anticipated that excess soil cuttings will be generated since only surface samples (0-0.5') will be collected as part of this Work Plan. All decontamination water will be disposed in the refinery wastewater treatment system upstream of the API Separator.

Surveys

The horizontal coordinates and elevation of each sampling location and the locations of all other pertinent structures will be determined by a registered New Mexico professional land surveyor in accordance with the State Plane Coordinate System (NMSA 1978 47-1-49-56 (Repl. Pamp. 1993)). The surveys will be conducted in accordance with Sections 500.1 through 500.12 of the Regulations and Rules of the Board of Registration for Professional Engineers and Surveyors Minimum Standards for Surveying in New Mexico. Horizontal positions will be measured to the nearest 0.1-ft and vertical elevations will be measured to the nearest 0.01-ft.

Investigation Methods

Soil Boring Installation

Shallow soil borings will be completed using a hand auger and/or shovel at appropriate locations within and into the banks of the drainage pathways. This sampling method is ideally suited due to the inaccessibility of a drill rig and the limited anticipated depth to bedrock in the vicinity of the seeps. The sampling equipment will be properly decontaminated before beginning each boring.

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[1] RPS, 2011, Investigation Report Group 6

[2] Western Refining, 2012, Groundwater Remediation and Monitoring Annual Report

The NMED will be notified as early as practicable if conditions arise or are encountered that do not allow the advancement of borings at planned sampling locations. The sampling will be accomplished under the direction of a qualified engineer or geologist who will maintain a detailed log of the materials and conditions encountered in each boring. Both sample information and visual observations of the samples will be recorded on the boring log. Known site features and/or site survey grid markers will be used as references to locate each boring prior to surveying the location as described above. The boring locations will be measured to the nearest foot, and locations will be recorded on a scaled site map upon completion of each boring.

Soil Sampling

The individual sample locations have been selected in an attempt to determine the valence state of chromium, which was previously detected in soil samples collected from AOC No. 19. The surface samples may be collected using decontaminated, hand-held stainless steel sampling device, hand auger, or a pre-cleaned disposable sampling device. A portion of the sample will be placed in pre-cleaned, laboratory-prepared sample containers for laboratory chemical analysis. The remaining portions of the sample will be used for logging and field screening as discussed below. Sample handling and chain-of-custody procedures will be in accordance with the procedures presented below.

Discrete soil samples will be collected from 0-6" (all soil sample locations). Three soil samples are proposed at locations in the drainage pathways where the highest chromium concentrations were found in soil samples collected in August 2011 [AOC 19-13 (0-0.5'), AOC 19-14 (0-0.5'), and AOC 19-18 (0-0.5')] and at three additional locations within AOC No. 19 where contaminants were not detected at high concentration during the recent Group 6 investigation. The proposed sample locations are shown on enclosed Figure 2.

Quality Assurance/Quality Control (QA/QC) samples will be collected to monitor the validity of the soil sample collection procedures as follows:

- One field duplicate will be collected and analyzed for total chromium.

Soil Sample Field Screening and Logging

Samples will be screened in the field for evidence of contaminants. Field screening results will be recorded on the exploratory boring logs. The primary screening methods include: (1) visual examination, and (2) olfactory examination.

Visual screening includes examination of soil samples for evidence of staining caused by petroleum-related compounds. Field screening results may be site- and boring-specific and the results may vary with instrument type, the media screened, weather conditions, moisture content, soil type, and type of contaminant. Conditions capable of influencing the results of field screening will be recorded on the field logs.

The physical characteristics of the samples (such as mineralogy, ASTM soil classification, moisture content, texture, color, presence of stains or odors, and/or field screening results), depth where each sample was obtained, method of sample collection, and other observations will be recorded in the field log by a qualified geologist or engineer. Detailed logs of each soil boring will be completed in the field by a qualified engineer or geologist. Additional information, such as any unusual or noticeable conditions encountered during sampling, will be recorded on the logs.

Sample Handling

At a minimum, the following procedures will be used at all times when collecting samples during investigation, corrective action, and monitoring activities:

1. Neoprene, nitrile, or other protective gloves will be worn when collecting samples. New disposable gloves will be used to collect each sample;

2. All samples collected of each medium for chemical analysis will be transferred into clean sample containers supplied by the project analytical laboratory with the exception of soil, rock, and sediment samples obtained in Encore® samplers. 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; and

3. Sample labels and documentation will be completed for each sample following procedures discussed below. 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 below, will be followed for all samples collected. All samples will be submitted to the laboratory soon enough 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.

Chain-of-custody and shipment procedures will include the following:

1. Chain-of-custody forms will be completed at the end of each sampling day, prior to the transfer of samples off site.

2. 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.

3. Each cooler or other container will be delivered directly to the analytical laboratory.

4. Glass bottles will be separated in the shipping container by cushioning material to prevent breakage.

5. Plastic containers will be protected from possible puncture during shipping using cushioning material.

6. The chain-of-custody form and sample request form will be shipped inside the sealed storage container to be delivered to the laboratory.

7. Chain-of-custody seals will be used to seal the sample-shipping container in conformance with EPA protocol.

8. Signed and dated chain-of-custody seals will be applied to each cooler prior to transport of samples from the site.

9. 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 and copies will be returned to the relinquishing party.

10. Copies of all chain-of-custody forms generated as part of sampling activities will be maintained on-site.

Decontamination Procedures

The objective of the decontamination procedures is to minimize the potential for cross-contamination. Sampling or measurement equipment, including but not limited to, stainless steel sampling tools will be decontaminated in accordance with the following procedures or other methods approved by the Department before each sampling attempt or measurement:

1. Brush equipment with a wire or other suitable brush, if necessary or practicable, to remove large particulate matter;

2. Rinse with potable tap water;

3. Wash with nonphosphate detergent or other detergent approved by the Department (examples include Fantastik™, Liqui-Nox®);

4. Rinse with potable tap water; and

5. Double rinse with deionized water.

All decontamination solutions will be collected and stored temporarily as described above in the discussion on the collection and management of investigation derived waste. Decontamination procedures and the cleaning agents used will be documented in the daily field log.

Documentation of Field Activities

Daily field activities, including observations and field procedures, will be recorded in a field log book. The original field forms will be maintained at the facility. Copies of the completed forms will be maintained in a bound and sequentially numbered field file for reference during field activities. Indelible ink will be used to record all field activities. Photographic documentation of field activities will be performed, as appropriate. The daily record of field activities will include the following:

1. Site or unit designation;
2. Date;
3. Time of arrival and departure;
4. Field investigation team members including subcontractors and visitors;
5. Weather conditions;
6. Daily activities and times conducted;
7. Observations;
8. Record of samples collected with sample designations and locations specified;
9. Photographic log, as appropriate;
10. Field monitoring data, including health and safety monitoring;
11. Equipment used and calibration records, if appropriate;
12. List of additional data sheets and maps completed;
13. An inventory of the waste generated and the method of storage or disposal; and
14. Signature of personnel completing the field record.

Chemical Analyses

All samples collected for laboratory analysis will be submitted to an accredited laboratory. The laboratory will use the most recent standard EPA and industry-accepted analytical methods for target analytes as the testing methods for each medium sampled. Chemical analyses will be performed in accordance with the most recent EPA standard analytical methodologies and extraction methods.

The soil samples will be analyzed by the following methods:

- SW-846 Method 6010B for total chromium; and
- SW-846 Method 3060A/7196A for chromium VI.

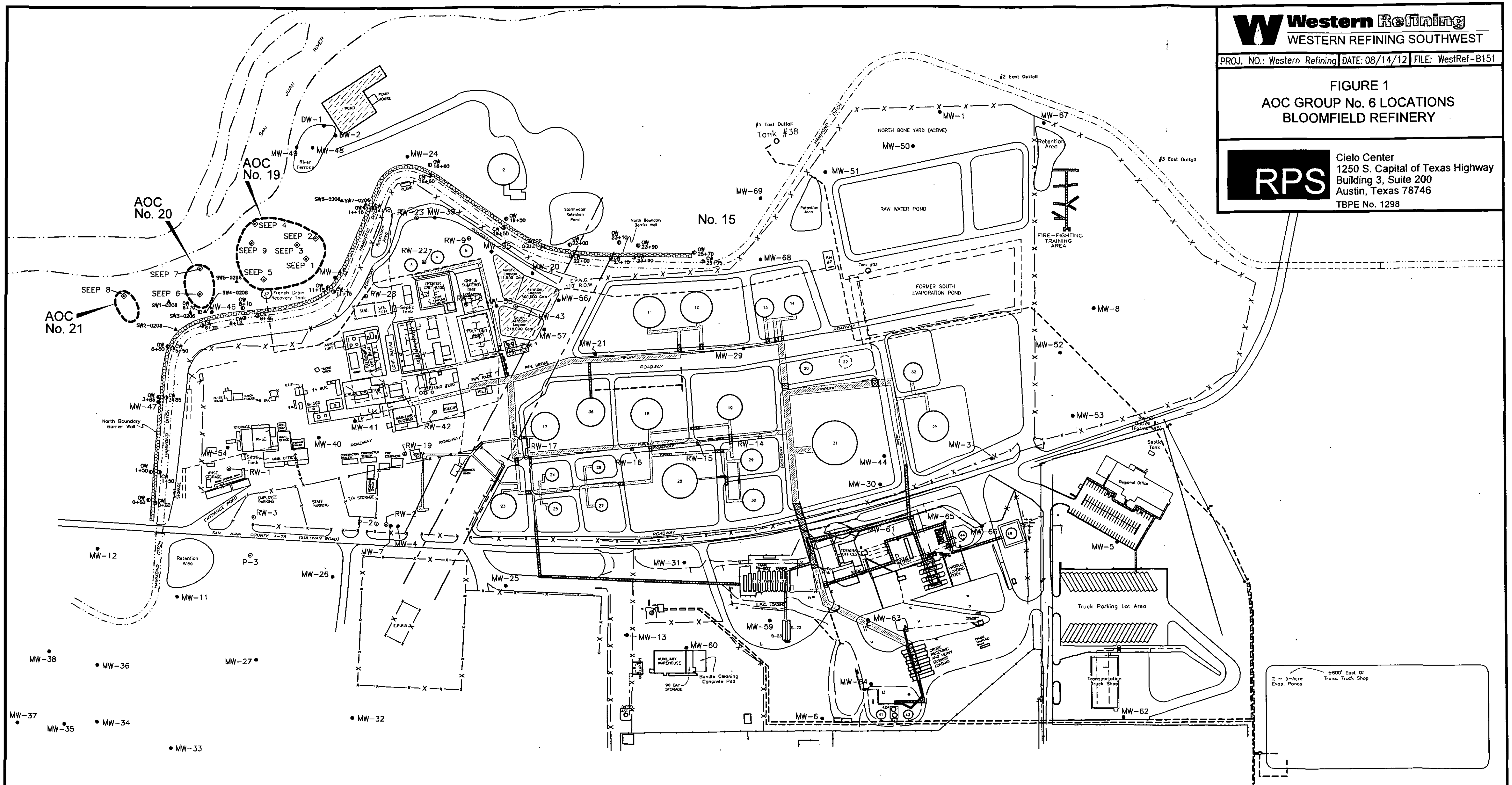
Schedule

This Investigation Work Plan will be implemented concurrently with the Group 9 Investigation Work Plan pending NMED approval. The estimated timeframes for each of the planned activities is as shown below:

- Field work (inclusive of all soil sampling) – one week;
- Laboratory analyses – four weeks;
- Data reduction and validation – two weeks; and
- Data gap analysis – two weeks.

Completion of the data gap analysis will complete all activities conducted under this Investigation Work Plan.

FIGURES



Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 08/14/12 | FILE: WestRef-B151

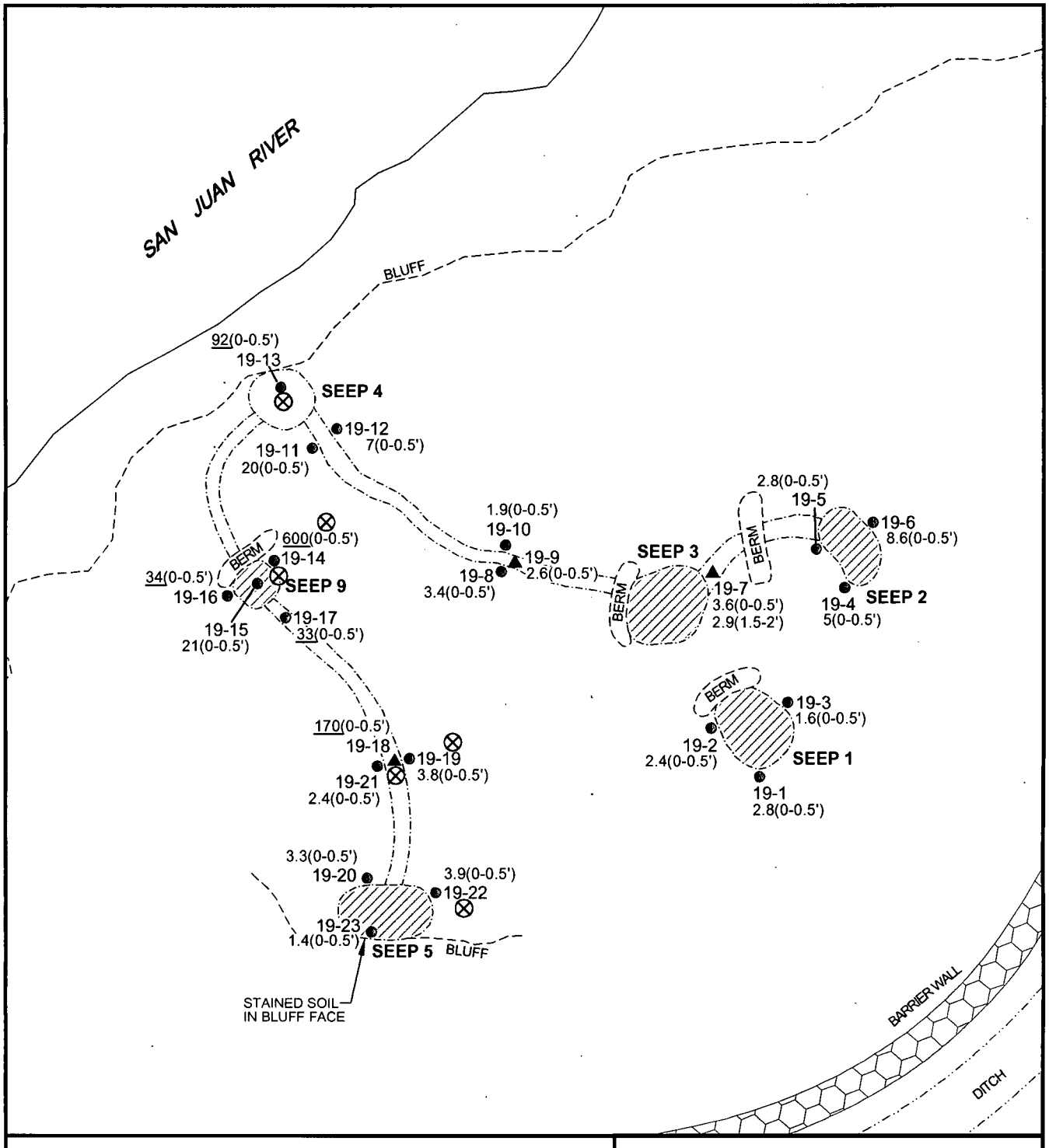
FIGURE 1
AOC GROUP No. 6 LOCATIONS
BLOOMFIELD REFINERY

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

LEGEND

- SEEP 1 ◈ SEEP LOCATION AND IDENTIFICATION NUMBER
- MW-1 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- OW 1+50 OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER
- CW 1+50 COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
- SW1-0206 ▲ SUMP WELL LOCATION AND IDENTIFICATION NUMBER
- P-2 PIEZOMETER IDENTIFICATION
- RW-1 ⊙ RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- UNDER GROUND PIPING (HYDROCARBONS)
- ABOVE GROUND PIPE-WAY
- SLURRY BARRIER WALL
- ABANDONED UNDERGROUND PIPING
- UNDER GROUND WASTEWATER PIPING
- UNDER GROUND DRAIN PIPING
- FORMER TANK LOCATION
- —x—x— FENCE

0 300
SCALE IN FEET



LEGEND

- ⊗ PROPOSED NEW SOIL SAMPLE LOCATION
- **SEEP 1** SEEP IDENTIFICATION NUMBER
- 19-1 ● SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
- 19-7 ▲ SOIL BORING LOCATION AND IDENTIFICATION NUMBER
- LINED CATCHMENT BASIN
- DRAINAGE PATHWAY
- 2.4(0-0.5') CHROMIUM CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
- 23.7 CONCENTRATION EXCEEDS DAF SCREENING LEVEL

N

0 50
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 08/14/12	FILE: WestRef-A137

FIGURE 2
AOC No. 19
CHROMIUM SOIL MAP
BLOOMFIELD REFINERY

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

Western Refining
LOGISTICS

WNR NYSE

July 26, 2012

RECEIVED OCD

2012 JUL 30 P 12:55

John E. Kieling, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, NM 87505

UPS Tracking #: 1Z 881 839 24 5595 6248 (Delivery to NMED)
Certified Mail #: 7009 2250 0002 3833 5315 (Delivery to OCD)

RE: Response to NMED's Approval
Investigation Report Group 6 (AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47)
Western Refining Southwest, Inc., Bloomfield Refinery
EPA ID# NMD089416416
HWB-WRB-11-008

Dear Mr. Kieling:

Pursuant to your approval letter dated July 5, 2012, Western Refining Southwest, Inc., Bloomfield Refinery ("Western") has prepared the following responses to address your comments. Please find the requested revisions enclosed and note that the requested investigation work plan for Group 6 will be submitted on or before October 12, 2012, as requested.

NMED Comment No. 1:

Section 7 (Conclusions and Recommendations), pages 32 through 34, summarizes the results of the investigation and provides conclusions and recommendations for the work completed at Group 6. However, Western did not discuss or provide any recommendations to address the DRO result of 21,000 mg/kg from soil sample location AOC 19-23, which is significantly higher than the residential soil screening level (SSLs). NMED understands that the conditions at the site are not conducive to allow removal of the material from the bluff surface; however, Western must provide an explanation about the conditions at soil sample location AOC 19-23 to include a description of the location and an explanation why removal is not warranted or practicable. Western must include this discussion at the end of Section 7.2 (Recommendations) and provide a replacement page for the Report.

Western Response No. 1: Pursuant to our earlier discussions, please find enclosed replacement pages for Section 7. The text has been revised to clarify the actual site conditions in the area of sample location AOC 19-23. A redline-strikeout version is also included to facilitate your review.

NMED Comment No. 2:

Section 7.2 (Recommendations), page 34, states that "[a]dditional soil samples should be collected at the locations with the highest concentrations of chromium at AOC 19 [e.g., AOC 19-13 (0-0.5'), AOC 19-14 (0-0.5'), and AOC 19-18 (0-0.5')]. The samples should be analyzed for chromium VI to determine if the chromium detected in soils at AOC 19 is present as chromium III or chromium VI." Western must collect at least three additional soil samples from

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soils within AOC 19 at locations where contaminants are not detected at high concentrations to determine if chromium is typically present as chromium III and not present only as a result of local reducing conditions in areas containing petroleum contamination. Western must submit a letter work plan to propose the additional investigation activities to collect these soil samples.

Western Response No. 2: A work plan for collection of additional soil samples for chromium analysis will be submitted, as directed by NMED, on or before October 12, 2012.

NMED Comment No. 3:
Figures 12 (AOC No. 19 Arsenic Soil Map) through 19 (AOC No. 21 Diesel Range Organics Soil Map) depict surface soil and soil boring locations with their corresponding analytical results. In addition, the results greater than the SSL are underlined. However, Western did not specify which SSL is represented in the figures. In future submittals, specify which SSLs are referenced in figures.

Western Response No. 3: In future submittals, the SSL value will be explained in the legend of any associated figures.

NMED Comment No. 4:
Appendix C provides site photographs of the areas of concern (AOCs) and seep locations. Some of the site photos depict sample locations, but they are not identified in the captions. In future submittals, identify the sample locations in the captions below the site photos if the sample locations are visible in the photo.

Western Response No. 4: In future submittals, any sample locations that appear in site photos will be identified in a caption below the photo.

If you have questions regarding the above responses or the enclosure, please feel free to contact me at (505) 632-4171at your convenience.

Sincerely,

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

Enclosure

cc: Dave Cobrain – NMED HWB
Leona Tsinnajinnie – NMED HWB
Carl Chavez - NMOCD
Allen Hains – Western Refining El Paso

Section 7
Conclusions and Recommendations

This section summarizes and provides an evaluation of the potential impacts as shown in field screening data and analytical data. An investigation of soils was conducted at Group 6 (AOCs 19, 20, and 21) to assess and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, soil samples were collected and analyzed for potential site-related constituents.

7.1 Conclusions

AOC No. 19 – Seep North of MW-45

Three metals (arsenic, cobalt, and chromium) and diesel range organics were detected in soil samples at concentrations exceeding their respective screening levels. Arsenic was detected in nine samples at concentrations above the DAF screening level, with eight of these samples having concentrations above the residential screening level. Cobalt was detected in generally low concentrations with a maximum detected value of 11 mg/kg. As shown in Table 5, the samples with concentrations of cobalt above the screening levels do not have concentrations of organic constituents above screening levels. Chromium was detected in five samples at concentrations above the DAF screening level with only one being above the residential screening level. Arsenic, chromium, and cobalt are naturally occurring constituents in many soils and it is possible that these constituents are naturally occurring in soils at the Bloomfield Refinery. The analyses for chromium were for total chromium, which are compared to the chromium VI screening levels. It may be overly conservative to compare to the total chromium results to the chromium VI screening levels, but additional analyses will be required to speciate the chromium.

The ~~only~~ analytical results for organic constituents (i.e., diesel range organics) above only the DAF screening level occur at three locations with a maximum value of 770 mg/kg. All three of these detections of diesel range organics are below the residential screening level. A fourth sample (AOC 19-23), which was collected from a cliff face, had a concentration of diesel range organics above the DAF and residential screening levels. This single detection of diesel range organics above the residential screening level does not warrant a response action because there is very limited potential for exposure to the small area represented by this sample.

The AOC 19-23 sample was collected from the location on a cliff face that had the greatest visible staining from apparent hydrocarbons. The entire cliff face at this location is only approximately five feet high and seven feet long, and there is very limited access to this area. The seep that caused the presence of hydrocarbons is no longer active with the installation of the slurry wall, therefore the hydrocarbons present at the surface should naturally degrade over time. The actual volume of impacted soils present near the land surface is also very small, as it appears the previous seep mainly caused only surface staining of soils along the small cliff face.

AOC No. 20 – Seep North of MW-46

Only cobalt and diesel range organics were detected at concentrations above the applicable screening levels. Cobalt was detected in only one soil sample at a concentration (8.9 mg/kg) above the DAF screening level (5.51 mg/kg) but did not exceed the residential soil screening level of 23 mg/kg. As noted above, cobalt may be a naturally occurring constituent. Diesel range organics were detected in only one sample at a concentration (490 mg/kg) above the DAF soil screening level of 200 mg/kg. None of the diesel range organic analytical results exceeded the residential direct contact screening level of 1,830 mg/kg.

AOC No. 21 – Seep North of MW-47

Similarly to AOC No. 20, only cobalt and diesel range organics were detected at concentrations above the applicable screening levels. Cobalt was detected in eight soil samples at concentrations above the DAF screening level (5.51 mg/kg) but none exceed the residential soil screening level of 23 mg/kg. Diesel range organics were detected in one sample at a concentration (710 mg/kg) above the DAF soil screening level of 200 mg/kg. None of the diesel range organic analytical results exceed the residential direct contact screening level of 1,830 mg/kg.

Cumulative Risk Evaluation

A cumulative risk evaluation for soils is presented in Table 6. This was conducted by taking the maximum reported concentration of each detected constituent from all three AOCs and dividing by the residential screening level and non-residential screening levels as shown in the equations below. These calculations are separated for carcinogenic and non-carcinogenic constituents. The cumulative carcinogenic risk is 6.703×10^{-5} assuming residential land use

and 1.36 x 10^{-5} for non-residential land use. The hazard index for residential land use is 3.557 and for non-residential land use is 1.652.

$$Site\ Risk = \left(\frac{conc_x}{SSL_x} + \frac{conc_y}{SSL_y} + \frac{conc_z}{SSL_z} + \cdots + \frac{conc_i}{SSL_i}\right) \times 10^{-5}$$

$$Site\ Hazard\ Index\ (HI) = \left(\frac{conc_x}{SSL_x} + \frac{conc_y}{SSL_y} + \frac{conc_z}{SSL_z} + \cdots + \frac{conc_i}{SSL_i}\right) \times 1$$

7.2 Recommendations

Western plans to conduct an investigation of background locations and will attempt to establish site-specific background values for various naturally occurring constituents (e.g., arsenic and cobalt in soils). After background values have been established, site data collected for AOCs 19, 20 and 21 should be reassessed to determine if some analytical results are actually representative of background conditions and not site-related impacts.

Additional soil samples should be collected at the locations with the highest concentrations of chromium at AOC 19 [e.g., AOC19-13 (0-0.5'), AOC 19-14 (0-0.5'), and AOC 19-18 (0-0.5')]. The samples should be analyzed for chromium VI to determine if the chromium detected in soils at AOC 19 is present as chromium III or chromium VI. If the chromium is determined to be chromium III instead of chromium VI, then the screening levels in Table 5 will need to be revised along with any associated figures.

After site-specific background values have been established and the location-specific speciation of chromium has been determined, then preparation of a risk assessment for the Group 6 AOCs may be appropriate. The site concentrations have been compared to residential screening levels in this investigation report; however, the physical nature of the seep areas may limit future use of this area. An evaluation of potential exposures in a site-specific risk assessment could offer a more appropriate evaluation of actual risks based on more likely future use of the area at AOCs 19, 20, and 21.

Section 7
Conclusions and Recommendations

This section summarizes and provides an evaluation of the potential impacts as shown in field screening data and analytical data. An investigation of soils was conducted at Group 6 (AOCs 19, 20, and 21) to assess and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, soil samples were collected and analyzed for potential site-related constituents.

7.1 Conclusions

AOC No. 19 – Seep North of MW-45

Three metals (arsenic, cobalt, and chromium) and diesel range organics were detected in soil samples at concentrations exceeding their respective screening levels. Arsenic was detected in nine samples at concentrations above the DAF screening level, with eight of these samples having concentrations above the residential screening level. Cobalt was detected in generally low concentrations with a maximum detected value of 11 mg/kg. As shown in Table 5, the samples with concentrations of cobalt above the screening levels do not have concentrations of organic constituents above screening levels. Chromium was detected in five samples at concentrations above the DAF screening level with only one being above the residential screening level. Arsenic, chromium, and cobalt are naturally occurring constituents in many soils and it is possible that these constituents are naturally occurring in soils at the Bloomfield Refinery. The analyses for chromium were for total chromium, which are compared to the chromium VI screening levels. It may be overly conservative to compare to the total chromium results to the chromium VI screening levels, but additional analyses will be required to speciate the chromium.

The analytical results for organic constituents (i.e., diesel range organics) above only the DAF screening level occur at three locations with a maximum value of 770 mg/kg. All three of these detections of diesel range organics are below the residential screening level. A fourth sample (AOC 19-23), which was collected from a cliff face, had a concentration of diesel range organics above the DAF and residential screening levels. This single detection of diesel range organics above the residential screening level does not warrant a response action because there is very limited potential for exposure to the small area represented by this sample.

The AOC 19-23 sample was collected from the location on a cliff face that had the greatest visible staining from apparent hydrocarbons. The entire cliff face at this location is only approximately five feet high and seven feet long, and there is very limited access to this area. The seep that caused the presence of hydrocarbons is no longer active with the installation of the slurry wall, therefore the hydrocarbons present at the surface should naturally degrade over time. The actual volume of impacted soils present near the land surface is also very small, as it appears the previous seep mainly caused only surface staining of soils along the small cliff face.

AOC No. 20 – Seep North of MW-46

Only cobalt and diesel range organics were detected at concentrations above the applicable screening levels. Cobalt was detected in only one soil sample at a concentration (8.9 mg/kg) above the DAF screening level (5.51 mg/kg) but did not exceed the residential soil screening level of 23 mg/kg. As noted above, cobalt may be a naturally occurring constituent. Diesel range organics were detected in only one sample at a concentration (490 mg/kg) above the DAF soil screening level of 200 mg/kg. None of the diesel range organic analytical results exceeded the residential direct contact screening level of 1,830 mg/kg.

AOC No. 21 – Seep North of MW-47

Similarly to AOC No. 20, only cobalt and diesel range organics were detected at concentrations above the applicable screening levels. Cobalt was detected in eight soil samples at concentrations above the DAF screening level (5.51 mg/kg) but none exceed the residential soil screening level of 23 mg/kg. Diesel range organics were detected in one sample at a concentration (710 mg/kg) above the DAF soil screening level of 200 mg/kg. None of the diesel range organic analytical results exceed the residential direct contact screening level of 1,830 mg/kg.

Cumulative Risk Evaluation

A cumulative risk evaluation for soils is presented in Table 6. This was conducted by taking the maximum reported concentration of each detected constituent from all three AOCs and dividing by the residential screening level and non-residential screening levels as shown in the equations below. These calculations are separated for carcinogenic and non-carcinogenic constituents. The cumulative carcinogenic risk is 6.703×10^{-5} assuming residential land use

and 1.36 x 10^{-5} for non-residential land use. The hazard index for residential land use is 3.557 and for non-residential land use is 1.652.

$$Site\ Risk = \left(\frac{conc_x}{SSL_x} + \frac{conc_y}{SSL_y} + \frac{conc_z}{SSL_z} + \cdots + \frac{conc_i}{SSL_i}\right) \times 10^{-5}$$

$$Site\ Hazard\ Index\ (HI) = \left(\frac{conc_x}{SSL_x} + \frac{conc_y}{SSL_y} + \frac{conc_z}{SSL_z} + \cdots + \frac{conc_i}{SSL_i}\right) \times 1$$

7.2 Recommendations

Western plans to conduct an investigation of background locations and will attempt to establish site-specific background values for various naturally occurring constituents (e.g., arsenic and cobalt in soils). After background values have been established, site data collected for AOCs 19, 20 and 21 should be reassessed to determine if some analytical results are actually representative of background conditions and not site-related impacts.

Additional soil samples should be collected at the locations with the highest concentrations of chromium at AOC 19 [e.g., AOC19-13 (0-0.5'), AOC 19-14 (0-0.5'), and AOC 19-18 (0-0.5')]. The samples should be analyzed for chromium VI to determine if the chromium detected in soils at AOC 19 is present as chromium III or chromium VI. If the chromium is determined to be chromium III instead of chromium VI, then the screening levels in Table 5 will need to be revised along with any associated figures.

After site-specific background values have been established and the location-specific speciation of chromium has been determined, then preparation of a risk assessment for the Group 6 AOCs may be appropriate. The site concentrations have been compared to residential screening levels in this investigation report; however, the physical nature of the seep areas may limit future use of this area. An evaluation of potential exposures in a site-specific risk assessment could offer a more appropriate evaluation of actual risks based on more likely future use of the area at AOCs 19, 20, and 21.

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

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DAVE MARTIN
Secretary

BUTCH TONGATE
Deputy Secretary

JAMES H. DAVIS, Ph.D.
Director
Resource Protection Division

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 5, 2012

Mr. Randy Schmaltz
Environmental Manager
Western Refining, Bloomfield Refinery
P.O. Box 159
Bloomfield, New Mexico 87413

RE: APPROVAL
INVESTIGATION REPORT GROUP 6 (AOC NO. 19 SEEP NORTH OF MW-45, AOC NO. 20 SEEP NORTH OF MW-46, AND AOC NO. 21 SEEP NORTH OF MW-47)
WESTERN REFINING SOUTHWEST, INC., BLOOMFIELD REFINERY
EPA ID# NMD089416416
HWB-WRB-11-008

Dear Mr. Schmaltz:

The New Mexico Environment Department (NMED) has completed its review of Western Refining Southwest, Inc., Bloomfield Refinery's (Western) *Investigation Report Group 6 (AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47)* (Report), dated November 2011. NMED hereby approves this Report with the following comments.

Comment 1

Section 7 (Conclusions and Recommendations), pages 32 through 34, summarizes the results of the investigation and provides conclusions and recommendations for the work completed at Group 6. However, Western did not discuss or provide any recommendations to address the

DRO result of 21,000 mg/kg from soil sample location AOC 19-23, which is significantly higher than the residential soil screening level (SSLs). NMED understands that the conditions at the site are not conducive to allow removal of the material from the bluff surface; however, Western must provide an explanation about the conditions at soil sample location AOC 19-23 to include a description of the location and an explanation why removal is not warranted or practicable. Western must include this discussion at the end of Section 7.2 (Recommendations) and provide a replacement page for the Report.

Comment 2

Section 7.2 (Recommendations), page 34, states that "[a]dditional soil samples should be collected at the locations with the highest concentrations of chromium at AOC 19 [e.g., AOC 19-13 (0-0.5'), AOC 19-14 (0-0.5'), and AOC 19-18 (0-0.5')]. The samples should be analyzed for chromium VI to determine if the chromium detected in soils at AOC 19 is present as chromium III or chromium VI." Western must collect at least three additional soil samples from soils within AOC 19 at locations where contaminants are not detected at high concentrations to determine if chromium is typically present as chromium III and not present only as a result of local reducing conditions in areas containing petroleum contamination. Western must submit a letter work plan to propose the additional investigation activities to collect these soil samples.

Comment 3

Figures 12 (AOC No. 19 Arsenic Soil Map) through 19 (AOC No. 21 Diesel Range Organics Soil Map) depict surface soil and soil boring locations with their corresponding analytical results. In addition, the results greater than the SSL are underlined. However, Western did not specify which SSL is represented in the figures. In future submittals, specify which SSLs are referenced in figures.

Comment 4

Appendix C provides site photographs of the areas of concern (AOCs) and seep locations. Some of the site photos depict sample locations, but they are not identified in the captions. In future submittals, identify the sample locations in the captions below the site photos if the sample locations are visible in the photo.

Western must adhere to all requirements in this Approval in future submittals. The replacement page must be submitted to NMED by **July 27, 2012**. The work plan referenced in Comment 2 must be submitted to NMED no later than **October 12, 2012**.

If you have any questions regarding this letter, please contact Leona Tsinnajinnie of my staff at (505) 476-6057.

Sincerely,

for

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
C. Chavez, OCD
A. Hains, Western
K. Robinson, Western Bloomfield Refinery

File: HWB-WRB-11-008 and Reading 2012

Western Refining

WNR LISTED NYSE

November 11, 2011

John E. Kieling, Acting Bureau Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, NM 87505

UPS Mail #: 1ZF9F6470196574075 (Addressed to NMED)
Certified Mail #: 7009 2250 0002 3833 5094 (Addressed to OCD)

Re: Group 6 Investigation Report
Western Refining Southwest, Inc., Bloomfield Refinery
EPA ID# NMD089416416

Dear Mr. Kieling:

Western Refining Southwest, Inc., Bloomfield Refinery submits the referenced Investigation Report pursuant to Section IV.B.7 of the July 2007 HWB Order. This Investigation Report summarizes the site environmental investigation activities completed for AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47, which has been designated as Group 6.

If you have any questions or would like to discuss the Investigation Report, please contact me at (505) 632-4171

Sincerely,

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

cc: Dave Cobrain – NMED HWB
Leona Tsinnajinnie – NMED HWB
Carl Chavez - NMOCD
Allen Hains – Western Refining El Paso
Scott Crouch – RPS Austin

RPS

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INVESTIGATION REPORT
GROUP 6

(AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47)

Bloomfield Refinery
Western Refining Southwest, Inc.
#50 Rd 4990
Bloomfield, New Mexico 87413

November 2011

James R. Schmaltz
Environmental Manager
Western Refining Southwest, Inc.
Bloomfield Refinery

Scott T. Crouch, P.G.
Senior Consultant
RPS
1250 South Capital of Texas Highway
Building Three, Suite 200
Austin, Texas 78746

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List of Acronyms

American Petroleum Institute (API)
areas of concern (AOCs)
benzene, toluene, ethylbenzene, and xylene (BTEX)
below ground level (bgl)
Code of Federal Regulations (CFR)
dilution/attenuation factor (DAF)
Environmental Protection Agency (EPA)
hazard index (HI)
hollow-stem auger (HSA)
investigation derived waste (IDW)
liquefied petroleum gas (LPG)
Massachusetts Department of Environmental Protection (MADEP)
maximum contaminant level (MCL)
monitoring well (MW)
New Mexico Administrative Code (NMAC)
New Mexico Environment Department (NMED)
Resource Conservation and Recovery Act (RCRA)
photoionization detector (PID)
polyvinyl chloride (PVC)
separate phase hydrocarbon (SPH)
Solid Waste Management Units (SWMUs)
total petroleum hydrocarbon (TPH)
toxicity characteristic leaching procedure (TCLP)
unified soil classification system (USCS)
volatile organic constituent (VOC)

Executive Summary

The Bloomfield Refinery, which is located in the Four Corners Area of New Mexico, has been in operation since the late 1950s. Past inspections by State and federal environmental inspectors have identified locations where releases to the environment may have occurred. These locations are generally referred to as Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs).

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. for the Bloomfield Refinery, this environmental site investigation was completed for AOC No. 19 (Seep North of MW-45), AOC No. 20 (Seep North of MW-46), and AOC No. 21 (Seep North of MW-47), which are designated as Group 6.

The Order requires that San Juan Refining Company and Giant Industries Arizona, Inc. determine and evaluate the presence, nature, and extent of historical releases of contaminants at the aforementioned AOCs. The investigation activities included collection and analysis of soil samples for potential site-related constituents beginning on August 15, 2011 and continuing through August 17, 2011. The samples were collected from 6 soil borings, which were completed using a hand auger, and from an additional 34 surface sample locations. A total of 45 soil samples (excluding additional quality assurance samples) were collected for analysis of potential site-related constituents (e.g., volatile and semi-volatile organics, total petroleum hydrocarbons, and metals).

Three metals (arsenic, chromium, and cobalt) and diesel range organics were detected in soil samples at concentrations exceeding their respective residential screening levels. Most of the soil samples with constituents detected at concentrations above the screening levels (excluding cobalt) are located at AOC No. 19; cobalt was reported at concentrations above the screening level at all three AOCs. A single sample at both AOC No. 20 and No. 21 had detections of diesel range organics at concentrations above the screening level.

Future studies are planned to evaluate background concentrations at the refinery and after site-specific background concentrations have been established for metals in soils, the reported results should be reevaluated to determine if any of the detected results are representative of background conditions. Additional sampling and analysis should be conducted to determine the

site-specific speciation of chromium in soils near the seeps. Subsequent to the comparison to background and determination of the speciation of chromium, a risk assessment could be completed to provide a more definitive evaluation of the risks posed by the presence of the constituents in area of the seeps.

Section 1
Introduction

The Bloomfield Refinery is located immediately south of Bloomfield, New Mexico in San Juan County (Figure 1). The physical address is #50 Road 4990, Bloomfield, New Mexico 87413. The Bloomfield Refinery is located on approximately 263 acres. Bordering the facility is a combination of federal and private properties. Public property managed by the Bureau of Land Management lies to the south. The majority of undeveloped land in the vicinity of the facility is used extensively for oil and gas production and, in some instances, grazing. U.S. Highway 550 is located approximately one-half mile west of the facility. The topography of the main portion of the site is generally flat with steep bluffs to the north where the San Juan River intersects Tertiary terrace deposits.

The Bloomfield Refinery is currently owned by San Juan Refining Company, a New Mexico corporation, and operated by Western Refining Southwest, Inc. formerly known as Giant Industries Arizona, Inc., an Arizona corporation. The Bloomfield Refinery has an approximate refining capacity of 18,000 barrels per day. Various process units operated at the facility, included crude distillation, reforming, fluidized catalytic cracking, sulfur recovery, merox treater, catalytic polymerization, and diesel hydrotreating. Products produced at the refinery included gasoline, diesel fuels, jet fuels, kerosene, propane, butane, naphtha, residual fuel, fuel oils, and liquefied petroleum gas (LPG).

On July 27, 2007, the New Mexico Environment Department (NMED) issued an Order to San Juan Refining Company and Giant Industries Arizona, Inc. ("Western") requiring investigation and corrective action at the Bloomfield Refinery. This Investigation Report has been prepared for the AOCs designated as Group 6 in the Order. Group 6 includes AOC No. 19 (Seep North of MW-45), AOC No. 20 (Seep North of MW-46), and AOC No. 21 (Seep North of MW-47).

The area of investigation that is the subject of this report is shown on Figure 2. The Group 6 AOCs are located north of the refinery complex, along the bluff that runs along the south side of the San Juan River.

The purpose of the site investigation is to determine and evaluate the presence, nature, and extent of releases of contaminants in accordance with 20.4.1.500 New Mexico Administrative Code (NMAC) incorporating 40 Code of Federal Regulations (CFR) Section 264.101. The

investigation activities were conducted in accordance with Section IV of the Order and focused on soil as that is the environmental media in these areas that may potentially contain contaminants. Groundwater presence in the area has been significantly reduced by the installation of a slurry wall along the top of bluff in April 2005. The investigation was completed pursuant to the Investigation Work Plan dated December 2009 (revised February 2011), which was approved by the NMED on March 1, 2011.

The samples of soil were analyzed for volatile and semi-volatile organic constituents, petroleum hydrocarbons, and metals. The results of these analyses are compared to applicable State or federal cleanup and screening levels as specified in Section VII. of the Order and as directed by NMED.

Section 2
Background

This section presents background information for Group 6, including a review of historical waste management activities for each location to identity the following:

- Type and characteristics of waste and contaminants handled in the subject AOCs;
- Known and possible sources of impacts;
- History of releases; and
- Known extent of impacts prior to the current investigation.

From 2001 to 2002, the Hammond Irrigation Ditch was lined with concrete. The ditch extends along the Facility's northern and western boundaries between the refinery and the San Juan River. The water present in the ditch acted as a hydraulic barrier prior to installation of the concrete liner, confining the bulk of the impacts to within the refinery boundaries. A recovery system with a French drain was installed to preserve the integrity of the concrete liner.

Between August and December 2004, petroleum hydrocarbons and water were observed to be seeping out of seven areas on the north side of the refinery near monitoring wells MW-45, MW-46, and MW-47. During inspections of these areas, hydrocarbon was observed to have stained the soil. Figure 2 shows the locations of these seeps.

Four seeps (Nos. 1, 2, 5, and 9) are located within two small drainage tributaries to the San Juan River at a location north of monitoring well MW-45. These seeps are referred to as AOC No. 19 Seep North of MW-45. Two seeps (Seep Nos. 6 and 7) were discovered along the bluff north of monitoring well MW-46 and are referred to as AOC No. 20 Seep North of MW-46. The last seep (No. 8) is located along the bluff above the San Juan River north of monitoring well MW-47 and is referred to as AOC No. 21 Seep North of MW-47.

Nine catchment basins were installed as temporary measures when the seeps were first identified in 2004. A liner was installed at each catchment basin with the exception of Seep No. 4. Initially, the water accumulating in the catchment basins was pumped to Tank 37 and then to the Refinery's wastewater treatment system. The basins were constructed by placing high density polyethylene (HDPE) on top of the exposed bedrock after the visibly impacted soils had been removed and earthen berms formed. The design of the catchment basins also allows the accumulation of rain water in addition to groundwater discharge.

The North Boundary Barrier Wall (slurry wall) was designed and installed along the top of bluff by April 2005 as a permanent control measure to prevent further potential discharges of groundwater to surface water and the generation of seeps along the bluff (Figure 2). Subsequent to the installation of the slurry wall and with the continued recovery of groundwater from the Hammond Ditch French drain, the discharge from the seeps was significantly reduced.

Only Seeps No. 1, 6, and 9 currently have any actual discharge of groundwater. Seep No. 1 has the most flow at the rate of a trickle. Seep No. 6 has about two thirds the flow of Seep No. 1 with Seep No. 9 measured by drips with no continuous flow. Seep Nos. 2, 5, 7, and 8 did have historic flows, but groundwater discharge has ceased subsequent to the installation of the slurry wall.

Water samples were collected from the seeps in 2007. The samples were collected on three occasions (October 9, 2007, November 8, 2007, and December 10, 2007) from the seeps, which had an active discharge of groundwater. The samples were collected from Seep Nos. 1, 6, 7, 8, and 9 shown on Figure 3 and were identified on the chain-of-custodies and analytical reports as Outfall #1, Outfall #6, Outfall #7, Outfall #8, and Outfall #9. The analytical results are summarized in Table 1. All of the analyses were non-detect for BTEX (benzene, ethylbenzene, toluene, and xylenes) constituents, with one exception. The October sample from Seep No. 1 (Outfall #1) indicated very low concentrations of benzene and xylenes at 0.0029 mg/l and 0.0039 mg/l, respectively. Both subsequent samples from this location were non-detect for all BTEX constituents. All of the detected results and non-detect quantitation limits for the 2007 analyses are less than the potentially applicable groundwater and surface water quality standards shown in Table 1.

Water samples have been collected from the seeps on a semiannual basis starting in 2008. As part of the Facility-Wide Groundwater Monitoring Plan, Western checks all of the identified seep locations (Nos. 1 through 9) on a bi-weekly basis to determine if there is evidence of an active groundwater discharge. The presence of groundwater discharges is recorded and water samples are collected during the semiannual sampling event, when water is present, from all seeps that have indicated an active groundwater discharge within the past six months. The analytical results from these seep samples are summarized in Table 1. No semi-volatile organic compounds were detected in any of the seep samples and, therefore, are not included in the summary table. All analytical results are included in the Groundwater Remediation and Monitoring Report, which is submitted to the NMED in April of each year.

Results of the historical analyses of seep samples show that chloride and sulfate are detected at concentrations above the New Mexico Water Quality Control Commission Standards for Groundwater. All of the 2008 and 2009 analyses were non-detect for BTEX (Western Refining Southwest, Inc., 2009). Methyl tert-butyl ether (MTBE) was sporadically reported in some seep samples at concentrations ranging from less than 0.001 to 0.048 mg/L.

Section 3
Scope of Activities

3.1 Soil Boring Installation and Sample Collection

Pursuant to Section IV of the Order and the approved Group 6 Investigation Work Plan, an investigation of soils was conducted to determine and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, surface soil samples were collected and soil borings were installed at AOCs 19, 20, and 21 (Figure 3). No groundwater samples were collected as the water from the seeps is already collected and analyzed on a semiannual basis as part of the Facility-Wide Groundwater Monitoring Plan. As outlined in the work plan, there is the potential for constituents to have been released to soils at known locations at AOCs 19, 20, and 21 and therefore a judgmental sampling design was implemented.

Where the HDPE liners are present within the catchment basins, surface soil samples were collected as discussed below and in Section 4.3. Hand augured soil borings were installed at select locations along the arroyos (drainage pathways) and samples were collected from the following intervals where refusal did not prevent sample collection to these depths:

- 0-0.5';
- 1.5-2.5'; and
- Total depth of the boring (if different from the two designated sampling intervals).

Six soil borings were completed at locations in the middle of the drainage pathways and at locations just downstream from the berms of the catchment basins. Thirty four surface soil samples (0-0.5' only) were collected at the seep faces, on top of the HDPE liners, at select locations along the bottom of the drainage pathways, and along the margins of the drainage pathways, which occur on the banks of the drainage pathways and at the edge of the catchment basin liners.

Soil samples were collected at AOC No. 19 from the following locations (Figure 4):

- Three surface soil samples [AOC 19-1 (0-0.5'), AOC 19-2 (0-0.5'), and AOC 19-3 (0-0.5')] were collected near Seep No. 1, with one of the samples collected from the seep face and the other two samples collected along the margins of the drainage pathway;
- Near Seep No.2, a total of three surface soil samples [AOC 19-4 (0-0.5'), AOC 19-5 (0-0.5'), and AOC 19-6 (0-0.5')] were collected with one collected from the seep face and the other two collected from along the margins of the drainage pathway;

- Three surface soil samples [AOC 19-20 (0-0.5'), AOC 19-22 (0-0.5'), and AOC 19-23 (0-0.5')] were collected near Seep No. 5 with one collected from the seep face and two collected along the margins of the drainage pathway;

- Four surface soil samples [AOC 19-14 (0-0.5'), AOC 19-15 (0-0.5'), AOC 19-16 (0-0.5'), and AOC 19-17 (0-0.5')] were collected near Seep No. 9 with one collected from the bottom of the drainage pathway where the seep originated, one sample collected from the center of the lined catchment basin, and two samples collected from along the margins of the drainage pathway;

- One surface soil sample [AOC 19-13 (0-0.5')] was collected at Seep No. 4 at the center of the natural basin where the seep daylighted;

- Two surface soil samples [AOC 19-19 (0-0.5'), and AOC 19-21 (0-0.5')] were collected from along the margins of the drainage pathway between Seep No. 5 and Seep No. 9;

- Four surface soil samples [AOC 19-8 (0-0.5'), AOC 19-10 (0-0.5'), AOC 19-11 (0-0.5'), and AOC 19-12 (0-0.5')] were collected along the margins of the drainage pathway between Seep No. 3 and Seep No. 4; and

- Four soil samples [AOC 19-7 (0-0.5'), AOC 19-7 (1.5-2.0'), AOC 19-9 (0-0.5'), and AOC 19-18 (0-0.5')] were collected from the three soil borings, which are located near the center of the two major drainage pathways that occur at AOC No. 19. The original Scope of Services called for two samples from each boring but refusal was reached at a depth of 0.5' in two of the borings, thus preventing sample collection from the 1.5-2.0' interval.

At AOC No. 20, soil samples were collected at the following locations (Figure 5):

- Four surface samples [AOC 20-1 (0-0.5'), AOC 20-2 (0-0.5'), AOC 20-3 (0-0.5'), and AOC 20-4 (0-0.5')] were collected at Seep No. 6 with one sample collected from the seep face, one soil sample collected from on top of the catchment liner, and two samples collected from along the margins of the drainage pathway;

- Three surface soil samples [AOC 20-9 (0-0.5'), AOC 20-10 (0-0.5'), and AOC 20-11 (0-0.5')] were collected at Seep No. 7, with one sample collected from the top of the catchment liner and two samples collected from along the margins of the drainage pathway;

- Two surface soil samples [AOC 20-8 (0-0.5') and AOC 20-12 (0-0.5')] were collected from along the center line of the drainage pathway that extends from Seep No. 6 toward the San Juan River;

- Two surface soil samples [AOC 20-6 (0-0.5') and AOC 20-7 (0-0.5')] were collected from the margins of the drainage pathway that extends from Seep No. 6 toward the San Juan River; and

- One soil sample [AOC 20-5 (0-0.5')] was collected from a soil boring at the center line of the drainage pathway that extends below Seep No. 6. The original Scope of Services called for two samples from each boring but refusal was reached at a depth of 0.5' in this boring, thus preventing sample collection from the 1.5-2.0' interval.

Soil samples were collected from the following locations at AOC No. 21 (Figure 6):

- Three surface soil samples [AOC 21-2 (0-0.5'), AOC 21-3 (0-0.5'), and AOC 21-4 (0-0.5')] were collected at Seep No. 8, with one collected from the top of the catchment liner and two collected from along the margins of the drainage pathway; and

- Six soil samples [AOC 21-1 (0-0.5'), AOC 21-1 (1.5-2.0'), AOC 21-1 (2.0-2.5'), AOC 21-5 (0-0.5'), AOC 21-5 (1.5-2.0'), and AOC 21-5 (2.0-2.5') were collected from two soil borings, with one positioned at the discharge point of Seep No. 8 and the other down the drainage pathway just below the catchment berm near Seep No. 8.

3.2 Background Information Research

Documents containing the results of previous investigations and subsequent routine groundwater monitoring data from monitoring wells and the seeps were reviewed to facilitate development of the Investigation Work Plan. The previously collected data provide detailed information on the overall subsurface conditions, including hydrogeology and contaminant distribution within groundwater on a site-wide basis. The data collected under this scope of services will supplement the existing soil and groundwater information and provide specific information regarding contaminant occurrence and distribution within soils near the seeps.

3.3 Collection and Management of Investigation Derived Waste

Soil cuttings (i.e., excess sample material) were contained and will be characterized using methods based on the type of contaminants suspected or encountered. A discrete sample will be collected for waste characterization using a decontaminated stainless-steel spoon because the material is uniform in character and there was only a very small volume of soils generated (i.e., less than one 55-gallon drum), which were collected from within an area with similar types of potential constituents. Additional discussion on management of IDW is presented in Appendix A. The soil sample will be analyzed for leachable RCRA 8 Metals [(Environmental Protection Agency (EPA) method 6010B] using the toxicity characteristic leaching procedure (TCLP) , Total Petroleum Hydrocarbons (gasoline, diesel, and motor oil ranges- EPA method 8015B), Polyaromatic Hydrocarbons (EPA method 8310), and BTEX and methyl tertiary butyl ether (EPA method 8260B).

All decontamination water (approximately 30 gallons total) was disposed at the end of each day in the refinery wastewater treatment system upstream of the American Petroleum Institute (API) Separator.

3.4 Surveys

A hand held GPS receiver was used to record the coordinates of each surface soil and soil boring location. These coordinates were recorded on the field boring logs. The soil boring locations were subsequently surveyed by a registered surveyor.

The horizontal coordinates and elevation of each surface sampling location; the surface coordinates and elevation of each soil boring, and the locations of all other pertinent structures was determined by a registered New Mexico professional land surveyor in accordance with the State Plane Coordinate System (NMSA 1978 47-1-49-56 (Repl. Pamp. 1993)). The surveys were conducted in accordance with Sections 500.1 through 500.12 of the Regulations and Rules of the Board of Registration for Professional Engineers and Surveyors Minimum Standards for Surveying in New Mexico. Horizontal positions were measured to the nearest 0.1-ft, and vertical elevations were measured to the nearest 0.01-ft. The survey data is included in Appendix B.

Section 4
Field Investigation Results

This section provides a summary of the surface and subsurface conditions at the refinery, including AOCs No. 19, 20, and 21. A discussion is included on the installation of soil borings, field screening of soils, and collection of soil samples for analysis. Groundwater and surface water conditions are described in the last two subsections.

4.1 Surface Conditions

Regionally, the surface topography slopes toward the floodplain of the San Juan River, which runs along the northern boundary of the refinery complex. To the south of the refinery, the drainage is to the northwest. North of the refinery, across the San Juan River, surface water flows in a southeasterly direction toward the San Juan River. The active portion of the refinery property, where the process units and storage tanks are located, is generally of low relief with an overall northwest gradient of approximately 0.02 ft/ft. The refinery sits on an alluvial floodplain terrace deposit and there is a steep bluff (approx. drop of 90 feet) at the northern boundary of the refinery where the San Juan River intersects the floodplain terrace, which marks the southern boundary of the floodplain. AOCs 19, 20, and 21 are located on the face of this steep bluff.

There are two locally significant arroyos, one immediately east and another immediately west of the refinery. These arroyos collect most of the surface water flows in the area, thus significantly reducing surface water flows across the refinery. A minor drainage feature is located on the eastern portion of the refinery, where the former Landfill Pond (SWMU No. 9) was located. There are several steep arroyos located to the west along the northern refinery boundary on the steep bluff face that capture local surface water flows and minor groundwater discharges. As shown in the photographs in Appendix C, the seeps associated with AOC Nos. 19, 20 and 21 are located within these western arroyos along the northern refinery boundary.

The refinery complex is bisected by County Rd #4990 (Sullivan Road), which runs east-west. The process units, storage tanks (crude oil and liquid products), wastewater treatment systems, and AOCs 19, 20, and 21 are located north of the county road. The crude oil and product loading racks, LPG storage tanks and loading racks, maintenance buildings/90-day storage area, pipeline offices, transportation truck shop, and the Class I injection well are located south of the county road. There is very little vegetation throughout these areas with most surfaces

composed of concrete, asphalt, or gravel. The area between the refinery and the San Juan River where AOCs 19, 20 and 21 are located does have limited vegetation on steep slopes that do not support dense vegetation.

4.2 Subsurface Conditions

Numerous soil borings and monitoring wells have been completed across the refinery property during previous site investigations and installation of the slurry wall, which runs along the northern and western refinery boundary. Based on the available site-specific and regional subsurface information, the site is underlain by the Quaternary Jackson Lake terrace deposits, which unconformably overlie the Tertiary Nacimiento Formation. The Jackson Lake deposits consist of fine grained sand, silt and clay that grades to coarse sand, gravel and cobble size material closer to the contact with the Nacimiento Formation. The Jackson Lake Formation is over 40 feet thick near the southeast portion of the site and generally thins to the northwest toward the San Juan River. The Nacimiento Formation is primarily composed of fine grained materials (e.g., carbonaceous mudstone/claystone with interbedded sandstones) with a reported local thickness of approximately 570 feet (Groundwater Technology Inc., 1994).

Figures 7 and 8 present cross-sections of the shallow subsurface based on borings logs from on-site monitoring well completions. The boring log for MW-54 on Figure 7 is similar to the logs for MW-45 and MW-46 and depicts the shallow subsurface stratigraphy in the vicinity of AOC Nos. 19, 20 and 21. The surface elevation along the bluff is approximately 5504 feet MSL (based on the surface elevations of monitoring wells MW-45 and MW-46). As shown in Cross-Section A-A' (Figure 7), the top of the Nacimiento Formation occurs at approximately 5495 feet MSL. Due to erosion along the bluff, the elevation of the top of the Nacimiento near the seeps is as much as 60 feet lower.

The uppermost aquifer is under water table conditions and occurs within the sand and gravel deposits of the Jackson Lake Formation. The Nacimiento Formation functions as an aquitard at the site that prevents constituents from migrating to deeper aquifers. The potentiometric surface as measured in August 2009 is presented as Figure 9 and shows the groundwater flowing to the northwest.

Previous investigations have identified and delineated impacts to groundwater from historical site operations. Figure 10 shows the distribution of separate phase hydrocarbon (SPH) in the subsurface based on the apparent thickness of SPH measured in monitoring wells. SPH is not

present within the AOC seeps or within nearby monitoring wells. Dissolved-phase impacts are depicted on Figure 11.

4.3 Exploratory Drilling Investigations, Soil Sampling and Boring Abandonment

This subsection provides a description of surface and subsurface investigations to locate potential impacts to soils. This includes soil field screening results, soil sampling intervals and methods for detection of surface and subsurface impacts in soils.

The soil borings were completed using a hand auger and a general description of the exploratory drilling activities is as follows. The sampling equipment (i.e., hand auger and stainless steel trowel) was decontaminated between each borehole, as described in Appendix A. All soil borings were extended to the depth of refusal, which varied from 0.5 feet to 2.5 feet.

Discrete soil samples were collected for laboratory analysis at the following intervals:

- 0-0.5' (all locations);
- 1.5-2.0' (AOC 19-1, AOC 21-1, and AOC 21-5); and
- 2.0-2.5' (AOC 21-1 and AOC 21-5).

The installation of soil borings and collection of soil samples is discussed below in numerical order for each of the AOCs. A description of the field screening and soil sampling procedures are presented in Appendix A – Field Methods. Copies of the boring logs are provided in Appendix D. In addition to being included on the soil boring logs, the soil vapor (i.e., headspace) screening results are summarized in Table 2. The locations of the soil borings appear on Figures 12 through 19.

4.3.1 AOC 19 – Seep North of MW-45

AOC 19-1

On August 15, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-1. One soil sample was collected from 0 - 0.5 feet. The sample was collected from the discharge point of Seep 1 and was noted as being clayey sand, which was moist to saturated. Field screening with a photoionization detector (PID) indicated potential impacts with an elevated reading of 92 parts per million (ppm).

AOC 19-2

On August 15, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-2. One soil sample was collected from 0 - 0.5 feet. The sample was collected near Seep 1 and was noted as being clayey sand, which was damp to dry. Field screening with a PID did not indicate impacts with a reading of 5 ppm and there was no odor.

AOC 19-3

One surface soil sample was collected from 0 - 0.5 feet on August 15, 2011 at location AOC 19-3 using a stainless steel trowel. The sample was collected near Seep 1 and was noted as being clayey sand, which was dry to damp. Field screening with a PID did not indicate impacts with a reading of 5 ppm and there was no odor.

AOC 19-4

On August 15, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-4. One soil sample was collected from 0 - 0.5 feet. The sample was collected from the historic discharge point of Seep 2 and was noted as being clayey sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 4.2 ppm and there was no odor.

AOC 19-5

One surface soil sample was collected from 0 - 0.5 feet on August 15, 2011 at location AOC 19-5 using a stainless steel trowel. The sample was collected near Seep 2 and was noted as being silty sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 3.5 ppm and there was no odor.

AOC 19-6

On August 15, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-6. One soil sample was collected from 0 - 0.5 feet. The sample was collected near Seep 2 and was noted as being clayey sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 2 ppm and there was no odor.

AOC 19-7

On August 16, 2011 a hand auger was used to collect soil samples at location AOC 19-7 to the depth of refusal, which occurred a depth of 2 feet below ground level (bgl). Soil boring AOC 19-

7 was located along the center line of the drainage pathway below Seep 2 and just above the catchment basin referred to as Seep 3. No odor and low PID readings (2.0 – 2.4 ppm) were observed from 0 to 2 feet bgl in very fine sand and samples were collected from 0 - 0.5 feet and 1.5 - 2.0 feet bgl. Groundwater was not encountered and the boring was plugged on August 16, 2011.

AOC 19-8

One surface soil sample was collected from 0 - 0.5 feet on August 15, 2011 at location AOC 19-8 using a stainless steel trowel. The sample was collected along the drainage pathway between catchment basins known as Seep 3 and 4 and was logged as silt, which was dry. Field screening with a PID did not indicate impacts with a reading of 4.8 ppm and there was no odor.

AOC 19-9

On August 16, 2011 a hand auger was used to collect soil samples at location AOC 19-9 to the depth of refusal, which occurred a depth of 0.5 feet bgl. Soil boring AOC 19-9 was located along the center line of the drainage pathway betweens Seep 3 and 4. No odor and a low PID reading (3.2 ppm) were observed from 0 to 0.5 feet bgl in very fine sand and a sample was collected from 0 - 0.5 feet. Groundwater was not encountered and the boring was plugged on August 16, 2011.

AOC 19-10

On August 15, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-10. One soil sample was collected from 0 - 0.5 feet. The sample was collected along the drainage pathway between catchment basins known as Seep 3 and 4 and was noted as being fine sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 2.6 ppm and there was no odor.

AOC 19-11

One surface soil sample was collected from 0 - 0.5 feet on August 15, 2011 at location AOC 19-11 using a stainless steel trowel. The sample was collected along the drainage pathway just above the catchment basin known as Seep 4 and was logged as silt, which was dry. Field screening with a PID did not indicate impacts with a reading of 3.1 ppm and there was no odor.

AOC 19-12

On August 15, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-12. One soil sample was collected from 0 - 0.5 feet. The sample was collected along the drainage pathway just above the catchment basin known as Seep 4 and was noted as being silty fine sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 2.8 ppm and there was no odor.

AOC 19-13

One surface soil sample was collected from 0 - 0.5 feet on August 15, 2011 at location AOC 19-13 using a stainless steel trowel. The sample was collected from the center of the catchment basin known as Seep 4 and was logged as silty sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 1.8 ppm and there was no odor.

AOC 19-14

On August 16, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-14. One soil sample was collected from 0 - 0.5 feet. The sample was collected near Seep 9 and was logged as silt, which was dry. Field screening with a PID did not indicate impacts with a reading of 2.4 ppm and there was no odor.

AOC 19-15

One surface soil sample was collected from 0 - 0.5 feet on August 16, 2011 at location AOC 19-15 using a stainless steel trowel. The sample was collected from center of Seep 9 and was logged as silt, which was dry. Field screening with a PID did not indicate impacts with a reading of 1.2 ppm and there was no odor.

AOC 19-16

On August 16, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-16. One soil sample was collected from 0 - 0.5 feet. The sample was collected at Seep 9 and was logged as silty fine sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 4.6 ppm and there was no odor.

AOC 19-17

One surface soil sample and a duplicate were collected from 0 - 0.5 feet on August 16, 2011 at location AOC 19-17 using a stainless steel trowel. The sample was collected from the drainage

pathway near the origin of Seep 9 and was logged as sandy clay, which was damp to moist. Field screening with a PID did not indicate impacts with a reading of 3.2 ppm and there was no odor.

AOC 19-18

On August 16, 2011 a hand auger was used to collect soil samples at location AOC 19-18 to the depth of refusal, which occurred a depth of 0.5 feet bgl. Soil boring AOC 19-18 was located along the center line of the drainage pathway between Seeps 5 and 9. No odor and a low PID reading (4.2 ppm) were observed from 0 to 0.5 feet bgl in a gravelly, fine to medium grained sand and a sample was collected from 0 - 0.5 feet.

AOC 19-19

One surface soil sample was collected from 0 - 0.5 feet on August 16, 2011 at location AOC 19-19 using a stainless steel trowel. The sample was collected from the drainage pathway between Seeps 5 and 9, and was logged as gravelly, very fine sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 2.8 ppm and there was no odor.

AOC 19-20

On August 16, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-20. One soil sample was collected from 0 - 0.5 feet. The sample was collected from the drainage pathway at Seep 5 and was logged as gravelly, very fine grained sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 3.2 ppm and there was no odor.

AOC 19-21

One surface soil sample was collected from 0 - 0.5 feet on August 16, 2011 at location AOC 19-21 using a stainless steel trowel. The sample was collected between Seeps 5 and 9 and was logged as gravelly, very fine sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 3.6 ppm and there was no odor.

AOC 19-22

On August 16, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 19-22. One soil sample was collected from 0 - 0.5 feet. The sample was

collected at Seep 5 and described as gravelly, very fine grained sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 2.1 ppm and there was no odor.

AOC 19-23

One surface soil sample was collected from 0 - 0.5 feet on August 16, 2011 at location AOC 19-23 using a stainless steel trowel. The sample was collected at the historic discharge point at Seep 5 and was logged as weathered sandstone, which was dry. Field screening with a PID did not indicate impacts with a reading of 4.9 ppm but there was a faint odor and there was an indication of staining.

4.3.2 AOC 20 – Seep North of MW-46

AOC 20-1

On August 17, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 20-1. One soil sample was collected from 0 - 0.5 feet. The sample was collected near the discharge point for Seep 6 and was logged as gravelly, fine grained sand, which was damp. Field screening with a PID did not indicate impacts with a reading of 2.0 ppm and there was no odor.

AOC 20-2

One surface soil sample was collected from 0 - 0.5 feet on August 17, 2011 at location AOC 20-2 using a stainless steel trowel. The sample was collected at Seep 6 and was logged as clayey sand, which was damp. Field screening with a PID did not indicate impacts with a reading of 1.3 ppm and there was no odor.

AOC 20-3

On August 17, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 20-3. One soil sample and a duplicate were collected from 0 - 0.5 feet. The sample was collected near the center of the containment area for Seep 6 and was logged as clay, which was damp. Field screening with a PID did indicate a potential for impacts with a reading of 33 ppm and there was a faint odor.

AOC 20-4

One surface soil sample was collected from 0 - 0.5 feet on August 17, 2011 at location AOC 20-4 using a stainless steel trowel. The sample was collected at Seep 6 and was logged as silt,

which was damp. Field screening with a PID indicated a low potential for impacts with a reading of 9.4 ppm and there was no odor.

AOC 20-5

On August 17, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 20-5. This location was designated for a soil boring but refusal was reached at 0.5 feet so the sample was collected with a trowel from 0 - 0.5 feet. The sample was collected along the center of the drainage that flows from Seep 6 to Seep 7. The sample was logged as dry sandy gravel with gravel sizes ranging from ½ inch to 6 inches. Field screening with a PID did not indicate impacts with a reading of 2.4 ppm and there was no odor.

AOC 20-6

One surface soil sample was collected from 0 - 0.5 feet on August 17, 2011 at location AOC 20-6 using a stainless steel trowel. The sample was collected along the drainage pathway betweens Seeps 6 and 7, and was logged as very fine sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 2.4 ppm and there was no odor.

AOC 20-7

On August 17, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 20-7. One soil sample was collected from 0 - 0.5 feet. The sample was collected along the drainage that flows from Seep 6 to Seep 7. The sample was logged as dry fine sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 0.7 ppm and there was no odor.

AOC 20-8

On August 17, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 20-8. The sample was collected with a trowel from 0 - 0.5 feet. The sample was collected along the center of the drainage that flows from Seep 6 to Seep 7. The sample was logged as dry sandy gravel with gravel sizes ranging from ½ inch to 6 inches. Field screening with a PID did not indicate impacts with a reading of 0.7 ppm and there was no odor.

AOC 20-9

One surface soil sample was collected from 0 - 0.5 feet on August 17, 2011 at location AOC 20-9 using a stainless steel trowel. The sample was collected near Seep 7 and was logged as very

fine sand, which was dry. Field screening with a PID did not indicate impacts with a reading of 2.4 ppm and there was no odor.

AOC 20-10

On August 17, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 20-10. The sample was collected with a trowel from 0 - 0.5 feet. The sample was collected near Seep 7 and was logged as dry very fine sand. Field screening with a PID did not indicate impacts with a reading of 2.7 ppm and there was no odor.

AOC 20-11

One surface soil sample was collected from 0 - 0.5 feet on August 17, 2011 at location AOC 20-11 using a stainless steel trowel. The sample was collected near the center of historic Seep 7 and was logged as dry sandy gravel with gravel sizes ranging from ½ inch to 6 inches. Field screening with a PID did not indicate impacts with a reading of 2.3 ppm and there was no odor.

AOC 20-12

On August 17, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 20-12. The sample was collected with a trowel from 0 - 0.5 feet. The sample was collected near Seep 7 and was logged as dry very fine sand. Field screening with a PID did not indicate impacts with a reading of 2.1 ppm and there was no odor.

4.3.3 AOC 21 – Seep North of MP-47

AOC 21-1

On August 17, 2011 a hand auger was used to collect soil samples at location AOC 21-1 to the depth of refusal, which occurred a depth of 2.5 feet bgl. Soil boring AOC 21-1 was completed at the historic discharge location of Seep 8. No odor and low PID readings (0.8 – 1.6 ppm) were observed from 0 to 2.5 feet bgl in silty sand. Soil samples were collected from 0 - 0.5 feet, 1.5 - 2.0 feet and 2.0 – 2.5 feet bgl. Groundwater was not encountered and the boring was plugged on August 17, 2011.

AOC 21-2

One surface soil sample and a duplicate were collected from 0 - 0.5 feet on August 15, 2011 at location AOC 21-2 using a stainless steel trowel. The sample was collected near Seep 8 and

was logged as dry silty clay. Field screening with a PID indicated a low potential for impacts with a reading of 9.8 ppm and there was no odor.

AOC 21-3

On August 15, 2011 a surface soil sample was collected using a stainless steel trowel at location AOC 21-3. The sample was collected from 0 - 0.5 feet. The sample was collected near Seep 8 and was logged as dry silty fine sand. Field screening with a PID did not indicate impacts with a reading of 1.3 ppm and there was no odor.

AOC 21-4

One surface soil sample was collected from 0 - 0.5 feet on August 15, 2011 at location AOC 21-4 using a stainless steel trowel. The sample was collected from the center of the catchment basin at Seep 8 and was logged as dry silt. Field screening with a PID did not indicate a potential for impacts with a reading of 5.0 ppm and there was no odor.

AOC 21-5

On August 17, 2011 a hand auger was used to collect soil samples at location AOC 21-5 to the depth of refusal, which occurred a depth of 2.5 feet bgl. Soil boring AOC 21-5 was located along the center of the drainage pathway, downstream of Seep 8. No odor and low PID readings (0.7 ppm) were observed from 0 to 2.5 feet bgl in silty sand. Soil samples were collected from 0 - 0.5 feet, 1.5 - 2.0 feet and 2.0 – 2.5 feet bgl. Groundwater was not encountered and the boring was plugged on August 17, 2011.

4.4 Groundwater Conditions

The uppermost aquifer is under water table conditions and occurs within the sand and gravel deposits of the Jackson Lake Formation. The Nacimiento Formation functions as an aquitard at the site and prevents site related contaminants from migrating to deeper aquifers. The potentiometric surface as measured in August 2009 is presented in Figure 9 and shows the groundwater flowing to the northwest. The potentiometric surface at the site is consistent with the regional gradient in that movement is toward to the San Juan River, which is a location of regional groundwater discharge. The installation of the North Boundary Barrier Wall (i.e., slurry wall) and collection wells/French drain along the western and northern boundary of the refinery controls the flow of groundwater in this area and has basically eliminated the discharge of groundwater from the refinery.

The slurry wall was designed and installed as a permanent control measure to prevent further potential discharges of groundwater to surface water and the generation of seeps along the bluff. Subsequent to the installation of the slurry wall in 2005 and with the continued recovery of groundwater from the Hammond Ditch French drain, the discharge from the seeps was significantly reduced. Only Seeps Nos. 1, 6, and 9 currently have any actual discharge of groundwater. Seep No. 1 has the most flow at the rate of a trickle. Seep No. 6 has about two thirds the flow of Seep No. 1 with Seep No. 9 measured by drips with no continuous flow. Seep Nos. 2, 5, 7, and 8 did have historic flows, but groundwater discharge has ceased subsequent to the installation of the slurry wall.

No separate phase hydrocarbon (SPH) has been observed in the discharge from the seeps since installation of the slurry wall. The areas with the greatest saturated thickness are generally found near and along the Hammond Ditch and on-site surface impoundments (i.e., the current and former raw water ponds). The predominant source of recharge to the shallow aquifer beneath the refinery is recharge from man-made features (e.g., the Hammond Ditch and on-site surface impoundments).

The saturated thickness in the water table aquifer varies from zero feet in the southern and eastern portions of the site to a maximum of approximately eight feet along the northern portion of the refinery, on the up-gradient side of the slurry wall. On the down-gradient side of the slurry wall in the area of AOCs 19, 20, and 21, the saturated thickness has declined significantly since installation of the slurry wall as indicated by the number of dry wells in this area, as shown on Figure 10.

4.5 Surface Water Conditions

The only local surface water body, excluding on-site surface impounds and the Hammond Irrigation Ditch, is the San Juan River, which flows along the northern most property boundary. There were no accumulations of surface water observed during the site investigation in the areas of AOCs 19, 20, or 21. The discharge from the seeps at AOCs 19, 20, and 21 is currently so low as not to generate an accumulation of surface water but during rainfall events, there could be temporary accumulations of surface water in some of the catchment basins constructed near the seeps.

Regionally, the surface topography slopes toward the floodplain of the San Juan River, and across most of the refinery and to the south of the refinery, the drainage is to the northwest.

There is a steep bluff (approx. drop of 90 feet) at the northern boundary of the refinery where the San Juan River intersects the floodplain terrace, which marks the southern boundary of the floodplain. AOCs 19, 20, and 21 are located on this steep bluff.

There are two locally significant arroyos, one immediately east and another immediately west of the refinery, which collect most of the surface water flows in the area, thus significantly reducing surface water flows across the refinery. A minor drainage feature is located on the eastern portion of the refinery, where the Landfill Pond (SWMU No. 9) was located and there are several steep arroyos along the northern refinery boundary that primarily capture only local surface water flows. There are smaller arroyos located on the bluff face and the seeps are generally near the headwall of the arroyos or along the arroyos.

The average annual rainfall is only approximately 8.6 inches, thus the threat of surface water transport of contaminants as suspended load or dissolved phase is low. The refinery implements a Stormwater Pollution Prevention Plan to ensure that surface waters of the State are not impacted by refinery operations.

Section 5
Regulatory Criteria

The applicable screening and cleanup levels are specified in Section VII of the Order issued by NMED on July 2, 2007. The soil cleanup levels are based on a target excess cancer risk of 10^{-5} for carcinogenic contaminants and a target hazard index of 1.0 for noncarcinogenic contaminants. The Order specifies a hierarchy of screening levels, with the screening levels based on NMED guidance taking precedence over EPA's Region VI Human Health Medium Specific Screening Levels with one exception for groundwater. Based on direction received from NMED subsequent to issuance of the Order, EPA's Region VI Human Health Medium Specific Screening Levels have been replaced with EPA Regional Screening Levels dated April 2009. NMED guidance used to establish cleanup levels includes the *Technical Background Document for Development of Soil Screening Levels* (Revision 5.0 dated August 2009) and *Total Petroleum Hydrocarbon (TPH) Screening Guidelines* (dated October 2006).

For non-residential properties (e.g., the Bloomfield Refinery), the soil screening levels must be protective of commercial/industrial workers throughout the upper two feet of surface soils and construction workers throughout the upper ten feet based on NMED criteria. NMED residential soil screening levels are applied to the upper ten feet and soil screening levels for protection of groundwater apply throughout the vadose zone. EPA soil screening levels for direct contact exposure apply to the upper two feet of the vadose zone. To achieve closure as "corrective action complete without controls", the affected media must meet residential screening levels, which are presented in Table 3. Table 4 provides a list of the available NMED and EPA soil screening levels for non-residential properties. While Tables 3 and 4 indicate the various depths to which the individual soil screening levels are applicable, Table 5 discussed below does not include this level of detail.

The aforementioned Tables 3 and 4 have soil screening levels for the soil-to-groundwater pathway that are based on a dilution/attenuation factor (DAF) of 1.0 and 11.25 A review of site conditions indicates that a DAF of 1.0 is overly conservative, thus a site-specific DAF value was calculated. A review of the site-specific conditions at each of the SWMUs and AOCs recently investigated indicates that the conditions at SWMU No. 2 Drum Storage Area North Bone Yard could present a greater potential for constituents to leach from soils to the underlying groundwater because SWMU No. 2 has the shallowest depth to groundwater. There is not a

significant accumulation of groundwater present above the Nacimiento Formation at AOCs 19, 20, or 21. A DAF value of 11.25 was calculated for SWMU No. 2 in the Group No. 2 Investigation Report (dated May 2009, revised March 2010) and although it may be overly conservative for the AOCs investigated under Group 6, the same DAF value of 11.25 is applied at all locations presented in this Investigation Report. The documentation of the calculation of the site-specific DAF value is provided in Appendix E.

The screening levels that are compared to individual soil sample results from AOCs 19, 20, and 21 are presented in Table 5. The screening levels included in Table 5 are based on residential land use and include screening levels to evaluate the potential for constituents to migrate to groundwater using the site-specific DAF of 11.25. The screening levels in Table 5 have not been segregated based on depth of the soil sample as discussed above for Tables 3 and 4. It should also be noted that the screening levels for chromium are conservatively based on the presence of chromium VI; speciation has not been conducted to determine if the detected chromium is chromium III or chromium VI.

A review of the NMED TPH Screening Guidelines (dated 2006) indicates that the TPH screening levels were developed based on screening levels and compositional assumptions developed by the Massachusetts Department of Environmental Protection (MADEP). The screening levels were developed to be protective of both direct contact exposures and leachate generation. The analytical results, as presented in Table 5, are reported for gasoline range organics (C6- C10), diesel range organics (>C10-C28), and motor oil range organics (>C28-C35). The applicable TPH screening levels used for comparison to the individual samples are selected from Table 2a of the NMED guidance. Because the specific type of products (e.g., diesel fuel or jet fuel) that were released in the potential source areas and migrated to AOCs 19, 20, or 21 is not known, "unknown oil" was selected from Table 2a for comparison to the diesel range analytical results. There are no screening levels for comparison to results reported in the gasoline range.

The analyses for motor oil range organics only report results for >C28 to C35. Since the motor oil range analytical results only include hydrocarbons greater than C28, it is not appropriate to compare the results against screening levels for product types that have lower hydrocarbon ranges (e.g., diesel fuel – 60% C11-C22 aromatics and 40% C9-C18 aliphatics). The only product type in the NMED guidance that contains the >C28-C35 carbon range is "waste oil",

which includes C19-C36. Therefore, the motor oil range soil analytical results are compared to the "waste oil" soil screening levels.

The DAF screening levels for diesel and motor range organics in Table 5 are conservatively based on residential land use. The DAF screening levels have not been adjusted for the site-specific DAF value of 11.25 because the default screening levels that NMED based on the MADEP screening levels already incorporate a minor adjustment for the DAF component.

To evaluate the potential for "direct contact" type exposures (e.g., dermal contact, ingestion, and inhalation of particulates and volatiles) to TPH in surface soils, a screening level was developed for the "direct contact" pathways. This screening level was developed for C11-C22 aromatics as it has one of the highest toxicities of any of the TPH fractions used by NMED to calculate screening levels and is used to compare to "unknown oil." The calculation of the screening level for C11-C22 aromatics is documented in Appendix F. The calculation uses Equation 1 (Combined Exposures to Noncarcinogenic Contaminants in Soil; Residential Scenario) and all provided default exposure values from NMED's August 2009 *Technical Background Document for Development of Soil Screening Levels, Revision 5.0.* The toxicity values are taken from MADEP's Massachusetts Contingency Plan Standards spreadsheets, 2009 (http://www.mass.gov/dep/cleanup/laws/standard.htm). This screening level of 1,830 mg/kg is shown in the "residential soil screening level" column of Table 5 and is used for comparison to the diesel range analytical results. This calculation was previously approved by NMED in the Group 2 Investigation Report (revised March 2010). A separate "direct contact" screening level was not developed for motor oil because all detected values are already less than the more conservative DAF screening level.

Some of the individual constituents reported by the laboratory do not have screening levels but were all non-detect except 2-hexanone, 4-methl-2-pentanone, and 4-isopropyltoluene. These constituents were detected at low concentrations (e.g., a maximum of 0.00584 mg/kg) in only a few samples.

Section 6
Site Impacts

This section discusses the chemical analyses performed and presents the analytical results that were obtained through the analysis of soil samples, which were collected at the Group 6 AOCs. The analytical results for soils are presented and compared to applicable screening levels, as described in Section 5.0.

6.1 Soil Sampling Chemical Analytical Results

Soil samples were analyzed by Hall Environmental Analysis Laboratory in Albuquerque, New Mexico using the following methods for organic constituents:

- SW-846 Method 8260 volatile organic compounds;
- SW-846 Method 8270 semi-volatile organic compounds; and
- SW-846 Method 8015B gasoline, diesel, and motor oil range petroleum hydrocarbons.

Soil samples were analyzed for the following metals using the indicated analytical methods.

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.3/335.2 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

The analytical results for AOCs 19, 20, and 21 are summarized in Table 5. The individual results that exceed the applicable screening levels are indicated using a bold font and/or are highlighted, as explained in the table footnotes. Maps showing the distribution of constituents detected in soils above screening levels are included as Figures 12 – 19. The concentrations

shown on Figures 12 – 19 that exceed the screening levels in Table 5 are underlined on the figures (i.e., concentrations above residential and/or DAF (11.25) screening levels). The laboratory analytical reports are included in Appendix G and the data validation of the results, which includes the analytical results for the associated QA/QC samples, is included in Appendix H. The constituents that have concentrations in soils above screening levels are discussed below.

AOC No. 19 – Seep North of MW-45

Arsenic was detected in nine samples [AOC 19-2 (0-0.5'), AOC 19-3 (0-0.5'), AOC 19-8 (0-0.5'), AOC 19-9 (0–0.5'), AOC 19-13 (0–0.5'), AOC 19-16 (0–0.5'), AOC 19-17 (0-0.5'), AOC 19-18 (0–0.5'), and AOC 19-23 (0-0.5')] at concentrations above the DAF screening level (0.148 mg/kg) and all of these samples except AOC 19-16 (0-0.5') also have concentrations above the residential screening level (3.59 mg/kg). The detected concentrations range from 2.9 mg/kg to 24 mg/kg. The arsenic analytical results are shown on Figure 12.

Chromium (reported as total chromium) was detected in five soil samples [AOC 19-13 (0-0.5'), AOC 19-14 (0-0.5'), AOC 19-16 (0-0.5'), AOC 19-17 (0-0.5'), and AOC 19-18 (0-0.5')] at a concentration above the chromium VI DAF screening level of 23.7 mg/kg. Chromium was detected in one soil sample [AOC 19-14 (0-0.5')] at a concentration of 600 mg/kg, which exceeds the chromium VI residential soil screening level of 219 mg/kg. Speciation of the detected chromium results was not performed to determine if the chromium is present as chromium III or chromium VI. The lowest chromium III screening level is a value of 113,000 mg/kg for residential exposure. The detected concentrations ranged from 1.6 mg/kg to 600 mg/kg. The chromium analytical results are shown on Figure 13.

Cobalt was detected in three soil samples [(AOC 19-2 (0-0.5'), AOC 19-12 (0–0.5'), and AOC 19-15 (0–0.5')] at concentrations above the DAF screening level (5.51 mg/kg) but none exceed the residential soil screening levels. The detected concentrations range from 1.6 mg/kg to 11 mg/kg. The cobalt analytical results are shown on Figure 14.

Diesel range organics were detected in four samples [(AOC 19-1 (0-0.5'), AOC 19-13 (0–0.5'), AOC 19-14 (0–0.5'), and AOC 19-23 (0–0.5')] at concentrations above the DAF soil screening level and one of these samples [AOC 19-23 (0-0.5')] had a concentration of 21,000 mg/kg, which exceeds the residential direct contact screening level of 1,830 mg/kg. The detected concentrations range from 16 mg/kg to 21,000 mg/kg. The diesel range organics analytical results are shown on Figure 15.

AOC No. 20 – Seep North of MW-46

Cobalt was detected in one soil sample [(AOC 20-3 (0-0.5')] at a concentration (8.9 mg/kg) above the DAF screening level (5.51 mg/kg) but did not exceed the residential soil screening level of 23 mg/kg. The cobalt analytical results for AOC No. 20 are shown on Figure 16.

Diesel range organics were detected in one sample [(AOC 20-4 (0–0.5')] at a concentration (490 mg/kg) above the DAF soil screening level of 200 mg/kg. None of the analytical results exceeded the residential direct contact screening level of 1,830 mg/kg. The diesel range organics analytical results for AOC No. 20 are shown on Figure 17.

AOC No. 21 – Seep North of MW-47

Cobalt was detected in eight soil samples [(AOC 21-1 (0-0.5'), AOC 21-1 (1.5-2'), AOC 21-2 (0-0.5'), AOC 21-3 (0-0.5'), AOC 21-4 (0-0.5'), AOC 21-5 (0-0.5'), AOC 21-5 (1.5-2'), and AOC 21-5 (2.0-2.5')] at concentrations above the DAF screening level (5.51 mg/kg) but none exceed the residential soil screening level of 23 mg/kg. The detected concentrations range from 5.5 mg/kg to 9.1 mg/kg. The cobalt analytical results for AOC No. 21 are shown on Figure 18.

Diesel range organics were detected in one sample [(AOC 21-2 (0–0.5')] at a concentration (710 mg/kg) above the DAF soil screening level of 200 mg/kg. None of the analytical results exceeded the residential direct contact screening level of 1,830 mg/kg. The diesel range organics analytical results for AOC No. 21 are shown on Figure 19.

Section 7
Conclusions and Recommendations

This section summarizes and provides an evaluation of the potential impacts as shown in field screening data and analytical data. An investigation of soils was conducted at Group 6 (AOCs 19, 20, and 21) to assess and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, soil samples were collected and analyzed for potential site-related constituents.

7.1 Conclusions

AOC No. 19 – Seep North of MW-45

Three metals (arsenic, cobalt, and chromium) and diesel range organics were detected in soil samples at concentrations exceeding their respective screening levels. Arsenic was detected in nine samples at concentrations above the DAF screening level, with eight of these samples having concentrations above the residential screening level. Cobalt was detected in generally low concentrations with a maximum detected value of 11 mg/kg. As shown in Table 5, the samples with concentrations of cobalt above the screening levels do not have concentrations of organic constituents above screening levels. Chromium was detected in five samples at concentrations above the DAF screening level with only one being above the residential screening level. Arsenic, chromium, and cobalt are naturally occurring constituents in many soils and it is possible that these constituents are naturally occurring in soils at the Bloomfield Refinery. The analyses for chromium were for total chromium, which are compared to the chromium VI screening levels. It may be overly conservative to compare to the total chromium results to the chromium VI screening levels, but additional analyses will be required to speciate the chromium.

The only analytical results for organic constituents (i.e., diesel range organics) above the DAF screening level occur at three locations with a maximum value of 770 mg/kg. All of the detections of diesel range organics are below the residential screening level.

AOC No. 20 – Seep North of MW-46

Only cobalt and diesel range organics were detected at concentrations above the applicable screening levels. Cobalt was detected in only one soil sample at a concentration (8.9 mg/kg)

above the DAF screening level (5.51 mg/kg) but did not exceed the residential soil screening level of 23 mg/kg. As noted above, cobalt may be a naturally occurring constituent. Diesel range organics were detected in only one sample at a concentration (490 mg/kg) above the DAF soil screening level of 200 mg/kg. None of the diesel range organic analytical results exceeded the residential direct contact screening level of 1,830 mg/kg.

AOC No. 21 – Seep North of MW-47

Similarly to AOC No. 20, only cobalt and diesel range organics were detected at concentrations above the applicable screening levels. Cobalt was detected in eight soil samples at concentrations above the DAF screening level (5.51 mg/kg) but none exceed the residential soil screening level of 23 mg/kg. Diesel range organics were detected in one sample at a concentration (710 mg/kg) above the DAF soil screening level of 200 mg/kg. None of the diesel range organic analytical results exceed the residential direct contact screening level of 1,830 mg/kg.

Cumulative Risk Evaluation

A cumulative risk evaluation for soils is presented in Table 6. This was conducted by taking the maximum reported concentration of each detected constituent from all three AOCs and dividing by the residential screening level and non-residential screening levels as shown in the equations below. These calculations are separated for carcinogenic and non-carcinogenic constituents. The cumulative carcinogenic risk is 6.703×10^{-5} assuming residential land use and 1.36×10^{-5} for non-residential land use. The hazard index for residential land use is 3.557 and for non-residential land use is 1.652.

$$Site\ Risk = \left(\frac{conc_x}{SSL_x} + \frac{conc_y}{SSL_y} + \frac{conc_z}{SSL_z} + \cdots + \frac{conc_i}{SSL_i}\right) \times 10^{-5}$$

$$Site\ Hazard\ Index\ (HI) = \left(\frac{conc_x}{SSL_x} + \frac{conc_y}{SSL_y} + \frac{conc_z}{SSL_z} + \cdots + \frac{conc_i}{SSL_i}\right) \times 1$$

7.2 Recommendations

Western plans to conduct an investigation of background locations and will attempt to establish site-specific background values for various naturally occurring constituents (e.g., arsenic and

cobalt in soils). After background values have been established, site data collected for AOCs 19, 20 and 21 should be reassessed to determine if some analytical results are actually representative of background conditions and not site-related impacts.

Additional soil samples should be collected at the locations with the highest concentrations of chromium at AOC 19 [e.g., AOC19-13 (0-0.5'), AOC 19-14 (0-0.5'), and AOC 19-18 (0-0.5')]. The samples should be analyzed for chromium VI to determine if the chromium detected in soils at AOC 19 is present as chromium III or chromium VI. If the chromium is determined to be chromium III instead of chromium VI, then the screening levels in Table 5 will need to be revised along with any associated figures.

After site-specific background values have been established and the location-specific speciation of chromium has been determined, then preparation of a risk assessment for the Group 6 AOCs may be appropriate. The site concentrations have been compared to residential screening levels in this investigation report; however, the physical nature of the seep areas may limit future use of this area. An evaluation of potential exposures in a site-specific risk assessment could offer a more appropriate evaluation of actual risks based on more likely future use of the area at AOCs 19, 20, and 21.

Section 8
References

Groundwater Technology Inc., 1994, RCRA Facility Investigation/Corrective Measures Study Report Bloomfield Refining Company #50 County Road 4990 Bloomfield, New Mexico, p.51.

Western Refining Southwest, Inc., 2009, Groundwater Remediation and Monitoring Annual Report, Bloomfield Refinery Bloomfield New Mexico, p.37.

Table 1
Group 6 Historical Seep Discharge Analyses
Western Refining Southwest - Bloomfield Refinery

le on	Date	EPA 8260B					EPA 300.0							SM 2320B	
		Benzene (mg/L)	Toluene (mg/L)	EthylBen (mg/L)	Xylene (mg/L)	MTBE (mg/L)	Fluoride (mg/L)	Chloride (mg/L)	Bromide (mg/L)	Nitrite (mg/L)	Nitrate (mg/L)	Phosphorus (mg/L)	Sulfate (mg/L)	CO2 (mg/L)	A (m
		0.005 [2]	**0.75** [1]	**0.7** [2]	**0.62** [1]	**0.012** [3]	**1.6** [1]	**250** [1]	**NE**	**1** [2]	**10** [2]	**NE**	**600** [1]	**NE**	
	Aug-09	<0.001	<0.001	<0.001	<0.003	0.003	0.29	**390**	NA	<2.0	<0.10	<0.50	**1500**	200	
	Apr-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Aug-08	<0.001	<0.001	<0.001	<0.003	**0.042**	0.35	**370**	NA	<1.0	<0.10	<0.50	**1500**	250	
1	Apr-08	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Dec-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Nov-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Oct-07	<0.001	0.0029	<0.001	0.0039	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Aug-09	<0.001	<0.001	<0.001	<0.003	<0.0015	0.22	**1400**	NA	<2.0	<2.0	<10	**6800**	120	
3	Apr-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Aug-08	<0.001	<0.001	<0.001	<0.003	<0.015	0.8	**370**	NA	<1.0	<0.10	<0.50	**2500**	160	
	Apr-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Aug-09	<0.001	<0.001	<0.001	<0.003	<0.0015	0.58	**4800**	NA	<2.0	<2.0	<10	**1500**	150	
	Apr-09	<0.001	<0.001	<0.001	<0.002	**0.014**	<0.50	**2900**	1.6	<2.0		<0.50	**1000**	420	
	Aug-08	<0.001	<0.001	<0.001	<0.003	0.006	0.47	**2500**	NA	<1.0	<0.10	<0.50	**960**	370	
6	Apr-08	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Dec-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Nov-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Oct-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Aug-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
7	Apr-08	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Dec-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Nov-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Oct-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Aug-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-09	<0.001	<0.001	<0.001	<0.002	<0.001	0.33	**650**	1.7	<1.0		<0.50	**2200**	190	
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
8	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Dec-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Nov-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Oct-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Aug-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-09	<0.001	<0.001	<0.001	<0.002	**0.048**	0.35	**620**	1.0	<1.0		<0.50	**1500**	420	
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
9	Apr-08	<0.001	<0.001	<0.001	<0.002	NS[2]	**NS[2]**	**NS[2]**	**NA**	**NS[2]**	**NS[2]**	**NS[2]**	**NS[2]**	**NS[2]**	
	Dec-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Nov-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
	Oct-07	<0.001	<0.001	<0.001	<0.002	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	

NE = not established
NS[1] = Seep location is Dry or Not Enough Water to Sample- No Sample
NS[2] = Not Sampled - Sample was taken before implementation of Facility-Wide Monitoring Plan
NA = Constituent analysis not requested
1- WQCC 20NMAC 6.2.3103 = New Mexico Water Quality Control Commmission Standard for Groundwater of 10,000 ug/l
2 - 40 CFR141.61 = Safe Driking Water Act Maximum Contaminant Level
3 - EPA Regional Screening Level - Tap Water
No active discharge at Seeps 2, 4 and 5 has been present to sample since implementation of the Facility-Wide Monitoring
mg/L = milligram per liter
0.048 - bolded and shaded value exceeds screening level

TABLE 2
Group 6 Soil Boring Samples - Vapor Screening Results
Bloomfield Refinery - Bloomfield, New Mexico

AOC 19	OVM (ppm)	AOC 20	OVM (ppm)	AOC 21	OVM (ppm)
Sample Interval Depth - 0-0.5'					
AOC 19-1	92	AOC 20-1	2	AOC 21-1	1.5
AOC 19-2	5	AOC 20-2	1.3	AOC 21-2	9.8
AOC 19-3	5	AOC 20-3	33	AOC 21-3	1.3
AOC 19-4	4.2	AOC 20-4	9.4	AOC 21-4	5
AOC 19-5	3.5	AOC 20-5	2.4	AOC 21-5	0.7
AOC 19-6	2	AOC 20-6	2.4		
AOC 19-7	2.3	AOC 20-7	0.7		
AOC 19-8	4.8	AOC 20-8	0.7		
AOC 19-9	3.2	AOC 20-9	2.4		
AOC 19-10	2.6	AOC 20-10	2.7		
AOC 19-11	3.1	AOC 20-11	2.3		
AOC 19-12	2.8	AOC 20-12	2.1		
AOC 19-13	1.8				
AOC 19-14	2.4				
AOC 19-15	1.2				
AOC 19-16	4.6				
AOC 19-17	3.2				
AOC 19-18	4.2				
AOC 19-19	2.8				
AOC 19-20	3.2				
AOC 19-21	3.6				
AOC 19-22	2.1				
AOC 19-23	4.9				
Sample Interval Depth - 0.5-1.5'					
AOC 19-7	2			AOC 21-1	0.8
				AOC 21-5	0.7
Sample Interval Depth - 1.5-2'					
AOC 19-7	2.4			AOC 21-1	1.6
				AOC 21-5	0.7
Sample Interval Depth - 2-2.5'					
				AOC 21-1	1.1
				AOC 21-5	0.7

OVM - organic vapor monitor
ppm - parts per million

TABLE 3
Residential Soil Screening Levels
Bloomfield Refinery - Bloomfield, New Mexico

	NMED		EPA		Cross Media Soil-to-Ground Water NMED	Cross Media Soil-to-Ground Water EPA		Cross Media Soil-to-Ground Water NMED	Cross Media Soil-to-Ground Water EPA		
Analyte	Residential Soil (mg/kg)	Endpoint	Residential Soil (mg/kg)	ResSoil key	DAF1 (mg/kg)	GW_Risk-based SSL (mgkg)	GW_MCL-based SSL (mg/kg)	DAF (11.25) (mg/kg)	GW_Risk-based SSL (11.25) (mgkg)	GW_MCL-based SSL (11.25) (mg/kg)	Constituent Detected
Applicable depth interval	0-10'		0-2'		All depths			All depths			
Acenaphthene	3.44E+03	ns	3.40E+03	n	2.05E+01	2.70E+01	-	2.31E+02	3.04E+02	-	N
Acenaphthylene	-	-	-	-	-	-	-	-	-	-	N
Acetone	6.75E+04	n	6.10E+04	n	3.84E+00	4.40E+00	-	4.32E+01	4.95E+01	-	Y
Aniline	-	-	8.50E+01	c**	-	3.40E-03	-	-	3.83E-02	-	N
Anthracene	1.72E+04	ns	1.70E+04	n	3.37E+02	4.50E+02	-	3.79E+03	5.06E+03	-	N
Antimony	3.13E+01	n	3.10E+01	n	6.61E-01	6.60E-01	2.70E-01	7.44E+00	7.43E+00	3.04E+00	N
Arsenic	3.59E+00	c	3.90E-01	c*	1.31E-02	1.30E-03	2.90E-01	1.48E-01	1.46E-02	3.26E+00	Y
Azobenzene	-	-	4.90E+00	c	-	5.10E-04	-	-	5.74E-03	-	N
Barium	1.56E+04	n	1.50E+04	n	3.01E+02	3.00E+02	8.20E+01	3.39E+03	3.38E+03	9.23E+02	Y
Benz(a)anthracene	4.81E+00	c	1.50E-01	c	3.20E-01	1.40E-02	-	3.59E+00	1.58E-01	-	N
Benzene	1.55E+01	c	1.10E+00	c*	1.85E-03	2.30E-04	2.80E-03	2.08E-02	2.59E-03	3.15E-02	N
Benzo(a)pyrene	4.81E-01	c	1.50E-02	c	1.09E-01	4.60E-03	3.10E-01	1.22E+00	5.18E-02	3.49E+00	N
Benzo(b)fluoranthene	4.81E+00	c	1.50E-01	c	1.11E+00	4.70E-02	-	1.25E+01	5.29E-01	-	N
Benzo(g,h,i)perylene	-	-	-	-	-	-	-	-	-	-	N
Benzo(k)fluoranthene	4.81E+01	c	1.50E+00	c	1.09E+01	4.60E-01	-	1.22E+02	5.18E+00	-	N
Benzoic acid	-	-	2.40E+05	nm	-	3.30E+01	-	-	3.71E+02	-	Y
Benzyl alcohol	-	-	3.10E+04	n	-	4.20E+00	-	-	4.73E+01	-	N
Beryllium	1.56E+02	n	1.60E+02	n	5.77E+01	5.80E+01	3.20E+00	6.49E+02	6.53E+02	3.60E+01	Y
Bis(2-chloroethoxy)methane	-	-	1.80E+02	n	-	2.30E-02	-	-	2.59E-01	-	N
Bis(2-chloroethyl)ether	2.56E+00	c	1.90E-01	c	2.33E-05	2.70E-06	-	2.62E-04	3.04E-05	-	N
Bis(2-chloroisopropyl)ether	9.15E+01	c	-	-	2.56E-03	-	-	2.88E-02	-	-	N
Bis(2-ethylhexyl)phthalate	2.80E+02	c	3.50E+01	c*	1.19E+01	1.60E+00	2.00E+00	1.34E+02	1.80E+01	2.25E+01	N
Bromobenzene	-	-	9.40E+01	n	-	1.50E-02	-	-	1.69E-01	-	N
Bromodichloromethane	5.25E+00	c	2.80E-01	c	2.76E-04	3.30E-05	-	3.11E-03	3.71E-04	-	N
Bromoform	-	-	6.10E+01	c*	-	2.30E-03	-	-	2.59E-02	-	N
Bromomethane	2.23E+01	n	7.90E+00	n	1.94E-03	2.20E-03	-	2.18E-02	2.48E-02	-	N
4-Bromophenyl phenyl ether	-	-	-	-	-	-	-	-	-	-	N
2-Butanone (MEK)	3.96E+04	n	2.80E+04	ns	1.27E+00	1.50E+00	-	1.43E+01	1.69E+01	-	Y
Butyl benzyl phthalate	-	-	2.60E+02	c*	-	6.70E-01	-	-	7.54E+00	-	N
Cadmium	7.79E+01	n	7.00E+01	n	1.37E+00	1.40E+00	3.80E-01	1.55E+01	1.58E+01	4.28E+00	N
Carbazole	-	-	-	-	-	-	-	-	-	-	N
Carbon disulfide	1.94E+03	ns	6.70E+02	ns	2.52E-01	2.70E-01	-	2.84E+00	3.04E+00	-	Y
Carbon tetrachloride	4.38E+00	c	2.50E-01	c	7.39E-04	7.90E-05	2.00E-03	8.32E-03	8.89E-04	2.25E-02	N
Chlorobenzene	5.08E+02	ns	3.10E+02	n	5.38E-02	6.80E-02	7.50E-02	6.06E-01	7.65E-01	8.44E-01	N
Chloroethane	-	-	-	-	-	-	-	-	-	-	N
Chloroform	5.72E+00	c	3.00E-01	c	4.68E-04	5.50E-05	-	5.27E-03	6.19E-04	-	N
Chloromethane	3.56E+01	c	1.20E+02	n	4.18E-03	4.90E-02	-	4.70E-02	5.51E-01	-	N
4-Chloro-3-methylphenol	-	-	-	-	-	-	-	-	-	-	N
4-Chloroaniline	-	-	2.40E+00	c	-	1.20E-04	-	-	1.35E-03	-	N
4-Chlorophenyl phenyl ether	-	-	-	-	-	-	-	-	-	-	N
4-Chlorotoluene	-	-	5.50E+03	ns	-	2.80E+00	-	-	3.15E+01	-	N
2-Chloronaphthalene	6.26E+03	ns	6.30E+03	ns	1.35E+01	1.80E+01	-	1.52E+02	2.03E+02	-	N
2-Chlorophenol	3.91E+02	n	3.90E+02	n	1.53E-01	2.00E-01	-	1.72E+00	2.25E+00	-	N
2-Chlorotoluene	1.56E+03	ns	1.60E+03	ns	6.24E-01	8.00E-01	-	7.02E+00	9.00E+00	-	N
Chromium III	1.13E+05	nl	1.20E+05	nm	9.86E+07	9.90E+07	-	1.11E+09	1.11E+09	-	Y
Chromium VI	2.19E+02	n	2.30E+02	n	2.11E+00	2.10E+00	-	2.37E+01	2.36E+01	-	
Chrysene	4.81E+02	c	1.50E+01	c	3.26E+01	1.40E+00	-	3.67E+02	1.58E+01	-	N
cis-1,2-DCE	7.82E+02	n	7.80E+02	n	9.43E-02	1.10E-01	2.10E-02	1.06E+00	1.24E+00	2.36E-01	N
cis-1,3-Dichloropropene	2.35E+01	c	1.70E+00	c*	1.35E-03	1.60E-04	-	1.52E-02	1.80E-03	-	N
Cobalt	-	-	2.30E+01	n	-	4.90E-01	-	-	5.51E+00	-	Y
Cyanide	1.56E+03	n	1.60E+03	n	7.44E+00	7.40E+00	2.00E+00	8.37E+01	8.33E+01	2.25E+01	N
1,1-Dichloroethane	6.29E+01	c	3.40E+00	c	6.09E-03	7.00E-04	-	6.85E-02	7.88E-03	-	N
1,1-Dichloroethene	6.18E+02	n	2.50E+02	n	1.19E-01	1.20E-01	2.60E-03	1.34E+00	1.35E+00	2.93E-02	N
1,1-Dichloropropene	-	-	-	-	-	-	-	-	-	-	N
1,2-Dibromo-3-chloropropane	1.94E-01	c	5.60E-03	c	2.97E-06	1.50E-07	9.20E-05	3.35E-05	1.69E-06	1.04E-03	N
1,2-Dibromoethane (EDB)	5.74E-01	c	3.40E-02	c	1.58E-05	1.90E-06	1.50E-05	1.78E-04	2.14E-05	1.69E-04	N
1,2-Dichlorobenzene	3.01E+03	ns	2.00E+03	ns	3.13E-01	4.00E-01	6.60E-01	3.53E+00	4.50E+00	7.43E+00	N
3,3'-Dichlorobenzidine	8.71E+00	c	1.10E+00	c	1.70E-02	2.30E-03	-	1.92E-01	2.59E-02	-	N
1,2-Dichloroethane (EDC)	7.74E+00	c	4.50E-01	c	3.65E-04	4.40E-05	1.50E-03	4.11E-03	4.95E-04	1.69E-02	N
1,2-Dichloropropane	1.47E+01	c	9.30E-01	c*	1.11E-03	1.30E-04	1.70E-03	1.25E-02	1.46E-03	1.91E-02	N
1,3-Dichlorobenzene	-	-	-	-	-	-	-	-	-	-	N
1,3-Dichloropropane	-	-	1.60E+03	n	-	2.70E-01	-	-	3.04E+00	-	N
1,4-Dichlorobenzene	3.21E+01	c	2.60E+00	c	3.57E-03	4.60E-04	8.10E-02	4.02E-02	5.18E-03	9.11E-01	N
2,2-Dichloropropane	-	-	-	-	-	-	-	-	-	-	N
2,4-Dichlorophenol	1.83E+02	n	1.80E+02	n	1.37E-01	1.80E-01	-	1.54E+00	2.03E+00	-	N
2,4-Dimethylphenol	1.22E+03	n	1.20E+03	n	9.12E-01	1.20E+00	-	1.03E+01	1.35E+01	-	N
4,6-Dinitro-2-methylphenol	-	-	-	-	-	-	-	-	-	-	N
2,4-Dinitrophenol	1.22E+02	n	1.20E+02	n	5.25E-02	6.80E-02	-	5.91E-01	7.65E-01	-	N
2,4-Dinitrotoluene	1.26E+01	c	1.60E+00	c*	1.56E-03	2.00E-04	-	1.75E-02	2.25E-03	-	N
2,6-Dinitrotoluene	6.12E+01	n	6.10E+01	n	2.67E-02	3.40E-02	-	3.00E-01	3.83E-01	-	N
Dibenz(a,h)anthracene	4.81E-01	c	1.50E-02	c	3.62E-01	1.50E-02	-	4.07E+00	1.69E-01	-	N
Dibenzofuran	-	-	-	-	-	-	-	-	-	-	N
Dibromochloromethane	1.13E+01	c	7.00E-01	c	3.38E-04	4.00E-05	-	3.80E-03	4.50E-04	-	N
Dibromomethane	-	-	7.80E+02	n	-	9.10E-02	-	-	1.02E+00	-	N
Dichlorodifluoromethane	4.81E+02	n	1.90E+02	n	7.23E-01	6.10E-01	-	8.14E+00	6.86E+00	-	N
Diethyl phthalate	4.89E+04	n	4.90E+04	n	1.06E+01	1.30E+01	-	1.19E+02	1.46E+02	-	N
Dimethyl phthalate	6.11E+05	nl	-	-	8.36E+01	-	-	9.40E+02	-	-	N
Di-n-butyl phthalate	6.11E+03	n	-	-	8.63E+00	-	-	9.70E+01	-	-	N
Di-n-octyl phthalate	-	-	-	-	-	-	-	-	-	-	N
Ethylbenzene	6.96E+01	c	5.70E+00	c	1.46E-02	1.90E-03	8.90E-01	1.64E-01	2.14E-02	1.00E+01	N
Fluoranthene	2.29E+03	n	2.30E+03	n	1.55E+02	2.10E+02	-	1.75E+03	2.36E+03	-	N
Fluorene	2.29E+03	ns	2.30E+03	n	2.50E+01	3.30E+01	-	2.81E+02	3.71E+02	-	N
Hexachlorobenzene	2.45E+00	c	3.00E-01	c	2.21E-03	2.90E-04	7.00E-03	2.48E-02	3.26E-03	7.88E-02	N

TABLE 3
Residential Soil Screening Levels
Bloomfield Refinery - Bloomfield, New Mexico

	NMED		EPA		Cross Media Soil-to-Ground Water NMED	Cross Media Soil-to-Ground Water EPA		Cross Media Soil-to-Ground Water NMED	Cross Media Soil-to-Ground Water EPA		
Analyte	Residential Soil (mg/kg)	Endpoint	Residential Soil (mg/kg)	ResSoil key	DAF1 (mg/kg)	GW_Risk-based SSL (mgkg)	GW_MCL-based SSL (mg/kg)	DAF (11.25) (mg/kg)	GW_Risk-based SSL (11.25) (mgkg)	GW_MCL-based SSL (11.25) (mg/kg)	Constituent Detected
Applicable depth interval	0-10'		0-2'		All depths			All depths			
Hexachlorobutadiene	-	-	6.20E+00	c**	-	1.90E-03	-	-	2.14E-02	-	N
Hexachlorocyclopentadiene	3.67E+02	n	3.70E+02	n	6.13E-01	8.00E-01	1.80E-01	6.90E+00	9.00E+00	2.03E+00	N
Hexachloroethane	6.11E+01	n	3.50E+01	c**	1.93E-02	3.20E-03	-	2.17E-01	3.60E-02	-	N
2-Hexanone	-	-	-	-	-	-	-	-	-	-	Y
Indeno(1,2,3-cd)pyrene	4.81E+00	c	1.50E-01	c	3.70E+00	1.60E-01	-	4.16E+01	1.80E+00	-	N
Isophorone	4.13E+03	c	5.10E+02	c*	1.85E-01	2.20E-02	-	2.08E+00	2.48E-01	-	N
Isopropylbenzene (cumene)	3.21E+03	ns	2.20E+03	ns	9.86E-01	1.30E+00	-	1.11E+01	1.46E+01	-	N
4-Isopropyltoluene	-	-	-	-	-	-	-	-	-	-	Y
Lead	4.00E+02	IEUBK	4.00E+02	nL	-	-	-	-	-	-	Y
Mercury	7.71E+00	ns	4.30E+00	ns	2.93E-02	3.00E-02	1.00E-01	3.30E-01	3.38E-01	1.13E+00	Y
Methyl tert-butyl ether (MTBE)	8.62E+02	c	3.90E+01	c	2.29E-02	2.70E-03	-	2.58E-01	3.04E-02	-	N
Methylene chloride	1.99E+02	c	1.10E+01	c	1.07E-02	1.20E-03	1.30E-03	1.21E-01	1.35E-02	1.46E-02	Y
1-Methylnaphthalene	-	-	2.20E+01	c	-	1.50E-02	-	-	1.69E-01	-	N
2-Methylnaphthalene	-	-	3.10E+02	n	-	9.00E-01	-	-	1.01E+01	-	N
2-Methylphenol	-	-	3.10E+03	n	-	2.00E+00	-	-	2.25E+01	-	N
3+4-Methylphenol	-	-	3.10E+02	n	-	1.90E-01	-	-	2.14E+00	-	Y
4-Methyl-2-pentanone	-	-	-	-	-	-	-	-	-	-	Y
2-Nitroaniline	-	-	1.80E+02	n	-	3.30E-02	-	-	3.71E-01	-	N
3-Nitroaniline	-	-	-	-	-	-	-	-	-	-	N
4-Nitroaniline	-	-	2.40E+01	c*	-	1.00E-03	-	-	1.13E-02	-	N
2-Nitrophenol	-	-	-	-	-	-	-	-	-	-	N
4-Nitrophenol	-	-	-	-	-	-	-	-	-	-	N
Naphthalene	4.50E+01	c	3.90E+00	c*	4.19E-03	5.50E-04	-	4.72E-02	6.19E-03	-	N
n-Butylbenzene	-	-	-	-	-	-	-	-	-	-	N
Nickel	1.56E+03	n	1.40E+04	c	4.77E+01	4.80E+01	-	5.36E+02	5.40E+02	-	Y
Nitrobenzene	4.94E+01	c	4.40E+00	c*	6.86E-03	7.10E-05	-	7.72E-02	7.99E-04	-	N
N-Nitrosodi-n-propylamine	-	-	6.90E-02	c	-	1.10E-05	-	-	1.24E-04	-	N
N-Nitrosodiphenylamine	8.00E+02	c	9.90E+01	c	1.29E+00	1.70E-01	-	1.45E+01	1.91E+00	-	N
n-Propylbenzene	-	-	-	-	-	-	-	-	-	-	N
Pentachlorophenol	2.07E+01	c	3.00E+00	c	2.94E-02	3.90E-03	7.00E-03	3.30E-01	4.39E-02	7.88E-02	N
Phenanthrene	1.83E+03	ns	-	-	8.34E+01	-	-	9.39E+02	-	-	N
Phenol	1.83E+04	n	1.80E+04	n	6.30E+00	8.10E+00	-	7.09E+01	9.11E+01	-	N
Pyrene	1.72E+03	ns	1.70E+03	n	1.12E+02	1.50E+02	-	1.26E+03	1.69E+03	-	N
Pyridine	-	-	7.80E+01	n	-	9.70E-03	-	-	1.09E-01	-	N
sec-Butylbenzene	-	-	-	-	-	-	-	-	-	-	N
Selenium	3.91E+02	n	3.90E+02	n	9.65E-01	9.50E-01	2.60E-01	1.09E+01	1.07E+01	2.93E+00	N
Silver	3.91E+02	n	3.90E+02	n	1.57E+00	1.60E+00	-	1.76E+01	1.80E+01	-	Y
Styrene	8.97E+03	ns	6.50E+03	ns	1.56E+00	2.00E+00	1.20E-01	1.76E+01	2.25E+01	1.35E+00	N
1,2,3-Trichlorobenzene	-	-	-	-	-	-	-	-	-	-	N
1,1,1,2-Tetrachloroethane	2.92E+01	c	2.00E+00	c	1.73E-03	2.10E-04	-	1.94E-02	2.36E-03	-	N
1,1,1-Trichloroethane	2.18E+04	ns	9.00E+03	ns	2.98E+00	3.30E+00	7.20E-02	3.35E+01	3.71E+01	8.10E-01	N
1,1,2,2-Tetrachloroethane	7.97E+00	c	5.90E-01	c	2.25E-04	2.80E-05	-	2.53E-03	3.15E-04	-	N
1,1,2-Trichloroethane	1.72E+01	c	1.10E+00	c	6.74E-04	8.20E-05	1.70E-03	7.58E-03	9.23E-04	1.91E-02	N
2,4,5-Trichlorophenol	6.11E+03	n	6.10E+03	n	7.13E+00	9.40E+00	-	8.02E+01	1.06E+02	-	N
2,4,6-Trichlorophenol	6.11E+01	n	4.40E+01	c**	7.13E-02	1.60E-02	-	8.02E-01	1.80E-01	-	N
1,2,3-Trichloropropane	9.15E-01	c	9.10E-02	c	3.56E-05	4.40E-06	-	4.01E-04	4.95E-05	-	N
1,2,4-Trichlorobenzene	1.43E+02	ns	8.70E+01	n	1.02E-02	1.30E-02	1.10E-01	1.15E-01	1.46E-01	1.24E+00	N
1,2,4-Trimethylbenzene	-	-	6.70E+01	n	-	2.40E-02	-	-	2.70E-01	-	N
1,3,5-Trimethylbenzene	-	-	4.70E+01	n	-	2.00E-02	-	-	2.25E-01	-	N
tert-Butylbenzene	-	-	-	-	-	-	-	-	-	-	N
Tetrachloroethene (PCE)	6.99E+00	c	5.70E-01	c	4.49E-04	5.20E-05	2.40E-03	5.05E-03	5.85E-04	2.70E-02	N
Toluene	5.57E+03	ns	5.00E+03	ns	1.38E+00	1.70E+00	7.60E-01	1.56E+01	1.91E+01	8.55E+00	Y
trans-1,2-DCE	2.73E+02	n	1.10E+02	n	3.01E-02	3.40E-02	3.20E-02	3.39E-01	3.83E-01	3.60E-01	N
trans-1,3-Dichloropropene	2.35E+01	c	1.70E+00	c*	1.35E-03	1.60E-04	-	1.52E-02	1.80E-03	-	N
Trichloroethene (TCE)	4.57E+01	c	2.80E+00	c	5.30E-03	6.10E-04	1.90E-03	5.96E-02	6.86E-03	2.14E-02	N
Trichlorofluoromethane	2.01E+03	ns	8.00E+02	n	9.01E-01	8.40E-01	-	1.01E+01	9.45E+00	-	N
Vanadium	3.91E+02	n	5.50E+02	n	1.83E+02	2.60E+02	-	2.05E+03	2.93E+03	-	Y
Vinyl chloride	8.65E-01	c	6.00E-02	c	2.88E-04	5.60E-06	7.00E-04	3.24E-03	6.30E-05	7.88E-03	N
Xylenes, Total	1.09E+03	ns	6.00E+02	ns	1.76E-01	2.30E-01	1.10E+01	1.98E+00	2.59E+00	1.24E+02	N
Zinc	2.35E+04	n	2.30E+04	n	6.82E+02	6.80E+02	-	7.67E+03	7.65E+03	-	Y

c - carcinogen
n - noncarcinogen
cs - carcinogen, SSL may exceed saturation
ns - noncarcinogen, SSL may exceed saturation
nl - noncarcinogen, SSL may exceed ceiling limit
nls - noncarcinogen, SSL may exceed both saturation and ceiling limit
- no screenig value currently available

NMED - Technical Background Document for Development of Soil Screening Levels - Revision 5.0 (August 2009)
EPA - Regional Screening Levels (April 2009)

TABLE 4
Non- Residential Soil Screening Levels
Bloomfield Refinery - Bloomfield, New Mexico

	NMED				EPA		Cross Media Soil-to-Ground Water NMED	Cross Media Soil-to-Ground Water EPA		Cross Media Soil-to-Ground Water NMED	Cross Media Soil-to-Ground Water EPA		
Analyte	IndOccSoil (mg/kg)	IndOccSoil (Endpoint)	ConsWork (mg/kg)	ConsWork Soil (Endpoint)	Industrial (mg/kg)	IndSoil _key	DAF1 (mg/kg)	GW_Risk-based SSL (mg/kg)	GW_MCL-based SSL (mg/kg)	DAF (11.25) (mg/kg)	GW_Risk-based SSL (11.25) (mgkg)	GW_MCL-based SSL (11.25) (mg/kg)	Constituent Detected
Applicable depth interval	0-2'		0-10'		0-2'		All depths			All depths			
Acenaphthene	3.67E+04	ns	1.86E+04	n	3.30E+04	n	2.05E+01	2.70E+01	-	2.31E+02	3.04E+02	-	N
Acenaphthylene	-	-	-	-	-	-	-	-	-	-	-	-	N
Acetone	8.51E+05	nls	2.63E+05	nls	6.10E+05	nms	3.84E+00	4.40E+00	-	4.32E+01	4.95E+01	-	Y
Aniline	-	-	-	-	3.00E+02	c*	-	3.40E-03	-	-	3.83E-02	-	N
Anthracene	1.83E+05	nl	6.68E+04	ns	1.70E+05	nm	3.37E+02	4.50E+02	-	3.79E+03	5.06E+03	-	N
Antimony	4.54E+02	n	1.24E+02	n	4.10E+02	n	6.61E-01	6.60E-01	2.70E-01	7.44E+00	7.43E+00	3.04E+00	N
Arsenic	1.77E+01	c	6.54E+01	n	1.60E+00	c	1.31E-02	1.30E-03	2.90E-01	1.48E-01	1.46E-02	3.26E+00	Y
Azobenzene	-	-	-	-	2.20E+01	c	-	5.10E-04	-	-	5.74E-03	-	N
Barium	2.24E+05	nl	4.35E+03	n	1.90E+05	nm	3.01E+02	3.00E+02	8.20E+01	3.39E+03	3.38E+03	9.23E+02	Y
Beryllium	2.26E+03	n	1.44E+02	n	2.00E+03	n	5.77E+01	5.80E+01	3.20E+00	6.49E+02	6.53E+02	3.60E+01	Y
Benz(a)anthracene	2.34E+01	c	2.13E+02	c	2.10E+00	c	3.20E-01	1.40E-02	-	3.59E+00	1.58E-01	-	N
Benzene	8.54E+01	c	4.71E+02	n	5.60E+00	c*	1.85E-03	2.30E-04	2.80E-03	2.08E-02	2.59E-03	3.15E-02	N
Benzo(a)pyrene	2.34E+00	c	2.13E+01	c	2.10E-01	c	1.09E-01	4.60E-03	3.10E-01	1.22E+00	5.18E-02	3.49E+00	N
Benzo(b)fluoranthene	2.34E+01	c	2.13E+02	c	2.10E+00	c	1.11E+00	4.70E-02	-	1.25E+01	5.29E-01	-	N
Benzo(g,h,i)perylene	-	-	-	-	-	-	-	-	-	-	-	-	N
Benzo(k)fluoranthene	2.34E+02	c	2.06E+03	c	2.10E+01	c	1.09E+01	4.60E-01	-	1.22E+02	5.18E+00	-	Y
Benzoic acid	-	-	-	-	2.50E+06	nm	-	3.30E+01	-	-	3.71E+02	-	N
Benzyl alcohol	-	-	-	-	3.10E+05	nm	-	4.20E+00	-	-	4.73E+01	-	Y
Bis(2-chloroethoxy)methane	-	-	-	-	1.80E+03	n	-	2.30E-02	-	-	2.59E-01	-	N
Bis(2-chloroethyl)ether	1.36E+01	c	1.47E+02	c	9.00E-01	c	2.33E-05	2.70E-06	-	2.62E-04	3.04E-05	-	N
Bis(2-chloroisopropyl)ether	4.54E+02	c	3.10E+03	cs	-	-	2.56E-03	-	-	2.88E-02	-	-	N
Bis(2-ethylhexyl)phthalate	1.37E+03	c	4.76E+03	n	1.20E+02	c	1.19E+01	1.60E+00	2.00E+00	1.34E+02	1.80E+01	2.25E+01	N
Bromobenzene	-	-	-	-	4.10E+02	n	-	1.50E-02	-	-	1.69E-01	-	N
Bromodichloromethane	2.92E+01	c	3.50E+03	cs	1.40E+00	c	2.76E-04	3.30E-05	-	3.11E-03	3.71E-04	-	N
Bromoform	-	-	-	-	2.20E+02	c*	-	2.30E-03	-	-	2.59E-02	-	N
Bromomethane	8.36E+01	n	6.71E+01	n	3.50E+01	n	1.94E-03	2.20E-03	-	2.18E-02	2.48E-02	-	N
4-Bromophenyl phenyl ether	-	-	-	-	-	-	-	-	-	-	-	-	N
2-Butanone (MEK)	3.69E+05	nl	1.48E+05	nls	1.90E+05	nms	1.27E+00	1.50E+00	-	1.43E+01	1.69E+01	-	Y
Butyl benzyl phthalate	-	-	-	-	9.10E+02	c	-	6.70E-01	-	-	7.54E+00	-	N
Cadmium	1.12E+03	n	3.09E+02	n	8.00E+02	n	1.37E+00	1.40E+00	3.80E-01	1.55E+01	1.58E+01	4.28E+00	N
Carbazole	-	-	-	-	-	-	-	-	-	-	-	-	N
Carbon disulfide	7.54E+03	ns	5.89E+03	ns	3.00E+03	ns	2.52E-01	2.70E-01	-	2.84E+00	3.04E+00	-	Y
Carbon tetrachloride	2.43E+01	c	1.99E+02	n	1.30E+00	c	7.39E-04	7.90E-05	2.00E-03	8.32E-03	8.89E-04	2.25E-02	N
Chlorobenzene	2.14E+03	n	1.58E+03	ns	1.50E+03	ns	5.38E-02	6.80E-02	7.50E-02	6.06E-01	7.65E-01	8.44E-01	N
Chloroethane	-	-	-	-	-	-	-	-	-	-	-	-	N
Chloroform	3.19E+01	c	6.71E+02	c	1.50E+00	c	4.68E-04	5.50E-05	-	5.27E-03	6.19E-04	-	N
Chloromethane	1.98E+02	c	1.13E+03	n	5.10E+02	n	4.18E-03	4.90E-02	-	4.70E-02	5.51E-01	-	N
4-Chloro-3-methylphenol	-	-	-	-	-	-	-	-	-	-	-	-	N
4-Chloroaniline	-	-	-	-	8.60E+00	c	-	1.20E-04	-	-	1.35E-03	-	N
4-Chlorophenyl phenyl ether	-	-	-	-	-	-	-	-	-	-	-	-	N
4-Chlorotoluene	-	-	-	-	7.20E+04	ns	-	2.80E+00	-	-	3.15E+01	-	N
2-Chloronaphthalene	9.08E+04	ns	2.48E+04	ns	8.20E+04	ns	1.35E+01	1.80E+01	-	1.52E+02	2.03E+02	-	N
2-Chlorophenol	5.68E+03	n	1.55E+03	n	5.10E+03	n	1.53E-01	2.00E-01	-	1.72E+00	2.25E+00	-	N
2-Chlorotoluene	2.27E+04	ns	6.19E+03	ns	2.00E+04	ns	6.24E-01	8.00E-01	-	7.02E+00	9.00E+00	-	N
Chromium III	1.57E+06	nl	4.47E+05	nl	1.50E+06	nm	9.86E+07	9.90E+07	-	1.11E+09	1.11E+09	-	Y
Chromium VI	2.92E+03	n	4.49E+02	n	1.40E+03	c	2.11E+00	2.10E+00	-	2.37E+01	2.36E+01	-	
Chrysene	2.34E+03	c	2.06E+04	c	2.10E+02	c	3.26E+01	1.40E+00	-	3.67E+02	1.58E+01	-	N
cis-1,2-DCE	1.14E+04	ns	3.10E+03	cs	1.00E+04	ns	9.43E-02	1.10E-01	2.10E-02	1.06E+00	1.24E+00	2.36E-01	N
cis-1,3-Dichloropropene	1.26E+02	c	5.10E+02	n	8.40E+00	c*	1.35E-03	1.60E-04	-	1.52E-02	1.80E-03	-	N
Cobalt	-	-	-	-	3.00E+02	n	-	4.90E-01	-	-	5.51E+00	-	Y
Cyanide	2.27E+04	n	6.19E+03	n	2.00E+04	n	7.44E+00	7.40E+00	2.00E+00	8.37E+01	8.33E+01	2.25E+01	N
1,1-Dichloroethane	3.50E+02	c	6.88E+03	cs	1.70E+01	c	6.09E-03	7.00E-04	-	6.85E-02	7.88E-03	-	N
1,1-Dichloroethene	2.22E+03	ns	1.83E+03	ns	1.10E+03	n	1.19E-01	1.20E-01	2.60E-03	1.34E+00	1.35E+00	2.93E-02	N
1,1-Dichloropropene	-	-	-	-	-	-	-	-	-	-	-	-	N
1,2-Dibromo-3-chloropropane	1.09E+00	c	2.30E+01	c	7.30E-02	c	2.97E-06	1.50E-07	9.20E-05	3.35E-05	1.69E-06	1.04E-03	N
1,2-Dibromoethane (EDB)	3.14E+00	c	4.86E+01	c	1.70E-01	c	1.58E-05	1.90E-06	1.50E-05	1.78E-04	2.14E-05	1.69E-04	N
1,2-Dichlorobenzene	1.43E+04	ns	9.71E+03	ns	1.00E+04	ns	3.13E-01	4.00E-01	6.60E-01	3.53E+00	4.50E+00	7.43E+00	N
3,3'-Dichlorobenzidine	4.26E+01	c	3.71E+02	c	3.80E+00	c	1.70E-02	2.30E-03	-	1.92E-01	2.59E-02	-	N
1,2-Dichloroethane (EDC)	4.28E+01	c	7.51E+02	c	2.20E+00	c	3.65E-04	4.40E-05	1.50E-03	4.11E-03	4.95E-04	1.69E-02	N
1,2-Dichloropropane	8.17E+01	c	1.17E+02	n	4.70E+00	c*	1.11E-03	1.30E-04	1.70E-03	1.25E-02	1.46E-03	1.91E-02	N
1,3-Dichlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	N
1,3-Dichloropropane	-	-	-	-	2.00E+04	ns	-	2.70E-01	-	-	3.04E+00	-	N
1,4-Dichlorobenzene	1.80E+02	c	3.78E+03	cs	1.30E+01	c	3.57E-03	4.60E-04	8.10E-02	4.02E-02	5.18E-03	9.11E-01	N
2,2-Dichloropropane	-	-	-	-	-	-	-	-	-	-	-	-	N
2,4-Dichlorophenol	2.05E+03	n	7.15E+02	n	1.80E+03	n	1.37E-01	1.80E-01	-	1.54E+00	2.03E+00	-	N
2,4-Dimethylphenol	1.37E+04	n	4.76E+03	n	1.20E+04	n	9.12E-01	1.20E+00	-	1.03E+01	1.35E+01	-	N
4,6-Dinitro-2-methylphenol	-	-	-	-	-	-	-	-	-	-	-	-	N
2,4-Dinitrophenol	1.37E+03	n	4.76E+02	n	1.20E+03	n	5.25E-02	6.80E-02	-	5.91E-01	7.65E-01	-	N
2,4-Dinitrotoluene	1.03E+02	c	4.76E+02	n	5.50E+00	c	1.56E-03	2.00E-04	-	1.75E-02	2.25E-03	-	N
2,6-Dinitrotoluene	6.87E+02	n	2.39E+02	n	6.20E+02	n	2.67E-02	3.40E-02	-	3.00E-01	3.83E-01	-	N
Dibenz(a,h)anthracene	2.34E+00	c	2.13E+01	c	2.10E-01	c	3.62E-01	1.50E-02	-	4.07E+00	1.69E-01	-	N
Dibenzofuran	-	-	-	-	-	-	-	-	-	-	-	-	N
Dibromochloromethane	6.13E+01	c	1.99E+03	c	3.40E+00	c	3.38E-04	4.00E-05	-	3.80E-03	4.50E-04	-	N
Dibromomethane	-	-	-	-	1.00E+04	ns	-	9.10E-02	-	-	1.02E+00	-	N
Dichlorodifluoromethane	1.55E+03	ns	1.37E+03	ns	7.80E+02	n	7.23E-01	6.10E-01	-	8.14E+00	6.86E+00	-	N
Diethyl phthalate	5.47E+05	nl	1.91E+05	nl	4.90E+05	nm	1.06E+01	1.30E+01	-	1.19E+02	1.46E+02	-	N
Dimethyl phthalate	6.84E+06	nl	2.38E+06	nl	-	-	8.36E+01	-	-	9.40E+02	-	-	N
Di-n-butyl phthalate	6.84E+04	n	2.38E+04	n	-	-	8.63E+00	-	-	9.70E+01	-	-	N

TABLE 4
Non- Residential Soil Screening Levels
Bloomfield Refinery - Bloomfield, New Mexico

							Cross Media Soil-to-Ground Water			Cross Media Soil-to-Ground Water			
	NMED				EPA		NMED	EPA		NMED	EPA		
Analyte	IndOccSoil (mg/kg)	IndOccSoil (Endpoint)	ConsWork (mg/kg)	ConsWork Soil (Endpoint)	Industrial (mg/kg)	IndSoil _key	DAF1 (mg/kg)	GW_Risk-based SSL (mg/kg)	GW_MCL-based SSL (mg/kg)	DAF (11.25) (mg/kg)	GW_Risk-based SSL (11.25) (mgkg)	GW_MCL-based SSL (11.25) (mg/kg)	Constituent Detected
Applicable depth interval	0-2'		0-10'		0-2'		All depths			All depths			
Di-n-octyl phthalate	-	-	-	-	-	-	-	-	-	-	-	-	N
Ethylbenzene	3.85E+02	c	6.63E+03	cs	2.90E+01	c	1.46E-02	1.90E-03	8.90E-01	1.64E-01	2.14E-02	1.00E+01	N
Fluoranthene	2.44E+04	n	8.91E+03	n	2.20E+04	n	1.55E+02	2.10E+02	-	1.75E+03	2.36E+03	-	N
Fluorene	2.44E+04	ns	8.91E+03	ns	2.20E+04	n	2.50E+01	3.30E+01	-	2.81E+02	3.71E+02	-	N
Hexachlorobenzene	1.20E+01	c	1.03E+02	c	1.10E+00	c	2.21E-03	2.90E-04	7.00E-03	2.48E-02	3.26E-03	7.88E-02	N
Hexachlorobutadiene	-	-	-	-	2.20E+01	c*	-	1.90E-03	-	-	2.14E-02	-	N
Hexachlorocyclopentadiene	4.10E+03	n	8.11E+02	n	3.70E+03	n	6.13E-01	8.00E-01	1.80E-01	6.90E+00	9.00E+00	2.03E+00	N
Hexachloroethane	6.84E+02	n	2.38E+02	n	1.20E+02	c**	1.93E-02	3.20E-03	-	2.17E-01	3.60E-02	-	N
2-Hexanone	-	-	-	-	-	-	-	-	-	-	-	-	Y
Indeno(1,2,3-cd)pyrene	2.34E+01	c	2.13E+02	c	2.10E+00	c	3.70E+00	1.60E-01	-	4.16E+01	1.80E+00	-	N
Isophorone	2.02E+04	c	4.75E+04	n	1.80E+03	c*	1.85E-01	2.20E-02	-	2.08E+00	2.48E-01	-	N
Isopropylbenzene (cumene)	1.49E+04	ns	1.03E+04	ns	1.10E+04	ns	9.86E-01	1.30E+00	-	1.11E+01	1.46E+01	-	N
4-Isopropyltoluene	-	-	-	-	-	-	-	-	-	-	-	-	Y
Lead	8.00E+02	IEUBK	8.00E+02	IEUBK	8.00E+02	nL	-	-	-	-	-	-	Y
Mercury	4.99E+01	n	6.36E+01	ns	2.40E+01	ns	2.93E-02	3.00E-02	1.00E-01	3.30E-01	3.38E-01	1.13E+00	Y
Methyl tert-butyl ether (MTBE)	4.69E+03	c	6.55E+04	cs	1.90E+02	c	2.29E-02	2.70E-03	-	2.58E-01	3.04E-02	-	N
Methylene chloride	1.09E+03	c	1.06E+04	ns	5.40E+01	c	1.07E-02	1.20E-03	1.30E-03	1.21E-01	1.35E-02	1.46E-02	Y
1-Methylnaphthalene	-	-	-	-	9.90E+01	c	-	1.50E-02	-	-	1.69E-01	-	N
2-Methylnaphthalene	-	-	-	-	4.10E+03	ns	-	9.00E-01	-	-	1.01E+01	-	N
2-Methylphenol	-	-	-	-	3.10E+04	n	-	2.00E+00	-	-	2.25E+01	-	N
3+4-Methylphenol	-	-	-	-	3.10E+03	n	-	1.90E-01	-	-	2.14E+00	-	Y
4-Methyl-2-pentanone	-	-	-	-	-	-	-	-	-	-	-	-	Y
2-Nitroaniline	-	-	-	-	1.80E+03	n	-	3.30E-02	-	-	3.71E-01	-	N
3-Nitroaniline	-	-	-	-	-	-	-	-	-	-	-	-	N
4-Nitroaniline	-	-	-	-	8.60E+01	c*	-	1.00E-03	-	-	1.13E-02	-	N
2-Nitrophenol	-	-	-	-	-	-	-	-	-	-	-	-	N
4-Nitrophenol	-	-	-	-	-	-	-	-	-	-	-	-	N
Naphthalene	2.52E+02	cs	7.02E+02	ns	2.00E+01	c*	4.19E-03	5.50E-04	-	4.72E-02	6.19E-03	-	N
n-Butylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	N
Nickel	2.27E+04	n	6.19E+03	n	6.90E+04	c	4.77E+01	4.80E+01	-	5.36E+02	5.40E+02	-	Y
Nitrobenzene	2.77E+02	c	5.20E+02	n	2.20E+01	c*	6.86E-03	7.10E-05	-	7.72E-02	7.99E-04	-	N
N-Nitrosodi-n-propylamine	-	-	-	-	2.50E-01	c	-	1.10E-05	-	-	1.24E-04	-	N
N-Nitrosodiphenylamine	3.91E+03	c	3.40E+04	c	3.50E+02	c	1.29E+00	1.70E-01	-	1.45E+01	1.91E+00	-	N
n-Propylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	N
Pentachlorophenol	1.00E+02	c	1.03E+03	c	9.00E+00	c	2.94E-02	3.90E-03	7.00E-03	3.30E-01	4.39E-02	7.88E-02	N
Phenanthrene	2.05E+04	ns	7.15E+03	ns	-	-	8.34E+01	-	-	9.39E+02	-	-	N
Phenol	2.05E+05	nl	6.88E+04	n	1.80E+05	nm	6.30E+00	8.10E+00	-	7.09E+01	9.11E+01	-	N
Pyrene	1.83E+04	ns	6.68E+03	ns	1.70E+04	n	1.12E+02	1.50E+02	-	1.26E+03	1.69E+03	-	N
Pyridine	-	-	-	-	1.00E+03	n	-	9.70E-03	-	-	1.09E-01	-	N
sec-Butylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	N
Selenium	5.68E+03	n	1.55E+03	n	5.10E+03	n	9.65E-01	9.50E-01	2.60E-01	1.09E+01	1.07E+01	2.93E+00	N
Silver	5.68E+03	n	1.55E+03	n	5.10E+03	n	1.57E+00	1.60E+00	-	1.76E+01	1.80E+01	-	Y
Styrene	5.12E+04	ns	3.03E+04	ns	3.80E+04	ns	1.56E+00	2.00E+00	1.20E-01	1.76E+01	2.25E+01	1.35E+00	N
1,2,3-Trichlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	N
1,1,1,2-Tetrachloroethane	1.61E+02	c	2.78E+03	cs	9.80E+00	c	1.73E-03	2.10E-04	-	1.94E-02	2.36E-03	-	N
1,1,1-Trichloroethane	7.71E+04	ns	6.43E+04	ns	3.90E+04	ns	2.98E+00	3.30E+00	7.20E-02	3.35E+01	3.71E+01	8.10E-01	N
1,1,2,2-Tetrachloroethane	4.33E+01	c	5.99E+02	c	2.90E+00	c	2.25E-04	2.80E-05	-	2.53E-03	3.15E-04	-	N
1,1,2-Trichloroethane	9.43E+01	c	1.24E+03	ns	5.50E+00	c	6.74E-04	8.20E-05	1.70E-03	7.58E-03	9.23E-04	1.91E-02	N
2,4,5-Trichlorophenol	6.84E+04	n	2.38E+04	n	6.20E+04	n	7.13E+00	9.40E+00	-	8.02E+01	1.06E+02	-	N
2,4,6-Trichlorophenol	6.84E+02	n	2.38E+02	n	1.60E+02	c**	7.13E-02	1.60E-02	-	8.02E-01	1.80E-01	-	N
1,2,3-Trichloropropane	4.54E+00	c	3.10E+01	c	4.10E-01	c	3.56E-05	4.40E-06	-	4.01E-04	4.95E-05	-	N
1,2,4-Trichlorobenzene	5.25E+02	ns	4.27E+02	ns	4.00E+02	ns	1.02E-02	1.30E-02	1.10E-01	1.15E-01	1.46E-01	1.24E+00	N
1,2,4-Trimethylbenzene	-	-	-	-	2.80E+02	ns	-	2.40E-02	-	-	2.70E-01	-	N
1,3,5-Trimethylbenzene	-	-	-	-	2.00E+02	n	-	2.00E-02	-	-	2.25E-01	-	N
tert-Butylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	N
Tetrachloroethene (PCE)	3.64E+01	c	3.38E+02	cs	2.70E+00	c	4.49E-04	5.20E-05	2.40E-03	5.05E-03	5.85E-04	2.70E-02	N
Toluene	5.79E+04	ns	2.11E+04	ns	4.60E+04	ns	1.38E+00	1.70E+00	7.60E-01	1.56E+01	1.91E+01	8.55E+00	Y
trans-1,2-DCE	9.95E+02	n	8.14E+02	n	5.00E+02	n	3.01E-02	3.40E-02	3.20E-02	3.39E-01	3.83E-01	3.60E-01	N
trans-1,3-Dichloropropene	1.26E+02	c	5.10E+02	n	8.40E+00	c*	1.35E-03	1.60E-04	-	1.52E-02	1.80E-03	-	N
Trichloroethene (TCE)	2.53E+02	c	4.60E+03	cs	1.40E+01	c	5.30E-03	6.10E-04	1.90E-03	5.96E-02	6.86E-03	2.14E-02	N
Trichlorofluoromethane	6.76E+03	ns	5.82E+03	ns	3.40E+03	ns	9.01E-01	8.40E-01	-	1.01E+01	9.45E+00	-	N
Vanadium	5.68E+03	n	1.55E+03	n	7.20E+03	n	1.83E+02	2.60E+02	-	2.05E+03	2.93E+03	-	Y
Vinyl chloride	2.59E+01	c	2.48E+02	c	1.70E+00	c	2.88E-04	5.60E-06	7.00E-04	3.24E-03	6.30E-05	7.88E-03	N
Xylenes, Total	3.61E+03	ns	3.13E+03	ns	2.60E+03	ns	1.76E-01	2.30E-01	1.10E+01	1.98E+00	2.59E+00	1.24E+02	N
Zinc	3.41E+05	nl	9.29E+04	n	3.10E+05	nm	6.82E+02	6.80E+02	-	7.67E+03	7.65E+03	-	Y

c - carcinogen
n - noncarcinogen
cs - carcinogen, SSL may exceed saturation
ns - noncarcinogen, SSL may exceed saturation
nl - noncarcinogen, SSL may exceed ceiling limit
nls - noncarcinogen, SSL may exceed both saturation and ceiling limit
- no screenig value currently available

NMED - Technical Background Document for Development of Soil Screening Levels - Revision 5.0 (August 2009)
EPA - Regional Screening Levels (April 2009)

Analytes	Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	AOC 19-1 (0-0.5')	AOC 19-2 (0-0.5')	AOC 19-3 (0-0.5')	AOC 19-4 (0-0.5')	AOC 19-5 (0-0.5')	AOC 19-6 (0-0.5')	AOC 19-7 (0-0.5')	AOC 19-7 (1.5-2.0)	AOC 19-8 (0-0.5')	AOC 19-9 (0-0.5)	AOC 19-10 (0-0.5')	AOC 19-11 (0-0.5')	AOC 19-12 (0-0.5')	AOC 19-13 (0-0.5')	AOC 19-14 (0-0.5')	AOC 19-15 (0-0.5')	AOC 19-16 (0-0.5')	AOC 19-17 (0-0.5')	AOC 19-18 (0-0.5)	AOC 19-19 (0-0.5')	AOC 19-20 (0-0.5')	AOC 19-21 (0-0.5')	AOC 19-22 (0-0.5')	AOC 19-23 (0-0.5')
Sample Date					8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/16/2011	8/16/2011	8/15/2011	8/16/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011
Metals (mg/kg)																												
Antimony	3.13E+01	(1)	7.44E+00	(4)	<2.5	<12	<2.5	<13	<5.0	<13	<2.5	<2.5	<2.5	<2.5	<5.0	<12	<13	<2.5	<5.0	<12	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Arsenic	3.59E+00	(1)	1.48E-01	(4)	<2.5	**14**	**11**	<13	<5.0	<13	<2.5	<2.5	**5.2**	**5.2**	<5.0	<12	<13	**3.6**	<5.0	<12	2.9	**3.8**	**3.6**	<2.5	<2.5	<2.5	<2.5	**24**
Barium	1.56E+04	(1)	3.39E+03	(4)	100	120	23	71	62	27	670	270	96	220	81	130	94	160	120	230	45	120	260	140	100	87	110	110
Beryllium	1.56E+02	(1)	6.49E+02	(4)	0.26	0.88	0.28	0.84	0.31	1.4	0.51	0.43	0.35	0.26	<0.30	<0.75	0.87	0.45	0.51	0.93	0.21	0.19	0.45	0.34	0.17	<0.15	0.21	<0.15
Cadmium	7.79E+01	(1)	1.55E+01	(4)	<0.10	<0.50	<0.10	<0.50	<0.20	<0.50	<0.10	<0.10	<0.10	<0.10	<0.20	<0.50	<0.50	<0.10	<0.20	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	2.19E+02	(1)	2.37E+01	(4)	2.8	2.4	1.6	5	2.8	8.6	3.6	2.9	3.4	2.6	1.9	20	7	92	**600**	21	34	33	170	3.8	3.3	2.4	3.9	1.4
Cobalt	2.30E+01	(2)	5.51E+00	(5)	1.6	11	3.6	3.9	3.9	3.6	2.8	2.1	3.8	2.3	2.9	5.3	6	3.1	4	7.3	2.6	1.4	2.6	2.5	2.7	1.8	2.3	2.6
Cyanide	1.56E+03	(1)	8.37E+01	(4)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Lead	4.00E+02	(1)	-	-	5.7	4.9	5.3	67	30	14	20	6.8	6.7	3.3	2.9	11	13	12	10	9.4	2.8	3.1	5.8	5.1	2.4	2.1	2.8	17
Mercury	7.71E+00	(1)	3.30E-01	(4)	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	0.13	0.051	<0.033	<0.033	<0.033	0.11	<0.033	<0.033	<0.033	<0.033
Nickel	1.56E+03	(1)	5.36E+02	(4)	2	19	3.4	5.4	3.7	6	3.5	2.5	4	2.5	2.8	6.3	7.4	3.8	5	9.8	2.9	1.6	3.2	3.1	2.6	1.7	2.7	2
Selenium	3.91E+02	(1)	1.09E+01	(4)	<2.5	<12	<2.5	<13	<5.0	<13	<2.5	<2.5	<2.5	<2.5	<5.0	<12	<13	<2.5	<5.0	<12	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Silver	3.91E+02	(1)	1.76E+01	(4)	0.31	<1.2	<0.25	<1.3	<0.50	<1.3	<0.25	<0.25	<0.25	<0.25	<0.50	<1.2	<1.3	<0.25	<0.50	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Vanadium	3.91E+02	(1)	2.05E+03	(4)	8.6	<12	6.9	16	11	17	11	7.9	9.7	6.6	<5.0	14	15	10	15	28	6.3	7.2	13	12	20	13	13	6.2
Zinc	2.35E+04	(1)	7.67E+03	(4)	13	54	17	31	17	43	18	15	19	12	16	54	43	110	340	64	32	43	190	20	16	12	15	8.6
Volatile Organic Compounds - (EPA Method 8260) mg/kg				(4)																								
1,1,1,2-Tetrachloroethane	2.92E+01	(1)	1.94E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	2.18E+04	(1)	3.35E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	7.97E+00	(1)	2.53E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloroethane	1.72E+01	(1)	7.58E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	6.29E+01	(1)	6.85E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	6.18E+02	(1)	1.34E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichloropropane	9.15E-01	(1)	4.01E-04	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	1.43E+02	(1)	1.15E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trimethylbenzene	6.70E+01	(2)	2.70E-01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromo-3-chloropropane	1.94E-01	(1)	3.35E-05	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane (EDB)	5.74E-01	(1)	1.78E-04	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	3.01E+03	(1)	3.53E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane (EDC)	7.74E+00	(1)	4.11E-03	(4)	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.050	<0.003	<0.003	<0.003	<0.050	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
1,2-Dichloropropane	1.47E+01	(1)	1.25E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	4.70E+01	(2)	2.25E-01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichloropropane	1.60E+03	(2)	3.04E+00	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	3.21E+01	(1)	4.02E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1-Methylnaphthalene	2.20E+02	(3)	1.69E-01	(5)	--	--	<0.001	--	--	<0.001	<0.001	<0.001	<0.001	<0.20	<0.001	<0.001	<0.001	<0.20	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,2-Dichloropropane	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Butanone (MEK)	3.96E+04	(1)	1.43E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.50	<0.001	<0.001	<0.001	<0.50	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0438
2-Chlorotoluene	1.56E+03	(1)	7.02E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Hexanone	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.50	<0.001	<0.001	<0.001	<0.50	<0.001	<0.001	<0.001	<0.001	<0.001	0.00456	<0.001	<0.001	<0.001	0.00584
2-Methylnaphthalene	3.10E+02	(2)	1.01E+01	(5)	--	--	<0.001	--	--	<0.001	<0.001	<0.001	<0.001	<0.20	<0.001	<0.001	<0.001	<0.20	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Chlorotoluene	5.50E+03	(2)	3.15E+01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Isopropyltoluene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Methyl-2-pentanone	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.00126	<0.001	<0.001	<0.001	<0.50	<0.001	<0.001	<0.001	<0.50	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00244
Acetone	6.75E+04	(1)	4.32E+01	(4)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.75	<0.002	<0.002	<0.002	<0.75	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.134
Benzene	1.55E+01	(1)	2.08E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromobenzene	9.40E+01	(2)	1.69E-01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	5.25E+00	(1)	3.11E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromoform	6.10E+02	(3)	2.59E-02	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromomethane	2.23E+01	(1)	2.18E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.15	<0.001	<0.001	<0.001	<0.15	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Carbon disulfide	1.94E+03	(1)	2.84E+00	(4)	0.00143	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.50	<0.001	<0.001	<0.001	<0.50	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Carbon tetrachloride	4.38E+00	(1)	8.32E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	5.08E+02	(1)	6.06E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroethane	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroform	5.72E+00	(1)	5.27E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloromethane	3.56E+01	(1)	4.70E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.15	<0.001	<0.001	<0.001	<0.15	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
cis-1,2-DCE	7.82E+02	(1)	1.06E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
cis-1,3-Dichloropropene	2.35E+01	(1)	1.52E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	1.13E+01	(1)	3.80E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromomethane	7.80E+02	(2)	1.02E+00	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dichlorodifluoromethane	4.81E+02	(1)	8.14E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	6.97E+01	(1)	1.64E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorobutadiene	6.20E+01	(3)	2.14E-02	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	3.21E+03	(1)	1.11E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Analytes	Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	AOC 19-1 (0-0.5')	AOC 19-2 (0-0.5')	AOC 19-3 (0-0.5')	AOC 19-4 (0-0.5')	AOC 19-5 (0-0.5')	AOC 19-6 (0-0.5')	AOC 19-7 (0-0.5')	AOC 19-7 (1.5-2.0)	AOC 19-8 (0-0.5')	AOC 19-9 (0-0.5)	AOC 19-10 (0-0.5')	AOC 19-11 (0-0.5')	AOC 19-12 (0-0.5')	AOC 19-13 (0-0.5')	AOC 19-14 (0-0.5')	AOC 19-15 (0-0.5')	AOC 19-16 (0-0.5')	AOC 19-17 (0-0.5')	AOC 19-18 (0-0.5)	AOC 19-19 (0-0.5')	AOC 19-20 (0-0.5')	AOC 19-21 (0-0.5')	AOC 19-22 (0-0.5')	AOC 19-23 (0-0.5')
Sample Date					8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/16/2011	8/16/2011	8/15/2011	8/16/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011
Methyl tert-butyl ether (MTBE)	8.62E+02	(1)	2.58E-01	(4)	0.014	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylene chloride	1.99E+02	(1)	1.21E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0118	0.0125	<0.001	<0.15	<0.001	<0.001	<0.001	<0.15	0.0134	<0.001	<0.001	<0.001	0.00981	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Naphthalene	4.50E+01	(1)	4.72E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Butylbenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Propylbenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
sec-Butylbenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Styrene	8.97E+03	(1)	1.76E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene (PCE)	6.99E+00	(1)	5.05E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	5.57E+03	(1)	1.56E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	0.00116	<0.001	<0.050	<0.001	0.00303	0.00654	0.00442	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00107
trans-1,2-DCE	2.73E+02	(1)	3.39E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
trans-1,3-Dichloropropene	2.35E+01	(1)	1.52E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethene (TCE)	4.57E+01	(1)	5.96E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichlorofluoromethane	2.01E+03	(1)	1.01E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl chloride	8.65E-01	(1)	3.24E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Xylenes, Total	1.09E+03	(1)	1.98E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.10	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Semi Volatile Organics - (EPA Method 8270) mg/kg				(4)																									
1,2,4-Trichlorobenzene	1.43E+02	(1)	1.15E-01	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
1,2-Dichlorobenzene	3.01E+03	(1)	3.53E+00	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
1,3-Dichlorobenzene	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
1,4-Dichlorobenzene	3.21E+01	(1)	4.02E-02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
1-Methylnaphthalene	2.20E+02	(3)	1.69E-01	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
2,4,5-Trichlorophenol	6.11E+03	(1)	8.02E+01	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
2,4,6-Trichlorophenol	6.11E+01	(1)	8.02E-01	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
2,4-Dichlorophenol	1.83E+02	(1)	1.54E+00	(4)	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.40	<0.40	<0.40	<0.40	<2.0	<0.40	<0.80	<2.0	<0.80	<0.80	<0.40	<0.80	<0.40	<0.40	<0.40	<0.80	<2.0
2,4-Dimethylphenol	1.22E+03	(1)	1.03E+01	(4)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30	<0.30	<0.30	<1.5	<0.30	<0.60	<1.5	<0.60	<0.60	<0.30	<0.60	<0.30	<0.30	<0.30	<0.60	<1.5
2,4-Dinitrophenol	1.22E+02	(1)	5.91E-01	(4)	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.40	<0.40	<0.40	<0.40	<2.0	<0.40	<0.80	<2.0	<0.80	<0.80	<0.40	<0.80	<0.40	<0.40	<0.40	<0.80	<2.0
2,4-Dinitrotoluene	1.26E+01	(1)	1.75E-02	(4)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
2,6-Dinitrotoluene	6.12E+01	(1)	3.00E-01	(4)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
2-Chloronaphthalene	6.26E+03	(1)	1.52E+02	(4)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.50	<0.25	<0.25	<0.25	<0.25	<1.2	<0.25	<0.50	<1.3	<0.50	<0.50	<0.25	<0.50	<0.25	<0.25	<0.25	<0.50	<1.2
2-Chlorophenol	3.91E+02	(1)	1.72E+00	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
2-Methylnaphthalene	3.10E+02	(2)	1.01E+01	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
2-Methylphenol	3.10E+03	(2)	2.25E+01	(5)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
2-Nitroaniline	1.80E+02	(2)	3.71E-01	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
2-Nitrophenol	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
3,3'-Dichlorobenzidine	8.71E+00	(1)	1.92E-01	(4)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.50	<0.25	<0.25	<0.25	<0.25	<1.2	<0.25	<0.50	<1.3	<0.50	<0.50	<0.25	<0.50	<0.25	<0.25	<0.25	<0.50	<1.2
3+4-Methylphenol	3.10E+02	(2)	2.14E+00	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
3-Nitroaniline	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
4,6-Dinitro-2-methylphenol	-	-	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
4-Bromophenyl phenyl ether	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
4-Chloro-3-methylphenol	-	-	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
4-Chloroaniline	2.40E+01	(3)	1.35E-03	(5)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
4-Chlorophenyl phenyl ether	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
4-Nitroaniline	2.40E+02	(3)	1.13E-02	(5)	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.40	<0.40	<0.40	<0.40	<2.0	<0.40	<0.80	<2.0	<0.80	<0.80	<0.40	<0.80	<0.40	<0.40	<0.40	<0.80	<2.0
4-Nitrophenol	-	-	-	-	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.50	<0.25	<0.25	<0.25	<0.25	<1.2	<0.25	<0.50	<1.3	<0.50	<0.50	<0.25	<0.50	<0.25	<0.25	<0.25	<0.50	<1.2
Acenaphthene	3.44E+03	(1)	2.31E+02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Acenaphthylene	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Aniline	8.50E+02	(3)	3.83E-02	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Anthracene	1.72E+04	(1)	3.79E+03	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Azobenzene	4.90E+01	(3)	5.74E-03	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Benz(a)anthracene	4.81E+00	(1)	3.59E+00	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Benzo(a)pyrene	4.81E-01	(1)	1.22E+00	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Benzo(b)fluoranthene	4.81E+00	(1)	1.25E+01	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Benzo(g,h,i)perylene	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Benzo(k)fluoranthene	4.81E+01	(1)	1.22E+02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Benzoic acid	2.40E+05	(2)	3.71E+02	(5)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	3.4
Benzyl alcohol	3.10E+04	(2)	4.73E+01	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Bis(2-chloroethoxy)methane	1.80E+02	(2)	2.59E-01	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Bis(2-chloroethyl)ether	2.56E+00	(1)	2.62E-04	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Bis(2-chloroisopropyl)ether	9.15E+01	(1)	2.88E-02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Bis(2-ethylhexyl)phthalate	2.80E+02	(1)	1.34E+02	(4)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
Butyl benzyl phthalate	2.60E+03	(3)	7.54E+00	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Carbazole	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Chrysene	4.81E+02	(1)	3.67E+02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Dibenz(a,h)anthracene	4.81E-01	(1)	4.07E+00	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Dibenzofuran	-	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0

Analytes	Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	AOC 19-1 (0-0.5')	AOC 19-2 (0-0.5')	AOC 19-3 (0-0.5')	AOC 19-4 (0-0.5')	AOC 19-5 (0-0.5')	AOC 19-6 (0-0.5')	AOC 19-7 (0-0.5')	AOC 19-7 (1.5-2.0)	AOC 19-8 (0-0.5')	AOC 19-9 (0-0.5)	AOC 19-10 (0-0.5')	AOC 19-11 (0-0.5')	AOC 19-12 (0-0.5')	AOC 19-13 (0-0.5')	AOC 19-14 (0-0.5')	AOC 19-15 (0-0.5')	AOC 19-16 (0-0.5')	AOC 19-17 (0-0.5')	AOC 19-18 (0-0.5)	AOC 19-19 (0-0.5')	AOC 19-20 (0-0.5')	AOC 19-21 (0-0.5')	AOC 19-22 (0-0.5')	AOC 19-23 (0-0.5')
Sample Date					8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/16/2011	8/16/2011	8/15/2011	8/16/2011	8/15/2011	8/15/2011	8/15/2011	8/15/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011	8/16/2011
Diethyl phthalate	4.89E+04	(1)	1.19E+02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Dimethyl phthalate	6.11E+05	(1)	9.40E+02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Di-n-butyl phthalate	6.11E+03	(1)	9.70E+01	(4)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
Di-n-octyl phthalate	-	-	-	-	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.50	<0.25	<0.25	<0.25	<0.25	<1.2	<0.25	<0.50	<1.3	<0.50	<0.50	<0.25	<0.50	<0.25	<0.25	<0.25	<0.50	<1.2
Fluoranthene	2.29E+03	(1)	1.75E+03	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Fluorene	2.29E+03	(1)	2.81E+02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Hexachlorobenzene	2.45E+00	(1)	2.48E-02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Hexachlorobutadiene	6.20E+01	(3)	2.14E-02	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Hexachlorocyclopentadiene	3.67E+02	(1)	6.90E+00	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Hexachloroethane	6.11E+01	(1)	2.17E-01	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Indeno(1,2,3-cd)pyrene	4.81E+00	(1)	4.16E+01	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Isophorone	4.13E+03	(1)	2.08E+00	(4)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
Naphthalene	4.50E+01	(1)	4.72E-02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Nitrobenzene	4.94E+01	(1)	7.72E-02	(4)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
N-Nitrosodi-n-propylamine	6.90E-01	(3)	1.24E-04	(5)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
N-Nitrosodiphenylamine	8.00E+02	(1)	1.45E+01	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Pentachlorophenol	2.07E+01	(1)	3.30E-01	(4)	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.80	<0.40	<0.40	<0.40	<0.40	<2.0	<0.40	<0.80	<2.0	<0.80	<0.80	<0.40	<0.80	<0.40	<0.40	<0.40	<0.80	<2.0
Phenanthrene	1.83E+03	(1)	9.39E+02	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Phenol	1.83E+04	(1)	7.09E+01	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Pyrene	1.72E+03	(1)	1.26E+03	(4)	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.40	<1.0	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<1.0
Pyridine	7.80E+01	(2)	1.09E-01	(5)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<1.0	<2.5	<1.0	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	<0.99	<2.5
Total Petroleum Hydrocarbons - (EPA Method 8015B) mg/kg																												
Diesel Range Organics (DRO)	1.83E+03	(7)	2.00E+02	(6)	770	<10	<10	76	110	29	190	<9.6	40	<9.9	<9.9	41	16	310	480	80	50	19	180	17	<9.7	<10	160	**21000**
Motor Oil Range Organics (MRO)	2.50E+03	(8)	2.50E+03	(9)	<520	<50	<51	76	93	<51	68	<48	<49	<49	<50	67	<49	<500	1100	130	89	56	<480	<49	<49	<52	49	<4900
Gasoline Range Organics (GRO)	-		-		11	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

-- No screening level or analytical result available

NMED - Technical Background Document for Development of Soil Screening Levels - Revision 5.0 (August 2009)

EPA - Regional Screening Levels (April 2009)

(1) NMED Residential Screening Level

(2) EPA Residential Screening Level

(3) EPA Residential - Screening Levels (April 2009) multiplied by 10 pursuant to Provision VII.B. of the July 7, 2007 NMED Order because the constituent is listed as carcinogenic

(4) SoilGW NMED Dilution Attenuation Factor (DAF) = 11.25

(5) SoilGW Risk-based EPA DAF = 11.25

(6) NMED Oct. 2006 TPH Screening Guidelines "uknown oil" with DAF = 1.0 - see report Section 5 for use of TPH screening levels

(7) NMED Oct. 2006 TPH Screening Guidelines(updated with Masschusetts Department of Environmental Protection 2009 tox data - uknown oil, residential, direct contact pathways

(8) NMED Oct. 2006 TPH Screening Guidelines "waste oil" - see report Section 5 for use of TPH screening levels

(9) NMED Oct. 2006 TPH Screening Guidelines "waste oil" with DAF = 1.0 - see report Section 5 for use of TPH screening levels

Bold represents value above Residential Screening Level
yellow highlight represents value above Leachate (DAF) Screening Level
Bold with yellow highlight value exceeds Residential Screening Level and DAF

Analytes	Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	AOC 20-1 (0-0.5')	AOC 20-2 (0-0.5')	AOC 20-3 (0-0.5')	AOC 20-4 (0-0.5')	AOC 20-5 (0-0.5')	AOC 20-6 (0-0.5')	AOC 20-7 (0-0.5')	AOC 20-8 (0-0.5')	AOC 20-9 (0-0.5')	AOC 20-10 (0-0.5')	AOC 20-11 (0-0.5')	AOC 20-12 (0-0.5')	AOC 21-1 (1.5-2.0')	AOC 21-1 (2.0-2.5')	AOC 21-1-(0-0.5')	AOC 21-2 (0-0.5')	AOC 21-3 (0-0.5')	AOC 21-4 (0-0.5')	AOC 21-5 (0-0.5')	AOC 21-5 (1.5-2.0')	AOC 21-5 (2.0-2.5')
Sample Date					8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/15/2011	8/15/2011	8/15/2011	8/17/2011	8/17/2011	8/17/2011
Metals (mg/kg)																									
Antimony	3.13E+01	(1)	7.44E+00	(4)	<2.5	<2.5	<13	<5.0	<2.5	<5.0	<2.5	<5.0	<5.0	<2.5	<2.5	<5.0	<13	<13	<13	<13	<12	<12	<13	<13	<13
Arsenic	3.59E+00	(1)	1.48E-01	(4)	<2.5	<2.5	<13	<5.0	<2.5	<5.0	<2.5	<5.0	<2.5	<2.5	<2.5	<2.5	<13	<13	<13	<13	<12	<12	<13	<13	<13
Barium	1.56E+04	(1)	3.39E+03	(4)	41	130	180	64	61	180	160	430	220	40	83	340	63	26	58	28	45	51	42	40	28
Beryllium	1.56E+02	(1)	6.49E+02	(4)	0.33	0.37	1.6	0.85	0.57	0.73	0.41	0.75	0.49	0.4	0.25	0.44	1.1	0.94	1.1	2.1	0.77	1.3	1	1	1.1
Cadmium	7.79E+01	(1)	1.55E+01	(4)	<0.10	<0.10	<0.50	<0.20	<0.10	<0.20	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chromium	2.19E+02	(1)	2.37E+01	(4)	4.7	4.6	11	7.1	4.7	8.6	3.2	6.4	5.5	3.6	2.5	4.1	9.1	7.3	8.9	11	6.6	9.6	8.5	8.4	9.3
Cobalt	2.30E+01	(2)	5.51E+00	(5)	2.9	2.8	8.9	4.9	3.1	5	3.3	4	3.3	3.3	1.9	2.9	7	5.5	8	8.5	6.5	7	6.9	9.1	7.5
Cyanide	1.56E+03	(1)	8.37E+01	(4)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.25	<0.25	<0.25	<0.25	<0.25	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Lead	4.00E+02	(1)	-	-	3.4	3.1	8.5	6.1	4	6.9	3.9	4.1	3.9	4.1	2.2	3.9	7.8	5.7	7.8	10	7	8.7	7.2	7.5	6.9
Mercury	7.71E+00	(1)	3.30E-01	(4)	<0.033	<0.033	<0.033	<0.066	<0.033	0.059	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Nickel	1.56E+03	(1)	5.36E+02	(4)	3.5	3.5	9	6	4.4	6.2	3.6	5.2	3.8	3.9	2.2	3.7	8.7	6.9	8.7	10	7.6	9.3	8.7	9.1	9.2
Selenium	3.91E+02	(1)	1.09E+01	(4)	<2.5	<2.5	<13	<5.0	<2.5	<5.0	<2.5	<5.0	<2.5	<2.5	<2.5	<2.5	<13	<13	<13	<13	<12	<12	<13	<13	<13
Silver	3.91E+02	(1)	1.76E+01	(4)	<0.25	<0.25	<1.3	<0.50	<0.25	<0.50	<0.25	<0.50	<0.25	<0.25	<0.25	<0.25	<1.3	<1.3	<1.3	<1.3	<1.2	<1.2	<1.3	<1.3	<1.3
Vanadium	3.91E+02	(1)	2.05E+03	(4)	19	14	32	16	12	15	8.2	18	9.8	8.5	8.6	11	19	13	18	17	13	16	17	18	18
Zinc	2.35E+04	(1)	7.67E+03	(4)	17	17	42	33	29	37	18	32	25	19	13	21	44	35	47	69	49	51	46	45	53
Volatile Organic Compounds - (EPA Method 8260) mg/kg				(4)																					
1,1,1,2-Tetrachloroethane	2.92E+01	(1)	1.94E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	2.18E+04	(1)	3.35E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	7.97E+00	(1)	2.53E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloroethane	1.72E+01	(1)	7.58E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	6.29E+01	(1)	6.85E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	6.18E+02	(1)	1.34E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichloropropane	9.15E-01	(1)	4.01E-04	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	1.43E+02	(1)	1.15E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trimethylbenzene	6.70E+01	(2)	2.70E-01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromo-3-chloropropane	1.94E-01	(1)	3.35E-05	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane (EDB)	5.74E-01	(1)	1.78E-04	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	3.01E+03	(1)	3.53E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane (EDC)	7.74E+00	(1)	4.11E-03	(4)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
1,2-Dichloropropane	1.47E+01	(1)	1.25E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	4.70E+01	(2)	2.25E-01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichloropropane	1.60E+03	(2)	3.04E+00	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	3.21E+01	(1)	4.02E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1-Methylnaphthalene	2.20E+02	(3)	1.69E-01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	–	–	–	<0.001	<0.001	<0.001
2,2-Dichloropropane	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Butanone (MEK)	3.96E+04	(1)	1.43E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Chlorotoluene	1.56E+03	(1)	7.02E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Hexanone	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Methylnaphthalene	3.10E+02	(2)	1.01E+01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	–	–	–	<0.001	<0.001	<0.001
4-Chlorotoluene	5.50E+03	(2)	3.15E+01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Isopropyltoluene	-	-	-	-	<0.001	<0.001	0.00477	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Methyl-2-pentanone	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Acetone	6.75E+04	(1)	4.32E+01	(4)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Benzene	1.55E+01	(1)	2.08E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromobenzene	9.40E+01	(2)	1.69E-01	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	5.25E+00	(1)	3.11E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromoform	6.10E+02	(3)	2.59E-02	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromomethane	2.23E+01	(1)	2.18E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Carbon disulfide	1.94E+03	(1)	2.84E+00	(4)	<0.001	<0.001	0.00291	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Carbon tetrachloride	4.38E+00	(1)	8.32E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	5.08E+02	(1)	6.06E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroethane	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroform	5.72E+00	(1)	5.27E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloromethane	3.56E+01	(1)	4.70E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
cis-1,2-DCE	7.82E+02	(1)	1.06E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
cis-1,3-Dichloropropene	2.35E+01	(1)	1.52E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	1.13E+01	(1)	3.80E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromomethane	7.80E+02	(2)	1.02E+00	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dichlorodifluoromethane	4.81E+02	(1)	8.14E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	6.97E+01	(1)	1.64E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorobutadiene	6.20E+01	(3)	2.14E-02	(5)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	3.21E+03	(1)	1.11E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Analytes	Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	AOC 20-1 (0-0.5')	AOC 20-2 (0-0.5')	AOC 20-3 (0-0.5')	AOC 20-4 (0-0.5')	AOC 20-5 (0-0.5')	AOC 20-6 (0-0.5')	AOC 20-7 (0-0.5')	AOC 20-8 (0-0.5')	AOC 20-9 (0-0.5')	AOC 20-10 (0-0.5')	AOC 20-11 (0-0.5')	AOC 20-12 (0-0.5')	AOC 21-1 (1.5-2.0')	AOC 21-1 (2.0-2.5')	AOC 21-1-(0-0.5')	AOC 21-2 (0-0.5')	AOC 21-3 (0-0.5')	AOC 21-4 (0-0.5')	AOC 21-5 (0-0.5')	AOC 21-5 (1.5-2.0')	AOC 21-5 (2.0-2.5')
Sample Date					8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/15/2011	8/15/2011	8/15/2011	8/17/2011	8/17/2011	8/17/2011
Methyl tert-butyl ether (MTBE)	8.62E+02	(1)	2.58E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylene chloride	1.99E+02	(1)	1.21E-01	(4)	0.00809	0.0117	0.0149	0.00884	0.00975	<0.001	0.0077	0.0044	<0.001	0.00189	0.00202	<0.001	0.00275	0.00369	0.00398	<0.001	<0.001	<0.001	0.00272	0.00222	0.002
Naphthalene	4.50E+01	(1)	4.72E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Butylbenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Propylbenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
sec-Butylbenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Styrene	8.97E+03	(1)	1.76E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene (PCE)	6.99E+00	(1)	5.05E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	5.57E+03	(1)	1.56E+01	(4)	0.00131	<0.001	0.0143	0.00566	<0.001	<0.001	<0.001	<0.001	<0.001	0.00167	<0.001	<0.001	<0.001	0.00138	0.00198	0.0193	<0.001	0.0162	<0.001	<0.001	<0.001
trans-1,2-DCE	2.73E+02	(1)	3.39E-01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
trans-1,3-Dichloropropene	2.35E+01	(1)	1.52E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethene (TCE)	4.57E+01	(1)	5.96E-02	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichlorofluoromethane	2.01E+03	(1)	1.01E+01	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl chloride	8.65E-01	(1)	3.24E-03	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Xylenes, Total	1.09E+03	(1)	1.98E+00	(4)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Semi Volatile Organics - (EPA Method 8270) mg/kg				(4)																					
1,2,4-Trichlorobenzene	1.43E+02	(1)	1.15E-01	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	3.01E+03	(1)	3.53E+00	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Dichlorobenzene	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	3.21E+01	(1)	4.02E-02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1-Methylnaphthalene	2.20E+02	(3)	1.69E-01	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,4,5-Trichlorophenol	6.11E+03	(1)	8.02E+01	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,4,6-Trichlorophenol	6.11E+01	(1)	8.02E-01	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2,4-Dichlorophenol	1.83E+02	(1)	1.54E+00	(4)	<0.40	<0.40	<0.80	<0.80	<0.80	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
2,4-Dimethylphenol	1.22E+03	(1)	1.03E+01	(4)	<0.30	<0.30	<0.60	<0.60	<0.60	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
2,4-Dinitrophenol	1.22E+02	(1)	5.91E-01	(4)	<0.40	<0.40	<0.80	<0.80	<0.80	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
2,4-Dinitrotoluene	1.26E+01	(1)	1.75E-02	(4)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2,6-Dinitrotoluene	6.12E+01	(1)	3.00E-01	(4)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Chloronaphthalene	6.26E+03	(1)	1.52E+02	(4)	<0.25	<0.25	<0.50	<0.50	<0.50	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Chlorophenol	3.91E+02	(1)	1.72E+00	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Methylnaphthalene	3.10E+02	(2)	1.01E+01	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Methylphenol	3.10E+03	(2)	2.25E+01	(5)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Nitroaniline	1.80E+02	(2)	3.71E-01	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-Nitrophenol	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
3,3'-Dichlorobenzidine	8.71E+00	(1)	1.92E-01	(4)	<0.25	<0.25	<0.50	<0.50	<0.50	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
3+4-Methylphenol	3.10E+02	(2)	2.14E+00	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.27	<0.20	<0.20	<0.20
3-Nitroaniline	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
4,6-Dinitro-2-methylphenol	-	-	-	-	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4-Bromophenyl phenyl ether	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
4-Chloro-3-methylphenol	-	-	-	-	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4-Chloroaniline	2.40E+01	(3)	1.35E-03	(5)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
4-Chlorophenyl phenyl ether	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
4-Nitroaniline	2.40E+02	(3)	1.13E-02	(5)	<0.40	<0.40	<0.80	<0.80	<0.80	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
4-Nitrophenol	-	-	-	-	<0.25	<0.25	<0.50	<0.50	<0.50	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Acenaphthene	3.44E+03	(1)	2.31E+02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Acenaphthylene	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Aniline	8.50E+02	(3)	3.83E-02	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Anthracene	1.72E+04	(1)	3.79E+03	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Azobenzene	4.90E+01	(3)	5.74E-03	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benz(a)anthracene	4.81E+00	(1)	3.59E+00	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(a)pyrene	4.81E-01	(1)	1.22E+00	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(b)fluoranthene	4.81E+00	(1)	1.25E+01	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(g,h,i)perylene	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(k)fluoranthene	4.81E+01	(1)	1.22E+02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzoic acid	2.40E+05	(2)	3.71E+02	(5)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzyl alcohol	3.10E+04	(2)	4.73E+01	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bis(2-chloroethoxy)methane	1.80E+02	(2)	2.59E-01	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bis(2-chloroethyl)ether	2.56E+00	(1)	2.62E-04	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bis(2-chloroisopropyl)ether	9.15E+01	(1)	2.88E-02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bis(2-ethylhexyl)phthalate	2.80E+02	(1)	1.34E+02	(4)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Butyl benzyl phthalate	2.60E+03	(3)	7.54E+00	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Carbazole	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chrysene	4.81E+02	(1)	3.67E+02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dibenz(a,h)anthracene	4.81E-01	(1)	4.07E+00	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dibenzofuran	-	-	-	-	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Analytes	Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	AOC 20-1 (0-0.5')	AOC 20-2 (0-0.5')	AOC 20-3 (0-0.5')	AOC 20-4 (0-0.5')	AOC 20-5 (0-0.5')	AOC 20-6 (0-0.5')	AOC 20-7 (0-0.5')	AOC 20-8 (0-0.5')	AOC 20-9 (0-0.5')	AOC 20-10 (0-0.5')	AOC 20-11 (0-0.5')	AOC 20-12 (0-0.5')	AOC 21-1 (1.5-2.0')	AOC 21-1 (2.0-2.5')	AOC 21-1-(0-0.5')	AOC 21-2 (0-0.5')	AOC 21-3 (0-0.5')	AOC 21-4 (0-0.5')	AOC 21-5 (0-0.5')	AOC 21-5 (1.5-2.0')	AOC 21-5 (2.0-2.5')
Sample Date					8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/17/2011	8/15/2011	8/15/2011	8/15/2011	8/17/2011	8/17/2011	8/17/2011
Diethyl phthalate	4.89E+04	(1)	1.19E+02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dimethyl phthalate	6.11E+05	(1)	9.40E+02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Di-n-butyl phthalate	6.11E+03	(1)	9.70E+01	(4)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Di-n-octyl phthalate	-	-	-	-	<0.25	<0.25	<0.50	<0.50	<0.50	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Fluoranthene	2.29E+03	(1)	1.75E+03	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Fluorene	2.29E+03	(1)	2.81E+02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Hexachlorobenzene	2.45E+00	(1)	2.48E-02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Hexachlorobutadiene	6.20E+01	(3)	2.14E-02	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Hexachlorocyclopentadiene	3.67E+02	(1)	6.90E+00	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Hexachloroethane	6.11E+01	(1)	2.17E-01	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Indeno(1,2,3-cd)pyrene	4.81E+00	(1)	4.16E+01	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Isophorone	4.13E+03	(1)	2.08E+00	(4)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Naphthalene	4.50E+01	(1)	4.72E-02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Nitrobenzene	4.94E+01	(1)	7.72E-02	(4)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
N-Nitrosodi-n-propylamine	6.90E-01	(3)	1.24E-04	(5)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
N-Nitrosodiphenylamine	8.00E+02	(1)	1.45E+01	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Pentachlorophenol	2.07E+01	(1)	3.30E-01	(4)	<0.40	<0.40	<0.80	<0.80	<0.80	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Phenanthrene	1.83E+03	(1)	9.39E+02	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Phenol	1.83E+04	(1)	7.09E+01	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Pyrene	1.72E+03	(1)	1.26E+03	(4)	<0.20	<0.20	<0.40	<0.40	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Pyridine	7.80E+01	(2)	1.09E-01	(5)	<0.50	<0.50	<0.99	<1.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Petroleum Hydrocarbons - (EPA Method 8015B) mg/kg																									
Diesel Range Organics (DRO)	1.83E+03	(7)	2.00E+02	(6)	<10	61	87	490	17	12	<10	<10	<10	<10	<9.7	<10	19	31	32	710	<10	23	57	78	160
Motor Oil Range Organics (MRO)	2.50E+03	(8)	2.50E+03	(9)	<51	<49	78	<500	64	<48	<50	<52	<51	<51	<48	<51	<49	<49	<49	<510	<50	<50	<51	<49	<49
Gasoline Range Organics (GRO)	-	-	-	-	<5.0	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

-- No screening level or analytical result available

NMED - Technical Background Document for Development of Soil Screening Levels - Revision 5.0 (August 2009)

EPA - Regional Screening Levels (April 2009)

(1) NMED Residential Screening Level

(2) EPA Residential Screening Level

(3) EPA Residential - Screening Levels (April 2009) multiplied by 10 pursuant to Provision VII.B. of the July 7, 2007 NMED Order because the constituent is listed as carcinogenic

(4) SoilGW NMED Dilution Attenuation Factor (DAF) = 11.25

(5) SoilGW Risk-based EPA DAF = 11.25

(6) NMED Oct. 2006 TPH Screening Guidelines "uknown oil" with DAF = 1.0 - see report Section 5 for use of TPH screening levels

(7) NMED Oct. 2006 TPH Screening Guidelines(updated with Masschusetts Department of Environmental Protection 2009 tox data - uknown oil, residential, direct contact pathways

(8) NMED Oct. 2006 TPH Screening Guidelines "waste oil" - see report Section 5 for use of TPH screening levels

(9) NMED Oct. 2006 TPH Screening Guidelines "waste oil" with DAF = 1.0 - see report Section 5 for use of TPH screening levels

Bold represents value above Residential Screening Level
yellow highlight represents value above Leachate (DAF) Screening Level
Bold with yellow highlight value exceeds Residential Screening Level and DAF

Table 6
Group 6 Soil Cumulative Risk and Hazard Index Evaluation
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Maximum Concentration	Maximum Concentration divided by Residential Soil Screening Level	Maximum Concentration divided by Non-Residential Soil Screening Level
CARCINOGENIC CONSTITUENTS							
Metals (mg/kg)							
Nickel	1.56E+03	(1)	6.19E+03	(5)	19	0.0121	0.0031
Arsenic	3.59E+00	(1)	1.77E+01	(4)	24	6.6907	1.3565
Volatile Organic Compounds - (EPA Method 8260) mg/kg							
Methylene chloride	1.99E+02	(1)	1.09E+03	(4)	0.0149	0.00007	0.00001
Carcinogenic Constituents Cumulative Risk x 10^{-5}						**6.703**	**1.360**
NON-CARCINOGENIC CONSTITUENTS							
Metals (mg/kg)							
Barium	1.56E+04	(1)	4.35E+03	(5)	670	0.0430	0.1539
Beryllium	1.56E+02	(1)	1.44E+02	(5)	2.1	0.0134	0.0146
Chromium	2.19E+02	(1)	4.49E+02	(5)	600	2.7397	1.3363
Cobalt	2.30E+01	(2)	3.00E+02	(6)	11	0.4783	0.0367
Silver	3.91E+02	(1)	1.55E+03	(5)	0.31	0.0008	0.0002
Vanadium	3.91E+02	(1)	1.55E+03	(5)	32	0.0818	0.0207
Zinc	2.35E+04	(1)	9.29E+04	(5)	340	0.0145	0.0037
Lead	4.00E+02	(1)	8.00E+02	(4)	67	0.1675	0.0838
Mercury	7.71E+00	(1)	4.99E+01	(4)	0.13	0.0169	0.0026
Volatile Organic Compounds - (EPA Method 8260) mg/kg							
2-Butanone (MEK)	3.96E+04	(1)	1.48E+05	(5)	0.0438	0.000001	0.0000003
2-Hexanone	-	-	-	-	0.00584	-	-
4-Methyl-2-pentanone	-	-	-	-	0.00244	-	-
Acetone	6.75E+04	(1)	2.63E+05	(5)	0.134	0.000002	0.000001
4-Isopropyltoluene	-	-	-	-	0.00477	-	-
Carbon disulfide	1.94E+03	(1)	5.89E+03	(5)	0.00461	0.000002	0.000001
Toluene	5.57E+03	(1)	2.11E+04	(5)	0.0256	0.000005	0.000001
Semi Volatile Organics - (EPA Method 8270) mg/kg							
Benzoic acid	2.40E+05	(2)	2.50E+06	(6)	3.4	0.0000	0.0000
3+4-Methylphenol	3.10E+02	(2)	3.10E+03	(6)	0.27	0.0009	0.0001
Non-Carcinogenic Constituents Hazard Index						**3.557**	**1.652**

- No screening level or analytical result available

NMED - Technical Background Document for Development of Soil Screening Levels - Revision 5.0 (August 2009)

EPA - Regional Screening Levels (April 2009)

(1) NMED Residential Screening Level

(2) EPA Residential Screening Level

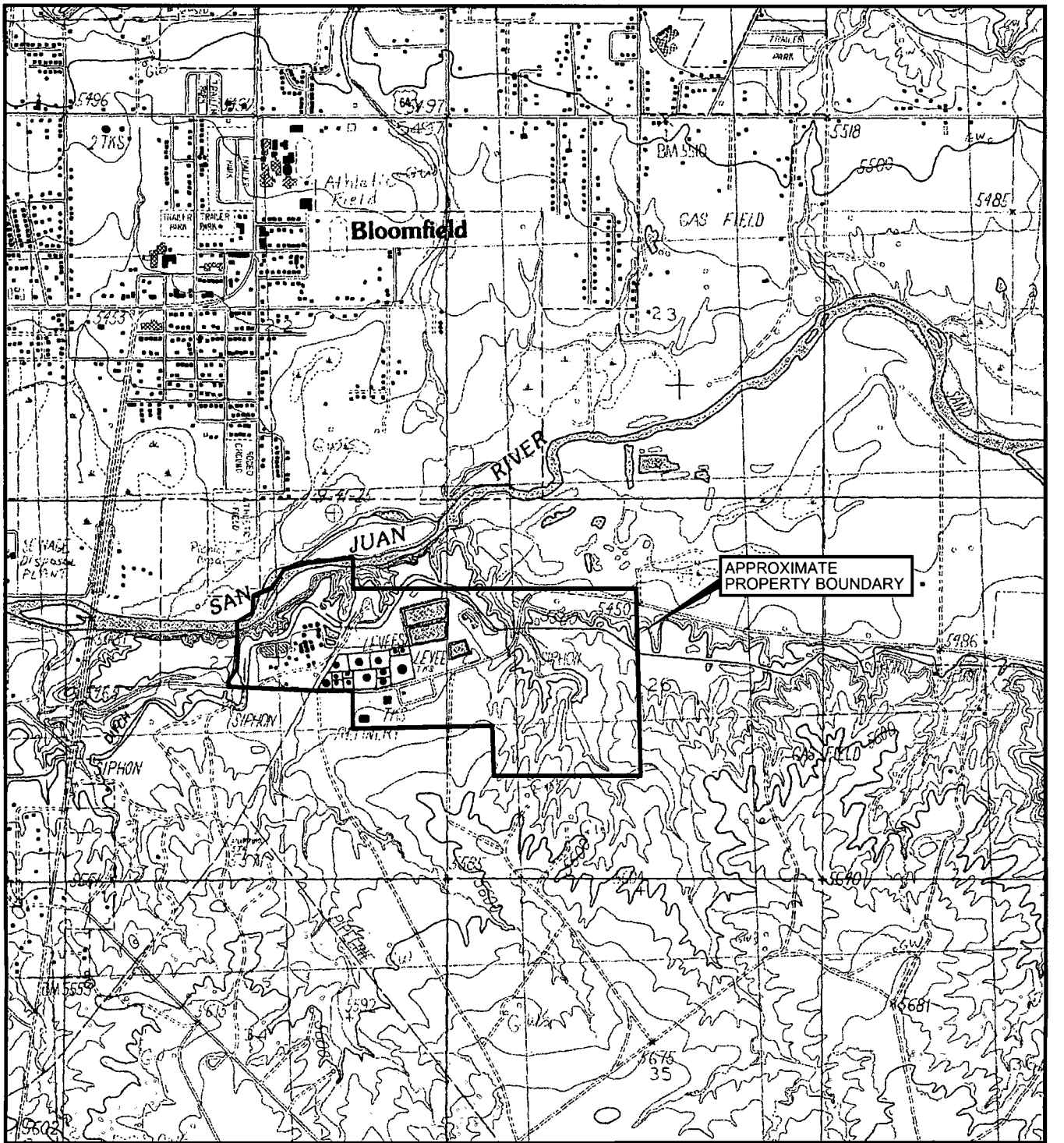
(3) EPA Residential - Screening Levels (April 2009) multiplied by 10 pursuant to Provision VII.B. of the July 7, 2007 NMED Order because the constituent is listed as carcinogenic

(4) NMED Industrial Occupational Screening Level

(5) NMED Construction Worker Screening Level

(6) EPA Industrial - Screening Levels (April 2009)

(7) EPA Industrial - Screening Levels (April 2009) multiplied by 10 pursuant to Provision VII.B. of the July 7, 2007 NMED Order because the constituent is listed as carcinogenic



Map Source: USGS 7.5 Min. Quad Sheet BLOOMFIELD, NM., 1985.

0 2000
SCALE IN FEET

QUADRANGLE LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 01/06/10	FILE: WestRef-A25

FIGURE 1
SITE LOCATION MAP
BLOOMFIELD REFINERY

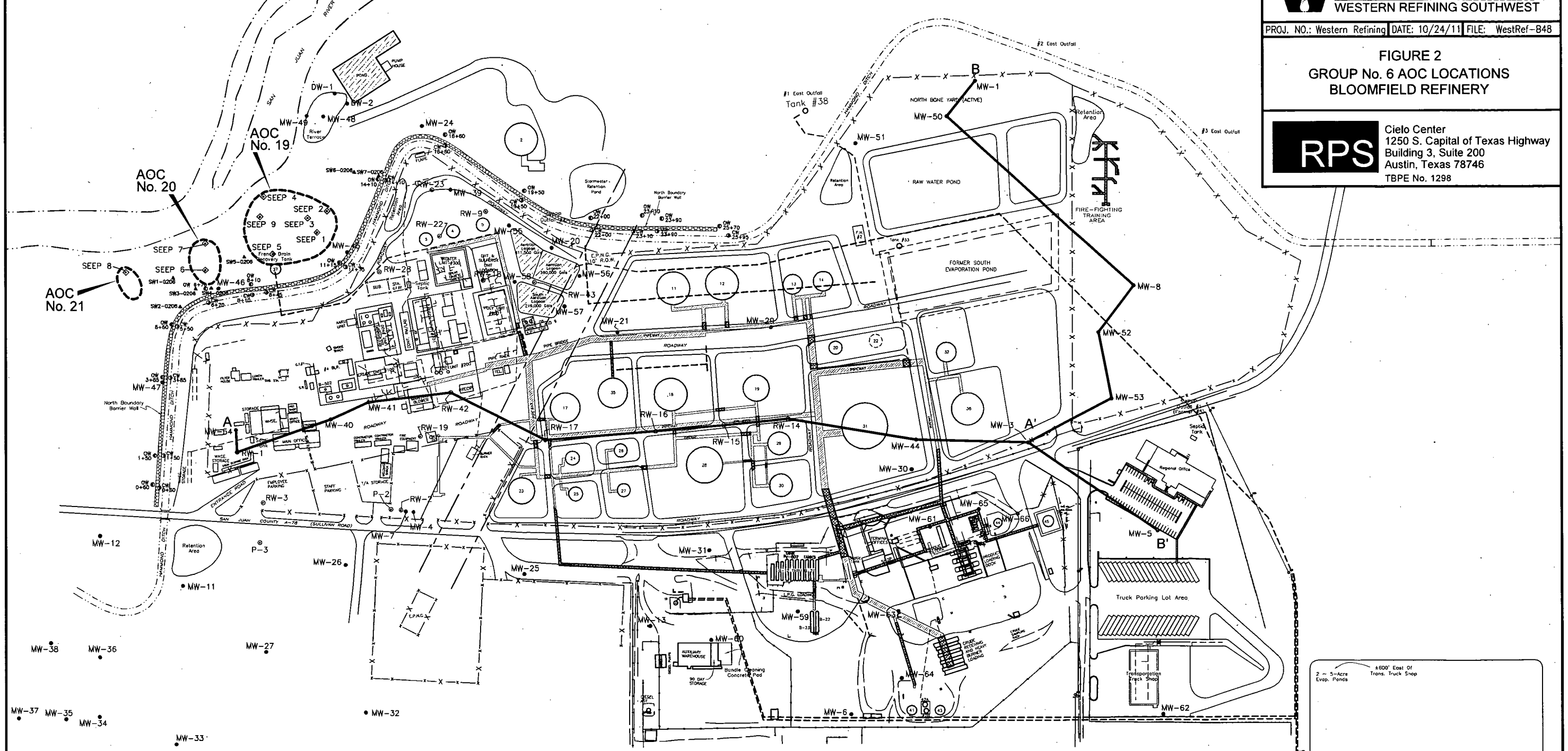
RPS
404 Camp Craft Road
Austin, Texas 78746

WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-B48

FIGURE 2
GROUP No. 6 AOC LOCATIONS
BLOOMFIELD REFINERY

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



LEGEND

- SEEP 1 ◈ SEEP LOCATION AND IDENTIFICATION NUMBER
- MW-1 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- RW-1 ⊛ RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- OW 1+50 ⊙ OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER
- CW 1+50 ◉ COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
- SW1-0206 ▲ SUMP WELL LOCATION AND IDENTIFICATION NUMBER
- P-2 PIEZOMETER IDENTIFICATION
- A —— A' LINE OF CROSS SECTION
- UNDER GROUND PIPING (HYDROCARBONS)
- ABOVE GROUND PIPE-WAY
- SLURRY BARRIER WALL
- ABANDONED UNDERGROUND PIPING (SWMU No. 6)
- UNDER GROUND WASTEWATER PIPING (SWMU No. 3)
- UNDER GROUND DRAIN PIPING (SWMU No. 27)
- —x—x— FENCE
- FORMER TANK LOCATION

N

0 300
SCALE IN FEET

Aerial Map Source: Google Map.

LEGEND

SEEP 1 ◈	SEEP LOCATION AND IDENTIFICATION NUMBER
MW-24 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
RW-28 ⊙	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
OW 16+60 ◐	OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER
CW 16+60 ◑	COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
SW6-0206 ▲	SUMP WELL LOCATION AND IDENTIFICATION NUMBER

N

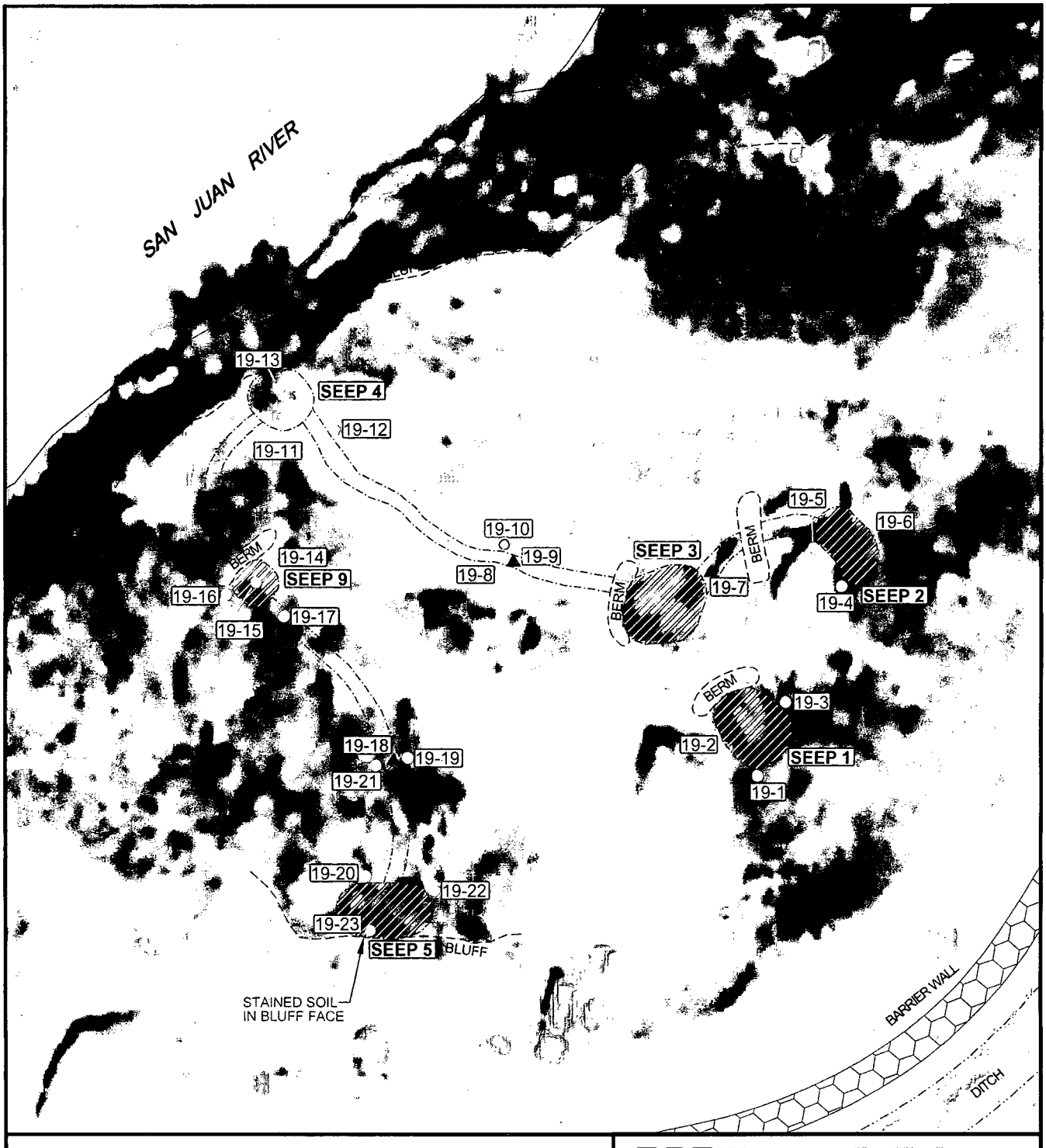
0 100
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-B114

FIGURE 3
AOC Nos. 19, 20 AND 21
SEEP LOCATION MAP
BLOOMFIELD REFINERY

RPS
Cielo Center
1250 S. Capital of Texas Highway
Building 3, Suite 200
Austin, Texas 78746



N

0 50

SCALE IN FEET

LEGEND

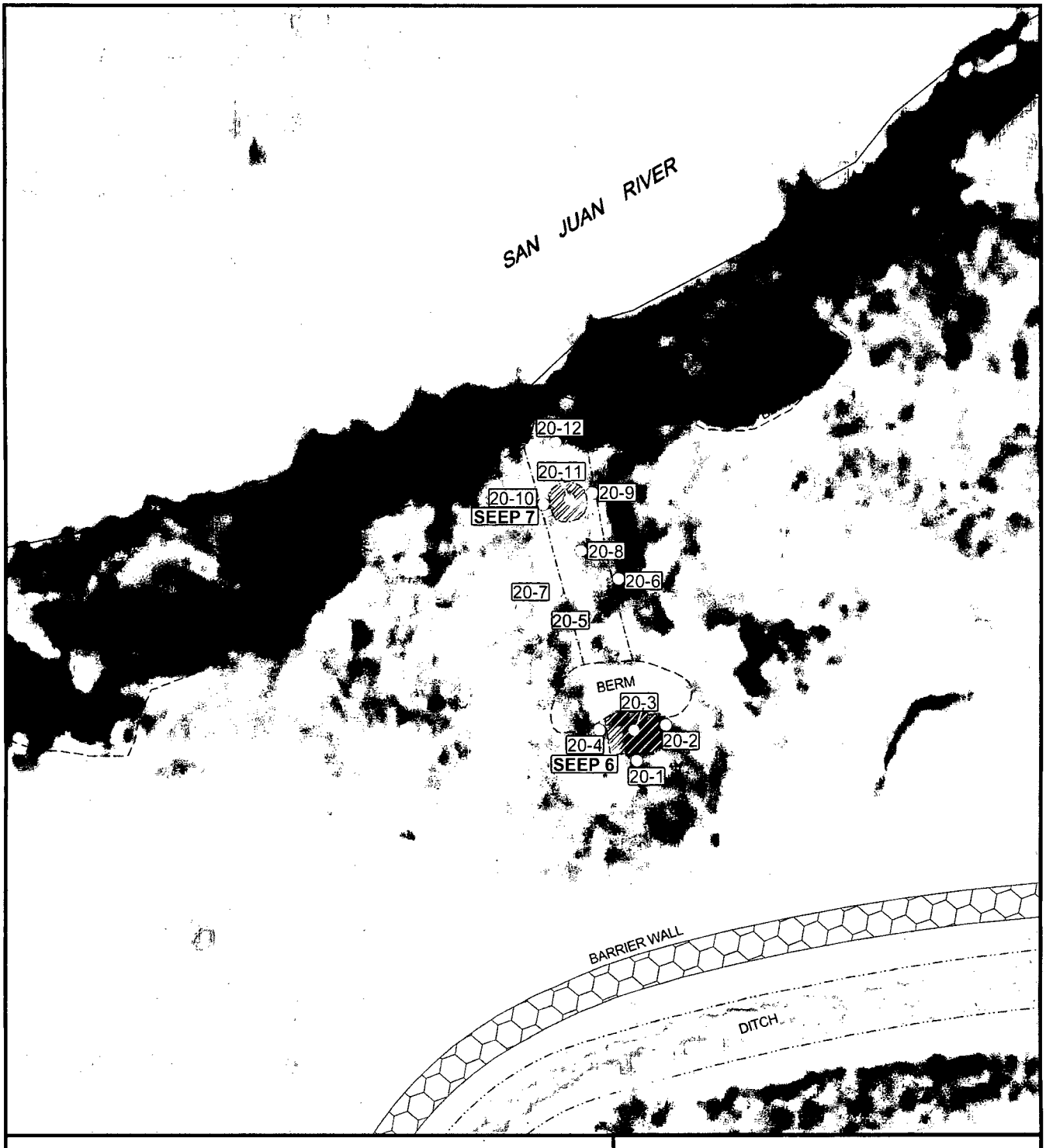
SEEP 1	SEEP IDENTIFICATION NUMBER
O	SURFACE SOIL SAMPLE LOCATION
△	SOIL BORING LOCATION
▨	LINED CATCHMENT BASIN
-·-·-·-	DRAINAGE PATHWAY

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-A135

FIGURE 4
AOC No. 19
SAMPLE LOCATION MAP
BLOOMFIELD REFINERY

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



LEGEND

SEEP 6 SEEP IDENTIFICATION NUMBER

○ SURFACE SOIL SAMPLE LOCATION

△ SOIL BORING LOCATION

LINED CATCHMENT BASIN

DRAINAGE PATHWAY

N

0 50

SCALE IN FEET

Western Refining

WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 10/24/11	FILE: WestRef-A135

FIGURE 5

AOC No. 20

SAMPLE LOCATION MAP

BLOOMFIELD REFINERY

RPS

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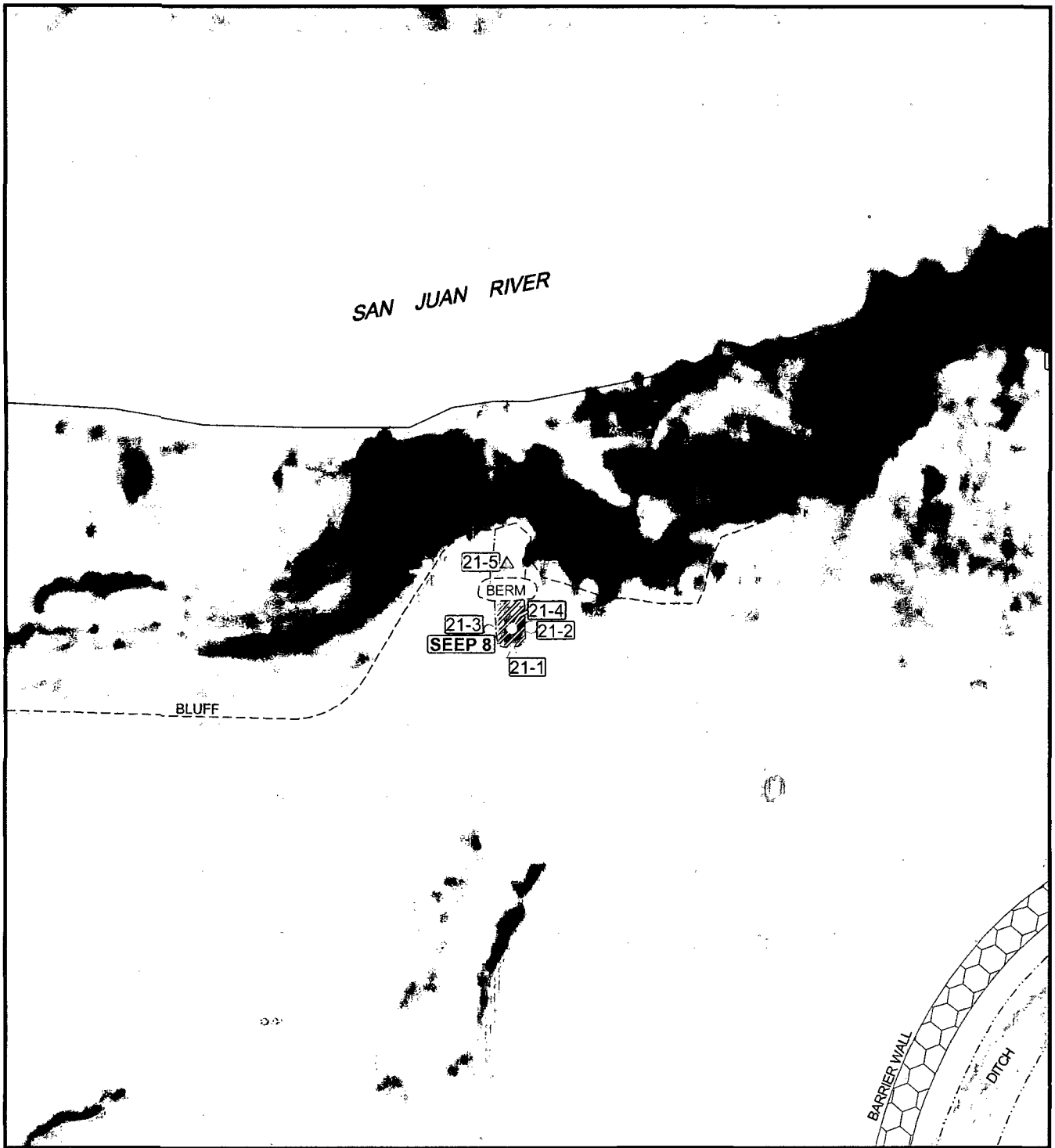
1250 S. Capital of Texas Highway
Building 3, Suite 200
Austin, Texas 78746
TBPE No. 1298



N

0 50
SCALE IN FEET

LEGEND

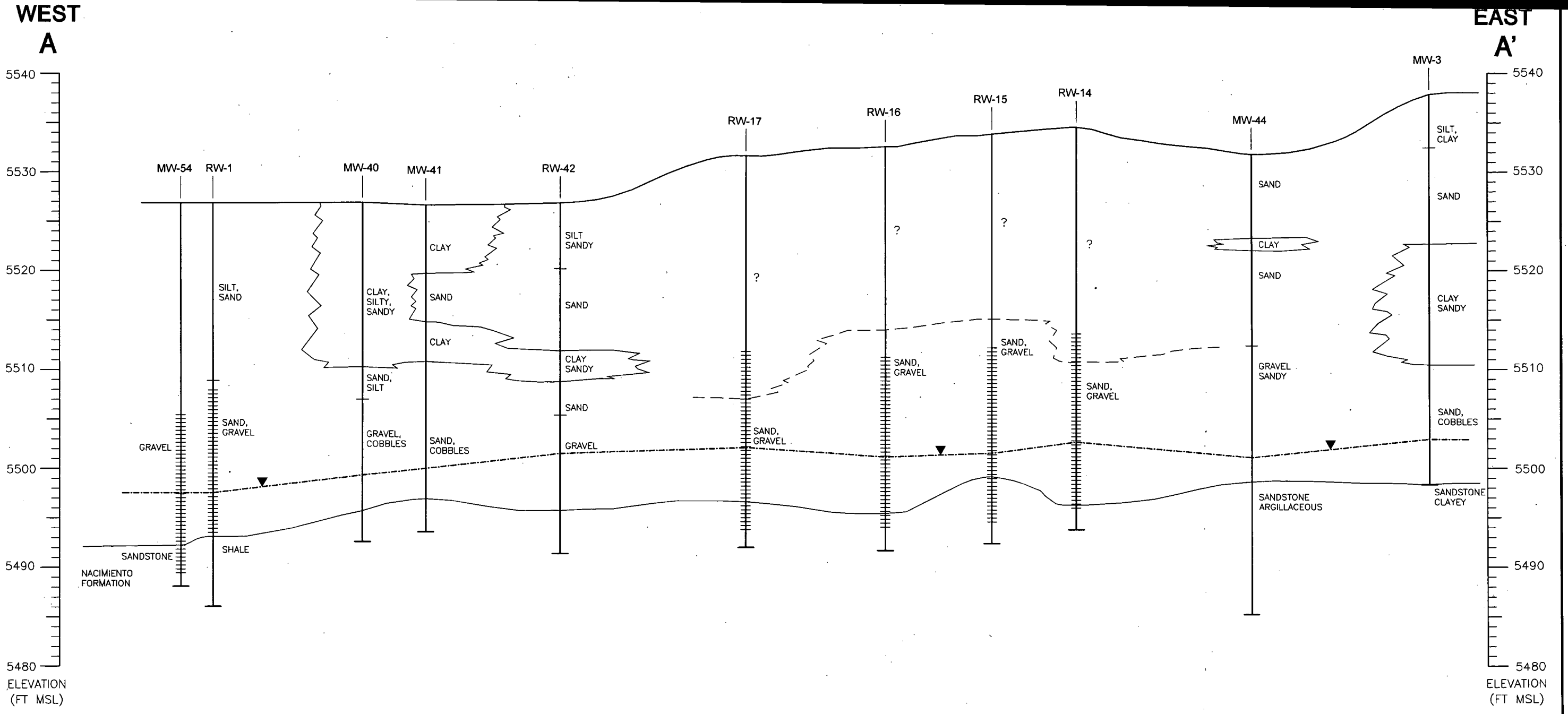
SEEP 8	SEEP IDENTIFICATION NUMBER
O	SURFACE SOIL SAMPLE LOCATION
△	SOIL BORING LOCATION
▨	LINED CATCHMENT BASIN
-·-·-·-	DRAINAGE PATHWAY

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 10/24/11	FILE: WestRef-A135

FIGURE 6
AOC No. 21
SAMPLE LOCATION MAP
BLOOMFIELD REFINERY

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



EXPLANATION

MW-54 ← WELL IDENTIFICATION

← WELL

← SCREEN INTERVAL

LITHOLOGIC CONTACTS

▼ – POTENTIOMETRIC SURFACE MEASURED AUGUST–OCTOBER 2008

10
0
200
SCALE IN FEET
VERTICAL EXAGGERATION = 20X

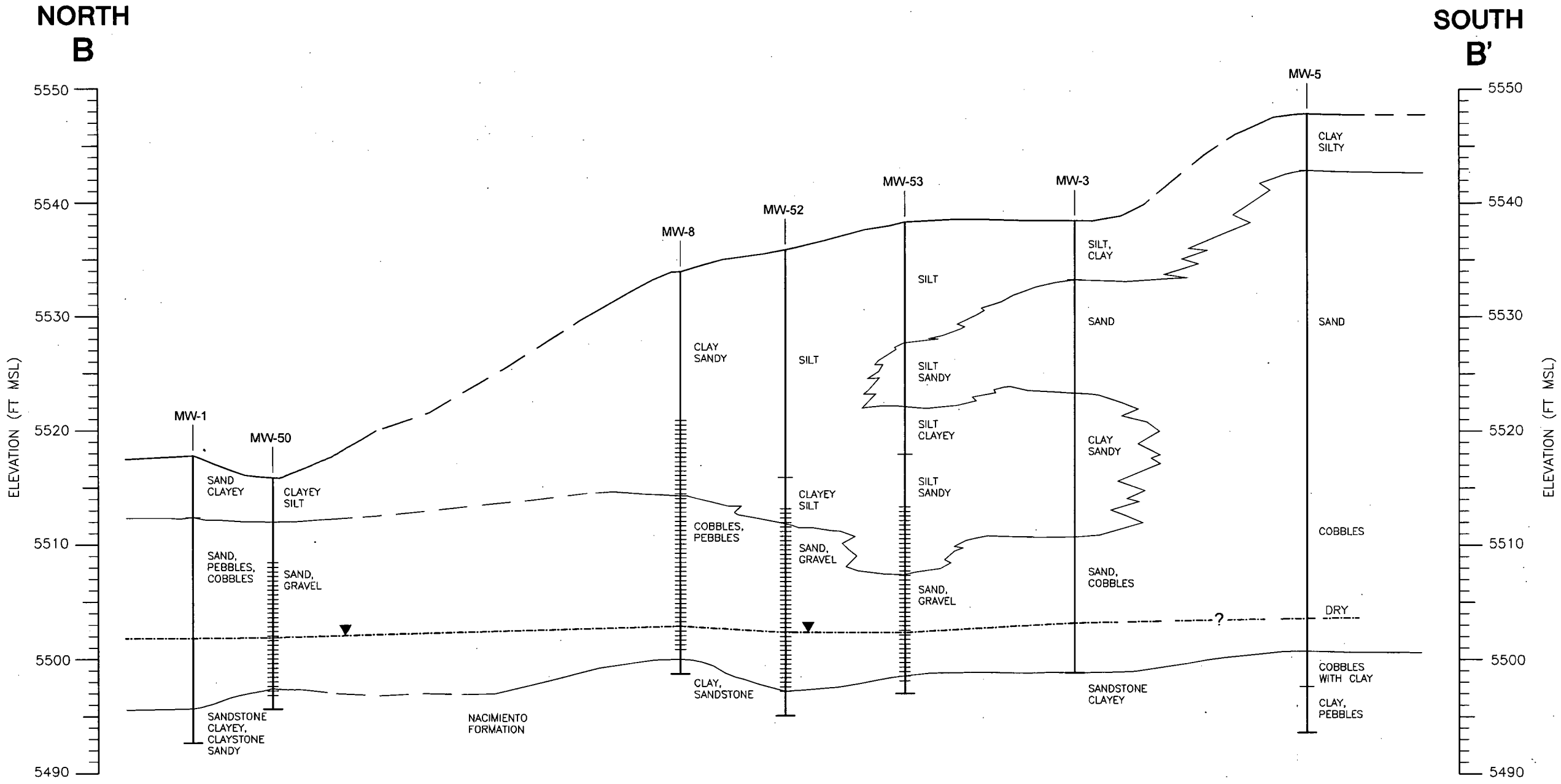
NOTE:
SCREEN INTERVAL NOT AVAILABLE FOR MW–3, MW–40, MW–41, MW–44, RW–42

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE:WestRef–B115

FIGURE 7
CROSS SECTION A-A'
WEST TO EAST
BLOOMFIELD REFINERY

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



EXPLANATION

MW-8 ← WELL IDENTIFICATION

← WELL

← SCREEN INTERVAL

LITHOLOGIC CONTACTS

– POTENTIOMETRIC SURFACE MEASURED AUGUST–OCTOBER 2008

10

0 200

SCALE IN FEET
VERTICAL EXAGGERATION = 20X

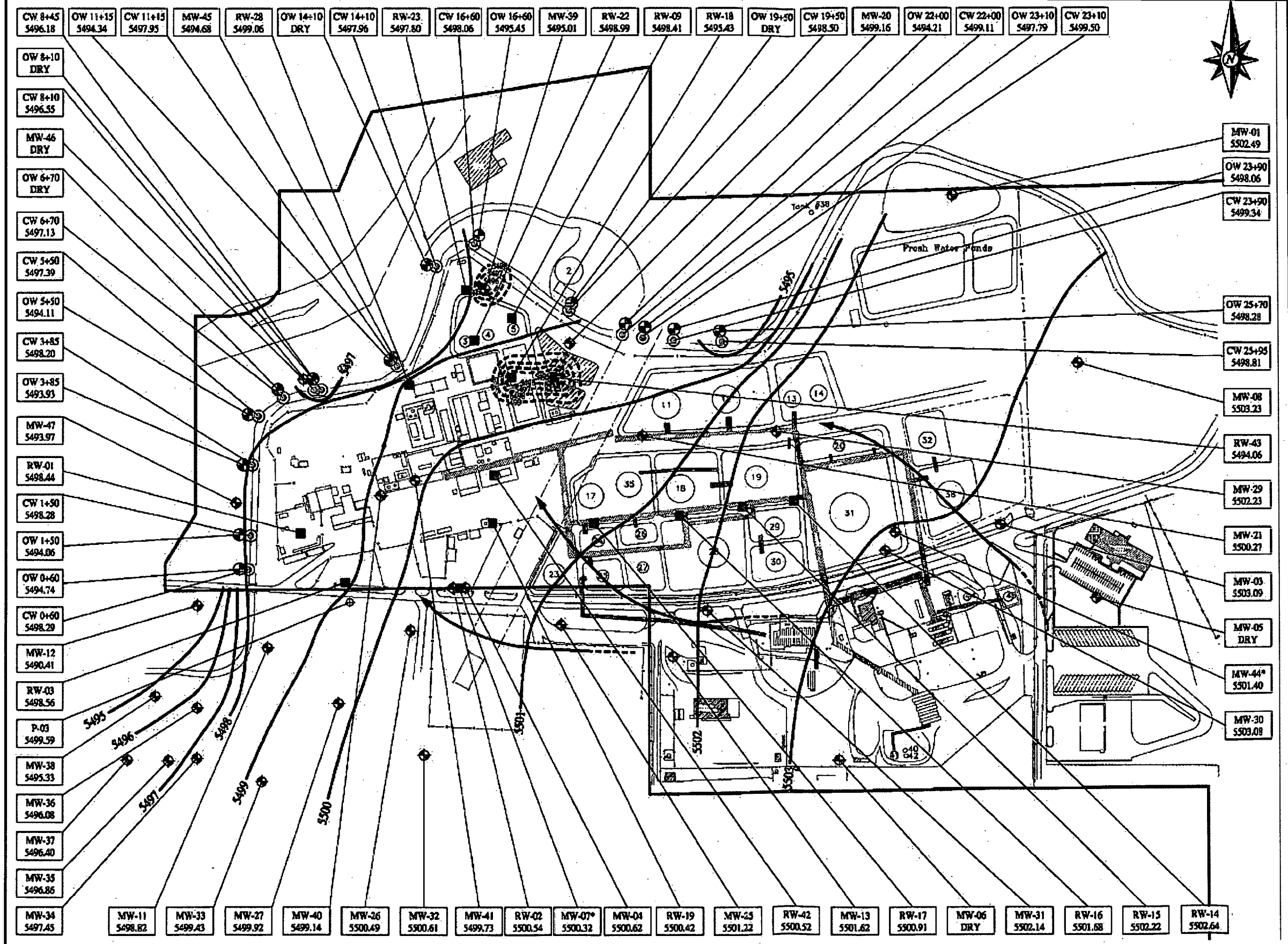
NOTE:
SCREEN INTERVAL NOT AVAILABLE FOR MW–1, MW–3, MW–5

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE:WestRef–B116

FIGURE 8
CROSS SECTION B-B'
NORTH TO SOUTH
BLOOMFIELD REFINERY

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



0 360
APPROXIMATE SCALE IN FEET

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 5493.97 -Well ID -Groundwater Elevation (ft amsl)

Notes:
* Deeper Well; data not used to contour.

3rd Quarter
August 17th

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-B76

FIGURE 9

POTENTIOMETRIC SURFACE MAP
AUGUST 2009
BLOOMFIELD REFINERY

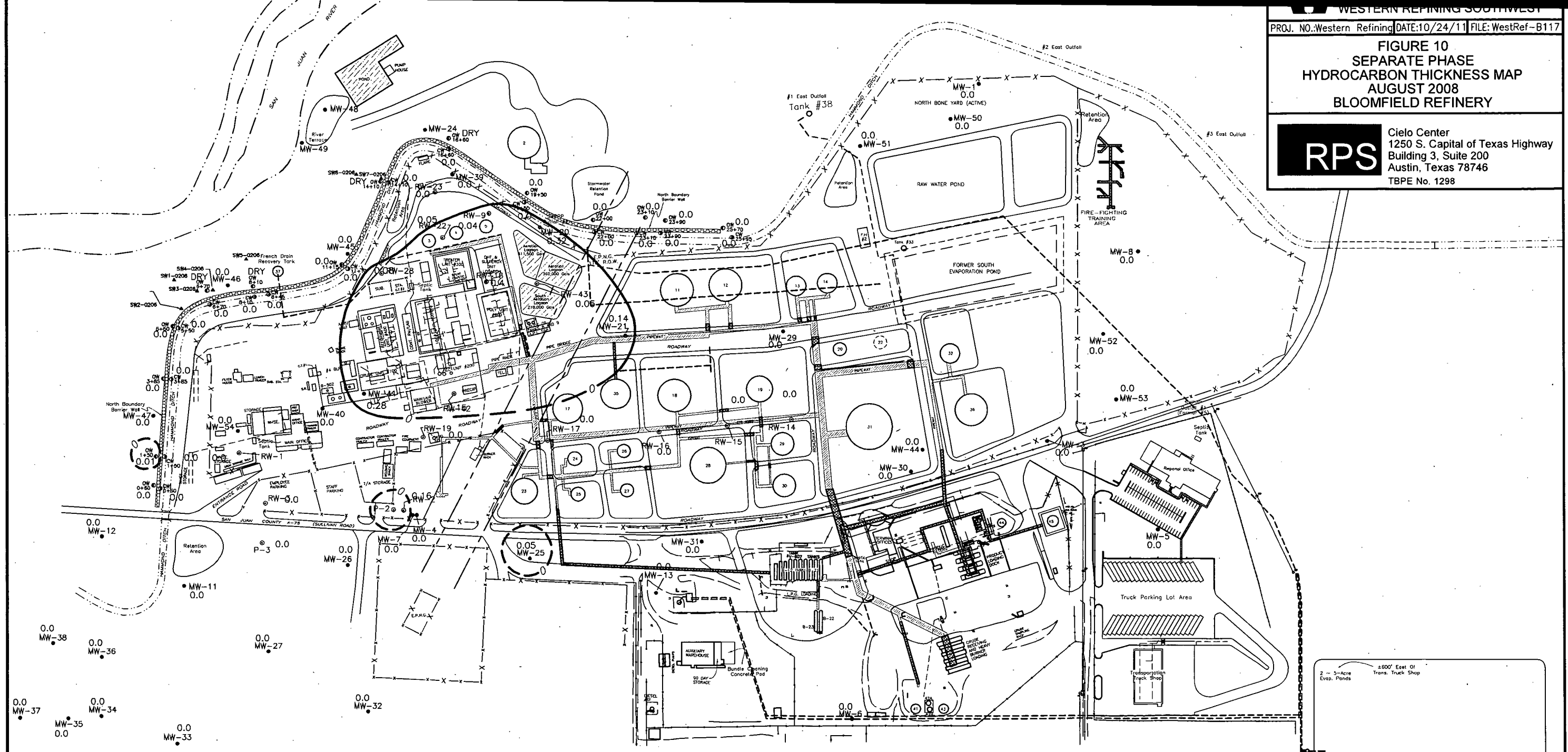
RPS
Cielo Center
1250 S. Capital of Texas Highway
Building 3, Suite 200
Austin, Texas 78746
TBPE No. 1298

WESTERN REFINING SOUTHWEST

PROJ. NO.:Western Refining | DATE:10/24/11 | FILE: WestRef-B117

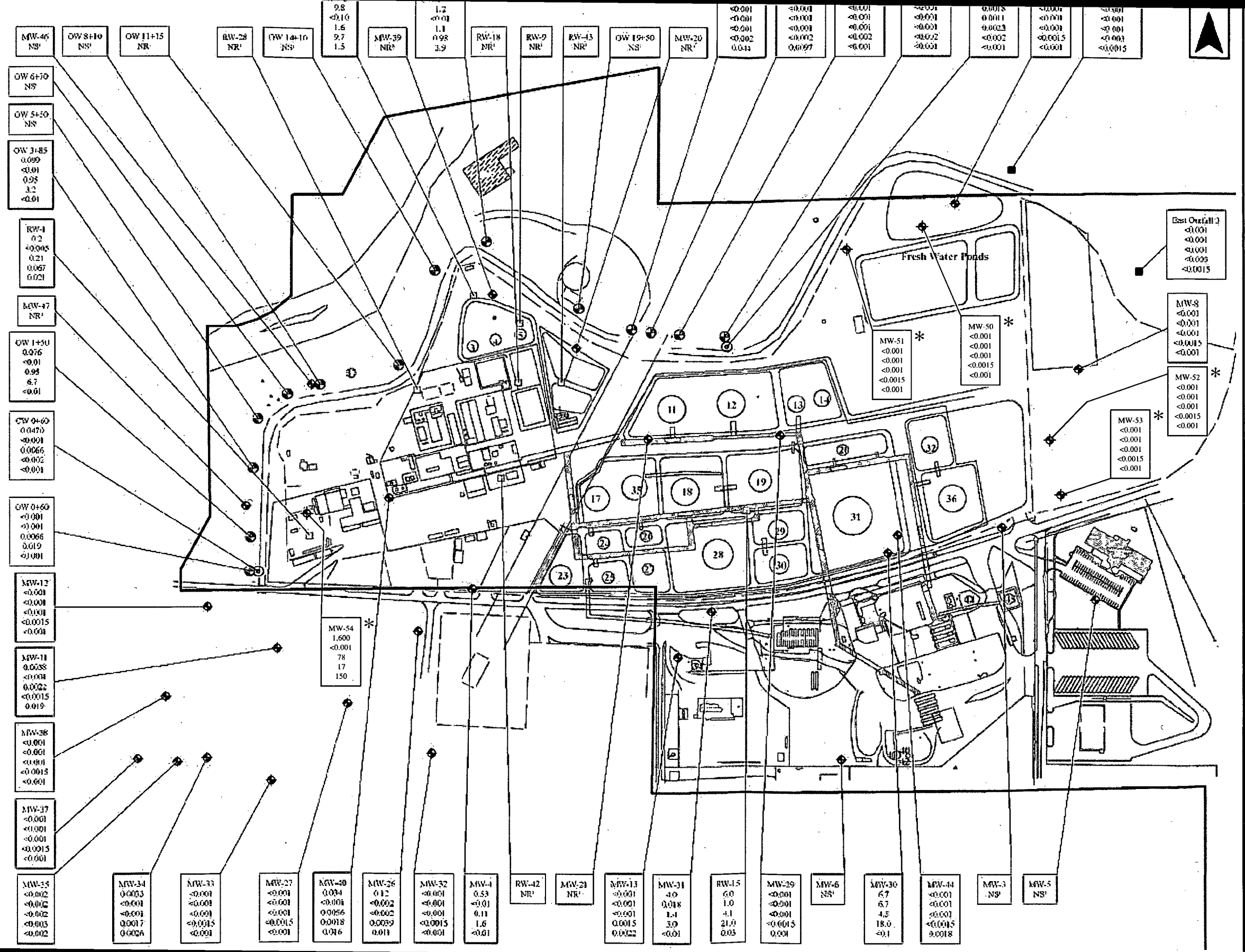
FIGURE 10
SEPARATE PHASE HYDROCARBON THICKNESS MAP
AUGUST 2008
BLOOMFIELD REFINERY

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



LEGEND

- MW-1 ● — MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- RW-1 ⊗ — RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- OW 1+50 ⊕ — OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER
- CW 1+50 ⊕ — COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
- SW1-0206 ▲ — SUMP WELL LOCATION AND IDENTIFICATION NUMBER
- P-2 — PIEZOMETER IDENTIFICATION
- 0 — LNAPL THICKNESS CONTOUR (FT MSL)
- 0.15 — APPARENT LNAPL THICKNESS IN WELL (FT)
- UNDER GROUND PIPING (HYDROCARBONS)
- ABOVE GROUND PIPE-WAY
- SLURRY BARRIER WALL
- FORMER TANK LOCATION
- ABANDONED UNDERGROUND PIPING
- UNDER GROUND WASTEWATER PIPING
- UNDER GROUND DRAIN PIPING
- FENCE



Legend

- Monitoring Well
- Observation Well
- Recovery Well
- Collection Well
- Outfall
- Site
- Approximate Property Line

MW-38	- Well Id
< 0.001	- Benzene
< 0.001	- Toluene
< 0.001	- Ethylbenzene
< 0.0015	- Xylenes, Total
0.001	- MTBE

Notes:

All concentrations in milligrams per liter (mg/L)

NS¹ = Well is Dry or Not Enough Water to Sample- No sample

NS² = Sample Inadvertently not Collected this Sampling Event

NR¹ = No Sample Required - Well Contains Separate Phase Hydrocarbon

NR² = No Sample Required per OCD and NMED Conditions

* = October 2008, All Other Samples Collected August 2008

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-B118

FIGURE 11
DISSOLVED-PHASE GROUNDWATER DATA
AUGUST AND OCTOBER 2008
BLOOMFIELD REFINERY

RPS
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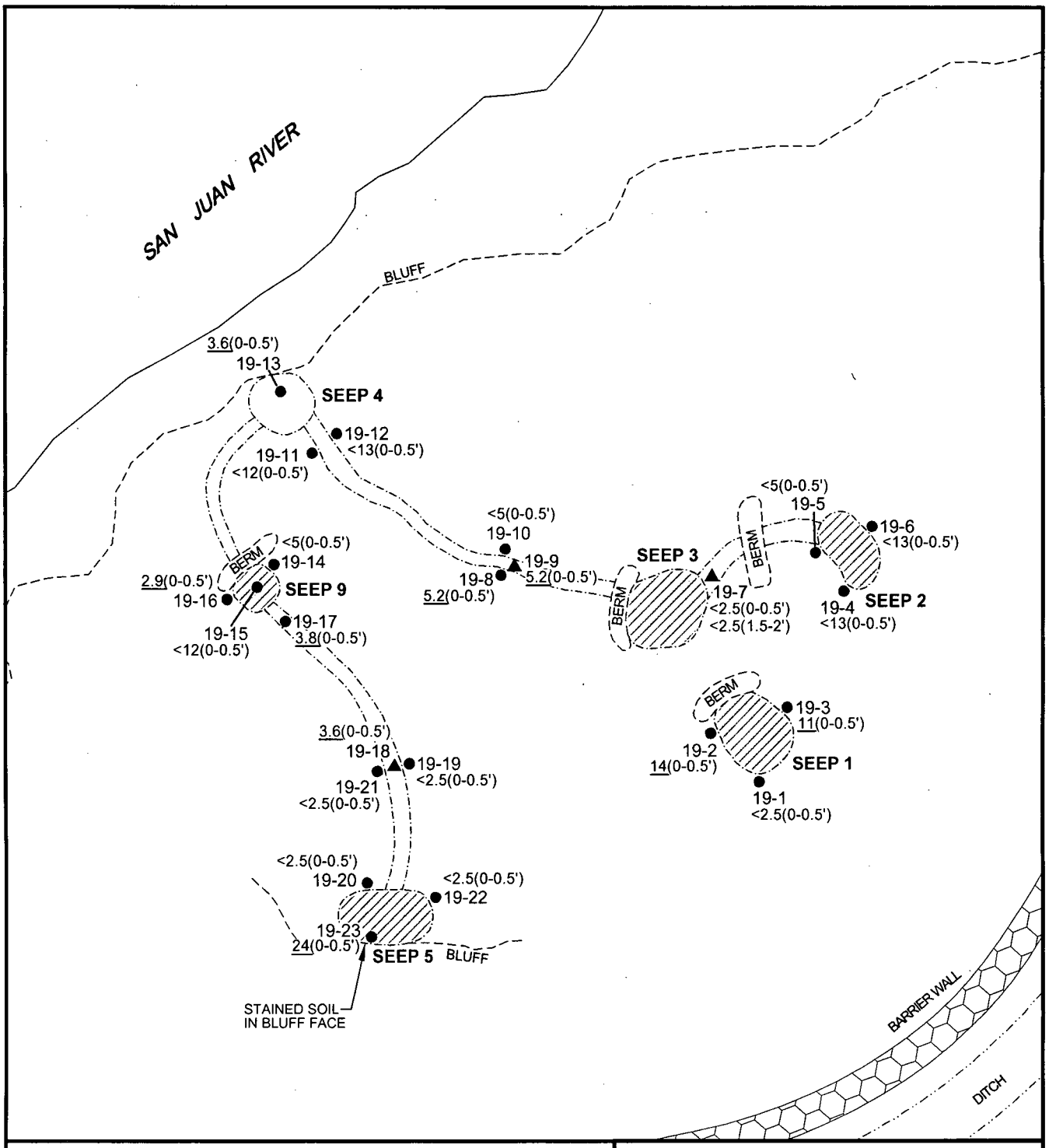
Austin, Texas 78746
TBPE No. 1298



LEGEND

SEEP 1	SEEP IDENTIFICATION NUMBER
19-1 ●	SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
19-7 ▲	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
▨	LINED CATCHMENT BASIN
-·-·-·-	DRAINAGE PATHWAY
<2.5(0-0.5')	ARSENIC CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
0.148	CONCENTRATION EXCEEDS SCREENING LEVEL

N

0 50
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-A136

FIGURE 12
AOC No. 19
ARSENIC SOIL MAP
BLOOMFIELD REFINERY

RPS
Cielo Center
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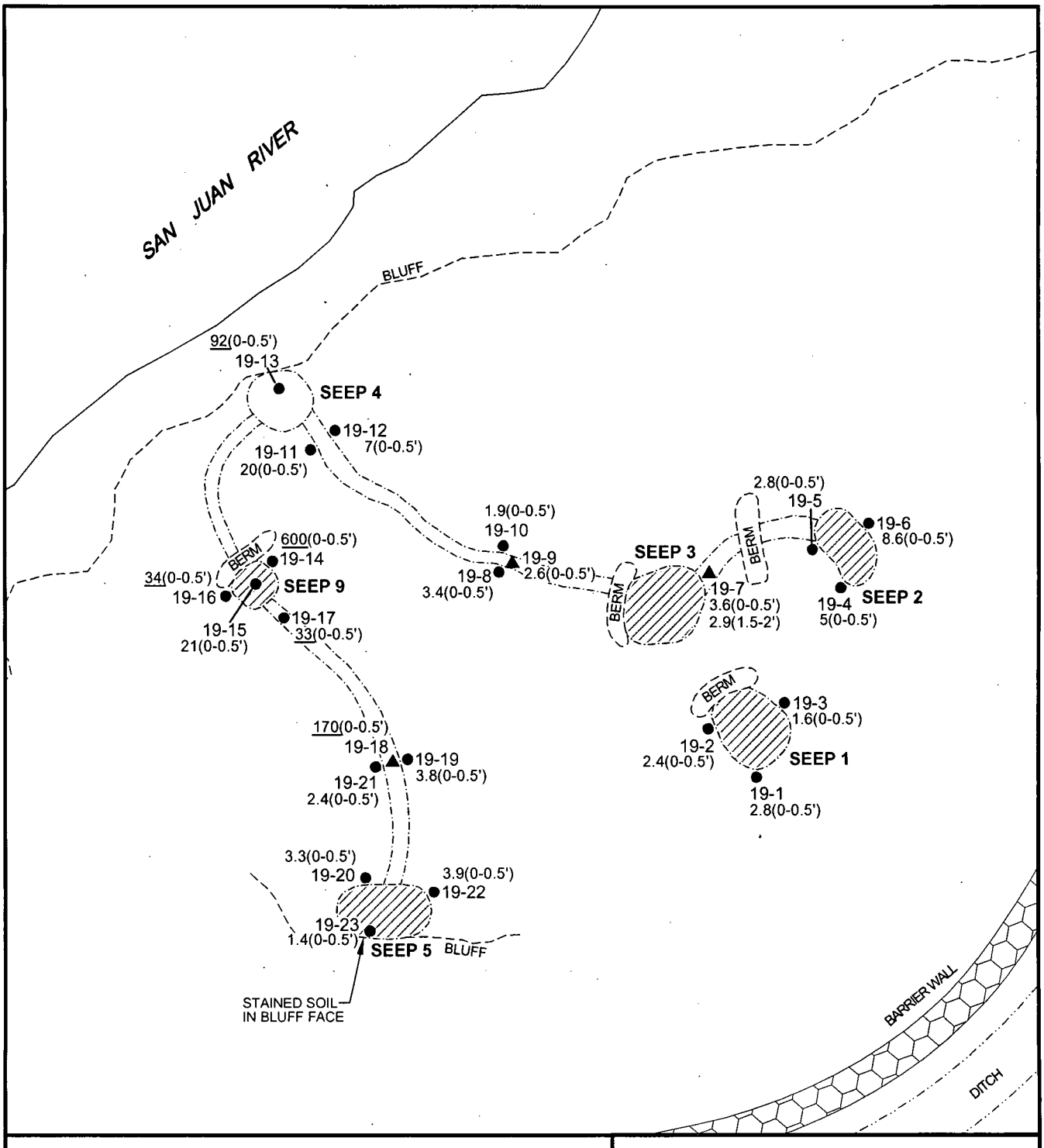
Building 3, Suite 200
Austin, Texas 78746
TBPE No. 1298



LEGEND

SEEP 1	SEEP IDENTIFICATION NUMBER
19-1 ●	SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
19-7 ▲	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
▨	LINED CATCHMENT BASIN
·-·-·-·-·	DRAINAGE PATHWAY
2.4(0-0.5')	CHROMIUM CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
23.7	CONCENTRATION EXCEEDS SCREENING LEVEL

N

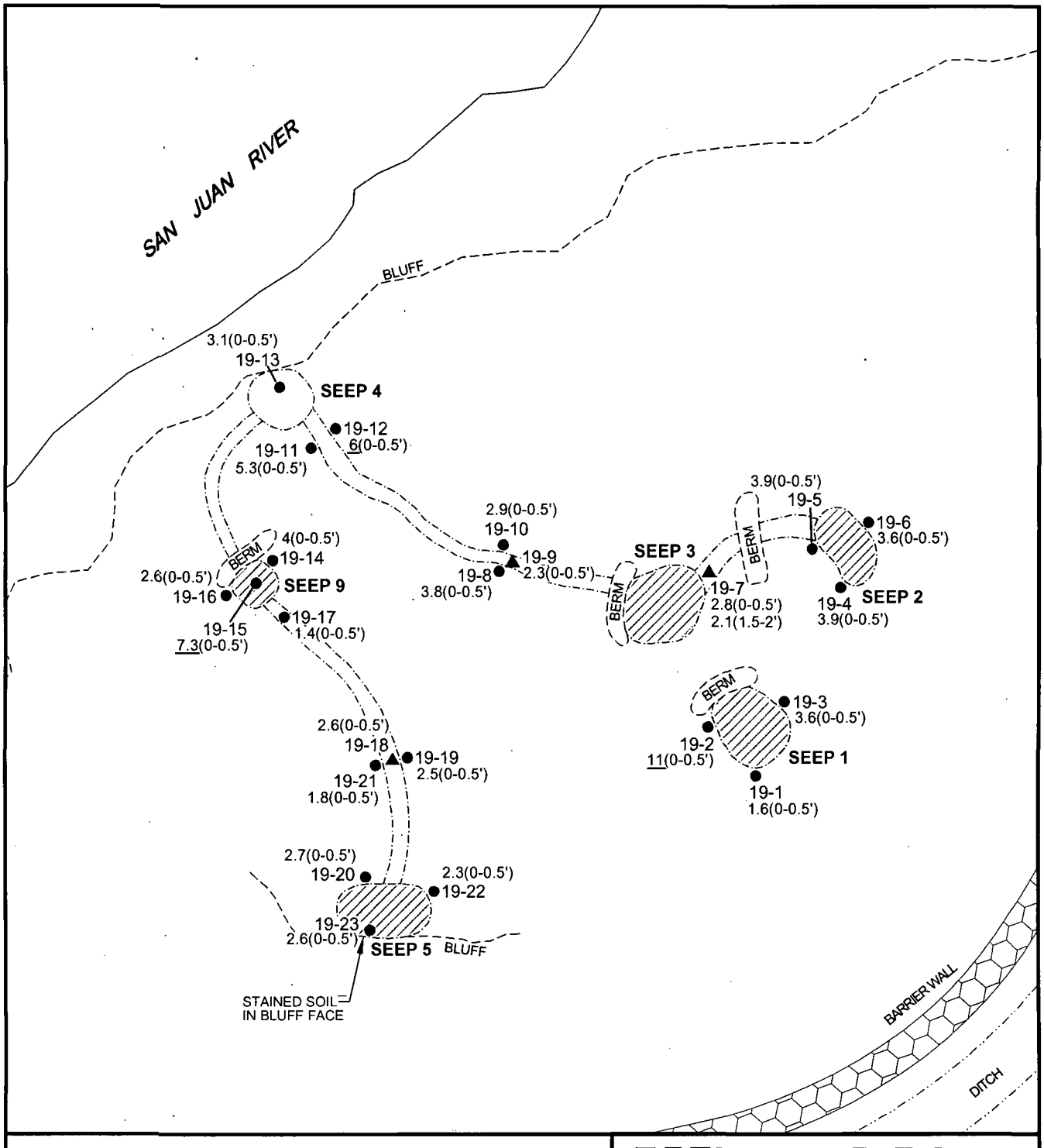
0 50
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-A136

FIGURE 13
AOC No. 19
CHROMIUM SOIL MAP
BLOOMFIELD REFINERY

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



LEGEND

SEEP 1	SEEP IDENTIFICATION NUMBER
19-1 ●	SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
19-7 ▲	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
▨	LINED CATCHMENT BASIN
·-·-·-·-·	DRAINAGE PATHWAY
2.8(0-0.5')	COBALT CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
5.51	CONCENTRATION EXCEEDS SCREENING LEVEL

N

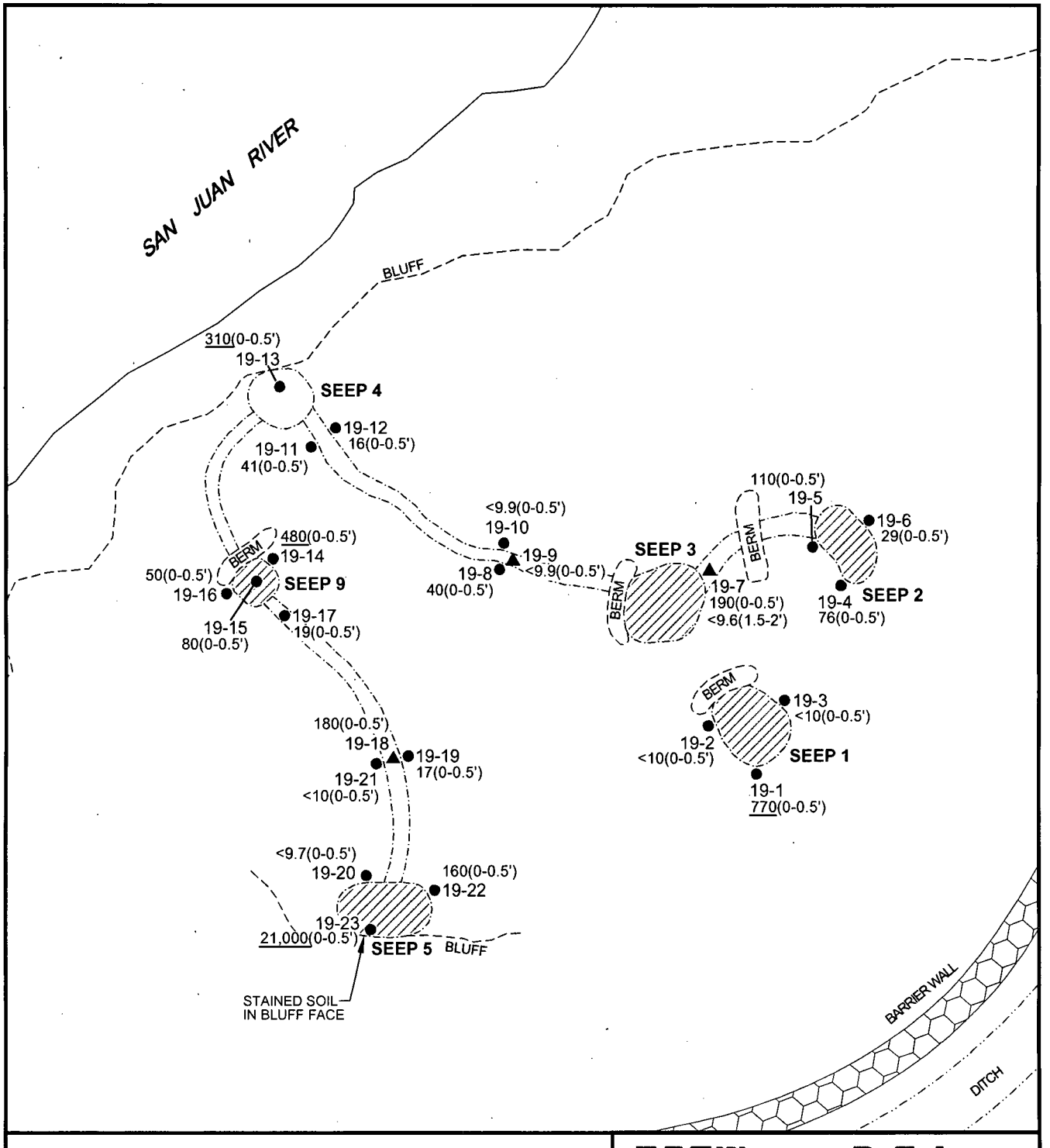
0 50
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-A136

FIGURE 14
AOC No. 19
COBALT SOIL MAP
BLOOMFIELD REFINERY

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



LEGEND

SEEP 1	SEEP IDENTIFICATION NUMBER
19-1 ●	SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
19-7 ▲	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
▨	LINED CATCHMENT BASIN
-·-·-	DRAINAGE PATHWAY
16(0-0.5')	DIESEL RANGE ORGANICS CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
200	CONCENTRATION EXCEEDS SCREENING LEVEL

N

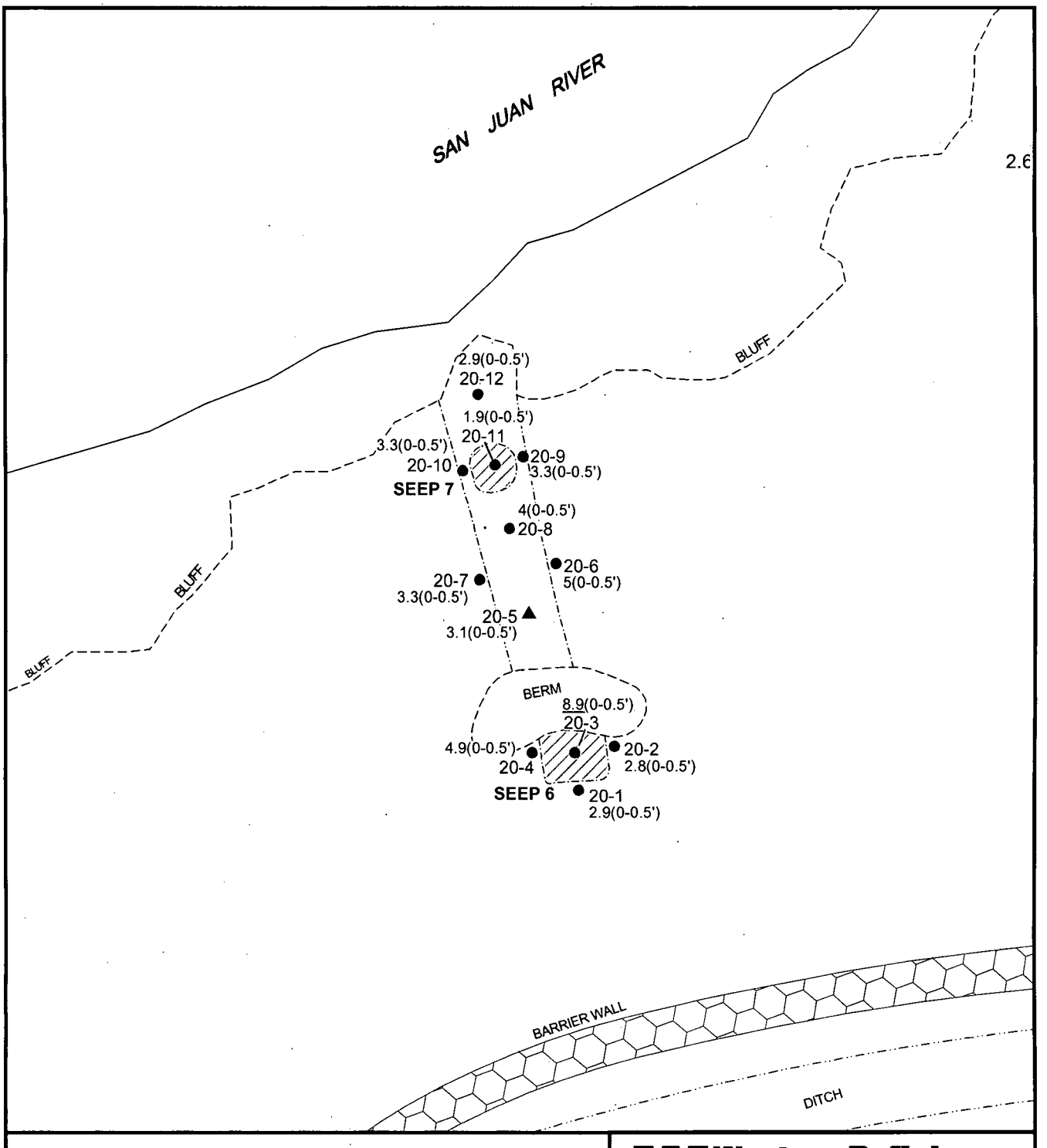
0 50
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-A136

FIGURE 15
AOC No. 19
DIESEL RANGE ORGANICS SOIL MAP
BLOOMFIELD REFINERY

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



LEGEND

SEEP 6	SEEP IDENTIFICATION NUMBER
20-1 ●	SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
20-5 ▲	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
▨	LINED CATCHMENT BASIN
·-·-·-·-·	DRAINAGE PATHWAY
4.9(0-0.5')	COBALT CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
5.51	CONCENTRATION EXCEEDS SCREENING LEVEL

N

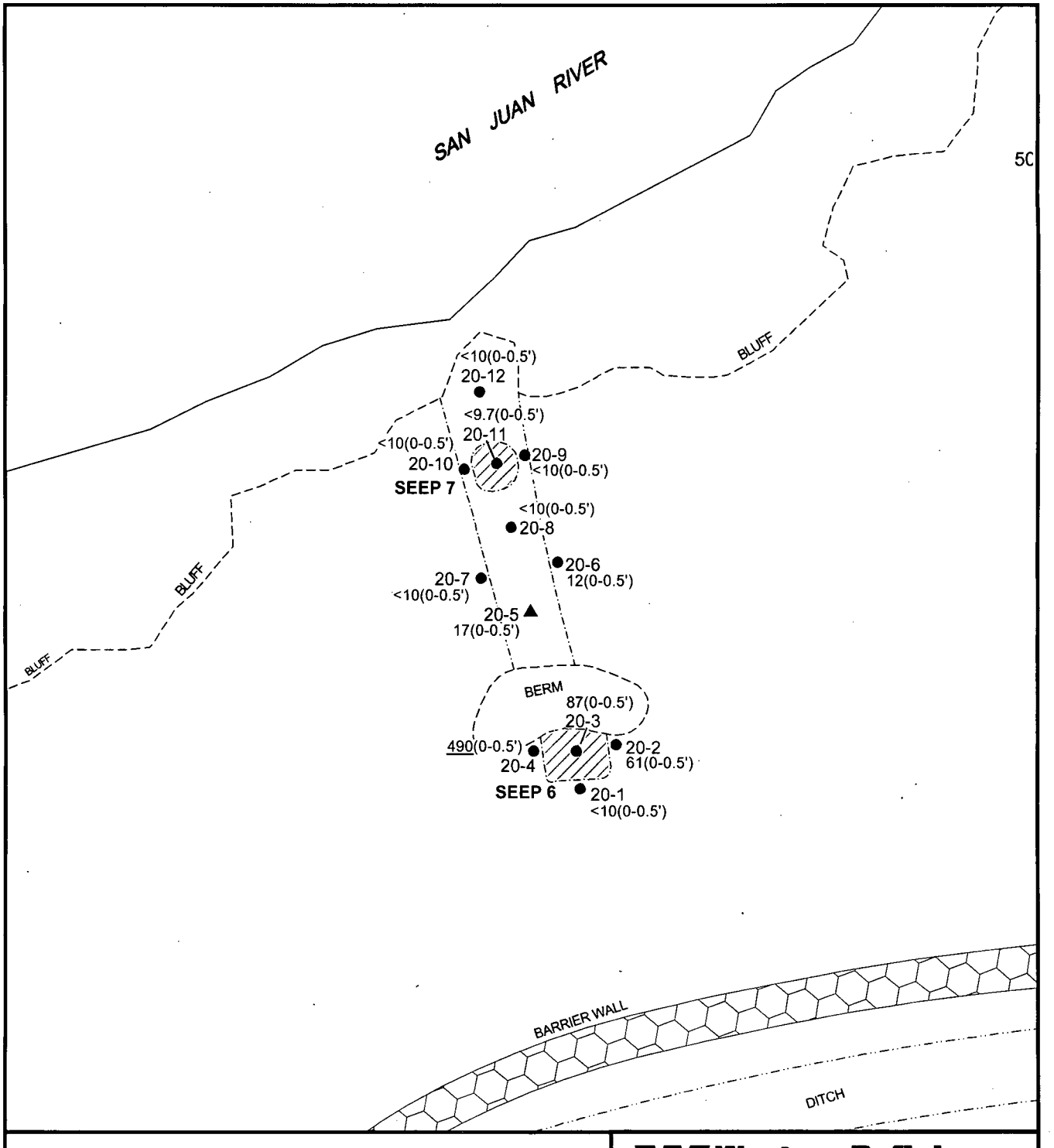
0 40
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-A136

FIGURE 16
AOC No. 20
COBALT SOIL MAP
BLOOMFIELD REFINERY

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



LEGEND

SEEP 6	SEEP IDENTIFICATION NUMBER
20-1 ●	SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
20-5 ▲	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
▨	LINED CATCHMENT BASIN
-·-·-·-	DRAINAGE PATHWAY
17(0-0.5')	DIESEL RANGE ORGANICS CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
200	CONCENTRATION EXCEEDS SCREENING LEVEL

N

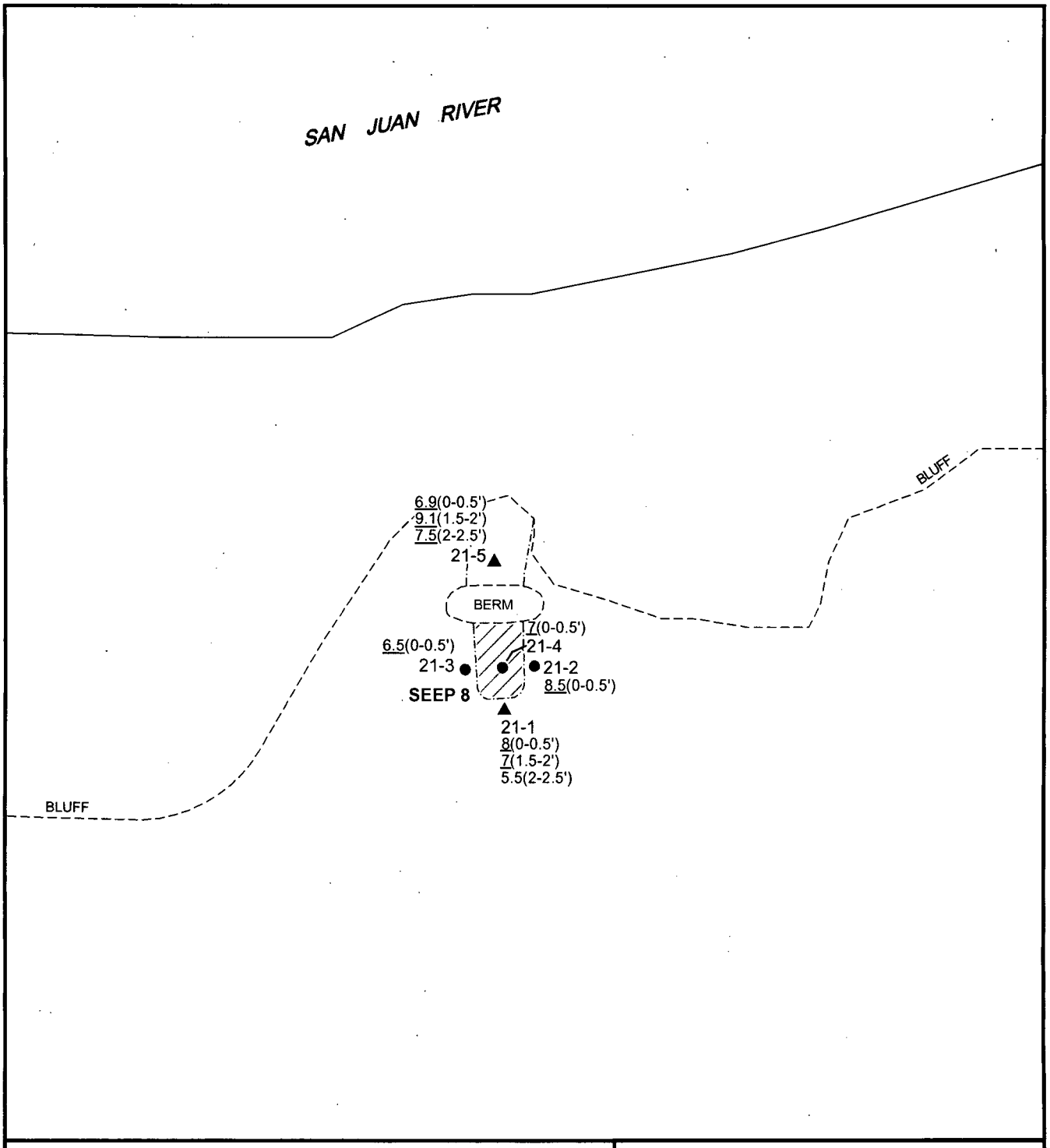
0 40
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 10/24/11 | FILE: WestRef-A136

FIGURE 17
AOC No. 20
DIESEL RANGE ORGANICS SOIL MAP
BLOOMFIELD REFINERY

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



LEGEND

SEEP 8	SEEP IDENTIFICATION NUMBER
21-2 ●	SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
21-1 ▲	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
▨	LINED CATCHMENT BASIN
-·-·-·-	DRAINAGE PATHWAY
5.5(0-0.5')	COBALT CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
5.51	CONCENTRATION EXCEEDS SCREENING LEVEL

N

0 30

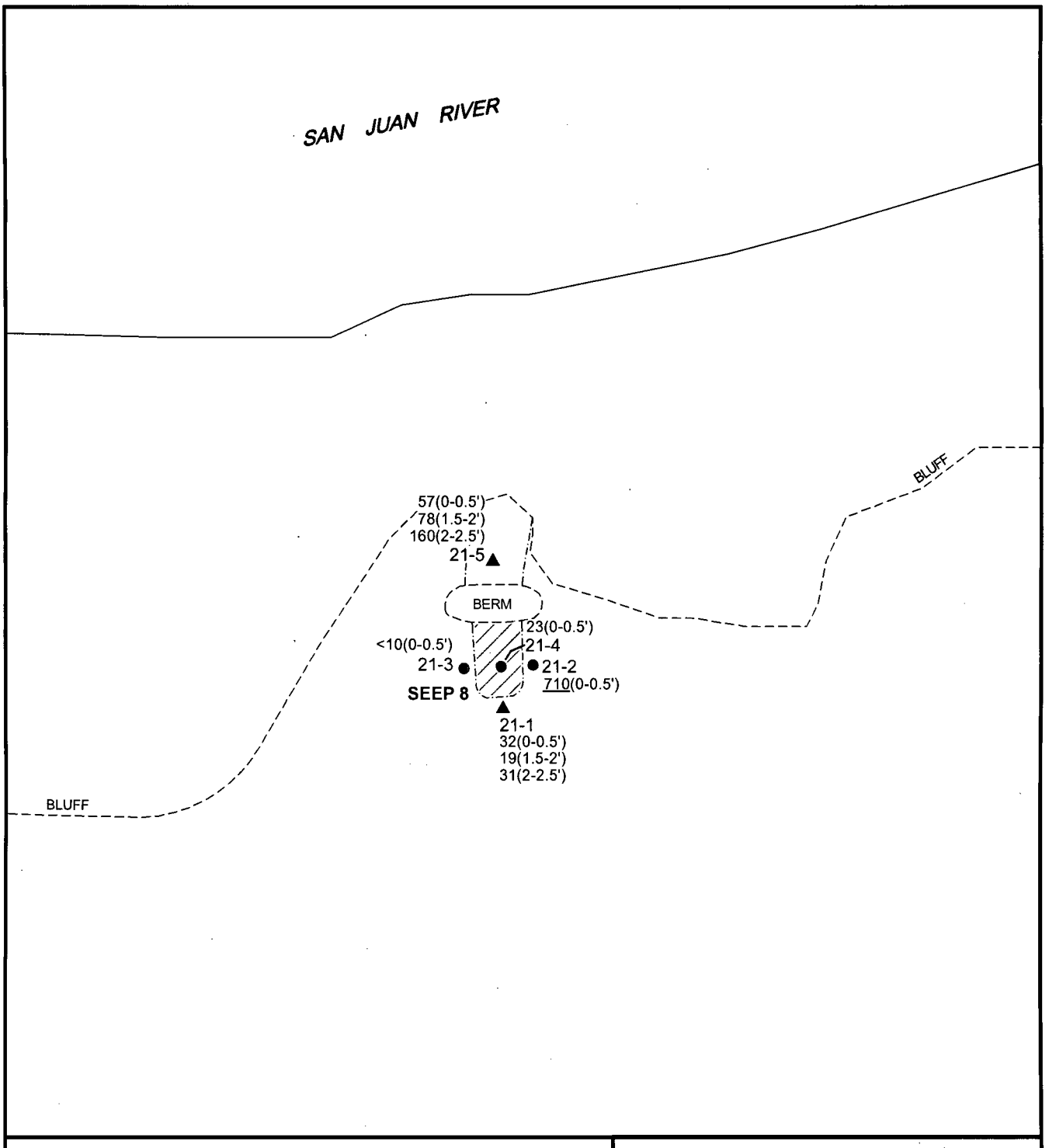
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 10/24/11	FILE: WestRef-A136

FIGURE 18
AOC No. 21
COBALT SOIL MAP
BLOOMFIELD REFINERY

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



LEGEND

SEEP 8	SEEP IDENTIFICATION NUMBER
21-2 ●	SURFACE SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
21-1 ▲	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
	LINED CATCHMENT BASIN
	DRAINAGE PATHWAY
32(0-0.5')	DIESEL RANGE ORGANICS CONCENTRATION, mg/kg (SAMPLE DEPTH - FT)
200	CONCENTRATION EXCEEDS SCREENING LEVEL

0 30
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 10/24/11	FILE: WestRef-A136

FIGURE 19
AOC No. 21
DIESEL RANGE ORGANICS SOIL MAP
BLOOMFIELD REFINERY

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

Appendix A

Field Methods

Field Methods

Pursuant to Section IV of the Order, an investigation of soils was conducted to determine and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, soil was collected from borings and surface sample locations at AOCs No. 19, 20, and 21. The field methods are described below and individual discussions are presented for the following activities:

- Drilling procedures;
- Soil screening;
- Decontamination procedures;
- Sample collection and handling procedures;
- Equipment calibration; and
- Management of investigation derived waste.

Drilling Procedures

The soil borings were completed using a hand auger. Soil samples were collected continuously and logged by a qualified geologist in accordance with the Unified Soil Classification System (USCS) nomenclature. As shown on the boring logs, the data recorded included the lithologic interval, symbol, percent recovery, field screening results, and a sample description of the cuttings and core samples.

Soil Screening

Samples obtained from the borings and surface samples were screened in the field on 2-foot intervals for evidence of contaminants. Field screening results were recorded on the soil boring logs. Field screening results were used to aid in the selection of soil samples for laboratory analysis. The primary screening methods include: (1) visual examination, (2) olfactory examination, and (3) headspace vapor screening for volatile organic compounds.

Visual screening included examining the soil samples for evidence of staining caused by petroleum-related compounds or other substances that may have caused staining of soils such as elemental sulfur or cyanide compounds. Headspace vapor screening was conducted and involved placing a soil sample in a plastic sealable bag allowing space for ambient air. The bag was sealed, labeled and then shaken gently to expose the soil to the air trapped in the container. The sealed bag was allowed to rest for a minimum of 5 minutes while the vapors equilibrated. Vapors present within the sample bag's headspace were then measured by inserting the probe of a MiniRae 3000 portable volatile organic constituent (VOC) monitor PGM-7600 in a small opening in the bag. The maximum value and the ambient air temperature were

recorded on the field boring log for each sample. The screening results are presented in Table 2. Field screening results and any conditions that were considered to be capable of influencing the results of the field screening were recorded on the field logs.

Decontamination Procedures

The sampling equipment coming in direct contact with the samples (e.g., hand augers and stainless steel trowel) were decontaminated using a brush, as necessary, to remove larger particulate matter followed by a rinse with potable water, wash with nonphosphate detergent, rinse with potable water, and double rinse with deionized water. In the event that more than one AOC was investigated during the day a new batch of wash water and rinse water was prepared prior to decontamination.

Sample Collection and Handling Procedures

Soil samples were collected using a stainless steel trowel or directly from the auger bucket for borings completed with a hand auger. The selected portion of the sample interval was placed in pre-cleaned, laboratory-prepared sample containers for laboratory chemical analysis. Three soil samples were collected for VOC analysis. An Encore® Sampler was used for collection of soil samples for low-level VOC analysis pursuant to EPA method 5035; the second sample aliquot (approximately 1 gram) was placed in a laboratory-prepared container with a methanol preservative; and the third sample aliquot was placed in an 8-ounce glass jar, which was filled to the top to minimize any head space.

Samples were immediately placed into an ice chest with ice. The samples were maintained in the custody of the sampler until the chain-of-custody form was completed and the ice chest was sealed for shipment to the laboratory.

Equipment Calibration

Soil vapor screening was conducted using a MiniRae 3000 portable VOC monitor PGM-7600. The instrument was calibrated at the beginning of each work day to a concentration of 100 ppm isobutylene.

Management of Investigation Derived Waste

The decontamination water from the drilling equipment was collected in five-gallon buckets and was subsequently placed in open top 55-gallon drums, which were sealed at the end of each work day. The decontamination water generated from sampling equipment was collected in

buckets and placed in open top 55-gallon drums, which were sealed at the end of each work day. The decon water was disposed in the Refinery's wastewater treatment system up-stream of the API Separator. Soil cuttings were also placed into an open-top 55-gallon drum, which was sealed when not in use. The drum of soils was labeled and temporarily stored in a concrete curbed area pending waste characterization and disposal.

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10/27/2011

Western Refining Southwest

Seep Areas of Concern Field Ties

Note** This X, Y, Z shown here is dervied from the City of Bloomfield Control Network

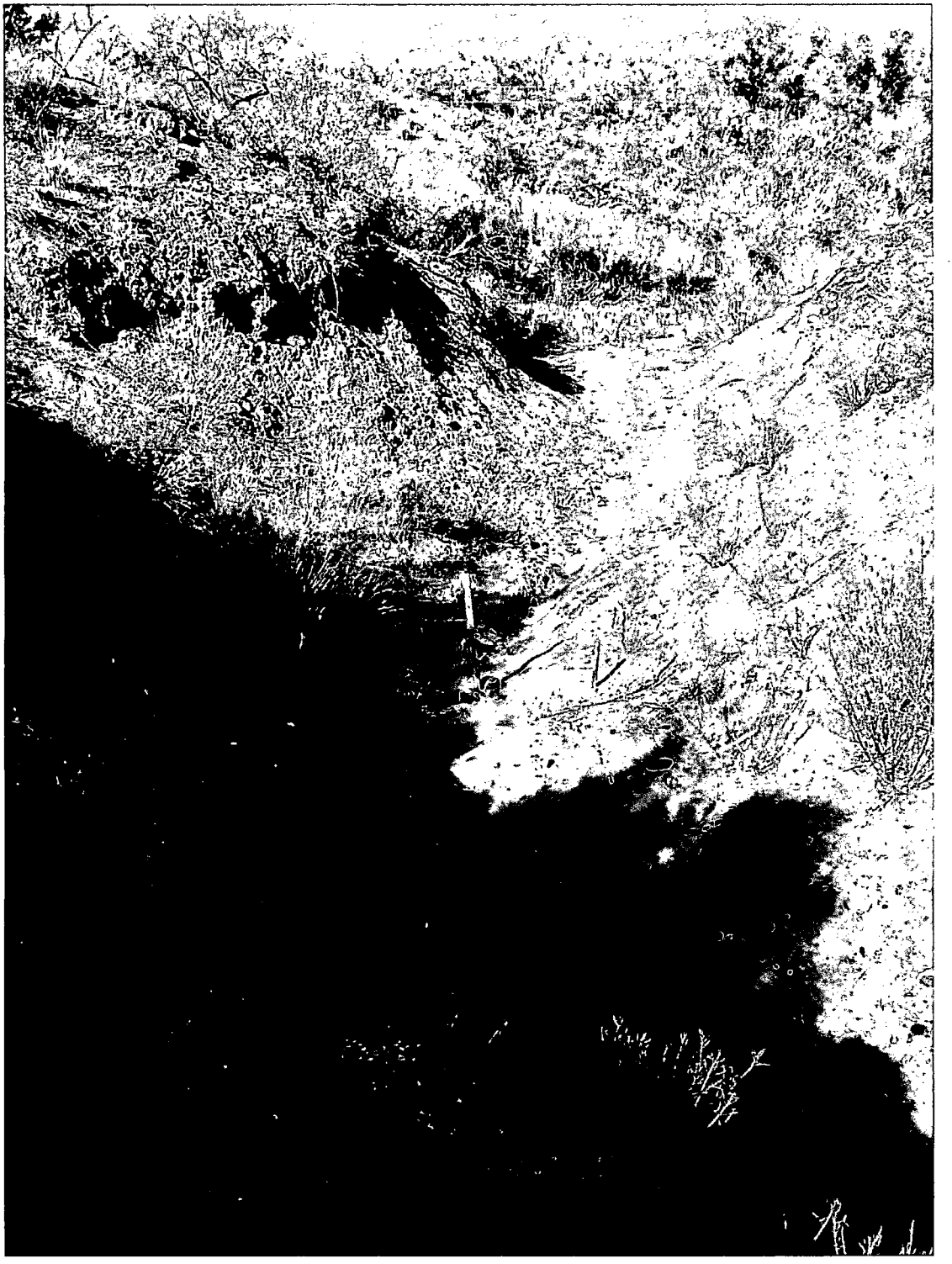
Point	Northing	Easting	Elevation	Location
5000	74568.654	181637.006	5474.453	AOC 19-1
5001	74591.068	181633.472	5468.928	AOC 19-3
5002	74582.146	181619.347	5470.37	AOC 19-2
5003	74648.195	181652.866	5470.392	AOC 19-5
5004	74648.531	181659.695	5471.97	AOC 19-4
5005	74660.661	181659.367	5472.586	AOC 19-6
5006	74643.39	181609.048	5459.017	AOC 19-7
5007	74641.537	181514.208	5443.684	AOC 19-8
5008	74643.172	181515.364	5443.599	AOC 19-9
5009	74644.548	181517.072	5443.81	AOC 19-10
5010	74680.844	181466.492	5439.073	AOC 19-11
5011	74687.795	181474.856	5439.119	AOC 19-12
5012	74702.828	181462.667	5437.428	AOC 19-13
5013	74629.846	181451.326	5445.7	AOC 19-15
5014	74628.77	181446.148	5447.474	AOC 19-16
5015	74622.64	181451.735	5446.746	AOC 19-17
5016	74631.436	181457.65	5448.15	AOC 19-14
5017	74574.618	181492.695	5461.77	AOC 19-21
5018	74575.084	181497.765	5460.765	AOC 19-18
5019	74575.963	181503.283	5461.075	AOC 19-19
5020	74532.91	181482.057	5477.244	AOC 19-20
5021	74530.609	181493.6	5477.52	AOC 19-22
5022	74513.176	181482.442	5480.975	AOC 19-23
5023	74472.531	181289.678	5467.509	AOC 20-2
5024	74470.728	181275.869	5467.38	AOC 20-4
5025	74471.467	181280.71	5465.067	AOC 20-3
5026	74461.182	181283.544	5469.417	AOC 20-1
5027	74513.196	181276.971	5456.308	AOC 20-5
5028	74526.439	181278.604	5453.998	AOC 20-6
5029	74530.099	181266.994	5453.359	AOC 20-7
5030	74535.077	181273.44	5451.499	AOC 20-8
5031	74540.095	181268.539	5450.617	AOC 20-10
5032	74540.076	181274.717	5449.867	AOC 20-11
5033	74537.171	181282.135	5451.334	AOC 20-9
5034	74555.04	181272.202	5446.088	AOC 20-12
5035	74450.302	181046.206	5473.066	AOC 21-1
5036	74460.204	181050.86	5472.78	AOC 21-2
5037	74472.412	181047.834	5470.482	AOC 21-5
5038	74460.782	181045.136	5471.458	AOC 21-4
5039	74465.222	181040.544	5471.977	AOC 21-3

AOC No. 19 – Seep and Catchment Basin No. 1

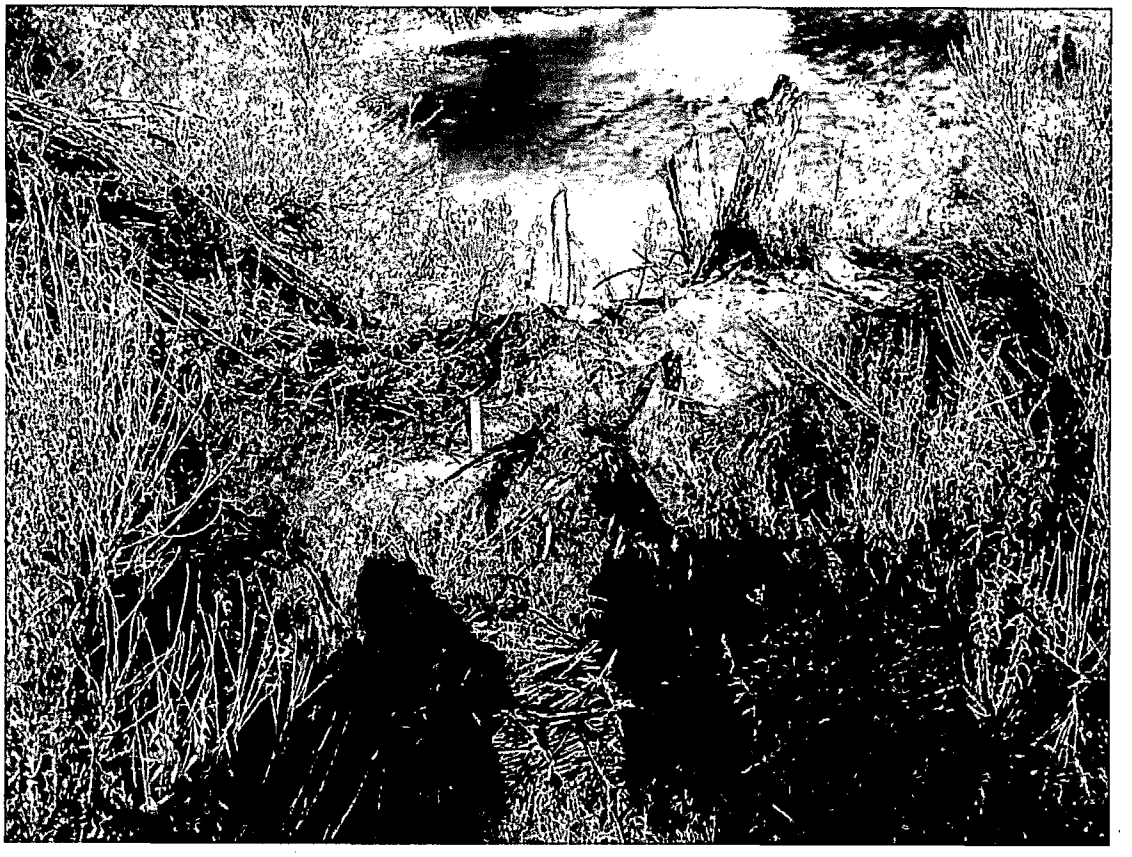
AOC No. 19 – Seep No. 2

AOC No. 19 – Sediment Within Catchment Basin No. 3

AOC No. 19 – Seep 9 Looking Southwest



AOC No. 19 – Looking Northwest Toward Catchment No. 4 from Catchment No. 3



AOC No. 19 – Looking northward at Seep 4

AOC No. 19 – Between Seep 5 and Seep 9

AOC No. 19 – HDPE Liner of Seep No. 5 Catchment Basin

AOC No. 19 – Stained Soil in Bluff Face of Seep No. 5

AOC No. 19 – Location of sample at Seep No. 5.

AOC 20 – Seep No. 6 With Water in Catchment Basin No. 6

AOC 20 – Looking North Toward Seep No. 7 From Berm Below Catchment Basin No. 6

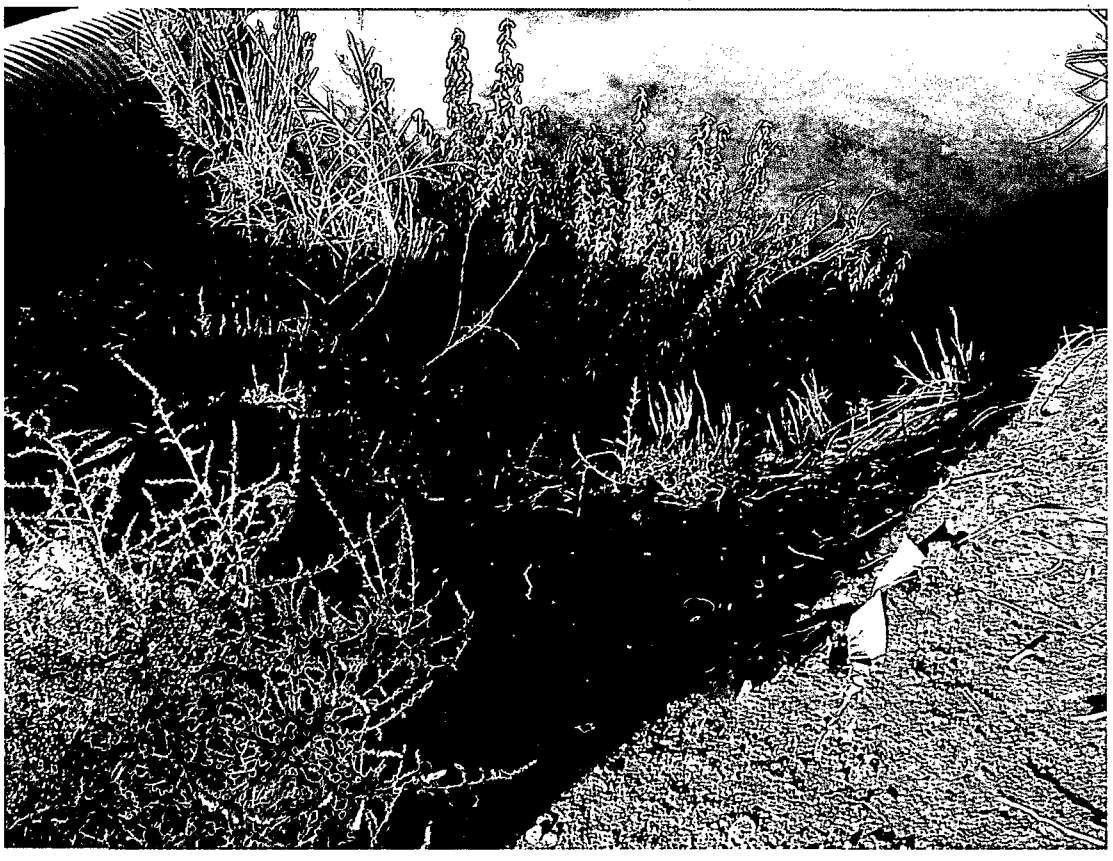
AOC 20 – Seep No. 7 and Bluff Overlooking San Juan River

AOC No. 20 – From Seep No. 7, looking south.

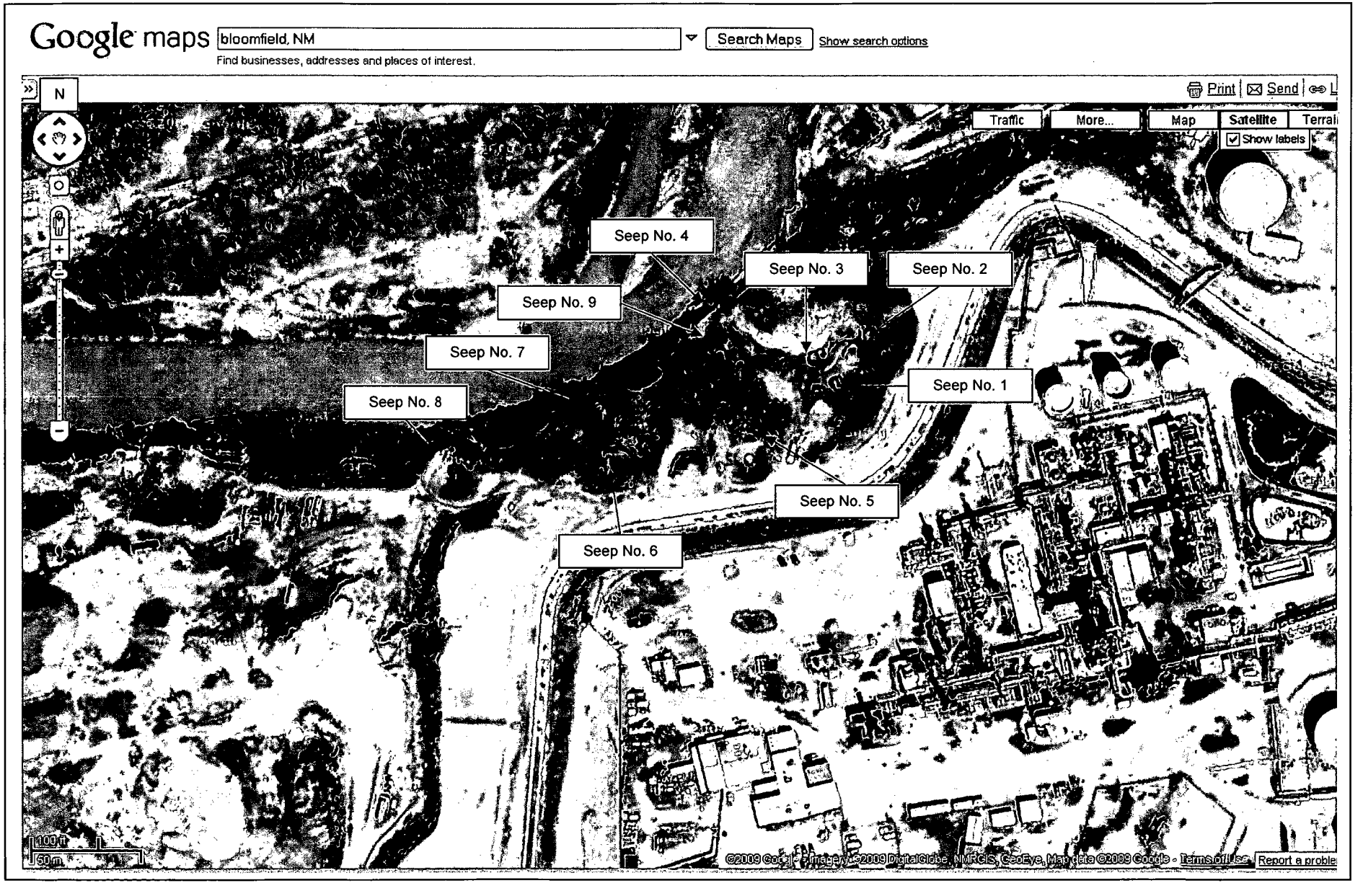
AOC No. 20 – Between Seep No. 7 and Seep No. 6, looking south.

AOC 21 – Seep No. 8 (Below Wood Wall) and Liner of Catchment Basin No. 8

AOC No. 21 – Looking north from above Seep No. 8.



AOC 21 – Looking North Over San Juan River Bluff From Catchment Basin No. 8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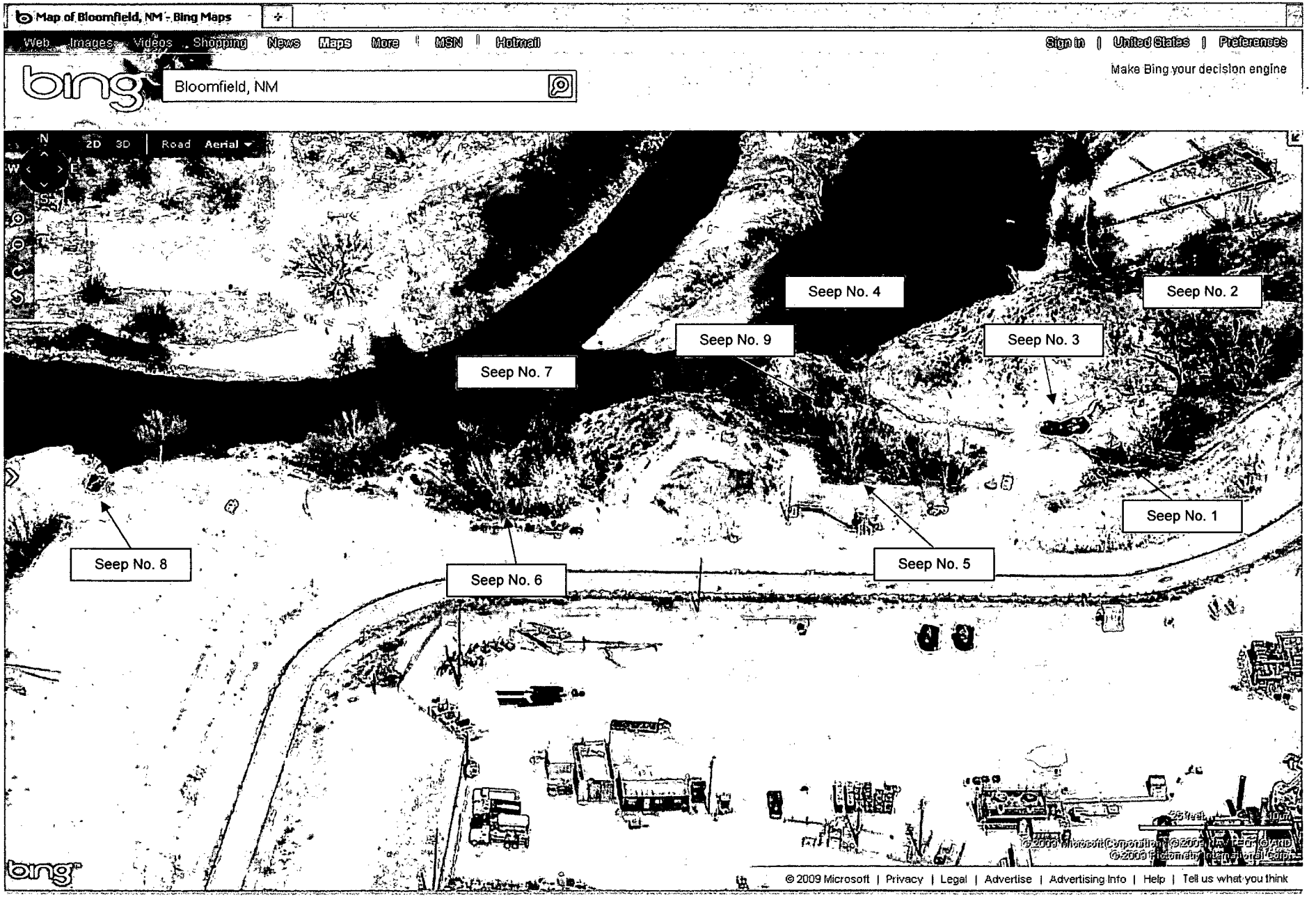
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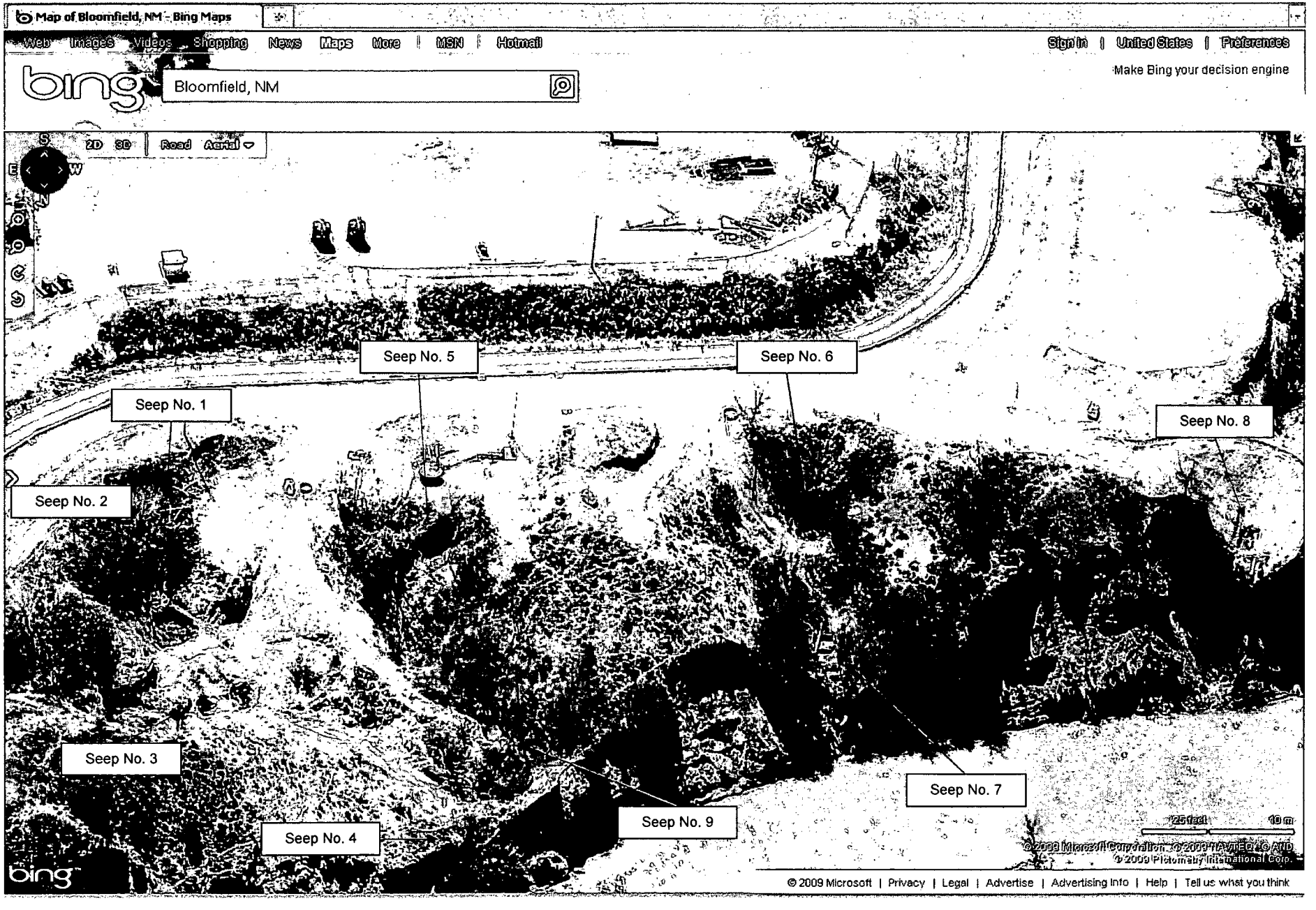
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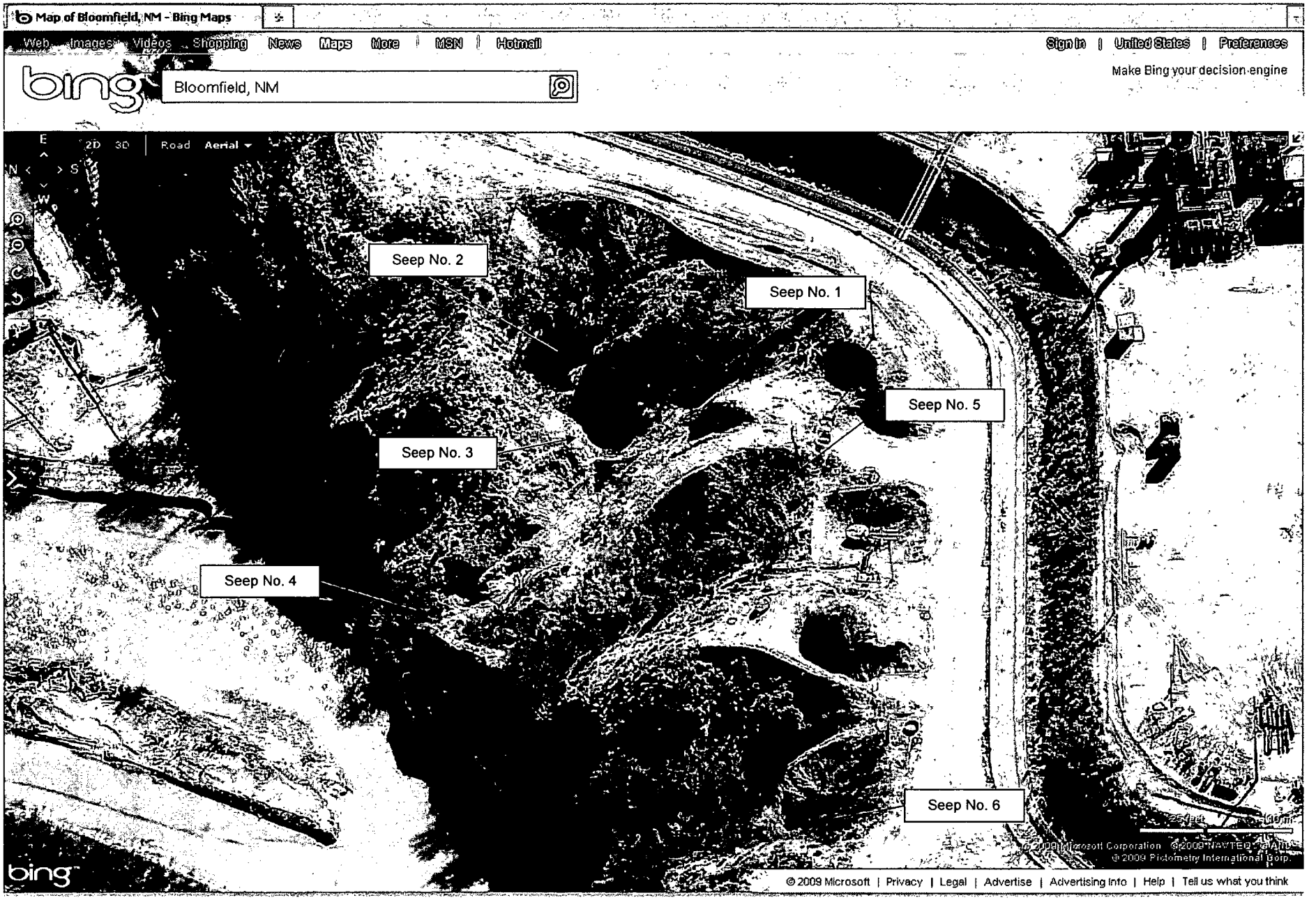
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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.957' W 107º58.667'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5474.453
Site Coordinates:
N 74568.654 **E** 181637.006

Boring No.: AOC 19-1
Start Date: 8/15/2011 12:00
Finish Date: 8/15/2011 12:30

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1220	G/2V/2E/3J		92 95ºF		100	**Clayey Sand (SC)** Fine grain, compact, moist to saturated, gray to black, 1/2 inch to +3 inch gravel present, detritus	
								Total Depth = 0.5' BGL	
2									2
4									4

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Austin, Texas 78746

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LOG OF BORING

Boring No.: AOC 19-2
Start Date: 8/15/2011 12:30
Finish Date: 8/15/2011 13:00

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.958' W 107º58.670'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5470.37
Site Coordinates:
N 74582.146 **E** 181619.347

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1240	G/2V/2E/3J		5.0 95ºF		100	**Clayey Sand (SC)** Fine grain, compact, dry to damp, tan, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-3
Start Date: 8/15/2011 11:50
Finish Date: 8/15/2011 12:00

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.960' W 107º58.669'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5468.928
Site Coordinates:
N 74591.068 **E** 181633.472

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1158	G/2V/2E/3J		5.0 95ºF		100	**Clayey Sand (SC)** Fine grain, compact, dry to damp, tan, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-4
Start Date: 8/15/2011 13:20
Finish Date: 8/15/2011 13:40

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.971' W 107º58.663'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5471.97
Site Coordinates:
N 74648.531 **E** 181659.695

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1325	G/2V/2E/3J		4.2 99ºF		100	**Clayey Sand (SC)** Very fine grain, loose, dry, light brown, no odor, detritus	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-5
Start Date: 8/15/2011 13:40
Finish Date: 8/15/2011 14:00

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.974' W 107º58.665'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5470.392
Site Coordinates:
N 74648.195 **E** 181652.866

Depth (ft.)	Sampling: Sample Depth	Sampling: Time	Sampling: Sample Type/ Containe/No.	Sampling: Saturation	Sampling: Organic Vapor (ppm)	Sampling: USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	1345	G/2V/2E/3J		3.5 99ºF		100	Ground Surface **Silty Sand (SM)** Very fine grain, loose, dry, light brown, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.971' W 107º58.665'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5472.586
Site Coordinates:
N 74660.661 **E** 181659.367

Boring No.: AOC 19-6
Start Date: 8/15/2011 14:00
Finish Date: 8/15/2011 14:10

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	1405	G/2V/2E/3J		2.0 99ºF		100	Ground Surface **Clayey Sand (SC)** Very fine grain, loose, dry, light gray, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.969' W 107º58.672'

Total Depth: 2' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5459.017
Site Coordinates:
N 74643.39 **E** 181609.048

Boring No.: AOC 19-7
Start Date: 8/16/2011 12:55
Finish Date: 8/16/2011 13:15

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1300	G/2V/2E/3J		2.3 95ºF		100	**Sand (SP)** Very fine grain, loose, dry, light brown, no odor	0
					2.0 95ºF		100	**Sand (SP)** Similar to above, no odor	
	1.5-2'	1305	G/2V/2E/3J		2.4 95ºF		100	**Sand (SP)** Similar to above, dry to damp, no odor, refusal at 2' bgl	
2								Total Depth = 2' BGL	2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.968' W 107º58.694'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5443.684
Site Coordinates:
N 74641.537 **E** 181514.208

Boring No.: AOC 19-8
Start Date: 8/15/2011 15:30
Finish Date: 8/15/2011 15:50

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	1540	G/2V/2E/3J		4.8 93ºF		100	Ground Surface **Silt (ML)** Very fine grain, loose, dry, light brown, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC-19-9
Start Date: 8/16/2011 13:15
Finish Date: 8/16/2011 13:30

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.969' W 107º58.693'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5443.599
Site Coordinates:
N 74643.172 **E** 181515.364

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1320	G/2V/2E/3J		3.2 91ºF		100	**Sand (SP)** Very fine grain, loose to compact, dry to damp, light gray, no odor, refusal at 0.5' bgl	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-10
Start Date: 8/15/2011 15:50
Finish Date: 8/15/2011 16:10

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.968' W 107º58.694'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5443.81
Site Coordinates:
N 74644.548 **E** 181517.072

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1555	G/2V/2E/3J		2.6 93ºF		100	**Sand (SP)** Fine grain, loose, dry, very light gray, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-11
Start Date: 8/15/2011 16:10
Finish Date: 8/15/2011 16:20

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates: N 36º41.975' W 107º58.704'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5439.073
Site Coordinates:
N 74680.844 **E** 181466.492

Depth (ft.)	Sampling: Sample Depth	Sampling: Time	Sampling: Sample Type/ Containe/No.	Sampling: Saturation	Sampling: Organic Vapor (ppm)	Sampling: USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	1615	G/2V/2E/3J		3.1 93ºF		100	Ground Surface **Silt (ML)** Very fine grain, compact, dry, light brown, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-12
Start Date: 8/15/2011 16:25
Finish Date: 8/15/2011 16:35

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.976' W 107º58.704'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5439.119
Site Coordinates:
N 74687.795 **E** 181474.856

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1630	G/2V/2E/3J		2.8 92ºF		100	**Silty Sand (SM)** Fine grain, loose, dry, brown, no odor, detritus	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-13
Start Date: 8/15/2011 16:40
Finish Date: 8/15/2011 16:50

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.979' W 107º58.704'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5437.428
Site Coordinates:
N 74702.828 **E** 181462.667

Depth (ft.)	Sampling: Sample Depth	Sampling: Time	Sampling: Sample Type/ Containe/No.	Sampling: Saturation	Sampling: Organic Vapor (ppm)	Sampling: USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	1645	G/2V/2E/3J		1.8 92ºF		100	Ground Surface **Silty Sand (SM)** Very fine grain, loose, dry, light gray, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-14
Start Date: 8/16/2011 08:00
Finish Date: 8/16/2011 08:20

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.969' W 107º58.700'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5448.15
Site Coordinates:
N 74631.436 **E** 181457.65

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	0810	G/2V/2E/3J		2.4 66ºF		100	**Silt (ML)** Very fine grain, loose, dry, brown, no odor	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.968' W 107º58.701'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5445.7
Site Coordinates:
N 74629.846 **E** 181451.326

Boring No.: AOC 19-15
Start Date: 8/16/2011 08:25
Finish Date: 8/16/2011 08:40

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	0830	G/2V/2E/3J		1.2 67ºF		100	Ground Surface **Silt (ML)** Very fine grain, compact, dense, dry, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-16
Start Date: 8/16/2011 08:40
Finish Date: 8/16/2011 09:00

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.967' W 107º58.702'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5447.474
Site Coordinates:
N 74628.77 **E** 181446.148

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	0850	G/2V/2E/3J		4.6 69ºF		100	**Silty Sand (SM)** Fine grain, loose, dry, tan, no odor, gravel present, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-17
Start Date: 8/16/2011 09:00
Finish Date: 8/16/2011 09:20

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.966' W 107º58.699'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5446.746
Site Coordinates:
N 74622.64 **E** 181451.735

Depth (ft.)	Sampling: Sample Depth	Sampling: Time	Sampling: Sample Type/ Containe/No.	Sampling: Saturation	Sampling: Organic Vapor (ppm)	Sampling: USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5' & Dup	0910	G/4V/ 4E/6J		3.2 69ºF		100	**Sandy Clay (CL)** Low plasticity, soft, damp to moist, dark brown, no odor, roots, loamy with earthworms, detritus	
								Total Depth = 0.5' BGL	
2									2
4									4

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Boring No.: AOC 19-18
Start Date: 8/16/2011 13:30
Finish Date: 8/16/2011 13:50

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.958' W 107º58.696'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5460.765
Site Coordinates:
N 74575.084 **E** 181497.765

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1345	G/2V/2E/3J		4.2 91ºF		100	**Gravelly Sand (SW)** Fine to medium grain, loose to compact, dry, brown, no odor, roots/stems/bark present, refusal at 0.5' bgl in large gravel	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.958' W 107º58.695'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5461.075
Site Coordinates:
N 74575.963 **E** 181503.283

Boring No.: AOC 19-19
Start Date: 8/16/2011 11:00
Finish Date: 8/16/2011 11:15

Depth (ft.)	Sampling: Sample Depth	Sampling: Time	Sampling: Sample Type/ Containe/No.	Sampling: Saturation	Sampling: Organic Vapor (ppm)	Sampling: USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1105	G/2V/2E/3J		2.8 83ºF		100	**Gravelly Sand (SW)** Very fine grain, loose, dry, tan, no odor, gravel ranged from 1/2 inch to +3 inches, subrounded, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.950' W 107º58.698'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5477.244
Site Coordinates:
N 74532.91 **E** 181482.057

Boring No.: AOC 19-20
Start Date: 8/16/2011 10:30
Finish Date: 8/16/2011 10:55

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1045	G/2V/2E/3J		3.2 82ºF		100	**Gravelly Sand (SW)** Very fine grain, loose, dry, tan, no odor, gravel ranged from 1/2 inch to +3 inches, subrounded, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.958' W 107º58.697'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5461.77
Site Coordinates:
N 74574.618 **E** 181492.695

Boring No.: AOC 19-21
Start Date: 8/16/2011 10:00
Finish Date: 8/16/2011 10:10

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1005	G/2V/2E/3J		3.6 80ºF		100	**Gravelly Sand (SW)** Very fine grain, loose, dry, tan, no odor, gravel ranged from 1/2 inch to +3 inches, subrounded, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 19-22
Start Date: 8/16/2011 10:20
Finish Date: 8/16/2011 10:30

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.949' W 107º58.696'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5477.52
Site Coordinates:
N 74530.609 **E** 181493.6

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1025	G/2V/2E/3J		2.1 80ºF		100	**Gravelly Sand (SW)** Very fine grain, loose, dry, tan, no odor, gravel ranged from 1/2 inch to +3 inches, subrounded, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.947' W 107º58.699'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5480.975
Site Coordinates:
N 74513.176 **E** 181482.442

Boring No.: AOC 19-23
Start Date: 8/16/2011 09:30
Finish Date: 8/16/2011 09:55

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	0945	G/2V/2E/3J		4.9 77ºF		100	**Weathered Sandstone (SS)** Fine grain, moderate to poor cementation, dry, dark brown, stained, faint odor	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.939' W 107º58.740'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5469.417
Site Coordinates:
N 74461.182 **E** 181283.544

Boring No.: AOC 20-1
Start Date: 8/17/2011 07:45
Finish Date: 8/17/2011 08:10

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	0800	G/2V/2E/3J		2.0 67ºF		100	**Gravelly Sand (SW)** Fine grain, loose, damp, brown, no odor, gravel ranges from 1/2 inch to +2 inches, subrounded	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.940' W 107º58.738'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5467.509
Site Coordinates:
N 74472.531 **E** 181289.678

Boring No.: AOC 20-2
Start Date: 8/17/2011 08:15
Finish Date: 8/17/2011 08:30

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	0820	G/2V/2E/3J		1.3 70ºF		100	Ground Surface **Clayey Sand (SC)** Fine grain, compact, damp, brown, no odor	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.940' W 107º58.739'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5465.067
Site Coordinates:
N 74471.467 **E** 181280.71

Boring No.: AOC 20-3
Start Date: 8/17/2011 08:35
Finish Date: 8/17/2011 08:45

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5' &Dup	0840	G/4V/ 4E/6J		33 71ºF		100	**Clay (CL)** Low plasticity, soft, damp, tan and black, faint odor	
								Total Depth = 0.5' BGL	
2									2
4									4

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Sheet: **1 of 1**

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.939' W 107º58.742'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5467.38
Site Coordinates:
N 74470.728 **E** 181275.869

Boring No.: AOC 20-4
Start Date: 8/17/2011 08:45
Finish Date: 8/17/2011 09:05

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	0900	G/2V/2E/3J		9.4 74ºF		100	**Silt (ML)** Low plasticity, soft, damp, brown, no odor	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 20-5
Start Date: 8/17/2011 09:15
Finish Date: 8/17/2011 10:00

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.948' W 107º58.739'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5456.308
Site Coordinates:
N 74513.196 **E** 181276.971

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	0945	G/2V/2E/3J		2.4 80ºF		100	**Sandy Gravel (GP)** Rounded gravel, 1/2 inch to +6 inches, very fine grain sand, loose, dry, no odor, brown, refusal at 0.5' bgl	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 20-6
Start Date: 8/17/2011 10:00
Finish Date: 8/17/2011 10:10

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.950' W 107º58.740'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5453.998
Site Coordinates:
N 74526.439 **E** 181278.604

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1005	G/2V/2E/3J		2.4 83ºF		100	**Sand (SP)** Very fine grain, loose, dry, brown, no odor	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 20-7
Start Date: 8/17/2011 10:15
Finish Date: 8/17/2011 10:30

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.950' W 107º58.743'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5453.359
Site Coordinates:
N 74530.099 **E** 181266.994

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1025	G/2V/2E/3J		0.7 84ºF		100	**Sand (SP)** Fine grain, loose, dry, light gray, no odor	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.951' W 107º58.742'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5451.499
Site Coordinates:
N 74535.077 **E** 181273.44

Boring No.: AOC 20-8
Start Date: 8/17/2011 10:35
Finish Date: 8/17/2011 10:50

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1045	G/2V/2E/3J		0.7 84ºF		100	**Sandy Gravel (GP)** Subrounded, 1/2 inch to +6 inches, fine grain sand, compact, dry, brown, no odor	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 20-9
Start Date: 8/17/2011 11:00
Finish Date: 8/17/2011 11:30

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.951' W 107º58.739'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5451.334
Site Coordinates:
N 74537.171 **E** 181282.135

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1120	G/2V/2E/3J		2.4 95ºF		100	**Sand (SP)** Very fine grain, loose, dry, light gray, no odor	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 20-10
Start Date: 8/17/2011 11:30
Finish Date: 8/17/2011 11:50

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.951' W 107º58.743'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5450.617
Site Coordinates:
N 74540.095 **E** 181268.539

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1140	G/2V/2E/3J		2.7 92ºF		100	**Sand (SP)** Very fine grain, loose, dry, light tan, no odor	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 20-11
Start Date: 8/17/2011 11:55
Finish Date: 8/17/2011 12:10

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.951' W 107º58.742'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5449.867
Site Coordinates:
N 74540.076 **E** 181274.717

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1200	G/2V/2E/3J		2.3 94ºF		100	**Sandy Gravel (GP)** Subrounded, 1/2 inch to +6 inches, very fine grain sand, compact, dry, brown, no odor	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.954' W 107º58.742'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5446.088
Site Coordinates:
N 74555.04 **E** 181272.202

Boring No.: AOC 20-12
Start Date: 8/17/2011 12:10
Finish Date: 8/17/2011 12:25

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
	0-0.5'	1220	G/2V/2E/3J		2.1 93ºF		100	**Sand (SP)** Very fine grain, loose, dry, light tan, no odor	
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 21-1
Start Date: 8/17/2011 14:30
Finish Date: 8/17/2011 15:00

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.937' W 107º58.788'

Total Depth: 2.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5473.066
Site Coordinates:
N 74450.302 **E** 181046.206

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1435	G/2V/2E/3J		1.5 92ºF		100	**Silty Sand (SM)** Very fine grain, loose, dry, gray, no odor	0
					0.8 92ºF		100	**Silty Sand (SM)** Similar to above, no odor	
	1.5-2'	1445	G/2V/2E/3J		1.6 92ºF		100	**Silty Sand (SM)** Similar to above, no odor	
2	2-2.5'	1455	G/2V/2E/3J		1.1 92ºF		100	**Silty Sand (SM)** Similar to above, no odor, refusal at 2.5' bgl	2
								Total Depth = 2.5' BGL	
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.940' W 107º58.786'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5472.78
Site Coordinates:
N 74460.204 **E** 181050.86

Boring No.: AOC 21-2
Start Date: 8/15/2011 09:30
Finish Date: 8/15/2011 09:55

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5' &Dup	0940	G/4V/ 4E/6J		9.8 76ºF		100	**Silty Clay (CL)** Low plasticity, soft, dry, light tan to dark gray, no odor, detritus	0
								Total Depth = 0.5' BGL	
2									2
4									4

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LOG OF BORING

Boring No.: AOC 21-3
Start Date: 8/15/2011 09:56
Finish Date: 8/15/2011 10:11

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.938' W 107º58.789'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5471.977
Site Coordinates:
N 74465.222 **E** 181040.544

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	1000	G/2V/2E/3J		1.3 78ºF		100	Ground Surface **Silty Sand (SM)** Very fine grain, loose, dry, light tan to light gray, no odor, sandstone gravel present, detritus Total Depth = 0.5' BGL	0
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.939' W 107º58.788'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5471.458
Site Coordinates:
N 74460.782 **E** 181045.136

Boring No.: AOC 21-4
Start Date: 8/15/2011 10:12
Finish Date: 8/15/2011 10:25

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0	0-0.5'	1020	G/2V/2E/3J		5.0 79ºF		100	Ground Surface **Silt (ML)** Very fine grain, loose, dry, light gray, no odor, roots and stems present, detritus Total Depth = 0.5' BGL	0
2									2
4									4

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LOG OF BORING

Client: Western Refining Southwest, Inc.
Site: SWMU Group #6, Bloomfield Refinery
Job No.: UEC01318 - Bloomfield, NM
Geologist: Tracy Payne
Driller: N/A
Drilling Rig: N/A
Drilling Method: N/A
Sampling Method: Stainless Steel Trowel
Comments: GPS Coordinates - N 36º41.940' W 107º58.789'

Total Depth: 0.5' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5470.482
Site Coordinates:
N 74472.412 **E** 181047.834

Boring No.: AOC 21-5
Start Date: 8/17/2011 15:00
Finish Date: 8/17/2011 16:05

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0-0.5'	1520	G/2V/2E/3J		0.7 91ºF		100	**Silty Sand (SM)** Very fine grain, loose, dry, gray, no odor	0
					0.7 91ºF		100	**Silty Sand (SM)** Similar to above, no odor	
	1.5-2'	1540	G/2V/2E/3J		0.7 91ºF		100	**Silty Sand (SM)** Similar to above, no odor	
2	2-2.5'	1600	G/2V/2E/3J		0.7 91ºF		100	**Silty Sand (SM)** Similar to above, no odor, refusal at 2.5' bgl	2
								Total Depth = 2.5' BGL	
4									4

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Calculation of Site-Specific Dilution/Attenuation Factor (DAF)

The DAF value was calculated using equation 19 from NMED's *Technical Background Document for Development of Soil Screening Levels (Revision 5.0, August 2009).*

$$DAF = 1 + \left(\frac{K * i * D}{I * L} \right) \qquad DAF = 1 + \left(\frac{4{,}893 * 0.0023 * 1}{0.01 * 100} \right) = 11.25$$

Where:

$$D = \left(0.0112 * L^2\right)^{0.5} + D_a \left(1 - \exp\left[\frac{-L * I}{K * i * D_a} \right] \right)$$

K = Aquifer hydraulic conductivity (m/yr)
i = Hydraulic gradient (m/m)
D = Mixing zone depth (m)
I = Infiltration rate (m/yr)
L= Source length parallel to ground water flow (m)
D_a= Aquifer thickness (m)

Derivation of site-specific values:

K = 4,893 m/yr as determined from pumping test at well RW-22 (lowest of three values determined during 1994 RCRA Facility Investigation)
i = 0.0023 m/m as measured during August 2008 ground water sampling event
D = 1 m (lower of aquifer thickness (1m) or calculated mixing zone depth (10.58m))
I = 0.01 m derivation using EPA's HELP model as described below
L = 100 m – conservative average of SWMU/AOC source area length
D_a= 1 m - average saturated thickness measured during August 2008 ground water sampling event

Calculation of Infiltration Rate

Pursuant to *EPA's Soil Screening Guidance: User's Guide (Second Edition, July 1996)*, infiltration rates can be calculated either of two ways: (1) assume that infiltration rate is equivalent to recharge, or (2) use the EPA HELP model to estimate infiltration. Because the Bloomfield site is located in an area with low annual rainfall rates and high potential evapotranspiration rates, method 1 is not representative of site conditions. That is to say that it is unreasonable to assume that infiltration is equal to recharge.

EPA's HELP model was used to calculate the site-specific infiltration rate. Site-specific meteorological data was obtained from the Western Regional Climate Center and New Mexico State University, which operates a nearby weather station (Bloomfield 3 SE) as part of the NWS Cooperator Climate Stations. The weather station is located 1.7 miles south of Bloomfield on HWY 44 and then two miles east on Industrial Blvd, thus being approximately two miles southeast of the Western Bloomfield Refinery.

Data obtained from the Bloomfield 3 SE station includes mean monthly temperature and average monthly precipitation. The average wind speed (13.5 km/hr) was obtained from

the Western Regional Climate Center, as measured at the Farmington, NM airport. Daily solar radiation and quarterly relative humidity values were based on measurements from Albuquerque, NM. This data was obtained from the National Oceanic and Atmospheric Administration (NOAA) and is included in the HELP model's Weather Generator module. A review of the monthly average weather conditions (temperature and precipitation) at Bloomfield and Albuquerque as shown in the table below indicates very similar conditions such that use of quarterly relative humidity and solar radiation from Albuquerque should be sufficient to estimate conditions at Bloomfield. The quarterly relative humidity values used are 48%, 30%, 45%, and 50% for the first, second, third, and fourth quarters, respectively.

The vadose zone physical properties were based on the predominant lithology as observed during on-site monitoring well installation. The soil type chosen in the model was loamy sand with an average thickness of 5 meters. The land surface was assumed to be bare soil with a slope of 0%. This should be a conservative estimate, as there is a slight slope across most of the refinery with the exception of areas within tank dikes. There are structures (e.g., parking lots, building pads, concrete foundations, etc.) that could limit infiltration but the model assumes only bare soil without any obstructions to infiltration. Based on the selected soil type (loamy sand), the model default value for porosity is 0.437, field capacity is 0.105, wilting point is 0.047, and saturated hydraulic conductivity is 0.0017 cm/day. These model default vales are taken from the US Department of Agriculture.

Using the model's synthetic weather generator and the aforementioned inputs, the model was run for a 40 year period to simulate potential infiltration (percolation or leakage through Layer 1). The model output is enclosed, showing the annual values. Over the modeled 40 year period, the average annual infiltration was 0.01 meters. This average annual infiltration was used in the aforementioned calculation of the site-specific DAF value.

Bloomfield 3 SE, New Mexico Weather Station Data

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Average Max Temp (F)	41	48.6	57.4	67.2	77.4	88	92	89	81.8	69.4	54.4	43.4	67.5
Average Min. Temp (F)	16.2	22.4	27.8	35	43.8	52.1	59.6	57.7	49.5	37.7	25.7	18	37.1
Mean Monthly Temp (F)	28.6	35.5	42.6	51.1	60.6	70.1	75.8	73.4	65.7	53.6	40.1	30.7	52.3
Mean Monthly Temp (C)	-1.89	1.94	5.89	10.61	15.89	21.14	24.33	22.97	18.69	11.97	4.47	-0.72	
Average total Prec. (in)	0.55	0.56	0.63	0.6	0.52	0.38	0.99	1.27	0.95	0.95	0.63	0.57	8.60
Average total Prec. (mm)	13.97	14.224	16.002	15.24	13.208	9.652	25.146	32.258	24.13	24.13	16.002	14.478	

Data collected from 1/1/1914 to 12/31/2005 at the Bloomfield 3 SE (#291063) weather monitoring station; obtained from Western Regional Climate Center, National Oceanic & Atmospheric Administration

Albuquerque, New Mexico Weather Station Data

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Average Max Temp (F)	49.9	53.6	60.8	72.4	80.1	91.1	93.2	92	84.8	74.4	59.5	49.8	71.8
Average Min. Temp (F)	20.9	23.7	30.2	38.7	46.8	56.3	62	60.5	52.5	40.3	26.4	21.6	40
Mean Monthly Temp (F)	35.4	38.65	45.5	55.55	63.45	73.7	77.6	76.25	68.65	57.35	42.95	35.7	55.9
Mean Monthly Temp (C)	1.89	3.69	7.50	13.08	17.47	23.17	25.33	24.58	20.36	14.08	6.08	2.06	
Average total Prec. (in)	0.32	0.29	0.46	0.61	0.7	0.87	1.3	1.57	1.03	0.63	0.43	0.46	8.67
Average total Prec. (mm)	8.128	7.366	11.684	15.494	17.78	22.098	33.02	39.878	26.162	16.002	10.922	11.684	

Data collected from 1/1/1932 to 1/31/1954 at the Albuquerque (#290222) weather monitoring station; obtained from Western Regional Climate Center, National Oceanic & Atmospheric Administration

F - Fahrenheit
C- Celsius

in - inch
mm- millimeter

Project : Western Refining Bloomfield, New Mexico

Estimation of infiltration at Bloomfield Refinery

Model : HELP

An US EPA model for predicting landfill hydrologic processes and testing of effectiveness of landfill designs

Author : Scott Crouch

Client : Western Refining - Randy Schmaltz

Location : Bloomfield, NM

3/11/2010

Profile 1

Model Settings

[HELP] Case Settings

Parameter	Value	Units
Runoff Method	Model calculated	(-)
Initial Moisture Settings	Model calculated	(-)

[HELP] Surface Water Settings

Parameter	Value	Units
Runoff Area	100	(%%)
Vegetation Class	Bare soil	(-)

Profile Structure

Layer	Top (m)	Bottom (m)	Thickness (m)
Loamy Sand	100.0000	95.0000	5.0000

1.1. Layer. Loamy Sand

Top Slope Length: 0.0000
Bottom Slope Length: 0.0000
Top Slope: 0.0000
Bottom Slope : 0.0000

[HELP] Vertical Perc. Layer Parameters

Parameter	Value	Units
total porosity	0.437	(vol/vol)
field capacity	0.105	(vol/vol)
wilting point	0.047	(vol/vol)
sat.hydr.conductivity	0.0017	(cm/sec)
subsurface inflow	0	(mm/year)

Annual Totals rate (m)

	Precipitation (m)	Runoff (m)	Evapotranspiration (m)	Percolation or leakance through Layer 1 (m)
Year-1 (m)	1.9660E-01	0.0000E+00	1.8579E-01	5.2109E-05
Year-2 (m)	3.0180E-01	0.0000E+00	2.6922E-01	1.0255E-04
Year-3 (m)	2.3510E-01	0.0000E+00	2.3452E-01	1.9650E-04
Year-4 (m)	2.3000E-01	0.0000E+00	2.1004E-01	2.4626E-04
Year-5 (m)	2.5270E-01	0.0000E+00	2.3977E-01	4.1142E-04
Year-6 (m)	1.5870E-01	0.0000E+00	1.4899E-01	3.6109E-04
Year-7 (m)	1.8420E-01	0.0000E+00	1.7010E-01	5.0670E-04
Year-8 (m)	2.5770E-01	0.0000E+00	2.3978E-01	5.9778E-04
Year-9 (m)	1.9170E-01	0.0000E+00	1.7956E-01	7.2288E-04
Year-10 (m)	2.2820E-01	0.0000E+00	1.9825E-01	9.4104E-04
Year-11 (m)	2.3680E-01	0.0000E+00	2.2456E-01	1.6311E-03
Year-12 (m)	2.5940E-01	0.0000E+00	2.4152E-01	3.7601E-03
Year-13 (m)	1.8440E-01	0.0000E+00	1.7107E-01	5.6153E-03
Year-14 (m)	1.5860E-01	0.0000E+00	1.5145E-01	1.0341E-02
Year-15 (m)	2.4990E-01	0.0000E+00	2.3436E-01	1.4166E-02
Year-16 (m)	1.6700E-01	0.0000E+00	1.5633E-01	1.4482E-02
Year-17 (m)	1.3040E-01	0.0000E+00	1.1372E-01	1.2954E-02
Year-18 (m)	1.5020E-01	0.0000E+00	1.4066E-01	1.3977E-02
Year-19 (m)	2.0530E-01	0.0000E+00	1.9662E-01	1.3219E-02
Year-20 (m)	1.8180E-01	0.0000E+00	1.6946E-01	1.0024E-02
Year-21 (m)	2.3550E-01	0.0000E+00	2.1477E-01	1.0887E-02
Year-22 (m)	1.3750E-01	0.0000E+00	1.3022E-01	1.0618E-02
Year-23 (m)	2.3340E-01	0.0000E+00	2.2529E-01	1.4634E-02
Year-24 (m)	2.2170E-01	0.0000E+00	2.0414E-01	1.0021E-02
Year-25 (m)	1.4510E-01	0.0000E+00	1.3452E-01	1.3558E-02
Year-26 (m)	2.0130E-01	1.2902E-06	1.7333E-01	1.3059E-02
Year-27 (m)	2.3200E-01	0.0000E+00	2.1409E-01	1.5689E-02
Year-28 (m)	1.9260E-01	0.0000E+00	1.8730E-01	9.9471E-03
Year-29 (m)	2.3390E-01	0.0000E+00	2.1475E-01	1.1847E-02
Year-30 (m)	1.8890E-01	0.0000E+00	1.7801E-01	1.8487E-02
Year-31 (m)	2.4520E-01	0.0000E+00	2.2175E-01	1.6094E-02
Year-32 (m)	2.2790E-01	0.0000E+00	2.0877E-01	1.2385E-02
Year-33 (m)	3.1730E-01	4.0020E-04	2.9335E-01	1.3069E-02
Year-34 (m)	2.1170E-01	0.0000E+00	1.8598E-01	1.4984E-02
Year-35 (m)	2.7430E-01	0.0000E+00	2.6796E-01	1.6877E-02
Year-36 (m)	1.5090E-01	0.0000E+00	1.2899E-01	2.4361E-02
Year-37 (m)	2.1680E-01	0.0000E+00	2.1801E-01	1.6731E-02
Year-38 (m)	1.7490E-01	0.0000E+00	1.5227E-01	1.8959E-02
Year-39 (m)	2.1190E-01	0.0000E+00	1.6801E-01	1.5479E-02
Year-40 (m)	1.7540E-01	0.0000E+00	1.8233E-01	1.7584E-02
Total (m)	8.3887E+00	4.0149E-04	7.7796E+00	3.9958E-01

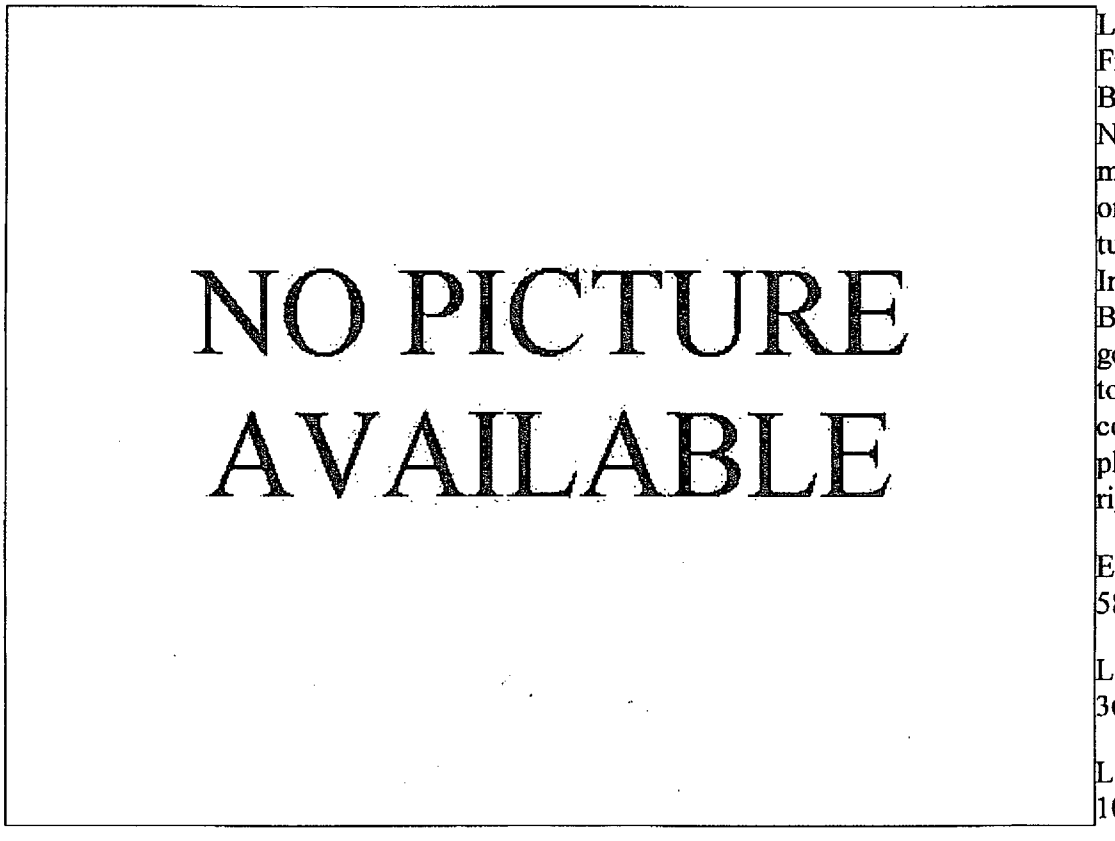
Average
= 0.01M

NWS Cooperator Climate Stations

Weather Data from Individual Stations Around New Mexico

Bloomfield 3-SE-Bloomfield, NM

Climate Data



Location: From Bloomfield, NM go 1.7 miles south on HWY 44, turn east on Industrial BLVD and go 2.0 miles to gas compressor plant on right.

Elevation: 5806 feet

Latitude: 36°40'

Longitude: 107°58'

Ground Cover: Flat sandy plateau cut by broken terrain of sandstone hills and arroyos.

Cooperator Number: 29-1063-1

Questions or comments about this page can be directed to:

webmaster@weather.nmsu.edu
NMSU Weather BBS
Dept. of Agronomy and Horticulture
BOX 30003, Dept. 3Q
LAS CRUCES, NM 88003-0003

NMSU MONITORED CLIMATE STATIONS
NMSU Weather Homepage

Western Regional Climate Center

About Us

The Regional Climate Centers (RCC) deliver climate services at national, regional and state levels working with NOAA partners in the National Climatic Data Center, National Weather Service, the American Association of State Climatologists, and NOAA Research Institutes. This successful effort resulted in jointly developed products, services, and capabilities that enhance the delivery of climate information to the American public, and builds a solid foundation for a National Climate Service. As NOAA and Congress work to help society adapt to climate change, these collaborative efforts form a framework for the service, data stewardship, and applied research components of the National Climate Service.

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- DRI LDM Logs (ldmd, netcheck and syscheck)

Division of Atmospheric Sciences

NEW MEXICO

AVERAGE WIND SPEED - MPH

STATION	ID	Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
ALAMOGORDO AIRPORT ASOS	KALM	1996-2006	5.1	6.3	7.1	7.9	7.1	6.9	6.1	5.3	5.2	5.2	5.0	5.0	6.0
ALAMOGORDO-HOLLOMAN AFB	KHMN	1996-2006	8.5	9.7	10.6	11.8	10.8	10.6	9.8	9.1	8.8	8.5	8.1	8.3	9.6
ALBUQUERQUE AP ASOS	KABQ	1996-2006	7.0	8.2	9.3	11.1	10.0	10.0	8.7	8.3	8.0	7.9	7.2	6.9	8.5
ALBUQUERQUE-DBLE EAGLE	KAEG	1999-2006	7.1	7.9	9.0	10.6	9.5	8.6	7.0	6.2	7.0	6.5	6.5	6.1	7.7
ARTESIA AIRPORT ASOS	KATS	1997-2006	7.8	9.1	10.1	10.9	10.2	9.9	7.8	6.9	7.6	7.8	7.6	7.4	8.5
CARLSBAD AIRPORT ASOS	KCNM	1996-2006	9.2	9.8	10.9	11.4	10.4	9.9	8.5	7.7	8.2	8.5	8.4	8.8	9.3
CLAYTON MUNI AP ASOS	KCAO	1996-2006	11.9	12.7	13.4	14.6	13.4	13.0	11.7	10.8	11.8	12.1	12.1	12.0	12.4
CLINES CORNERS	KCQC	1998-2006	16.2	16.1	15.7	16.9	14.6	13.5	10.6	10.1	11.8	13.3	15.0	16.0	14.1
CLOVIS AIRPORT AWOS	KCVN	1996-2006	12.3	12.3	13.4	13.8	12.4	11.9	9.7	8.9	9.7	10.9	11.6	12.2	11.6
CLOVIS-CANNON AFB	KCVS	1996-2006	12.5	12.6	13.6	13.8	12.2	12.5	10.7	10.0	10.2	11.3	11.7	12.4	12.0
DEMING AIRPORT ASOS	KDMN	1996-2006	8.7	9.7	10.9	12.0	10.6	10.1	8.9	8.1	8.4	8.2	8.5	8.1	9.3
FARMINGTON AIRPORT ASOS	KFMN	1996-2006	7.3	8.3	9.0	9.8	9.4	9.4	8.7	8.2	8.0	7.8	7.6	7.3	8.4
GALLUP AIRPORT ASOS	KGUP	1996-2006	5.7	6.9	7.8	10.0	9.0	8.8	6.9	6.0	6.5	6.1	5.6	5.3	7.0
GRANTS-MILAN AP ASOS	KGNT	1997-2006	7.8	8.8	9.6	10.9	10.0	9.8	8.1	7.2	7.9	8.4	8.0	7.6	8.7
HOBBS AIRPORT AWOS	KHOB	1996-2006	11.3	11.9	12.6	13.4	12.5	12.3	11.0	10.0	10.2	10.6	10.7	11.1	11.4
LAS CRUCES AIRPORT AWOS	KLRU	2000-2006	6.4	7.5	8.8	10.1	8.7	8.2	6.8	6.0	6.2	6.1	6.4	6.0	7.3
LAS VEGAS AIRPORT ASOS	KLVS	1996-2006	10.9	12.2	12.5	14.3	12.4	11.8	10.0	9.2	10.9	10.8	11.0	10.9	11.4
LOS ALAMOS AP AWOS	KLAM	2005-2006	3.9	5.7	7.5	8.1	7.1	7.3	5.3	4.8	5.7	5.1	4.4	3.2	5.4
RATON AIRPORT ASOS	KRTN	1998-2006	8.9	9.4	10.4	12.2	10.8	10.2	8.4	8.1	8.6	9.0	8.6	8.5	9.4
ROSWELL AIRPORT ASOS	KROW	1996-2006	7.4	8.9	9.9	11.1	10.3	10.2	8.8	7.9	8.3	8.0	7.5	7.3	8.8
RUIDOSO AIRPORT AWOS	KSRR	1996-2006	8.8	9.6	10.0	11.6	10.0	8.4	5.9	5.3	6.4	7.4	7.9	8.7	8.3
SANTA FE AIRPORT ASOS	KSAF	1996-2006	8.9	9.5	9.9	11.2	10.6	10.5	9.2	8.8	8.8	9.1	8.7	8.5	9.5
SILVER CITY AP AWOS	KSVC	1999-2006	8.1	8.7	9.9	10.8	10.2	9.9	8.5	7.2	6.9	7.6	7.9	7.7	8.5
TAOS AIRPORT AWOS	KSKX	1996-2006	5.8	6.5	7.7	9.1	8.6	8.5	7.1	6.6	6.7	6.6	6.0	5.7	7.0
TRUTH OR CONSEQ AP ASOS	KTCS	1996-2006	7.4	8.7	9.9	11.1	10.4	9.8	8.1	7.4	7.7	8.0	7.7	7.3	8.6
TUCUMCARI AIRPORT ASOS	KTCC	1999-2006	10.0	11.2	11.9	13.6	11.9	11.6	9.9	9.3	10.0	10.0	10.4	10.2	10.8

8.4 miles/hr × 1kilo/.62miles = 13.5 kmhr

NEVADA

AVERAGE WIND SPEED - MPH

STATION	ID	Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
DESERT ROCK AP-MERCURY	KDRA	1996-2006	8.0	8.8	9.2	10.7	10.5	10.5	9.6	9.1	8.8	8.2	7.7	8.4	9.1
ELKO AIRPORT ASOS	KEKO	1996-2006	4.6	5.3	5.9	6.7	6.4	6.3	5.7	5.3	5.0	4.6	4.6	4.8	5.4
ELY AIRPORT ASOS	KELY	1996-2006	9.0	9.0	9.6	10.3	9.8	10.2	9.8	9.9	9.6	9.5	8.8	9.2	9.5

BLOOMFIELD 3 SE, NEW MEXICO (291063)

Period of Record Monthly Climate Summary

Period of Record : 1/ 1/1914 to 12/31/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	41.0	48.6	57.4	67.2	77.4	88.0	92.0	89.0	81.8	69.4	54.4	43.4	67.5
Average Min. Temperature (F)	16.2	22.4	27.8	35.0	43.8	52.1	59.6	57.7	49.5	37.7	25.7	18.0	37.1
Average Total Precipitation (in.)	0.55	0.56	0.63	0.60	0.52	0.38	0.99	1.27	0.95	0.95	0.63	0.57	8.61
Average Total SnowFall (in.)	3.8	2.2	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.6	3.4	11.4
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 92.9% Min. Temp.: 93.2% Precipitation: 95.4% Snowfall: 79% Snow Depth: 70.2%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Back to:
State Map | Western U.S. map | Home Page

NOTE:
To print data frame (right side), click on right frame before printing.

1971 - 2000

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1971-2000 Normals (~3 KB)

1961 - 1990

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1961-1990 Normals (~3 KB)

Period of Record

- Station Metadata
- Station Metadata Graphics

General Climate Summary Tables

- Temperature
- Precipitation
- Heating Degree Days
- Cooling Degree Days
- Growing Degree Days

ALBUQUERQUE, NEW MEXICO (290222)

Period of Record Monthly Climate Summary

Period of Record : 1/ 1/1932 to 1/31/1954

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	49.9	53.6	60.8	72.4	80.1	91.1	93.2	92.0	84.8	74.4	59.5	49.8	71.8
Average Min. Temperature (F)	20.9	23.7	30.2	38.7	46.8	56.3	62.0	60.5	52.5	40.3	26.4	21.6	40.0
Average Total Precipitation (in.)	0.32	0.29	0.46	0.61	0.70	0.87	1.30	1.57	1.03	0.63	0.43	0.46	8.67
Average Total SnowFall (in.)	2.3	1.5	1.0	0.9	0.2	0.0	0.0	0.0	0.0	0.0	1.2	2.0	9.3
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 26.1% Min. Temp.: 26.1% Precipitation: 72.2% Snowfall: 26.1% Snow Depth: 26.1%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Equation 1
Combined Exposures to Noncarcinogenic Contaminants in Soil
Residential Scenario

$$C = \frac{THQ \times BW_c \times AT_n}{EF_r \times ED_c \left[\left(\frac{1}{RfD_o} \times \frac{IRS_c}{10^6 mg/kg} \right) + \left(\frac{1}{RfD_o} \times \frac{SA_c \times AF_c \times ABS}{10^6 mg/kg} \right) + \left(\frac{1}{RFD_i} \times \frac{IRA_c}{VF_s + PEF} \right) \right]}$$

Parameter	Definition (units)	NMED Default	TPH C11-C21 Aromatics
C	Contaminant concentration (mg/kg)	--	**1.83E+03**
THQ	Target hazard quotient	1	1
BW_c	Body weight, child (kg)	15	15
AT_n	Averaging time, noncarcinogens, ED x 365 (days)	2190	2190
EF_t	Exposure frequency, resident (days/yr)	350	350
ED_c	Exposure duration, child (yr)	6	6
IRS_c	Soil ingestion rate, child (mg/day)	200	200
RfDo	Oral reference dose (mg/kg-day)	--	**0.03**
SA_c	Dermal surface area, child (cm^2/day)	2800	2800
AF_c	Soil adherance factor, child (mg/cm^2)	0.2	0.2
ABS	Skin absorbtion factor (unitless)	--	**0.1**
IRA_c	Inhalation rate, child (m^3/day)	10	10
RfDi	Inhalation reference dose (mg/kg-day)	--	**0.05**
VFs	Volatilization factor, Equation 14 (mg^3/kg)	--	**8.10E+04**
PEF	Particulate emission factor, Equation 16 (m^3/kg)	--	**6.61E+09**

Ingestion	Dermal	Inhalation
2346.428571	8380.102041	5.17E+08

Equations and Default values from New Mexico Enviroment Department's Technical Background Document for Development of Soil Screening Levels, Revisions 5.0, August 2009

Toxicity factors from Massachusetts Department of Environmental Protection Masschusetts Contingency Plan Standards Spreadsheets 2009 (**bolded values**)

Equation 14
Derivation of the Volatilization Factor for Residential and Commercial/Industrial Scenarios

$$VF_s = \frac{Q/C_{vol} \times (3.14 \times D_A \times T)^{0.5} \times 10^{-4}}{(2 \times \rho_b \times D_A)}$$

$$D_A = \frac{\left[\frac{\Theta_a^{10/3} D_a H' + \Theta_w^{10/3} D_w}{n^2}\right]}{\rho_b K_d + \Theta_w + \Theta_a H'}$$

Parameter	Definition (units)	NMED Default	TPH C11-C21 Aromatics
VF_s	Volatilization factor for soil (m^3/kg)	--	**8.10E+04**
D_A	Apparent diffusivity (cm^2/s)	--	**2.35E-06**
Q/C_{vol}	Inverse of mean concentration at the center of a 0.5 acre square source (g/m^2-s per kg/m^3)	68.18	68.18
T	Exposure interval (s)	9.5E+08	9.50E+08
ρb	Dry bulk soil density (g/cm^3)	1.5	1.5
n	Total soil porosity 1-(ρb/ρs)	0.43	0.43
Θa	Air-filled soil porosity (n-Θ_w)	0.17	0.17
Θw	Water-filled soil porosity	0.26	0.26
ρs	Soil particle density (g/cm^3)	2.65	2.65
D_a	Diffusivity in air (cm^2/s)	--	**0.06**
H'	Dimensionless Henry's Law Constant	--	**0.03**
D_w	Diffusivity in water (cm^2/s)	--	**1.00E-05**
K_d	Soil-water partition coefficient (cm^3/g) = K_{oc} x f_{oc} (organics)	--	**7.518**
K_{oc}	Soil organic carbon partition coefficient (cm^3/g)	--	**5012**
f_{oc}	Fraction organic carbon in soil (g/g)	0.0015	0.0015

Equations and Default values from New Mexico Enviroment Department's Technical Background Document for Development of Soil Screening Levels, Revisions 5.0, August 2009
Physical and chemical properties from Massachusetts Department of Environmental Protection Masschusetts Contingency Plan Standards Spreadsheets 2009 (**bolded values**)

Equation 16
Derivation of the Particulate Emission Factor
Residential and Commercial/Industrial Scenarios

$$PEF = Q/C_{wind} \times \frac{3{,}600 \text{ sec}/hr}{0.036 \times (1-V) \times \left(\frac{U_m}{U_t}\right)^3 \times F(x)}$$

Parameter	Definition (units)	Default
PEF	Particulate emission factor (m^3/kg)	**6.61E+09**
Q/Cwind	Inverse of mean concentration at center of 0.5 acre square source (g/m^2-sec per kg/m^3)	81.85
V	Fraction of vegetative cover (unitless)	0.5
Um	Mean annual windspeed (m/s)	4.02
Ut	Equivalent threshold value of windspeed at 7 m (m/s)	11.32
F(x)	Function dependent on Um/Ut using Cowherd at al. 1985 (unitless)	0.0553

Equations and Default values from New Mexico Enviroment Department's Technical Background Document for Development of Soil Screening Levels, Revisions 5.0, August 2009

Chain-of-Custody Record

1 of 2

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield, NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@wnr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Group 6 RCRA Inv.
Project #:
Project Manager: Kelly Robinson
Sampler: Kelly + Tracy
On Ice:
Sample Temperature:

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA) TPH-GRO	8270 (Semi-VOA)	TPH-MRO DRO	Metals (See attached)			Air Bubbles (Y or N)
8/15/11	1158	Soil	AOC 19-3 (0-0.5')	3 Jars	None	-1										X	X	X	X			
				2 Encore	↓											X						
				2 Vials	MeOH											X						
	1220	Soil	AOC 19-1 (0-0.5')	3 Jars	None	-2										X	X	X	X			
				2 Encore	↓											X						
				2 Vials	MeOH											X						
	1240		AOC 19-2 (0-0.5')	3 Jars	None	-3										X	X	X	X			
				2 Encore	↓											X						
				2 Vials	MeOH											X						
	1325		AOC 19-4 (0-0.5')	3 Jars	None	-4										X	X	X	X			
				2 Encore	↓											X						
				2 Vials	MeOH											X						

Date: 8/15/11 Time: 1500 Relinquished by: Kelly Robinson
Received by: To UPS Date Time

Date: Time: Relinquished by:
Received by: Michelle Garcia Date: 8/16/11 Time: 10:36

Remarks: See attached for metals list.

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

(2)

1.0C

2 of 2

Chain-of-Custody Record

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield, NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@conr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Group 6 RCRA luv
Project #:
Project Manager: Kelly Robinson
Sampler: Kelly & Tracy
On Ice: [redacted]
Sample Temperature: [redacted]

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1108[redacted]
8/15/11	1345	Soil	AOC 19-5(0-0.5')	3 Jars	None	-5
				2 encores	↓	
				2 vials	MeOH	
	1405		AOC 19-6(0-0.5')	3 Jars	None	-6
				2 encore	↓	
				2 Vials	MeOH	
—	—	—	MeOH Blank	2 vials	MeOH	-7

Analysis Request

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA) TPH-GRO	8270 (Semi-VOA)	TPH-DRO, MRO	Metals			Air Bubbles (Y or N)
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X						

Remarks: See attached for Metals List.

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/15/11	1500	Kelly Robinson	To UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
			Michelle Garcia	8/16/11	10:30

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Western Refining - Bloomfield

METALS ANALYSES

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.3/335.2 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Chain-of-Custody Record

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@wnr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Group 6 RCRA Inv.
Project #: AOC No. 21
Project Manager: Kelly Robinson
Sampler: Kelly : Tracy
On Ice: ☒ Yes ☐ No
Sample Temperature: 4.0

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1204021	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (VOA), TPH-GRO	8270 (Semi-VOA)	TPH-MRO, DRO	Metals (See Attached)			Air Bubbles (Y or N)
8/15/11	940	Soil	AOC 21-2(0-0.5')	3 Jars	None	-1										X	X	X	X			
	↓	↓	↓	2 Vials	MeOH											X						
				2 Encores	None											X						
	940 1000	Soil	AOC 21-2(0-0.5') DUP	3 Jars	None	-2										X	X	X	X			
				2 Vials	MeOH											X						
				2 Encores	None											X						
	1000		AOC 21-3 (0-0.5')	3 Jars	None	-3										X	X	X	X			
				2 Vials	MeOH											X						
				2 Encores	None											X						
	1020		AOC 21-4(0-0.5')	3 Jars	None	-4										X	X	X	X			
				2 Vials	MeOH											X						
↓	↓	↓	↓	2 Encores	None											X						

Date: 8/15/11 Time: 1500 Relinquished by: Kelly Robinson
Received by: TO UPS Date Time
Date: Time: Relinquished by:
Received by: Michelle Garcia 8/16/11 10:38

Remarks: See attached for Metals List

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Western Refining - Bloomfield

METALS ANALYSES

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.3/335.2 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Chain-of-Custody Record

1 of 3 Cooler #2

Client: Western Refining Bloomfield Refinery

Mailing Address: 50 Road 4990 Bloomfield NM 87413

Phone #: 505-632-4166

email or Fax#: Kelly.Robinson@wnr.com

QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☐ EDD (Type) Excel

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: GROUP 6 RCRA Inv.

Project #: AOC No. 19

Project Manager: Kelly Robinson

Sampler: Kelly : Tracy

On Ice: ☒ Yes ☐ No

Sample Temperature: 4.0

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1204 0
8/15/11	1540	Soil	AOC 19-8 (0-0.5')	3 Jars	None	-1
				2 encore	↓	
				2 vials	MeOH	
8/15/11	1555		AOC 19-10 (0-0.5')	3 Jars	None	-2
				2 encore	↓	
				2 vials	MeOH	
	1615		AOC 19-11 (0-0.5')	3 Jars	None	-3
				2 encore	↓	
				2 vials	MeOH	
	1630		AOC 19-12 (0-0.5')	3 Jars	None	-4
				2 encore	↓	
				2 vials	MeOH	

Analysis Request

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA) TPH-GRO	8270 (Semi-VOA)	TPH - DRO MRO	Metals (See Attached)			Air Bubbles (Y or N)
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						

Date: 8/16/11 Time: 1400 Relinquished by: Kelly Robinson Received by: TO UPS Date Time

Date: Time: Relinquished by: Received by: 8/17/11 Time: 945

Remarks: See attached for metals list

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Chain-of-Custody Record

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Cooler #2

Client: Western Refining Bloomfield Refinery

Mailing Address: 50 Road 4990 Bloomfield, NM 87413

Phone #: 505-632-4166

email or Fax#: Kelly.Robinson@wnr.com

QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: GROUP 6 RCRA Inv.

Project #: —

Project Manager: Kelly Robinson

Sampler: Kelly & Tracy

On Ice: Yes

Sample Temperature: [illegible]

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.
8/15/11	1645	Soil	AOC 19-13 (0-0.5')	3 Jars	None	-5
				2 encores	↓	
				2 vials	MeOH	
8/16/11	0810	Soil	AOC 19-14 (0-0.5')	3 Jars	None	-6
				2 encores	↓	
				2 vials	MeOH	
	0830	Soil	AOC 19-15 (0-0.5')	3 Jars	None	-7
				2 encores	↓	
				2 vials	MeOH	
	0850		AOC 19-16 (0-0.5')	3 Jars	None	-8
				2 encores	↓	
				2 vials	MeOH	

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/18/11	1400	Kelly Robinson	TO UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
				8/17/11	955

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA), TPH - GRO	8270 (Semi-VOA)	TPH - MRO, DRO	Metals (see attached)			Air Bubbles (Y or N)
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						

Remarks: See attached metals list

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

(5)

3 of 3

Chain-of-Custody Record

Client: Western Refining Bloomfield Refinery

Mailing Address: 50 Road 4990 Bloomfield, NM 87413

Phone #: 505-632-4166

email or Fax#: Kelly.Robinson@wnr.com

QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: GROUP 6 RCRA INV.

Project #:

Project Manager: Kelly Robinson

Sampler: Kelly + Tracy

On Ice: ☒ Yes ☐ No

Sample Temperature: 4°C

Cooler #2

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (VOA), TPH-GRO	8270 (Semi-VOA)	TPH-DRO, MRO	Metals (See attached)			Air Bubbles (Y or N)
—	—	—	MeOH Blank	2 vials	MeOH	-9										X						

Date: 8/16/11 Time: 1400 Relinquished by: Kelly Robinson

Received by: TO UPS Date Time

Date: Time: Relinquished by:

Received by: Date: 8/17/11 Time: 945

Remarks: See attached for metals list.

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

METALS ANALYSES

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.3/335.2 mod.
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Chain-of-Custody Record

1 of 2 Cooler #3

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Client: Western Refining Bloomfield, Refinery

Mailing Address: 50 Road 4990 Bloomfield, NM 87413

Phone #: 505-632-4166

email or Fax: Kelly.Robinson@wnr.com

QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: GROUP 6 RCRA INV

Project #: ———

Project Manager: Kelly Robinson

Sampler: Kelly TRACY

On Ice: ☒ Yes ☐ No

Sample Temperature: 2.0 °C

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1108
8/16/11	0910	Soil	AOC 19-17 (0-0.5')	3 Jars	None	-1
				2 encore	↓	-1
				2 vials	MeOH	-1
		Soil	AOC 19-17 (0-0.5') DUP	3 Jars	None	-2
				2 encore	↓	-2
				2 vials	MeOH	-2
	0945	Soil	AOC 19-23 (0-0.5')	3 Jars	None	-3
				2 encore	↓	-3
				2 vials	MeOH	-3
	1000	Soil	AOC 19-21 (0-0.5')	3 Jars	None	-4
				2 encore	↓	-4
				2 vials	MeOH	-4

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/16/11	1400	Kelly Robinson	TO UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
				8/17/11	945

Analysis Request

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions ($F, Cl, NO_3, NO_2, PO_4, SO_4$)	8081 Pesticides / 8082 PCB's	8260B (VOA) TPH-(GRO	8270 (Semi-VOA)	Metals (See Attached)	TPH - (DRO, MRO)			Air Bubbles (Y or N)
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						

Remarks: See attached for metals list

Chain-of-Custody Record

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield, NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@wnr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) Excel

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Group 6 RCRA Inv.
Project #: —
Project Manager: Kelly Robinson
Sampler: Kelly : Tracy
On Ice: ☒ Yes ☐ No
Sample Temperature: 1.7 °C

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1204122
8/16/11	1025	Soil	AOC 19-22 (0-0.5')	3 Jars	None	-5
				2 encores	↓	-5
				2 vials	MeOH	-5
	1045	Soil	AOC 19-20 (0-0.5')	3 Jars	None	-6
				2 encores	↓	-6
				2 vials	MeOH	-6
	1105	Soil	AOC 19-19 (0-0.5')	3 Jars	None	-7
				2 encores	↓	-7
				2 vials	MeOH	-7
—	—	—	MeOH Blank	2 vials	MeOH	-8

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/16/11	1400	Kelly Robinson	TO UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
				8/17/11	945

Remarks: See Attached for Metals List

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

292

Code #3

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (VOA) TPH + GRO	8270 (Semi-VOA)	TPH-DRO, MRO	Metals (see attached)			Air Bubbles (Y or N)
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X	X	X	X			
									X						
									X						
									X						

METALS ANALYSES

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.3/335.2 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Chain-of-Custody Record

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield, NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@wnr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) Excel

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Group 6 RCRA Inv.
Project #: AOC No. 20
Project Manager: Kelly Robinson
Sampler: Kelly & Tracy
On Ice: Yes
Sample Temperature:

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Cooler #4

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type		BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (~~VOA~~), TPH-GRO	8270 (Semi-VOA)	TPH-DRO, ORO	Metals (See attached)			Air Bubbles (Y or N)
8/17/11	0800	Soil	AOC 20-1 (0-0.5')	3 Jars	None	1										X	X	X	X			
				2 encore	↓											X						
				2 vials	MeOH											X						
	0820		AOC 20-2 (0-0.5')	3 Jar	None	2										X	X	X	X			
				2 encore	↓											X						
				2 vials	MeOH											X						
—	—	—	~~TRIP BLANKS~~ AT 8/19/11	3 vials	HCl	3										X						

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/17/11	1400	Kelly Robinson	TO UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
				8/18/11	1000

Remarks: See attached for Metals list.

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

METALS ANALYSES

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.3/335.2 mod.
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Chain-of-Custody Record

1 of 2

Client: Western Refining Bloomfield Refinery

Mailing Address: 50 Road 4990 Bloomfield, NM 87413

Phone #: 505-632-4166

email or Fax#: Kelly.Robinson@wnr.com

QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☒ EDD (Type) Excel

Turn-Around Time:
☒ Standard ☐ Rush _____

Project Name: GROUP 6 RCRA INV.

Project #: AOC No. 19

Project Manager: Kelly Robinson

Sampler: Kelly : Tracy

On Ice: ☒ Yes ☐ No

Sample Temperature: 4

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4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Codes #4

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (VOA), TPH-GRO	8270 (Semi-VOA)	TPH-DRO, MRO	Metals (See Attached)			Air Bubbles (Y or N)
8/16/11	1300	Soil	AOC 19-7 (0-0.5')	3 Jars	None	1										X	X	X	X			
				2 encores	↓											X						
				2 vials	MeOH											X						
8/16/11	1305	Soil	AOC 19-7 (1.5-2.0')	3 Jars	None	2										X	X	X	X			
				2 encores	↓											X						
				2 vials	MeOH											X						
	1320	Soil	AOC 19-9 (0-0.5')	3 Jars	None	3										X	X	X	X			
				2 encores	↓											X						
				2 vials	MeOH											X						
	1345		AOC 19-18 (0-0.5')	3 Jars	None	4										X	X	X	X			
				2 encores	↓											X						
				2 vials	MeOH											X						

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/17/11	1400	Kelly Robinson	TO UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
				8/18/11	1100

Remarks: See Attached for Metals List.

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(9)

Chain-of-Custody Record

2 of 2

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Tel. 505-345-3975 Fax 505-345-4107

Cooler #1

Client:	Western Refining Bloomfield Refinery
Mailing Address:	50 Road 4990 Bloomfield, NM 87413
Phone #:	505-632-4166
email or Fax#:	Kelly.Robinson@wnr.com
QA/QC Package:	☐ Standard ☒ Level 4 (Full Validation)
Accreditation	☐ NELAP ☐ Other
☐ EDD (Type)	EXCEL
Turn-Around Time:	☒ Standard ☐ Rush
Project Name:	GROUP 6 RCRA Inv.
Project #:	AOC No. 19
Project Manager:	Kelly Robinson
Sampler:	Kelly & Tracy
Sample Temperature:	

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA) TPH - GRO	8270 (Semi-VOA)	TPH-DRO, MRO	Metals (See Attached)			Air Bubbles (Y or N)
8/16/11	1530	Water	EB-AOC 19	4 VOAs	HCl	5										X						
↓	↓	↓	↓	2 Amber	HNO_3												X	X				
↓	↓	↓	↓	1 Poly	None														X			
—	—	—	MeOH Blank	2 vials		6										X	X		X			

Date:	Time:	Relinquished by:	Received by:	Date	Time	Remarks:
8/17/11	1400	Kelly Robinson	TO UPS			See Attached for Metals List.
Date:	Time:	Relinquished by:	Received by:	Date	Time	Trip Blank 8/18
				8/18/11	1000	

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Chain-of-Custody Record

192

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield, NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@wnr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Group 6 RCRA Inv.
Project #:
Project Manager: Kelly Robinson
Sampler: Kelly & Tracy
On Ice: ☒ Yes ☐ No
Sample Temperature: 2.5

HALL ENVIRONMENTAL ANALYSIS LABORATORY
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4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Cooler #6

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1204150	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA), TPH-GRO	8270 (Semi-VOA)	TPH (DRO, ~~GRO~~, ORO)	Metals (See Attached)			Air Bubbles (Y or N)
8/17/11	1045	Soil	AOC 20-8(0-0.5')	3 Jars	None	-1										X	X	X	X			
				2 encore	↓	-1										X						
				2 vials	MeOH	-1										X						
	1120	Soil	AOC 20-9(0-0.5')	3 Jars	None	-2										X	X	X	X			
				2 encore	↓	-2										X						
				2 vials	MeOH	-2										X						
	1140	Soil	AOC 20-10(0-0.5')	3 Jars	None	-3										X	X	X	X			
				2 encore	↓	-3										X						
				2 vials	MeOH	-3										X						
	1200	Soil	AOC 20-11(0-0.5')	3 Jars	None	-4										X	X	X	X			
				2 encore	↓	-4										X						
				2 vials	MeOH	-4										X						

Date: 8/17/11 Time: 1400 Relinquished by: Kelly Robinson
Received by: TO UPS Date Time
Date: Time: Relinquished by:
Received by: Date 8/18/11 Time 1000

Remarks: See Attached for Metals List

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

(16)

Chain-of-Custody Record

2 of 2

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield, NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@WNR.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: Group 6 RCRA IW
Project #:
Project Manager: Kelly Robinson
Sampler: Kelly & TRACY
On Ice: ☒ Yes ☐ No
Sample Temperature: 2.0 °C

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4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	TPH-GRO	TPH-DRO NRO	Metals			Air Bubbles (Y or N)
8/17/11	1220	Soil	AOC 20-12(0-0.5)	3 Jar	None	-5										X	X	X	X				
				2 ea Jar		-5										X							
				2 Vials		-5										X							
8/17/11	1235	Water	EB-AOC 20	4 Vials	HCl	-6										X							
				1 Poly	HNO_3	-6														X			
				2 Amber	None	-6											X	X	X				
—	—	—	MeOH Blank	—	—	-7										X							
—	—	—	Trip Blank	—	—	-8										X							

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/17/11	1400	Kelly Robinson	To UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
				8/18/11	10:00

Remarks: See attached for metals list.

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

METALS ANALYSES

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.3/335.2 mod.
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Chain-of-Custody Record

1322

Client: Western Refining
Bloomfield Refinery

Mailing Address: 50 Road 4990
Bloomfield, NM 87413

Phone #: 505-632-4166

email or Fax#: Kelly.Robinson@conr.com

QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☒ EDD (Type) Excel

Turn-Around Time:
☒ Standard ☐ Rush

Project Name:
Group 6 RCRA Inv.

Project #:
—

Project Manager:
Kelly Robinson

Sampler: Kelly + Tracy

On Ice: ☒ Yes ☐ No

Sample Temperature: 2.3

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4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Cooler #5

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1107-98	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (VOA), TPH-GRO	8270 (Semi-VOA)	TPH-DRO, GRO, MRO	Metals (see attached)			Air Bubbles (Y or N)
8/17/11	840	Soil	AOC 20-3 (0-0.5')	3 Jars	None	-1										X	X	X	X			
	↓		↓	2 ounce	↓	-1										X						
	↓		↓	2 vials	MeOH	-1										X						
	840		AOC 20-3 (0-0.5') Dup	3 Jars	None	-2										X	X	X	X			
	↓		↓	2 ounce	↓	-2										X						
	↓		↓	2 vials	MeOH	-2										X						
	0900		AOC 20-4 (0-0.5')	3 Jars	None	-3										X	X	X	X			
	↓		↓	2 ounce	↓	-3										X						
	↓		↓	2 vials	MeOH	-3										X						
	945		AOC 20-5 (0-0.5')	3 Jars	None	-4										X	X	X	X			
	↓		↓	2 ounce	↓	-4										X						
↓	↓	↓	↓	2 vials	MeOH	-4										X						

Date: 8/17/11 Time: 1400 Relinquished by: Kelly Robinson
Received by: TO UPS Date Time

Date: Time: Relinquished by:
Received by: Date: 8/18/11 Time: 10:00

Remarks: See attached for metals list

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical re

2 of 2

Chain-of-Custody Record

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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Tel. 505-345-3975 Fax 505-345-4107

Cooler #5

Client:	Western Refining Bloomfield Refinery
Mailing Address:	50 Road 4990 Bloomfield, NM 87413
Phone #:	505-632-4166
email or Fax#:	Kelly.Robinson@wnr.com
QA/QC Package:	☐ Standard ☒ Level 4 (Full Validation)
Accreditation	☐ NELAP ☐ Other
☒ EDD (Type)	Excel
Turn-Around Time:	☒ Standard ☐ Rush
Project Name:	Group 6 RCRA Inv.
Project #:	—
Project Manager:	Kelly Robinson
Sampler:	Kelly & Tracy
On Ice:	☒ Yes ☐ No
Sample Temperature:	4°

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1108714	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (VOA) TPH - GRO	8270 (Semi-VOA)	TPH - DRO MRO	Metals (See attached)			Air Bubbles (Y or N)
8/17/11	1005	Soil	AOC 20-6 (0-0.5')	3 Jars	None	-5-10										X	X	X	X			
↓	↓	↓	↓	2 ounces	↓	-5-10										X						
↓	↓	↓	↓	2 vials	MeOH	-5-10										X						
8/17/11	1025	Soil	AOC 20-7 (0-0.5')	3 Jars	None	-6-11										X	X	X	X			
↓	↓	↓	↓	2 ounces	↓	-6-11										X						
↓	↓	↓	↓	2 vials	MeOH	-6-11										X						
—	—	—	MeOH Blank			-7-12										X						

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/17/11	1400	Kelly Robinson	TO UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
				8/18/11	10:00

Remarks: See Attached for metals list.

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

(14)

METALS ANALYSES

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.3/335.2 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Chain-of-Custody Record

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield, NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@wnr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) Excel

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: GROUP 6 RCRA Investigation
Project #:
Project Manager: Kelly Robinson
Sampler: Kelly ; Tracy
On Ice: ☒ Yes ☐ No
Sample Temperature: 1.0

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Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (VOA), TPH-GRO	8270 (Semi-VOA)	TPH-MRO, DRO	Metals (See attached)			Air Bubbles (Y or N)
8/17/11	1435	Soil	AOC 21-1 (0-0.5')	3 Jars	None	1										X	X	X	X			
				2 encore	↓											X						
				2 vials	MeOH											X						
8/17/11	1445	Soil	AOC 21-1 (1.5-2.0')	3 Jars	None	2										X	X	X	X			
				2 encores	↓											X						
				2 vials	MeOH											X						
	1455	Soil	AOC 21-1 (2.0-2.5')	3 Jars	None	3										X	X	X	X			
				2 encore	↓											X						
				2 vials	MeOH											X						
	1520	Soil	AOC 21-5 (0-0.5')	3 Jars	None	4										X	X	X	X			
				2 encores	↓											X						
				2 vials	MeOH											X						

Date: 8/18/11 Time: 1400 Relinquished by: Kelly Robinson
Received by: TO UPS Date Time
Date: Time: Relinquished by:
Received by: Mickey Ga: Date 8/19/11 Time 9:30

Remarks: See attached for metals list.

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

(1A)

Chain-of-Custody Record

Client: Western Refining
Bloomfield Refinery
Mailing Address: 50 Road 4990
Bloomfield, NM 87413
Phone #: 505-632-4166
email or Fax#: Kelly.Robinson@wnr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type) EXCEL

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: GROUP 6 RCRA Investigation
Project #:
Project Manager: Kelly Robinson
Sampler: Kelly & Tracy
On Ice: [illegible]
Sample Temperature: [illegible]

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4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F,Cl,NO3,NO2,PO4,SO4)	8081 Pesticides / 8082 PCB's	8260B (~~VOA~~), TPH-GRO	8270 (Semi-VOA)	TPH-M&O, DRO	Metals (See Attached)			Air Bubbles (Y or N)
8/17/11	~~1540~~ [illegible]	Soil	AOC 21-5(1.5-2.0')	3 Jars	None	5										X	X	X	X			
	↓	↓	↓	2 encore	↓											X						
	↓	↓	↓	2 vials	MeOH	[illegible]										X						
	1600	Soil	AOC 21-5(2.0-2.5')	3 Jars	None	6										X	X	X	X			
	↓	↓	↓	2 encore	↓											X						
↓	↓	↓	↓ 2 dup	2 vials	MeOH											X						
8/17/11	1615	Water	EB - AOC 21-5 [illegible]	4 VOAs	HCl	7										X						
↓	↓	↓	↓	1 Poly	HNO_3														X			
↓	↓	↓	↓	2 Amber	None												X	X				
—	—	—	MeOH Blank	2 vials	MeOH	8										X						

Remarks: See attached for metals list

Date	Time	Relinquished by:	Received by:	Date	Time
8/18/11	1400	Kelly Robinson	To UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
			Michelle Gp	8/19/11	9:30

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical rep

1.0 DATA VALIDATION INTRODUCTION

This summary presents data verification results for soil samples collected from soil borings installed at the Bloomfield Refinery in accordance with the approved Investigation Work Plan - Group 6. The data review was performed in accordance with the procedures specified in the Order issued by NMED (NMED, 2007), USEPA Functional Guidelines for Organic and Inorganic Data Review, and quality assurance and control parameters set by the project laboratory Hall Environmental Analysis Laboratory, Inc.

A total of 45 soil samples were collected in August 2011 in accordance with the Group 6 Investigation Work Plan. Soil samples were submitted to Hall Environmental Analysis Laboratory for the following parameters in accordance with the approved Work Plan:

- volatile organic compounds (VOCs) by USEPA Method 8260B;
- semi-volatile organic compounds (SVOCs) by USEPA Method 8270;
- Gasoline, diesel, and motor oil range organics by SW-846 Method 8015B;
- Total recoverable metals (Antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, nickel, selenium, silver, vanadium, and zinc) by SW846 Method 6010B;
- Cyanide by EPA Method 335.4; and
- Mercury by EPA Method 7471.

Additionally, 15 quality assurance samples consisting of trip blanks, field blanks, equipment rinsate blanks, and field duplicates were collected and analyzed as part of the investigation activities. Table A-1 presents a summary of the sample identifications, laboratory sample identifications, and requested analytical parameters.

2.0 QUALITY CONTROL PARAMETERS REVIEWED

Sample results were subject to a Level II data review that includes an evaluation of the following quality control (QC) parameters:

- Chain-of-Custody;
- Sample Preservation and Temperature Upon Laboratory Receipt
- Holding Times;
- Blank Contamination (method blanks, trip blanks, field blanks, and equipment rinsate blanks);
- Surrogate Recovery (for organic parameters);
- Laboratory Control Sample (LCS) Recovery and Relative Percent Difference (RPD);
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and RPD;
- Duplicates (field duplicate, laboratory duplicate); and
- Other Applicable QC Parameters.

The data qualifiers used to qualify the analytical results associated with QC parameters outside of the established data quality objectives are defined below:

J+ The analyte was positively identified; however, the result should be considered an estimated value with a potential high bias.

J- The analyte was positively identified; however, the result should be considered an estimated value with a potential low bias.

UJ The reporting limit is considered an estimated value.

R Quality control indicates that the data is not usable.

Results qualified as "J+", "J-", or "UJ" are of acceptable data quality and may be used quantitatively to fulfill the objectives of the analytical program, per EPA guidelines.

Results for the performance monitoring events that required qualification based on the data verification are summarized in Table A-2.

2.1 CHAIN-OF-CUSTODY

The chain-of-custody documentation associated with project samples was found to be complete. Chain-of-custodies included sample identifications, date and time of collection, requested parameters, and relinquished/received signatures.

2.2 SAMPLE PRESERVATION AND TEMPERATURE UPON LABORATORY RECEIPT

Samples collected were received preserved and intact by Hall Environmental Laboratories, Inc. Samples were received by the laboratory at a temperature of 6.0 degrees Celsius or lower. Data qualification on lower temperature samples was not required.

2.3 HOLDING TIMES

All samples were extracted and analyzed within method-specified holding time limits.

2.4 BLANK CONTAMINATION

2.4.1 Method Blank

Method blanks were analyzed at the appropriate frequency. Target compounds were not detected in the method blanks, with the exception of the following:

- 2-Butanone was detected in method blank for analytical batch 28144. Associated field sample results were non-detect; therefore data qualification was not needed.

2.4.2 Trip Blank

Trip blanks were analyzed at the appropriate frequency as specified in the Order. Target compounds were not detected in the trip blanks.

2.4.3 Field Blanks/Equipment Rinsate Blank

Field and equipment rinsate blanks were collected at the appropriate frequency as specified in the Group 6 Investigation Work Plan. Target compounds were not detected in the field blanks and equipment rinsate blank, with the exception of the following:

- Bromodichlormethane was detected in equipment blank EB-AOC19, EB-AOC20, amd EB-AOC21 at 2.3 ug/L, 2.6 ug/L, and 1.9 ug/L, respectively. Associated field samples were non-detect; therefore data qualification was not needed.
- Dibromochloromethane was detected in equipment blank EB-AOC19, EB-AOC20, and EB-AOC21 at 2.5 ug/L, 3.7 ug/L, and 2.7 ug/L, respectively. Associated field samples were non-detect; therefore data qualification was not needed.
- 2-Butanone was detected in equipment blank EB-AOC19 at 24 ug/L. Associated field sample AOC 19-23 (0-0.5') was qualified "J+" due to a potential high bias.
- Acetone was detected in equipment blank EB-AOC19 at 35 ug/L. Associated field sample AOC 19-23 (0-0.5') was qualified "J+" due to a potential high bias.

2.4.4 Common Laboratory Contaminants

Per USEPA guidelines, common laboratory contaminants for VOC analysis are acetone, 2-butanone (MEK), cyclohexane, chloromethane, and methylene chloride. Common laboratory contaminants for SVOC analysis include phthalates. Concentrations were not detected in method blanks, and therefore no field data was qualified due to common laboratory impacts.

2.4.5 Methanol Blanks

Methanol Blanks provided by the laboratory were analyzed for VOCs.

2.5 SURROGATE RECOVERY

Surrogate recoveries for the organic and inorganic analyses were performed at the required frequency and were within laboratory acceptance limits, with the following exceptions:

- Surrogate recoveries for Di-n-octylphthalate (DNOP) and bromofluorobenzene (BFB) were below the lower acceptance limit for several field soil samples. Low surrogate recovery was due to required sample dilution for analytical analysis and/or matrix interference; therefore data qualification was not required.
- Surrogate recovery for 4-Bromofluorobenzene (18.4%) was below the lower acceptance limit of 70.0% for sample AOC 19-1 (0-0.5'). Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for 1,2-Dichloroethane-d4 was below the lower acceptance limit of 70% for several samples. Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for 4-Terphenyl-d14 (117%) was above the upper acceptance limit of 108% for Sample AOC 19-23 (0-0.5'). Data qualification was not required because the remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for 4-Bromofluorobenzene (66.5%) was below the lower acceptance limit of 70.0% for sample AOC 20-3 (0-0.5'). Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for 4-Bromofluorobenzene (60.8%) was below the lower acceptance limit of 70.0% for sample AOC 20-3 (0-0.5') DUP. Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for DNOP (137%) was above the upper acceptance limit of 73.4% for AOC 21-5 (0-0.5'). The associated field sample result for DRO was qualified "J+" for a potential high bias.

2.6 LCS RECOVERY AND RELATIVE PERCENT DIFFERENCE

LCS/LCS duplicates were performed at the required frequency and were evaluated based on the following criteria:

- If the analyte recovery was above acceptance limits for the LCS or LCS duplicate, but the analyte was not detected in the associated batch, then data qualification was not required.
- If the analyte recovery was above acceptance limits for the LCS or LCS duplicate and the analyte was detected in the associated batch, then the analyte results were qualified "J+" to account for a potential high bias.
- If the analyte recovery was below acceptance limits for LCS or LCS duplicate then the analyte results in the associated analytical batch were qualified ("UJ" for non-detects and "J-" for detected results) to acount for a potential low bias.

LCS/LCSD percent recoveries and relative percent differences (RPDs) were within acceptance limits; therefore no data qualification due to LCS/LCSD was required.

2.7 MS/MSD RECOVERY AND RELATIVE PERCENT DIFFERENCE

MS/MSD samples were performed at the required frequency and were evaluated by the following criteria:

- If the MS or MSD recovery for an analyte was above acceptance limits but the analyte was not detected in the associated analytical batch, then data qualification was not required.
- If the MS or MSD recovery for an analyte was above acceptance limits and the analyte was detected in the associated analytical batch, then analyte results were qualified "J+" to account for a potential high bias.
- Low MS/MSD recoveries for inorganic parameters result in sample qualification of the associated analytical batch.
- Results were not qualified based on non-project specific MS/MSD (i.e., batch QC) recoveries.

MS/MSD percent recoveries and RPDs were within acceptance limits except for the following:

- The MS/MSD percent recoveries for Antimony (38.4% / 37.8%) were below the lower acceptance limit of 75% for analytical batch 28094. Associated field sample results for Antimony were non-detect. Data qualification "UJ" was required to indicate a potential bias for the associated samples.

- The MS/MS duplicate percent recoveries for Antimony (55.4%/ 50.1%) were below the lower acceptance limit of 75% for analytical batch 28123. The following associated field samples were qualified "UJ" to indicate a potential low bias:

  - AOC 19-3 (0-0.5')
  - AOC 19-1 (0-0.5')
  - AOC 19-2 (0-0.5')
  - AOC 19-4 (0-0.5')
  - AOC 19-5 (0-0.5')
  - AOC 19-6 (0-0.5')
  - AOC 19-19 (0-0.5')
  - AOC 19-17 (0-0.5')
  - AOC 19-17 (0-0.5') DUP
  - AOC 19-23 (0-0.5')
  - AOC 19-21 (0-0.5')
  - AOC 19-22 (0-0.5')
  - AOC 19-20 (0-0.5')

- The MS/MS duplicate percent recoveries for Selenium (56.9% / 61.3%) were below the lower acceptance limit of 75% for analytical batch 28123. The following associated field samples were qualified "UJ" to indicate a potential low bias:

  - AOC 19-19 (0-0.5')
  - AOC 19-21 (0-0.5')
  - AOC 19-22 (0-0.5')
  - AOC 19-20 (0-0.5')
  - AOC 19-17 (0-0.5')
  - AOC 19-17 (0-0.5') DUP
  - AOC 19-23 (0-0.5')

2.8 DUPLICATES

2.8.1 Field Duplicates

Field duplicates were collected at a rate of 10 percent and submitted for analysis. The RPDs between the field duplicate and its associated sample were calculated and are presented in Table A-3. The field duplicates were evaluated by the following criteria:

- If an analyte was detected at a concentration greater than five times the method reporting limit, the RPD should be less than 35 percent for soil and 25 percent for ground water samples.
- If an analyte was detected at a concentration that is less than five times the method reporting limit, then the difference between the sample and the field duplicate should not exceed the method reporting limit.
- Duplicate RPDs are calculated by dividing the difference of the concentrations by the average of the concentrations.

Field duplicate RPDs were within acceptance limits except for the following:

- Barium for field sample AOC 21-1 (0-0.5');
- Zinc for field sample AOC 19-17;
- Diesel Range Organics (DRO), Motor Oil Range Organics (MRO), carbon disulfide, and beryllium for field sample AOC 20-3 (0-0.5').

3.0 COMPLETENESS SUMMARY

Two types of completeness were calculated for this project: contract and technical. The following equations were used to calculate the two types of completeness:

$$\% \text{ Contract Completeness} = \left(\frac{\text{Number of contract compliant results}}{\text{Number of reported results}}\right) \times 100$$

$$\% \text{ Technical Completeness} = \left(\frac{\text{Number of usable results}}{\text{Number of reported results}}\right) \times 100$$

The overall contract completeness, which includes the evaluation of protocol and contract deviations, which includes the evaluation of the QC parameters listed in Section 2.0, was approximately 95 percent for soil analysis. The technical completeness attained for Group 6 RCRA Investigation activities was 100 percent. The completeness results are provided in Table A-4. The analytical results for the required analytes per the approved Group 6 Work Plan were considered usable for the intended purposes and the project DQOs have been met.

TABLE A-1
Sampling and Analysis Schedule

Table A-1
Sampling and Analysis Schedule
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Sample ID	Lab ID	Date Collected	Sample Type
AOC 19-3 (0-0.5')	1108623-01	8/15/2011	N
AOC 19-1 (0-0.5')	1108623-02	8/15/2011	N
AOC 19-2 (0-0.5')	1108623-03	8/15/2011	N
AOC 19-4 (0-0.5')	1108623-04	8/15/2011	N
AOC 19-5 (0-0.5')	1108623-05	8/15/2011	N
AOC 19-6 (0-0.5')	1108623-06	8/15/2011	N
MeOH Blank	1108623-07	8/15/2011	MB
AOC 21-2 (0-0.5')	1108624-01	8/15/2011	N
AOC 21-2 (0-0.5') DUP	1108624-02	8/15/2011	FD
AOC 21-3 (0-0.5')	1108624-03	8/15/2011	N
AOC 21-4 (0-0.5')	1108624-04	8/15/2011	N
AOC 19-8 (0-0.5')	1108694-01	8/15/2011	N
AOC 19-10 (0-0.5')	1108694-02	8/15/2011	N
AOC 19-11 (0-0.5')	1108694-03	8/15/2011	N
AOC 19-12 (0-0.5')	1108694-04	8/15/2011	N
AOC 19-13 (0-0.5')	1108694-05	8/15/2011	N
AOC 19-14 (0-0.5')	1108694-06	8/16/2011	N
AOC 19-15 (0-0.5')	1108694-07	8/16/2011	N
AOC 19-16 (0-0.5')	1108694-08	8/16/2011	N
MeOH Blank	1108694-09	8/16/2011	MB
AOC 19-17 (0-0.5')	1108698-01	8/16/2011	N
AOC 19-17 (0-0.5') DUP	1108698-02	8/16/2011	FD
AOC 19-23 (0-0.5')	1108698-03	8/16/2011	N
AOC 19-21 (0-0.5')	1108698-04	8/16/2011	N
AOC 19-22 (0-0.5')	1108698-05	8/16/2011	N
AOC 19-20 (0-0.5')	1108698-06	8/16/2011	N
AOC 19-19 (0-0.5')	1108698-07	8/16/2011	N
Methanol Blank	1108698-08	8/16/2011	MB
AOC 20-1 (0-0.5')	1108747-01	8/17/2011	N
AOC 20-2 (0-0.5')	1108747-02	8/172011	N
AOC 19-7 (0-0.5')	1108748-01	8/16/2011	N
AOC 19-7 (1.5-2.0)	1108748-02	8/16/2011	N
AOC 19-9 (0-0.5)	1108748-03	8/16/2011	N
AOC 19-18 (0-0.5)	1108748-04	8/16/2011	N
EB-AOC 19	1108748-05	8/16/2011	EB
MEOH BLANK	1108748-06	8/16/2011	MB
TRIP BLANK	1108748-07	8/16/2011	TB
AOC 20-8 (0-0.5')	1108750-01	8/17/2011	N
AOC 20-9 (0-0.5')	1108750-02	8/17/2011	N
AOC 20-10 (0-0.5')	1108750-03	8/17/2011	N
AOC 20-11 (0-0.5')	1108750-04	8/17/2011	N
AOC 20-12 (0-0.5')	1108750-05	8/17/2011	N
EB-AOC 20	1108750-06	8/17/2011	EB
Methanol Blank	1108750-07	8/17/2011	MB
Trip Blank	1108750-08	8/17/2011	TB
AOC 20-3 (0-0.5')	1108790-01	8/17/2011	N
AOC 20-3 (0-0.5') DUP	1108790-02B	8/17/2011	FD
AOC 20-4 (0-0.5')	1108790-03	8/17/2011	N
AOC 20-5 (0-0.5')	1108790-04	8/17/2011	N
AOC 20-6 (0-0.5')	1108790-05	8/17/2011	N
AOC 20-7 (0-0.5')	1108790-06	8/17/2011	N
Methanol Blank	1108790-07	8/17/2011	MB
AOC 21-1-(0.5')	1108822-01	8/17/2011	N
AOC 21-1 (1.5-2.0')	1108822-02	8/17/2011	N
AOC 21-1 (2.0-2.5')	1108822-03	8/17/2011	N
AOC 21-5 (0-0.5')	1108822-04	8/17/2011	N
AOC 21-5 (1.5-2.0')	1108822-05	8/17/2011	N
AOC 21-5 (2.0-2.5')	1108822-06	8/17/2011	N
EB-AOC21	1108822-07	8/17/2011	EB
MEOH BLANK	1108822-08	8/17/2011	MB

Notes:

VOCs = Volatile Organic Compounds
N = Normal field sample
FD = Field duplicate
TB = Trip Blank
EB = Equipment Blank
MB = Methanol Blank

TABLE A-2
Qualified Data

Table A-2
Qualified Data
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Sample ID	Date Collected	Analyte	Result	Units	Matrix	Qualifier	Comments
AOC 19-2 (0-0.5')	8/15/2011	Antimony	< 12	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-4 (0-0.5')	8/15/2011	Antimony	< 13	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-6 (0-0.5')	8/15/2011	Antimony	< 13	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-1 (0-0.5')	8/15/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-3 (0-0.5')	8/15/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-5 (0-0.5')	8/15/2011	Antimony	< 5.0	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-3 (0-0.5')	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-1 (0-0.5')	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-2 (0-0.5')	8/16/2011	Antimony	< 12	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-4 (0-0.5')	8/16/2011	Antimony	< 13	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-5 (0-0.5')	8/16/2011	Antimony	< 5.0	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-6 (0-0.5')	8/16/2011	Antimony	< 13	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-17 (0-0.5')	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-17 (0-0.5')	8/16/2011	Selenium	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-17 (0-0.5') DUP	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-17 (0-0.5') DUP	8/16/2011	Selenium	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-23 (0-0.5')	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-23 (0-0.5')	8/16/2011	Selenium	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-21 (0-0.5')	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-21 (0-0.5')	8/16/2011	Selenium	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-22 (0-0.5')	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-22 (0-0.5')	8/16/2011	Selenium	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-20 (0-0.5')	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-20 (0-0.5')	8/16/2011	Selenium	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-19 (0-0.5')	8/16/2011	Antimony	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-19 (0-0.5')	8/16/2011	Selenium	< 2.5	mg/Kg	Soil	UJ	Qaulified due to low MS/ MSD recovery
AOC 19-23 (0-0.5')	8/16/2011	2-Butanone	43.8	ug/kg-dry	Soil	J+	Qualified due to equipment blank detections
AOC 19-23 (0-0.5')	8/16/2011	Acetone	134	ug/kg-dry	Soil	J+	Qualified due to equipment blank detections
AOC 21-5 (0-0.5')	8/17/2011	Diesel Range Organcs (DRO)	57	mg/kg	Soil	J+	Qualified due to high surrogate recovery

ug/kg - microgram per kilogram
mg/kg - milligrams per kilogram
UJ - Estimated reporting limit
J+ = high bias

MS/MSD - Matrix spike/matrix spike duplicate

TABLE A-3
Field Duplicate Summary

Table A-3
Field Duplicate Summary
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Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	AOC 21-2 (0-0.5') Sample Result	AOC 21-2 (0-0.5') DUP Field Duplicate	RPD (%)
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	710	860	19.1
	Motor Oil Range Organics (MRO)	< 510	< 500	NC
	Gasoline Range Organics (GRO)	< 5.0	< 5.0	NC
VOCs (ug/kg-dry)	1,1,1,2-Tetrachloroethane	< 1.00	< 1.00	NC
	1,1,1-Trichloroethane	< 1.00	< 1.00	NC
	1,1,2,2-Tetrachloroethane	< 1.00	< 1.00	NC
	1,1,2-Trichloroethane	< 1.00	< 1.00	NC
	1,1-Dichloroethane	< 1.00	< 1.00	NC
	1,1-Dichloroethene	< 1.00	< 1.00	NC
	1,1-Dichloropropene	< 1.00	< 1.00	NC
	1,2,3-Trichlorobenzene	< 1.00	< 1.00	NC
	1,2,3-Trichloropropane	< 1.00	< 1.00	NC
	1,2,4-Trichlorobenzene	< 1.00	< 1.00	NC
	1,2,4-Trimethylbenzene	< 1.00	< 1.00	NC
	1,2-Dibromo-3-chloropropane	< 1.00	< 1.00	NC
	1,2-Dibromoethane (EDB)	< 1.00	< 1.00	NC
	1,2-Dichlorobenzene	< 1.00	< 1.00	NC
	1,2-Dichloroethane (EDC)	< 3.00	< 3.00	NC
	1,2-Dichloropropane	< 1.00	< 1.00	NC
	1,3,5-Trimethylbenzene	< 1.00	< 1.00	NC
	1,3-Dichlorobenzene	< 1.00	< 1.00	NC
	1,3-Dichloropropane	< 1.00	< 1.00	NC
	1,4-Dichlorobenzene	< 1.00	< 1.00	NC
	2,2-Dichloropropane	< 1.00	< 1.00	NC
	2-Butanone	< 1.00	< 1.00	NC
	2-Chlorotoluene	< 1.00	< 1.00	NC
	2-Hexanone	< 1.00	< 1.00	NC
	4-Chlorotoluene	< 1.00	< 1.00	NC
	4-Isopropyltoluene	< 1.00	< 1.00	NC
	4-Methyl-2-pentanone	< 1.00	< 1.00	NC
	Acetone	< 2.00	< 2.00	NC
	Benzene	< 1.00	< 1.00	NC
	Bromobenzene	< 1.00	< 1.00	NC
	Bromodichloromethane	< 1.00	< 1.00	NC
	Bromoform	< 1.00	< 1.00	NC
	Bromomethane	< 1.00	< 1.00	NC
	Carbon disulfide	< 1.00	< 1.00	NC
	Carbon tetrachloride	< 1.00	< 1.00	NC
	Chlorobenzene	< 1.00	< 1.00	NC
	Chloroethane	< 1.00	< 1.00	NC
	Chloroform	< 1.00	< 1.00	NC
	Chloromethane	< 1.00	< 1.00	NC
	cis-1,2-DCE	< 1.00	< 1.00	NC
	cis-1,3-Dichloropropene	< 1.00	< 1.00	NC
	Dibromochloromethane	< 1.00	< 1.00	NC
	Dibromomethane	< 1.00	< 1.00	NC
	Dichlorodifluoromethane	< 1.00	< 1.00	NC
	Ethylbenzene	< 1.00	< 1.00	NC
	Hexachlorobutadiene	< 1.00	< 1.00	NC
	Isopropylbenzene	< 1.00	< 1.00	NC
	Methyl tert-butyl ether (MTBE)	< 1.00	< 1.00	NC
	Methylene chloride	< 1.00	< 1.00	NC
	Naphthalene	< 1.00	< 1.00	NC
	n-Butylbenzene	< 1.00	< 1.00	NC
	n-Propylbenzene	< 1.00	< 1.00	NC
	sec-Butylbenzene	< 1.00	< 1.00	NC
	Styrene	< 1.00	< 1.00	NC
	tert-Butylbenzene	< 1.00	< 1.00	NC
	Tetrachloroethene (PCE)	< 1.00	< 1.00	NC
	Toluene	19.3	25.6	28.1
	trans-1,2-DCE	< 1.00	< 1.00	NC
	trans-1,3-Dichloropropene	< 1.00	< 1.00	NC
	Trichloroethene (TCE)	< 1.00	< 1.00	NC
	Trichlorofluoromethane	< 1.00	< 1.00	NC
	Vinyl chloride	< 1.00	< 1.00	NC
	Xylenes, Total	< 1.00	< 1.00	NC

Table A-3
Field Duplicate Summary
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	Parameter	AOC 21-2 (0-0.5') Sample Result	AOC 21-2 (0-0,5') DUP Field Duplicate	RPD (%)
SVOCs (mg/kg-dry):	1,2,4-Trichlorobenzene	< 0.20	< 0.20	NC
	1,2-Dichlorobenzene	< 0.20	< 0.20	NC
	1,3-Dichlorobenzene	< 0.20	< 0.20	NC
	1,4-Dichlorobenzene	< 0.20	< 0.20	NC
	1-Methylnaphthalene	< 0.20	< 0.20	NC
	2,4,5-Trichlorophenol	< 0.20	< 0.20	NC
	2,4,6-Trichlorophenol	< 0.20	< 0.20	NC
	2,4-Dichlorophenol	< 0.40	< 0.40	NC
	2,4-Dimethylphenol	< 0.30	< 0.30	NC
	2,4-Dinitrophenol	< 0.40	< 0.40	NC
	2,4-Dinitrotoluene	< 0.50	< 0.50	NC
	2,6-Dinitrotoluene	< 0.50	< 0.50	NC
	2-Chloronaphthalene	< 0.25	< 0.25	NC
	2-Chlorophenol	< 0.20	< 0.20	NC
	2-Methylnaphthalene	< 0.20	< 0.20	NC
	2-Methylphenol	< 0.50	< 0.50	NC
	2-Nitroaniline	< 0.20	< 0.20	NC
	2-Nitrophenol	< 0.20	< 0.20	NC
	3,3'-Dichlorobenzidine	< 0.25	< 0.25	NC
	3+4-Methylphenol	< 0.20	< 0.20	NC
	3-Nitroaniline	< 0.20	< 0.20	NC
	4,6-Dinitro-2-methylphenol	< 0.50	< 0.50	NC
	4-Bromophenyl phenyl ether	< 0.20	< 0.20	NC
	4-Chloro-3-methylphenol	< 0.50	< 0.50	NC
	4-Chloroaniline	< 0.50	< 0.50	NC
	4-Chlorophenyl phenyl ether	< 0.20	< 0.20	NC
	4-Nitroaniline	< 0.40	< 0.40	NC
	4-Nitrophenol	< 0.25	< 0.25	NC
	Acenaphthene	< 0.20	< 0.20	NC
	Acenaphthylene	< 0.20	< 0.20	NC
	Aniline	< 0.20	< 0.20	NC
	Anthracene	< 0.20	< 0.20	NC
	Azobenzene	< 0.20	< 0.20	NC
	Benz(a)anthracene	< 0.20	< 0.20	NC
	Benzo(a)pyrene	< 0.20	< 0.20	NC
	Benzo(b)fluoranthene	< 0.20	< 0.20	NC
	Benzo(g,h,i)perylene	< 0.20	< 0.20	NC
	Benzo(k)fluoranthene	< 0.20	< 0.20	NC
	Benzoic acid	< 0.50	< 0.50	NC
	Benzyl alcohol	< 0.20	< 0.20	NC
	Bis(2-chloroethoxy)methane	< 0.20	< 0.20	NC
	Bis(2-chloroethyl)ether	< 0.20	< 0.20	NC
	Bis(2-chloroisopropyl)ether	< 0.20	< 0.20	NC
	Bis(2-ethylhexyl)phthalate	< 0.50	< 0.50	NC
	Butyl benzyl phthalate	< 0.20	< 0.20	NC
	Carbazole	< 0.20	< 0.20	NC
	Chrysene	< 0.20	< 0.20	NC
	Dibenz(a,h)anthracene	< 0.20	< 0.20	NC
	Dibenzofuran	< 0.20	< 0.20	NC
	Diethyl phthalate	< 0.20	< 0.20	NC
	Dimethyl phthalate	< 0.20	< 0.20	NC
	Di-n-butyl phthalate	< 0.50	< 0.50	NC
	Di-n-octyl phthalate	< 0.25	< 0.25	NC
	Fluoranthene	< 0.20	< 0.20	NC
	Fluorene	< 0.20	< 0.20	NC
	Hexachlorobenzene	< 0.20	< 0.20	NC
	Hexachlorobutadiene	< 0.20	< 0.20	NC
	Hexachlorocyclopentadiene	< 0.20	< 0.20	NC
	Hexachloroethane	< 0.20	< 0.20	NC
	Indeno(1,2,3-cd)pyrene	< 0.20	< 0.20	NC
	Isophorone	< 0.50	< 0.50	NC
	Naphthalene	< 0.20	< 0.20	NC
	Nitrobenzene	< 0.50	< 0.50	NC
	N-Nitrosodi-n-propylamine	< 0.20	< 0.20	NC
	N-Nitrosodiphenylamine	< 0.20	< 0.20	NC
	Pentachlorophenol	< 0.40	< 0.40	NC
	Phenanthrene	< 0.20	< 0.20	NC
	Phenol	< 0.20	< 0.20	NC
	Pyrene	< 0.20	< 0.20	NC
	Pyridine	< 0.50	< 0.50	NC

Table A-3
Field Duplicate Summary
Group 6 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	AOC 21-2 (0-0.5') Sample Result	AOC 21-2 (0-0.5') DUP Field Duplicate	RPD (%)
Metals (mg/kg-dry):	Antimony	< 13	< 12	NC
	Arsenic	< 13	< 12	NC
	Barium	28	45	**46.6**
	Beryllium	2.1	2.1	0.0
	Cadmium	< 0.50	< 0.50	NC
	Chromium	11	11	0
	Cobalt	8.5	7.7	9.9
	Cyanide	< 0.30	< 0.30	NC
	Lead	10	11	9.5
	Mercury	< 0.033	< 0.033	NC
	Nickel	10	10	0.0
	Selenium	< 13	< 12	NC
	Silver	< 1.3	< 1.2	NC
	Vanadium	17	16	6
	Zinc	69	64	7.5

Notes:
RPD = Relative percent difference; [(difference)/(average)]* 100
NC = Not calculated; RPD values were not calculated for non-detects
ug/kg-dry = micrograms per kilogram dry
mg/kg-dry = milligrams per kilogram
* = Field Duplicate RPD Outlier

Table A-3
Field Duplicate Summary
Group 6 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	AOC 19-17 (0-0.5') Sample Result	AOC 19-17 (0-0.5') DUP Field Duplicate	RPD (%)
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	19	21	10.0
	Motor Oil Range Organics (MRO)	56	63	11.8
	Gasoline Range Organics (GRO)	< 5.0	< 5.0	NC
VOCs (ug/kg-dry)	1,1,1,2-Tetrachloroethane	< 1.00	< 1.00	NC
	1,1,1-Trichloroethane	< 1.00	< 1.00	NC
	1,1,2,2-Tetrachloroethane	< 1.00	< 1.00	NC
	1,1,2-Trichloroethane	< 1.00	< 1.00	NC
	1,1-Dichloroethane	< 1.00	< 1.00	NC
	1,1-Dichloroethene	< 1.00	< 1.00	NC
	1,1-Dichloropropene	< 1.00	< 1.00	NC
	1,2,3-Trichlorobenzene	< 1.00	< 1.00	NC
	1,2,3-Trichloropropane	< 1.00	< 1.00	NC
	1,2,4-Trichlorobenzene	< 1.00	< 1.00	NC
	1,2,4-Trimethylbenzene	< 1.00	< 1.00	NC
	1,2-Dibromo-3-chloropropane	< 1.00	< 1.00	NC
	1,2-Dibromoethane (EDB)	< 1.00	< 1.00	NC
	1,2-Dichlorobenzene	< 1.00	< 1.00	NC
	1,2-Dichloroethane (EDC)	< 3.00	< 3.00	NC
	1,2-Dichloropropane	< 1.00	< 1.00	NC
	1,3,5-Trimethylbenzene	< 1.00	< 1.00	NC
	1,3-Dichlorobenzene	< 1.00	< 1.00	NC
	1,3-Dichloropropane	< 1.00	< 1.00	NC
	1,4-Dichlorobenzene	< 1.00	< 1.00	NC
	1-Methylnaphthalene	< 1.00	< 1.00	NC
	2,2-Dichloropropane	< 1.00	< 1.00	NC
	2-Butanone	< 1.00	< 1.00	NC
	2-Chlorotoluene	< 1.00	< 1.00	NC
	2-Hexanone	< 1.00	< 1.00	NC
	2-Methylnaphthalene	< 1.00	< 1.00	NC
	4-Chlorotoluene	< 1.00	< 1.00	NC
	4-Isopropyltoluene	< 1.00	< 1.00	NC
	4-Methyl-2-pentanone	< 1.00	< 1.00	NC
	Acetone	< 2.00	< 2.00	NC
	Benzene	< 1.00	< 1.00	NC
	Bromobenzene	< 1.00	< 1.00	NC
	Bromodichloromethane	< 1.00	< 1.00	NC
	Bromoform	< 1.00	< 1.00	NC
	Bromomethane	< 1.00	< 1.00	NC
	Carbon disulfide	< 1.00	< 1.00	NC
	Carbon tetrachloride	< 1.00	< 1.00	NC
	Chlorobenzene	< 1.00	< 1.00	NC
	Chloroethane	< 1.00	< 1.00	NC
	Chloroform	< 1.00	< 1.00	NC
	Chloromethane	< 1.00	< 1.00	NC
	cis-1,2-DCE	< 1.00	< 1.00	NC
	cis-1,3-Dichloropropene	< 1.00	< 1.00	NC
	Dibromochloromethane	< 1.00	< 1.00	NC
	Dibromomethane	< 1.00	< 1.00	NC
	Dichlorodifluoromethane	< 1.00	< 1.00	NC
	Ethylbenzene	< 1.00	< 1.00	NC
	Hexachlorobutadiene	< 1.00	< 1.00	NC
	Isopropylbenzene	< 1.00	< 1.00	NC
	Methyl tert-butyl ether (MTBE)	< 1.00	< 1.00	NC
	Methylene chloride	< 1.00	< 1.00	NC
	Naphthalene	< 1.00	< 1.00	NC
	n-Butylbenzene	< 1.00	< 1.00	NC
	n-Propylbenzene	< 1.00	< 1.00	NC
	sec-Butylbenzene	< 1.00	< 1.00	NC
	Styrene	< 1.00	< 1.00	NC
	tert-Butylbenzene	< 1.00	< 1.00	NC
	Tetrachloroethene (PCE)	< 1.00	< 1.00	NC
	Toluene	4.42	4.02	9.5
	trans-1,2-DCE	< 1.00	< 1.00	NC
	trans-1,3-Dichloropropene	< 1.00	< 1.00	NC
	Trichloroethene (TCE)	< 1.00	< 1.00	NC
	Trichlorofluoromethane	< 1.00	< 1.00	NC
	Vinyl chloride	< 1.00	< 1.00	NC
	Xylenes, Total	< 1.00	< 1.00	NC

Table A-3
Field Duplicate Summary
Group 6 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	AOC 19-17 (0-0.5') Sample Result	AOC 19-17 (0-0.5') DUP Field Duplicate	RPD (%)
SVOCs (mg/kg-dry):	1,2,4-Trichlorobenzene	< 0.20	< 0.20	NC
	1,2-Dichlorobenzene	< 0.20	< 0.20	NC
	1,3-Dichlorobenzene	< 0.20	< 0.20	NC
	1,4-Dichlorobenzene	< 0.20	< 0.20	NC
	1-Methylnaphthalene	< 0.20	< 0.20	NC
	2,4,5-Trichlorophenol	< 0.20	< 0.20	NC
	2,4,6-Trichlorophenol	< 0.20	< 0.20	NC
	2,4-Dichlorophenol	< 0.40	< 0.40	NC
	2,4-Dimethylphenol	< 0.30	< 0.30	NC
	2,4-Dinitrophenol	< 0.40	< 0.40	NC
	2,4-Dinitrotoluene	< 0.50	< 0.50	NC
	2,6-Dinitrotoluene	< 0.50	< 0.50	NC
	2-Chloronaphthalene	< 0.25	< 0.25	NC
	2-Chlorophenol	< 0.20	< 0.20	NC
	2-Methylnaphthalene	< 0.20	< 0.20	NC
	2-Methylphenol	< 0.50	< 0.50	NC
	2-Nitroaniline	< 0.20	< 0.20	NC
	2-Nitrophenol	< 0.20	< 0.20	NC
	3,3'-Dichlorobenzidine	< 0.25	< 0.25	NC
	3+4-Methylphenol	< 0.20	< 0.20	NC
	3-Nitroaniline	< 0.20	< 0.20	NC
	4,6-Dinitro-2-methylphenol	< 0.50	< 0.50	NC
	4-Bromophenyl phenyl ether	< 0.20	< 0.20	NC
	4-Chloro-3-methylphenol	< 0.50	< 0.50	NC
	4-Chloroaniline	< 0.50	< 0.50	NC
	4-Chlorophenyl phenyl ether	< 0.20	< 0.20	NC
	4-Nitroaniline	< 0.40	< 0.40	NC
	4-Nitrophenol	< 0.25	< 0.25	NC
	Acenaphthene	< 0.20	< 0.20	NC
	Acenaphthylene	< 0.20	< 0.20	NC
	Aniline	< 0.20	< 0.20	NC
	Anthracene	< 0.20	< 0.20	NC
	Azobenzene	< 0.20	< 0.20	NC
	Benz(a)anthracene	< 0.20	< 0.20	NC
	Benzo(a)pyrene	< 0.20	< 0.20	NC
	Benzo(b)fluoranthene	< 0.20	< 0.20	NC
	Benzo(g,h,i)perylene	< 0.20	< 0.20	NC
	Benzo(k)fluoranthene	< 0.20	< 0.20	NC
	Benzoic acid	< 0.50	< 0.50	NC
	Benzyl alcohol	< 0.20	< 0.20	NC
	Bis(2-chloroethoxy)methane	< 0.20	< 0.20	NC
	Bis(2-chloroethyl)ether	< 0.20	< 0.20	NC
	Bis(2-chloroisopropyl)ether	< 0.20	< 0.20	NC
	Bis(2-ethylhexyl)phthalate	< 0.50	< 0.50	NC
	Butyl benzyl phthalate	< 0.20	< 0.20	NC
	Carbazole	< 0.20	< 0.20	NC
	Chrysene	< 0.20	< 0.20	NC
	Dibenz(a,h)anthracene	< 0.20	< 0.20	NC
	Dibenzofuran	< 0.20	< 0.20	NC
	Diethyl phthalate	< 0.20	< 0.20	NC
	Dimethyl phthalate	< 0.20	< 0.20	NC
	Di-n-butyl phthalate	< 0.50	< 0.50	NC
	Di-n-octyl phthalate	< 0.25	< 0.25	NC
	Fluoranthene	< 0.20	< 0.20	NC
	Fluorene	< 0.20	< 0.20	NC
	Hexachlorobenzene	< 0.20	< 0.20	NC
	Hexachlorobutadiene	< 0.20	< 0.20	NC
	Hexachlorocyclopentadiene	< 0.20	< 0.20	NC
	Hexachloroethane	< 0.20	< 0.20	NC
	Indeno(1,2,3-cd)pyrene	< 0.20	< 0.20	NC
	Isophorone	< 0.50	< 0.50	NC
	Naphthalene	< 0.20	< 0.20	NC
	Nitrobenzene	< 0.50	< 0.50	NC
	N-Nitrosodi-n-propylamine	< 0.20	< 0.20	NC
	N-Nitrosodiphenylamine	< 0.20	< 0.20	NC
	Pentachlorophenol	< 0.40	< 0.40	NC
	Phenanthrene	< 0.20	< 0.20	NC
	Phenol	< 0.20	< 0.20	NC
	Pyrene	< 0.20	< 0.20	NC

Table A-3
Field Duplicate Summary
Group 6 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	AOC 19-17 (0-0.5') Sample Result	AOC 19-17 (0-0.5') DUP Field Duplicate	RPD (%)
	Pyridine	< 0.50	< 0.50	NC
Metals (mg/kg-dry):	Antimony	< 2.5	< 2.5	NC
	Arsenic	3.8	< 2.5	NC
	Barium	120	120	0.0
	Beryllium	0.19	0.25	27.3
	Cadmium	< 0.10	< 0.10	NC
	Chromium	33	43	26.3
	Cobalt	1.4	1.8	25.0
	Cyanide	< 0.30	< 0.30	NC
	Lead	3.1	3.6	14.9
	Mercury	< 0.033	< 0.033	NC
	Nickel	1.6	2.1	27.0
	Selenium	< 2.5	< 2.5	NC
	Silver	< 0.25	< 0.25	NC
	Vanadium	7.2	8.8	20.0
	Zinc	43	77	**56.7**

Notes:
RPD = Relative percent difference; [(difference)/(average)]* 100
NC = Not calculated; RPD values were not calculated for non-detects
ug/kg-dry = micrograms per kilogram dry
mg/kg-dry = milligrams per kilogram
* = Field Duplicate RPD Outlier

Table A-3
Field Duplicate Summary
Group 6 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	AOC 20-3 (0-0.5') Sample Result	AOC 20-3 (0-0.5') DUP Field Duplicate	RPD (%)
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	87	150	**53.1**
	Motor Oil Range Organics (MRO)	78	120	**42.2**
	Gasoline Range Organics (GRO)	< 25	< 25	NC
VOCs (ug/kg-dry)	1,1,1,2-Tetrachloroethane	< 1.00	< 1.00	NC
	1,1,1-Trichloroethane	< 1.00	< 1.00	NC
	1,1,2,2-Tetrachloroethane	< 1.00	< 1.00	NC
	1,1,2-Trichloroethane	< 1.00	< 1.00	NC
	1,1-Dichloroethane	< 1.00	< 1.00	NC
	1,1-Dichloroethene	< 1.00	< 1.00	NC
	1,1-Dichloropropene	< 1.00	< 1.00	NC
	1,2,3-Trichlorobenzene	< 1.00	< 1.00	NC
	1,2,3-Trichloropropane	< 1.00	< 1.00	NC
	1,2,4-Trichlorobenzene	< 1.00	< 1.00	NC
	1,2,4-Trimethylbenzene	< 1.00	< 1.00	NC
	1,2-Dibromo-3-chloropropane	< 1.00	< 1.00	NC
	1,2-Dibromoethane (EDB)	< 1.00	< 1.00	NC
	1,2-Dichlorobenzene	< 1.00	< 1.00	NC
	1,2-Dichloroethane (EDC)	< 3.00	< 3.00	NC
	1,2-Dichloropropane	< 1.00	< 1.00	NC
	1,3,5-Trimethylbenzene	< 1.00	< 1.00	NC
	1,3-Dichlorobenzene	< 1.00	< 1.00	NC
	1,3-Dichloropropane	< 1.00	< 1.00	NC
	1,4-Dichlorobenzene	< 1.00	< 1.00	NC
	1-Methylnaphthalene	< 1.00	< 1.00	NC
	2,2-Dichloropropane	< 1.00	< 1.00	NC
	2-Butanone	< 1.00	< 1.00	NC
	2-Chlorotoluene	< 1.00	< 1.00	NC
	2-Hexanone	< 1.00	< 1.00	NC
	2-Methylnaphthalene	< 1.00	< 1.00	NC
	4-Chlorotoluene	< 1.00	< 1.00	NC
	4-Isopropyltoluene	4.77	< 1.00	NC
	4-Methyl-2-pentanone	< 1.00	< 1.00	NC
	Acetone	< 2.00	< 2.00	NC
	Benzene	< 1.00	< 1.00	NC
	Bromobenzene	< 1.00	< 1.00	NC
	Bromodichloromethane	< 1.00	< 1.00	NC
	Bromoform	< 1.00	< 1.00	NC
	Bromomethane	< 1.00	< 1.00	NC
	Carbon disulfide	2.91	4.61	**45.2**
	Carbon tetrachloride	< 1.00	< 1.00	NC
	Chlorobenzene	< 1.00	< 1.00	NC
	Chloroethane	< 1.00	< 1.00	NC
	Chloroform	< 1.00	< 1.00	NC
	Chloromethane	< 1.00	< 1.00	NC
	cis-1,2-DCE	< 1.00	< 1.00	NC
	cis-1,3-Dichloropropene	< 1.00	< 1.00	NC
	Dibromochloromethane	< 1.00	< 1.00	NC
	Dibromomethane	< 1.00	< 1.00	NC
	Dichlorodifluoromethane	< 1.00	< 1.00	NC
	Ethylbenzene	< 1.00	< 1.00	NC
	Hexachlorobutadiene	< 1.00	< 1.00	NC
	Isopropylbenzene	< 1.00	< 1.00	NC
	Methyl tert-butyl ether (MTBE)	< 1.00	< 1.00	NC
	Methylene chloride	14.9	13.1	12.8
	Naphthalene	< 1.00	< 1.00	NC
	n-Butylbenzene	< 1.00	< 1.00	NC
	n-Propylbenzene	< 1.00	< 1.00	NC
	sec-Butylbenzene	< 1.00	< 1.00	NC
	Styrene	< 1.00	< 1.00	NC
	tert-Butylbenzene	< 1.00	< 1.00	NC
	Tetrachloroethene (PCE)	< 1.00	< 1.00	NC
	Toluene	14.3	15.8	9.9
	trans-1,2-DCE	< 1.00	< 1.00	NC
	trans-1,3-Dichloropropene	< 1.00	< 1.00	NC
	Trichloroethene (TCE)	< 1.00	< 1.00	NC
	Trichlorofluoromethane	< 1.00	< 1.00	NC
	Vinyl chloride	< 1.00	< 1.00	NC
	Xylenes, Total	< 1.00	< 1.00	NC

Table A-3
Field Duplicate Summary
Group 6 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	AOC 20-3 (0-0.5') Sample Result	AOC 20-3 (0-0.5') DUP Field Duplicate	RPD (%)
SVOCs (mg/kg-dry):	1,2,4-Trichlorobenzene	< 0.40	< 0.40	NC
	1,2-Dichlorobenzene	< 0.40	< 0.40	NC
	1,3-Dichlorobenzene	< 0.40	< 0.40	NC
	1,4-Dichlorobenzene	< 0.40	< 0.40	NC
	1-Methylnaphthalene	< 0.40	< 0.40	NC
	2,4,5-Trichlorophenol	< 0.40	< 0.40	NC
	2,4,6-Trichlorophenol	< 0.40	< 0.40	NC
	2,4-Dichlorophenol	< 0.80	< 0.80	NC
	2,4-Dimethylphenol	< 0.60	< 0.60	NC
	2,4-Dinitrophenol	< 0.80	< 0.80	NC
	2,4-Dinitrotoluene	< 0.99	< 1.0	NC
	2,6-Dinitrotoluene	< 0.99	< 1.0	NC
	2-Chloronaphthalene	< 0.50	< 0.50	NC
	2-Chlorophenol	< 0.40	< 0.40	NC
	2-Methylnaphthalene	< 0.40	< 0.40	NC
	2-Methylphenol	< 0.99	< 1.0	NC
	2-Nitroaniline	< 0.40	< 0.40	NC
	2-Nitrophenol	< 0.40	< 0.40	NC
	3,3'-Dichlorobenzidine	< 0.50	< 0.50	NC
	3+4-Methylphenol	< 0.40	< 0.40	NC
	3-Nitroaniline	< 0.40	< 0.40	NC
	4,6-Dinitro-2-methylphenol	< 0.99	< 1.0	NC
	4-Bromophenyl phenyl ether	< 0.40	< 0.40	NC
	4-Chloro-3-methylphenol	< 0.99	< 1.0	NC
	4-Chloroaniline	< 0.99	< 1.0	NC
	4-Chlorophenyl phenyl ether	< 0.40	< 0.40	NC
	4-Nitroaniline	< 0.80	< 0.80	NC
	4-Nitrophenol	< 0.50	< 0.50	NC
	Acenaphthene	< 0.40	< 0.40	NC
	Acenaphthylene	< 0.40	< 0.40	NC
	Aniline	< 0.40	< 0.40	NC
	Anthracene	< 0.40	< 0.40	NC
	Azobenzene	< 0.40	< 0.40	NC
	Benz(a)anthracene	< 0.40	< 0.40	NC
	Benzo(a)pyrene	< 0.40	< 0.40	NC
	Benzo(b)fluoranthene	< 0.40	< 0.40	NC
	Benzo(g,h,i)perylene	< 0.40	< 0.40	NC
	Benzo(k)fluoranthene	< 0.40	< 0.40	NC
	Benzoic acid	< 0.99	< 1.0	NC
	Benzyl alcohol	< 0.40	< 0.40	NC
	Bis(2-chloroethoxy)methane	< 0.40	< 0.40	NC
	Bis(2-chloroethyl)ether	< 0.40	< 0.40	NC
	Bis(2-chloroisopropyl)ether	< 0.40	< 0.40	NC
	Bis(2-ethylhexyl)phthalate	< 0.99	< 1.0	NC
	Butyl benzyl phthalate	< 0.40	< 0.40	NC
	Carbazole	< 0.40	< 0.40	NC
	Chrysene	< 0.40	< 0.40	NC
	Dibenz(a,h)anthracene	< 0.40	< 0.40	NC
	Dibenzofuran	< 0.40	< 0.40	NC
	Diethyl phthalate	< 0.40	< 0.40	NC
	Dimethyl phthalate	< 0.40	< 0.40	NC
	Di-n-butyl phthalate	< 0.99	< 1.0	NC
	Di-n-octyl phthalate	< 0.50	< 0.50	NC
	Fluoranthene	< 0.40	< 0.40	NC
	Fluorene	< 0.40	< 0.40	NC
	Hexachlorobenzene	< 0.40	< 0.40	NC
	Hexachlorobutadiene	< 0.40	< 0.40	NC
	Hexachlorocyclopentadiene	< 0.40	< 0.40	NC
	Hexachloroethane	< 0.40	< 0.40	NC
	Indeno(1,2,3-cd)pyrene	< 0.40	< 0.40	NC
	Isophorone	< 0.99	< 1.0	NC
	Naphthalene	< 0.40	< 0.40	NC
	Nitrobenzene	< 0.99	< 1.0	NC
	N-Nitrosodi-n-propylamine	< 0.40	< 0.40	NC
	N-Nitrosodiphenylamine	< 0.40	< 0.40	NC
	Pentachlorophenol	< 0.80	< 0.80	NC
	Phenanthrene	< 0.40	< 0.40	NC
	Phenol	< 0.40	< 0.40	NC
	Pyrene	< 0.40	< 0.40	NC
	Pyridine	< 0.99	< 1.0	NC

Table A-3
Field Duplicate Summary
Group 6 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	AOC 20-3 (0-0.5') Sample Result	AOC 20-3 (0-0.5') DUP Field Duplicate	RPD (%)
Metals (mg/kg-dry):	Antimony	< 13	< 13	NC
	Arsenic	< 13	< 13	NC
	Barium	180	160	11.7
	Beryllium	1.6	0.86	**60.1**
	Cadmium	< 0.50	< 0.50	NC
	Chromium	11	9.7	12.5
	Cobalt	8.9	8.0	10.6
	Cyanide	< 0.30	< 0.30	NC
	Lead	8.5	7.3	15
	Mercury	< 0.033	< 0.033	NC
	Nickel	9.0	8.7	3.3
	Selenium	< 13	< 13	NC
	Silver	< 1.3	< 1.3	NC
	Vanadium	32	24	28.5
	Zinc	42	42	0.0

Notes:
RPD = Relative percent difference; [(difference)/(average)]* 100
NC = Not calculated; RPD values were not calculated for non-detects
ug/kg-dry = micrograms per kilogram dry
mg/kg-dry = milligrams per kilogram
* = Field Duplicate RPD Outlier

TABLE A-4
Completeness Summaries

Table A-4
Completeness Summary - Soil
Group 6 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	Total Number of Results	Number of Contractual Compliance	Percent Contractural Compliance	Number of Usable Results	Percent Technical Compliance
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	45	44 [b]	97.8	45	100
	Motor Oil Range Organics (MRO)	45	45	100.0	45	100
	Gasoline Range Organics (GRO)	45	45	100.0	45	100
VOCs (ug/kg-dry)	1-Methylnaphthalene	38	38	100.0	38	100
	2-Methylnapthalene	38	38	100.0	38	100
	2-Butanone	45	44 [a]	97.8	45	100
	Acetone	45	44 [a]	97.8	45	100
	All remaining VOC analytes	45	45	100.0	45	100
SVOCs (mg/kg-dry):	All SVOCs	45	45	100	45	100
Metals (mg/kg-dry):	Antimony	45	26 [c]	57.8	45	100
	Selenium	45	38 [c]	84.4	45	100
	All remaining metals	45	45	100.0	45	100

Notes:
Number of samples used in completeness calculations includes field duplicates but does not include equipment rinsate, field, or trip blanks.
Percent Contractural Compliance = (number of contract compliant results / Number of reported results)*100
Percent Technial Compliance = (Number of usable results / Number of reported results) * 100
a = Qualified due to equipment blank detection.
b = Qualified due to high surrogate recoveries
c = Qualified due to low MS/MSD recovery

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

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DAVE MARTIN
Secretary

RAJ SOLOMON, P.E.
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

March 1, 2011

Mr. Randy Schmaltz
Environmental Manager
Western Refining, Bloomfield Refinery
P.O. Box 159
Bloomfield, New Mexico 87413

RE: APPROVAL
INVESTIGATION WORK PLAN GROUP 6 (AOC NO. 19 SEEP NORTH OF MW-45, AOC NO. 20 SEEP NORTH OF MW-46, AND AOC NO. 21 SEEP NORTH OF MW-47)
WESTERN REFINING SOUTHWEST, INC., BLOOMFIELD REFINERY
EPA ID# NMD089416416
HWB-WRB-10-002

Dear Mr. Schmaltz:

The New Mexico Environment Department (NMED) has reviewed Western Refining Southwest, Inc., Bloomfield Refinery's (Western) *Investigation Work Plan Group 6 (AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47)* (Work Plan), dated February 2011. NMED hereby approves this Work Plan with the following comments.

Comment 1

Figure 5 (Potentiometric Surface Map) and Figure 7 (Dissolved-Phase Groundwater Data) provide text boxes that report groundwater elevations and data results. In Figure 7, the groundwater data result boxes for MW-50 through MW-54 are easier to read than the other results included in Figure 7. In future documents, ensure that all text boxes are legible.

Comment 2

Figure 6 (Separate Phase Hydrocarbon Thickness Map) provides separate phase hydrocarbon (SPH) thickness measurements and contours for the whole refinery. The figure illustrates the light non-aqueous phase liquid (LNAPL) thickness with blue contours, but the corresponding LNAPL thickness measurements are reported in red font, which could be interpreted as representing a value other than LNAPL thickness. To avoid confusion in future documents, be consistent when reporting the SPH measurements and contours by keeping them the same color.

Comment 3

Appendix A (Photographs) includes photographs of all the seeps associated with the Group 6 AOCs. Photograph "AOC No. 19 – Seep No. 2" is clearly shown. However, it is difficult to view Seep No. 7 from the photograph "AOC 20 – Looking North Toward Seep No. 7 From Berm Below Catchment Basin No. 6." Future documents containing photographs of this nature must include arrows and labels on the photographs to clearly depict the locations of the seeps and catchment basins.

Western must adhere to all requirements in this Approval in future submittals. The Investigation Report must be submitted to NMED on or before November 15, 2011. If you have any questions regarding this letter, please contact Leona Tsinnajinnie of my staff at (505) 476-6057.

Sincerely,

John E. Kieling
Program Manager
Permits Management Program
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
H. Monzeglio, NMED HWB
C. Chavez, OCD
A. Hains, Western

File: HWB-WRB-10-002 and Reading

Western Refining

BLOOMFIELD REFINERY

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2009 DEC 30 PM 1 35

December 22, 2009

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

Re: Giant Refining Company, Bloomfield Refinery (currently know as Western Refinery Southwest, Inc. – Bloomfield Refinery) Order No. HWB 07-34 (CO) Investigation Work Plan Group No. 6

Dear Mr. Bearzi:

Western Refining Southwest Inc. - Bloomfield Refinery submits the referenced Investigation Work Plan pursuant to Section IV.B.4 of the July 2007 HWB Order. The Investigation Work Plan covers Group No. 6, which includes AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47. The Investigation Work Plan was developed and formatted to meet the requirements of Section X.B of the July 2007 HWB Order.

If you have any questions or would like to discuss the Investigation Work Plan, please contact me at (505) 632-4171.

Sincerely,

James R. Schmaltz
Environmental Manager
Western Refining Southwest, Inc.
Bloomfield Refinery

cc: Hope Monzeglio – NMED HWB
Carl Chavez – NMOCD (w/attachment)
Dave Cobrain – NMED HWB
Laurie King – EPA Region 6 (w/attachment)
Todd Doyle – Bloomfield Refinery
Allen Hains – Western Refining El Paso

RPS

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INVESTIGATION WORK PLAN
Group 6

(AOC No. 19 Seep North of MW-45,
AOC No. 20 Seep North of MW-46,
and AOC No. 21 Seep North of MW-47)

Bloomfield Refinery
Western Refining Southwest, Inc.
#50 Rd 4990
Bloomfield, New Mexico 87413

December 2009

James R. Schmaltz
Environmental Manager

Western Refining Southwest, Inc.
Bloomfield Refinery

Mark S. Katterjohn, P.G.
Senior Consultant

RPS
404 Camp Craft Rd.
Austin, Texas 78746

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Executive Summary

The Bloomfield Refinery, which is located in the Four Corners Area of New Mexico, has been in operation since the late 1950s. Past inspections by State and federal environmental inspectors have identified locations where releases to the environment may have occurred. These locations are generally referred to as Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs).

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. for the Bloomfield Refinery, this Investigation Work Plan has been prepared for the AOCs designated as Group 6. A Class I modification to the facility's RCRA permit was approved on June 10, 2008 to reflect the change in ownership of the refinery to Western Refining Southwest, Inc. The operator is now Western Refining Southwest, Inc. – Bloomfield Refinery

The planned investigation activities include collection of soil samples, which will be analyzed for potential site-related constituents. The Investigation Work Plan includes specific sampling locations, sample collection procedures, and analytical methods. The scope of the proposed investigation is based, in part, on the results of previous site investigation activities.

Group 6 covers seeps located along the San Juan River northwest of the processing units, which are identified as AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47 in the NMED Order. The Order requires that San Juan Refining Company and Giant Industries Arizona, Inc. ("Western") determine and evaluate the presence, nature, and extent of historical releases of contaminants at the aforementioned AOCs. This Investigation Work Plan has been developed to collect the necessary data to meet the requirements of the Order.

Section 1
Introduction

The Bloomfield Refinery is located immediately south of Bloomfield, New Mexico in San Juan County (Figure 1). The physical address is #50 Road 4990, Bloomfield, New Mexico 87413. The Bloomfield Refinery is located on approximately 263 acres. Bordering the facility is a combination of federal and private properties. Public property managed by the Bureau of Land Management lies to the south. The majority of undeveloped land in the vicinity of the facility is used extensively for oil and gas production and, in some instances, grazing. U.S. Highway 44 is located approximately one-half mile west of the facility. The topography of the main portion of the site is generally flat with steep bluffs to the north where the San Juan River intersects Tertiary terrace deposits.

The Bloomfield Refinery is a crude oil refinery currently owned by Western Refining Southwest, Inc., which is a wholly owned subsidiary of Western Refining Company, and it is operated by Western Refining Southwest, Inc. – Bloomfield Refinery. The Bloomfield Refinery has an approximate refining capacity of 18,000 barrels per day. Various process units are operated at the facility, including crude distillation, reforming, fluidized catalytic cracking, sulfur recovery, merox treater, catalytic polymerization, and diesel hydrotreating. Current and past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, naphtha, residual fuel, fuel oils, and LPG.

On July 27, 2007, the New Mexico Environment Department (NMED) issued an Order to San Juan Refining Company and Giant Industries Arizona, Inc. ("Western") requiring investigation and corrective action at the Bloomfield Refinery. This Investigation Work Plan has been prepared for the Areas of Concern (AOC) designated as Group 6 in the Order, which includes AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47. The location of AOC Nos. 19, 20 and 21 are shown on Figure 2. Photographs of select locations around the seeps are included in Appendix A.

The purpose of the site investigation is to determine and evaluate the presence, nature, and extent of releases of contaminants in accordance with 20.4.1.500 New Mexico Administrative Code (NMAC) incorporating 40 Code of Federal Regulations (CFR) Section 264.101. The investigation activities will be conducted in accordance with Section IV of the Order.

Section 2
Background

This section presents background information for the AOCs, including a review of historical waste management and product storage activities to identity the following:

- Type and characteristics of all waste and all potential contaminants handled in the subject AOCs;
- Known and possible sources of contamination;
- History of releases; and
- Known extent of contamination.

From 2001 to 2002, the Hammond Irrigation Ditch was lined with concrete. The ditch extends along the Facility's northern and western boundaries between the refinery and the San Juan River. The water present in the ditch acted as a hydraulic barrier prior to installation of the liner, confining the bulk of the contaminants to within the refinery boundaries. A recovery system with a French drain was installed to preserve the integrity of the concrete liner.

Between August and December 2004, petroleum hydrocarbons and water were observed to be seeping out of seven areas on the north side of the refinery near monitoring wells MW-45, MW-46, and MW-47. During inspections of these areas, hydrocarbon was observed to have stained the soil. Figure 2 shows the locations of these seeps.

Four seeps (Nos. 1, 2, 5, and 9) are located within two small drainage tributaries to the San Juan River at a location north of monitoring well MW-45. These seeps are referred to as AOC No. 19 Seep North of MW-45. Two seeps (Seep Nos. 6 and 7) were discovered along the bluff north of monitoring well MW-46 and are referred to as AOC No. 20 Seep North of MW-46. The last seep (No. 8) is located along the bluff above the San Juan River north of monitoring well MW-47 and is referred to as AOC No. 21 Seep North of MW-47.

Nine catchment basins were installed as temporary measures when the seeps were first identified in 2004. A liner was installed at each catchment basin with the exception of Seep No. 4. Initially, the water accumulating in the catchment basins was pumped to Tank 37 and then to the Refinery's wastewater treatment system. The basins were constructed by placing high density polyethylene (HDPE) on top of the exposed bedrock after the visibly impacted soils had

been removed and earthen berms formed. The design of the catchment basins also allows the accumulation of rain water in addition to groundwater discharge.

The North Boundary Barrier Wall (slurry wall) was designed and installed by April 2005 as a permanent control measure to prevent further potential discharges of groundwater to surface water and the generation of seeps along the bluff. Subsequent to the installation of the slurry wall and with the continued recovery of groundwater from the Hammond Ditch French drain, the discharge from the seeps was significantly reduced.

Only Seep Nos. 1, 6, 7, 8, and 9 currently have any actual discharge of groundwater. Seep No. 1 has the most flow at the rate of a trickle. Seep No. 6 has about two thirds the flow of Seep No. 1 with Seep Nos. 7, 8, and 9 measured by drips with no continuous flow. Seep Nos. 2 and 5 did have historic flows, but groundwater discharge has ceased subsequent to the installation of the slurry wall.

Water samples were collected from the seeps in 2007. The samples were collected on three occasions (October 9, 2007, November 8, 2007, and December 10, 2007) from the seeps, which had an active discharge of groundwater. The samples were collected from Seep Nos. 1, 6, 7, 8, and 9 shown on Figure 8 and were identified on the chain-of-custodies and analytical reports as Outfall #1, Outfall #6, Outfall #7, Outfall #8, and Outfall #9. The analytical results are summarized in Table 1. All of the analyses were non-detect for BTEX (benzene, ethylbenzene, toluene, and xylenes) constituents, with one exception. The October sample from Seep No. 1 (Outfall #1) indicated very low concentrations of benzene and xylenes at 0.0029 mg/l and 0.0039 mg/l, respectively. Both subsequent samples from this location were non-detect for all BTEX constituents. All of the detected results and non-detect quantitation limits are less than the potentially applicable groundwater and surface water quality standards shown in Table 1.

Water samples have been collected from the seeps on a semiannual basis starting in 2008. As part of the Facility-Wide Groundwater Monitoring Plan, Western checks all of the identified seep locations (Nos. 1 through 9) on a bi-weekly basis to determine if there is evidence of an active groundwater discharge. The presence of groundwater discharges is recorded and water samples are collected during the semiannual sampling event, when water is present, from all seeps that have indicated an active groundwater discharge within the past six months. The analytical results from these seep samples are summarized in Table 2. No semivolatile organic compounds were detected in any of the seep samples and, therefore, are not included in the

summary table. All analytical results are included in the Groundwater Remediation and Monitoring Report, which is submitted to the NMED in April of each year.

Results of the historical analyses of seep samples show that chloride and sulfate are detected at concentrations above the New Mexico Water Quality Control Commission Standards for Groundwater. All of the 2008 and 2009 analyses were non-detect for BTEX (benzene, ethylbenzene, toluene, and xylenes). Methyl tert-butyl ether (MTBE) was sporadically reported in some seep samples at concentrations ranging from less than 0.001 to 0.048 mg/L.

Section 3
Site Conditions

The surface and subsurface conditions that could affect the fate and transport of any contaminants are discussed below. This information is based on recent visual observations and historical subsurface investigations.

3.1 Surface Conditions

Regionally, the surface topography slopes toward the floodplain of the San Juan River, which runs along the northern boundary of the refinery complex. To the south of the refinery, the drainage is to the northwest. North of the refinery, across the San Juan River, surface water flows in a southeasterly direction toward the San Juan River. The active portion of the refinery property, where the process units and storage tanks are located, is generally of low relief with an overall northwest gradient of approximately 0.02 ft/ft. The refinery sits on an alluvial floodplain terrace deposit and there is a steep bluff (approx. drop of 90 feet) at the northern boundary of the refinery where the San Juan River intersects the floodplain terrace, which marks the southern boundary of the floodplain.

There are two locally significant arroyos, one immediately east and another immediately west of the refinery. These arroyos collect most of the surface water flows in the area, thus significantly reducing surface water flows across the refinery. A minor drainage feature is located on the eastern portion of the refinery, where the former Landfill Pond (SWMU No. 9) was located and there are several steep arroyos along the northern refinery boundary that capture local surface water flows and minor groundwater discharges.

The refinery complex is bisected by County Rd #4990 (Sulivan Road), which runs east-west. The process units, storage tanks (crude oil and liquid products), and wastewater treatment systems are located north of the county road. The crude oil and product loading racks, LPG storage tanks and loading racks, maintenance buildings/90-day storage area, pipeline offices, transportation truck shop, and the Class I injection well are located south of the county road. There is very little vegetation throughout these areas with most surfaces composed of concrete, asphalt, or gravel. The area between the refinery and the San Juan River does have limited vegetation on steep slopes that do not support dense vegetation.

3.2 Subsurface Conditions

Numerous soil borings and monitoring wells have been completed across the refinery property during previous site investigations and installation of the slurry wall, which runs along the northern and western refinery boundary. Based on the available site-specific and regional subsurface information, the site is underlain by the Quaternary Jackson Lake terrace deposits, which unconformably overlie the Tertiary Nacimiento Formation. The Jackson Lake deposits consist of fine grained sand, silt and clay that grades to coarse sand, gravel and cobble size material closer to the contact with the Nacimiento Formation. The Jackson Lake Formation is over 40 feet thick near the southeast portion of the site and generally thins to the northwest toward the San Juan River. The Nacimiento Formation is primarily composed of fine grained materials (e.g., carbonaceous mudstone/claystone with interbedded sandstones) with a reported local thickness of approximately 570 feet (Groundwater Technology Inc., 1994).

Figures 3 and 4 present cross-sections of the shallow subsurface based on borings logs from on-site monitoring well completions. The uppermost aquifer is under water table conditions and occurs within the sand and gravel deposits of the Jackson Lake Formation. The Nacimiento Formation functions as an aquitard at the site that prevents contaminants from migrating to deeper aquifers. The potentiometric surface as measured in August 2008 is presented as Figure 5 and shows the groundwater flowing to the northwest, toward the San Juan River.

Previous investigations have identified and delineated impacts to groundwater from historical site operations. Figure 6 shows the distribution of separate phase hydrocarbon (SPH) in the subsurface based on the apparent thickness of SPH measured in monitoring wells. Dissolved-phase impacts are depicted on Figure 7.

Section 4
Scope of Services

4.1 Anticipated Activities

Pursuant to Section IV of the Order, a scope of services has been developed to determine and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, surface and shallow soil samples will be collected at AOC No. 19 Seep North of MW-45, AOC No. 20 Seep North of MW-46, and AOC No. 21 Seep North of MW-47. No groundwater samples are planned as the water from the seeps is already collected and analyzed on a semiannual basis as part of the Facility-Wide Groundwater Monitoring Plan. Therefore, the site investigation will be limited to the collection of soil samples. Where the HDPE liners are present within the catchment basins, surface soil samples will be collected as discussed below and in Section 5.2. Hand augured soil borings will be installed at select locations along the arroyos (drainage pathways) and samples will be collected from the following intervals:

- 0-6";
- 18-24";
- The sample from each soil boring with the greatest apparent degree of contamination, based on field observations and field screening; and
- Any additional intervals as determined based on field screening results.

Six soil borings are proposed for locations in the middle of the drainage pathways and at locations just downstream from the berms of the catchment basins. Thirty four surface soil samples (0-6") will be collected at the seep faces, on top of the HDPE liner, at select locations along the bottom of the drainage pathways, and along the margins of the drainage pathways, which occur on the banks of the drainage pathways and at the edge of the catchment basin liners.

Soil samples will be collected at AOC No. 19 from the following locations:

- Three surface soil samples will be collected near Seep No. 1, with one of the samples collected from the seep face and the other two samples collected along the margins of the drainage pathway;

- Near Seep No.2, a total of three surface soil samples will be collected with one collected from the seep face and the other two collected from along the margins of the drainage pathway;

- Three surface soil samples will be collected near Seep No. 5 with one collected from the seep face and two more collected along the margins of the drainage pathway;

- Four surface soil samples will be collected near Seep No. 9 with one collected from the bottom of the drainage pathway where the seep originated, one from the center of the lined catchment basin, and two from along the margins of the drainage pathway;

- One surface soil sample will be collected at Seep No. 4 at the center of the natural basin where the seep daylighted;

- Two surface soil samples will be collected from along the margins of the drainage pathway between Seep No. 5 and Seep No. 9;

- Four surface soil samples will be collected along the margins of the drainage pathway between Seep No. 3 and Seep No. 4; and

- A minimum of six soil samples will be collected from the three soil borings, which are located near the center of the two major drainage pathways that occur at AOC No. 19.

At AOC No. 20, soil samples will be collected at the following locations:

- Four surface samples will be collected at Seep No. 6 with one sample collected from the seep face, one soil sample collected from on top of the catchment liner, and two samples collected from along the margins of the drainage pathway;

- Three surface soil samples will be collected at Seep No. 7, with one sample collected from the top of the catchment liner and two samples collected from along the margins of the drainage pathway;

- Two surface soil samples will be collected from along the center line of the drainage pathway that extends from Seep No. 6 toward the San Juan River;

- Two surface soil samples will be collected from the margins of the drainage pathway that extends from Seep No. 6 toward the San Juan River; and

- A minimum of two soil samples will be collected from one soil boring at the center line of the drainage pathway that extends below Seep No. 6.

Soil samples will be collected from the following locations at AOC No. 21:

- Three surface soil samples will be collected at Seep No. 8, with one collected from the top of the catchment liner and two collected from along the margins of the drainage pathway; and

- A minimum of four soil samples will be collected from two soil borings, with one positioned at the discharge point of Seep No. 8 and the other down the drainage pathway just below the catchment berm near Seep No. 8.

The soil samples will be analyzed by the following methods:

- SW-846 Method 8260 (volatile organic compounds);
- SW-846 Method 8270 (semi-volatile organic compounds);
- SW-846 Method 8015B gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics;
- SW-846 Methods 6010/6020 and 7470/7471 (metals); and
- SW-846 Methods 335.4/335.2 (cyanide).

4.2 Background Information Research

Documents containing the results of previous investigations and subsequent routine groundwater monitoring data from monitoring wells and the seeps were reviewed to facilitate development of this work plan. The previously collected data provide detailed information on the overall subsurface conditions, including hydrogeology and contaminant distribution within groundwater on a site-wide basis. The data collected under this scope of services will supplement the existing soil and groundwater information and provide specific information regarding contaminant occurrence and distribution within soils near the seeps.

4.3 Collection and Management of Investigation Derived Waste

Excess sample material and decontamination fluids, and all other investigation derived waste (IDW) associated with site investigation activities will be contained and characterized using methods based on the boring location, boring depth, and type of contaminants suspected or encountered. All decontamination water will be disposed in the refinery wastewater treatment system upstream of the API Separator. An IDW management plan is included as Appendix B.

4.4 Surveys

The horizontal coordinates and elevation of each sampling location and the locations of all other pertinent structures will be determined by a registered New Mexico professional land surveyor in accordance with the State Plane Coordinate System (NMSA 1978 47-1-49-56 (Repl. Pamp. 1993)). The surveys will be conducted in accordance with Sections 500.1 through 500.12 of the Regulations and Rules of the Board of Registration for Professional Engineers and Surveyors Minimum Standards for Surveying in New Mexico. Horizontal positions will be measured to the nearest 0.1-ft and vertical elevations will be measured to the nearest 0.01-ft.

Section 5
Investigation Methods

The purpose of the site investigation is to determine and evaluate the presence, nature, and extent of releases of contaminants. Guidance on selecting and developing sampling plans as provided in *Guidance for Choosing a Sampling Design for Environmental Data Collection* (EPA, 2000) was utilized to select the appropriate sampling strategy.

5.1 Soil Boring Installation

Shallow soil borings will be completed using a hand auger and/or shovel at appropriate locations within and into the banks of the drainage pathways where the HDPE liner of the catchment basins is not present. This sampling method is ideally suited due to the inaccessibility of a drill rig and the limited anticipated depth to bedrock in the vicinity of the seeps. The sampling equipment will be properly decontaminated before beginning each boring.

The NMED will be notified as early as practicable if conditions arise or are encountered that do not allow the advancement of borings at planned sampling locations. Appropriate actions (e.g., relocation of borings to a less threatening location) will be taken to minimize any negative impacts from investigative borings. The depth of soil borings in the vicinity of the seeps may be limited due to collapse of the overlying soil. The soil borings within the drainage pathways will be extended to the top of bedrock (Nacimiento Formation) or to refusal, whichever occurs first, at an anticipated completion depth of less than 3 feet. Soil samples will be collected continuously and logged by a qualified geologist or engineer.

The sampling will be accomplished under the direction of a qualified engineer or geologist who will maintain a detailed log of the materials and conditions encountered in each boring. Both sample information and visual observations of the cuttings and core samples will be recorded on the boring log. Known site features and/or site survey grid markers will be used as references to locate each boring prior to surveying the location as described in Section 4.4. The boring locations will be measured to the nearest foot, and locations will be recorded on a scaled site map upon completion of each boring.

5.2 Soil Sampling

Since there is the potential for constituents to have been released to soils at known locations at AOC Nos. 19, 20 and 21, a judgmental sampling design is appropriate. Soil samples will be collected from the locations where groundwater reaches the land surface (i.e., seep face) and along the bottom and sides of the drainage pathways where water flowed and accumulated. The individual sample locations have been selected in an attempt to determine the highest concentrations of constituents in soil and to determine the horizontal extent of the impacts. The surface soil samples (0-6") collected from the seep faces and soil that has accumulated on top of the catchment basin liners where water accumulated should represent the higher concentration areas. Samples collected from soil borings located at seep faces and along the center of the drainage pathways will also represent higher concentration areas. The drainage pathways are generally narrow and deeply incised into the alluvial terrace deposits overlying the bedrock (Nacimiento Formation). Surface soil samples (0-6") collected from the sides of the steep slopes along the drainage pathways and at the edge of catchment liners will be used to define the horizontal extent of any impacts identified in the seep faces and bottom of the drainage pathways.

The six soil borings will be completed using a hand auger to the top of bedrock or to refusal, whichever occurs first. The thirty four surface soil sample locations will terminate at the top of the HDPE-liner, where present, or at a depth of 6", unless Western elects to extend the sampling deeper based on field screening results. A decontaminated hand auger will be used to obtain disturbed soils during the installation of each boring. Surface samples may be collected using decontaminated, hand-held stainless steel sampling device, hand auger, or a pre-cleaned disposable sampling device. A portion of the sample will be placed in pre-cleaned, laboratory-prepared sample containers for laboratory chemical analysis. The use of an Encore® Sampler or other similar device will be used during collection of soil samples for VOC analysis. The remaining portions of the sample will be used for logging and field screening as discussed in Section 5.2.1. Sample handling and chain-of-custody procedures will be in accordance with the procedures presented below in Section 5.3.

Discrete soil samples will be collected at the soil borings for laboratory analyses at the following intervals:

- 0-6" (all soil sample locations);
- 18-24" (only from the six deeper hand-augured soil boring locations);

- The sample from each of the six hand-augured soil borings with the greatest apparent degree of contamination, based on field observations and field screening; and

- Any additional intervals as determined based on field screening results.

Proposed sampling locations for AOC Nos. 19, 20 and 21 are shown on Figures 9, 10 and 11, respectively and are described in detail below.

AOC No. 19

Soil samples will be collected at AOC No. 19 from the following locations:

- Three surface soil samples will be collected near Seep No. 1, with one of the samples collected from the seep face and the other two collected along the margins of the drainage pathway;

- Near Seep No.2, a total of three surface soil samples will be collected with one from the seep face and the other two from along the margins of the drainage pathway;

- Three surface soil samples will be collected near Seep No. 5 with one collected from the seep face and two more collected along the margins of the drainage pathway;

- Four surface soil samples will be collected near Seep No. 9 with one collected from the bottom of the drainage pathway where the seep originated, one from the center of the lined catchment basin, and two from along the margins of the drainage pathway;

- One surface soil sample will be collected at Seep No. 4 at the center of the natural basin where the seep daylighted;

- Two surface soil samples will be collected along the margins of the drainage pathway between Seep No. 5 and Seep No. 9;

- Four surface soil samples will be collected along the margins of the drainage pathway between Seep No. 3 and Seep No. 4; and

- A minimum of six soil samples will be collected from the three soil borings, which are located near the center of the two major drainage pathways that occur at AOC No. 19.

AOC No. 20

At AOC No. 20, soil samples will be collected at the following locations:

- Four surface samples will be collected at Seep No. 6 with one sample collected from the seep face, one soil sample collected from on top of the catchment liner, and two samples collected from along the margins of the drainage pathway;

- Three surface soil samples will be collected at Seep No. 7, with one sample collected from the top of the catchment liner and two samples collected from along the margins of the drainage pathway;

- Two surface soil samples will be collected from along the center line of the drainage pathway that extends from Seep No. 6 toward the San Juan River;

- Two surface soil samples will be collected from the margins of the drainage pathway that extends from Seep No. 6 toward the San Juan River; and

- A minimum of two soil samples will be collected from one soil boring at the center line of the drainage pathway that extends below Seep No. 6.

AOC No. 21

Soil samples will be collected from the following locations at AOC No. 21:

- Three surface soil samples will be collected at Seep No. 8, with one collected from the top of the catchment liner and two collected from along the margins of the drainage pathway; and

- A minimum of four soil samples will be collected from two soil borings, with one positioned at the discharge point of Seep No. 8 and another down the drainage pathway just below the catchment berm near Seep No. 8.

Quality Assurance/Quality Control (QA/QC) samples will be collected to monitor the validity of the soil sample collection procedures as follows:

- Field duplicates will be collected at a rate of 10 percent;

- Equipment blanks will be collected from all sampling apparatus at a frequency of 10 percent or one per day if disposable sampling equipment is used; and

- Field blanks will be collected at a frequency of one per day.

5.2.1 Soil Sample Field Screening and Logging

Samples obtained from the borings will be screened in the field on 1.0 foot intervals for evidence of contaminants. Field screening results will be recorded on the exploratory boring logs and will be used to aid in the selection of soil samples for laboratory analysis. The primary screening methods include: (1) visual examination, (2) olfactory examination, and (3) headspace vapor screening for volatile organic compounds.

Visual screening includes examination of soil samples for evidence of staining caused by petroleum-related compounds. Headspace vapor screening targets volatile organic compounds

and involves placing a soil sample in a plastic sample bag or a foil sealed container allowing space for ambient air. The container will be sealed and then shaken gently to expose the soil to the air trapped in the container. The sealed container will be allowed to rest for a minimum of 5 minutes while vapors equilibrate. Vapors present within the sample bag's headspace will then be measured by inserting the probe of the instrument in a small opening in the bag or through the foil. The maximum value and the ambient air temperature will be recorded on the field boring log for each sample.

The monitoring instruments will be calibrated each day to the manufacturer's standard for instrument operation. A photo-ionization detector (PID) equipped with a 10.6 or higher electron volt (eV) lamp or a combustible gas indicator will be used for VOC field screening. Field screening results may be site- and boring-specific and the results may vary with instrument type, the media screened, weather conditions, moisture content, soil type, and type of contaminant. Conditions capable of influencing the results of field screening will be recorded on the field logs.

The physical characteristics of the samples (such as mineralogy, ASTM soil classification, moisture content, texture, color, presence of stains or odors, and/or field screening results), depth where each sample was obtained, method of sample collection, and other observations will be recorded in the field log by a qualified geologist or engineer. Detailed logs of each soil boring will be completed in the field by a qualified engineer or geologist. Additional information, such as the presence of water-bearing zones and any unusual or noticeable conditions encountered during drilling, will be recorded on the logs.

5.3 Sample Handling

At a minimum, the following procedures will be used at all times when collecting samples during investigation, corrective action, and monitoring activities:

1. Neoprene, nitrile, or other protective gloves will be worn when collecting samples. New disposable gloves will be used to collect each sample;

2. All samples collected of each medium for chemical analysis will be transferred into clean sample containers supplied by the project analytical laboratory with the exception of soil, rock, and sediment samples obtained in Encore® samplers. 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; and

3. Sample labels and documentation will be completed for each sample following procedures discussed below. 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 below, will be followed for all samples collected. All samples will be submitted to the laboratory soon enough 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.

Chain-of-custody and shipment procedures will include the following:

1. Chain-of-custody forms will be completed at the end of each sampling day, prior to the transfer of samples off site.

2. 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.

3. Each cooler or other container will be delivered directly to the analytical laboratory.

4. Glass bottles will be separated in the shipping container by cushioning material to prevent breakage.

5. Plastic containers will be protected from possible puncture during shipping using cushioning material.

6. The chain-of-custody form and sample request form will be shipped inside the sealed storage container to be delivered to the laboratory.

7. Chain-of-custody seals will be used to seal the sample-shipping container in conformance with EPA protocol.

8. Signed and dated chain-of-custody seals will be applied to each cooler prior to transport of samples from the site.

9. 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 and copies will be returned to the relinquishing party.

10. Copies of all chain-of-custody forms generated as part of sampling activities will be maintained on-site.

5.4 Decontamination Procedures

The objective of the decontamination procedures is to minimize the potential for cross-contamination. A designated decontamination area will be established for decontamination of sampling equipment.

Sampling or measurement equipment, including but not limited to, stainless steel sampling tools will be decontaminated in accordance with the following procedures or other methods approved by the Department before each sampling attempt or measurement:

1. Brush equipment with a wire or other suitable brush, if necessary or practicable, to remove large particulate matter;
2. Rinse with potable tap water;
3. Wash with nonphosphate detergent or other detergent approved by the Department (examples include Fantastik™, Liqui-Nox®);
4. Rinse with potable tap water; and
5. Double rinse with deionized water.

All decontamination solutions will be collected and stored temporarily as described in Section 4.3. Decontamination procedures and the cleaning agents used will be documented in the daily field log.

5.5 Field Equipment Calibration Procedures

Field equipment requiring calibration will be calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures. At a minimum, calibration checks will be conducted daily, or at other intervals approved by the Department, 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. In the interim, a properly calibrated replacement instrument will be used.

5.6 Documentation of Field Activities

Daily field activities, including observations and field procedures, will be recorded in a field log book. The original field forms will be maintained at the facility. Copies of the completed forms will be maintained in a bound and sequentially numbered field file for reference during field activities. Indelible ink will be used to record all field activities. Photographic documentation of field activities will be performed, as appropriate. The daily record of field activities will include the following:

1. Site or unit designation;
2. Date;
3. Time of arrival and departure;
4. Field investigation team members including subcontractors and visitors;
5. Weather conditions;

6. Daily activities and times conducted;
7. Observations;
8. Record of samples collected with sample designations and locations specified;
9. Photographic log, as appropriate;
10. Field monitoring data, including health and safety monitoring;
11. Equipment used and calibration records, if appropriate;
12. List of additional data sheets and maps completed;
13. An inventory of the waste generated and the method of storage or disposal; and
14. Signature of personnel completing the field record.

5.7 Chemical Analyses

All samples collected for laboratory analysis will be submitted to an accredited laboratory. The laboratory will use the most recent standard EPA and industry-accepted analytical methods for target analytes as the testing methods for each medium sampled. Chemical analyses will be performed in accordance with the most recent EPA standard analytical methodologies and extraction methods.

The soil samples will be analyzed by the following methods:

- SW-846 Method 8260 volatile organic compounds;
- SW-846 Method 8270 semi-volatile organic compounds; and
- SW-846 Method 8015B gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics.

Soil samples will also be analyzed for the following metals and cyanide using the indicated analytical methods.

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.4/335.2 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

5.8 Data Quality Objectives

The Data Quality Objectives (DQOs) were developed to ensure that newly collected data are of sufficient quality and quantity to address the projects goals, including Quality Assurance/Quality Control (QA/QC) issues (EPA, 2006). The project goals are established in the Order and are to determine and evaluate the presence, nature, and extent of releases of contaminants at specified AOCs. The type of data required to meet the project goals includes chemical analyses of soil, sediment and groundwater to determine if there has been a release of contaminants at the individual AOCs.

The quantity of data is AOC specific and based on the historical operations at individual locations. The quality of data required is consistent across locations and is specified in Section VIII.D.7.c of the Order. In general, method detection limits should be 20% or less of the applicable background levels, cleanup standards and screening levels.

Additional DQOs include precision, accuracy, representativeness, completeness, and comparability. Precision is a measurement of the reproducibility of measurements under a given set of circumstances and is commonly stated in terms of standard deviation or coefficient

of variation (EPA, 1987). Precision is also specific to sampling activities and analytical performance. Sampling precision will be evaluated through the analyses of duplicate field samples and laboratory replicates will be utilized to assess laboratory precision.

Accuracy is a measurement in the bias of a measurement system and may include many sources of potential error, including the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques (EPA, 1987). An evaluation of the accuracy will be performed by reviewing the results of field/trip blanks, matrix spikes, and laboratory QC samples.

Representativeness is an expression of the degree to which the data accurately and precisely represent the true environmental conditions. Sample locations and the number of samples have been selected to ensure the data is representative of actual environmental conditions. Based on AOC specific conditions, this may include either biased (i.e., judgmental) locations/depths or unbiased (systematic grid samples) locations, as discussed in Section 5.2 for soils. In addition, sample collection techniques (e.g., field monitoring and decontamination of sampling equipment) will be utilized to help ensure representative results.

Completeness is defined as the percentage of measurements taken that are actually valid measurements, considering field QA and laboratory QC problems. EPA Contract Laboratory Program (CLP) data has been found to be 80-85% complete on a nationwide basis and this has been extrapolated to indicate that Level III, IV, and V analytical techniques will generate data that are approximately 80% complete (EPA, 1987). As an overall project goal, the completeness goal is 85%; however, some samples may be critical based on location or field screening results and thus a sample-by-sample evaluation will be performed to determine if the completeness goals have been obtained.

Comparability is a qualitative parameter, which expresses the confidence with which one data set can be compared to another. Industry standard sample collection techniques and routine EPA analytical methods will be utilized to help ensure data are comparable to historical and future data. Analytical results will be reported in appropriate units for comparison to historical data and cleanup levels.

Section 6
Monitoring and Sampling Program

Water samples from the seeps are collected on a semiannual basis as part of the NMED-approved Facility-Wide Groundwater Monitoring Plan. In accordance with Section 5.3 of the Facility-Wide Groundwater Monitoring Plan, water samples are collected from the seeps, if water is present. All seep locations are visually inspected bi-weekly to monitor active groundwater discharge along the bluff (NMED, 2008). The analytical results are included in the Groundwater Remediation and Monitoring Report submitted in April of each year. Groundwater is removed from any seep where analytical results exceed any of the standards set by the Water Quality Control Commission (WQCC), the EPA Maximum Contaminant Level (MCL), or the EPA Region VI Human Health Medium Specific Screening Levels (Tap Water) in the absence of a WQCC standard or MCL (NMED, 2008).

Section 7
Schedule

This investigation Work Plan will be implemented within 90 days of NMED approval. The estimated timeframes for each of the planned activities is as shown below:

- Field work (inclusive of all soil sampling) -- four weeks;
- Laboratory analyses for initial sampling event – eight weeks;
- Data reduction and validation (soils) – three weeks; and
- Data gap analysis – three weeks.

Completion of the data gap analysis will complete all activities conducted under this investigation Work Plan. Western will then prepare an Investigation Report pursuant to Section X.C of the Order. The Investigation Report will be submitted to the NMED within 120 calendar days of completion of the data gap analysis.

Section 8
References

EPA, 1987, Data Quality Objectives for Remedial Response Activities; United States Environmental Protection Agency, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, OSWER Directive 9355.0-7B, 85p

EPA, 2000, Guidance on Choosing a Sampling Design for Environmental Data Collection, EPA/240/R-02/005, EPA QA/G-5S, 168 p.

EPA, 2006, Guidance on Systematic Planning Using the Data Quality Objectives Process, United States Environmental Protection Agency, Office of Environmental Information; EPA/240/B-06/001, p. 111.

Groundwater Technology Inc., 1994, RCRA Facility Investigation/Corrective Measures Study Report Bloomfield Refining Company #50 County Road 4990 Bloomfield, New Mexico, p.51.

NMED, 2007, State of New Mexico Environment Department v. San Juan Refining Company and Giant Industries, Inc.; Order July 27, 2007, p. 133

NMED, 2008. New Mexico Environmental Department (NMED) Hazardous Waste Bureau, Approval with Direction Facility-Wide Groundwater Monitoring Plan dated March 25, 2008.

Tables

Table 1
Summary of 2007 Groundwater Seep Concentrations
Group 6 Investigation Work Plan
Western Refining Southwest - Bloomfield Refinery

		Parameters			
		Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)
WQCC 20NMAC 6.2.3103(mg/L):		**0.01**	**0.75**	**0.75**	**0.62**
WQCC 20NMAC 6.4(mg/L):		**0.022**	**6.8**	**3.1**	**NE**
Sample ID:	**Date Sampled:**				
Outfall #1 (Seep No.1)	10/9/2007	<0.001	0.0029	<0.001	0.0039
	11/8/2007	<0.001	<0.001	<0.001	<0.002
	12/10/2007	<0.001	<0.001	<0.001	<0.002
Outfall #6 (Seep No. 6)	10/9/2007	<0.001	<0.001	<0.001	<0.002
	11/8/2007	<0.001	<0.001	<0.001	<0.002
	12/10/2007	<0.001	<0.001	<0.001	<0.002
Outfall #7 (Seep No. 7)	10/9/2007	<0.001	<0.001	<0.001	<0.002
	11/8/2007	<0.001	<0.001	<0.001	<0.002
	12/10/2007	<0.001	<0.001	<0.001	<0.002
Outfall #8 (Seep No. 8)	10/9/2007	<0.001	<0.001	<0.001	<0.002
	11/7/2007	<0.001	<0.001	<0.001	<0.002
	12/10/2007	<0.001	<0.001	<0.001	<0.002
Outfall #9 (Seep No. 9)	10/9/2007	<0.001	<0.001	<0.001	<0.002
	11/8/2007	<0.001	<0.001	<0.001	<0.002
	12/10/2007	<0.001	<0.001	<0.001	<0.002

Notes:
mg/L = milligram per liter
NE = not established
WQCC 20NMAC 6.2.3103 = New Mexico Standard for Groundwater of 10,000 ug/L or less
WQCC 20NMAC 6.4 = New Mexico Standards for Interstate and Intrastate Surface Water

Table 2
Summary of Facility-Wide Monitoring Plan Seep Concentrations
Group 6 Investigation Work Plan
Western Refining Southwest - Bloomfield Refinery

		EPA 8260B						EPA 300.0							SM 2320B		
Sample Location	Date	Benzene (mg/L)	Toluene (mg/L)	EthylBen (mg/L)	Xylene (mg/L)	MTBE (mg/L)		Fluoride (mg/L)	Chloride (mg/L)	Bromide (mg/L)	Nitrite (mg/L)	Nitrate (mg/L)	P (mg/L)	Sulfate (mg/L)	CO2 (mg/L)	ALK (mg/L)	
		0.005	0.75	0.70	0.62	0.012	40CFR141.61 (Benzene and Ethylbenzene) WQCC 20 NMAC 6.2.3103 EPA Region VI Screening Level (MTBE)	1.6	250	--	1	10	--	600	--	--	WQCC 20 NMAC 6.2.3103
Seep 1	Aug-09	<0.001	<0.001	<0.001	<0.003	0.003		0.29	390	NA	<2.0	<0.10	<0.50	1500	200	220	
	Apr-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Aug-08	<0.001	<0.001	<0.001	<0.003	0.042		0.35	370	NA	<1.0	<0.10	<0.50	1500	250	250	
	Apr-08	<0.001	<0.001	<0.001	<0.002	NS[2]		NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
Seep 3	Aug-09	<0.001	<0.001	<0.001	<0.003	<0.0015		0.22	1400	NA	<2.0	<2.0	<10	6800	120	130	
	Apr-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Aug-08	<0.001	<0.001	<0.001	<0.003	<0.015		0.8	370	NA	<1.0	<0.10	<0.50	2500	160	160	
	Apr-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
Seep 6	Aug-09	<0.001	<0.001	<0.001	<0.003	<0.0015		0.58	4800	NA	<2.0	<2.0	<10	1500	150	160	
	Apr-09	<0.001	<0.001	<0.001	<0.002	0.014		<0.50	2900	1.6	<2.0		<0.50	1000	420	440	
	Aug-08	<0.001	<0.001	<0.001	<0.003	0.006		0.47	2500	NA	<1.0	<0.10	<0.50	960	370	370	
	Apr-08	<0.001	<0.001	<0.001	<0.002	NS[2]		NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
Seep 7	Aug-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-08	<0.001	<0.001	<0.001	<0.002	NS[2]		NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
Seep 8	Aug-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-09	<0.001	<0.001	<0.001	<0.002	<0.001		0.33	650	1.7	<1.0		<0.50	2200	190	200	
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]		NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	
Seep 9	Aug-09	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-09	<0.001	<0.001	<0.001	<0.002	0.048		0.35	620	1.0	<1.0		<0.50	1500	420	460	
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]		NS[1]	NS[1]	NA	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	
	Apr-08	<0.001	<0.001	<0.001	<0.002	NS[2]		NS[2]	NS[2]	NA	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	

NS[1] = Seep location is Dry or Not Enough Water to Sample- No Sample

NS[2] = Not Sampled - Sample was taken before implementation of Facility-Wide Monitoring Plan

NA = Constituent analysis not requested

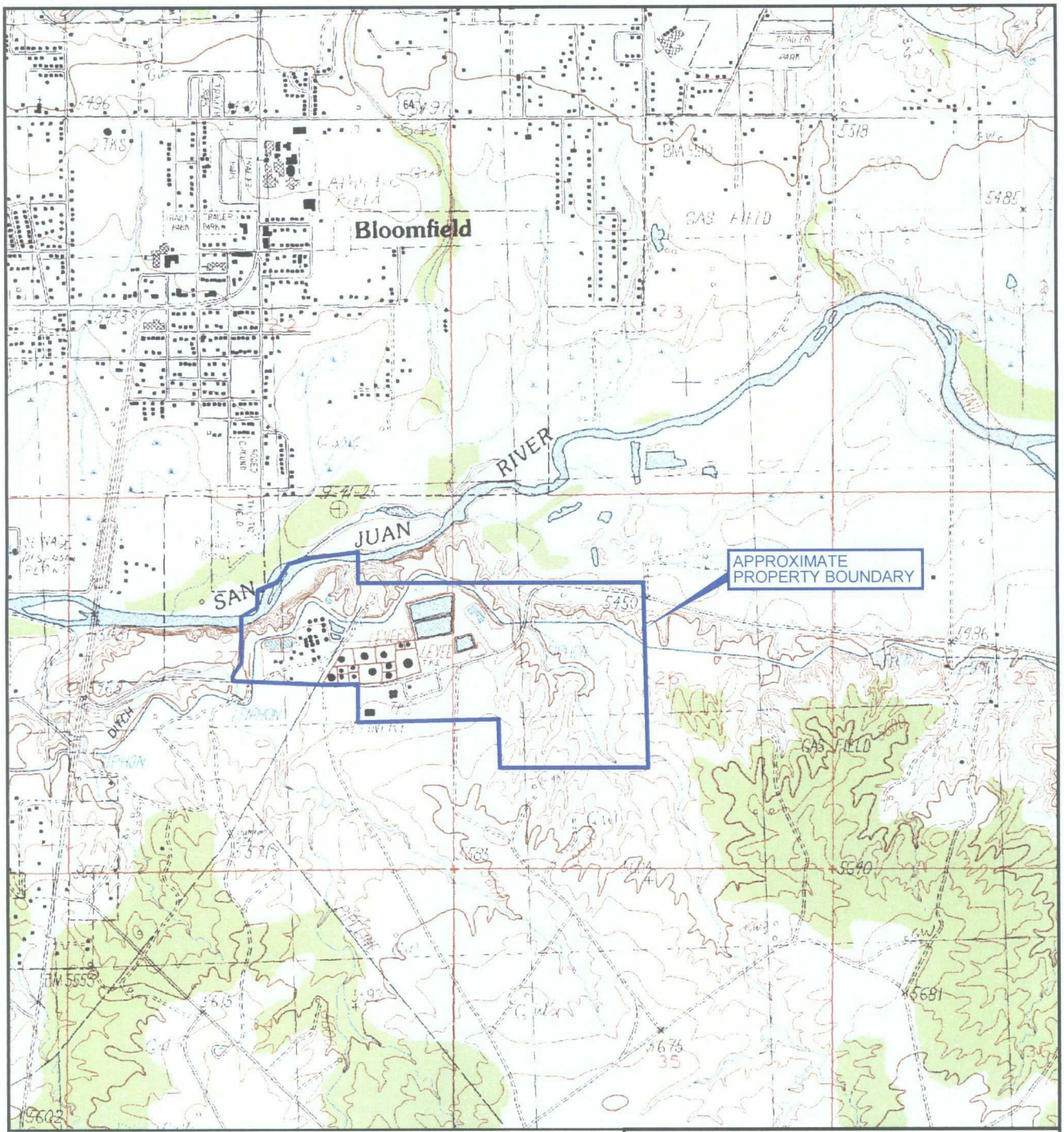
WQCC 20NMAC 6.2.3103 = New Mexico Water Quality Control Commmission Standard for Groundwater of 10,000 ug/L or less

40CFR141.61 = Safe Driking Water Act Maximum Contaminant Level

EPA Region VI Human Health Medium-Specific Screening Level - Tap Water

No active discharge at Seeps 2, 4 and 5 has been present to sample since implementation of the Facility-Wide Monitoring Plan

Figures



Map Source: USGS 7.5 Min. Quad Sheet BLOOMFIELD, NM., 1985.

N

0 2000

SCALE IN FEET

NEW MEXICO

QUADRANGLE LOCATION

Western Refining

WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 6/19/08	FILE:WestRef-A25

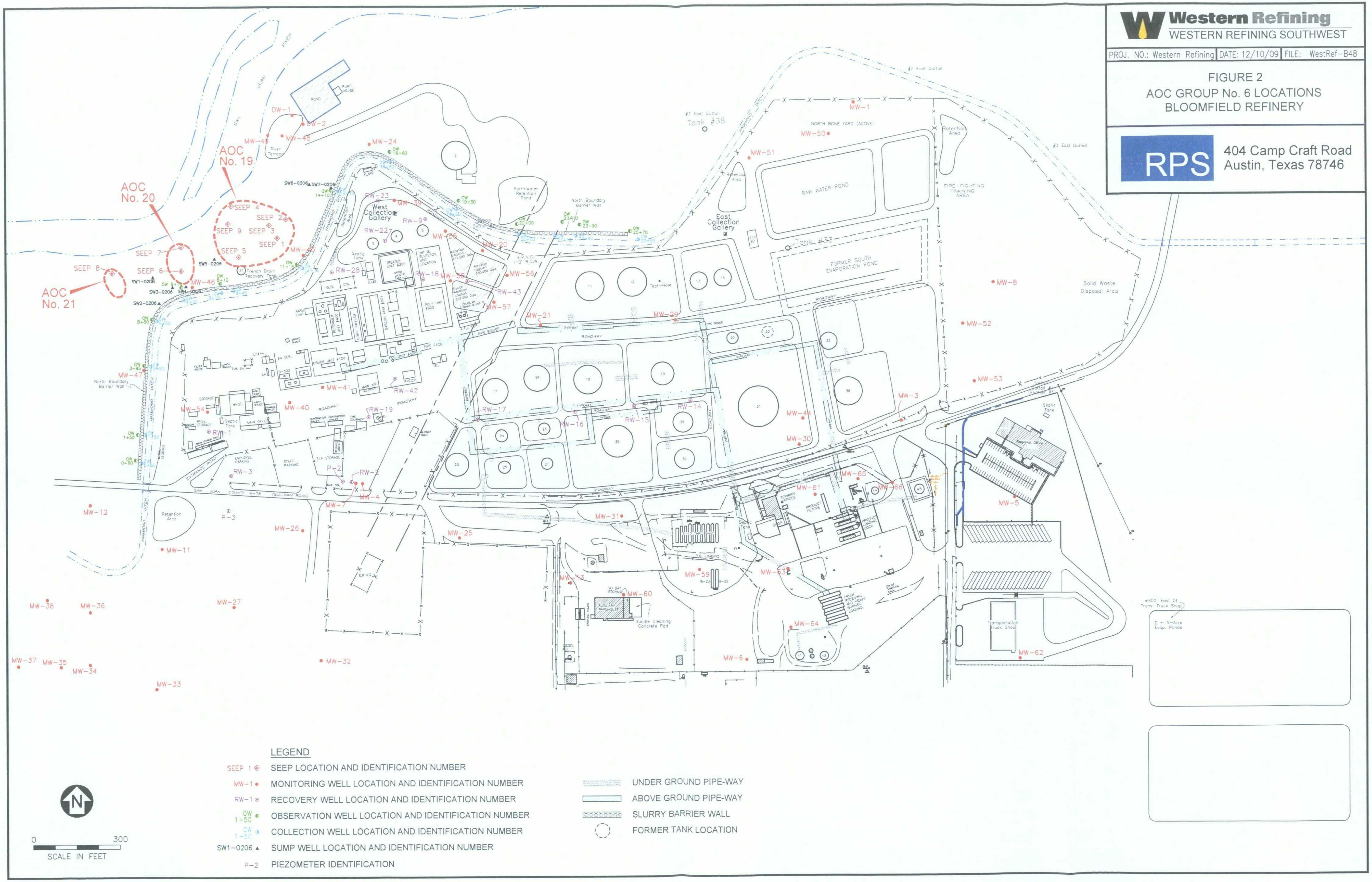
FIGURE 1

SITE LOCATION MAP

BLOOMFIELD REFINERY

404 Camp Craft Road
Austin, Texas 78746

RPS JDC



Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 12/10/09 | FILE: WestRef-B48

FIGURE 2
AOC GROUP No. 6 LOCATIONS
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

WEST
A

EAST
A'

5540
5530
5520
5510
5500
5490
5480
ELEVATION
(FT MSL)

MW-54
RW-1
MW-40
MW-41
RW-42
RW-17
RW-16
RW-15
RW-14
MW-44
MW-3

SILT,
SAND

SAND,
GRAVEL

GRAVEL

SANDSTONE

NACIMIENTO
FORMATION

SHALE

CLAY,
SILTY,
SANDY

SAND,
SILT

GRAVEL,
COBBLES

CLAY

SAND

CLAY

SAND,
COBBLES

SILT
SANDY

SAND

CLAY
SANDY

SAND

GRAVEL

?

?

?

?

SAND,
GRAVEL

SAND,
GRAVEL

SAND,
GRAVEL

SAND,
GRAVEL

SAND

CLAY

SAND

GRAVEL
SANDY

SANDSTONE
ARGILLACEOUS

SILT,
CLAY

SAND

CLAY
SANDY

SAND,
COBBLES

SANDSTONE
CLAYEY

EXPLANATION

MW-54 ← WELL IDENTIFICATION

WELL

SCREEN INTERVAL

LITHOLOGIC CONTACTS

– POTENTIOMETRIC SURFACE MEASURED AUGUST–OCTOBER 2008

10
0
200
SCALE IN FEET
VERTICAL EXAGGERATION = 20X

Western Refining
WESTERN REFINING SOUTHWEST

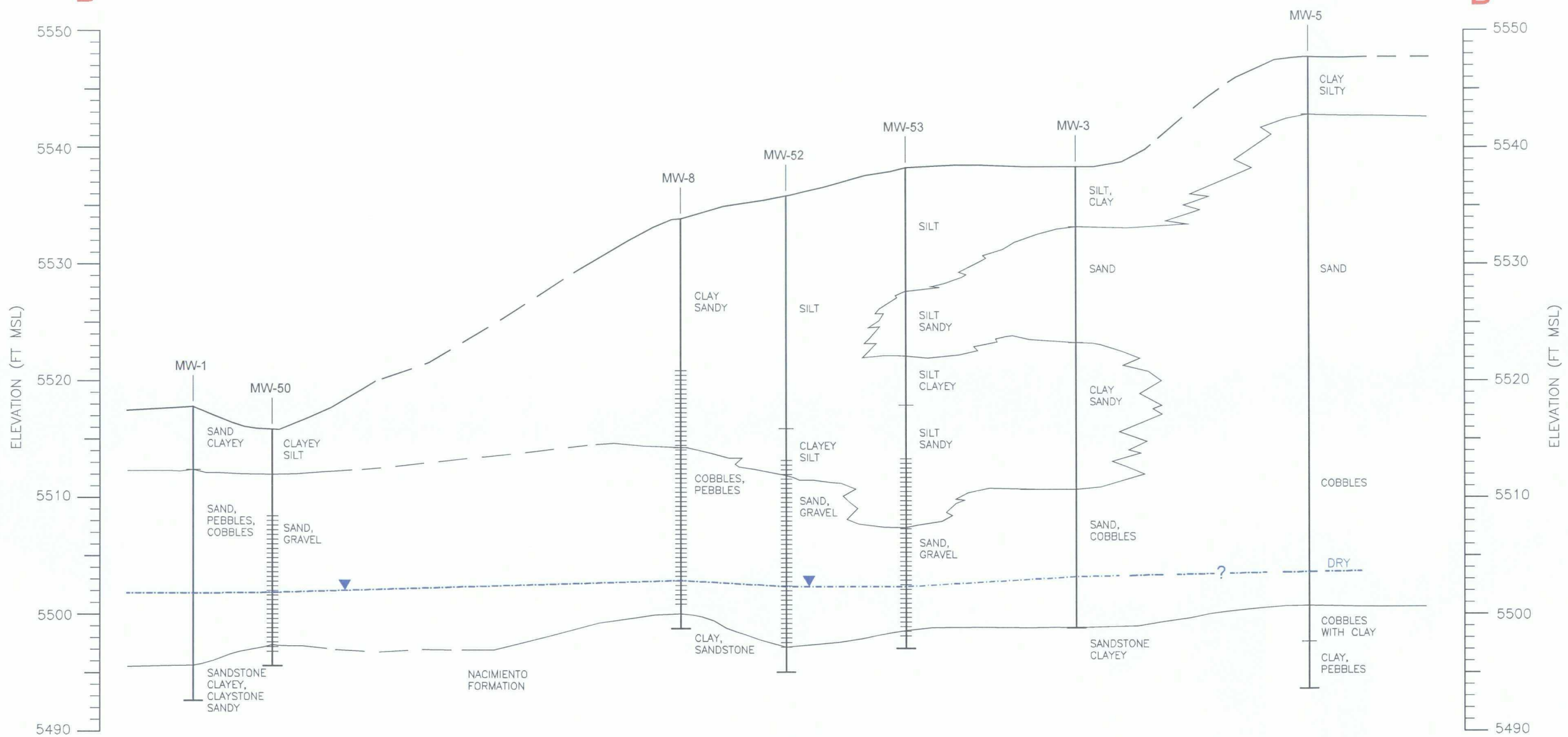
PROJ. NO.: Western Refining	DATE: 04/29/09	FILE: WestRef-B28

FIGURE 3
CROSS SECTION A-A'
WEST TO EAST
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

NORTH
B

SOUTH
B'



EXPLANATION

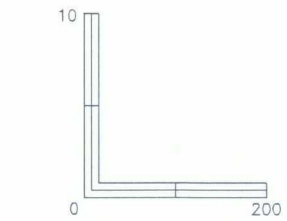
MW-8 ← WELL IDENTIFICATION

← WELL

← SCREEN INTERVAL

LITHOLOGIC CONTACTS

– POTENTIOMETRIC SURFACE MEASURED AUGUST–OCTOBER 2008



SCALE IN FEET
VERTICAL EXAGGERATION = 20X

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 04/29/09 | FILE: WestRef-B29

FIGURE 4
CROSS SECTION B-B'
NORTH TO SOUTH
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/21/09 | FILE: WestRef-B19

FIGURE 5
POTENTIOMETRIC SURFACE MAP
AUGUST 2008
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

LEGEND

- MW-1 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- RW-1 ◉ RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- OW 1+50 ◐ OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER
- CW 1+50 ◑ COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
- SW1-0206 ▲ SUMP WELL LOCATION AND IDENTIFICATION NUMBER
- P-2 PIEZOMETER IDENTIFICATION
- 5500 CONTOUR OF GROUNDWATER ELEVATION (FT MSL)
- 5502.5 GROUNDWATER ELEVATION (FT MSL) (AUGUST 2008) [MW-50 TO MW-54 MEASURED 10/28/2008]
- UNDER GROUND PIPE-WAY
- ABOVE GROUND PIPE-WAY
- SLURRY BARRIER WALL
- FORMER TANK LOCATION

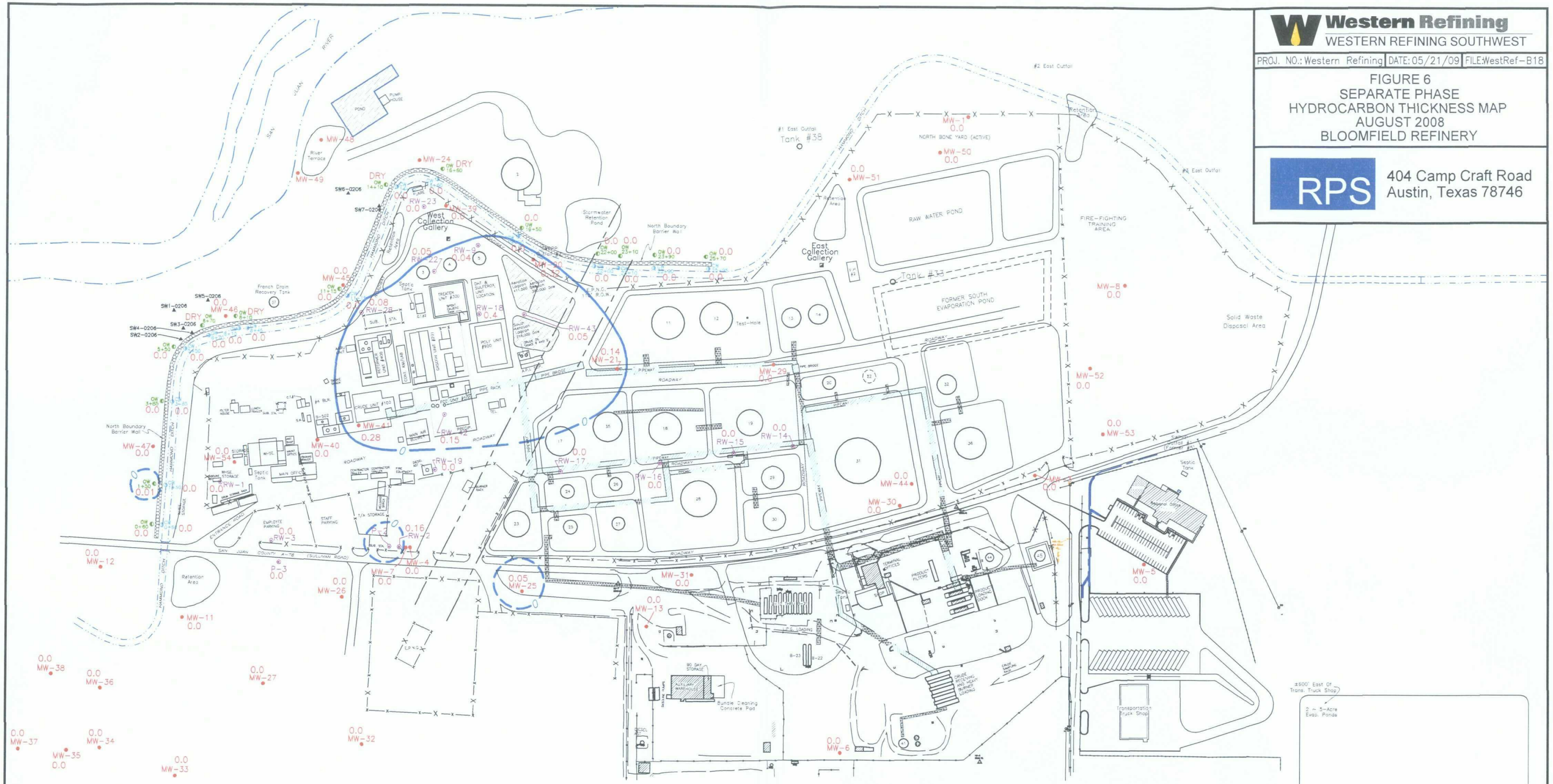
0 300
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 05/21/09	FILE: WestRef-B18

FIGURE 6
SEPARATE PHASE HYDROCARBON THICKNESS MAP
AUGUST 2008
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746



LEGEND

MW-1 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
RW-1 ⊕	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
OW 1+50 ◐	OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER
CW 1+50 ◍	COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
SW1-0206 ▲	SUMP WELL LOCATION AND IDENTIFICATION NUMBER
P-2	PIEZOMETER IDENTIFICATION
—0—	LNAPL THICKNESS CONTOUR (FT MSL)
0.15	APPARENT LNAPL THICKNESS IN WELL (FT)
	UNDER GROUND PIPE-WAY
	ABOVE GROUND PIPE-WAY
	SLURRY BARRIER WALL
	FORMER TANK LOCATION

0 300
SCALE IN FEET

Map Source: Western Refining Southwest, Inc. 2008 Facility–Wide Groundwater Monitoring Report, Fig 14.

N

0 360

APPROXIMATE SCALE IN FEET

Legend

- Monitoring Well
- Observation Well
- Recovery Well
- Collection Well
- Outfall
- Site
- Approximate Property Line

MW-38	- Well Id
< 0.001	- Benzene
< 0.001	- Toluene
< 0.001	- Ethylbenzene
< 0.0015	- Xylenes, Total
0.001	- MTBE

Notes:

All concentrations in milligrams per liter (mg/L)

NS[1] = Well is Dry or Not Enough Water to Sample- No sample

NS[2] = Sample Inadvertently not Collected this Sampling Event

NR[1] = No Sample Required - Well Contains Separate Phase Hydrocarbon

NR[2] = No Sample Required per OCD and NMED Conditions

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 05/25/09	FILE: WestRef-B32

FIGURE 7
DISSOLVED-PHASE GROUNDWATER DATA
AUGUST AND OCTOBER 2008
BLOOMFIELD REFINERY

RPS JDC
404 Camp Craft Road
Austin, Texas 78746

Aerial Map Source: Google Map.

LEGEND

SEEP 1 ◈	SEEP LOCATION AND IDENTIFICATION NUMBER
MW-24 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
RW-28 ⊙	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
OW 16+60 ◐	OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER
CW 16+60 ◑	COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
SW6-0206 ▲	SUMP WELL LOCATION AND IDENTIFICATION NUMBER

N

0 100
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 12/10/09 | FILE: WestRef-B49

FIGURE 8
AOC Nos. 19, 20 AND 21
SEEP LOCATION MAP
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

N

0 50

SCALE IN FEET

LEGEND

SEEP 1 SEEP IDENTIFICATION NUMBER

SURFACE SOIL SAMPLE LOCATION

SOIL BORING LOCATION

LINED CATCHMENT BASIN

DRAINAGE PATHWAY

Western Refining

WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 12/11/09 | FILE: WestRef-A38

FIGURE 9

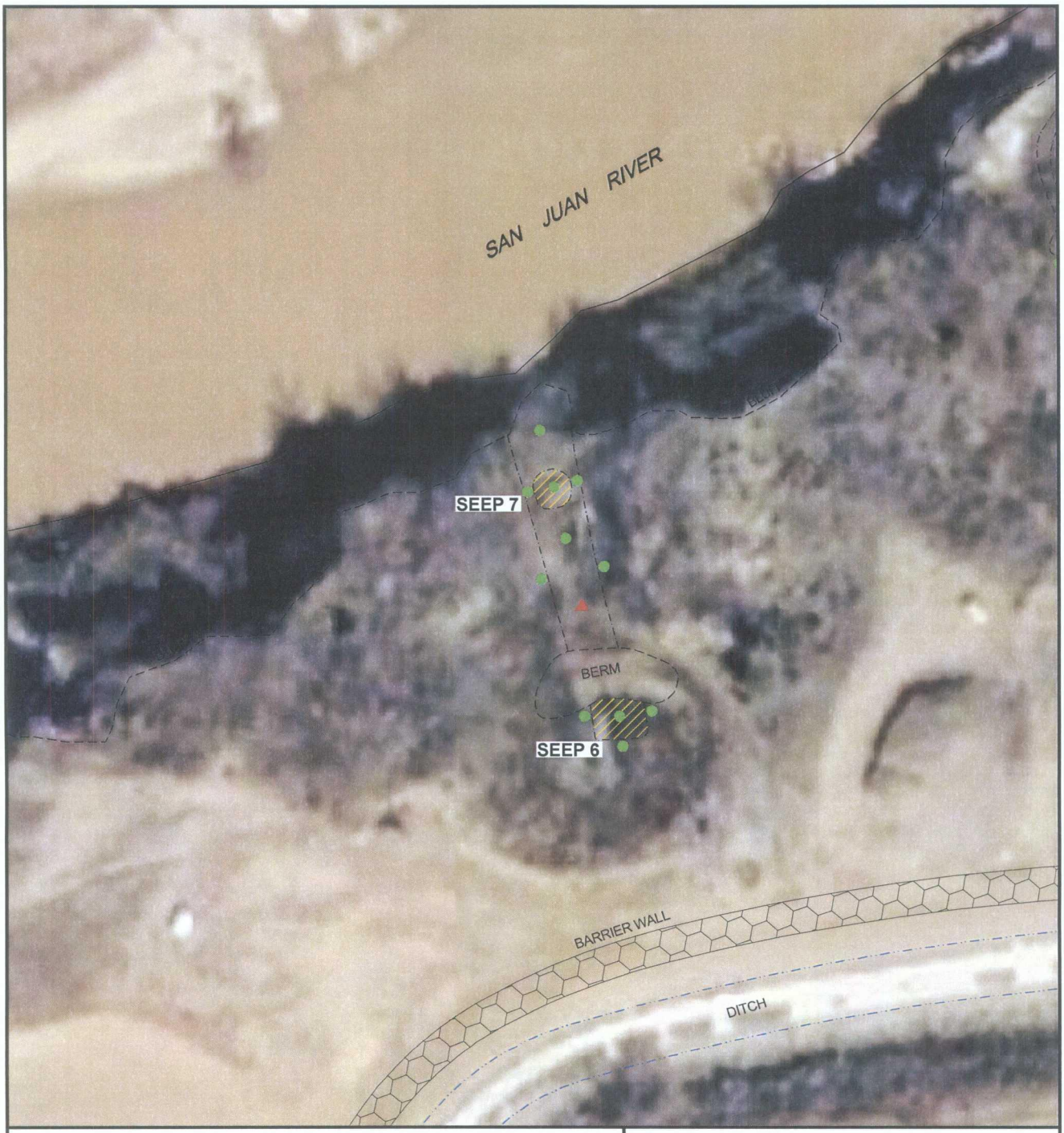
AOC No. 19

SAMPLE LOCATION MAP

BLOOMFIELD REFINERY

RPS

404 Camp Craft Road
Austin, Texas 78746



N

0 50

SCALE IN FEET

LEGEND

SEEP 6 SEEP IDENTIFICATION NUMBER

SURFACE SOIL SAMPLE LOCATION

SOIL BORING LOCATION

LINED CATCHMENT BASIN

DRAINAGE PATHWAY

Western Refining

WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 12/11/09	FILE: WestRef-A38

FIGURE 10

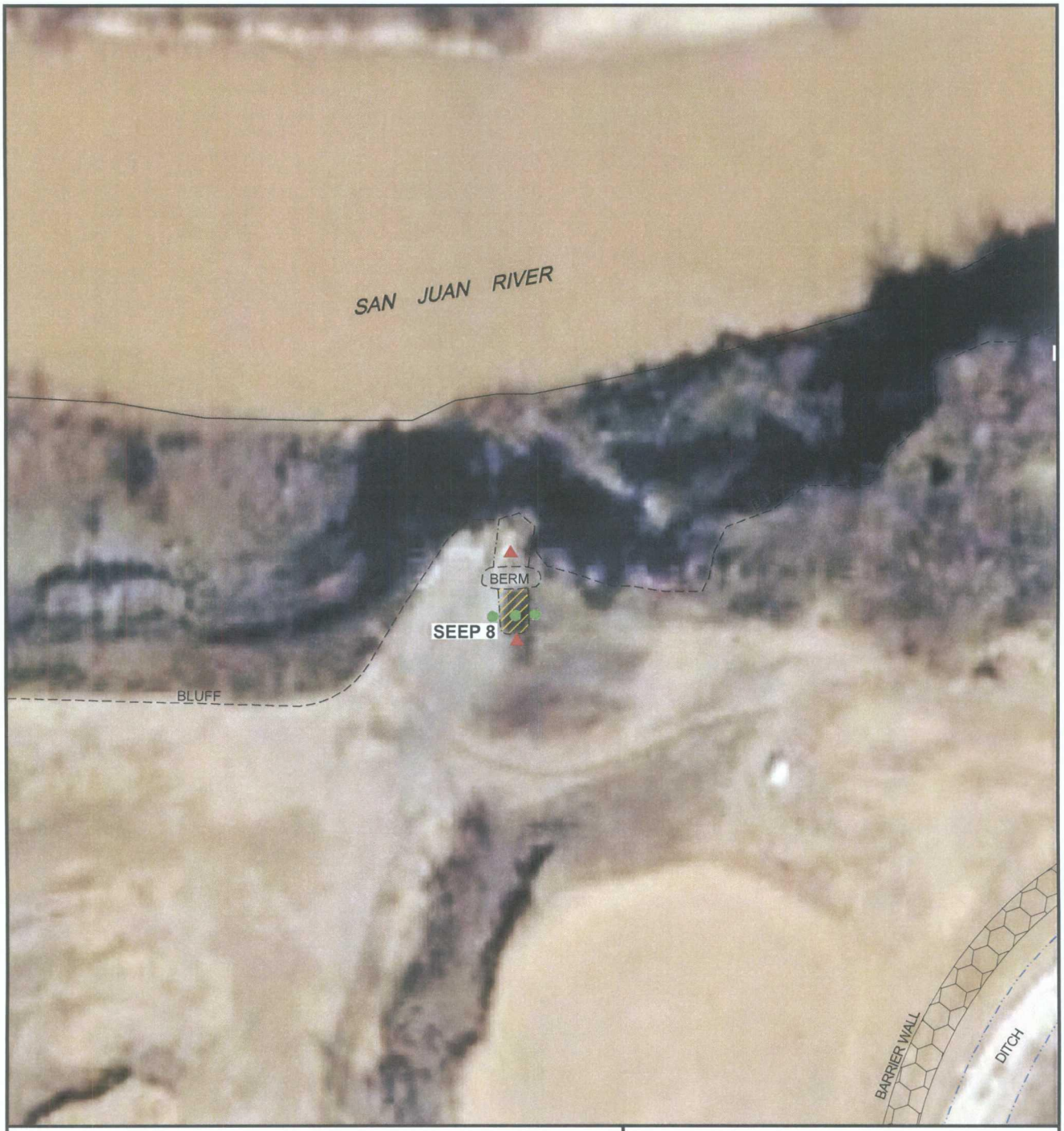
AOC No. 20

SAMPLE LOCATION MAP

BLOOMFIELD REFINERY

RPS

404 Camp Craft Road
Austin, Texas 78746



N

0 50
SCALE IN FEET

LEGEND

SEEP 8	SEEP IDENTIFICATION NUMBER
●	SURFACE SOIL SAMPLE LOCATION
▲	SOIL BORING LOCATION
▨	LINED CATCHMENT BASIN
- - - -	DRAINAGE PATHWAY

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 12/11/09	FILE: WestRef-A38

FIGURE 11
AOC No. 21
SAMPLE LOCATION MAP
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

Appendix A

Photographs


Google maps
bloomfield, NM
Search Maps
Show search options
Find businesses, addresses and places of interest
Print
Send
Link
Traffic
More...
Map
Satellite
Terrain
Show labels
Seep No. 4
Seep No. 3
Seep No. 2
Seep No. 9
Seep No. 7
Seep No. 1
Seep No. 8
Seep No. 5
Seep No. 6
100 ft
50 m
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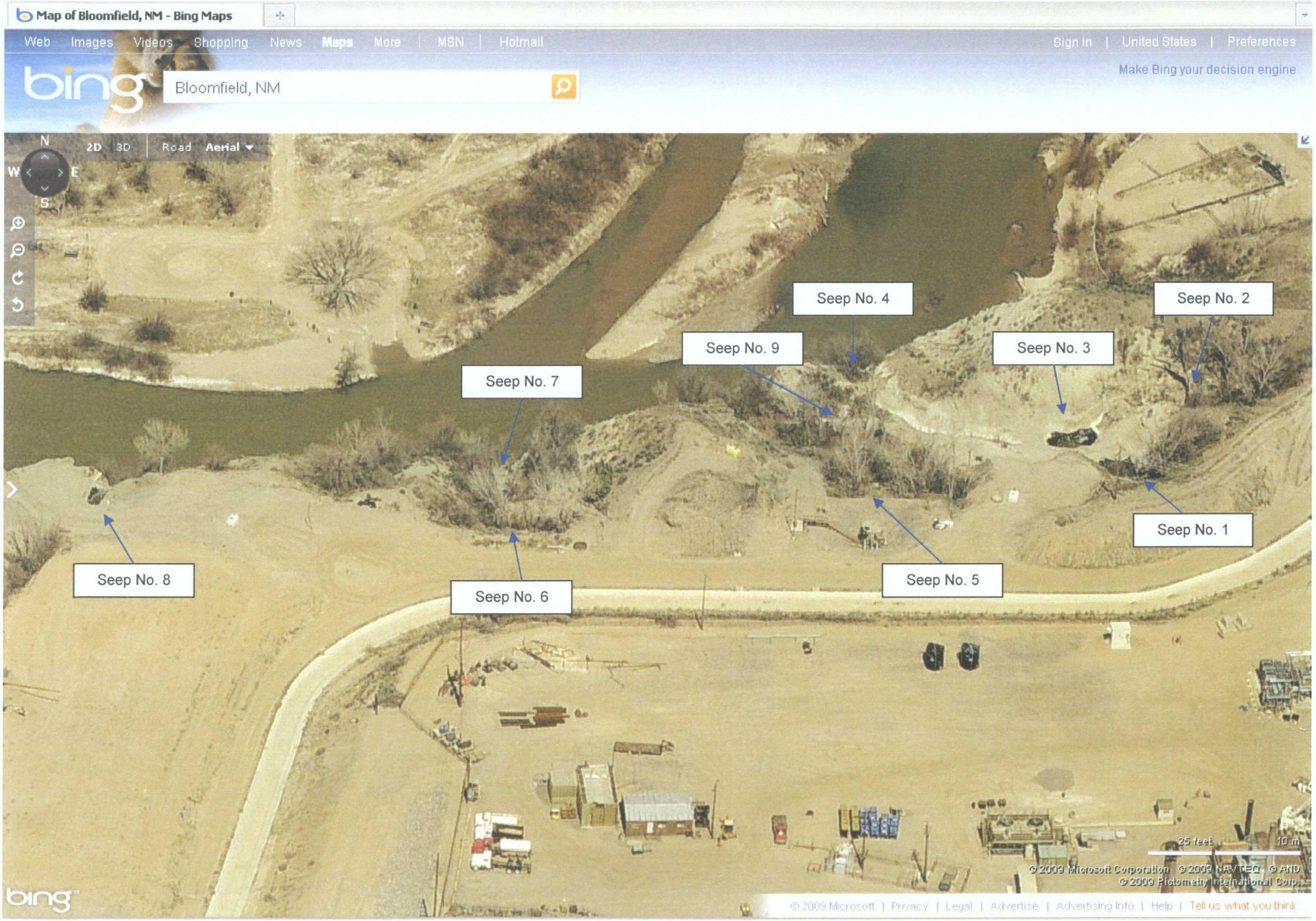
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S
2D 3D
Road Aerial
Seep No. 4
Seep No. 2
Seep No. 9
Seep No. 3
Seep No. 7
Seep No. 1
Seep No. 8
Seep No. 6
Seep No. 5
25 feet
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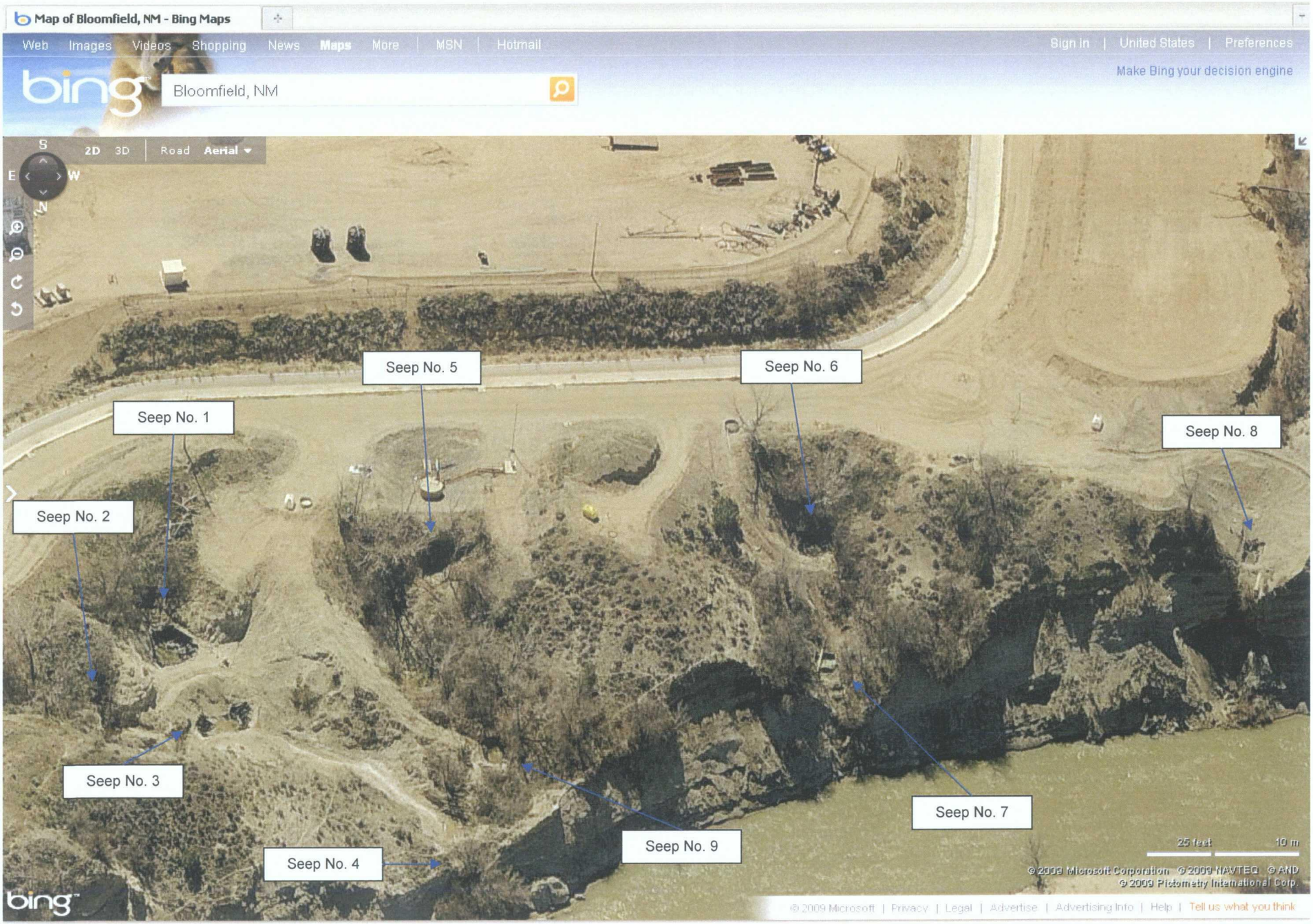
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Bloomfield, NM
2D 3D Road Aerial
Seep No. 1
Seep No. 2
Seep No. 3
Seep No. 4
Seep No. 5
Seep No. 6
Seep No. 7
Seep No. 8
Seep No. 9
25 feet 10 m
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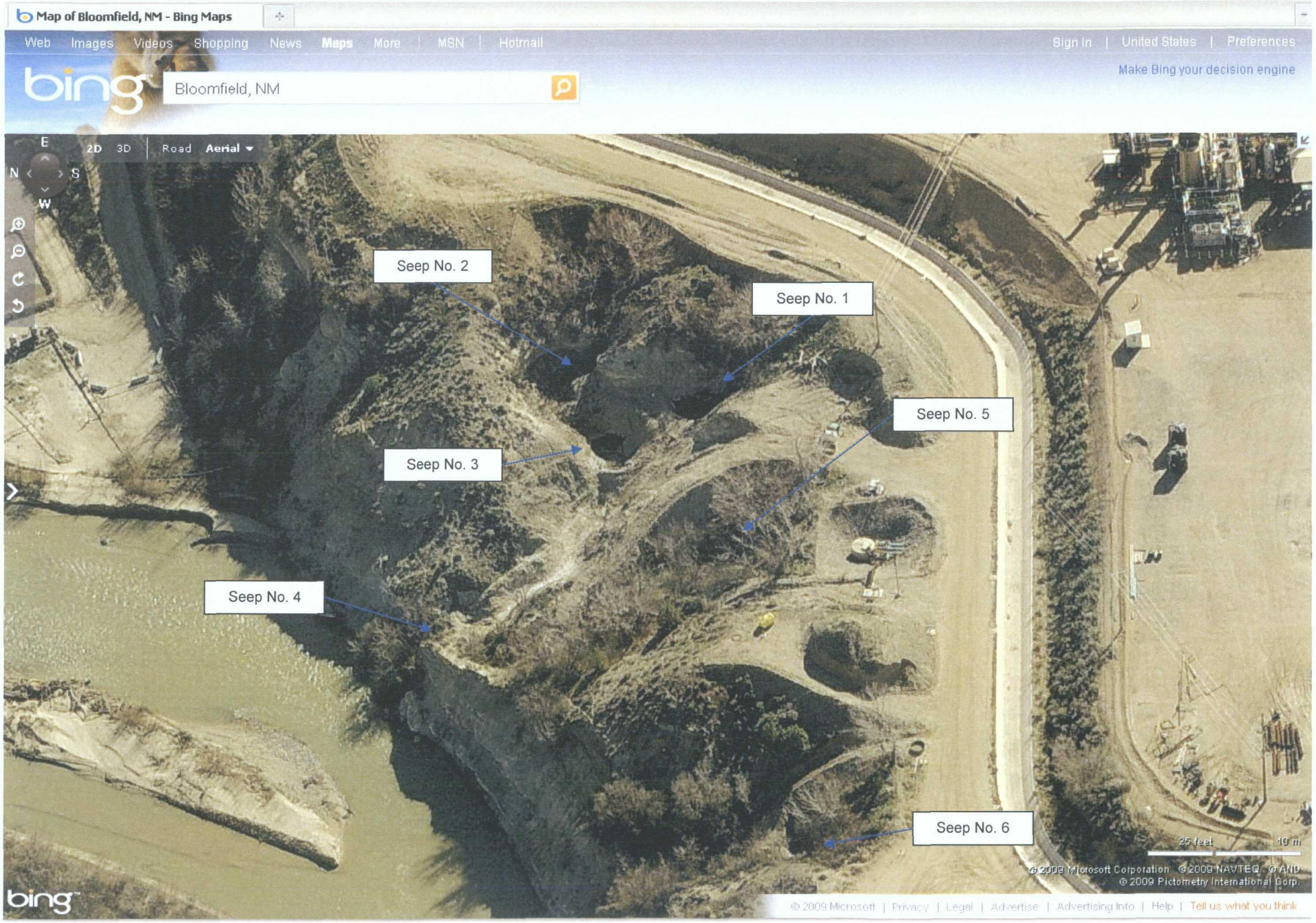
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Bloomfield, NM
2D 3D Road Aerial
Seep No. 2
Seep No. 1
Seep No. 5
Seep No. 3
Seep No. 4
Seep No. 6
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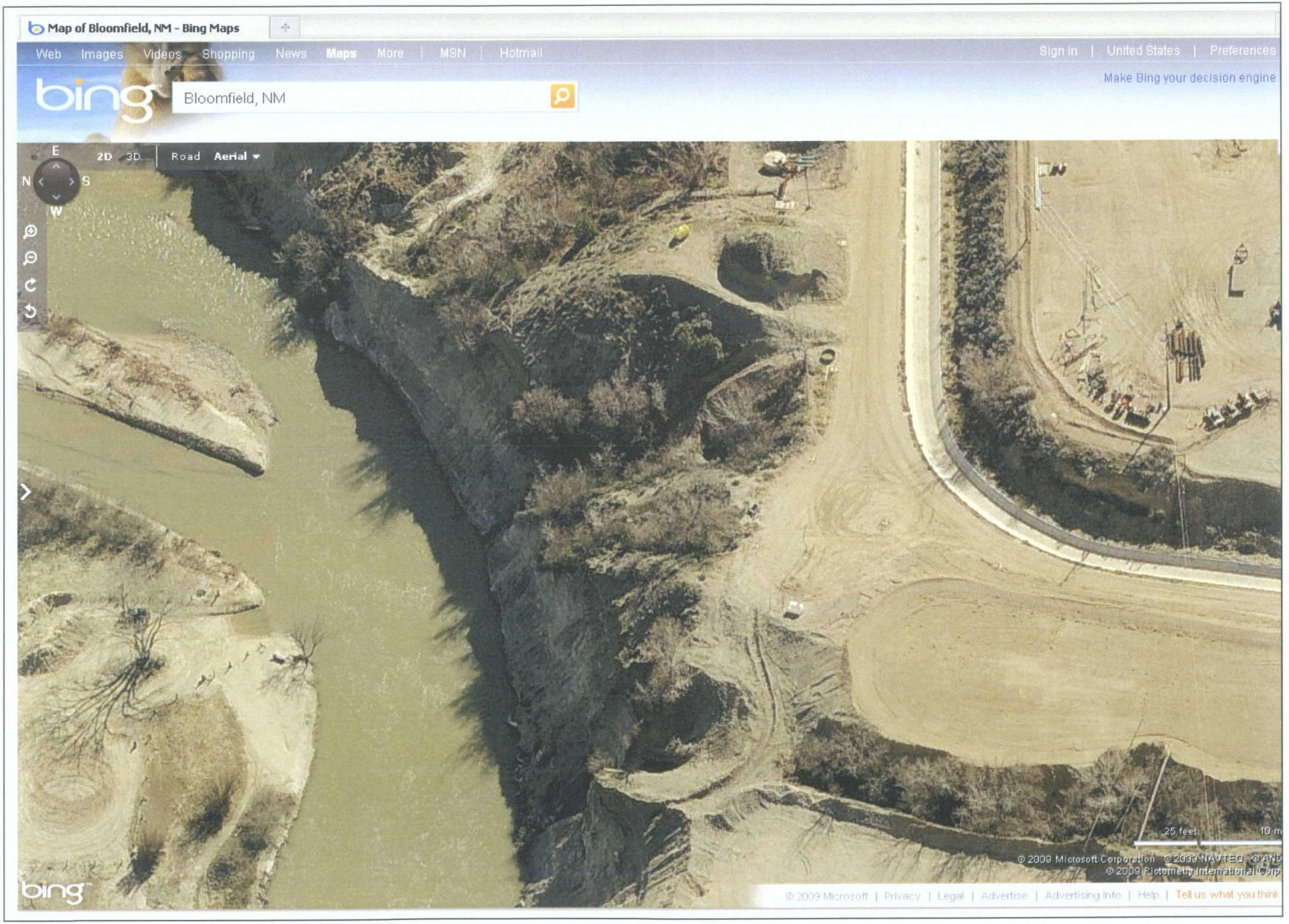
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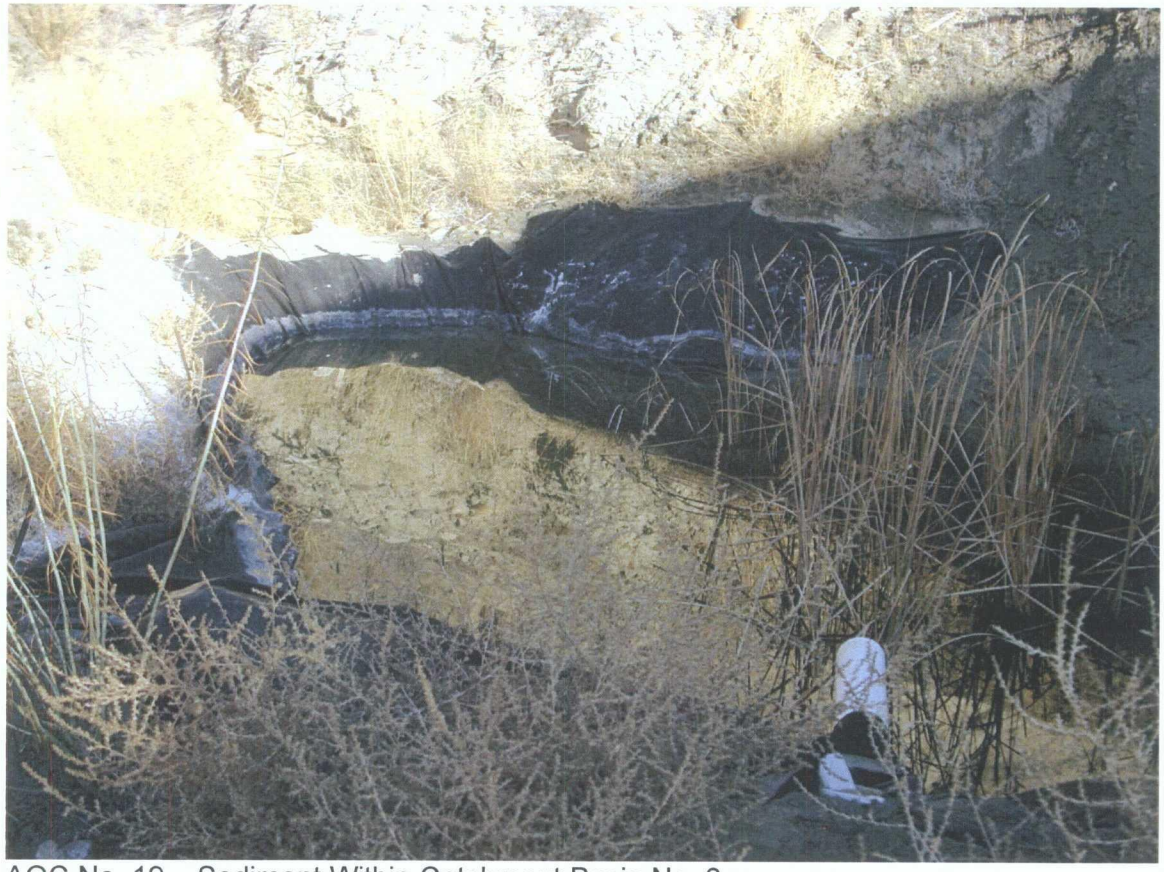
AOC No. 19 – Seep and Catchment Basin No. 1

AOC No. 19 – Seep No. 2



AOC No. 19 – Sediment Within Catchment Basin No. 3

AOC No. 19 – Looking Southeast Toward Catchment No. 3 from Catchment No. 4

AOC No. 19 – HDPE Liner of Seep No. 5 Catchment Basin

AOC No. 19 – Stained Soil in Bluff Face of Seep No. 5

AOC No. 19 – Exposed Liner at Seep No. 9

AOC 20 – Seep No. 6 With Water in Catchment Basin No. 6

AOC 20 – Looking North Toward Seep No. 7 From Berm Below Catchment Basin No. 6

AOC 20 – Seep No. 7 and Bluff Overlooking San Juan River

AOC 21 – Seep No. 8 (Below Wood Wall) and Liner of Catchment Basin No. 8

AOC 21 – Looking North Over San Juan River Bluff From Catchment Basin No. 8

Appendix B

Investigation Derived Waste (IDW) Management Plan

IDW Management Plan

All IDW will be properly characterized and disposed of in accordance with all federal, State, and local rules and regulations for storage, labeling, handling, transport, and disposal of waste. If soils are found to be non-hazardous and concentrations of constituents are less than the NMED residential soil screening levels, then soils may be reused on-site pursuant to the approval of the NMED. The IDW may be characterized for disposal based on the known or suspected contaminants potentially present in the waste. It is assumed that there are no listed wastes present in environmental media at any of the planned investigation areas.

A dedicated decontamination facility will be setup prior to any sample collection activities. The decontamination facility will be designed so as to capture and contain all decontamination fluids (e.g., wash water and rinse water) and foreign materials washed off the sampling equipment. The fluids will be pumped directly into suitable storage containers (e.g., labeled 55-gallon drums), which will be located at satellite accumulation areas until the fluids are disposed in the refinery wastewater treatment system upstream of the API separator. The solids captured in the decontamination facility will be shoveled into 55-gallon drums and stored at the designated satellite accumulation area pending proper waste characterization for off-site disposal.

Any solids generated (e.g., used soil cores) will be characterized by testing to determine if there are any hazardous characteristics in accordance with 40 Code of Federal Regulations (CFR) Part 261. This includes tests for ignitability, corrosivity, reactivity, and toxicity. If the materials are not characteristically hazardous, then further testing will be performed pursuant to the requirements of the facility to which the materials will be transported. Depending upon the results of analyses for individual investigation soil samples, additional analyses may include TPH and polynuclear aromatic hydrocarbons. All miscellaneous waste materials (e.g., discarded gloves, packing materials, etc.) will be placed into the refinery's solid waste storage containers for off-site disposal.