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REPORTS

HWB CO SWMU Grp. No. 5 Investigation Work Plan

6/25/2009

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
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Phone (505) 476-6000 Fax (505) 476-6030
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DAVE MARTIN
Secretary

BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

November 4, 2011

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

RE: APPROVAL WITH MODIFICATIONS
INVESTIGATION REPORT GROUP 5 (SWMU NO. 15 TANK FARM AREA)
WESTERN REFINING SOUTHWEST INC., BLOOMFIELD REFINERY
EPA ID# NMD089416416
HWB-WRB-11-006

Dear Mr. Schmaltz:

The New Mexico Environment Department (NMED) has received Western Refining Southwest, Inc., Bloomfield Refinery's (Western) *Investigation Report Group 5 (SWMU No. 5 Tank Farm Area)* (Report) dated July 2011. NMED has reviewed the Report and hereby issues this Approval with the following modifications.

1. Section 3.2 (Background Information Research), page 9:

Western's Statement: "[d]ocuments containing the results of previous investigations and subsequent routine groundwater monitoring data from monitoring wells were reviewed to facilitate development of the Group 5 Investigation Work Plan. The previously collected data provides valuable information on the overall subsurface conditions, including hydrogeology and contaminant distribution within groundwater. The data collected under this investigation supplements the historical groundwater data and provide SWMU-specific information regarding contaminant occurrence and distribution within soils and groundwater."

NMED's Comment: In future work plans and reports, provide references and citations for all investigations used as background information for work plans and reports. Provide the reference for the investigation mentioned in the statement in a response letter.

2. **Section 4.3 (Exploratory Drilling Investigations, Soil Sampling and Boring Abandonment, SWMU 15-12), page 17:**

Western's Statement: "[t]he PID readings were low (2.3-3.2 ppm) over the upper eight feet but increased to 280 in the 10 to 12' interval and reached a maximum value of 1,325 ppm in the 14 – 16' interval. The PID reading decreased to 235 ppm in the 18 to 20' interval."

NMED's Comment: The 18-20 foot depth exhibited a PID reading of 235, but Western did not continue to advance the boring past this depth. In the response letter, explain why the boring was not advanced deeper than 20 feet or until the Nacimiento Formation was encountered. In all future investigations, if the field screening evidence indicates increasing or relatively high levels of contamination, Western must continue to advance the soil boring beneath the water table, until field screening indicates decreasing contaminant levels or until the drilling equipment hits refusal, or explain why drilling was discontinued.

3. **Section 4.3 (Exploratory Drilling Investigations, Soil Sampling and Boring Abandonment, SWMU 15-13), page 17:**

Western's Statement: "[a] maximum PID reading of 1,727 ppm was recorded from a depth of 12 to 14'. A silt deposit present from the land surface to a depth of eight feet graded to clayey silt, which persisted to a depth of 12' bgl. Silty sand is present from 12 to 16' bgl and grades to gravelly sand, which continued to the termination depth of 28' bgl."

NMED's Comment: Detected VOC concentrations decreased with depth in several of the borings exhibiting high PID readings. In the response letter, state whether or not boring SWMU 15-13 followed this same trend. In future work plans and reports, include discussions of all field screening information in the appropriate sections of the documents.

4. **Section 7.2 (Recommendations), page 40:**

NMED Comment: Western recommends reassessing the analytical data from the SWMU No. 15 investigation with the background values established by the background study that was completed in the summer of 2011. Western recommends additional delineation in the vicinity of soil boring locations SWMU 15-6, 15-11, 15-12, and 15-13. Western must provide a work plan to conduct additional investigation at SWMU 15. At a minimum, the work plan must propose additional investigation to the water table beneath the site and must propose the collection of soil samples for analysis of volatile organic compounds (VOCs), semi-volatile organic compounds

(SVOCs), Skinner List Metals, diesel range organics (DRO), gasoline range organics (GRO), motor oil range organics (MRO), and general chemistry. In addition, if groundwater is encountered, groundwater samples must be collected and analyzed with the same analytical suite as the soil samples as well as cyanide, and dissolved iron and manganese. If separate phase hydrocarbons are encountered, Western must collect a sample for fuel fingerprint analysis to characterize the product.

5. Section 7.2 (Recommendations), page 41:

Western's Statement: "[w]ith the combination of groundwater data collected from previously existing wells and the new groundwater samples recently collected, the impacts to groundwater within the tank farm have been adequately characterized to support final remedy selection. No further investigation of groundwater within the tank farm is recommended at this time."

NMED's Comment: Western asserts that previous and current data have adequately characterized the groundwater in the SWMU that supports their final remedy. However, Western does not discuss a remedy or reference a submittal with plans for a remedy. Provide a discussion regarding potential remedies in the response letter.

6. Table 1 (Historical Subsurface Soil Vapor Concentrations):

NMED's Comment: Western provides a table summarizing the historical subsurface soil vapor concentrations from a previous investigation, but a reference document is not cited. Provide replacement pages for the tables with the response letter that provides the reference in the table notes.

7. Table 2 (Historical Groundwater Analyses):

NMED's Comment: Table 2 provides a summary of the historical groundwater data. In several cells of the table, "--" was not defined. In future documents, define all symbols in all tables.

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9. **Figures 4 (Cross Section A-A', West to East), 5 (Cross Section B-B', North to South), and 6 (Cross Section C-C', North to South):**

NMED's Comment: Figures 4, 5, and 6 are missing screened intervals for the following monitoring wells, MW-1, MW-3, MW-5, MW-6, MW-41, MW-42, MW-44, MW-52, and RW-42. Provide replacement pages with the missing information and ensure all well information is available on all figures in future documents.

10. **Appendix B (Survey Data):**

NMED's Comment: Appendix B provides survey data for the soil borings and new monitoring wells from the investigation. However, in Section 3.4 (Surveys), Western does not discuss the survey point locations for the new monitoring wells (e.g., north side of the PVC casing or the highest location on the PVC casing). In future documents, Western must describe the location of the measuring points for all monitoring wells.

Western must address all comments required by this Approval with Modifications. A letter containing the required responses and replacement pages must be submitted to NMED on or before **February 13, 2012**. Western must submit a work plan for the additional investigations to NMED on or before **March 19, 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
Acting Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
L. Tsinnajinnie, NMED HWB
C. Chavez, OCD
A. Hains, Western Refining Company, El Paso, Texas

File: HWB-WRB-11-006 and Reading 2011

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Sincerely,

for

John E. Kieling
Acting Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
L. Tsinnajinnie, NMED HWB
C. Chavez, OCD
A. Hains, Western Refining Company, El Paso, Texas

File: HWB-WRB-11-006 and Reading 2011

Western Refining

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August 3, 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

Certified Mail #: 7010 1870 0002 6760 0245
Certified Mail #: 7010 1870 0002 6760 0252

Re: Group 5 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 SWMU No. 15 Tank Farm Area, which has been designated as Group 5.

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

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INVESTIGATION REPORT
GROUP 5

(SWMU No. 15 Tank Farm Area)

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

July 2011

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

Scott T. Crouch, P.G.
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RPS
404 Camp Craft Rd.
Austin, Texas 78746

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List of Appendices

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 augering (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)
recovery well (RW)
separate phase hydrocarbon (SPH)
Solid Waste Management Units (SWMUs)
total petroleum hydrocarbon (TPH)
total volatile organic content (TVOC)
toxicity characteristic leaching procedure (TCLP)
unified soil classification system (USCS)
volatile organic constituent (VOC)
Water Quality Control Commission (WQCC)

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 SWMU No. 15 (Tank Farm Area), which is designated as Group 5.

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 SWMU. The investigation activities included collection and analysis of soil and groundwater samples for potential site-related constituents beginning on August 19, 2010 and continuing through December 1, 2010. This included the completion of 25 soil borings with 55 soil samples (excluding additional quality assurance samples) collected for analysis of potential site-related constituents (e.g., volatile and semi-volatile organics, total petroleum hydrocarbons, and metals). Two of the 25 soil borings were completed as permanent monitoring wells, one boring was completed as a piezometer, and temporary well completions were installed in two additional borings to allow collection of groundwater samples. Five groundwater 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, metals, and inorganic/general water quality parameters).

Four metals (arsenic, chromium, cobalt, and mercury), 11 organic constituents (1,1,2-trichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, benzene, bromodichloromethane, chloromethane, ethylbenzene, naphthalene, and xylenes), and diesel and motor oil range organics were detected in soil samples at concentrations exceeding their respective screening levels, although some exceed only the residential screening levels. Most of the soil samples with constituents detected at concentrations above the screening levels (excluding arsenic, chromium, cobalt, and chloromethane) are located in the southwest portion of the tank farm near Tanks 25, 26, and 27.

Two other locations of potential concern were identified near Tank 20 and Tank 31. The samples collected near Tanks 25, 26, and 27 indicate the greatest impacts at depths greater than four feet and the results are consistent with the subsurface soil vapor samples collected during the Resource Conservation and Recovery Act (RCRA) facility investigations in the early 1990s, which show the greatest impacts in the southwest portion of the tank farm.

More than half of the 21 metals for which analyses were conducted in groundwater samples were detected at concentrations above the screening levels in groundwater samples collected from the two temporary well completions in borings near Tanks 11 and 12, and Tank 26. It is possible that these results are affected by high turbidity levels in these water samples. Manganese was the only metal detected above the screening levels in water samples collected from permanent monitoring well MW-68. The other permanent monitoring well (MW-69) was dry during both attempted sampling events. The majority of the organic constituents (e.g.,1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, benzene, naphthalene, xylenes, and TPH) and inorganic constituents (e.g., chloride and total dissolved solids) with concentrations above screening levels were detected in groundwater samples collected from borings located between Tanks 11 and 12 and near Tank 26. No organic constituents were detected at concentrations above screening levels in groundwater samples collected at MW-68 (located on north side of tank farm). Only benzene was found above screening levels in a groundwater sample collected from the piezometer installed near Tanks 13 and14, although it did have a reduced list of constituents reported as it was not part of the investigation conducted pursuant to the Group 5 Investigation Work Plan. Earlier analyses of groundwater samples collected from existing monitoring and recovery wells have shown impacts by petroleum hydrocarbons across much of the refinery tank farm and the new analyses generally tend to confirm previous investigations.

Additional delineation of potential impacts in soils is recommended near Tanks 20, 25, 26, 27, and 31. With the combination of groundwater data collected from previously existing wells and the new groundwater samples recently collected, the impacts to groundwater within the tank farm have been adequately characterized to support final remedy selection. No further investigation of groundwater within the tank farm is recommended at this time.

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 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 Solid Waste Management Unit (SWMU) designated as Group 5 in the Order. Group 5 includes only SWMU No. 15 - Tank Farm Area.

The area of investigation that is the subject of this report is shown on Figure 2. Group 5 – SWMU No. 15 is located in the tank farm on the eastern portion of the refinery property, north of County Road 4990.

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 soils and groundwater as those are the environmental media in these areas that may potentially contain contaminants. The investigation was completed pursuant to the Investigation Work Plan dated June 2009 (revised July 2010), which was approved by the NMED on July 19, 2010, with a few borings drilled deeper based on field conditions, which are discussed in Sections 4.3 and 4.4. Western also chose to drill boring SWMU 15-1 deeper although screening of soils did not require that this boring be extended.

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

Section 2
Background

This section presents background information for Group 5, including a review of historical waste management activities for each location to identity the following:

- Type and characteristics of waste and contaminants handled in SWMU No. 15;
- Known and possible sources of impacts;
- History of releases; and
- Known extent of impacts prior to the current investigation.

2.1 SWMU No. 15 Tank Farm Area

The crude oil and product storage tanks were constructed when the refinery was built in the late 1950s. There is no information available on exactly which tanks were first constructed or what materials were stored in each tank but the tank farm has always been located in the same general area and has only been used to store crude oil and refined petroleum products. The main portion of the tank farm lies just east of the processing units and along the north side of County Road #4990. In addition, there are three smaller tanks located on the north side of the processing units that are identified as SWMU No. 14 Tanks 3, 4, and 5 but these tanks are not part of the Group 5 investigation.

When petroleum refining operations were suspended in November 2009, there were 17 tanks used to store petroleum products and three tanks used to store crude oil in SWMU No. 15. One additional tank (Tank #22), which was used to store gasoline, had previously been removed from the Refinery. A list of each of the tanks with the current status of the tank and the type of material stored in each is included in Table 11.

There have been several documented surface spills within the tank farm, as described below:

- 1984 – 880 barrels of naphtha spilled within tank dike (individual tank not specified) with 800 barrels recovered;

- 1985 – 400 barrels of unleaded gasoline released and all but 20 barrels recovered, location not specified other than within tank farm;

- 1985 – 140 barrels of diesel spilled inside the diked area around Tank 19 with 60 barrels recovered;

- 1986 – 20 barrels of naphtha spilled with over 19 barrels recovered, no specific location;

- 1987 – 290 barrels of regular gasoline spilled with "most" reported as recovered, no specific location;
- 1989 – 100 barrels of unidentified product spilled at Tank 22 with 99+ barrels recovered;
- 1991 – 180 barrels of Jet A spilled at Tank 26 with 120 barrels recovered; and
- 2008 – 20 barrels of diesel/water mix spilled at Tank 18 with 16 barrels recovered.

Additional possible sources of releases within the tank farm are leaks from the bottom of storage tanks. Based on the permeable nature of the subsurface soils and general lack of laterally continuous low permeable strata within the tank farm, it is likely that leaks from tank floors would migrate vertically and have little, if any, expression in soils beyond the footprint of the tank. Tanks with possible integrity concerns identified from inspection of the floors include Tanks 17, 18, 19, 20, 23, 24, 25, 26, 29, 30, and 31. The roof drain collection system between Tanks 11 and 12 has also been identified as a potential area of concern. Tanks 11 and 12 are constructed with a roof drain connection that is equipped with a manually operated valve. A hose connects to the roof drain of each tank and discharges to the common below-grade concrete sump that is located between the two tanks.

Past investigations completed as part of the RCRA Facility Investigation conducted pursuant to the Administrative Consent Order issued on April 10, 1992 by the United States Environmental Protection Agency evaluated potential impacts to soil and groundwater at the tank farm area. The soil investigation consisted of a soil gas survey, which included the installation of 33 borings within and near the tank farm area (Figure 3). Soil gas samples were collected from two depth horizons, shallow (3 to 4 feet) and deep (7.5 to 10 feet). The samples were analyzed using a portable gas chromatograph for benzene, toluene, ethylbenzene, and xylene (BTEX) and for total volatile organic content (TVOC). The results for the samples collected in the area of the tank farm are provided in Table 1. Most of the samples contained very low to non-detect concentrations of volatile organics with the highest levels measured in the deeper sample interval in the southwestern portion of the tank farm at locations PH-22, PH-24, and PH-25, which are near Tanks 24, 25, and 27.

Impacts to groundwater within the tank farm were documented in the 1980s and recovery wells (RW-14, RW-15, RW-16, and RW-17) were installed in August, 1990. Additional monitoring wells (MW-21, MW-29, MW-30, and MW-44) were installed in 1994 and 1998 within the tank farm to further delineate impacts to groundwater. The locations of these wells are shown on Figure 3 and the historical analytical results from groundwater samples collected from these wells are summarized in Table 2 (Western Refining Southwest, Inc., 2009).

Section 3
Scope of Activities

3.1 Soil Boring, Monitoring Well Installation and Sample Collection

Pursuant to Section IV of the Order, an investigation of soils and groundwater was conducted to determine and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, soil borings and monitoring wells were installed at SWMU No. 15 – Tank Farm Area (Figure 8).

As outlined in the work plan, there is the potential for constituents to have been released to soils at known locations at SWMU No. 15 and therefore a judgmental sampling design was implemented. Examples of these areas include documented spills that accumulated in low areas within tank dikes and areas with previous subsurface soil vapor samples indicating the presence of petroleum hydrocarbons.

Six ten-foot soil borings were proposed for locations that have documented spills from individual tanks (Tanks 18, 19, 26, the former location of Tank 22, the roof drain collection area between Tanks 11 and 12) and the location with the highest subsurface soil vapor concentrations at Tank 27. The six ten-foot soil borings were proposed to be drilled to a minimum depth of ten feet, or five feet below the deepest detected contamination, whichever was deeper, unless saturation was encountered at a shallower depth which would result in termination of the soil sample collection.

In accordance with the work plan, the following soil borings were installed to a depth of 10 feet using hollow-stem augering (HSA) drilling and sampling methodology:

- SWMU 15-4 – This boring is located southeast of Tank 18. It was advanced to a depth of 10 feet below ground level (bgl). Two soil samples were collected from 0.5 – 1.5 feet and 2 – 3 feet.

- SWMU 15-5 – This boring is located northeast of Tank 19. It was advanced to a depth of 10 feet bgl. Two soil samples were collected from 0.5 – 2 feet and 8 – 10 feet.

- SWMU 15-6 – This boring is located southwest of Tank 20, near the former location of Tank 22. It was advanced to a depth of 10 feet bgl. Two soil samples were collected from 0.5 – 2 feet (with duplicate) and 8 – 10 feet.

Because of field evidence (e.g., elevated organic vapor readings and hydrocarbon odors) indicating potential impacts extending below 10 feet, the following soil borings were installed at depths greater than 10 feet using HSA drilling and sampling methodology:

- SWMU 15-2 - This boring is located between Tanks 11 and 12. It was advanced to a depth of 19 feet bgl. Soil samples were collected from the following intervals: 0.5 – 2 feet, 4 – 6 feet, and 10 -14 feet. A groundwater sample was collected from this boring after the installation of a temporary monitoring well.

- SWMU 15-12 – This boring is located south of Tank 27. It was advanced to a depth of 20 feet bgl, at which point moisture levels began to increase. Three soil samples were collected from the following intervals: 0.5 - 2 feet, 14 – 16 feet and 18 – 20 feet.

- SWMU 15-13 – This boring is located south of Tank 26. It was advanced to a depth of 28 feet bgl. Three soil samples were collected from the following intervals: 0.5 – 2 feet; 12 – 14 feet and 22 – 25 feet. A groundwater sample was collected from this boring after the installation of a temporary monitoring well.

Seventeen soil borings for SWMU No. 15 were proposed to terminate at a depth of three feet if completed by hand auger or at a depth of six feet if installed with a drilling rig. The decision to use a hand auger versus a drilling rig was based on accessibility. The borings went deeper when Western elected to extend the sampling deeper based on field screening results. The following soil borings were installed to a depth of three feet using a hand auger.

- SWMU 15-19 – This boring is located southwest of Tank 24. Two soil samples were collected from 0.5 – 2 feet (with duplicate) and from 2 – 3 feet.

- SWMU 15-20 – This boring is located northwest of Tank 17. Two soil samples were collected from 0.5 – 2 feet and from 2 – 3 feet.

- SWMU 15-21 – This boring is located northwest of Tank 29. Two soil samples were collected from 0.5 – 2 feet and from 2 – 3 feet.

- SWMU 15-23 – This boring is located south of Tank 32. Two soil samples were collected from 0.5 – 2 feet (with duplicate) and from 2 – 3 feet.

- SWMU 15-24 – This boring is located southwest of Tank 30. Two soil samples were collected from 0.5 – 2 feet and from 2 – 3 feet.

- SWMU 15-25 – This boring is located southeast of Tank 23. Two soil samples were collected from 0.5 – 2 feet and from 2 – 3 feet.

The following soil borings were installed to a depth of six feet using the HSA drilling and sampling method.

- SWMU 15-3 – This boring is located northeast of Tank 35. Two soil samples were collected from 0.5 – 2 feet and 2 – 4 feet.

- SWMU 15-7 – This boring is located northwest of Tank 31. Two soil samples were collected from 0.5 – 2 feet and 2 – 4 feet.

- SWMU 15-8 – This boring is located southwest of Tank 31. Three soil samples were collected from 0 – 0.5 feet, 0.5 – 2 feet, and 2 – 4 feet.

- SWMU 15-9 – This boring is located northwest of Tank 36. Two soil samples were collected from 0.5 – 2 feet and 4 – 6 feet (with duplicate).

- SWMU 15-10 – This boring is located northeast of Tank 23. Two soil samples were collected from 0.5 – 2 feet and 4 – 6 feet.

- SWMU 15-14 – This boring is located northeast of Tank 28. Two soil samples were collected from 0.5 – 2 feet and 2 – 4 feet.

- SWMU 15-15 – This boring is located east of Tank 29. Two soil samples were collected from 0.5 – 2 feet and 2 – 4 feet.

- SWMU 15-16 – This boring is located southwest of Tank 29. Two soil samples were collected from 0.5 – 2 feet and 2 – 4 feet.

- SWMU 15-17 – This boring is located northwest of Tank 28. Two soil samples were collected from 0.5 – 2 feet and 2 – 4 feet.

The following two soil borings were designated to be installed to a depth of six feet using the HSA drilling and sampling method; however, they were drilled deeper as described below:

- SWMU 15-1 – This boring is located on the south side of Tanks 13 and 14. Two soil samples were collected from 0.5 – 2 feet and 2 - 4 feet. Although there was no field evidence of impacts in the upper six feet or to even deeper soils, Western chose to drill to groundwater (total depth of 24 feet) in an effort to determine groundwater conditions in this area. Saturation was encountered at 14 feet bgl. The Nacimiento Formation was encountered at 22 feet bgl. A 2-inch temporary well screened was installed at this location from 7.5 to 22.5 feet bgl. A groundwater sample was collected.

- SWMU 15-11 – This boring is located southwest of Tank 25. During sampling in the upper six feet, elevated photoionization detector (PID) readings were observed and the boring was continued beyond the designated six feet to a depth of 18 feet. Three soil samples were collected from 0.5 – 2 feet, 4 - 6 feet and 16 – 18 feet.

The following two remaining soil borings were drilled and sampled using the HSA method and were subsequently converted to monitoring wells:

- SWMU 15-18 – This boring is located north of the tank dike for Tanks 13 and 14. The boring was advanced to a depth of 18 feet. Two soil samples were collected from 1.5 – 2 feet and 12 – 14 feet. Monitoring well MW-68 was installed at this location. The well was developed in accordance with the approved Investigation Work Plan and all soil and groundwater samples were collected pursuant to the approved Investigation Work Plan.

- SWMU 15-22 – This boring is located on the north side of the Hammond ditch approximately 220 feet north of SWMU 15-18 (MW-68). Two soil samples were collected from 0.5 – 2 feet and 2 – 4 feet. Monitoring well MW-69 was installed at this location even though no saturated interval was encountered above the Nacimiento Formation. No groundwater was available to allow collection of a sample.

3.2 Background Information Research

Documents containing the results of previous investigations and subsequent routine groundwater monitoring data from monitoring wells were reviewed to facilitate development of the Group 5 Investigation Work Plan. The previously collected data provides valuable information on the overall subsurface conditions, including hydrogeology and contaminant distribution within groundwater. The data collected under this investigation supplements the historical groundwater data and provide SWMU-specific information regarding contaminant occurrence and distribution within soils and groundwater.

3.3 Collection and Management of Investigation Derived Waste

Drill cuttings, excess sample material and decontamination fluids, and all other investigation derived waste (IDW) associated with soil borings were contained and characterized using methods based on the boring location, boring depth, drilling method, and type of contaminants suspected or encountered. Because the soils were all collected from within one SWMU and the material is very uniform in character (e.g., no visible or olfactory differences), one discrete sample was collected for waste characterization using a decontaminated stainless-steel spoon. Additional discussion on management of IDW is presented in Appendix A. The sample was 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). The laboratory analytical report (Order No. 1011439) is included in Appendix F.

The non-hazardous soil (approximately 2.0 cubic yards) was sent to the Envirotech Inc. Soil Remediation Facility in Hill Top, NM. All purged groundwater and decontamination water (approximately 220 gallons) was disposed in the refinery wastewater treatment system upstream of the American Petroleum Institute (API) Separator.

3.4 Surveys

Known site features and/or site survey grid markers were used as references to locate each boring as part of the field documentation prior to surveying the location. The boring locations were measured to the nearest foot and locations were placed on a scaled map. In addition, a hand held GPS receiver was used to record the coordinates of each soil boring. 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 boring, the top of each monitoring well casing, and the ground surface at each monitoring well location; 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 SWMU 15. A discussion is included on the installation of soil borings, field screening of soils, and collection of soil samples for analysis. This is followed by a description of the installation of permanent and temporary well completions and the collection of groundwater samples. Groundwater and surface water conditions are described, followed by a discussion on field screening of vadose zone soil vapors.

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 portion of the refinery property where the process units, tank farm (SWMU No. 15), and raw water ponds 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, 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 property, 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 and minor groundwater discharges. The only surface water flowing across SWMU No. 15 is precipitation that falls directly on this area and the tank dikes control surface water flow.

The refinery complex is bisected by County Rd #4990 (Sullivan Road), which runs east-west. The process units, SWMU No. 15 (crude oil and liquid products storage tanks), wastewater treatment system, raw water ponds, fire training area, and both landfills 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

Class I injection well are located south of the county road. There is very little vegetation throughout any of 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 slopes that are not too steep to support vegetation. The land surface at SWMU No. 15 is mostly bare dirt and gravel.

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. Nineteen soil borings were completed using hollow-stem augers under this scope of work for Group 5, two of which were completed as permanent monitoring wells.

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 near thick near the southeast portion of the site and generally thins to the northwest toward the San Juan River. The depth to the Nacimiento within SWMU No. 15 is approximately 35 to 40 feet. 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, 1994).

Figures 4, 5, and 6 present cross-sections of the shallow subsurface based on borings logs from on-site monitoring well completions. An underground pipeline is present in the northern portion of SWMU No. 15, which carries treated process water. There is an abandoned underground pipeline in the same area, as shown on Figure 2. Most of the other pipelines within the tank farm are above ground but there are a few other short underground lines as indicated on Figure 2. These underground pipelines are part of SWMU No. 3 Underground Piping Currently in Use and SWMU No. 6 Abandoned Underground Piping, and will be investigated under the Group 8 Investigation Work Plan, although some of the borings completed under this Scope of Work are also located near these underground lines.

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 and also the potential for deeper soil impacts to have migrated vertically to the underlying groundwater.. This includes soil field screening results, soil sampling intervals and methods for detection of surface and subsurface impacts in soils.

Most soil borings were drilled using the hollow-stem auguring (HSA) method and a general description of the exploratory drilling activities is as follows. The drilling equipment was decontaminated between each borehole, as described in Appendix A. All soil borings were drilled to a minimum depth of 10 feet, with the exception of six soil borings (SWMU 15-19, SWMU 15-20, SWMU 15-21, SWMU 15-23, SWMU 15-24, and SWMU 15-25), which were hand augured to a depth of three feet. If there was any indication of impacts based on field screening results at 10 feet or evidence of waste materials or other signs of impacts, then the boring was drilled deeper until reaching a depth of five feet below any observed impacts (e.g., odors or elevated PID readings) or to the top of saturation, whichever was achieved first. Four of the borings were drilled to depths sufficient to encounter saturation. If impacted media was detected at the water table, then the boring was drilled five feet below the water table or to refusal (whichever occurred first) to facilitate collection of groundwater samples.

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

- 0-0.5' (at borings with evidence of significant impacts near the land surface);
- 0.5-2' (all borings);
- From the 6" interval at the top of saturation;
- The sample from each boring with the greatest apparent degree of contamination, based on field observations and field screening; and
- Any additional potentially impacted intervals as determined based on field screening results.

The installation of soil borings and collection of soil samples is discussed below in numerical order. 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 C. In addition to being included on the soil boring logs, the soil vapor (i.e., headspace) screening results are summarized in Table 3. The locations of the soil borings appear on Figures 8 through 19.

SWMU 15-1

On August 19, 2010 the drilling rig was set up on location SWMU 15-1. Sample collection was accomplished using the HSA drilling method and split spoon samplers. One soil sample was collected from 0.5 – 2 feet. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 6 feet bgl. The sampling terminated at six feet bgl. The borehole was grouted to the surface on August 19, 2010.

On August 24, 2010 the drilling rig was moved back to this same location and an additional soil sample was collected from 2 – 4' bgl immediately adjacent to the original boring location. There were no indications of impacts based on the field screening results (i.e., PID readings ranged from 0.7 to 10.6 ppm) nor was there any visual or olfactory evidence of impacts from the surface to a depth of approximately 14 feet bgl. Although this boring location was originally scheduled to penetrate to a depth of only three to six feet, depending on the drilling method, Western elected to drill it to the depth of saturation to evaluate groundwater conditions in the area. The PID readings increased to 1,849 ppm and a strong odor was observed when saturation was encountered at 14 feet bgl. The lithology is described as silty/clayey sand to a depth of six feet, where it changes to a gravelly sand. The Nacimiento Formation was encountered at 22 feet bgl. In order to accommodate the installation of well casing materials, the borehole was advanced to a depth of 24 feet bgl and the boring was completed as a piezometer, as discussed below in Section 4.4.

SWMU 15-2

On August 19, 2010 the drilling rig was set up on location SWMU 15-2 and drilled to a depth of 19' bgl. An odor and slightly elevated PID reading (29.8 ppm) was observed from 1' to 2' bgl in a silty sand and a sample was collected from 0.5' to 2.0' bgl. At four feet, the lithology changed to a gravelly sand and a sample was collected from 4' to 6' bgl; the associated PID reading was 7.0 ppm. Due to the field indications of potential impacts, the boring was continued below the original completion depth of 10 feet. The PID readings gradually increased to a maximum of 77.9 ppm in the 10 to 12' interval. The lithology changed from fine-grained gravelly sand to medium-grained sand at approximately 11' bgl. Saturation was encountered at 14' bgl and a soil sample was collected from 10 to 14' bgl. The boring was extended for another five feet within the medium grained sand. Prior to plugging the boring, a groundwater sample was collected as discussed below in Section 4.4. The boring was plugged on August 19, 2010.

SWMU 15-3

On August 19, 2010 the drilling rig was set up on location SWMU 15-3 and drilled to a depth of 6' bgl. No odors were observed and PID readings ranged from 1.4 to 4.9 ppm. Silty sand was present from 0 to 4' bgl, grading to silty clay that continued to the termination depth of the boring. One soil sample was collected from 0.5 – 2.0' bgl and a second sample was collected from 2.0 – 4.0' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-4

On August 19, 2010 the drilling rig was set up on location SWMU 15-4 and drilled to a depth of 10' bgl. No odors were observed and PID readings ranged from 0.6 to 9.9 ppm. Over the 10 foot interval, the lithology was predominantly sandy silt with silty clay logged from 2 – 4' and 7 – 8' bgl. A soil sample was collected from 0.5 – 1.5' bgl and another from 2.0 – 3.0' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-5

On August 19, 2010 the drilling rig was set up on location SWMU 15-5 and drilled to a depth of 10' bgl. No odors were observed and PID readings ranged from 0.5 to 1.0 ppm. The lithology graded from silty clay in the upper six inches to silt that extended to a depth of 6' bgl. Silty sand is present from 6' to the termination depth of 10' bgl. Soil samples were collected from 0.5 – 2.0' and 8 – 10' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-6

On August 19, 2010 the drilling rig was set up on location SWMU 15-6 and drilled to a depth of 10' bgl. Brown staining and a hydrocarbon odor was observed from 1 – 2' bgl with a PID reading 108 ppm. These field indications of potential impacts were concentrated in a silty clay layer from 0 to 2' bgl. The PID reading decreased to 28.4 in a clayey silt layer present from 2 to 4' bgl and continued to decrease with depth to a reading of 3.1 ppm in the 8 to 10' interval. Soil samples were collected from 0.5 – 2.0' (duplicate) and 8 – 10' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWU 15-7

On August 20, 2010 the drilling rig was set up on location SWMU 15-7 and drilled to a depth of 6' bgl. Slight staining and a faint odor were observed from 0 – 2' bgl with a PID reading 4.1 ppm. These field indications of potential impacts were concentrated in a silty clay layer from 0 to 2' bgl. The silty clay graded to clayey silt from 2 to 6' bgl. The PID reading remained low throughout the boring with a maximum value of 5.0 ppm in the 4 to 6' interval. Soil samples were collected from 0.5 – 2.0' and 2 – 4' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-8

On August 20, 2010 the drilling rig was set up on location SWMU 15-8 and drilled to a depth of 6' bgl. No odor was observed and PID readings ranged from 7.4 to 32 ppm. The lithology graded from silty sand in the upper two feet to clayey silt over the lower four feet. The highest PID reading of 32 ppm occurred in the upper six inches and a soil sample (0 – 0.5') was collected from this depth. Two additional samples were collected from 0.5 – 2.0' and 2 – 4' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-9

On August 20, 2010 the drilling rig was set up on location SWMU 15-9 and drilled to a depth of 6' bgl. No odor was observed and PID readings ranged from 2.6 to 4.8 ppm. The lithology graded from clayey silt in the upper one foot to silty sand over the lower five feet. Two samples were collected from 0.5 – 2.0' and 4 – 6' (duplicate) bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-10

On August 20, 2010 the drilling rig was set up on location SWMU 15-10 and drilled to a depth of 6' bgl. No odor was observed and PID readings ranged from 1.7 to 4.8 ppm. The soils are composed of clayey silt throughout the six foot interval sampled. Two samples were collected from 0.5 – 2.0' and 4 – 6' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-11

On August 23, 2010 the drilling rig was set up on location SWMU 15-11 and drilled to a depth of 18' bgl. Although this boring location was originally scheduled to penetrate to a depth of only three to six feet, depending on the drilling method, Western drilled deeper to delineate the vertical extent of impacts observed at a depth of six feet. PID readings were low (1.2 – 4.9 ppm) and no odor was observed in the upper two feet, which is composed of silty clay. The PID readings increased in the two to four foot interval to 104 ppm in a clayey silt deposit. The maximum PID reading of 1,600 ppm was recorded in the four to six foot interval. The PID readings decreased consistently with depth to a value of 25.7 ppm in the 16 – 18 foot interval and no odor was observed. The lithology becomes coarser with depth, going from silty clay (0-2'), clayey silt (2-12'), silty sand (12-16'), to a gravelly sand (16-18'). Three samples were collected from 0.5 – 2.0', 4 – 6', and 16-18' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-12

On August 23, 2010 the drilling rig was set up on location SWMU 15-12 and drilled to a depth of 20' bgl. This boring location was originally scheduled to penetrate to a depth of 10 feet, but was drill deeper to delineate the vertical extent of possible impacts based on elevated PID readings of 60 ppm in the eight to ten foot interval. The PID readings were low (2.3 – 3.2 ppm) over the upper eight feet but increased to 280 in the 10 to 12' interval and reached a maximum value of 1,325 ppm in the 14 – 16' interval. The PID reading decreased to 235 ppm in the 18 to 20' interval. The lithology is clayey silt over the upper 10 feet and grades to silty clay from 10 to 16 feet. Silty sand is present from 16 to 18 feet and grades to a gravelly sand below 18 feet. Three samples were collected from 0.5 – 2.0', 14 – 16', and 18 - 20' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-13

On August 23, 2010 the drilling rig was set up on location SWMU 15-13 and drilled to a depth of 28' bgl. This boring was originally planned to have a termination depth of ten feet but due to the presence of potential impacts, the boring was extended to the depth of saturation. An odor and elevated PID reading (334 ppm) was observed from the lower portion of the zero to two foot interval and these field indications of potential impacts continued throughout the full depth of the boring. A maximum PID reading of 1,727 ppm was recorded from a depth of 12 to 14'. A silt deposit present from the land surface to a depth of eight feet graded to clayey silt, which persisted to a depth of 12' bgl. Silty sand is present from 12 to 16' bgl and grades to gravelly sand, which continued to the termination depth of 28' bgl. Saturation was encountered at 26' bgl. Three soil samples were collected from 0.5 – 2.0', 12 – 14', and 22 - 25' bgl. Prior to plugging the boring, a groundwater sample was collected as discussed below in Section 4.4. The boring was plugged on August 23, 2010.

SWMU 15-14

On August 24, 2010 the drilling rig was set up on location SWMU 15-14 and drilled to a depth of 6' bgl. No odor was observed and PID readings were consistently measured at 1.9 ppm. The lithology is silt throughout the six foot interval sampled. Two samples were collected from 0.5 – 2.0' and 2 – 4' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-15

On August 24, 2010 the drilling rig was set up on location SWMU 15-15 and drilled to a depth of 6' bgl. No odor was observed and PID readings ranged from 0.7 to 0.9 ppm. The lithology grades from clayey silt in the upper two feet to silt in the lower four feet. Two samples were collected from 0.5 – 2.0' and 2 – 4' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-16

On August 24, 2010 the drilling rig was set up on location SWMU 15-16 and drilled to a depth of 6' bgl. No odor was observed and PID readings ranged from 0.8 to 1.7 ppm. The lithology grades from clayey silt in the upper two feet to silt in the lower four feet. Two samples were collected from 0.5 – 2.0' and 2 – 4' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-17

On August 24, 2010 the drilling rig was set up on location SWMU 15-17 and drilled to a depth of 6' bgl. No odor was observed and PID readings ranged from 1.0 to 1.9 ppm. The lithology consists of silt throughout the six foot interval sampled. Two samples were collected from 0.5 – 2.0' and 2 – 4' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-18

On August 27, 2010 the drilling rig was set up on location SWMU 15-18 and drilled to a depth of 18' bgl. This boring was originally planned to include installation of a permanent monitoring well. No odor was observed and PID readings ranged from 0.1 ppm to 2.0 ppm. A silty sand deposit present from the land surface to a depth of four feet grades to gravelly sand, which persists to a depth of 16.5' where the Nacimiento Formation was encountered. Saturation was encountered at 14' bgl. Two soil samples were collected from 0.5 – 2.0' and 12 – 14' bgl. The boring was completed as a permanent monitoring well as discussed below in Section 4.4.

SWMU 15-19

On August 30, 2010 a hand auger was used to collect soil samples from location SWMU 15-19. The boring extended to a depth of three feet and the lithology is silty sand. No odor was observed and PID readings ranged from 0.9 to 1.2 ppm. Two samples were collected from 0.5 – 2.0' (duplicate) and 2 – 3' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-20

On August 30, 2010 a hand auger was used to collect soil samples from location SWMU 15-20. The boring extended to a depth of three feet and the soils are composed of silty sand. No odor was observed and PID readings ranged from 0.9 to 1.7 ppm. Two samples were collected from 0.5 – 2.0' and 2 – 3' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-21

On August 30, 2010 a hand auger was used to collect soil samples from location SWMU 15-21. The boring extended to a depth of three feet in a clayey silt deposit. No odor was observed and PID readings ranged from 1.3 to 1.5 ppm. Two samples were collected from 0.5 – 2.0' and 2 – 3' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-22

On August 31, 2010 the drilling rig was set up on location SWMU 15-22 and drilled to a depth of 12' bgl. This boring was originally planned to include installation of a permanent monitoring well. No odor was observed and PID readings ranged from 1.3 ppm to 2.9 ppm. A gravelly sand deposit is present from the land surface to a depth of eight feet, where the Nacimiento Formation was encountered. Saturation was not encountered in the boring. Two soil samples were collected from 0.5 – 2.0' and 2 – 4' bgl. The boring was completed as a permanent monitoring well as discussed below in Section 4.4.

SWMU 15-23

On September 1, 2010 a hand auger was used to collect soil samples from location SWMU 15-23. The boring extended to a depth of three feet in silty/clayey sand. No odor was observed and PID readings ranged from 0.3 to 0.8 ppm. Two samples were collected from 0.5 – 2.0' (duplicate) and 2 – 3' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-24

On September 1, 2010 a hand auger was used to collect soil samples from location SWMU 15-24. The boring extended to a depth of three feet in silty/clayey sand. No odor was observed and PID readings ranged from 0.4 to 0.5 ppm. Two samples were collected from 0.5 – 2.0' and 2 – 3' bgl. Groundwater was not encountered and the boring was plugged on the same day.

SWMU 15-25

On September 1, 2010 a hand auger was used to collect soil samples from location SWMU 15-25. The boring extended to a depth of three feet in silty sand. No odor was observed and PID readings ranged from 0.9 to 1.1 ppm. Two samples were collected from 0.5 – 2.0' and 2 – 3' bgl. Groundwater was not encountered and the boring was plugged on the same day.

4.4 Monitoring Well Construction and Groundwater Sampling

This section describes the methods and details of monitoring well construction and the collection of groundwater samples. The description includes the dates of well construction. The wells and groundwater samples are discussed in numerical order of the associated soil borings. Copies of the boring and well construction logs are provided in Appendix C. The well development and purging procedures and groundwater sample collection procedures are discussed in Appendix A. The locations of the monitoring wells and borings from which groundwater samples were collected appear on Figures 20 through 38.

SWMU 15-1/ EXP-1

On August 24, 2010 the drilling rig was set up on this location. Although the boring would have only been drilled to a depth of six feet pursuant to the investigation work plan, Western chose to drill deeper to the top of the Nacimiento Formation and collect a groundwater sample. There were no elevated PID readings until saturation was encountered at 14 feet bgl. The PID readings ranged from 1849 ppm to 30 ppm. The saturated interval consists of gravelly sand and sandy gravel and exhibited a strong odor.

As shown on the well construction log for SWMU15-1/Piezometer, the Nacimiento Formation was encountered at 22 feet bgl and consists of dense sandstone. The sandstone was damp and brown. In order to accommodate the screen placement the borehole was advanced to a depth of 24 feet bgl. Slotted (0.01 inch) 2-inch rigid PVC well screen was placed at the bottom of the boring and extended for 15 feet (7.50 to 22.50 feet) to ensure that the entire saturated zone was open to the piezometer. The 10/20 sand filter pack was installed to 3.25 feet over the top of the screen. As the sand was installed in the well bore the hollow stem augers were removed. Approximately 3.25 feet of bentonite was placed over the filter pack and hydrated. A concrete surface plug was installed over the bentonite to the land surface. The surface completion consists of a stickup completion, which includes a protective PVC casing with cap that was secured in the concrete surface plug.

Groundwater samples were collected at SWMU 15-1 (EXP-1) on September 7, 2010. The water samples were collected following the procedures discussed in Appendix A.

<u>SWMU 15-2</u>

On August 19, 2010 the drilling rig was set up on location SWMU 15-2. This location was not designated for a monitoring well completion but field screening evidence of potential impacts in soils resulted in the boring being extended to saturation. Saturation was encountered at 14 feet bgl in a sand with the odor being strong. The boring was terminated at 19 feet bgl in the same sand deposit. A temporary 10-foot stainless steel well screen was installed at this location and a groundwater sample was collected from the well as discussed in Appendix A. The well screen was removed and decontaminated. The borehole was grouted on August 19, 2010.

<u>SWMU 15 -13</u>

On August 23, 2010 the drilling rig was set up on location SWMU 15-13. This location was not designated for a monitoring well completion but field screening evidence of potential impacts in soils resulted in the boring being extended to saturation. Saturation was encountered at 26' bgl in a gravelly sand and the boring was terminated at 28' bgl. A temporary 10-foot stainless steel well screen was installed at this location and a groundwater sample was collected from the well as discussed in Appendix A. The well screen was removed and decontaminated. The borehole was grouted on August 23, 2010.

SWMU 15-18 / MW-68

On August 27, 2010 the drilling rig was set up on location SWMU 15-18. This boring was designated for a permanent monitoring well in the work plan. As shown on the well construction log for MW-68, the Nacimiento Formation was encountered at 16.50 feet bgl and consisted of fine to medium grain, dense, friable sandstone. The sandstone was damp and light brown to tan. Saturation was encountered at 14 feet bgl. In order to accommodate the well setting the borehole was advanced to a depth of 18.25 feet bgl.

A four-inch diameter, slotted (0.01 inch) rigid PVC well screen was placed at the bottom of the well and extended for 10 feet (7.00 to 17.00 feet) to ensure that the entire saturated zone was open to the well. Rigid Schedule 40 PVC with threads was utilized for the well casing. A 6-inch sand bed was placed at the bottom of the well bore. The 10/20 sand filter pack was installed to 2 feet over the top of the well screen. As the sand was installed in the well bore the hollow stem augers were removed. Two feet of bentonite was placed over the filter pack and hydrated. On August 31, 2010 an annular grout was installed to within two feet of the ground surface and allowed to cure for a minimum of 24 hours. On September 1, 2010 the surface pad and protective aluminum cover were installed. The surface completion consists of stickup completion, which includes a protective aluminum enclosure with cap that was secured in a concrete pad measuring 4-feet by 4-feet wide by 6-inches thick. The concrete pad was wire reinforced. The aluminum protective casing extended 4 feet above the top surface of the concrete pad.

Four-inch diameter steel bollards were installed 6 inches from each corner of the concrete pad. The bollards were installed two feet below grade and extended three feet above grade. The bollards were installed vertically level and extend the same height. The holes for the bollards were dug by hand with the diameter of the borehole measured a minimum of 6-inches. Each bollard was cemented into the ground with the cement extending from the bottom of the hole to the surface. The bollard was filled with cement. Each bollard was pretreated to remove rust, primed, and painted with two coats of safety-yellow paint.

Groundwater samples were collected at MW-68 on September 7, 2010 and December 1, 1010. On both occasions, the well was first purged and the water samples collected following the procedures discussed in Appendix A.

SWMU 15-22 / MW-69

On August 31, 2010 the drilling rig was set up on location SWMU 15-22. This boring was designated for a permanent monitoring well in the work plan. As shown on the well construction log for MW-69, the Nacimiento Formation was encountered at 8 feet bgl and consisted of fine grain, compact/dense sandstone. The sandstone was damp and light tan. The gravelly sands that were encountered above the Nacimiento Formation were not saturated. In order to accommodate the well setting the borehole was advanced to a depth of 9.75 feet bgl.

A four-inch diameter, slotted (0.01 inch) rigid PVC well screen was placed at the bottom of the well and extended for 5 feet (3.5 to 8.5 feet) to ensure that the gravelly sand zone was open to the well. Rigid Schedule 40 polyvinyl chloride (PVC) with threads was utilized for the well casing. A 6-inch sand bed was placed at the bottom of the well bore. The 10/20 sand filter pack was installed to 2 feet over the top of the well screen. As the sand was installed in the well bore the hollow stem augers were removed. One and one-half feet of bentonite was placed over the filter pack and hydrated. On September 1, 2010 the surface pad and protective aluminum cover were installed in the same manner as described above for MW-68.

An attempt was made to collect groundwater samples at MW-69 on September 7, 2010 and December 1, 1010. On both occasions, the well was found to be dry and no samples could be collected.

4.5 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 7 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 slurry wall and collection wells/French drain along the western and northern boundary of the refinery controls the flow of groundwater in this area.

The depth to saturation in the area of the SWMU 15 varies from approximately 14 feet near boring SWMU 15-1 to 26 feet at SWMU 15-13. No separate phase hydrocarbon (SPH) was observed in the new permanent monitor wells (MW-68 and MW-69) installed during this investigation or the temporary well completions at SWMU 15-1, 15-2 or 15-13. 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. A maximum of approximately eight feet of saturation was observed in the Group 5 borings in SWMU 15-1/piezometer, while no free water was present in MW-69, which terminated four feet within the top of the Nacimiento Formation. 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).

4.6 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 or conditions likely to result in the future accumulation of surface water. 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. The portion of the refinery property where the process units, tank farm (SWMU No. 15), and raw water ponds are located is generally of low relief with an overall northwest gradient of approximately 0.02 ft/ft. Surface drainage flows to the northeast across SWMU No. 16 (former active landfill) and to the west across SWMU No. 10 (fire training area). 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, 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.

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 tanks within SWMU No. 15 are surrounded by tank dikes, which control surface water. Further, the refinery implements a Stormwater Pollution Prevention Plan to ensure that surface waters of the State are not impacted by refinery operations.

4.7 Vadose Zone Vapor Sampling Results

Prior to collection of the groundwater samples at MW-68 and SWMU 15-1 (EXP-1), a total well vapor sample was collected and field analyzed for carbon dioxide and oxygen. Field vapor measurements were collected using a multi-gas meter as described in Appendix A, and the results were recorded on a field sampling log. These measurements are included in Table 9 along with the associated PID readings.

The O_2 and CO_2 levels measured at SWMU 15-1 do not indicate any significant level of biologic activity in the vadose zone. The PID reading was 0.3 ppm. The O_2 level of 18.8% measured at SWMU 15-1 is close to ambient conditions of 21% and the CO_2 level of 0.29% is low as would be expected in the absence of significant biological activity. At MW-68, the O_2 levels are slightly lower 10.4% and 13.3% (September and December 2010, respectively) vs. 18.1% at SWMU 15-1 and CO_2 is higher, 5.2% and 7% vs. 0.29% at SWMU 15-1, thus indicating potential biologic activity in the vadose zone near MW-68. The PID readings at MW-68 were 0.8 and 1.1 ppm in September and December 2010, respectively.

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 that is discussed below. 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 4. Table 5 provides a list of the available NMED and EPA soil screening levels for non-residential properties. While Tables 4 and 5 indicate the various depths to which the individual soil screening levels are applicable, Table 7 discussed below does not include this level of detail.

The groundwater cleanup levels are based on New Mexico Water Quality Control Commission (WQCC) standards (20.6.2.7 WW NMAC, 20.6.2.3103, and 20.6.2.4103) unless there is a federal maximum contaminant level (MCL), in which case the lower of the two values is selected as the cleanup level. If neither a WCQQ standard nor an MCL is available, then the cleanup level is based on a NMED Tap Water Screening Level pursuant to direction of NMED subsequent to issuance of the Order. If a NMED Tap Water Screening Level is not available for a constituent, then an EPA Regional Screening Level is used. Table 6 presents the groundwater cleanup levels, with the applicable cleanup level highlighted.

The aforementioned Tables 4 and 5 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 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 this location has the shallowest depth to groundwater. 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 SWMU investigated under Group 5, 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 D.

The screening levels that are compared to individual sample results from SWMU No. 15 are presented in Table 7 for soils and Table 8 for groundwater. The screening levels included in Table 7 and 8 are based on residential and non-residential land use, and Table 7 includes a screening level to evaluate the potential for constituents to migrate to groundwater using a site-specific DAF of 11.25. For the non-residential screening levels, the lower of the construction worker scenario and commercial/industrial scenario screening levels for each constituent is included in the data tables if NMED screening levels are available. If NMED soil screening levels are not available for a particular constituent, then EPA soils screening levels are used. The screening levels in Table 7 have not been segregated based on depth of the soil sample as discussed above for Tables 4 and 5. 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 analytical results, as presented in Tables 7 and 8, 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 for comparison to the individual samples are selected from Table 2a. where possible based on the type of products (e.g., diesel fuel or jet fuel) that were spilled or stored in a particular location. For example, Jet A fuel was spilled near Tank 26 in 1991 in the same area as soil boring SWMU 15-13, which would support the use of the "kerosene and jet fuel" screening levels for soil samples collected at this location. There are no screening levels for comparison to results reported in the gasoline range for either soils or groundwater. Similarly, because there is not a screening level for waste oil in groundwater, a DAF value for soils to be protective of waste oil leaching to groundwater is not applicable.

The analyses for motor oil range organics only report results for >C28 to C35. Since the motor oil range 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 that contains the >C28-C35 carbon range is "waste oil", which includes C19-C36. Therefore, the motor oil range organic soil analytical results are compared to the "waste oil" soil screening levels. The NMED guidance specifies the inclusion of "petroleum-related contaminants" as the groundwater criteria for waste oil instead of a motor oil range screening level and these constituents are included in the list of reported analytes in Table 8. The screening levels compared to the diesel range organic analytical results are described below.

All of the soil samples collected near Tank 26 at SWMU 15-13, from depths of 0.5-2', 12-14' and 22-25', and elevated PID readings from below 0.5' to the depth of saturation indicate a surface release in this area, which is consistent with the release of jet fuel reported in 1991. There are elevated TPH concentrations at two other nearby locations (SWMU 15-11 and SWMU 15-12) that are near Tanks 25 and 27, which have stored diesel fuel and slurry oil, respectively. Slurry oil is composed of only heavy end (longer chain) hydrocarbons, which would be similar to NMED products types of "mineral oil dielectric fluid" or "waste oil." Of the potential product types either stored or spilled in the area of Tanks 25, 26, and 27, diesel fuel has the lowest (most conservative) screening level. The soil analytical results for samples collected in the areas of Tanks 25, 26, and 27 (i.e., from soil borings 15-11, 15-12, and 15-13) are conservatively compared to the screening levels for diesel fuel, which are used for comparison to both the DAF and non-residential exposures. All other diesel range sample results are conservatively compared to the product type "unknown oil" under the DAF and non-residential columns, which has a screening level of 200 mg/kg. The DAF screening levels for diesel range organics in Table 7 are based on non-residential land use as the tank farm is anticipated to continue to be used for non-residential purposes. The two DAF screening levels used for comparison to the diesel range soil analytical results 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 E. 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 column of Table 7 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 similar calculation for non-residential land use is also included but the resulting direct contact screening levels are not utilized in this report, pending NMED's review of these calculations.

The diesel range analytical results for groundwater presented in Table 8 are compared to the most conservative groundwater TPH screening level (i.e., unknown oil) of 0.2 milligrams per liter (mg/l). The most conservative screening level is used due to the potential for releases from unknown sources to have commingled with documented sources (e.g., the jet fuel spill near Tank 26).

Some of the individual constituents reported by the laboratory do not have screening levels but were all non-detect with respect to soil, except 4-isopropyltoluene, n-butylbenzene, n-propylbenzene, and sec-butylbenzene. With respect to groundwater, there were also detections of constituents that do not have screening levels. The constituents detected in groundwater that do not have screening levels include, 4-isopropyltoluene, n-butylbenzene, n-propylbenzene, sec-butylbenzene, phenanthrene, bicarbonate, calcium, magnesium, potassium, and sodium. None of these 10 constituents are classified as a carcinogen.

Section 6
Site Impacts

This section discusses the chemical analyses performed and presents the analytical results that were obtained through the analysis of soil and groundwater samples, which were collected at the Group 5 SWMU. The results for soils and groundwater analyses 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 SWMU No. 15 are summarized in Table 7. The individual results that exceed the applicable cleanup levels are highlighted, as noted in the table footnotes. Maps showing the distribution of constituents detected in soils above screening levels are included as Figures 8 – 19. The concentrations shown on Figures 8 – 19 that exceed the screening levels in Table 7 are underlined on the figures (i.e., concentrations above non-residential and/or DAF (11.25) screening levels). The laboratory analytical reports are included in Appendix F and the data validation of the results, which includes the analytical results for the associated QA/QC samples, is included in Appendix G.

The constituents that have concentrations in soils above screening levels as measured in samples collected from within SWMU No. 15 are discussed below. Arsenic was detected in eight samples [SWMU 15-3 (0.5-2.0'), SWMU 15-7 (0.5-2.0'), SWMU 15-8 (0-0.5'), SWMU 15-8 (0.5 – 2.0'), SWMU 15-9 (0.5 – 2.0'), SWMU 15-10 (0.5 – 2.0'), SWMU 15-12 (14 – 16'), and SWMU 15-18 (0.5 – 2.0')) at concentrations above the DAF screening level (0.148 mg/kg) but none exceed the non-residential screening level and only three samples (SWMU 15-3 (0.5 – 2.0'), SWMU 15-7 (0.5 – 2.0'), and SWMU 15-10(0.5 – 2.0')) have concentrations above the residential screening level (3.59 mg/kg). The detected concentrations range from 2.6 mg/kg to 5.5 mg/kg.

Chromium was detected in one soil sample [SWMU 15-18 (12-14")] at a concentration of 56 mg/kg, which exceeds the chromium VI DAF screening level of 23.7 mg/kg. A speciation of the detected chromium result 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.

Cobalt was detected in six soil samples (SWMU 15-11 (4 – 6'), SWMU 15-13 (0.5 – 2.0'), SWMU 15-19 (0.5 – 2.0'), SWMU 15-20 (0.5 – 2.0'), SWMU 15-24 (0.5 – 2.0'), and SWMU 15-25 (0.5 – 2.0')) at concentrations above the DAF screening level (5.51 mg/kg) but none exceed the residential or non-residential soil screening levels. The detected concentrations range from 1.6 mg/kg to 6.2 mg/kg.

Mercury was detected in two samples (SWMU 15-8 (0 – 0.5') and SWMU 15-11 (4 – 6')) at concentrations above the DAF screening level (0.33 mg/kg) but none exceed the non-residential screening level and only one sample (SWMU 15-11 (4 – 6')) has concentrations above the residential screening level (7.71 mg/kg). The detected concentrations range from 0.06 mg/kg to 9.1 mg/kg. The mercury concentrations are shown on Figure 8.

1,1,2-Trichloroethane was detected in one sample (SWMU 15-13 (12 – 14')) at a concentration above the DAF screening level (0.00758 mg/kg) but did not exceed the residential or non-residential screening levels. Only this one sample had a detected concentration of 3.4 mg/kg, while all others were non-detect. The 1,1,2-trichloroethane analytical results are shown on Figure 9.

1,2,4-Trimethylbenzene was detected in five samples (SWMU 15-6 (0.5 – 2.0'), SWMU 15-11 (4 – 6'), SWMU 15-12 (14 – 16'), SWMU 15-13 (12 – 14'), and SWMU 15-13 (22 – 25')) at concentrations above the DAF screening level (0.27 mg/kg) but none exceed the non-residential screening level and only one sample (SWMU 15-11 (4 – 6')) has a concentration above the residential screening level (67 mg/kg). The detected concentrations range from 0.00141 mg/kg to 92 mg/kg. The 1,2,4-trimethylbenzene analytical results are shown on Figure 10.

1,3,5-Trimethylbenzene was detected in six samples [SWMU 15-6 (0.5-2.0'), SWMU 15-11 (4 – 6'), SWMU 15-12 (14 – 16'), SWMU 15-13 (0.5 – 2.0'), SWMU 15-13 (12 – 14'), and SWMU 15-13 (22 – 25')) at concentrations above the DAF screening level (0.225 mg/kg) but none exceed the non-residential or residential screening levels. The detected concentrations range from 0.00108 mg/kg to 27 mg/kg. The 1,3,5-trimethylbenzene analytical results are shown on Figure 11.

1-Methylnaphthalene was detected in three samples (SWMU 15-11 (4 – 6'), SWMU 15-13 (12 – 14'), and SWMU 15-13 (22 – 25')) at concentrations above the DAF screening level (0.169 mg/kg) but none exceed the non-residential or residential screening levels. The detected concentrations range from 6.2 mg/kg to 14 mg/kg. The 1-methylnaphthalene analytical results are shown on Figure 12.

2-Methylnaphthalene was detected in three samples (SWMU 15-11 (4 – 6'), SWMU 15-13 (12 – 14'), and SWMU 15-13 (22 – 2 5')) at concentrations above the DAF screening level (10.1 mg/kg) but none exceed the non-residential or residential screening levels. The detected concentrations range from 11 mg/kg to 25 mg/kg. The 2-methylnaphthalene analytical results are shown on Figure 13.

Benzene and bromodichloromethane were both detected in only one sample (SWMU 15-11 (4 – 6')). Benzene was detected at 1.4 mg/kg, which exceeds the DAF screening level (0.0208 mg/kg) but not the non-residential or residential screening levels. Similarly, bromodichloromethane was detected at 3.0 mg/kg, which exceeds the DAF screening level (0.00311 mg/kg) but not the non-residential or residential screening levels. The benzene analytical results are shown on Figure 14.

Chloromethane was detected at concentrations above the DAF screening level (0.047 mg/kg) in 14 samples but none exceed the non-residential or residential screening levels. It was also detected at similar concentrations (0.086 mg/kg to 0.13 mg/kg) in all six of the methanol field blanks, as discussed in Section 7 and Appendix G – Quality Assurance/Quality Control. The detected concentrations range from 0.071 mg/kg to 1.3 mg/kg.

Ethylbenzene was detected in four samples (SWMU 15-11 (4 – 6'), SWMU 15-12 (14 – 16'), SWMU 15-13 (12 – 14'), and SWMU 15-13 (22 – 25')) at concentrations above the DAF screening level (0.164 mg/kg) but none exceed the non-residential or residential screening levels. The detected concentrations range from 0.61 mg/kg to 8.0 mg/kg. The ethylbenzene analytical results are shown on Figure 15.

Naphthalene was detected in four samples (SWMU 15-11 (4 – 6'), SWMU 15-12 (14 – 16'), SWMU 15-13 (12 – 14'), and SWMU 15-13 (22 – 25')) at concentrations above the DAF screening level (0.0472 mg/kg) but none exceed the non-residential or residential screening levels. The detected concentrations range from 0.64 mg/kg to 18 mg/kg. The naphthalene analytical results are shown on Figure 16.

Xylenes were detected in four samples (SWMU 15-11 (4 – 6'), SWMU 15-12 (14 – 16'), SWMU 15-13 (12 – 14'), and SWMU 15-13 (22 – 25')) at concentrations above the DAF screening level (1.98 mg/kg) but none exceed the non-residential or residential screening levels. The detected concentrations range from 0.00603 mg/kg to 62 mg/kg. The xylenes analytical results are shown on Figure 17.

Diesel range organics were detected in seven samples (SWMU 15-6 (0.5 – 2.0'), SWMU 15-7 (0.5 – 2.0'), SWMU 15-11 (4 – 6'), SWMU 15-13 (0.5 – 2.0'), SWMU 15-13 (12 – 14'), SWMU 15-13 (22 – 25'), and SWMU 15-21 (0.5 – 2.0')) at concentrations above the soil screening levels. As explained in Section 5, the screening level of 200 mg/kg ("unknown oil") is compared against all soil samples except those in the area of Tanks 25, 26, and 27 (borings SWMU 15-11, SWMU 15-12, and SWMU 15-13) where screening levels of 520 mg/kg and 1,120 mg/kg ("diesel fuel" – residential and non-residential, respectively) apply. The detected concentrations range from 12 mg/kg to 13,000 mg/kg. The diesel range organics analytical results are shown on Figure 18.

Motor oil range organics were detected in one sample (SWMU 15-6 (0.5 – 2.0')) at a concentration above the residential screening level of 2,500 mg/kg ("waste oil"). The detected concentrations range from 64 mg/kg to 4,600 mg/kg. The motor oil range organics analytical results are shown on Figure 19.

6.2 Groundwater Sampling Chemical Analytical Results

The groundwater samples were analyzed for organic constituents 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, diesel, and motor oil range organics.

Groundwater 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

In addition, groundwater samples were analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	Method SM 2540
Bicarbonate	SM 2320B
Carbonate [1]	SM 2320B
Alkalinity (as $CaCO_3$)[1]	SM 2320B

Analyte	Analytical Method
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	SW-846 method 7140
Magnesium	SW-846 method 7450
Sodium	SW-846 method 7770
Potassium	SW-846 method 7610
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Iron (total & dissolved)	SW-846 method 6010/6020

[1]*Additional constituent not required per the July 2010 Investigation Work Plan*

The groundwater analyses were completed as approved in the site investigation work plan with only a few of exceptions as noted in the table above and discussed below. Separate analyses of nitrate and nitrite were completed for all water samples collected except from MW-68 during the September 2010 event. A total result for nitrate plus nitrite was reported for the sample collected from MW-68 on September 7, 2010. The work plan listed analyses for ferric/ferrous iron but the lab reported total and dissolved iron. The laboratory reported iron by method 6010B Total Recoverable Metals, which represents the sum of both ferric and ferrous iron. In addition, the analyses include iron by method 6010B dissolved metals, which represents ferrous iron. Ferric iron can be calculated by subtracting the dissolved analytical result from the total recoverable result.

The analytical results and the applicable cleanup levels are presented in Table 8. The individual results that exceed the applicable cleanup levels are highlighted. Maps depicting the distribution of the various constituents detected in groundwater samples above the screening levels are provided in Figures 20 – 38. The concentrations shown on Figures 20 – 38 that exceed the screening levels in Table 8 are underlined on the figures. The results for the associated QA/QC samples and the data validation are provided in Appendix G. The laboratory analytical reports are included in Appendix F.

There were a number of metals detected in groundwater samples collected from the temporary wells completions at SWMU 15-2 and SWMU 15-3 at concentrations above screening levels that were not found to be present in concentrations above the screening levels in the permanent monitoring well (MW-68). This list of metals includes: (1) arsenic detected at 0.45 mg/l and 0.011 mg/l vs. a screening level of 0.01 mg/l; (2) barium detected at 22 mg/l and 1.4 mg/l vs. a screening level of 1 mg/l; (3) Beryllium detected at SWMU 15-2 at 0.039 mg/l vs. a screening level of 0.004 mg/l; (4) chromium detected at 0.75 and 0.063 mg/l vs. a screening level of 0.05 mg/l; (5) cobalt detect at SWMU 15-2 at 0.39 mg/l vs. a screening level of 0.05 mg/l; (6) iron (total) detected at 1,500 and 87 mg/l vs. a screening level of 26 mg/l; (7) dissolved iron detected at 22 mg/l at SWMU 15-13 vs. a screening level of 1.0 mg/l; (8) lead detected at 0.32 and 0.017 mg/l vs. a screening level of 0.015 mg/l; (9) mercury detected at SWMU 15-2 at 0.004 mg/l vs. a screening level of 0.002 mg/l; (10) nickel detected at SWMU 15-2 at 0.59 mg/l vs. a screening level of 0.2 mg/l; and (11) vanadium detected at SWMU 15-2 at 2 mg/l vs. a screening level of 0.183 mg/l. Manganese was the only metal detected in groundwater samples collected from permanent well MW-68 (MW-69 was dry) at concentrations above the screening levels. Manganese was detected at concentrations of 1.6 and 1.2 mg/l in the groundwater samples collected from MW-68 on the September 7, 2010 and December 1, 2010, respectively. Manganese was detected at concentrations of 160 and 6.5 mg/l in the groundwater samples collected from borings SWMU 15-2 and SWMU 15-3, respectively.

Seven organic constituents, including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, benzene, naphthalene, and xylenes, were detected in groundwater samples at concentrations above the screening levels. 1,2,4-Trimethylbenzene was detected in groundwater samples collected from borings SWMU 15-1, SWMU 15-2, and SWMU 15-13 at concentrations ranging from 0.39 to 0.96 mg/l vs. a screening level of 0.015 mg/l. 1,3,5-Trimethylbenzene was detected in groundwater samples collected from borings SWMU 15-2 and SWMU 15-13 at concentrations of 0.19 and 0.16 mg/l vs. a screening level of 0.012 mg/l. 1-Methylnaphthalene was detected in a groundwater sample collected from boring SWMU 15-13 at a concentration of 0.14 mg/l vs. a screening level of 0.0023 mg/l. 2-Methylnaphthalene was detected in a groundwater sample collected from boring SWMU 15-13 at a concentration of 0.21 mg/l vs. a screening level of 0.15 mg/l. Benzene was detected in groundwater samples collected from borings SWMU 15-2 and SWMU 15-13 at concentrations of 0.21 and 0.46 mg/l vs. a screening level of 0.005 mg/l. Naphthalene was detected in groundwater samples collected from borings SWMU 15-2 and SWMU 15-13 at concentrations of 0.028 and 0.3 mg/l vs. a screening level of 0.00143 mg/l. Xylenes were detected in groundwater samples collected from borings SWMU 15-2 and SWMU 15-13 at concentrations of 0.8 and 2.2 mg/l vs. a screening level of 0.62 mg/l.

In addition to the seven individual organic constituents discussed above, diesel range organics were detected in groundwater samples collected from borings SWMU 15-2 and SWMU 15-13 at concentrations of 0.6 and 3.9 mg/l vs. a screening level of 0.2 mg/l ("unknown oil"). Motor oil range organics were detected in groundwater samples collected from borings SWMU 15-2 and SWMU 15-13 at concentrations of 17 and 9.5 mg/l, respectively. As discussed in Section 5, the motor oil range results are compared against the "waste oil" standards and as such there is no TPH screening level for the motor oil fraction but rather individual petroleum-related constituents were evaluated.

Under the general classification of inorganics, chloride was detected in a groundwater sample collected from boring SWMU 15-13 at a concentration of 490 mg/l vs. a screening level of 250 mg/l. Total dissolved solids were detected in groundwater samples collected from borings SWMU 15-2 and SWMU 15-13 at concentrations of 1,420 and 2,270 mg/l vs. a screening level of 1,000 mg/l.

6.3 General Groundwater Chemistry

The measurement of field purging parameters included measurement of groundwater pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, and temperature. The results of the measurements are included in Table 9 and fluid levels measured prior to purging are presented in Table 10.

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 and groundwater was conducted at Group 5 (SWMU No. 15) to assess and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, soil samples and groundwater samples were collected at SWMU 15 and analyzed for potential site-related constituents.

7.1 Conclusions

Soils

Four metals (arsenic, cobalt, chromium, and mercury), 11 organic constituents (1,1,2-trichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, benzene, bromodichloromethane, chloromethane, ethylbenzene, naphthalene, and xylenes), and diesel and motor oil range organics were detected in soil samples at concentrations exceeding their respective screening levels. Both arsenic and cobalt were detected in generally low concentrations with maximum detected values of 5.5 and 6.2 mg/kg, respectively. As shown in Table 7, the samples with concentrations of arsenic, cobalt and chromium above the screening levels do not in many instances have concentrations of organic constituents above screening levels. Arsenic, chromium, and cobalt are both naturally occurring constituents in many soils and it is possible that these constituents are naturally occurring in soils at the Bloomfield Refinery. Chloromethane is detected in many of the soil samples at generally low concentrations ranging from 0.071 mg/kg to 1.3 mg/kg. Chloromethane is also detected in the associated blanks (0.086 mg/kg to 0.13 mg/kg), as discussed in Appendix G and it is possible that many of the detections may not represent actual site impacts but rather can be attributed to the use of methanol as a preservative in the soil samples.

Most of the soil samples with constituents detected at concentrations above the screening levels (excluding arsenic, cobalt, chromium, and chloromethane) are located in the southwest portion of the tank farm near Tanks 25, 26, and 27. There are two exceptions, samples from borings SWMU 15-6 (near tank 20) and SWMU 15-8 (southwest of Tank 31) also have concentrations over the screening levels. The samples collected near Tank 25, 26, and 27 indicate the greatest impacts at depths greater than four feet, with the exception of 1,3,5-Trimethylbenzene and diesel range organics, which are found near the surface south of Tank 26 in boring SWMU 15-13. These results are consistent with the subsurface soil vapor samples collected during the RCRA facility investigations in the early 1990s, which also show the greatest impacts in the southwest portion of the tank farm (Figure 3). One hundred and eighty barrels of Jet A were spilled at Tank 26 in 1991 with 120 barrels recovered, which may be the source of the observed impacts in this area.

Regarding the two areas beyond the southwest portion of the tank farm, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene and diesel range organics were detected above screening levels near Tank 20 in boring SWMU 15-6 at a depth of 0.5 – 2.0' bgl. Based on the TPH analyses, which are non-detect in the sample collected from 8-10' bgl, and the low PID readings below the 0.5 – 2.0' sample interval, the impacts near Tank 20 appear limited to the shallow subsurface.

A soil sample collected from 0 – 0.5' at boring SWMU 15-8 near Tank 31 had a mercury concentration of 0.34 mg/kg that barely exceeds the screening level 0.33 mg/kg. No other constituents exceed the screening levels in this sample except arsenic and chloromethane, which are both present at low concentrations and as discussed above may not be associated with a release of contaminants in this area. Mercury was not detected (<0.033 mg/kg) in the sample collected immediately below the 0 – 0.5' sample from a depth of 0.5 – 2.0'.

A cumulative risk evaluation for soils is presented in Table 12. This was conducted by taking the maximum reported concentration of each detected constituent 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 3.146 x 10^{-5} assuming residential land use and 0.604 x 10^{-5} for non-residential land use. The hazard index for residential land use is 2.168 and for non-residential land use is 0.501.

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

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

Groundwater

There are a seemingly large number of metals detected in groundwater samples collected from the soil borings at SWMU 15-2 and SWMU 15-13 at concentrations above screening levels. It is possible that these results are affected by high turbidity levels in these water samples. These two samples were collected immediately after completion of the well boring by insertion of a temporary stainless-steel well screen without well development to help remove entrained sediment. Manganese was the only metal detected above the screening level in water samples collected from permanent monitoring well MW-68.

The majority of the organic constituents (e.g.,1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, benzene, naphthalene, xylenes, and TPH) and inorganic constituents (e.g., chloride and total dissolved solids) with concentrations above screening levels were detected in groundwater samples collected from borings SWMU 15-2 (between Tanks 11 and 12) and SWMU 15-13 (near Tank 26). No organic constituents were detected at concentrations above screening levels in groundwater samples collected at MW-68 and only benzene was found above screening levels at SWMU 15-1, although it did have a reduced list of constituents reported as it was not part of the investigation conducted pursuant to the Group 5 Investigation Work Plan. Earlier analyses of groundwater samples collected from existing monitoring and recovery wells have shown impacts by petroleum hydrocarbons across much of the refinery tank farm and the new analyses generally tend to confirm previous investigations.

A cumulative risk evaluation for groundwater is presented in Table 13. This was conducted by taking the maximum reported concentration of each detected constituent and dividing by the residential screening levels, as shown in equation above in the discussion for soil. These calculations are separated for carcinogenic and non-carcinogenic constituents. The cumulative carcinogenic risk level is calculated to be 4.08×10^{-3} and the hazard index is 89.06.

7.2 Recommendations

Western plans to conduct an investigation of background locations in the summer of 2011 and will attempt to establish site-specific background values for various naturally occurring constituents (e.g., arsenic and cobalt in soils and manganese in groundwater). After background values have been established, site data collected for SWMU No. 15 should be reassessed to determine if some analytical results are actually representative of background conditions and not site-related impacts. Regardless of the results of this background assessment, additional delineation of potential impacts in soils should be conducted at the following locations:

- SWMU 15-6 near Tank 20;
- SWMU 15-11 near Tank 25;
- SWMU 15-12 near Tank 27; and
- SWMU 15-13 near Tank 26.

With the combination of groundwater data collected from previously existing wells and the new groundwater samples recently collected, the impacts to groundwater within the tank farm have been adequately characterized to support final remedy selection. No further investigation of groundwater within the tank farm is recommended at this time.

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.

Tables

Table 1
Historical Subsurface Soil Vapor Concentrations
SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

SAMPLE ID	PROBE HOLE	DEPTH (FEET)	DATE	BENZENE	TOLUENE	ETHYL-BENZENE	m&p-XYLENE	o- XYLENE	TVOC	COMMENTS
BLANK-01	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-02	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-Probe Rod Blank
SG-09	PH-05	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-10	PH-05	8	12/9/93	<1	<1	<1	<1	<1	1	
SG-10(D)	PH-05	8	12/9/93	<1	<1	<1	<1	<1	1	QC-Injection Duplicate
BLANK-03	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-11	PH-06	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-12	PH-06	7.5	12/9/93	<1	<1	<1	<1	<1	3	
SG-13	PH-07	3	12/9/93	<1	<1	<1	<1	<1	1	
SG-14	PH-07	9	12/9/93	<1	<1	<1	<1	<1	1	
SG-15	PH-08	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-16	PH-08	8	12/9/93	<1	<1	<1	<1	<1	0	
SG-17	PH-09	3	12/9/93	<1	1	<1	<1	<1	2	
SG-18	PH-09	10	12/9/93	<1	<1	<1	<1	<1	0	
SG-19	PH-10	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-20	PH-10	10	12/9/93	<1	<1	<1	<1	<1	0	
SG-20(D)	PH-10	10	12/9/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-04	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-21	PH-11	3	12/9/93	<1	<1	<1	<1	<1	1	
SG-22	PH-11	10	12/9/93	<1	<1	<1	<1	<1	3	
SG-23	PH-12	3	12/9/93	<1	<1	<1	<1	<1	1	
SG-24	PH-12	10	12/9/93	<1	<1	<1	<1	<1	1	
SG-25	PH-13	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-26	PH-13	10	12/9/93	<1	<1	<1	<1	<1	0	
SG-27	PH-14	3	12/9/93	<1	<1	<1	<1	<1	1	
SG-28	PH-14	10	12/9/93	<1	<1	<1	<1	<1	0	

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SAMPLE ID	PROBE HOLE	DEPTH (FEET)	DATE	BENZENE	TOLUENE	ETHYL-BENZENE	m&p-XYLENE	o- XYLENE	TVOC	COMMENTS
SG-28(D)	PH-14	10	12/9/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-05	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-06	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-07	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-Probe Rod Blank
SG-29	PH-15	3	12/10/93	<1	2	<1	<1	<1	25	
SG-30	PH-15	9	12/10/93	<1	61	<1	19	9	1108	
SG-31	PH-16	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-32	PH-16	9	12/10/93	<1	<1	<1	<1	<1	0	
SG-33	PH-17	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-34	PH-17	9	12/10/93	<1	<1	<1	1	<1	2	
SG-35	PH-18	3	12/10/93	<1	2	<1	1	<1	3	
SG-36	PH-18	9	12/10/93	<1	<1	<1	<1	<1	0	
SG-37	PH-19	3	12/10/93	<1	3	<1	2	<1	3	
SG-38	PH-19	9	12/10/93	<1	<1	<1	<1	<1	0	
SG-38(D)	PH-19	9	12/10/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-08	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-39	PH-20	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-40	PH-20	9	12/10/93	<1	77	13	39	14	345	
SG-41	PH-21	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-42	PH-21	9	12/10/93	<1	<1	<1	<1	<1	0	
SG-43	PH-22	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-44	PH-22	9	12/10/93	35	1508	199	2260	95	6474	
SG-45	PH-23	3	12/10/93	<1	11	3	8	2	23	
SG-46	PH-23	9	12/10/93	<1	2	<1	1	<1	3	
SG-47	PH-24	3	12/10/93	16	115	27	145	36	721	
SG-48	PH-24	9	12/10/93	88	271	63	331	62	1571	

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SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

SAMPLE ID	PROBE HOLE	DEPTH (FEET)	DATE	BENZENE	TOLUENE	ETHYL-BENZENE	m&p-XYLENE	o- XYLENE	TVOC	COMMENTS
SG-48(D)	PH-24	9	12/10/93	91	272	60	313	60	1547	QC-Duplicate Injection
BLANK-09	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-49	PH-25	3	12/10/93	91	76	9	55	7	41	
SG-50	PH-25	9	12/10/93	447	532	82	538	61	2519	
SG-51	PH-26	3	12/10/93	1	<1	2	11	2	36	
SG-52	PH-26	9	12/10/93	27	14	<1	16	2	97	
SG-52(D)	PH-26	9	12/10/93	27	15	1	17	2	100	QC-Duplicate Injection
BLANK-10	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-11	NA	NA	12/11/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-12	NA	NA	12/11/93	<1	<1	<1	<1	<1	0	QC-Probe Rod Blank
SG-53	PH-27	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-54	PH-27	9	12/11/93	<1	<1	<1	<1	<1	1	
SG-55	PH-28	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-56	PH-28	9	12/11/93	<1	<1	<1	<1	<1	0	
SG-57	PH-29	3	12/11/93	<1	<1	<1	1	<1	1	
SG-58	PH-29	9	12/11/93	<1	<1	<1	<1	<1	0	
SG-61	PH-31	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-62	PH-31	9	12/11/93	<1	<1	<1	<1	<1	0	
SG-62(D)	PH-31	9	12/11/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-13	NA	NA	12/11/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-63	PH-32	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-64	PH-32	9	12/11/93	<1	<1	<1	2	<1	2	
SG-65	PH-33	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-66	PH-33	10	12/11/93	<1	<1	<1	<1	<1	0	
SG-67	PH-34	3	12/11/93	<1	<1	<1	<1	<1	1	

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Historical Subsurface Soil Vapor Concentrations
SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

SAMPLE ID	PROBE HOLE	DEPTH (FEET)	DATE	BENZENE	TOLUENE	ETHYL-BENZENE	m&p-XYLENE	o- XYLENE	TVOC	COMMENTS
SG-68	PH-34	9	12/11/93	<1	<1	<1	<1	<1	0	
SG-71	PH-36	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-72	PH-36	9	12/11/93	7	6	2	12	<1	35	
SG-72(D)	PH-36	9	12/11/93	7	7	2	12	<1	37	QC-Duplicate Injection
BLANK-14	NA	NA	12/11/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-15	NA	NA	12/12/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-16	NA	NA	12/12/93	<1	<1	<1	<1	<1	0	QC-Probe Rod Blank
SG-78	PH-40	3	12/12/93	<1	<1	<1	<1	<1	0	
SG-79	PH-40	8.5	12/12/93	<1	<1	<1	<1	<1	0	
SG-80	PH-41	3	12/12/93	<1	<1	<1	<1	<1	0	
SG-81	PH-41	8.5	12/12/93	<1	<1	<1	<1	<1	0	
SG-82	PH-42	3	12/12/93	<1	<1	<1	<1	<1	0	
SG-83	PH-42	9	12/12/93	<1	<1	<1	<1	<1	0	
SG-83(D)	PH-42	9	12/12/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-17	NA	NA	12/12/93	<1	<1	<1	<1	<1	0	QC-System Blank

Notes: NA = Not applicable
QC = Quality Control
D = Duplicate analysis
<1 = Not detected at lower quanitfiable limit
units = Micrograms per liter of headspace vapor analyzed
TVOC = Total volatile organic content

Table 2
Historical Groundwater Analyses
SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

Sample Location	Date	Benzene	Toluene	EthylBenzene	Xylene	MTBE	Acenaphthene	Bis(2-ethylexyl) phthalate	2,4 Dimethy lphenol	Fluorene	2-Methylnaph thalene	Naphthalene	Phenanthrene	Phenol	Arsenic	Barium	Cadmium	Calcium	Chromium
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.005 [2]	0.75 [1]	0.7 [2]	0.62 [1]	0.012 [3]	2.2 [3]	0.006 [3]	0.73 [3]	1.5 [3]	0.15 [3]	0.14 [3]	--	0.005 [1]	0.01 [2]	1 [1]	0.005 [2]	--	0.05 [1]
MW-3	Apr-99	0.005	ND	0.005	0.029	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-99	ND	0.001	ND	ND	--	--	--	--	--	--	ND	--	--	--	--	--	--	--
	Sep-00	ND	ND	ND	ND	--	--	--	--	--	--	ND	--	--	--	--	--	--	--
	Sep-01	ND	ND	ND	ND	--	--	--	--	--	--	ND	--	--	--	--	--	--	--
	Aug-02	<0.001	<0.001	<0.001	0.003	NR[2]	--	--	--	--	--	ND	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	<0.001	<0.001	<0.001	<0.001	<0.001	--	--	--	--	--	--	--	--	<0.02	0.3	<0.002	490	<0.006
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	--	--	--	--	--	--	--	--	NS[1]	NS[1]	NS[1]	--	NS[1]
	Apr-05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-05	<0.001	<0.001	<0.001	<0.001	<0.001	--	--	--	--	--	--	--	--	<0.020	0.018	<0.002	480	<0.006
	Apr-06	<0.001	<0.001	<0.001	<0.003	<0.0025	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-06	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	--	--	--	--	--	--	--	--	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-07	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-07	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	--	--	--	--	--	--	--	--	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-08	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]	NS[1]	NS[1]	NS[1]
RW-15	Apr-99	14	25	6.9	35.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-99	7.4	9.2	2.7	17.1	--	--	--	--	--	--	0.59	--	--	--	--	--	--	--
	Sep-00	7.6	14	3.3	14	--	--	--	--	--	--	0.89	--	--	--	--	--	--	--
	Sep-01	9	17	4.4	25	--	--	--	--	--	--	0.82	--	--	--	--	--	--	--
	Aug-02	12	19	3.8	22	NR[2]	--	--	--	--	--	0.58	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-04	9.4	15	2.8	22	<0.25	--	--	--	--	--	--	--	--	<0.020	1.2	<0.002	--	<0.006
	Apr-05	9.0	11.0	2.5	19.0	<0.10	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-05	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	NR[1]	NR[1]	NR[1]	--	NR[1]
	Apr-06	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-06	20.0	20.0	7.2	43.0	<0.38	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	<0.006
	Apr-07	6.8	2.9	3	15	<0.62	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-07	6.9	6.2	3.5	20	0.03	<0.05	<0.075	0.078	<0.05	0.33	0.35	0.068	0.11	<0.020	1.8	<0.002	--	<0.006
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-08	6.0	1.0	4.1	21.0	0.03	<0.01	<0.01	0.013	<0.01	0.079	0.28	<0.01	0.018	<0.020	1.5	<0.002	--	<0.006
RW-17	Aug-02	1.9	ND	1.3	11	--	--	--	--	--	--	1.4	--	--	--	--	--	--	--

Table 2
Historical Groundwater Analyses
SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

Sample Location	Date	Benzene	Toluene	EthylBenzene	Xylene	MTBE	Acenaphthene	Bis(2-ethylexyl) phthalate	2,4 Dimethy lphenol	Fluorene	2-Methylnaph thalene	Naphthalene	Phenanthrene	Phenol	Arsenic	Barium	Cadmium	Calcium	Chromium
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.005 [2]	0.75 [1]	0.7 [2]	0.62 [1]	0.012 [3]	2.2 [3]	0.006 [3]	0.73 [3]	1.5 [3]	0.15 [3]	0.14 [3]	--	0.005 [1]	0.01 [2]	1 [1]	0.005 [2]	--	0.05 [1]
MW-21	Aug-02	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Aug-03	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	NR[1]	NR[1]	NR[1]	--	NR[1]
	Mar-04	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-04	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	<0.020	0.029	<0.0020	--	<0.0060
	Apr-05	0.13	<0.0025	0.025	0.028	0.041	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-05	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	NR[1]	NR[1]	NR[1]	--	NR[1]
	Apr-06	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-06	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	NR[1]	NR[1]	NR[1]	--	NR[1]
	Aug-07	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	NR[1]	NR[1]	NR[1]	--	NR[1]
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-08	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	--	--	--	--	--	--	--	--	NR[1]	NR[1]	NR[1]	--	NR[1]
MW-29	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-04	<0.0005	<0.0005	<0.0005	<0.0005	0.0026	--	--	--	--	--	--	--	--	<0.020	0.039	<0.002	--	<0.006
	Apr-05	<0.0005	<0.0005	<0.0005	<0.0005	0.0037	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[1]	NR[1]	NR[1]	--	NR[1]
	Apr-06	<0.001	<0.001	<0.001	<0.003	0.0045	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Apr-07	<0.001	<0.001	<0.001	<0.002	0.004	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-07	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	--	--	--	--	--	--	--	--	NS[3]	NS[3]	NS[3]	--	NS[3]
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-08	<0.001	<0.001	<0.001	<0.0015	0.001	--	--	--	--	--	--	--	--	<0.020	0.072	<0.0020	--	<0.0060
MW-30	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-04	1.7	0.37	1.9	2.5	<0.10	--	--	--	--	--	--	--	--	<0.020	0.24	<0.002	--	0.0073
	Apr-05	5.7	3.7	4.4	12.0	<0.10	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Apr-06	3.5	1.4	2.6	6.8	<0.620	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Aug-07	6.0	2.9	4.0	16.0	<0.02	<0.01	<0.015	<0.01	<0.01	0.14	0.44	<0.01	<0.01	<0.020	0.89	<0.002	--	<0.006
	Apr-08	6.0	2.4	3.5	13.0	<0.15	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-08	6.7	6.7	4.5	18.0	<0.1	<0.01	<0.01	0.019	<0.01	0.21	0.59	<0.01	<0.01	<0.020	0.72	<0.0020	--	<0.0060

Table 2
Historical Groundwater Analyses
SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

Sample Location	Date	Benzene	Toluene	EthylBenzene	Xylene	MTBE	Acenaphthene	Bis(2-ethylexyl) phthalate	2,4 Dimethylphenol	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Phenol	Arsenic	Barium	Cadmium	Calcium	Chromium
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.005 [2]	0.75 [1]	0.7 [2]	0.62 [1]	0.012 [3]	2.2 [3]	0.006 [3]	0.73 [3]	1.5 [3]	0.15 [3]	0.14 [3]	--	0.005 [1]	0.01 [2]	1 [1]	0.005 [2]	--	0.05 [1]
MW-31	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-04	3.7	0.4	0.32	1.2	<0.25	--	--	--	--	--	--	--	--	<0.02	0.35	<0.002	--	<0.0088
	Apr-05	2.6	0.0062	0.45	1.2	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Apr-06	6.1	1.5	0.94	4.5	<0.120	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Apr-07	4.3	<0.10	1.4	4.7	<0.25	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-07	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	--	--	--	--	--	--	--	--	NS[2]	NS[2]	NS[2]	--	NS[2]
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-08	4.0	0.018	1.4	3.0	<0.01	--	--	--	--	--	--	--	--	<0.020	1.1	<0.0020	--	<0.0060
MW-44	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-04	<0.0005	<0.0005	<0.0005	<0.0005	0.0048	--	--	--	--	--	--	--	--	<0.020	0.084	<0.0020	--	0.1
	Apr-05	<0.0005	<0.0005	<0.0005	<0.0005	0.0041	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[1]	NR[1]	NR[1]	--	NR[1]
	Apr-06	<0.001	<0.001	<0.001	<0.003	0.0028	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--	--	NR[2]	NR[2]	NR[2]	--	NR[2]
	Apr-07	<0.001	0.006	0.003	0.034	<0.0025	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-07	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	--	--	--	--	--	--	--	--	NS[3]	NS[3]	NS[3]	--	NS[3]
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-08	<0.001	<0.001	<0.001	<0.0015	0.0018	--	--	--	--	--	--	--	--	<0.020	<0.020	<0.0020	--	<0.0060

NS[1]= Well is Dry or Not Enough Water to Sample- No Sample
NS[2] = Not Sampled due to approved Facility-Wide Monitoring Plan
NS[3] = 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 pre-2007 Conditions
1 - New Mexico Water Quality Control Commission Standard for Ground Water
2 - Safe Drinking Water Act Maximum Contaminant Level
3 - EPA Region VI Human Health Medium-Specific Screening Levels -Tap Water
9.2 concentration exceeds screening level

Table 2
Historical Groundwater Analyses
SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

Sample Location	Date	Copper	Iron	Lead	Magnesium	Manganese	Potassium	Selenium	Silver	Mercury	DRO	GRO	Fluoride	Chloride	Nitrite	Bromide	NO3	Phosphorus	Sulfate	CO2	ALK
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		--	1 [1]	0.015 [2]	--	0.2 [1]	--	0.05 [1]	0.05 [1]	0.002 [1]	1.72 [1]	--	--	250 [1]	1 [2]	--	10 [2]	--	600 [1]	--	--
MW-3	Apr-99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15.5	--	--	--	--
	Sep-00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	41	--	980	--	--
	Sep-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	<0.006	0.27	<0.005	140	0.58	10	0.024	<0.005	--	NR[2]	NR[2]	0.17	1400	41	22	NS[1]	<0.50	NS[1]	NS[1]	--
	Mar-04	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-04	--	--	NS[1]	--	--	--	NS[1]	NS[1]	NS[1]	NR[2]	NR[2]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-05	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-05	<0.006	0.047	<0.005	130	0.43	7.6	<0.050	<0.005	--	NR[2]	NR[2]	0.33	1200	<0.50	4.5	42	<0.50	2300	680	680
	Apr-06	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-06	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-07	--	--	--	--	--	--	--	--	--	NS[1]	NS[1]	--	--	--	--	--	--	--	--	--
	Aug-07	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[2]	NS[2]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-08	--	--	--	--	--	--	--	--	--	NS[1]	NS[1]	--	--	--	--	--	--	--	--	--
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
RW-15	Apr-99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oct-99	--	23.8	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--
	Sep-00	--	3.42	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	2.26	--	--
	Sep-01	--	5.7	--	--	--	--	--	--	--	--	--	--	--	--	--	4.2	--	ND	--	--
	Aug-02	--	5.2	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	4.9	NR[2]	50	NR[2]	NR[2]
	Aug-03	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-04	--	--	<0.005	--	--	--	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.3	460	<0.10	6.7	<0.10	<0.50	3.4	1100	NR[2]
	Apr-05	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-05	--	--	NR[1]	--	--	--	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-06	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-06	--	--	<0.005	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	<0.50	370	<0.50	7.6	NS[2]	<2.5	<2.5	1200	1200
	Apr-07	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-07	--	--	<0.005	--	--	--	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.32	400	<2.0	8.4	<0.10	<0.50	<0.50	1300	1300
	Apr-08	--	--	--	--	--	--	--	--	--	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--
	Aug-08	--	--	NR[2]	--	--	--	<0.05	<0.005	<0.0002	2.3	62	0.29	420	<2.0	7.8	<0.10	<0.50	0.76	1200	1200
RW-17	Aug-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Historical Groundwater Analyses
SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

Sample Location	Date	Copper	Iron	Lead	Magnesium	Manganese	Potassium	Selenium	Silver	Mercury	DRO	GRO	Fluoride	Chloride	Nitrite	Bromide	NO3	Phosphorus	Sulfate	CO2	ALK
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		--	1 [1]	0.015 [2]	--	0.2 [1]	--	0.05 [1]	0.05 [1]	0.002 [1]	1.72 [1]	--	--	250 [1]	1 [2]	--	10 [2]	--	600 [1]	--	--
MW-21	Aug-02	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	--	--	NR[1]	--	--	--	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Mar-04	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-04	--	--	<0.005	--	--	--	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.18	420	<0.10	3.4	<0.10	<0.50	1400	600	NR[2]
	Apr-05	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-05	--	--	NR[1]	--	--	--	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-06	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-06	--	--	NR[1]	--	--	--	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Aug-07	--	--	NR[1]	--	--	--	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-08	--	--	--	--	--	--	--	--	--	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--
	Aug-08	--	--	NR[1]	--	--	--	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
MW-29	Aug-02	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-04	--	--	<0.005	--	--	--	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.31	35	<0.10	<0.10	0.6	<0.50	150	210	NR[2]
	Apr-05	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-05	--	--	NR[1]	--	--	--	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-06	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-06	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-07	--	--	NS[3]	--	--	--	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]
	Apr-08	--	--	--	--	--	--	--	--	--	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--
	Aug-08	--	--	<0.0050	--	--	--	<0.25	<0.0050	<0.00020	<1.0	<0.05	0.36	57	<0.10	0.4	0.99	<0.50	160	200	210
MW-30	Aug-02	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-04	--	--	0.011	--	--	--	<0.05	<0.005	0.0002	NR[2]	NR[2]	0.18	360	<0.10	5.6	<0.10	<0.50	720	1200	NR[2]
	Apr-05	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-05	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-06	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-06	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-07	--	--	<0.005	--	--	--	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.17	240	<0.10	4.7	<0.10	<0.50	76	1500	1400
	Apr-08	--	--	--	--	--	--	--	--	--	7.3	68	--	--	--	--	--	--	--	--	--
	Aug-08	--	--	<0.0050	--	--	--	<0.25	<0.0050	<0.00020	6.3	80	0.15	210	<0.10	5.6	<0.10	<0.50	12	1500	1400

Table 2
Historical Groundwater Analyses
SWMU Group 5 Investigation
Western Refining Southwest - Bloomfield Refinery

Sample Location	Date	Copper	Iron	Lead	Magnesium	Manganese	Potassium	Selenium	Silver	Mercury	DRO	GRO	Fluoride	Chloride	Nitrite	Bromide	NO3	Phosphorus	Sulfate	CO2	ALK
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		--	1 [1]	0.015 [2]	--	0.2 [1]	--	0.05 [1]	0.05 [1]	0.002 [1]	1.72 [1]	--	--	250 [1]	1 [2]	--	10 [2]	--	600 [1]	--	--
MW-31	Aug-02	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-04	--	--	<0.005	--	--	--	<0.05	<0.005	0.0002	NR[2]	NR[2]	0.19	**370**	<0.10	7.2	0.14	<0.50	**750**	1200	1400
	Apr-05	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-05	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-06	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-06	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-07	--	--	NS[2]	--	--	--	NS[2]	NS[2]	NS[2]	NS[3]	NS[3]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]
	Apr-08	--	--	--	--	--	--	--	--	--	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--
	Aug-08	--	--	<0.0050	--	--	--	<0.050	<0.0050	<0.00020	<1.0	<0.05	0.15	**740**	<1.0	17	<0.10	<0.50	6.4	1100	1100
MW-44	Aug-02	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-04	--	--	**0.036**	--	--	--	<0.05	<0.0050	0.0003	NR[2]	NR[2]	0.3	210	<0.10	0.79	<0.10	<0.50	**2800**	400	NR[2]
	Apr-05	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-05	--	--	NR[1]	--	--	--	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-06	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-06	--	--	NR[2]	--	--	--	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	--	--	--	--	--	--	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
	Aug-07	--	--	NS[3]	--	--	--	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]
	Apr-08	--	--	--	--	--	--	--	--	--	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--
	Aug-08	--	--	<0.0050	--	--	--	<0.25	<0.0050	<0.00020	<1.0	<0.05	0.62	72	<0.10	0.28	<0.10	<0.50	**3000**	360	350

NS[1]= Well is Dry or Not Enough Water to Sample- No Sample
NS[2] = Not Sampled due to approved Facility-Wide Monitoring Plan
NS[3] = 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 pre-2007 Conditions
1 - New Mexico Water Quality Control Commission Standard for Ground Water
2 - Safe Drinking Water Act Maximum Contaminant Level
3 - EPA Region VI Human Health Medium-Specific Screening Levels -Tap Water
9.2 concentration exceeds screening level

TABLE 3
Group 5 Soil Boring Samples - Vapor Screening Results
Bloomfield Refinery - Bloomfield, New Mexico

Sample Interval Depth	SWMU 15-1	SWMU 15-2	SWMU 15-3	SWMU 15-4	SWMU 15-5	SWMU 15-6	SWMU 15-7	SWMU 15-8	SWMU 15-9
0 – 2'	7.0 / 8.5	8.8 / 29.8	2.4 / 4.9	1.2 / 6.3	0.6 / 0.5	1.5 / 108	4.1 / 3.2	32 / 7.4	2.6 / 3.4
2 – 4'	10.6	11.9	1.4	5.3	0.6	28.4	4.8	18.7	4.8
4 – 6'	9.6	7.0	1.4	9.9	0.9	6.7	5.0	9.7	4.0
6 – 8'		8.4		0.9	1.0	4.7			
8 –10'		41.1		0.6	0.9	3.1			
10 – 12'		77.9							
12 – 14'		53.5							

Sample Interval Depth	SWMU 15-10	SWMU 15-11	SWMU 15-12	SWMU 15-13	SWMU 15-14	SWMU 15-15	SWMU 15-16	SWMU 15-17
0 – 2'	1.7 / 3.1	1.2 / 4.9	2.9 / 2.8	6.7 / 334	1.9 / 1.9	0.9 / 0.7	1.7 / 0.8	1.9 / 1.7
2 – 4'	4.8	104	3.2	717	1.9	0.7	1.3	1.1
4 – 6'	2.8	1600	2.9	800	1.9	0.8	1.7	1.0
6 – 8'		1517	2.3	1168				
8 –10'		342	60	1070				
10 – 12'		312	280	1512				
12 – 14'		35	660	1727				
14 – 16'		85	1325	1686				
16 – 18'		25.7	1058	1326				
18 – 20'			235	--				
20 – 22'				1425				
22 – 24'				725				
24 – 26'				882				

Sample Interval Depth	SWMU 15-18	SWMU 15-19	SWMU 15-20	SWMU 15-21	SWMU 15-22	SWMU 15-23	SWMU 15-24	SWMU 15-25
0 – 2'	0.1 / 0.2	0.9 / 0.9	0.8 / 0.9	1.5 / 1.3	1.3 / 1.7	0.3 /0.4	0.4 / 0.5	0.9 / 1.1
2 – 4'	0.5	1.2	1.7	1.4	2.2	0.8	0.5	1.0
4 – 6'	0.1				2.2			
6 – 8'	0.1				2.8			
8 –10'	2.0				2.9			
10 – 12'	1.5				2.7			
12 – 14'	1.3							

UNITS - PPM

TABLE 4
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	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	-	**N**
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	Y
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	-	**N**
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	Y
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	-	Y
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	-	**N**
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	Y
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**

TABLE 4
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	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			
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	-	Y
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	-	Y
Chrysene	4.81E+02	c	1.50E+01	c	3.26E+01	1.40E+00	-	3.67E+02	1.58E+01	-	Y
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	Y
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**

TABLE 4
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	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			
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	Y
Fluoranthene	2.29E+03	n	2.30E+03	n	1.55E+02	2.10E+02	-	1.75E+03	2.36E+03	-	Y
Fluorene	2.29E+03	ns	2.30E+03	n	2.50E+01	3.30E+01	-	2.81E+02	3.71E+02	-	Y
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**
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	-	-	-	-	-	-	-	-	-	-	**N**
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	-	Y
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	-	Y
2-Methylnaphthalene	-	-	3.10E+02	n	-	9.00E-01	-	-	1.01E+01	-	Y
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	-	**N**

TABLE 4
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			
4-Methyl-2-pentanone	-	-	-	-	-	-	-	-	-	-	N
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	-	Y
n-Butylbenzene	-	-	-	-	-	-	-	-	-	-	Y
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	-	-	-	-	-	-	-	-	-	-	Y
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	-	-	Y
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	-	Y
Pyridine	-	-	7.80E+01	n	-	9.70E-03	-	-	1.09E-01	-	N
sec-Butylbenzene	-	-	-	-	-	-	-	-	-	-	Y
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	-	N
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	Y
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	-	Y
1,3,5-Trimethylbenzene	-	-	4.70E+01	n	-	2.00E-02	-	-	2.25E-01	-	Y

TABLE 4
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	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			
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	Y
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 5
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			
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	-	Y
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	Y
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	-	N
Benzoic acid	-	-	-	-	2.50E+06	nm	-	3.30E+01	-	-	3.71E+02	-	Y
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	Y
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	-	N
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

TABLE 5
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			
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	-	Y
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
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	Y
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

TABLE 5
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			
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	-	-	-	-	-	-	-	-	-	-	-	-	N
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	-	Y
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	-	Y
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	-	Y
2-Methylnaphthalene	-	-	-	-	4.10E+03	ns	-	9.00E-01	-	-	1.01E+01	-	Y
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	-	-	-	-	-	-	-	-	-	-	-	-	N
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	-	Y
n-Butylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	Y
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	-	-	-	-	-	-	-	-	-	-	-	-	Y
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	-	-	Y
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	-	Y
Pyridine	-	-	-	-	1.00E+03	n	-	9.70E-03	-	-	1.09E-01	-	N
sec-Butylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	Y
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	-	N
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

TABLE 5
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			
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	-	Y
1,3,5-Trimethylbenzene	-	-	-	-	2.00E+02	n	-	2.00E-02	-	-	2.25E-01	-	Y
tert-Butylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	Y
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	Y
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)

TABLE 6
Ground Water Screening Levels
Bloomfield Refinery - Bloomfield, New Mexico

	NMED			EPA			
Analyte	New Mexico WQCC Standards (ug/L)	NMED Tap Water (ug/L)	TapW_key	EPA Screening Levels.Tap Water (ug/L)	TapW_key	MCL (ug/L)	Constituent Detected
Acenaphthene	-	**2.19E+03**	n	2.20E+03	n	-	Y
Acenaphthylene	-	-	-	-	-	-	**N**
Acetone	-	**2.18E+04**	n	2.20E+04	n	-	Y
Aniline	-	-	-	**1.20E+01**	c*	-	**N**
Anthracene	-	**1.10E+04**	n	1 10E+04	n	-	**N**
Antimony	-	1.46E+01	n	1.50E+01	n	**6**	Y
Arsenic	100	4.48E-01	c	4.50E-02	c	**10**	Y
Azobenzene	-	-	-	**1.20E-01**	c	-	**N**
Barium	**1000**	7.30E+03	n	7.30E+03	n	2000	Y
Benz(a)anthracene	-	**9.21E-01**	c	2.90E-02	c	-	**N**
Benzene	10	4.13E+00	c	4 10E-01	c	**5**	Y
Benzo(a)pyrene	0.7	9.21E-02	c	2 90E-03	c	**0.2**	**N**
Benzo(b)fluoranthene	-	**9.21E-01**	c	2 90E-02	c	-	**N**
Benzo(g,h,i)perylene	-	-	-	-	-	-	**N**
Benzo(k)fluoranthene	-	**9.21E+00**	c	2.90E-01	c	-	**N**
Benzoic acid	-	-	-	**1.50E+05**	n	-	**N**
Benzyl alcohol	-	-	-	**1.80E+04**	n	-	**N**
Beryllium	-	7.30E+01	n	7.30E+01	n	**4**	**N**
Bis(2-chloroethoxy)methane	-	-	-	**1.10E+02**	n	-	**N**
Bis(2-chloroethyl)ether	-	**1.19E-01**	c	1 20E-02	c	-	**N**
Bis(2-chloroisopropyl)ether	-	**9.60E+00**	c	-	-	-	**N**
Bis(2-ethylhexyl)phthalate	-	4.80E+01	c	4 80E+00	c	**6**	Y
Bromobenzene	-	-	-	**2.00E+01**	n	-	**N**
Bromodichloromethane	-	**1.17E+00**	c	1 20E-01	c	-	**N**
Bromoform	-	-	-	**8.50E+00**	c*	-	**N**
Bromomethane	-	**8.66E+00**	n	8.70E+00	n	-	**N**
4-Bromophenyl phenyl ether	-	-	-	-	-	-	**N**
Butyl benzyl phthalate	-	-	-	**3.50E+01**	c	-	**N**
2-Butanone (MEK)	-	**7.06E+03**	n	7.10E+03	n	-	**N**
Cadmium	10	1.83E+01	n	1.80E+01	n	**5**	**N**
Carbazole	-	-	-	-	-	-	**N**
Carbon disulfide	-	**1.04E+03**	n	1.00E+03	n	-	**N**
Carbon tetrachloride	10	1 99E+00	c	2.00E-01	c	**5**	**N**
Chlorobenzene	-	9 13E+01	n	9.10E+01	n	**100**	**N**
Chloroethane	-	-	-	-	-	-	**N**
Chloroform	**100**	1.93E+00	c	1 90E-01	c	-	Y
Chloromethane	-	**1.78E+01**	c	1 90E+02	c	-	**N**
4-Chloro-3-methylphenol	-	-	-	-	-	-	**N**
4-Chloroaniline	-	-	-	**3.40E-01**	c	-	**N**
4-Chlorophenyl phenyl ether	-	-	-	-	-	-	**N**
4-Chlorotoluene	-	-	-	**2.60E+03**	n	-	**N**
2-Chloronaphthalene	-	-	-	**2.90E+03**	n	-	**N**
2-Chlorophenol	-	**1.83E+02**	n	1.80E+02	n	-	**N**
2-Chlorotoluene	-	-	-	**7.30E+02**	n	-	**N**
Chromium III	**50**	5.48E+04	n	5.50E+04	n	-	Y
Chromium VI	**50**	1 10E+02	n	1.10E+02	n	-	Y
Chrysene	-	**9.21E+01**	c	2.90E+00	c	-	**N**
Cobalt	**50**	-	-	1.10E+01	n	-	Y
Cyanide	**200**	7.30E+02	n	7.30E+02	n	200	Y
Dibenz(a,h)anthracene	-	**9.21E-02**	c	2.90E-03	c	-	**N**
Dibenzofuran	-	-	-	-	-	-	**N**
Dibromochloromethane	-	**1.47E+00**	c	1.50E-01	c	-	**N**
cis-1,2-DCE	-	3 65E+02	n	3.70E+02	n	**70**	**N**
trans-1,2-DCE	-	1.07E+02	n	1.10E+02	n	**100**	**N**
cis-1,3-Dichloropropene	-	-	-	-	-	-	**N**
trans-1,3-Dichloropropene	-	-	-	**4.30E-01**	c	-	**N**
Dibromomethane	-	-	-	**3.70E+02**	n	-	**N**
1,2-Dibromo-3-chloropropane	-	8 03E-03	c	3 20E-04	c	**0.2**	**N**
1,2-Dibromoethane (EDB)	0.1	-	-	6.50E-03	c	**0.05**	**N**
1,2-Dichlorobenzene	-	3 70E+02	n	3 70E+02	n	**600**	**N**
1,3-Dichlorobenzene	-	-	-	-	-	-	**N**
1,4-Dichlorobenzene	-	4 27E+00	c	4.30E-01	c	**75**	**N**

TABLE 6
Ground Water Screening Levels
Bloomfield Refinery - Bloomfield, New Mexico

	NMED			EPA			
Analyte	New Mexico WQCC Standards (ug/L)	NMED Tap Water (ug/L)	TapW_key	EPA Screening Levels.Tap Water (ug/L)	TapW_key	MCL (ug/L)	Constituent Detected
3,3'-Dichlorobenzidine	-	-	-	**1.50E-01**	c	-	**N**
Dichlorodifluoromethane	-	**3.95E+02**	n	3.90E+02	n	-	**N**
1,1-Dichloroethane	**25**	2.42E+01	c	2 40E+00	c	-	**N**
1,2-Dichloroethane (EDC)	10	1.49E+00	c	1.50E-01	c	**5**	Y
1,1-Dichloroethene	**5**	3.40E+02	n	3 40E+02	n	7	**N**
2,4-Dichlorophenol	-	**1.10E+02**	n	1.10E+02	n	-	**N**
1,2-Dichloropropane	-	3.86E+00	c	3.90E-01	c*	**5**	**N**
2,2-Dichloropropane	-	-	-	-	-	-	**N**
1,3-Dichloropropane	-	-	-	**7.30E+02**	n	-	**N**
1,1-Dichloropropene	-	-	-	-	-	-	**N**
Diethyl phthalate	-	**2.92E+04**	n	2.90E+04	n	-	**N**
Dimethyl phthalate	-	**3.65E+05**	n	-	-	-	**N**
2,4-Dimethylphenol	-	**7.30E+02**	n	7.30E+02	n	-	Y
4,6-Dinitro-2-methylphenol	-	-	-	-	-	-	**N**
2,4-Dinitrophenol	-	**7.30E+01**	n	7.30E+01	n	-	**N**
2,4-Dinitrotoluene	-	**2.17E+00**	c	2.20E-01	n	-	**N**
2,6-Dinitrotoluene	-	-	-	**3.70E+01**	n	-	**N**
Di-n-butyl phthalate	-	**3.65E+03**	n	-	-	-	**N**
Di-n-octyl phthalate	-	-	-	-	-	-	**N**
Ethylbenzene	750	1.48E+01	c	1.50E+00	c	**700**	Y
Fluoranthene	-	**1.46E+03**	n	1.50E+03	n	-	**N**
Fluorene	-	**1.46E+03**	n	1.50E+03	n	-	Y
Hexachlorobenzene	-	4.20E-01	c	4.20E-02	c	**1**	**N**
Hexachlorobutadiene	-	-	-	**8.60E-01**	c*	-	**N**
Hexachlorocyclopentadiene	-	2 19E+02	n	2 20E+02	n	**50**	**N**
Hexachloroethane	-	**3.65E+01**	n	4.80E+00	c**	-	**N**
2-Hexanone	-	-	-	-	-	-	**N**
Indeno(1,2,3-cd)pyrene	-	-	-	**2.90E-02**	c	-	**N**
Iron, Total	-	25 6	n	26	n	-	Y
Iron, Dissolved	1	25.6	n	26	n	-	Y
Isophorone	-	**7.07E+02**	c	7 10E+01	c	-	**N**
Isopropylbenzene (Cumene)	-	**6.79E+02**	n	6.80E+02	n	-	Y
4-Isopropyltoluene	-	-	-	-	-	-	Y
Lead	50	-	-	-	-	**15**	Y
Magnesium	-	-	-	-	-	-	Y
Manganese	**200**	8.76E+02	n	8.80E+02	n	-	Y
Mercury	**2**	5.62E-01	n	5.70E-01	n	2	Y
Methyl tert-butyl ether (MTBE)	-	**1.25E+02**	c	1.20E+01	c	-	Y
Methylene chloride	100	4.80E+01	c	4.80E+00	c	**5**	**N**
1-Methylnaphthalene	-	-	-	**2.30E+00**	c	-	Y
2-Methylnaphthalene	-	-	-	**1.50E+02**	n	-	Y
2-Methylphenol	-	-	-	**1.80E+03**	n	-	Y
3+4-Methylphenol	-	-	-	**1.80E+02**	n	-	Y
4-Methyl-2-pentanone	-	-	-	-	-	-	**N**
Naphthalene	-	**1.43E+00**	c	1.40E-01	c*	-	Y
n-Butylbenzene	-	-	-	-	-	-	Y
Nickel	**200**	7.30E+02	n	7.30E+02	n	-	Y
2-Nitroaniline	-	-	-	**1.10E+02**	n	-	**N**
3-Nitroaniline	-	-	-	-	-	-	**N**
4-Nitroaniline	-	-	-	**3.40E+00**	c*	-	**N**
2-Nitrophenol	-	-	-	-	-	-	**N**
4-Nitrophenol	-	-	-	-	-	-	**N**
Nitrobenzene	-	**1.49E+01**	n	1.20E-01	c	-	**N**
N-Nitrosodimethylamine	-	**1.32E-02**	c	4.20E-04	c	-	**N**
N-Nitrosodi-n-propylamine	-	-	-	**9.60E-03**	c	-	**N**
N-Nitrosodiphenylamine	-	**1.37E+02**	c	1.40E+01	c	-	**N**
n-Propylbenzene	-	-	-	-	-	-	Y
Pentachlorophenol	-	5.60E+00	c	5 60E-01	c	**1**	**N**
Phenanthrene	-	**1.10E+03**	n	-	-	-	Y
Phenol	**5**	1.10E+04	n	1 10E+04	n	-	Y
Pyrene	-	**1.10E+03**	n	1 10E+03	n	-	Y
Pyridine	-	-	-	**3.70E+01**	n	-	**N**
sec-Butylbenzene	-	-	-	-	-	-	Y
Selenium	**50**	1.83E+02	n	1 80E+02	n	50	Y
Silver	**50**	1.83E+02	n	1.80E+02	n	-	**N**
Styrene	-	1.62E+03	n	1.60E+03	n	**100**	**N**

TABLE 6
Ground Water Screening Levels
Bloomfield Refinery - Bloomfield, New Mexico

Analyte	NMED: New Mexico WQCC Standards (ug/L)	NMED: NMED Tap Water (ug/L)	NMED: TapW_key	EPA: EPA Screening Levels.Tap Water (ug/L)	EPA: TapW_key	EPA: MCL (ug/L)	Constituent Detected
tert-Butylbenzene	-	-	-	-	-	-	**N**
Tetrachloroethene (PCE)	20	-	-	1.10E-01	c	**5**	**N**
1,1,1,2-Tetrachloroethane	-	**5.24E+00**	c	5.20E-01	c	-	**N**
Toluene	**750**	2 28E+03	n	2.30E+03	n	1000	Y
1,2,3-Trichlorobenzene	-	-	-	-	-	-	**N**
1,2,4-Trichlorobenzene	-	8.16E+00	n	8 20E+00	n	**70**	**N**
2,4,5-Trichlorophenol	-	**3.65E+03**	n	3.70E+03	n	-	**N**
2,4,6-Trichlorophenol	-	**3.65E+01**	n	6.10E+00	c**	-	**N**
1,2,3-Trichloropropane	-	**9.60E-02**	c	9.60E-03	c	-	**N**
1,2,4-Trichlorobenzene	-	8 16E+00	n	8 20E+00	n	**70**	**N**
1,2,4-Trimethylbenzene	-	-	-	**1.50E+01**	n	-	Y
1,1,1-Trichloroethane	**60**	9 13E+03	n	9.10E+03	n	200	**N**
1,1,2,2-Tetrachloroethane	**10**	6.71E-01	c	6.70E-02	c	-	**N**
1,1,2-Trichloroethane	10	2 42E+00	c	2.40E-01	c	**5**	**N**
Trichloroethene (TCE)	100	-	-	1.70E+00	c	**5**	**N**
Trichlorofluoromethane	-	**1.29E+03**	n	1.30E+03	n	-	**N**
1,3,5-Trimethylbenzene	-	-	-	**1.20E+01**	n	-	Y
Vanadium	-	**1.83E+02**	n	2.60E+02	n	-	**N**
Vinyl chloride	**1**	8.61E-01	c	1.60E-02	c	2	**N**
Xylenes, Total	**620**	2.03E+02	n	2.00E+02	n	10000	Y
Zinc	**10000**	1.10E+04	n	1.10E+04	n	-	Y
General Chemistry							
Alkalinity	-	-	-	-	-	-	Y
Bicarbonate	-	-	-	-	-	-	Y
Carbonate	-	-	-	-	-	-	**N**
Calcium	-	-	-	-	-	-	Y
Chloride	**250000**	-	-	-	-	-	Y
Fluoride	**1600**	2.19E+03	n	-	-	-	Y
Iron	**1000**	2.56E+04	n	2 60E+04	n	-	Y
Nitrite	-	3.65E+03	n	3.70E+03	n	**1000**	Y
Nitrate (NO3 as N)	**10000**	-	-	5.80E+04	n	10000	Y
Potassium	-	-	-	-	-	-	Y
Sodium	-	-	-	-	-	-	Y
Sulfate	**600000**	-	-	-	-	-	Y
Total Dissolved Solids	**1000000**	-	-	-	-	-	Y
Motor Oil Range Organics (MRO)	-	-	-	-	-	-	**N**
Diesel Range Organics (DRO)	-	-	-	-	-	-	Y
Gasoline Range Organics (GRO)	-	-	-	-	-	-	Y

c - cancer, * = where n SL < 100X c SL, ** = where n SL < 10X c SL
n - noncancer
620 - Bolded value is applicable screening level
\- no screenig value currently available
EPA - Regional Screening Levels (April 2009)
NMED WQCC standards - Title 20 Chapter 6, Part 2, - 20.6.2.3101 Standards for Ground Water of 10,000 mg/l TDS Concentration or less

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-1 (0.5-2.0')	SWMU 15-1 (2-4')	SWMU 15-2 (0.5-2.0')	SWMU 15-2 (4-6')	SWMU 15-2 (10-14')	SWMU 15-3 (0.5-2.0')	SWMU 15-3 (2-4')	SWMU 15-4 (0.5-2.0')	SWMU 15-4 (2-3')	SWMU 15-5 (0.5-2.0')	SWMU 15-5 (8-10')	SWMU 15-6 (0.5-2.0')	SWMU 15-6 (8-10')	SWMU 15-7 (0.5-2.0')	SWMU 15-7 (2-4')	SWMU 15-8 (0-0.5')	SWMU 15-8 (0.5-2.0')	SWMU 15-8 (2-4')	SWMU 15-9 (0.5-2.0')	SWMU 15-9 (4-6')	SWMU 15-10 (0.5-2.0')
							1008838-01	1008B18-01	1008838-02	1008838-03	1008838-04	1008836-01	1008994-05	1008836-02	1008994-04	1008836-03	1008836-04	1008836-05	1008836-07	1008828-01	1008828-02	1008828-03	1008828-04	1008828-05	1008828-06	1008828-07	1008828-09
							8/19/2010	8/24/2010	8/19/2010	8/19/2010	8/19/2010	8/19/2010	8/24/2010	8/19/2010	8/24/2010	8/19/2010	8/19/2010	8/19/2010	8/19/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010
Metals (mg/kg)																											
Antimony	3.13E+01	(1)	1.24E+02	(5)	7.44E+00	(8)	<2.5	--	<2.5	<5.0	<2.4	<5.0	--	<5.0	--	<5.0	--	<13	--	<5.0	--	<2.4	<2.4	--	<2.5	--	<4.9
Arsenic	3.59E+00	(1)	1.77E+01	(4)	1.48E-01	(8)	<2.5	--	<2.5	<5.0	<2.4	5.5	--	<5.0	--	<5.0	--	<13	--	5.1	--	3.7	3	--	3	--	5.1
Barium	1.56E+04	(1)	4.35E+03	(5)	3.39E+03	(8)	60	--	140	360	100	220	--	180	--	120	--	200	--	210	--	180	95	--	140	--	200
Beryllium	1.56E+02	(1)	1.44E+02	(5)	6.49E+02	(8)	0.28	--	0.27	<0.30	<0.15	0.56	--	0.57	--	0.51	--	<0.75	--	0.59	--	0.36	0.21	--	0.29	--	0.56
Cadmium	7.79E+01	(1)	3.09E+02	(5)	1.55E+01	(8)	<0.098	--	<0.099	<0.20	<0.098	<0.20	--	<0.20	--	<0.20	--	<0.50	--	<0.20	--	0.11	<0.097	--	<0.099	--	<0.20
Chromium	2.19E+02	(1)	4.49E+02	(5)	2.37E+01	(8)	4.2	--	4	5.4	1.6	8.6	--	9.1	--	7.9	--	13	--	11	--	7.4	3.7	--	4.3	--	8.9
Cobalt	2.30E+01	(2)	3.00E+02	(6)	5.51E+00	(9)	2.3	--	2	2.8	1.6	4.9	--	4.6	--	4.2	--	5.1	--	4.5	--	4.4	2	--	2.4	--	4.9
Cyanide	1.56E+03	(1)	6.19E+03	(5)	8.37E+01	(8)	<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
Lead	4.00E+02	(1)	8.00E+02	(4)	-	-	2.7	--	2.4	2.8	1.2	5.3	--	5.2	--	4.5	--	6.5	--	25	--	10	2.4	--	2.6	--	5.3
Mercury	7.71E+00	(1)	4.99E+01	(4)	3.30E-01	(8)	<0.033	--	<0.033	<0.033	<0.033	<0.033	--	0.062	--	<0.033	--	0.06	--	<0.033	--	0.34	<0.033	--	<0.033	--	<0.033
Nickel	1.56E+03	(1)	6.19E+03	(5)	5.36E+02	(8)	3.5	--	3.4	2.4	1.2	7.5	--	7.2	--	6.7	--	7.9	--	7.8	--	5.3	2.6	--	3.6	--	7.8
Selenium	3.91E+02	(1)	1.55E+03	(5)	1.09E+01	(8)	<2.5	--	<2.5	<5.0	<2.4	<5.0	--	<5.0	--	<5.0	--	<13	--	<5.0	--	<2.4	<2.4	--	<2.5	--	<4.9
Silver	3.91E+02	(1)	1.55E+03	(5)	1.76E+01	(8)	<0.25	--	<0.25	<0.50	<0.24	<0.50	--	<0.50	--	<0.50	--	<1.3	--	<0.50	--	<0.24	<0.24	--	<0.25	--	<0.49
Vanadium	3.91E+02	(1)	1.55E+03	(5)	2.05E+03	(8)	12	--	12	19	8.2	26	--	23	--	24	--	27	--	26	--	17	13	--	13	--	29
Zinc	2.35E+04	(1)	9.29E+04	(5)	7.67E+03	(8)	17	--	14	16	8.2	38	--	32	--	30	--	40	--	37	--	47	13	--	15	--	38
Volatile Organic Compounds - (EPA Method 8260) mg/kg																											
1,1,1,2-Tetrachloroethane	2.92E+01	(1)	1.61E+02	(4)	1.94E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,1,1-Trichloroethane	2.18E+04	(1)	6.43E+04	(5)	3.35E+01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,1,2,2-Tetrachloroethane	7.97E+00	(1)	4.33E+01	(4)	2.53E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,1,2-Trichloroethane	1.72E+01	(1)	9.43E+01	(4)	7.58E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,1-Dichloroethane	6.29E+01	(1)	3.50E+02	(4)	6.85E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
1,1-Dichloroethene	6.18E+02	(1)	1.83E+03	(5)	1.34E+00	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,1-Dichloropropene	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
1,2,3-Trichlorobenzene	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
1,2,3-Trichloropropane	9.15E-01	(1)	4.54E+00	(4)	4.01E-04	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
1,2,4-Trichlorobenzene	1.43E+02	(1)	4.27E+02	(5)	1.15E-01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,2,4-Trimethylbenzene	6.70E+01	(2)	2.80E+02	(6)	2.70E-01	(9)	<0.0010752	--	<0.0010621	<0.0010302	0.00512	<0.0009244	--	<0.050	--	<0.050	--	0.84	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,2-Dibromo-3-chloropropane	1.94E-01	(1)	1.09E+00	(4)	3.35E-05	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
1,2-Dibromoethane (EDB)	5.74E-01	(1)	3.14E+00	(4)	1.78E-04	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,2-Dichlorobenzene	3.01E+03	(1)	9.71E+03	(5)	3.53E+00	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,2-Dichloroethane (EDC)	7.74E+00	(1)	4.28E+01	(4)	4.11E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,2-Dichloropropane	1.47E+01	(1)	8.17E+01	(4)	1.25E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,3,5-Trimethylbenzene	4.70E+01	(2)	2.00E+02	(6)	2.25E-01	(9)	<0.0010752	--	<0.0010621	<0.0010302	0.00157	<0.0009244	--	<0.050	--	<0.050	--	0.87	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,3-Dichlorobenzene	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,3-Dichloropropane	1.60E+03	(2)	2.00E+04	(6)	3.04E+00	(9)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1,4-Dichlorobenzene	3.21E+01	(1)	1.80E+02	(4)	4.02E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
1-Methylnaphthalene	2.20E+02	(3)	9.90E+02	(7)	1.69E-01	(9)	<0.1	--	<0.1	<0.1	<0.1	<0.1	--	<0.20	--	<0.20	--	<1.0	--	<2.0	--	<0.20	<0.1	--	<0.1	--	<0.1
2,2-Dichloropropane	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
2-Butanone (MEK)	3.96E+04	(1)	1.48E+05	(5)	1.43E+01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.50	--	<0.50	--	<2.5	--	<5.0	--	<0.50	<0.0009488	--	<0.0009602	--	<0.000995
2-Chlorotoluene	1.56E+03	(1)	6.19E+03	(5)	7.02E+00	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
2-Hexanone	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.50	--	<0.50	--	<2.5	--	<5.0	--	<0.50	<0.0009488	--	<0.0009602	--	<0.000995
2-Methylnaphthalene	3.10E+02	(2)	4.10E+03	(6)	1.01E+01	(9)	--	--	--	--	--	--	--	<0.20	--	<0.20	--	<1.0	--	<2.0	--	<0.20	--	--	--	--	--
4-Chlorotoluene	5.50E+03	(2)	7.20E+04	(6)	3.15E+01	(9)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
4-Isopropyltoluene	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
4-Methyl-2-pentanone	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.50	--	<0.50	--	<2.5	--	<5.0	--	<0.50	<0.0009488	--	<0.0009602	--	<0.000995
Acetone	6.75E+04	(1)	2.63E+05	(5)	4.32E+01	(8)	<0.0021504	--	<0.0021242	<0.0020604	<0.002027	<0.0018488	--	<0.75	--	<0.75	--	<3.8	--	<7.5	--	<0.75	<0.0018976	--	<0.0019204	--	<0.00199
Benzene	1.55E+01	(1)	8.54E+01	(4)	2.08E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Bromobenzene	9.40E+01	(2)	4.10E+02	(6)	1.69E-01	(9)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Bromodichloromethane	5.25E+00	(1)	2.92E+01	(4)	3.11E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Bromoform	6.10E+02	(3)	2.20E+03	(7)	2.59E-02	(9)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Bromomethane	2.23E+01	(1)	6.71E+01	(5)	2.18E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
Carbon disulfide	1.94E+03	(1)	5.89E+03	(5)	2.84E+00	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.50	--	<0.50	--	<2.5	--	<5.0	--	<0.50	<0.0009488	--	<0.0009602	--	<0.000995
Carbon tetrachloride	4.38E+00	(1)	2.43E+01	(4)	8.32E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
Chlorobenzene	5.08E+02	(1)	1.58E+03	(5)	6.06E-01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Chloroethane	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
Chloroform	5.72E+00	(1)	3.19E+01	(4)	5.27E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Chloromethane	3.56E+01	(1)	1.98E+02	(4)	4.70E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	0.095	--	0.093	--	<0.25	--	0.65	--	0.071	<0.0009488	--	<0.0009602	--	<0.000995
cis-1,2-DCE	7.82E+02	(1)	3.10E+03	(5)	1.06E+00	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
cis-1,3-Dichloropropene	2.35E+01	(1)	1.26E+02	(4)	1.52E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Dibromochloromethane	1.13E+01	(1)	6.13E+01	(4)	3.80E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Dibromomethane	7.80E+02	(2)	1.00E+04	(6)	1.02E+00	(9)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
Dichlorodifluoromethane	4.81E+02	(1)	1.37E+03	(5)	8.14E+00	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Ethylbenzene	6.97E+01	(1)	3.85E+02	(4)	1.64E-01	(8)	<0.0010752	--	<0.0010621	<0.0010302	0.00125	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-1 (0.5-2.0')	SWMU 15-1 (2-4')	SWMU 15-2 (0.5-2.0')	SWMU 15-2 (4-6')	SWMU 15-2 (10-14')	SWMU 15-3 (0.5-2.0')	SWMU 15-3 (2-4')	SWMU 15-4 (0.5-2.0')	SWMU 15-4 (2-3')	SWMU 15-5 (0.5-2.0')	SWMU 15-5 (8-10')	SWMU 15-6 (0.5-2.0')	SWMU 15-6 (8-10')	SWMU 15-7 (0.5-2.0')	SWMU 15-7 (2-4')	SWMU 15-8 (0-0.5')	SWMU 15-8 (0.5-2.0')	SWMU 15-8 (2-4')	SWMU 15-9 (0.5-2.0')	SWMU 15-9 (4-6')	SWMU 15-10 (0.5-2.0')
							1008838-01	1008B18-01	1008838-02	1008838-03	1008838-04	1008836-01	1008994-05	1008836-02	1008994-04	1008836-03	1008836-04	1008836-05	1008836-07	1008828-01	1008828-02	1008828-03	1008828-04	1008828-05	1008828-06	1008828-07	1008828-09
							8/19/2010	8/24/2010	8/19/2010	8/19/2010	8/19/2010	8/19/2010	8/24/2010	8/19/2010	8/24/2010	8/19/2010	8/19/2010	8/19/2010	8/19/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010
Hexachlorobutadiene	6.20E+01	(3)	2.20E+02	(7)	2.14E-02	(9)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
Isopropylbenzene	3.21E+03	(1)	1.03E+04	(5)	1.11E+01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Methyl tert-butyl ether (MTBE)	8.62E+02	(1)	4.69E+03	(4)	2.58E-01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Methylene chloride	1.99E+02	(1)	1.09E+03	(4)	1.21E-01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.15	--	<0.15	--	<0.75	--	<1.5	--	<0.15	<0.0009488	--	<0.0009602	--	<0.000995
Naphthalene	4.50E+01	(1)	2.52E+02	(4)	4.72E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.10	--	<0.10	--	<0.50	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
n-Butylbenzene	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
n-Propylbenzene	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
sec-Butylbenzene	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Styrene	8.97E+03	(1)	3.03E+04	(5)	1.76E+01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
tert-Butylbenzene	--	-	-	-	-	-	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Tetrachloroethene (PCE)	6.99E+00	(1)	3.64E+01	(4)	5.05E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Toluene	5.57E+03	(1)	2.11E+04	(5)	1.56E+01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	0.087	<0.0009488	--	<0.0009602	--	<0.000995
trans-1,2-DCE	2.73E+02	(1)	8.14E+02	(5)	3.39E-01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
trans-1,3-Dichloropropene	2.35E+01	(1)	1.26E+02	(4)	1.52E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Trichloroethene (TCE)	4.57E+01	(1)	2.53E+02	(4)	5.96E-02	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Trichlorofluoromethane	2.01E+03	(1)	5.82E+03	(5)	1.01E+01	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Vinyl chloride	8.65E-01	(1)	2.59E+01	(4)	3.24E-03	(8)	<0.0010752	--	<0.0010621	<0.0010302	<0.0010135	<0.0009244	--	<0.050	--	<0.050	--	<0.25	--	<0.50	--	<0.050	<0.0009488	--	<0.0009602	--	<0.000995
Xylenes, Total	1.09E+03	(1)	3.13E+03	(5)	1.98E+00	(8)	<0.0010752	--	<0.0010621	<0.0010302	0.00603	<0.0009244	--	<0.10	--	<0.10	--	0.91	--	<1.0	--	<0.10	<0.0009488	--	<0.0009602	--	<0.000995
Semi Volatile Organics - (EPA Method 8270) mg/kg																											
1,2,4-Trichlorobenzene	1.43E+02	(1)	4.27E+02	(5)	1.15E-01	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
1,2-Dichlorobenzene	3.01E+03	(1)	9.71E+03	(5)	3.53E+00	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
1,3-Dichlorobenzene	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
1,4-Dichlorobenzene	3.21E+01	(1)	1.80E+02	(4)	4.02E-02	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
2,4,5-Trichlorophenol	6.11E+03	(1)	2.38E+04	(5)	8.02E+01	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
2,4,6-Trichlorophenol	6.11E+01	(1)	2.38E+02	(5)	8.02E-01	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
2,4-Dichlorophenol	1.83E+02	(1)	7.15E+02	(5)	1.54E+00	(8)	<0.40	--	<0.40	<0.40	<0.40	<0.40	--	<0.40	--	<0.40	--	<2.0	--	<2.0	--	<0.80	<0.40	--	<0.40	--	<0.80
2,4-Dimethylphenol	1.22E+03	(1)	4.76E+03	(5)	1.03E+01	(8)	<0.30	--	<0.30	<0.30	<0.30	<0.30	--	<0.30	--	<0.30	--	<1.5	--	<1.5	--	<0.60	<0.30	--	<0.30	--	<0.60
2,4-Dinitrophenol	1.22E+02	(1)	4.76E+02	(5)	5.91E-01	(8)	<0.40	--	<0.40	<0.40	<0.40	<0.40	--	<0.40	--	<0.40	--	<2.0	--	<2.0	--	<0.80	<0.40	--	<0.40	--	<0.80
2,4-Dinitrotoluene	1.26E+01	(1)	1.03E+02	(4)	1.75E-02	(8)	<0.50	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	--	<0.50	--	<2.5	--	<2.5	--	<1.0	<0.50	--	<0.50	--	<1.0
2,6-Dinitrotoluene	6.12E+01	(1)	2.39E+02	(5)	3.00E-01	(8)	<0.50	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	--	<0.50	--	<2.5	--	<2.5	--	<1.0	<0.50	--	<0.50	--	<1.0
2-Chloronaphthalene	6.26E+03	(1)	2.48E+04	(5)	1.52E+02	(8)	<0.25	--	<0.25	<0.25	<0.25	<0.25	--	<0.25	--	<0.25	--	<1.3	--	<1.3	--	<0.50	<0.25	--	<0.25	--	<0.50
2-Chlorophenol	3.91E+02	(1)	1.55E+03	(5)	1.72E+00	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
2-Methylnaphthalene	3.10E+02	(2)	4.10E+03	(6)	1.01E+01	(9)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	1.2	--	<0.40	<0.20	--	<0.20	--	<0.40
2-Methylphenol	3.10E+03	(2)	3.10E+04	(6)	2.25E+01	(9)	<0.50	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	--	<0.50	--	<2.5	--	<2.5	--	<1.0	<0.50	--	<0.50	--	<1.0
2-Nitroaniline	1.80E+02	(2)	1.80E+03	(6)	3.71E-01	(9)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
2-Nitrophenol	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
3,3'-Dichlorobenzidine	8.71E+00	(1)	4.26E+01	(4)	1.92E-01	(8)	<0.25	--	<0.25	<0.25	<0.25	<0.25	--	<0.25	--	<0.25	--	<1.3	--	<1.3	--	<0.50	<0.25	--	<0.25	--	<0.50
3+4-Methylphenol	3.10E+02	(2)	3.10E+03	(6)	2.14E+00	(9)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
3-Nitroaniline	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
4,6-Dinitro-2-methylphenol	--	-	-	-	-	-	<0.50	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	--	<0.50	--	<2.5	--	<2.5	--	<1.0	<0.50	--	<0.50	--	<1.0
4-Bromophenyl phenyl ether	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
4-Chloro-3-methylphenol	--	-	-	-	-	-	<0.50	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	--	<0.50	--	<2.5	--	<2.5	--	<1.0	<0.50	--	<0.50	--	<1.0
4-Chloroaniline	2.40E+01	(3)	8.60E+01	(7)	1.35E-03	(9)	<0.50	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	--	<0.50	--	<2.5	--	<2.5	--	<1.0	<0.50	--	<0.50	--	<1.0
4-Chlorophenyl phenyl ether	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
4-Nitroaniline	2.40E+02	(3)	8.60E+02	(7)	1.13E-02	(9)	<0.25	--	<0.25	<0.25	<0.25	<0.25	--	<0.25	--	<0.25	--	<1.3	--	<1.3	--	<0.50	<0.25	--	<0.25	--	<0.50
4-Nitrophenol	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Acenaphthene	3.44E+03	(1)	1.86E+04	(5)	2.31E+02	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Acenaphthylene	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Aniline	8.50E+02	(3)	3.00E+03	(7)	3.83E-02	(9)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Anthracene	1.72E+04	(1)	6.68E+04	(5)	3.79E+03	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Azobenzene	4.90E+01	(3)	2.20E+02	(7)	5.74E-03	(9)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Benz(a)anthracene	4.81E+00	(1)	2.34E+01	(4)	3.59E+00	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Benzo(a)pyrene	4.81E-01	(1)	2.34E+00	(4)	1.22E+00	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Benzo(b)fluoranthene	4.81E+00	(1)	2.34E+01	(4)	1.25E+01	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Benzo(g,h,i)perylene	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Benzo(k)fluoranthene	4.81E+01	(1)	2.34E+02	(4)	1.22E+02	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Benzoic acid	2.40E+05	(2)	2.50E+06	(6)	3.71E+02	(9)	<0.50	--	<0.50	<0.50	<0.50	<0.50	--	<0.50	--	<0.50	--	<2.5	--	<2.5	--	<1.0	<0.50	--	<0.50	--	<1.0
Benzyl alcohol	3.10E+04	(2)	3.10E+05	(6)	4.73E+01	(9)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Bis(2-chloroethoxy)methane	1.80E+02	(2)	1.80E+03	(6)	2.59E-01	(9)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Bis(2-chloroethyl)ether	2.56E+00	(1)	1.36E+01	(4)	2.62E-04	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Bis(2-chloroisopropyl)ether	9.15E+01	(1)	4.54E+02	(4)	2.88E-02	(8)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Bis(2-ethylhexyl)phthalate	2.80E+02	(1)	1.37E+03	(4)	1.34E+02	(8)	<0.50	--	<0.50	3.5	<0.50	<0.50	--	<0.50	--	<0.50	--	<2.5	--	<2.5	--	<1.0	<0.50	--	<0.50	--	<1.0
Butyl benzyl phthalate	2.60E+03	(3)	9.10E+03	(7)	7.54E+00	(9)	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40
Carbazole	--	-	-	-	-	-	<0.20	--	<0.20	<0.20	<0.20	<0.20	--	<0.20	--	<0.20	--	<1.0	--	<1.0	--	<0.40	<0.20	--	<0.20	--	<0.40

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-1 (0.5-2.0')	SWMU 15-1 (2-4')	SWMU 15-2 (0.5-2.0')	SWMU 15-2 (4-6')	SWMU 15-2 (10-14')	SWMU 15-3 (0.5-2.0')	SWMU 15-3 (2-4')	SWMU 15-4 (0.5-2.0')	SWMU 15-4 (2-3')	SWMU 15-5 (0.5-2.0')	SWMU 15-5 (8-10')	SWMU 15-6 (0.5-2.0')	SWMU 15-6 (8-10')	SWMU 15-7 (0.5-2.0')	SWMU 15-7 (2-4')	SWMU 15-8 (0-0.5')	SWMU 15-8 (0.5-2.0')	SWMU 15-8 (2-4')	SWMU 15-9 (0.5-2.0')	SWMU 15-9 (4-6')	SWMU 15-10 (0.5-2.0')
							1008838-01	1008B18-01	1008838-02	1008838-03	1008838-04	1008836-01	1008994-05	1008836-02	1008994-04	1008836-03	1008836-04	1008836-05	1008836-07	1008828-01	1008828-02	1008828-03	1008828-04	1008828-05	1008828-06	1008828-07	1008828-09
							8/19/2010	8/24/2010	8/19/2010	8/19/2010	8/19/2010	8/19/2010	8/24/2010	8/19/2010	8/24/2010	8/19/2010	8/19/2010	8/19/2010	8/19/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010	8/20/2010
Chrysene	4.81E+02	(1)	2.34E+03	(4)	3.67E+02	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	2.2	–	<0.40	<0.20	–	<0.20	–	<0.40
Dibenz(a,h)anthracene	4.81E-01	(1)	2.34E+00	(4)	4.07E+00	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Dibenzofuran	–	-	-	-	-	-	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Diethyl phthalate	4.89E+04	(1)	1.91E+05	(5)	1.19E+02	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Dimethyl phthalate	6.11E+05	(1)	2.38E+06	(5)	9.40E+02	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Di-n-butyl phthalate	6.11E+03	(1)	2 38E+04	(5)	9.70E+01	(8)	<0.50	–	<0.50	<0.50	<0.50	<0.50	–	<0.50	–	<0 50	–	<2.5	–	<2.5	–	<1.0	<0.50	–	<0.50	–	<1.0
Di-n-octyl phthalate	–	-	-	-	-	-	<0.25	–	<0.25	<0.25	<0.25	<0.25	–	<0.25	–	<0.25	–	<1.3	–	<1.3	–	<0.50	<0.25	–	<0.25	–	<0.50
Fluoranthene	2.29E+03	(1)	8.91E+03	(5)	1.75E+03	(8)	<0 20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1 0	–	<0.40	<0.20	–	<0.20	–	<0.40
Fluorene	2.29E+03	(1)	8.91E+03	(5)	2.81E+02	(8)	<0 20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Hexachlorobenzene	2.45E+00	(1)	1.20E+01	(4)	2.48E-02	(8)	<0 20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1 0	–	<0.40	<0.20	–	<0.20	–	<0.40
Hexachlorobutadiene	6.20E+01	(3)	2.20E+02	(7)	2.14E-02	(9)	<0 20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1 0	–	<0.40	<0.20	–	<0.20	–	<0.40
Hexachlorocyclopentadiene	3.67E+02	(1)	8.11E+02	(5)	6.90E+00	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Hexachloroethane	6.11E+01	(1)	2.38E+02	(5)	2.17E-01	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Indeno(1,2,3-cd)pyrene	4.81E+00	(1)	2.34E+01	(4)	4.16E+01	(8)	<0 20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Isophorone	4.13E+03	(1)	2.02E+04	(4)	2.08E+00	(8)	<0.50	–	<0.50	<0.50	<0.50	<0 50	–	<0.50	–	<0.50	–	<2.5	–	<2.5	–	<1.0	<0.50	–	<0.50	–	<1.0
Naphthalene	4.50E+01	(1)	2.52E+02	(4)	4.72E-02	(8)	<0.20	–	<0.20	<0.20	<0.20	<0 20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Nitrobenzene	4.94E+01	(1)	2.77E+02	(4)	7.72E-02	(8)	<0.50	–	<0.50	<0.50	<0.50	<0.50	–	<0.50	–	<0.50	–	<2.5	–	<2.5	–	<1.0	<0.50	–	<0.50	–	<1.0
N-Nitrosodi-n-propylamine	6.90E-01	(3)	2 50E+00	(7)	1.24E-04	(9)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
N-Nitrosodiphenylamine	8.00E+02	(1)	3 91E+03	(4)	1.45E+01	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1 0	–	<0.40	<0.20	–	<0.20	–	<0.40
Pentachlorophenol	2.07E+01	(1)	1.00E+02	(4)	3.30E-01	(8)	<0.40	–	<0.40	<0.40	<0.40	<0.40	–	<0.40	–	<0.40	–	<2.0	–	<2.0	–	<0.80	<0.40	–	<0.40	–	<0.80
Phenanthrene	1.83E+03	(1)	7.15E+03	(5)	9.39E+02	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	4	–	<0.40	<0.20	–	<0.20	–	<0.40
Phenol	1.83E+04	(1)	6.88E+04	(5)	7.09E+01	(8)	<0 20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	<1.0	–	<0.40	<0.20	–	<0.20	–	<0.40
Pyrene	1.72E+03	(1)	6.68E+03	(5)	1.26E+03	(8)	<0.20	–	<0.20	<0.20	<0.20	<0.20	–	<0.20	–	<0.20	–	<1.0	–	4.8	–	<0.40	<0.20	–	<0.20	–	<0.40
Pyridine	7.80E+01	(2)	1.00E+03	(6)	1.09E-01	(9)	<0.50	–	<0.50	<0.50	<0.50	<0.50	–	<0.50	–	<0.50	–	<2.5	–	<2.5	–	<1.0	<0.50	–	<0.50	–	<1.0
Total Petroleum Hydrocarbons - (EPA Method 8015B) mg/kg																											
Diesel Range Organics (DRO)	1.83E+03	(13)	2.00E+02/ 1.12E+03	(11) / (12)	2.00E+02/ 1.12E+03	(11) / (12)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**2800**	<10	**13000**	<10	37	26	140	<10	<10	<10
Gasoline Range Organics (GRO)	–		–		–		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	65	<5.0	<5 0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Motor Oil Range Organics (MRO)	2.50E+03	(14)	5 00E+03	(14)	–		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4600	<50	1500	<50	94	64	340	<50	<50	<50

– 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

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

(9) SoilGW Risk-based EPA DAF = 11.25

(10) SoilGW MCL-based EPA DAF = 11.25

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

(12) NMED Oct. 2006 TPH Screening Guidelines "diesel #2/crankcase oil" with DAF = 1.0 - see report Section 5 for use on location specific screening levels

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

(14) NMED Oct. 2006 TPH Screening Guidelines "waste oil" - see report Section 5 for use on location specific screening levels

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

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-10 (4-6')	SWMU 15-11 (0.5-2.0')	SWMU 15-11 (4-6')	SWMU 15-11 (16-18')	SWMU 15-12 (0.5-2.0')	SWMU 15-12 (14-16')	SWMU 15-12 (18-20')	SWMU 15-13 (0.5-2.0')	SWMU 15-13 (12-14')	SWMU 15-13 (22-25')	SWMU 15-14 (0.5-2.0')	SWMU 15-14 (2-4')	SWMU 15-15 (0.5-2.0')	SWMU 15-15 (2-4')	SWMU 15-16 (0.5-2.0')	SWMU 15-16 (2-4')	SWMU 15-17 (0.5-2.0')	SWMU 15-17 (2-4')	SWMU 15-18 (0.5-2.0')	SWMU 15-18 (12-14')	SWMU 15-19 (0.5-2.0')
							1008828-10	1008992-01	1008992-02	1008992-03	1008992-04	1008992-05	1008992-06	1008992-07	1008992-08	1008992-09	1008994-02	1008994-03	1008994-06	1008994-07	1008994-08	1008994-09	1008994-10	1008994-11	1008B30-01	1008B30-02	1009025-01
							8/20/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/27/2010	8/27/2010	8/25/2010
Metals (mg/kg)																											
Antimony	3 13E+01	(1)	1.24E+02	(5)	7.44E+00	(8)	–	<13	<5.0	<2.5	<5.0	<2.5	<5.0	<5.0	<2.5	<2.5	<5.0	–	<5 0	–	<5.0	–	<5.0	–	<2.5	<13	<13
Arsenic	3.59E+00	(1)	1 77E+01	(4)	1.48E-01	(8)	–	<13	<5.0	<2.5	<5.0	2.6	<5.0	<5.0	<2.5	<2.5	<5.0	–	<5.0	–	<5.0	–	<5.0	–	3.6	<13	<13
Barium	1.56E+04	(1)	4.35E+03	(5)	3.39E+03	(8)	–	200	230	160	190	72	180	230	140	290	220	–	280	–	260	–	210	–	140	240	230
Beryllium	1.56E+02	(1)	1.44E+02	(5)	6.49E+02	(8)	–	<0.75	0.5	<0 15	0.51	0.43	<0.30	0.61	0.29	<0.15	0.52	–	0.51	–	0 55	–	0.54	–	0.27	<0.75	<0.75
Cadmium	7.79E+01	(1)	3.09E+02	(5)	1.55E+01	(8)	–	<0.50	<0.20	<0.10	<0.20	<0.10	<0.20	<0.20	<0.10	<0.10	<0.20	–	<0.20	–	<0.20	–	<0.20	–	<0.10	<0.50	<0.50
Chromium	2.19E+02	(1)	4.49E+02	(5)	2.37E+01	(8)	–	8.7	11	2.5	8.1	5.7	2.8	9.7	4.3	5.4	7.8	–	9.7	–	8.4	–	8.3	–	5.9	56	9.8
Cobalt	2.30E+01	(2)	3.00E+02	(6)	5.51E+00	(9)	–	5.4	5.6	2.1	5.1	2.9	2.1	5.7	2.6	2.9	5.4	–	4 9	–	5.2	–	4.9	–	3.3	4.6	6.1
Cyanide	1.56E+03	(1)	6.19E+03	(5)	8.37E+01	(8)	–	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0 50	<0.50	<0.50	<0.50	–	0.63	–	<0.50	–	<0.50	–	<0.50	<0.50	<0.50
Lead	4.00E+02	(1)	8.00E+02	(4)	-	-	–	6	29	1.6	5.3	2.8	1.7	6.1	2.8	1.4	5.7	–	32	–	5.7	–	5.5	–	6.6	1.9	6
Mercury	7.71E+00	(1)	4.99E+01	(4)	3.30E-01	(8)	–	<0.033	9.1	<0.033	0.28	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	–	0.066	–	<0.066	–	<0.033	–	<0.033	<0.033	<0.033
Nickel	1.56E+03	(1)	6.19E+03	(5)	5.36E+02	(8)	–	8.2	11	2.2	7.6	4.3	2.1	9	4	2.3	7.8	–	8.3	–	8.2	–	7.8	–	5.2	6.4	9.2
Selenium	3.91E+02	(1)	1.55E+03	(5)	1.09E+01	(8)	–	<13	<5.0	<2.5	<5.0	<2.5	<5.0	<5.0	<2.5	<2.5	<5.0	–	<5.0	–	<5.0	–	<5.0	–	<13	<13	<13
Silver	3.91E+02	(1)	1.55E+03	(5)	1.76E+01	(8)	–	<1.3	<0.50	<0.25	<0.50	<0.25	<0.50	<0.50	<0.25	<0.25	<0.50	–	<0.50	–	<0.50	–	<0.50	–	<0.25	<1.3	<1.3
Vanadium	3.91E+02	(1)	1.55E+03	(5)	2.05E+03	(8)	–	28	25	15	25	16	12	30	12	19	26	–	26	–	27	–	25	–	14	20	31
Zinc	2.35E+04	(1)	9.29E+04	(5)	7.67E+03	(8)	–	39	45	13	36	20	13	43	17	20	37	–	39	–	40	–	36	–	24	21	41
Volatile Organic Compounds - (EPA Method 8260) mg/kg																											
1,1,1,2-Tetrachloroethane	2.92E+01	(1)	1.61E+02	(4)	1.94E-02	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,1,1-Trichloroethane	2.18E+04	(1)	6.43E+04	(5)	3.35E+01	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1 0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,1,2,2-Tetrachloroethane	7.97E+00	(1)	4.33E+01	(4)	2.53E-03	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,1,2-Trichloroethane	1.72E+01	(1)	9.43E+01	(4)	7.58E-03	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	3.4	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,1-Dichloroethane	6.29E+01	(1)	3.50E+02	(4)	6.85E-02	(8)	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
1,1-Dichloroethene	6.18E+02	(1)	1.83E+03	(5)	1.34E+00	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,1-Dichloropropene	--	-	-	-	-	-	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
1,2,3-Trichlorobenzene	--	-	-	-	-	-	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
1,2,3-Trichloropropane	9.15E-01	(1)	4.54E+00	(4)	4.01E-04	(8)	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
1,2,4-Trichlorobenzene	1.43E+02	(1)	4.27E+02	(5)	1.15E-01	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,2,4-Trimethylbenzene	6.70E+01	(2)	2.80E+02	(6)	2.70E-01	(9)	–	<0.050	92	<0.050	<0.050	4.9	0.0037	<1.0	42	9.9	0.00656	–	0.00141	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,2-Dibromo-3-chloropropane	1.94E-01	(1)	1.09E+00	(4)	3.35E-05	(8)	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
1,2-Dibromoethane (EDB)	5.74E-01	(1)	3.14E+00	(4)	1.78E-04	(8)	–	<0.050	<1.0	<0.050	<0 050	<0.25	<0 0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0 050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,2-Dichlorobenzene	3.01E+03	(1)	9.71E+03	(5)	3.53E+00	(8)	–	<0.050	<1.0	<0.050	<0 050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,2-Dichloroethane (EDC)	7.74E+00	(1)	4.28E+01	(4)	4.11E-03	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,2-Dichloropropane	1.47E+01	(1)	8.17E+01	(4)	1.25E-02	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,3,5-Trimethylbenzene	4 70E+01	(2)	2.00E+02	(6)	2.25E-01	(9)	–	<0.050	27	<0.050	<0.050	2.8	0.00181	2.2	16	3.4	0.00108	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,3-Dichlorobenzene	--	-	-	-	-	-	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,3-Dichloropropane	1.60E+03	(2)	2.00E+04	(6)	3.04E+00	(9)	–	<0.050	<1.0	<0.050	<0.050	<0 25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1,4-Dichlorobenzene	3.21E+01	(1)	1.80E+02	(4)	4.02E-02	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0 050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
1-Methylnaphthalene	2.20E+02	(3)	9.90E+02	(7)	1.69E-01	(9)	–	<0.20	14	<0.20	<0.20	<1.0	<0.1	<4.0	9.9	6.2	<0.1	–	<0.1	–	<0.20	–	<0.20	–	<0.1	<0.1	<0.20
2,2-Dichloropropane	--	-	-	-	-	-	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
2-Butanone (MEK)	3.96E+04	(1)	1.48E+05	(5)	1.43E+01	(8)	–	<0.50	<10	<0.50	<0.50	<2.5	<0.0009499	<10	<10	<5.0	<0.0009283	–	<0.0009632	–	<0.50	–	<0.50	–	<0.0009998	<0.0009382	<0.50
2-Chlorotoluene	1.56E+03	(1)	6.19E+03	(5)	7.02E+00	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
2-Hexanone	--	-	-	-	-	-	–	<0.50	<10	<0.50	<0.50	<2.5	<0.0009499	<10	<10	<5 0	<0.0009283	–	<0.0009632	–	<0.50	–	<0.50	–	<0.0009998	<0.0009382	<0.50
2-Methylnaphthalene	3.10E+02	(2)	4.10E+03	(6)	1.01E+01	(9)	–	<0.20	25	<0.20	<0.20	<1.0	--	<4.0	17	11	--	–	--	–	<0.20	–	<0.20	–	--	--	<0.20
4-Chlorotoluene	5.50E+03	(2)	7.20E+04	(6)	3.15E+01	(9)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
4-Isopropyltoluene	--	-	-	-	-	-	–	<0.050	7.5	<0.050	<0.050	0 29	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
4-Methyl-2-pentanone	--	-	-	-	-	-	–	<0.50	<10	<0.50	<0.50	<2.5	<0 0009499	<10	<10	<5 0	<0.0009283	–	<0.0009632	–	<0.50	–	<0.50	–	<0.0009998	<0.0009382	<0.50
Acetone	6.75E+04	(1)	2.63E+05	(5)	4.32E+01	(8)	–	<0.75	<15	<0.75	<0.75	<3.8	<0.0018998	<15	<15	<7.5	<0.0018566	–	<0.0019264	–	<0.75	–	<0.75	–	<0.0019996	<0.0018764	<0.75
Benzene	1.55E+01	(1)	8.54E+01	(4)	2.08E-02	(8)	–	<0.050	1.4	<0.050	<0.050	<0 25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Bromobenzene	9.40E+01	(2)	4.10E+02	(6)	1.69E-01	(9)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Bromodichloromethane	5.25E+00	(1)	2.92E+01	(4)	3.11E-03	(8)	–	<0.050	3	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0 0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0 050
Bromoform	6.10E+02	(3)	2.20E+03	(7)	2.59E-02	(9)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Bromomethane	2.23E+01	(1)	6.71E+01	(5)	2.18E-02	(8)	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
Carbon disulfide	1.94E+03	(1)	5.89E+03	(5)	2.84E+00	(8)	–	<0.50	<10	<0.50	<0.50	<2.5	0.00103	<10	<10	<5.0	<0.0009283	–	<0.0009632	–	<0.50	–	<0.50	–	<0.0009998	<0.0009382	<0.50
Carbon tetrachloride	4.38E+00	(1)	2.43E+01	(4)	8.32E-03	(8)	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
Chlorobenzene	5.08E+02	(1)	1.58E+03	(5)	6.06E-01	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0 0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Chloroethane	--	-	-	-	-	-	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
Chloroform	5.72E+00	(1)	3.19E+01	(4)	5.27E-03	(8)	–	<0.050	<1 0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Chloromethane	3.56E+01	(1)	1.98E+02	(4)	4.70E-02	(8)	–	0.087	1.3	0.1	0.072	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	0.08	–	0.075	–	<0.0009998	<0.0009382	0.088
cis-1,2-DCE	7.82E+02	(1)	3.10E+03	(5)	1.06E+00	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
cis-1,3-Dichloropropene	2.35E+01	(1)	1.26E+02	(4)	1.52E-02	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1 0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Dibromochloromethane	1.13E+01	(1)	6.13E+01	(4)	3.80E-03	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Dibromomethane	7.80E+02	(2)	1.00E+04	(6)	1.02E+00	(9)	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
Dichlorodifluoromethane	4.81E+02	(1)	1.37E+03	(5)	8.14E+00	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0 050	–	<0.0009998	<0.0009382	<0.050
Ethylbenzene	6.97E+01	(1)	3.85E+02	(4)	1.64E-01	(8)	–	<0.050	8	<0.050	<0.050	0.61	<0.0009499	<1.0	5.5	0.98	<0.0009283	–	<0.0009632	–	<0 050	–	<0.050	–	<0.0009998	<0.0009382	<0.050

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-10 (4-6')	SWMU 15-11 (0.5-2.0')	SWMU 15-11 (4-6')	SWMU 15-11 (16-18')	SWMU 15-12 (0.5-2.0')	SWMU 15-12 (14-16')	SWMU 15-12 (18-20')	SWMU 15-13 (0.5-2.0')	SWMU 15-13 (12-14')	SWMU 15-13 (22-25')	SWMU 15-14 (0.5-2.0')	SWMU 15-14 (2-4')	SWMU 15-15 (0.5-2.0')	SWMU 15-15 (2-4')	SWMU 15-16 (0.5-2.0')	SWMU 15-16 (2-4')	SWMU 15-17 (0.5-2.0')	SWMU 15-17 (2-4')	SWMU 15-18 (0.5-2.0')	SWMU 15-18 (12-14')	SWMU 15-19 (0.5-2.0')
							1008828-10	1008992-01	1008992-02	1008992-03	1008992-04	1008992-05	1008992-06	1008992-07	1008992-08	1008992-09	1008994-02	1008994-03	1008994-06	1008994-07	1008994-08	1008994-09	1008994-10	1008994-11	1008B30-01	1008B30-02	1009025-01
							8/20/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/27/2010	8/27/2010	8/25/2010
Hexachlorobutadiene	6.20E+01	(3)	2.20E+02	(7)	2.14E-02	(9)	–	<0.10	<2.0	<0.10	<0.10	<0.50	<0.0009499	<2.0	<2.0	<1.0	<0.0009283	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
Isopropylbenzene	3.21E+03	(1)	1.03E+04	(5)	1.11E+01	(8)	–	<0.050	6.4	<0.050	<0.050	0.37	<0.0009499	<1.0	1.9	0.51	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Methyl tert-butyl ether (MTBE)	8.62E+02	(1)	4.69E+03	(4)	2.58E-01	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Methylene chloride	1.99E+02	(1)	1.09E+03	(4)	1.21E-01	(8)	–	<0.15	<3.0	<0.15	<0.15	<0.75	0.00639	<3.0	<3.0	<1.5	0.00928	–	0.00808	–	<0.15	–	<0.15	–	<0.0009998	<0.0009382	<0.15
Naphthalene	4.50E+01	(1)	2.52E+02	(4)	4.72E-02	(8)	–	<0.10	18	<0.10	<0.10	0.64	<0.0009499	<2.0	11	4.3	0.0191	–	0.00471	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
n-Butylbenzene	–	-	-	-	-	-	–	<0.050	7	<0.050	<0.050	<0.25	<0.0009499	<1.0	8.2	1.5	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
n-Propylbenzene	–	-	-	-	-	-	–	<0.050	11	<0.050	<0.050	0.39	<0.0009499	<1.0	7.4	1.9	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
sec-Butylbenzene	–	-	-	-	-	-	–	<0.050	7.3	<0.050	<0.050	<0.25	<0.0009499	<1.0	2.1	0.74	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Styrene	8.97E+03	(1)	3.03E+04	(5)	1.76E+01	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
tert-Butylbenzene	–	-	-	-	-	-	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Tetrachloroethene (PCE)	6.99E+00	(1)	3.64E+01	(4)	5.05E-03	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Toluene	5.57E+03	(1)	2.11E+04	(5)	1.56E+01	(8)	–	<0.050	1.8	<0.050	<0.050	<0.25	<0.0009499	<1.0	1.9	<0.50	0.0022	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
trans-1,2-DCE	2.73E+02	(1)	8.14E+02	(5)	3.39E-01	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
trans-1,3-Dichloropropene	2.35E+01	(1)	1.26E+02	(4)	1.52E-02	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Trichloroethene (TCE)	4.57E+01	(1)	2.53E+02	(4)	5.96E-02	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Trichlorofluoromethane	2.01E+03	(1)	5.82E+03	(5)	1.01E+01	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Vinyl chloride	8.65E-01	(1)	2.59E+01	(4)	3.24E-03	(8)	–	<0.050	<1.0	<0.050	<0.050	<0.25	<0.0009499	<1.0	<1.0	<0.50	<0.0009283	–	<0.0009632	–	<0.050	–	<0.050	–	<0.0009998	<0.0009382	<0.050
Xylenes, Total	1.09E+03	(1)	3.13E+03	(5)	1.98E+00	(8)	–	<0.10	62	<0.10	<0.10	8	0.00674	<2.0	54	6.1	0.00243	–	<0.0009632	–	<0.10	–	<0.10	–	<0.0009998	<0.0009382	<0.10
Semi Volatile Organics - (EPA Method 8270) mg/kg																											
1,2,4-Trichlorobenzene	1.43E+02	(1)	4.27E+02	(5)	1.15E-01	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
1,2-Dichlorobenzene	3.01E+03	(1)	9.71E+03	(5)	3.53E+00	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
1,3-Dichlorobenzene	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
1,4-Dichlorobenzene	3.21E+01	(1)	1.80E+02	(4)	4.02E-02	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
2,4,5-Trichlorophenol	6.11E+03	(1)	2.38E+04	(5)	8.02E+01	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
2,4,6-Trichlorophenol	6.11E+01	(1)	2.38E+02	(5)	8.02E-01	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
2,4-Dichlorophenol	1.83E+02	(1)	7.15E+02	(5)	1.54E+00	(8)	–	<0.80	<2.0	<0.40	<0.80	<0.40	<0.40	<2.0	<0.40	<0.40	<0.40	–	<0.80	–	<0.40	–	<0.40	–	<0.80	<0.40	<0.80
2,4-Dimethylphenol	1.22E+03	(1)	4.76E+03	(5)	1.03E+01	(8)	–	<0.60	<1.5	<0.30	<0.60	<0.30	<0.30	<1.5	<0.30	<0.30	<0.30	–	<0.60	–	<0.30	–	<0.30	–	<0.60	<0.30	<0.60
2,4-Dinitrophenol	1.22E+02	(1)	4.76E+02	(5)	5.91E-01	(8)	–	<0.80	<2.0	<0.40	<0.80	<0.40	<0.40	<2.0	<0.40	<0.40	<0.40	–	<0.80	–	<0.40	–	<0.40	–	<0.80	<0.40	<0.80
2,4-Dinitrotoluene	1.26E+01	(1)	1.03E+02	(4)	1.75E-02	(8)	–	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	–	<1.0	–	<0.50	–	<0.50	–	<1.0	<0.50	<1.0
2,6-Dinitrotoluene	6.12E+01	(1)	2.39E+02	(5)	3.00E-01	(8)	–	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	–	<1.0	–	<0.50	–	<0.50	–	<1.0	<0.50	<1.0
2-Chloronaphthalene	6.26E+03	(1)	2.48E+04	(5)	1.52E+02	(8)	–	<0.50	<1.3	<0.25	<0.50	<0.25	<0.25	<1.3	<0.25	<0.25	<0.25	–	<0.50	–	<0.25	–	<0.25	–	<0.50	<0.25	<0.50
2-Chlorophenol	3.91E+02	(1)	1.55E+03	(5)	1.72E+00	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
2-Methylnaphthalene	3.10E+02	(2)	4.10E+03	(6)	1.01E+01	(9)	–	<0.40	12	<0.20	<0.40	<0.20	<0.20	<1.0	11	8.7	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
2-Methylphenol	3.10E+03	(2)	3.10E+04	(6)	2.25E+01	(9)	–	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	–	<1.0	–	<0.50	–	<0.50	–	<1.0	<0.50	<1.0
2-Nitroaniline	1.80E+02	(2)	1.80E+03	(6)	3.71E-01	(9)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
2-Nitrophenol	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
3,3'-Dichlorobenzidine	8.71E+00	(1)	4.26E+01	(4)	1.92E-01	(8)	–	<0.50	<1.3	<0.25	<0.50	<0.25	<0.25	<1.3	<0.25	<0.25	<0.25	–	<0.50	–	<0.25	–	<0.25	–	<0.50	<0.25	<0.50
3+4-Methylphenol	3.10E+02	(2)	3.10E+03	(6)	2.14E+00	(9)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
3-Nitroaniline	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
4,6-Dinitro-2-methylphenol	–	-	-	-	-	-	–	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	–	<1.0	–	<0.50	–	<0.50	–	<1.0	<0.50	<1.0
4-Bromophenyl phenyl ether	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
4-Chloro-3-methylphenol	–	-	-	-	-	-	–	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	–	<1.0	–	<0.50	–	<0.50	–	<1.0	<0.50	<1.0
4-Chloroaniline	2.40E+01	(3)	8.60E+01	(7)	1.35E-03	(9)	–	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	–	<1.0	–	<0.50	–	<0.50	–	<1.0	<0.50	<1.0
4-Chlorophenyl phenyl ether	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
4-Nitroaniline	2.40E+02	(3)	8.60E+02	(7)	1.13E-02	(9)	–	<0.50	<1.3	<0.25	<0.50	<0.25	<0.25	<1.3	<0.25	<0.25	<0.25	–	<0.50	–	<0.25	–	<0.25	–	<0.50	<0.25	<0.50
4-Nitrophenol	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Acenaphthene	3.44E+03	(1)	1.86E+04	(5)	2.31E+02	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Acenaphthylene	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Aniline	8.50E+02	(3)	3.00E+03	(7)	3.83E-02	(9)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Anthracene	1.72E+04	(1)	6.68E+04	(5)	3.79E+03	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Azobenzene	4.90E+01	(3)	2.20E+02	(7)	5.74E-03	(9)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Benz(a)anthracene	4.81E+00	(1)	2.34E+01	(4)	3.59E+00	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Benzo(a)pyrene	4.81E-01	(1)	2.34E+00	(4)	1.22E+00	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Benzo(b)fluoranthene	4.81E+00	(1)	2.34E+01	(4)	1.25E+01	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Benzo(g,h,i)perylene	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Benzo(k)fluoranthene	4.81E+01	(1)	2.34E+02	(4)	1.22E+02	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Benzoic acid	2.40E+05	(2)	2.50E+06	(6)	3.71E+02	(9)	–	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	–	<1.0	–	<0.50	–	<0.50	–	<1.0	<0.50	<1.0
Benzyl alcohol	3.10E+04	(2)	3.10E+05	(6)	4.73E+01	(9)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Bis(2-chloroethoxy)methane	1.80E+02	(2)	1.80E+03	(6)	2.59E-01	(9)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Bis(2-chloroethyl)ether	2.56E+00	(1)	1.36E+01	(4)	2.62E-04	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Bis(2-chloroisopropyl)ether	9.15E+01	(1)	4.54E+02	(4)	2.88E-02	(8)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Bis(2-ethylhexyl)phthalate	2.80E+02	(1)	1.37E+03	(4)	1.34E+02	(8)	–	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	–	<1.0	–	<0.50	–	<0.50	–	<1.0	<0.50	<1.0
Butyl benzyl phthalate	2.60E+03	(3)	9.10E+03	(7)	7.54E+00	(9)	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40
Carbazole	–	-	-	-	-	-	–	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	–	<0.40	–	<0.20	–	<0.20	–	<0.40	<0.20	<0.40

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-10 (4-6')	SWMU 15-11 (0.5-2.0')	SWMU 15-11 (4-6')	SWMU 15-11 (16-18')	SWMU 15-12 (0.5-2.0')	SWMU 15-12 (14-16')	SWMU 15-12 (18-20')	SWMU 15-13 (0.5-2.0')	SWMU 15-13 (12-14')	SWMU 15-13 (22-25')	SWMU 15-14 (0.5-2.0')	SWMU 15-14 (2-4')	SWMU 15-15 (0.5-2.0')	SWMU 15-15 (2-4')	SWMU 15-16 (0.5-2.0')	SWMU 15-16 (2-4')	SWMU 15-17 (0.5-2.0')	SWMU 15-17 (2-4')	SWMU 15-18 (0.5-2.0')	SWMU 15-18 (12-14')	SWMU 15-19 (0.5-2.0')
							1008828-10	1008992-01	1008992-02	1008992-03	1008992-04	1008992-05	1008992-06	1008992-07	1008992-08	1008992-09	1008994-02	1008994-03	1008994-06	1008994-07	1008994-08	1008994-09	1008994-10	1008994-11	1008B30-01	1008B30-02	1009025-01
							8/20/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/23/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/24/2010	8/27/2010	8/27/2010	8/25/2010
Chrysene	4.81E+02	(1)	2.34E+03	(4)	3.67E+02	(8)	--	<0.40	<1.0	<0.20	<0.40	<0 20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Dibenz(a,h)anthracene	4.81E-01	(1)	2.34E+00	(4)	4.07E+00	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Dibenzofuran	--	-	-	-	-	-	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0 20	--	<0.20	--	<0.40	<0.20	<0.40
Diethyl phthalate	4.89E+04	(1)	1.91E+05	(5)	1.19E+02	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Dimethyl phthalate	6.11E+05	(1)	2.38E+06	(5)	9.40E+02	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Di-n-butyl phthalate	6.11E+03	(1)	2.38E+04	(5)	9.70E+01	(8)	--	<1.0	<2.5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	--	<1.0	--	<0.50	--	<0.50	--	<1.0	<0.50	<1.0
Di-n-octyl phthalate	--	-	-	-	-	-	--	<0.50	<1.3	<0.25	<0 50	<0.25	<0.25	<1.3	<0.25	<0.25	<0.25	--	<0.50	--	<0.25	--	<0.25	--	<0.50	<0.25	<0.50
Fluoranthene	2.29E+03	(1)	8.91E+03	(5)	1.75E+03	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	0.44	<0.20	<0.40
Fluorene	2.29E+03	(1)	8.91E+03	(5)	2.81E+02	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0 20	<1.0	<0.20	0.71	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Hexachlorobenzene	2.45E+00	(1)	1.20E+01	(4)	2.48E-02	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0 20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Hexachlorobutadiene	6.20E+01	(3)	2.20E+02	(7)	2.14E-02	(9)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Hexachlorocyclopentadiene	3.67E+02	(1)	8.11E+02	(5)	6.90E+00	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Hexachloroethane	6.11E+01	(1)	2.38E+02	(5)	2.17E-01	(8)	--	<0.40	<1.0	<0 20	<0.40	<0.20	<0 20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Indeno(1,2,3-cd)pyrene	4.81E+00	(1)	2.34E+01	(4)	4 16E+01	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0 20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Isophorone	4.13E+03	(1)	2.02E+04	(4)	2.08E+00	(8)	--	<1.0	<2 5	<0.50	<1.0	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	--	<1.0	--	<0.50	--	<0.50	--	<1.0	<0.50	<1.0
Naphthalene	4.50E+01	(1)	2.52E+02	(4)	4.72E-02	(8)	--	<0.40	6.7	<0.20	<0.40	0.22	<0.20	<1.0	5.5	3	<0.20	--	<0 40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Nitrobenzene	4.94E+01	(1)	2.77E+02	(4)	7.72E-02	(8)	--	<1.0	<2.5	<0.50	<1.0	<0 50	<0.50	<2.5	<0.50	<0.50	<0.50	--	<1.0	--	<0.50	--	<0.50	--	<1.0	<0.50	<1.0
N-Nitrosodi-n-propylamine	6.90E-01	(3)	2.50E+00	(7)	1.24E-04	(9)	--	<0.40	<1.0	<0 20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
N-Nitrosodiphenylamine	8.00E+02	(1)	3.91E+03	(4)	1.45E+01	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Pentachlorophenol	2.07E+01	(1)	1.00E+02	(4)	3.30E-01	(8)	--	<0.80	<2.0	<0.40	<0.80	<0.40	<0.40	<2.0	<0.40	<0.40	<0.40	--	<0.80	--	<0.40	--	<0.40	--	<0.80	<0.40	<0.80
Phenanthrene	1.83E+03	(1)	7.15E+03	(5)	9.39E+02	(8)	--	<0.40	1.4	<0.20	<0.40	<0.20	<0.20	1.3	1.9	1.7	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Phenol	1.83E+04	(1)	6.88E+04	(5)	7.09E+01	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Pyrene	1.72E+03	(1)	6.68E+03	(5)	1.26E+03	(8)	--	<0.40	<1.0	<0.20	<0.40	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	--	<0.40	--	<0.20	--	<0.20	--	<0.40	<0.20	<0.40
Pyridine	7.80E+01	(2)	1.00E+03	(6)	1.09E-01	(9)	--	<1.0	<2.5	<0.50	<1.0	<0 50	<0.50	<2.5	<0.50	<0.50	<0.50	--	<1.0	--	<0.50	--	<0.50	--	<1.0	<0.50	<1.0
Total Petroleum Hydrocarbons - (EPA Method 8015B) mg/kg																											
Diesel Range Organics (DRO)	**1.83E+03**	(13)	2.00E+02/ 1.12E+03	(11) / (12)	2.00E+02/ 1.12E+03	(11) / (12)	<10	52	**5000**	27	170	40	<10	**13000**	**2000**	**1500**	<10	<10	<10	<10	<10	17	<10	<10	<10	<10	<10
Gasoline Range Organics (GRO)	--		--		--		<5.0	<5.0	750	<5.0	<5.0	61	<5.0	78	690	92	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Motor Oil Range Organics (MRO)	2.50E+03	(14)	5.00E+03	(14)	--		<50	120	1900	<50	740	110	<50	<2500	<500	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

-- 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

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

(9) SoilGW Risk-based EPA DAF = 11.25

(10) SoilGW MCL-based EPA DAF = 11.25

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

(12) NMED Oct. 2006 TPH Screening Guidelines "diesel #2/crankcase oil" with DAF = 1.0 - see report Section 5 for use on location specific screening levels

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

(14) NMED Oct. 2006 TPH Screening Guidelines "waste oil" - see report Section 5 for use on location specific screening levels

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

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-19 (2-3')	SWMU 15-20 (0.5-2.0')	SWMU 15-20 (2-3')	SWMU 15-21 (0.5-2.0')	SWMU 15-21 (2-3')	SWMU 15-22 (0.5-2.0')	SWMU 15-22 (2-4')	SWMU 15-23 (0.5-2.0')	SWMU 15-23 (2-3')	SWMU 15-24 (0.5-2.0')	SWMU 15-24 (2-3')	SWMU 15-25 (0.5-2.0')	SWMU 15-25 (2-3')
							1009025-03	1009025-04	1009025-05	1009025-06	1009025-07	1009025-08	1009025-09	1009106-01	1009106-03	1009106-04	1009106-05	1009106-06	1009106-07
							8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010
Metals (mg/kg)																			
Antimony	3.13E+01	(1)	1.24E+02	(5)	7.44E+00	(8)	–	<13	–	<13	–	<2.5	–	<13	–	<13	–	<13	–
Arsenic	3.59E+00	(1)	1.77E+01	(4)	1.48E-01	(8)	–	<13	–	<13	–	<2.5	–	<13	–	<13	–	<13	–
Barium	1.56E+04	(1)	4.35E+03	(5)	3.39E+03	(8)	–	280	–	150	–	140	–	490	–	270	–	270	–
Beryllium	1.56E+02	(1)	1.44E+02	(5)	6.49E+02	(8)	–	<0.75	–	<0.75	–	0.15	–	<0.75	–	<0.75	–	<0.75	–
Cadmium	7.79E+01	(1)	3.09E+02	(5)	1.55E+01	(8)	–	<0.50	–	<0.50	–	<0.10	–	<0.50	–	<0.50	–	<0.50	–
Chromium	2.19E+02	(1)	4.49E+02	(5)	2.37E+01	(8)	–	9.4	–	8.8	–	3.5	–	9.1	–	9.6	–	9.6	–
Cobalt	2.30E+01	(2)	3.00E+02	(6)	5.51E+00	(9)	–	6.2	–	4 6	–	2.7	–	5.4	–	5.8	–	5.9	–
Cyanide	1.56E+03	(1)	6.19E+03	(5)	8.37E+01	(8)	–	<0.50	–	<0.50	–	<0.50	–	<0.50	–	<0.50	–	<0.50	–
Lead	4.00E+02	(1)	8.00E+02	(4)	-	-	–	6	–	22	–	2.1	–	5.7	–	8	–	5.9	–
Mercury	7.71E+00	(1)	4.99E+01	(4)	3.30E-01	(8)	–	<0.033	–	<0.033	–	0.11	–	<0.033	–	<0.033	–	<0.033	–
Nickel	1.56E+03	(1)	6.19E+03	(5)	5.36E+02	(8)	–	8.9	–	7.1	–	2.7	–	8.1	–	8.9	–	9.1	–
Selenium	3.91E+02	(1)	1.55E+03	(5)	1.09E+01	(8)	–	<13	–	<13	–	<2.5	–	<13	–	<13	–	<13	–
Silver	3.91E+02	(1)	1.55E+03	(5)	1.76E+01	(8)	–	<1.3	–	<1.3	–	<0 25	–	<1.3	–	<1.3	–	<1.3	–
Vanadium	3.91E+02	(1)	1.55E+03	(5)	2.05E+03	(8)	–	30	–	23	–	17	–	27	–	30	–	31	–
Zinc	2.35E+04	(1)	9.29E+04	(5)	7.67E+03	(8)	–	39	–	36	–	14	–	36	–	42	–	42	–
Volatile Organic Compounds - (EPA Method 8260) mg/kg																			
1,1,1,2-Tetrachloroethane	2.92E+01	(1)	1.61E+02	(4)	1.94E-02	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,1,1-Trichloroethane	2.18E+04	(1)	6.43E+04	(5)	3.35E+01	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,1,2,2-Tetrachloroethane	7.97E+00	(1)	4.33E+01	(4)	2.53E-03	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,1,2-Trichloroethane	1.72E+01	(1)	9.43E+01	(4)	7.58E-03	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,1-Dichloroethane	6.29E+01	(1)	3.50E+02	(4)	6.85E-02	(8)	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
1,1-Dichloroethene	6.18E+02	(1)	1.83E+03	(5)	1.34E+00	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,1-Dichloropropene	–	-	-	-	-	-	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
1,2,3-Trichlorobenzene	–	-	-	-	-	-	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
1,2,3-Trichloropropane	9.15E-01	(1)	4.54E+00	(4)	4.01E-04	(8)	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
1,2,4-Trichlorobenzene	1.43E+02	(1)	4.27E+02	(5)	1.15E-01	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,2,4-Trimethylbenzene	6.70E+01	(2)	2.80E+02	(6)	2.70E-01	(9)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,2-Dibromo-3-chloropropane	1.94E-01	(1)	1.09E+00	(4)	3.35E-05	(8)	–	<0.0010235	–	<0.10	–	<0 0009568	–	<0.10	–	<0.10	–	<0.0010059	–
1,2-Dibromoethane (EDB)	5.74E-01	(1)	3.14E+00	(4)	1.78E-04	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,2-Dichlorobenzene	3.01E+03	(1)	9.71E+03	(5)	3.53E+00	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,2-Dichloroethane (EDC)	7.74E+00	(1)	4.28E+01	(4)	4.11E-03	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,2-Dichloropropane	1.47E+01	(1)	8.17E+01	(4)	1.25E-02	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,3,5-Trimethylbenzene	4.70E+01	(2)	2.00E+02	(6)	2.25E-01	(9)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,3-Dichlorobenzene	–	-	-	-	-	-	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,3-Dichloropropane	1.60E+03	(2)	2.00E+04	(6)	3.04E+00	(9)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1,4-Dichlorobenzene	3 21E+01	(1)	1.80E+02	(4)	4.02E-02	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
1-Methylnaphthalene	2.20E+02	(3)	9.90E+02	(7)	1.69E-01	(9)	–	<0.1	–	<0.20	–	<0.1	–	<0.20	–	<0.20	–	<0.1	–
2,2-Dichloropropane	–	-	-	-	-	-	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
2-Butanone (MEK)	3.96E+04	(1)	1.48E+05	(5)	1.43E+01	(8)	–	<0.0010235	–	<0.50	–	<0.0009568	–	<0.50	–	<0.50	–	<0.0010059	–
2-Chlorotoluene	1.56E+03	(1)	6.19E+03	(5)	7.02E+00	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
2-Hexanone	–	-	-	-	-	-	–	<0.0010235	–	<0.50	–	<0.0009568	–	<0.50	–	<0.50	–	<0.0010059	–
2-Methylnaphthalene	3.10E+02	(2)	4.10E+03	(6)	1.01E+01	(9)	–	–	–	<0.20	–	–	–	<0.20	–	<0.20	–	–	–
4-Chlorotoluene	5.50E+03	(2)	7.20E+04	(6)	3.15E+01	(9)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
4-Isopropyltoluene	–	-	-	-	-	-	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
4-Methyl-2-pentanone	–	-	-	-	-	-	–	<0.0010235	–	<0.50	–	<0 0009568	–	<0.50	–	<0 50	–	<0.0010059	–
Acetone	6 75E+04	(1)	2.63E+05	(5)	4.32E+01	(8)	–	<0.002047	–	<0.75	–	<0.0019136	–	<0.75	–	<0.75	–	<0.0020118	–
Benzene	1.55E+01	(1)	8.54E+01	(4)	2.08E-02	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Bromobenzene	9.40E+01	(2)	4.10E+02	(6)	1.69E-01	(9)	–	<0.0010235	–	<0 050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Bromodichloromethane	5.25E+00	(1)	2.92E+01	(4)	3.11E-03	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Bromoform	6.10E+02	(3)	2.20E+03	(7)	2.59E-02	(9)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Bromomethane	2.23E+01	(1)	6.71E+01	(5)	2 18E-02	(8)	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
Carbon disulfide	1.94E+03	(1)	5.89E+03	(5)	2.84E+00	(8)	–	<0.0010235	–	<0.50	–	<0.0009568	–	<0.50	–	<0.50	–	<0.0010059	–
Carbon tetrachloride	4.38E+00	(1)	2.43E+01	(4)	8.32E-03	(8)	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
Chlorobenzene	5.08E+02	(1)	1.58E+03	(5)	6.06E-01	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Chloroethane	–	-	-	-	-	-	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
Chloroform	5.72E+00	(1)	3.19E+01	(4)	5.27E-03	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Chloromethane	3.56E+01	(1)	1.98E+02	(4)	4.70E-02	(8)	–	<0.0010235	–	0.087	–	<0.0009568	–	0.084	–	0.084	–	<0.0010059	–
cis-1,2-DCE	7.82E+02	(1)	3.10E+03	(5)	1.06E+00	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
cis-1,3-Dichloropropene	2.35E+01	(1)	1.26E+02	(4)	1.52E-02	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Dibromochloromethane	1.13E+01	(1)	6.13E+01	(4)	3.80E-03	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Dibromomethane	7.80E+02	(2)	1.00E+04	(6)	1.02E+00	(9)	–	<0.0010235	–	<0.10	–	<0.0009568	–	<0.10	–	<0.10	–	<0.0010059	–
Dichlorodifluoromethane	4.81E+02	(1)	1.37E+03	(5)	8.14E+00	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–
Ethylbenzene	6.97E+01	(1)	3.85E+02	(4)	1.64E-01	(8)	–	<0.0010235	–	<0.050	–	<0.0009568	–	<0.050	–	<0.050	–	<0.0010059	–

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-19 (2-3')	SWMU 15-20 (0.5-2.0')	SWMU 15-20 (2-3')	SWMU 15-21 (0.5-2.0')	SWMU 15-21 (2-3')	SWMU 15-22 (0.5-2.0')	SWMU 15-22 (2-4')	SWMU 15-23 (0.5-2.0')	SWMU 15-23 (2-3')	SWMU 15-24 (0.5-2.0')	SWMU 15-24 (2-3')	SWMU 15-25 (0.5-2.0')	SWMU 15-25 (2-3')
							1009025-03	1009025-04	1009025-05	1009025-06	1009025-07	1009025-08	1009025-09	1009106-01	1009106-03	1009106-04	1009106-05	1009106-06	1009106-07
							8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010
Hexachlorobutadiene	6 20E+01	(3)	2.20E+02	(7)	2 14E-02	(9)	--	<0.0010235	--	<0.10	--	<0.0009568	--	<0.10	--	<0.10	--	<0.0010059	--
Isopropylbenzene	3 21E+03	(1)	1.03E+04	(5)	1.11E+01	(8)	--	<0.0010235	--	<0.050	--	<0.0009568	--	<0 050	--	<0 050	--	<0 0010059	--
Methyl tert-butyl ether (MTBE)	8 62E+02	(1)	4 69E+03	(4)	2 58E-01	(8)	--	<0.0010235	--	<0.050	--	<0.0009568	--	<0.050	--	<0.050	--	<0 0010059	--
Methylene chloride	1.99E+02	(1)	1.09E+03	(4)	1 21E-01	(8)	--	0.00275	--	<0 15	--	0.0026	--	<0.15	--	<0.15	--	0 00428	--
Naphthalene	4.50E+01	(1)	2.52E+02	(4)	4 72E-02	(8)	--	<0.0010235	--	<0.10	--	<0.0009568	--	<0.10	--	<0.10	--	<0.0010059	--
n-Butylbenzene	--	-	-	-	-	-	--	<0 0010235	--	<0.050	--	<0.0009568	--	<0 050	--	<0.050	--	<0.0010059	--
n-Propylbenzene	--	-	-	-	-	-	--	<0 0010235	--	<0.050	--	<0.0009568	--	<0 050	--	<0.050	--	<0.0010059	--
sec-Butylbenzene	--	-	-	-	-	-	--	<0.0010235	--	<0.050	--	<0.0009568	--	<0.050	--	<0 050	--	<0 0010059	--
Styrene	8 97E+03	(1)	3.03E+04	(5)	1.76E+01	(8)	--	<0.0010235	--	<0 050	--	<0.0009568	--	<0.050	--	<0.050	--	<0 0010059	--
tert-Butylbenzene	--	-	-	-	-	-	--	<0.0010235	--	<0 050	--	<0 0009568	--	<0.050	--	<0.050	--	<0.0010059	--
Tetrachloroethene (PCE)	6.99E+00	(1)	3.64E+01	(4)	5.05E-03	(8)	--	<0 0010235	--	<0 050	--	<0.0009568	--	<0.050	--	<0.050	--	<0.0010059	--
Toluene	5.57E+03	(1)	2.11E+04	(5)	1.56E+01	(8)	--	<0 0010235	--	<0.050	--	<0 0009568	--	<0.050	--	<0.050	--	<0.0010059	--
trans-1,2-DCE	2.73E+02	(1)	8.14E+02	(5)	3.39E-01	(8)	--	<0 0010235	--	<0.050	--	<0 0009568	--	<0 050	--	<0 050	--	<0 0010059	--
trans-1,3-Dichloropropene	2.35E+01	(1)	1.26E+02	(4)	1 52E-02	(8)	--	<0.0010235	--	<0 050	--	<0.0009568	--	<0.050	--	<0.050	--	<0.0010059	--
Trichloroethene (TCE)	4.57E+01	(1)	2.53E+02	(4)	5.96E-02	(8)	--	<0.0010235	--	<0 050	--	<0.0009568	--	<0.050	--	<0.050	--	<0.0010059	--
Trichlorofluoromethane	2.01E+03	(1)	5 82E+03	(5)	1.01E+01	(8)	--	<0.0010235	--	<0.050	--	<0.0009568	--	<0.050	--	<0.050	--	<0.0010059	--
Vinyl chloride	8.65E-01	(1)	2.59E+01	(4)	3.24E-03	(8)	--	<0.0010235	--	<0.050	--	<0.0009568	--	<0.050	--	<0 050	--	<0 0010059	--
Xylenes, Total	1.09E+03	(1)	3 13E+03	(5)	1.98E+00	(8)	--	<0.0010235	--	<0.10	--	<0.0009568	--	<0.10	--	<0 10	--	<0 0010059	--
Semi Volatile Organics - (EPA Method 8270) mg/kg																			
1,2,4-Trichlorobenzene	1.43E+02	(1)	4.27E+02	(5)	1.15E-01	(8)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
1,2-Dichlorobenzene	3.01E+03	(1)	9.71E+03	(5)	3.53E+00	(8)	--	<0 40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
1,3-Dichlorobenzene	--	-	-	-	-	-	--	<0 40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
1,4-Dichlorobenzene	3.21E+01	(1)	1 80E+02	(4)	4.02E-02	(8)	--	<0 40	--	<1.0	--	<0.20	--	<0.20	--	<0 40	--	<0.20	--
2,4,5-Trichlorophenol	6.11E+03	(1)	2 38E+04	(5)	8.02E+01	(8)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0 40	--	<0.20	--
2,4,6-Trichlorophenol	6 11E+01	(1)	2.38E+02	(5)	8.02E-01	(8)	--	<0.40	--	<1 0	--	<0 20	--	<0.20	--	<0.40	--	<0.20	--
2,4-Dichlorophenol	1 83E+02	(1)	7.15E+02	(5)	1 54E+00	(8)	--	<0.80	--	<2.0	--	<0 40	--	<0.40	--	<0 80	--	<0.40	--
2,4-Dimethylphenol	1.22E+03	(1)	4.76E+03	(5)	1.03E+01	(8)	--	<0.60	--	<1 5	--	<0 30	--	<0.30	--	<0.60	--	<0.30	--
2,4-Dinitrophenol	1.22E+02	(1)	4.76E+02	(5)	5.91E-01	(8)	--	<0.80	--	<2.0	--	<0 40	--	<0 40	--	<0.80	--	<0 40	--
2,4-Dinitrotoluene	1.26E+01	(1)	1.03E+02	(4)	1.75E-02	(8)	--	<1.0	--	<2.5	--	<0.50	--	<0 50	--	<1.0	--	<0 50	--
2,6-Dinitrotoluene	6.12E+01	(1)	2.39E+02	(5)	3.00E-01	(8)	--	<1.0	--	<2.5	--	<0 50	--	<0.50	--	<1 0	--	<0.50	--
2-Chloronaphthalene	6.26E+03	(1)	2.48E+04	(5)	1 52E+02	(8)	--	<0.50	--	<1.3	--	<0 25	--	<0.25	--	<0.50	--	<0.25	--
2-Chlorophenol	3.91E+02	(1)	1.55E+03	(5)	1.72E+00	(8)	--	<0.40	--	<1.0	--	<0 20	--	<0.20	--	<0.40	--	<0.20	--
2-Methylnaphthalene	3.10E+02	(2)	4.10E+03	(6)	1.01E+01	(9)	--	<0.40	--	<1.0	--	<0 20	--	<0.20	--	<0.40	--	<0.20	--
2-Methylphenol	3 10E+03	(2)	3 10E+04	(6)	2.25E+01	(9)	--	<1.0	--	<2.5	--	<0 50	--	<0.50	--	<1.0	--	<0 50	--
2-Nitroaniline	1.80E+02	(2)	1 80E+03	(6)	3.71E-01	(9)	--	<0.40	--	<1.0	--	<0 20	--	<0.20	--	<0.40	--	<0 20	--
2-Nitrophenol	--	-	-	-	-	-	--	<0.40	--	<1.0	--	<0.20	--	<0 20	--	<0.40	--	<0.20	--
3,3´-Dichlorobenzidine	8 71E+00	(1)	4.26E+01	(4)	1 92E-01	(8)	--	<0.50	--	<1.3	--	<0.25	--	<0.25	--	<0.50	--	<0.25	--
3+4-Methylphenol	3 10E+02	(2)	3.10E+03	(6)	2 14E+00	(9)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
3-Nitroaniline	--	-	-	-	-	-	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
4,6-Dinitro-2-methylphenol	--	-	-	-	-	-	--	<1.0	--	<2.5	--	<0.50	--	<0.50	--	<1 0	--	<0.50	--
4-Bromophenyl phenyl ether	--	-	-	-	-	-	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
4-Chloro-3-methylphenol	--	-	-	-	-	-	--	<1.0	--	<2.5	--	<0.50	--	<0.50	--	<1.0	--	<0.50	--
4-Chloroaniline	2.40E+01	(3)	8.60E+01	(7)	1.35E-03	(9)	--	<1.0	--	<2.5	--	<0.50	--	<0.50	--	<1.0	--	<0.50	--
4-Chlorophenyl phenyl ether	--	-	-	-	-	-	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
4-Nitroaniline	2.40E+02	(3)	8.60E+02	(7)	1.13E-02	(9)	--	<0 50	--	<1.3	--	<0.25	--	<0.25	--	<0.50	--	<0.25	--
4-Nitrophenol	--	-	-	-	-	-	--	<0 40	--	<1.0	--	<0 20	--	<0 20	--	<0.40	--	<0.20	--
Acenaphthene	3.44E+03	(1)	1 86E+04	(5)	2.31E+02	(8)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
Acenaphthylene	--	-	-	-	-	-	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
Aniline	8 50E+02	(3)	3 00E+03	(7)	3.83E-02	(9)	--	<0 40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0 20	--
Anthracene	1 72E+04	(1)	6 68E+04	(5)	3.79E+03	(8)	--	<0 40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
Azobenzene	4 90E+01	(3)	2 20E+02	(7)	5 74E-03	(9)	--	<0 40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
Benz(a)anthracene	4 81E+00	(1)	2.34E+01	(4)	3.59E+00	(8)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0 40	--	<0.20	--
Benzo(a)pyrene	4.81E-01	(1)	2.34E+00	(4)	1.22E+00	(8)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
Benzo(b)fluoranthene	4.81E+00	(1)	2.34E+01	(4)	1 25E+01	(8)	--	<0.40	--	<1.0	--	<0.20	--	<0 20	--	<0 40	--	<0.20	--
Benzo(g,h,i)perylene	--	-	-	-	-	-	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0 40	--	<0 20	--
Benzo(k)fluoranthene	4.81E+01	(1)	2.34E+02	(4)	1 22E+02	(8)	--	<0 40	--	<1.0	--	<0.20	--	<0 20	--	<0.40	--	<0.20	--
Benzoic acid	2.40E+05	(2)	2.50E+06	(6)	3 71E+02	(9)	--	<1.0	--	<2.5	--	<0.50	--	<0.50	--	<1.0	--	<0.50	--
Benzyl alcohol	3.10E+04	(2)	3.10E+05	(6)	4.73E+01	(9)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
Bis(2-chloroethoxy)methane	1.80E+02	(2)	1.80E+03	(6)	2.59E-01	(9)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
Bis(2-chloroethyl)ether	2.56E+00	(1)	1.36E+01	(4)	2.62E-04	(8)	--	<0 40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0 20	--
Bis(2-chloroisopropyl)ether	9.15E+01	(1)	4.54E+02	(4)	2.88E-02	(8)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0 20	--
Bis(2-ethylhexyl)phthalate	2.80E+02	(1)	1.37E+03	(4)	1 34E+02	(8)	--	<1.0	--	<2.5	--	<0.50	--	<0.50	--	<1.0	--	<0 50	--
Butyl benzyl phthalate	2.60E+03	(3)	9 10E+03	(7)	7.54E+00	(9)	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0.20	--
Carbazole	--	-	-	-	-	-	--	<0.40	--	<1.0	--	<0.20	--	<0.20	--	<0.40	--	<0 20	--

Table 7
Group 5 Soil Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Residential Soil Screening Level	Source	Non-Residential Soil Screening Level	Source	Leachate DAF (11.25) (mg/kg) SoilGW NMED	Source	SWMU 15-19 (2-3')	SWMU 15-20 (0.5-2.0')	SWMU 15-20 (2-3')	SWMU 15-21 (0.5-2.0')	SWMU 15-21 (2-3')	SWMU 15-22 (0.5-2.0')	SWMU 15-22 (2-4')	SWMU 15-23 (0.5-2.0')	SWMU 15-23 (2-3')	SWMU 15-24 (0.5-2.0')	SWMU 15-24 (2-3')	SWMU 15-25 (0.5-2.0')	SWMU 15-25 (2-3')
							1009025-03	1009025-04	1009025-05	1009025-06	1009025-07	1009025-08	1009025-09	1009106-01	1009106-03	1009106-04	1009106-05	1009106-06	1009106-07
							8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	8/25/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010	9/1/2010
Chrysene	4.81E+02	(1)	2.34E+03	(4)	3.67E+02	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Dibenz(a,h)anthracene	4.81E-01	(1)	2.34E+00	(4)	4.07E+00	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Dibenzofuran	–	-	-	-	-	-	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Diethyl phthalate	4.89E+04	(1)	1.91E+05	(5)	1.19E+02	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Dimethyl phthalate	6.11E+05	(1)	2 38E+06	(5)	9.40E+02	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Di-n-butyl phthalate	6.11E+03	(1)	2 38E+04	(5)	9.70E+01	(8)	–	<1.0	–	<2.5	–	<0.50	–	<0.50	–	<1.0	–	<0.50	–
Di-n-octyl phthalate	–	-	-	-	-	-	–	<0.50	–	<1.3	–	<0.25	–	<0.25	–	<0.50	–	<0.25	–
Fluoranthene	2.29E+03	(1)	8 91E+03	(5)	1.75E+03	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Fluorene	2.29E+03	(1)	8.91E+03	(5)	2.81E+02	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Hexachlorobenzene	2.45E+00	(1)	1.20E+01	(4)	2.48E-02	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Hexachlorobutadiene	6.20E+01	(3)	2.20E+02	(7)	2.14E-02	(9)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Hexachlorocyclopentadiene	3.67E+02	(1)	8.11E+02	(5)	6.90E+00	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Hexachloroethane	6.11E+01	(1)	2.38E+02	(5)	2.17E-01	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Indeno(1,2,3-cd)pyrene	4.81E+00	(1)	2.34E+01	(4)	4.16E+01	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Isophorone	4.13E+03	(1)	2.02E+04	(4)	2.08E+00	(8)	–	<1.0	–	<2.5	–	<0.50	–	<0.50	–	<1.0	–	<0.50	–
Naphthalene	4.50E+01	(1)	2.52E+02	(4)	4.72E-02	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Nitrobenzene	4.94E+01	(1)	2.77E+02	(4)	7.72E-02	(8)	–	<1.0	–	<2.5	–	<0 50	–	<0.50	–	<1.0	–	<0.50	–
N-Nitrosodi-n-propylamine	6.90E-01	(3)	2.50E+00	(7)	1.24E-04	(9)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
N-Nitrosodiphenylamine	8.00E+02	(1)	3.91E+03	(4)	1.45E+01	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Pentachlorophenol	2.07E+01	(1)	1.00E+02	(4)	3.30E-01	(8)	–	<0.80	–	<2.0	–	<0.40	–	<0.40	–	<0.80	–	<0.40	–
Phenanthrene	1.83E+03	(1)	7.15E+03	(5)	9.39E+02	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Phenol	1.83E+04	(1)	6 88E+04	(5)	7.09E+01	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0 40	–	<0 20	–
Pyrene	1.72E+03	(1)	6.68E+03	(5)	1.26E+03	(8)	–	<0.40	–	<1.0	–	<0.20	–	<0.20	–	<0.40	–	<0.20	–
Pyridine	7.80E+01	(2)	1.00E+03	(6)	1.09E-01	(9)	–	<1.0	–	<2.5	–	<0.50	–	<0.50	–	<1.0	–	<0 50	–
Total Petroleum Hydrocarbons - (EPA Method 8015B) mg/kg																			
Diesel Range Organics (DRO)	1.83E+03	(13)	2 00E+02/ 1.12E+03	(11) / (12)	2.00E+02/ 1.12E+03	(11) / (12)	<10	110	<10	800	42	<10	<10	<10	<10	30	12	<10	<10
Gasoline Range Organics (GRO)	–		–		–		<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
Motor Oil Range Organics (MRO)	2.50E+03	(14)	5.00E+03	(14)	–		<50	130	<50	1900	65	<50	<50	<50	<50	81	<50	<50	<50

– 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

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

(9) SoilGW Risk-based EPA DAF = 11.25

(10) SoilGW MCL-based EPA DAF = 11.25

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

(12) NMED Oct. 2006 TPH Screening Guidelines "diesel #2/crankcase oil" with DAF = 1.0 - see report Section 5 for use on location specific screening levels

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

(14) NMED Oct. 2006 TPH Screening Guidelines "waste oil" - see report Section 5 for use on location specific screening levels

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

Table 8
Group 5 Groundwater Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Screening Levels	Source	SWMU 15-1 (EXP-1)	SWMU 15-2 (GW)	SWMU 15-13 (GW)	MW-68	MW-68
		Sample ID	1009338-01	1008838-05	1008994-01	1009356-01	1012096-01
		Sample Date	9/7/2010	8/19/2010	8/24/2010	9/7/2010	12/1/2010
Metals (mg/l)							
Antimony	6 00E-03	(2)	--	<0 0050	<0 0010	<0 0010	0
Arsenic	1 00E-02	(2)	--	0.45	0 011	0 0037	0.002
Barium	1.00E+00	(3)	--	22	1 4	0.069	0.048
Beryllium	4 00E-03	(2)	--	0 039	<0 0030	<0 0030	<0.0030
Cadmium	5 00E-03	(2)	--	<0 020	<0 0020	<0 0020	<0 0020
Calcium	-	-	--	900	190	96	120
Chromium	5.00E-02	(3)	--	0 75	0 063	<0 0060	<0.0060
Cobalt	5 00E-02	(3)	--	0 39	0 041	<0.0060	<0 0060
Cyanide, Total	2 00E-01	(3)	--	<0 010	<0 010	<0 010	<0 0050
Iron, Total	2 56E+01	(5)	--	1500	87	2.2	0 49
Iron, Dissolved	1 00E+00	(3)	--	<0 020	22	<0.020	<0.020
Lead	1 50E-02	(2)	--	0 32	0 017	0.0054	<0 0050
Magnesium	-	-	--	260	60	21	24
Manganese, Total	2.00E-01	(3)	--	160	6 5	1.6	1 2
Mercury	2 00E-03	(3)	--	0.004	<0 00020	<0 00020	<0 00020
Nickel	2.00E-01	(3)	--	0 59	0 12	0 01	0 011
Potassium	-	-	--	110	12	4	4 4
Selenium	5 00E-02	(3)	--	0 017	<0 0010	0 0017	0 002
Silver	5 00E-02	(3)	--	<0 050	<0 0050	<0 0050	<0.0050
Sodium	-	-	--	280	650	110	140
Vanadium	1 83E-01	(5)	--	2	0 12	<0 050	<0 050
Zinc	1 00E+01	(3)	--	2 7	0 27	<0 020	<0 020
Volatile Organic Compounds - (EPA Method 8260) ug/l							
1,1,1,2-Tetrachloroethane	5 24E+00	(5)	--	<5 0	<10	<1.0	<1.0
1,1,1-Trichloroethane	6 00E+01	(3)	--	<5 0	<10	<1 0	<1.0
1,1,2,2-Tetrachloroethane	1.00E+01	(3)	--	<10	<20	<2 0	<2 0
1,1,2-Trichloroethane	5.00E+00	(2)	--	<5 0	<10	<1 0	<1.0
1,1-Dichloroethane	2.50E+01	(3)	--	<5 0	<10	<1 0	<1.0
1,1-Dichloroethene	5 00E+00	(3)	--	<5.0	<10	<1 0	<1 0
1,1-Dichloropropene	-	-	--	<5 0	<10	<1 0	<1 0
1,2,3-Trichlorobenzene	-	-	--	<5 0	<10	<1.0	<1 0
1,2,3-Trichloropropane	9 60E-02	(5)	--	<10	<20	<2 0	<2.0
1,2,4-Trichlorobenzene	7.00E+01	(2)	--	<5 0	<10	<1 0	<1 0
1,2,4-Trimethylbenzene	1 50E+01	(1)	390	960	910	<1 0	<1 0
1,2-Dibromo-3-chloropropane	2.00E-01	(2)	--	<10	<20	<2.0	<2 0
1,2-Dibromoethane (EDB)	5 00E-02	(2)	--	<5 0	<10	<1 0	<1 0
1,2-Dichlorobenzene	6.00E+02	(2)	--	<5 0	<10	<1.0	<1.0
1,2-Dichloroethane (EDC)	5 00E+00	(2)	--	<5 0	<10	<1.0	<1.0
1,2-Dichloropropane	5 00E+00	(2)	--	<5 0	<10	<1 0	<1 0
1,3,5-Trimethylbenzene	1 20E+01	(1)	12	190	160	<1 0	<1 0
1,3-Dichlorobenzene	-	-	--	<5 0	<10	<1.0	<1.0
1,3-Dichloropropane	7 30E+02	(1)	--	<5 0	<10	<1 0	<1 0
1,4-Dichlorobenzene	7 50E+01	(2)	--	<5 0	<10	<1 0	<1.0
1-Methylnaphthalene	2 30E+00	(1)	--	<20	140	<4.0	<4.0
2,2-Dichloropropane	-	-	--	<10	<20	<2 0	<2 0
2-Butanone	7 06E+03	(5)	--	<50	<100	<10	<10
2-Chlorotoluene	7 30E+02	(1)	--	<5 0	<10	<1 0	<1 0
2-Hexanone	-	-	--	<50	<100	<10	<10
2-Methylnaphthalene	1 50E+02	(1)	--	<20	210	<4.0	<4.0
4-Chlorotoluene	2 60E+03	(1)	--	<5.0	<10	<1 0	<1 0
4-Isopropyltoluene	-	-	--	<5 0	22	<1 0	<1.0
4-Methyl-2-pentanone	-	-	--	<50	<100	<10	<10
Acetone	2 18E+04	(5)	--	<50	<100	<10	<10
Benzene	5 00E+00	(2)	3 8	210	460	<1 0	<1 0

Table 8
Group 5 Groundwater Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Screening Levels	Source	SWMU 15-1 (EXP-1)	SWMU 15-2 (GW)	SWMU 15-13 (GW)	MW-68	MW-68
		Sample ID	1009338-01	1008838-05	1008994-01	1009356-01	1012096-01
		Sample Date	9/7/2010	8/19/2010	8/24/2010	9/7/2010	12/1/2010
Bromobenzene	2.00E+01	(1)	--	<5.0	<10	<1.0	<1.0
Bromodichloromethane	1.17E+00	(5)	--	<5.0	<10	<1.0	<1.0
Bromoform	8.50E+00	(1)	--	<5.0	<10	<1.0	<1.0
Bromomethane	8.66E+00	(5)	--	<5.0	<10	<1.0	<3.0
Carbon disulfide	1.04E+03	(5)	--	<50	<100	<10	<10
Carbon Tetrachloride	5.00E+00	(2)	--	<5.0	<10	<1.0	<1.0
Chlorobenzene	1.00E+02	(2)	--	<5.0	<10	<1.0	<1.0
Chloroethane	-	-	--	<10	<20	<2.0	<2.0
Chloroform	1.00E+02	(3)	--	<5.0	<10	<1.0	<1.0
Chloromethane	1.78E+01	(5)	--	<5.0	<10	<1.0	<3.0
cis-1,2-DCE	7.00E+01	(2)	--	<5.0	<10	<1.0	<1.0
cis-1,3-Dichloropropene	-	-	--	<5.0	<10	<1.0	<1.0
Dibromochloromethane	1.47E+00	(5)	--	<5.0	<10	<1.0	<1.0
Dibromomethane	3.70E+02	(1)	--	<5.0	<10	<1.0	<1.0
Dichlorodifluoromethane	3.95E+02	(5)	--	<5.0	<10	<1.0	<1.0
Ethylbenzene	7.00E+02	(2)	47	270	610	<1.0	<1.0
Hexachlorobutadiene	8.60E-01	(1)	--	<5.0	<10	<1.0	<1.0
Isopropylbenzene (Cumene)	6.79E+02	(5)	--	31	94	<1.0	<1.0
Methyl tert-butyl ether (MTBE)	1.25E+02	(5)	<2.5	<5.0	<10	<1.0	<1.0
Methylene Chloride	5.00E+00	(2)	--	<15	<30	<3.0	<3.0
Naphthalene	1.43E+00	(5)	--	28	300	<2.0	<2.0
n-Butylbenzene	-	-	--	<5.0	23	<1.0	<1.0
n-Propylbenzene	-	-	--	130	180	<1.0	<1.0
sec-Butylbenzene	-	-	--	6.2	24	<1.0	<1.0
Styrene	1.00E+02	(2)	--	<5.0	<10	<1.0	<1.0
tert-Butylbenzene	-	-	--	<5.0	<10	<1.0	<1.0
Tetrachloroethene (PCE)	5.00E+00	(2)	--	<5.0	<10	<1.0	<1.0
Toluene	7.50E+02	(3)	1.4	390	150	<1.0	<1.0
trans-1,2-DCE	1.00E+02	(2)	--	<5.0	<10	<1.0	<1.0
trans-1,3-Dichloropropene	4.30E-01	(1)	--	<5.0	<10	<1.0	<1.0
Trichloroethene (TCE)	5.00E+00	(2)	--	<5.0	<10	<1.0	<1.0
Trichlorofluoromethane	1.29E+03	(5)	--	<5.0	<10	<1.0	<1.0
Vinyl chloride	1.00E+00	(3)	--	<5.0	<10	<1.0	<1.0
Xylenes, Total	6.20E+02	(3)	9.1	800	2200	<1.5	<1.5
Semi Volatile Organics - (EPA Method 8270) ug/l							
1,2,4-Trichlorobenzene	7.00E+01	(2)	--	<10	<10	<10	<10
1,2-Dichlorobenzene	6.00E+02	(2)	--	<10	<10	<10	<10
1,3-Dichlorobenzene	-	-	--	<10	<10	<10	<10
1,4-Dichlorobenzene	7.50E+01	(2)	--	<10	<10	<10	<10
2,4,5-Trichlorophenol	3.65E+03	(5)	--	<10	<10	<10	<10
2,4,6-Trichlorophenol	3.65E+01	(5)	--	<10	<10	<10	<10
2,4-Dichlorophenol	1.10E+02	(5)	--	<20	<20	<20	<20
2,4-Dimethylphenol	7.30E+02	(5)	--	<10	<10	<10	<10
2,4-Dinitrophenol	7.30E+01	(5)	--	<20	<20	<20	<20
2,4-Dinitrotoluene	2.17E+00	(5)	--	<10	<10	<10	<10
2,6-Dinitrotoluene	3.70E+01	(1)	--	<10	<10	<10	<10
2-Chloronaphthalene	2.90E+03	(1)	--	<10	<10	<10	<10
2-Chlorophenol	1.83E+02	(5)	--	<10	<10	<10	<10
2-Methylnaphthalene	1.50E+02	(1)	--	11	170	<10	<10
2-Methylphenol	1.80E+03	(1)	--	<10	<10	<10	<10
2-Nitroaniline	1.10E+02	(1)	--	<10	<10	<10	<10
2-Nitrophenol	-	-	--	<10	<10	<10	<10
3,3'-Dichlorobenzidine	1.50E-01	(1)	--	<10	<10	<10	<10
3+4-Methylphenol	1.80E+02	(1)	--	<10	<10	<10	<10
3-Nitroaniline	-	-	--	<10	<10	<10	<10

Table 8
Group 5 Groundwater Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Screening Levels	Source	SWMU 15-1 (EXP-1)	SWMU 15-2 (GW)	SWMU 15-13 (GW)	MW-68	MW-68
		Sample ID	1009338-01	1008838-05	1008994-01	1009356-01	1012096-01
		Sample Date	9/7/2010	8/19/2010	8/24/2010	9/7/2010	12/1/2010
4,6-Dinitro-2-methylphenol	-	-	--	<20	<20	<20	<20
4-Bromophenyl phenyl ether	-	-	--	<10	<10	<10	<10
4-Chloro-3-methylphenol	-	-	--	<10	<10	<10	<10
4-Chloroaniline	3.40E-01	(1)	--	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	-	-	--	<10	<10	<10	<10
4-Nitroaniline	3 40E+00	(1)	--	<10	<10	<20	<20
4-Nitrophenol	-	-	--	<10	<10	<10	<10
Acenaphthene	2.19E+03	(5)	--	<10	<10	<10	<10
Acenaphthylene	-	-	--	<10	<10	<10	<10
Aniline	1 20E+01	(1)	--	<10	<10	<10	<10
Anthracene	1 10E+04	(5)	--	<10	<10	<10	<10
Azobenzene	1 20E-01	(1)	--	<10	<10	<10	<10
Benz(a)anthracene	9 21E-01	(5)	--	<10	<10	<10	<10
Benzo(a)pyrene	2 00E-01	(2)	--	<10	<10	<10	<10
Benzo(b)fluoranthene	9 21E-01	(5)	--	<10	<10	<10	<10
Benzo(g,h,i)perylene	-	-	--	<10	<10	<10	<10
Benzo(k)fluoranthene	9 21E+00	(5)	--	<10	<10	<10	<10
Benzoic acid	1 50E+05	(1)	--	<20	<20	<20	<20
Benzyl alcohol	1 80E+04	(1)	--	<10	<10	<10	<10
Bis(2-chloroethoxy)methane	1.10E+02	(1)	--	<10	<10	<10	<10
Bis(2-chloroethyl)ether	1.19E-01	(5)	--	<10	<10	<10	<10
Bis(2-chloroisopropyl)ether	9 60E+00	(5)	--	<10	<10	<10	<10
Bis(2-ethylhexyl)phthalate	6 00E+00	(2)	--	<10	<10	<10	<10
Butyl benzyl phthalate	3 50E+01	(1)	--	<10	<10	<10	<10
Carbazole	-	-	--	<10	<10	<10	<10
Chrysene	9 21E+01	(5)	--	<10	<10	<10	<10
Dibenz(a,h)anthracene	9.21E-02	(5)	--	<10	<10	<10	<10
Dibenzofuran	-	-	--	<10	<10	<10	<10
Diethyl phthalate	2 92E+04	(5)	--	<10	<10	<10	<10
Dimethyl phthalate	3 65E+05	(5)	--	<10	<10	<10	<10
Di-n-butyl phthalate	3.65E+03	(5)	--	<10	<10	<10	<10
Di-n-octyl phthalate	-	-	--	<10	<10	<10	<10
Fluoranthene	1 46E+03	(5)	--	<10	<10	<10	<10
Fluorene	1 46E+03	(5)	--	<10	<10	<10	<10
Hexachlorobenzene	1 00E+00	(2)	--	<10	<10	<10	<10
Hexachlorobutadiene	8.60E-01	(1)	--	<10	<10	<10	<10
Hexachlorocyclopentadiene	5 00E+01	(2)	--	<10	<10	<10	<10
Hexachloroethane	3 65E+01	(5)	--	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	2 90E-02	(1)	--	<10	<10	<10	<10
Isophorone	7 07E+02	(5)	--	<10	<10	<10	<10
Naphthalene	1 43E+00	(5)	--	13	190	<10	<10
Nitrobenzene	1 49E+01	(5)	--	<10	<10	<10	<10
N-Nitrosodimethylamine	1 32E-02	(5)	--	<10	<10	<10	<10
N-Nitrosodi-n-propylamine	9 60E-03	(1)	--	<10	<10	<10	<10
N-Nitrosodiphenylamine	1 37E+02	(5)	--	<10	<10	<10	<10
Pentachlorophenol	1 00E+00	(2)	--	<20	<20	<20	<20
Phenanthrene	1.10E+03	(5)	--	<10	<10	<10	<10
Phenol	5 00E+00	(3)	--	<10	<10	<10	<10
Pyrene	1 10E+03	(5)	--	<10	<10	<10	<10
Pyridine	3 70E+01	(1)	--	<10	<10	<10	<10
Inorganics (mg/l)							
Chloride	2.50E+02	(3)	--	200	490	48	69
Nitrate (As N)+Nitrite (As N)	-	-	--	--	--	3 8	--
Nitrogen, Nitrate (As N)	1 00E+01	(3)	--	8.3	<0.50	--	5
Nitrogen, Nitrite (As N)	1.00E+00	(2)	--	<0.50	<2 0	--	<0.10

Table 8
Group 5 Groundwater Analytical Results Summary
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Screening Levels	Source	SWMU 15-1 (EXP-1)	SWMU 15-2 (GW)	SWMU 15-13 (GW)	MW-68	MW-68
		Sample ID	1009338-01	1008838-05	1008994-01	1009356-01	1012096-01
		Sample Date	9/7/2010	8/19/2010	8/24/2010	9/7/2010	12/1/2010
Sulfate	6.00E+02	(3)	--	500	8 3	260	390
Alkalinity, Total (As CaCO3)	-	-	--	340	1300	210	210
Bicarbonate	-	-	--	340	1300	210	210
Carbonate	-	-	--	<2 0	<5 0	<2.0	<2 0
Total Dissolved Solids	1 00E+03	(3)	--	1420	2270	698	934
Total Petroleum Hydrocarbons (mg/l)							
Diesel Range Organics (DRO)	2 00E-01	(4)	--	0 6	3 9	<0 20	<0 20
Motor Oil Range Organics (MRO)	-	-	--	17	9 5	<0 050	<0 050
Gasoline Range Organics (GRO)	-	-	--	<2 5	<2 5	<2 5	<2 5

(1) EPA - Regional Screening Levels (April 2009) - EPA Screening Levels.Tap Water
(2) EPA - Regional Screening Levels (April 2009) - MCL
(3) NMED WQCC standards - Title 20 Chapter 6, Part 2, - 20.6.2.3101 Standards for Ground Water of 10,000 mg/l TDS
(4) NMED TPH Screening Guidelines Oct 2006 - "unknown oil" - see report Sections 5 and 7 for use on location specific
(5) NMED TAP Water Screening Levels - 2009 Background Document for Development of Soil Screening Levels
-- No screening level or analytical result available
4 2 highlighted value exceeds screening level

TABLE 9
Groundwater Field Measurements & Subsurface Vapor Readings
Bloomfield Refinery - Bloomfield, New Mexico

		Ground Water Data								Vapor Data		
Well	**Date**	**Well Volume**	**Temp (degrees F)**	**Specific Conductivity**	**Dissolved Oxygen (mg/L)**	**pH**	**ORP**	**TDS (ppm)**	**Purge Volume (calculated / actual - gallons)**	**O_2 (%)**	**CO_2 (%)**	**PID (ppm)**
SWMU 15-1 (EXP-1)	9/7/2010	0	17.75	1.001	2.02	6.98	120	NM	2.64 /2 *	18.1	0.2	0.3
		1	17.78	1.020	2.35	7.01	123	NM				
		2	17.85	1.180	2.39	7.00	125	NM				
MW-68	9/7/2010	0	16.26	1.100	5.02	7.17	144.7	1160	9.27 / 10	13.3	5.2	0.8
		1	15.00	1.211	5.36	7.19	136.1	1151				
		2	15.05	1.333	4.10	7.23	144.1	988				
		3	15.15	1.363	3.73	7.07	132.5	961				
		4	15.20	1.340	3.63	7.13	129.1	1002				
	12/1/2010	0	15.40	1.590	1.58	6.72	300	1159	8.82 / 10	10.4	7	1.1
		1	15.30	1.345	2.56	7.14	265	967				
		2	15.80	1.331	5.21	6.99	267	955.4				
		3	15.50	1.356	3.82	7.01	272	1179				

NM - not measured
* - very, very slow recovery

TABLE 10
Water Level Measurements
Bloomfield Refinery - Bloomfield, New Mexico

Well	Date	Top of Casing (ft-msl)	Depth to Bottom (ft)	Depth to Product (ft)	Depth to Water (ft)	Groundwater Elevation (ft-msl)	Product Thickness (ft)
SWMU 15-1 (EXP-1)	9/7/2010	5518.303	27.71	NPP	22.52	5495.78	0
MW-68	9/7/2010	5517.372	21.15	NPP	16.46	5500.91	0
	12/1/2010	5517.372	21.19	NPP	16.74	5500.63	0

NPP - no product present

Table 11
Storage Tanks Information Table
Group 5 Investigation
Bloomfield Refinery - Bloomfield, New Mexico

Tank ID	Status	Contents	Location	Comments
Tank 11	in service	currently empty	In main tank farm north of County Road 4990	historical use for reformate and unleaded gasoline
Tank 12	in service	currently empty	In main tank farm north of County Road 4990	historical use for cat/poly gas and unleaded gasoline
Tank 13	in service	unleaded gasoline	In main tank farm north of County Road 4990	historical use same as current use
Tank 14	in service	unleaded gasoline	In main tank farm north of County Road 4990	historical use same as current use
Tank 17	out of service	NA	In main tank farm north of County Road 4990	historical storage of reduced crude oil
Tank 18	in service	currently empty	In main tank farm north of County Road 4990	historical use for diesel storage
Tank 19	in service	Diesel	In main tank farm north of County Road 4990	historical use same as current use
Tank 20	in service	currently empty	In main tank farm north of County Road 4990	historical use for sweet naphtha
Tank 22	removed	NA	In main tank farm north of County Road 4990	historical storage of gasoline
Tank 23	in service	currently empty	In main tank farm north of County Road 4990	historical storage of base gas and unleaded gasoline
Tank 24	in service	Diesel	In main tank farm north of County Road 4990	historical use same as current use

Table 11
Storage Tanks Information Table
Group 5 Investigation
Bloomfield Refinery - Bloomfield, New Mexico

Tank ID	Status	Contents	Location	Comments
Tank 25	in service	Diesel	In main tank farm north of County Road 4990	historical use same as current use
Tank 26	out of service	NA	In main tank farm north of County Road 4990	kerosene prior to 1988, then sweet naptha
Tank 27	out of service	NA	In main tank farm north of County Road 4990	historical storage of slurry oil
Tank 28	in service	currently empty	In main tank farm north of County Road 4990	historical use for crude oil storage
Tank 29	in service	currently empty	In main tank farm north of County Road 4990	earlier storage of leaded gasoline and light cycle oil, more recent storage of gasoline/diesel-transmix
Tank 30	in service	gasoline/ diesel – transmix	In main tank farm north of County Road 4990	earlier storage of leaded gasoline and low sulfur diesel
Tank 31	in service	crude oil	In main tank farm north of County Road 4990	historical use same as current use
Tank 32	in service	unleaded gasoline	In main tank farm north of County Road 4990	historical storage of reformate
Tank 35	in service	currently empty	In main tank farm north of County Road 4990	historical storage of reformer feed, more recent storage of unleaded gasoline
Tank 36	in service	unleaded gasoline	In main tank farm north of County Road 4990	historical storage of gasoline

NA - not applicable

Table 12
Group 5 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)	11	0.0070	0.0018
Arsenic	3.59E+00	(1)	1.77E+01	(4)	5 5	1.5333	0.3109
Volatile Organic Compounds - (EPA Method 8260) mg/kg							
1,1,2-Trichloroethane	1.72E+01	(1)	9.43E+01	(4)	3.4	0.1982	0.0361
1-Methylnaphthalene	2.20E+02	(3)	9.90E+02	(7)	14	0.0636	0.0141
Bromodichloromethane	5.25E+00	(1)	2.92E+01	(4)	3	0.5717	0.1026
Ethylbenzene	6.97E+01	(1)	3.85E+02	(4)	8	0.1148	0.0208
Methylene chloride	1.99E+02	(1)	1.09E+03	(4)	0 00928	0.00005	0.00001
Benzene	1.55E+01	(1)	8.54E+01	(4)	1 4	0.0904	0.0164
Naphthalene	4.50E+01	(1)	2.52E+02	(4)	18	0.4004	0.0714
Semi Volatile Organics - (EPA Method 8270) mg/kg							
Chrysene	4 81E+02	(1)	2.34E+03	(4)	2.2	0.0046	0 0009
Bis(2-ethylhexyl)phthalate	2 80E+02	(1)	1 37E+03	(4)	3.5	0 0125	0.0026
Naphthalene	4.50E+01	(1)	2.52E+02	(4)	6.7	0.1491	0 0266
Carcinogenic Constituents Cumulative Risk x 10^{-5}						**3.146**	**0.604**
NON-CARCINOGENIC CONSTITUENTS							
Metals (mg/kg)							
Barium	1.56E+04	(1)	4.35E+03	(5)	490	0 0314	0.1126
Beryllium	1.56E+02	(1)	1 44E+02	(5)	0.61	0.0039	0.0042
Cadmium	7.79E+01	(1)	3.09E+02	(5)	0.11	0.0014	0.0004
Chromium	2.19E+02	(1)	4.49E+02	(5)	56	0.2557	0 1247
Cobalt	2.30E+01	(2)	3.00E+02	(6)	6.2	0.2696	0.0207
Cyanide	1.56E+03	(1)	6 19E+03	(5)	0.63	0.0004	0.0001
Vanadium	3.91E+02	(1)	1.55E+03	(5)	31	0 0793	0.0200
Zinc	2 35E+04	(1)	9.29E+04	(5)	47	0.0020	0.0005
Lead	4.00E+02	(1)	8.00E+02	(4)	32	0.0800	0.0400
Mercury	7.71E+00	(1)	4 99E+01	(4)	9.1	1.1803	0.1822
Volatile Organic Compounds - (EPA Method 8260) mg/kg							
1,2,4-Trimethylbenzene	6.70E+01	(2)	2.80E+02	(6)	92	1.3731	0.3286
1,3,5-Trimethylbenzene	4.70E+01	(2)	2 00E+02	(6)	27	0.5745	0.1350
2-Methylnaphthalene	3 10E+02	(2)	4.10E+03	(6)	25	0.0806	0.0061
4-Isopropyltoluene	-	-	-	-	7.5		
Carbon disulfide	1.94E+03	(1)	5.89E+03	(5)	0.00103	0.0000	0 0000
Chloromethane	3.56E+01	(1)	1.98E+02	(4)	1 3	0.0365	0.0066
Isopropylbenzene	3.21E+03	(1)	1.03E+04	(5)	6 4	0.0020	0.0006
n-Butylbenzene	-	-	-	-	8.2		
n-Propylbenzene	-	-	-	-	11		
sec-Butylbenzene	-	-	-	-	7.3		
Toluene	5 57E+03	(1)	2.11E+04	(5)	1.9	0 0003	0.0001
Xylenes, Total	1 09E+03	(1)	3.13E+03	(5)	62	0.0571	0.0198
Semi Volatile Organics - (EPA Method 8270) mg/kg							
Phenanthrene	1 83E+03	(1)	7.15E+03	(5)	4	0.0022	0.0006
2-Methylnaphthalene	3 10E+02	(2)	4.10E+03	(6)	12	0.0387	0 0029
Fluoranthene	2 29E+03	(1)	8.91E+03	(5)	0.44	0.0002	0.0000
Fluorene	2 29E+03	(1)	8.91E+03	(5)	0.71	0 0003	0.0001
Pyrene	1 72E+03	(1)	6.68E+03	(5)	4.8	0.0028	0.0007
Non-Carcinogenic Constituents Hazard Index						**2.168**	**0.501**

- 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)

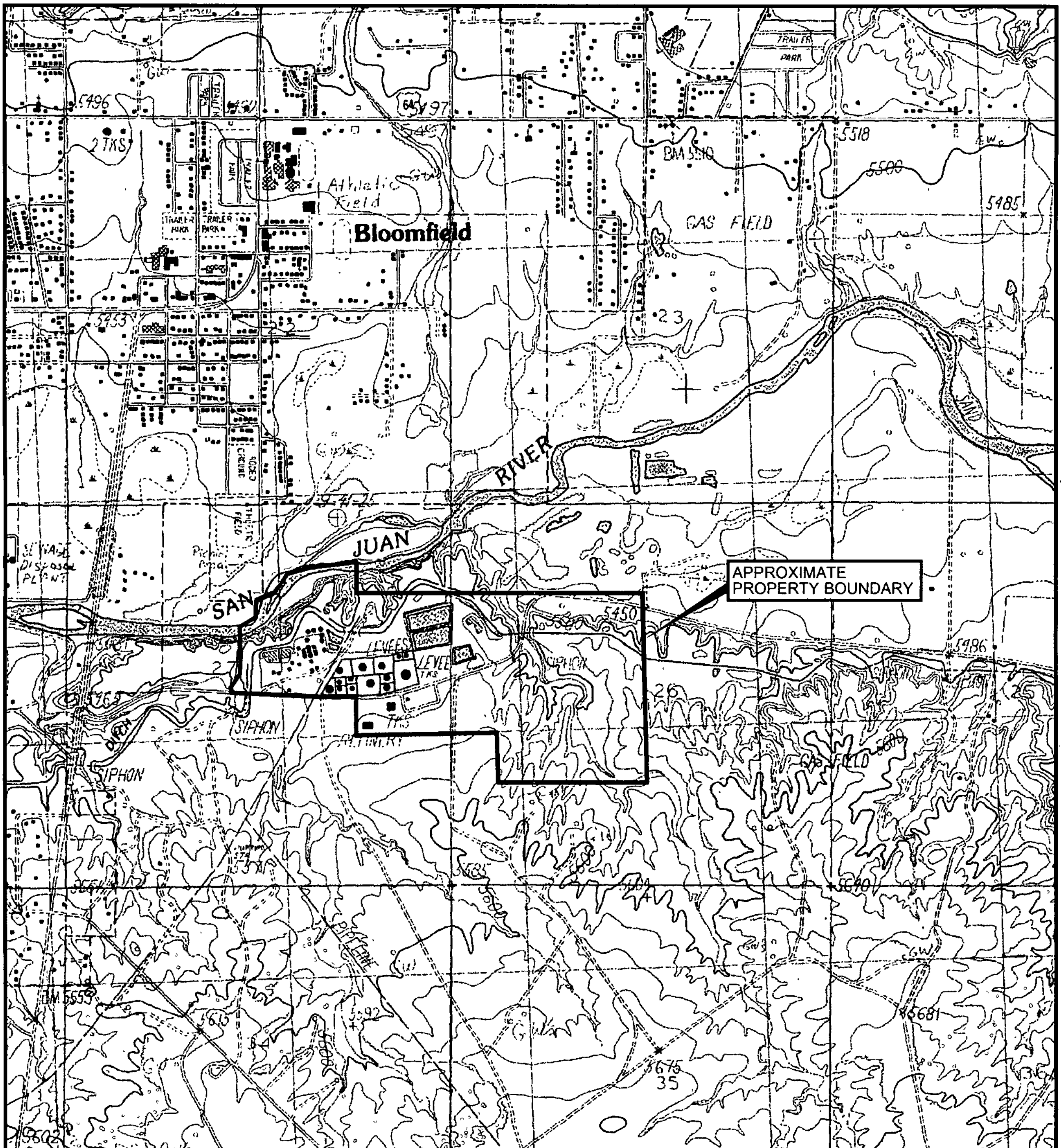
(7) EPA Industrial - Screening Levels (April 2009) multiplied by 10 pursuant to Provision VII.B. of the July 7, 2007 NMED Order because the constituent is listed as carcinogenic

Table 13
Group 5 Groundwater Cumulative Risk and Hazard Index Evaluation
Bloomfield Refinery - Bloomfield, New Mexico

Analytes	Screening Levels	Source	Maximum Concentration	Maximum Concentration divided by Residential Groundwater Screening Level
CARCINOGENIC CONSTITUENTS				
Metals (mg/l)				
Arsenic	1 00E-02	(2)	0 45	45
Volatile Organic Compounds - (EPA Method 8260) ug/l				
1-Methylnaphthalene	2.30E+00	(1)	140	60.87
Benzene	5 00E+00	(2)	460	92
Ethylbenzene	7.00E+02	(2)	610	0.8714
Naphthalene	1 43E+00	(4)	300	209 62
Carcinogenic Constituents Cumulative Risk x 10^{-5}				**408.36**
NON-CARCINOGENIC CONSTITUENTS				
Metals (mg/l)				
Barium	1 00E+00	(3)	22	22
Beryllium	4 00E-03	(2)	0 039	9 75
Calcium	-	-	900	--
Chromium	5 00E-02	(3)	0.75	15
Cobalt	5 00E-02	(3)	0 39	7 8
Iron, Dissolved	1 00E+00	(3)	22	22
Iron, Total	2 56E+01	(4)	1500	58 71
Lead	1 50E-02	(2)	0 32	21 33
Magnesium	-	-	260	--
Manganese, Total	2 00E-01	(3)	160	800 00
Mercury	2 00E-03	(3)	0.004	2
Nickel	2 00E-01	(3)	0 59	2 95
Potassium	-	-	110	--
Selenium	5 00E-02	(3)	0 017	0 34
Sodium	-	-	650	--
Vanadium	1 83E-01	(4)	2	10 96
Zinc	1 00E+01	(3)	2.7	0 27
Volatile Organic Compounds - (EPA Method 8260) ug/l				
1,2,4-Trimethylbenzene	1 50E+01	(1)	960	64
1,3,5-Trimethylbenzene	1.20E+01	(1)	190	15.83
2-Methylnaphthalene	1 50E+02	(1)	210	1 4
4-Isopropyltoluene	-	-	22	--
Isopropylbenzene (Cumene)	6 79E+02	(4)	94	0 14
n-Butylbenzene	-	-	23	--
n-Propylbenzene	-	-	180	--
sec-Butylbenzene	-	-	24	--
Toluene	7.50E+02	(3)	390	0 52
Xylenes, Total	6 20E+02	(3)	2200	3 55
Semi Volatile Organics - (EPA Method 8270) ug/l				
Alkalinity, Total (As CaCO3)	-	-	1300	--
Bicarbonate	-	-	1300	--
Chloride	2 50E+02	(3)	490	1 96
Nitrate (As N)+Nitrite (As N)	-	-	3 8	--
Nitrogen, Nitrate (As N)	1 00E+01	(3)	8 3	0 83
Sulfate	6 00E+02	(3)	500	0 8333
Non-Carcinogenic Constituents Hazard Index				**89.06**

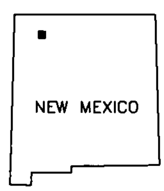
(1) EPA - Regional Screening Levels (April 2009) - EPA Screening Levels.Tap Water
(2) EPA - Regional Screening Levels (April 2009) - MCL
(3) NMED WQCC standards - 20.6.2.3101 Standards for Ground Water of 10,000 mg/l TDS Concentration or less
(4) NMED TAP Water Screening Levels - 2009 Background Document for Development of Soil Screening Levels
- No screening level or analytical result available

Figures



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

0 2000
SCALE IN FEET



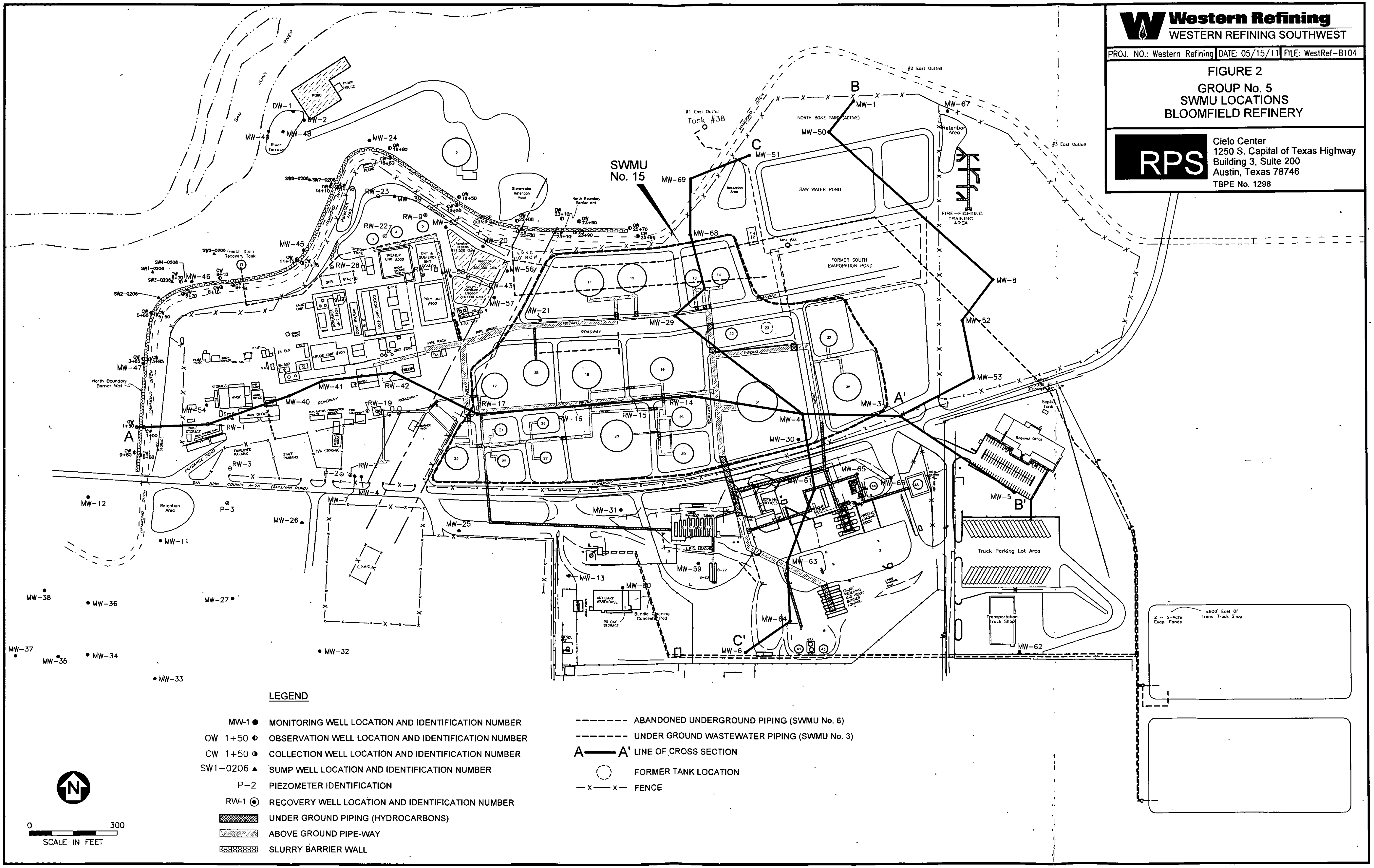
QUADRANGLE LOCATION

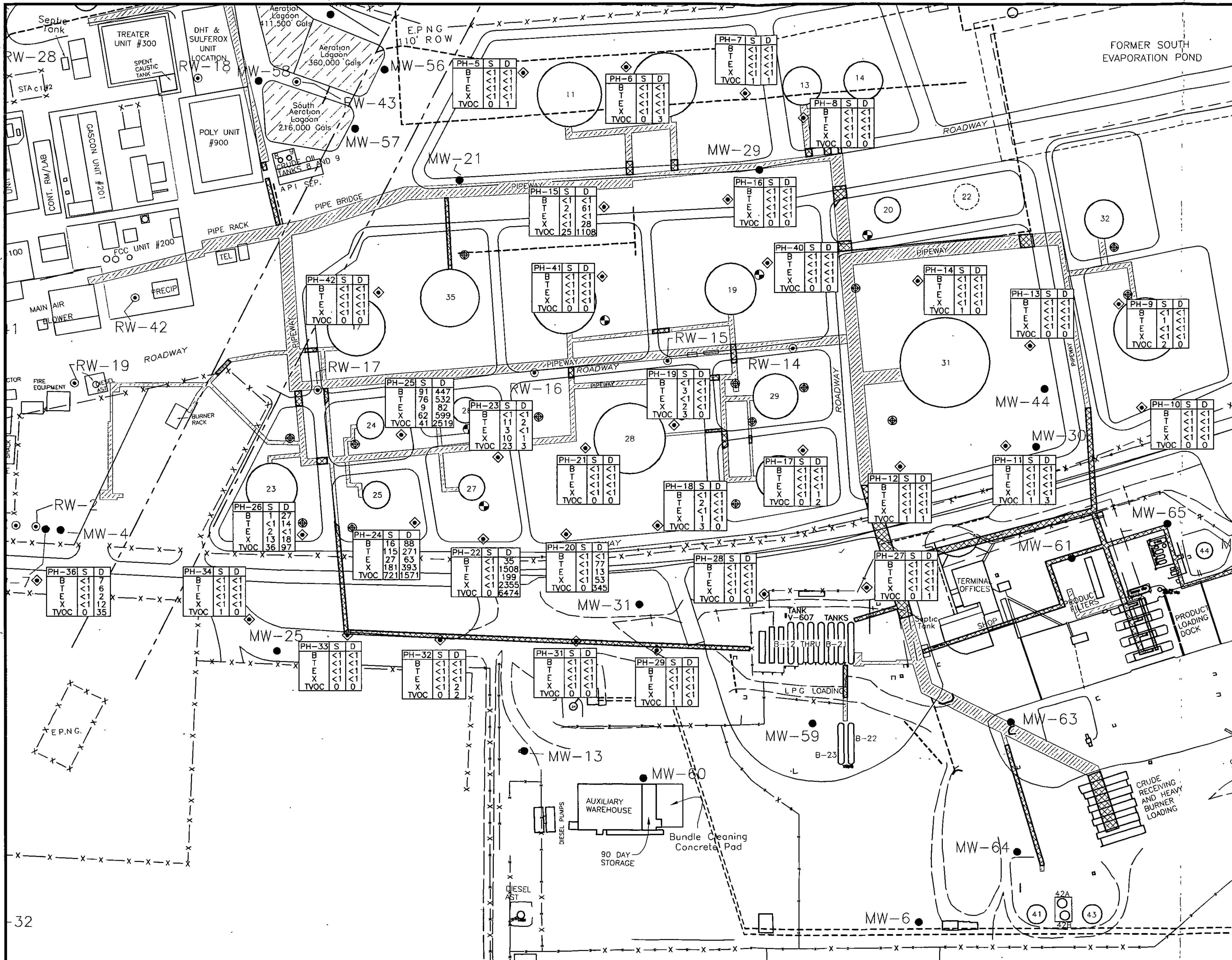
Western Refining
WESTERN REFINING SOUTHWEST

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
WESTERN REFINING SOUTHWEST
PROJ. NO.: Western Refining
DATE: 05/15/11
FILE: WestRef-B104
FIGURE 2
GROUP No. 5
SWMU LOCATIONS
BLOOMFIELD REFINERY
RPS
Cielo Center
1250 S. Capital of Texas Highway
Building 3, Suite 200
Austin, Texas 78746
TBPE No. 1298
SWMU No. 15
LEGEND
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 (SWMU No. 6)
UNDER GROUND WASTEWATER PIPING (SWMU No. 3)
A—A' LINE OF CROSS SECTION
FORMER TANK LOCATION
FENCE
0 300
SCALE IN FEET
N
Truck Parking Lot Area
RAW WATER POND
FORMER SOUTH EVAPORATION POND
FIRE-FIGHTING TRAINING AREA
NORTH BONE YARD (ACTIVE)
Transportation Truck Shop
Regional Office
2 – 5-Acre Evap Ponds
±600' East Of Trans Truck Shop



SOURCE:
RCRA FACILITY INVESTIGATION / CORRECTIVE MEASURES STUDY REPORT, BLOOMFIELD REFINING COMPANY, #50 COUNTY RD 4990, BLOOMFIELD, NEW MEXICO; PROJ. No. 023353014, NOV. 8, 1994, GROUNDWATER TECHNOLOGY, INC.

N

0 150
SCALE IN FEET

LEGEND

- PH-10 SOIL VAPOR SAMPLE LOCATION AND IDENTIFICATION NUMBER
- SURFACE SOIL SAMPLE LOCATION
- SOIL BORING LOCATION
- PROPOSED MONITORING WELL LOCATION
- MW-30 MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- RW-14 RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- UNDER GROUND PIPING (HYDROCARBONS)
- ABOVE GROUND PIPE-WAY
- ABANDONED UNDERGROUND PIPING
- UNDER GROUND WASTEWATER PIPING
- FENCE
- FORMER TANK LOCATION

S SHALLOW (3')
D DEEP (7.5'-10')
UNITS - $\mu g/L$ OF HEADSPACE VAPOR ANALYZED

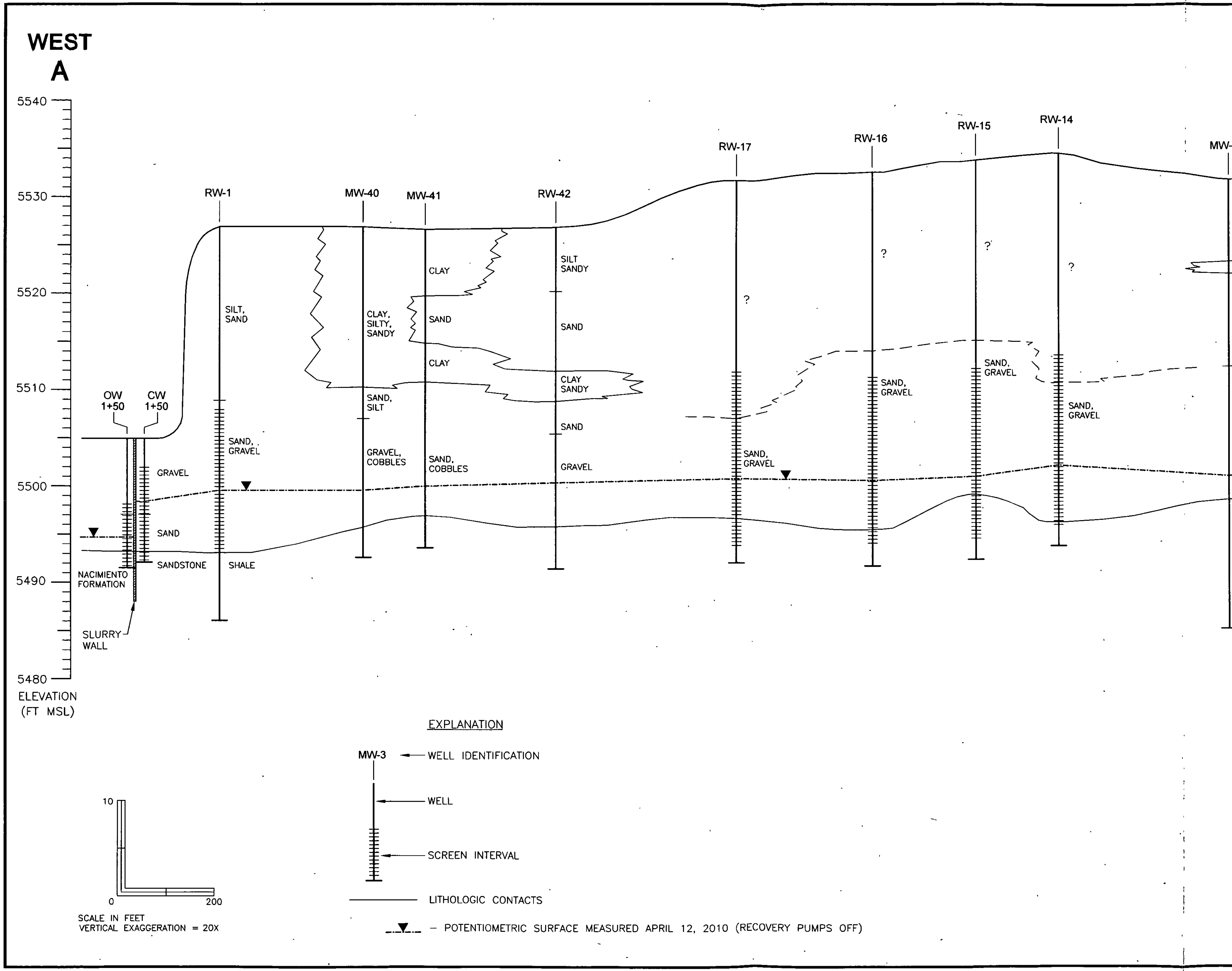
B - BENZENE
T - TOLUENE
E - ETHYLBENZENE
X - TOTAL XYLENES
TVOC - TOTAL VOLATILE ORGANIC CONTENT

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.. Western Refining | DATE: 05/15/11 | FILE: WestRef-B105

FIGURE 3
SUBSURFACE SOIL VAPOR CONCENTRATIONS
BLOOMFIELD REFINERY

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

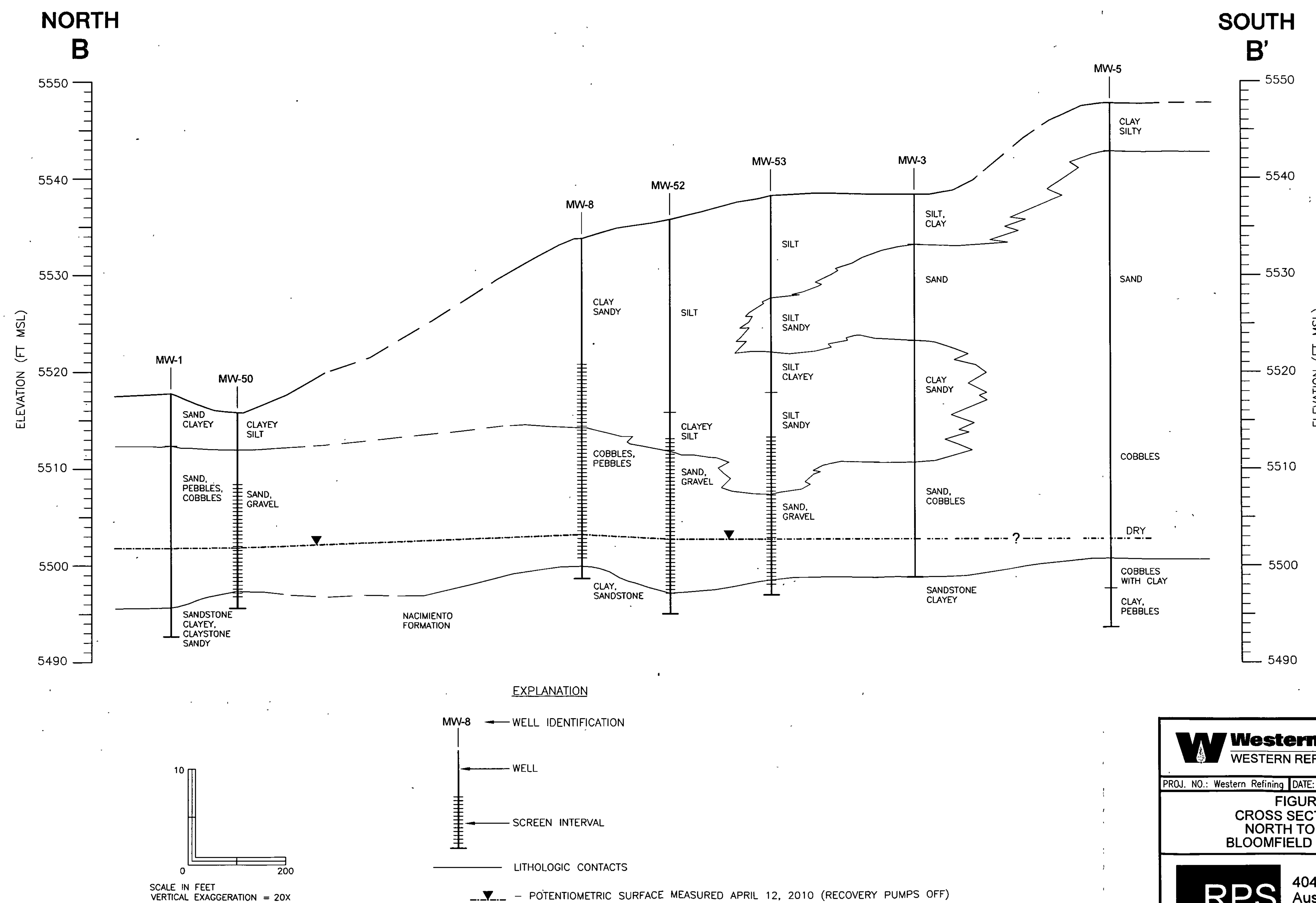


Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/15/11 | FILE: WestRef-B93

FIGURE 4
CROSS SECTION A-A'
WEST TO EAST
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

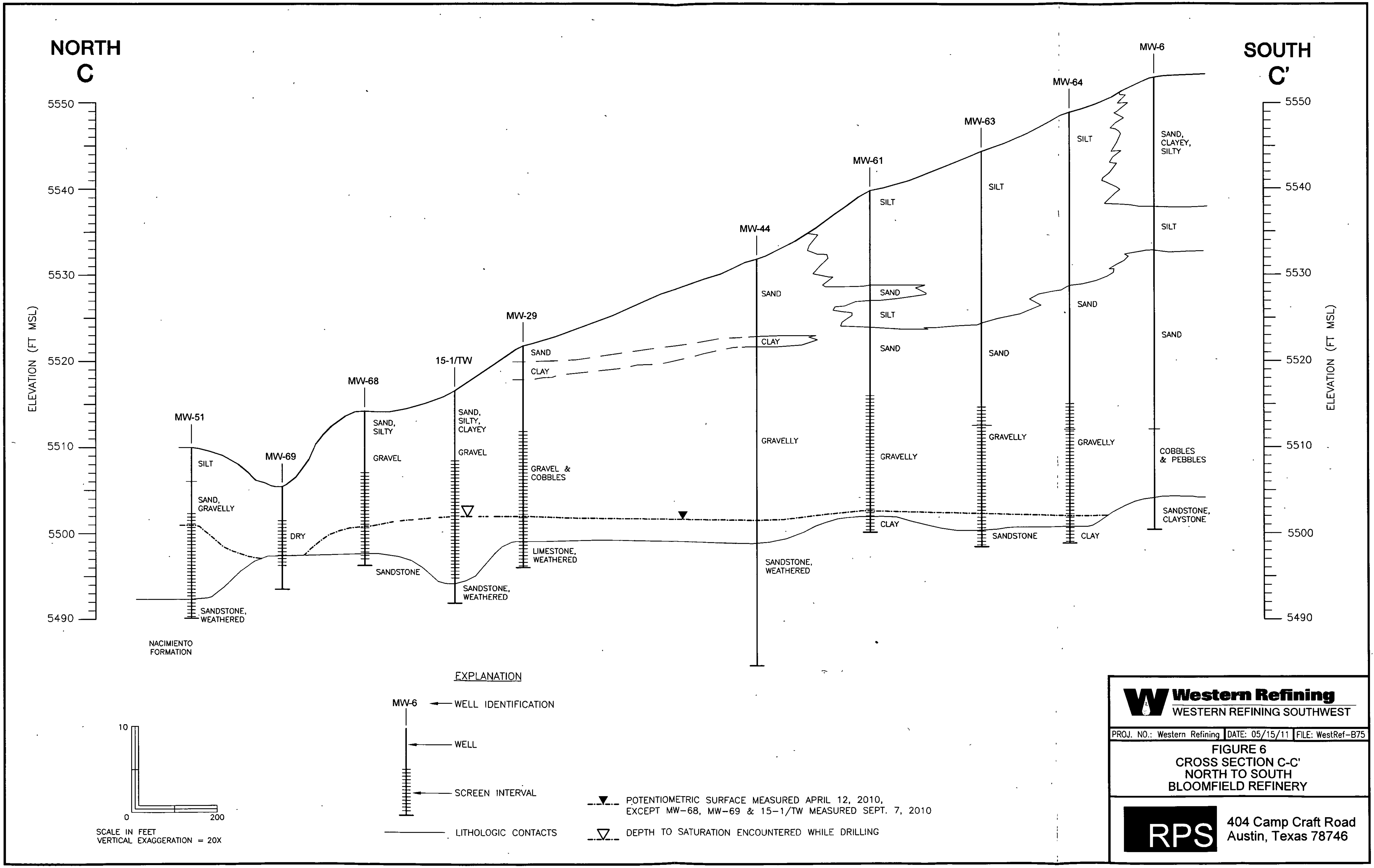


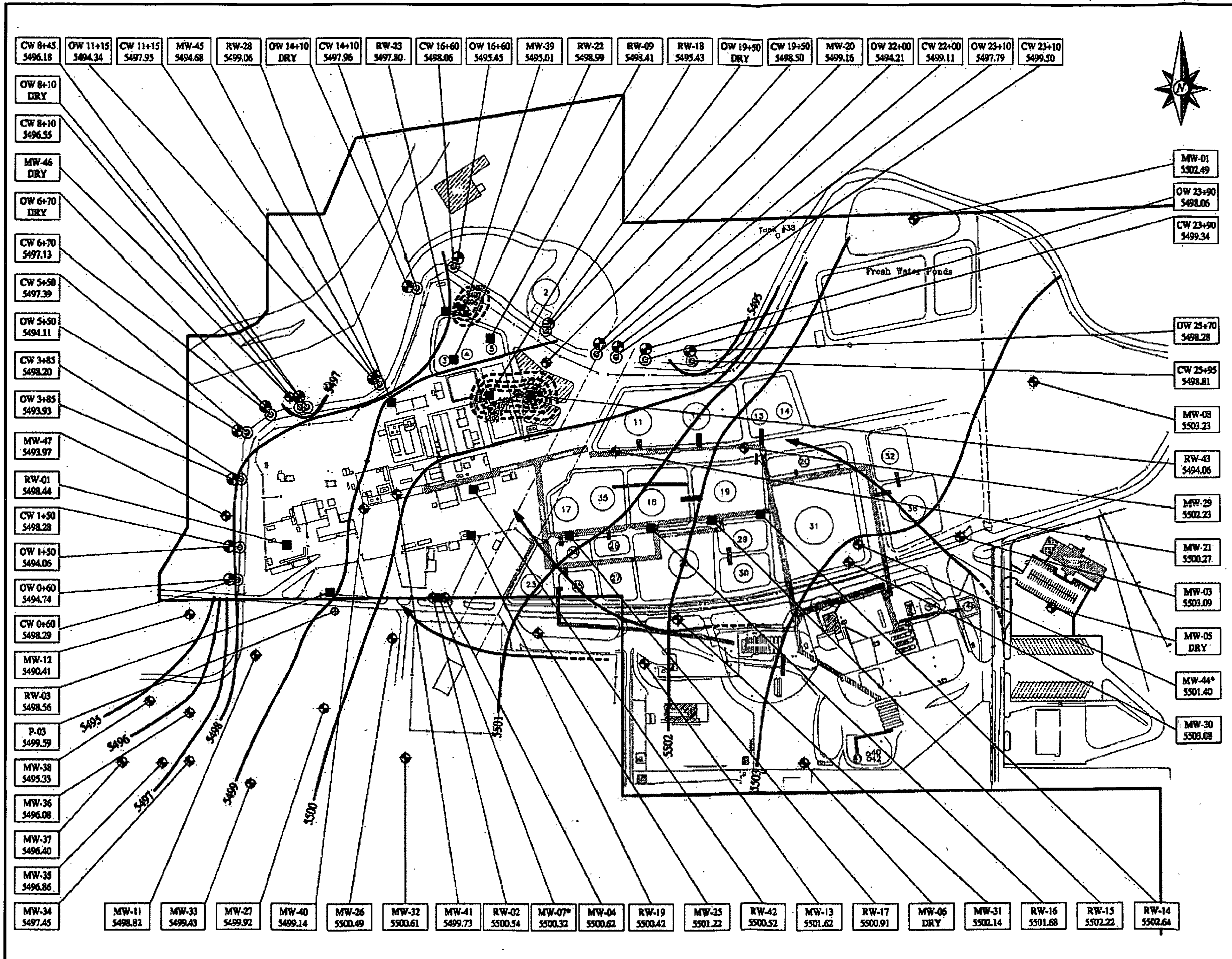
Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 05/15/11	FILE: WestRef-B94

FIGURE 5
CROSS SECTION B-B'
NORTH TO SOUTH
BLOOMFIELD REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746


NORTH
C
SOUTH
C'
ELEVATION (FT MSL)
5550
5540
5530
5520
5510
5500
5490
MW-51
MW-69
MW-68
15-1/TW
MW-29
MW-44
MW-61
MW-63
MW-64
MW-6
SILT
SAND, GRAVELLY
SANDSTONE, WEATHERED
DRY
SAND, SILTY
GRAVEL
SANDSTONE
SAND, SILTY, CLAYEY
GRAVEL
SANDSTONE, WEATHERED
SAND
CLAY
GRAVEL & COBBLES
LIMESTONE, WEATHERED
SAND
CLAY
GRAVELLY
SANDSTONE, WEATHERED
SILT
SAND
SILT
SAND
GRAVELLY
CLAY
SILT
SAND
GRAVELLY
SANDSTONE
SILT
SAND
GRAVELLY
CLAY
SAND, CLAYEY, SILTY
SILT
SAND
COBBLES & PEBBLES
SANDSTONE, CLAYSTONE
NACIMIENTO FORMATION
10
0
200
SCALE IN FEET
VERTICAL EXAGGERATION = 20X
EXPLANATION
MW-6 WELL IDENTIFICATION
WELL
SCREEN INTERVAL
LITHOLOGIC CONTACTS
POTENTIOMETRIC SURFACE MEASURED APRIL 12, 2010, EXCEPT MW-68, MW-69 & 15-1/TW MEASURED SEPT. 7, 2010
DEPTH TO SATURATION ENCOUNTERED WHILE DRILLING
Western Refining
WESTERN REFINING SOUTHWEST
PROJ. NO.: Western Refining
DATE: 05/15/11
FILE: WestRef-B75
FIGURE 6
CROSS SECTION C-C'
NORTH TO SOUTH
BLOOMFIELD REFINERY
RPS
404 Camp Craft Road
Austin, Texas 78746



Map Source: Western Refining Southwest, Inc. 2010, Fig 17.

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

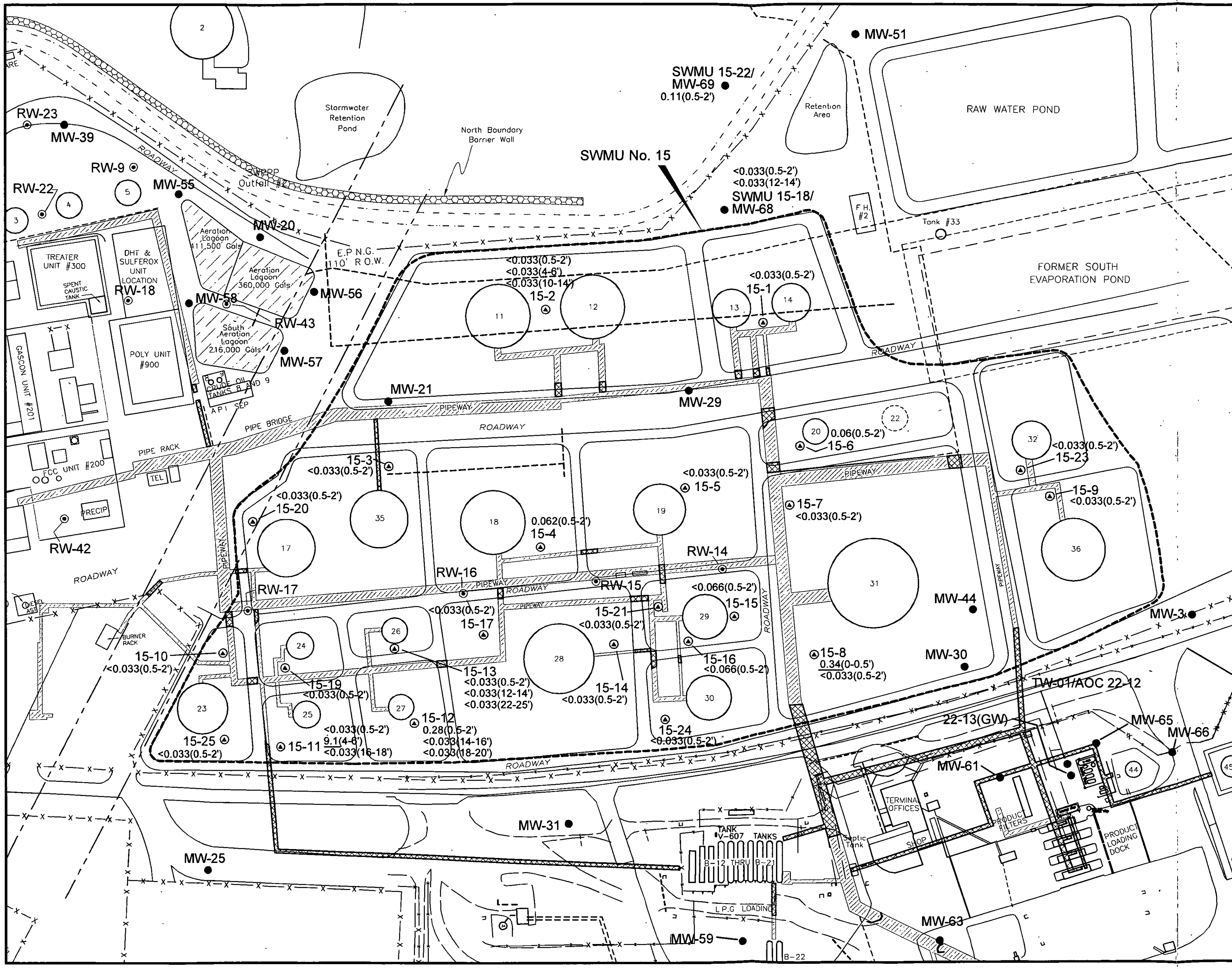
Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE. 05/15/11 | FILE: WestRef-B76

FIGURE 7

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



0 150
SCALE IN FEET

LEGEND

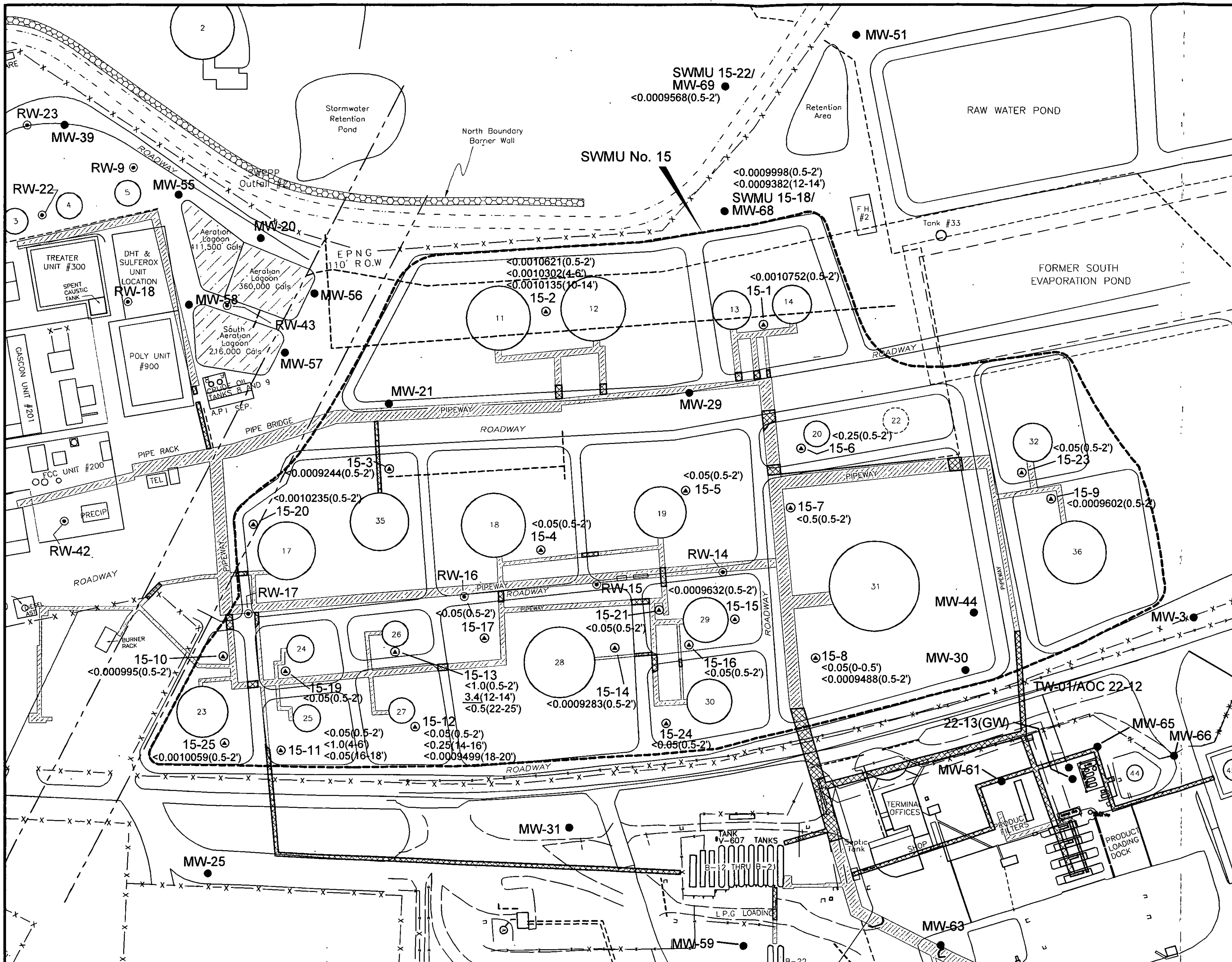
MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◎	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
0.062(0.5-2')	MERCURY CONCENTRATION, mg/kg (SAMPLE DEPTH, FT.)
0.33	CONCENTRATION EXCEEDS SCREENING LEVEL
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/11/11 | FILE: WestRefB102

FIGURE 8
GROUP No. 5 - SWMU No. 15
MERCURY SOILS MAP
BLOOMFIELD REFINERY

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



0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.05(0.5-2')	1,1,2-TRICHLOROETHANE CONCENTRATION, mg/kg (SAMPLE DEPTH, FT.)
0.00758	CONCENTRATION EXCEEDS SCREENING LEVEL
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/11/11 | FILE:WestRefB102

FIGURE 9
GROUP No. 5 - SWMU No. 15
1,1,2-TRICHLOROETHANE SOILS MAP
BLOOMFIELD REFINERY

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

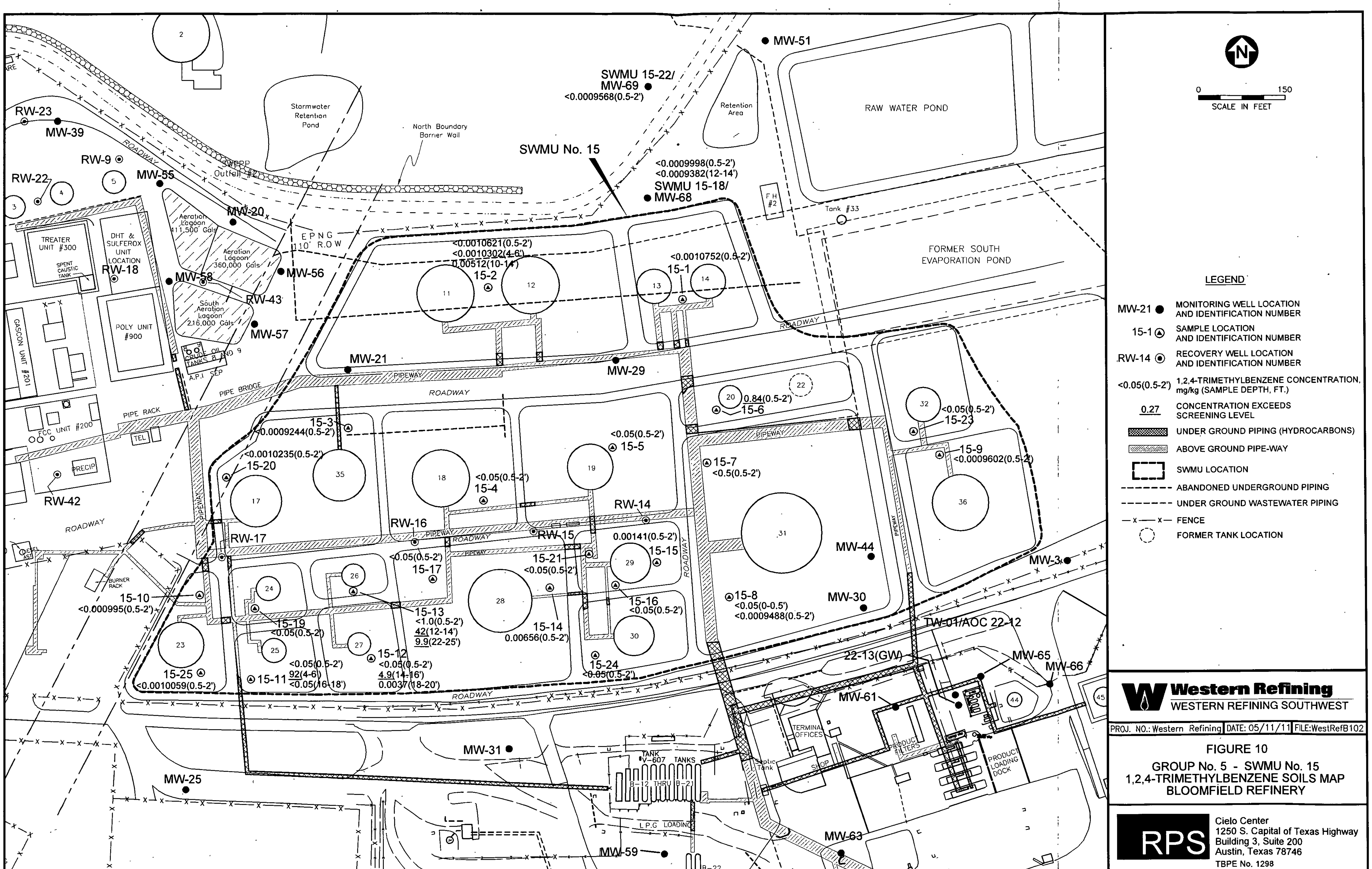
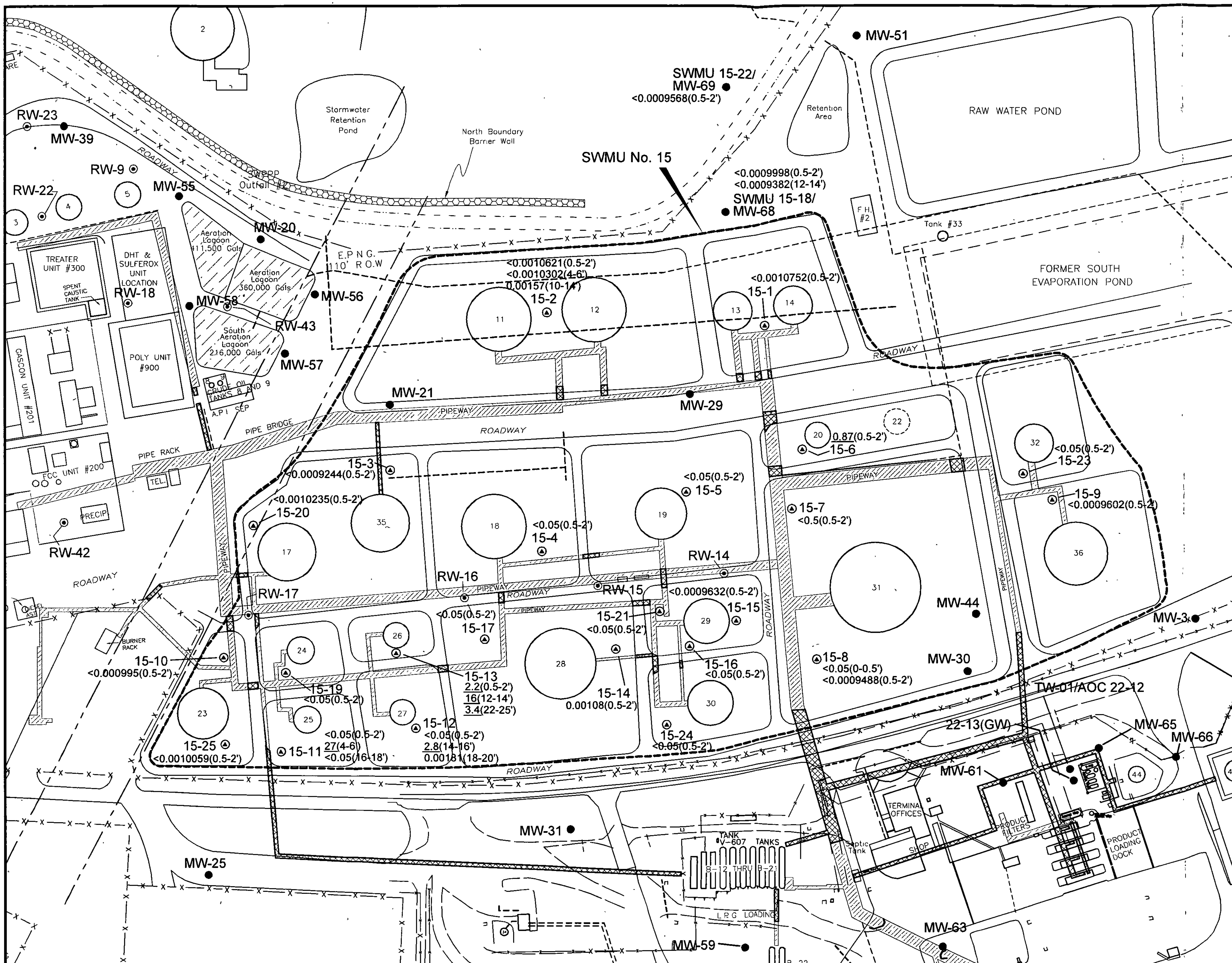


FIGURE 10
GROUP No. 5 - SWMU No. 15
1,2,4-TRIMETHYLBENZENE SOILS MAP
BLOOMFIELD REFINERY



0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◎	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.05(0.5-2')	1,3,5-TRIMETHYLBENZENE CONCENTRATION, mg/kg (SAMPLE DEPTH, FT.)
0.225	CONCENTRATION EXCEEDS SCREENING LEVEL
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

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FIGURE 11
GROUP No. 5 - SWMU No. 15
1,3,5-TRIMETHYLBENZENE SOILS MAP
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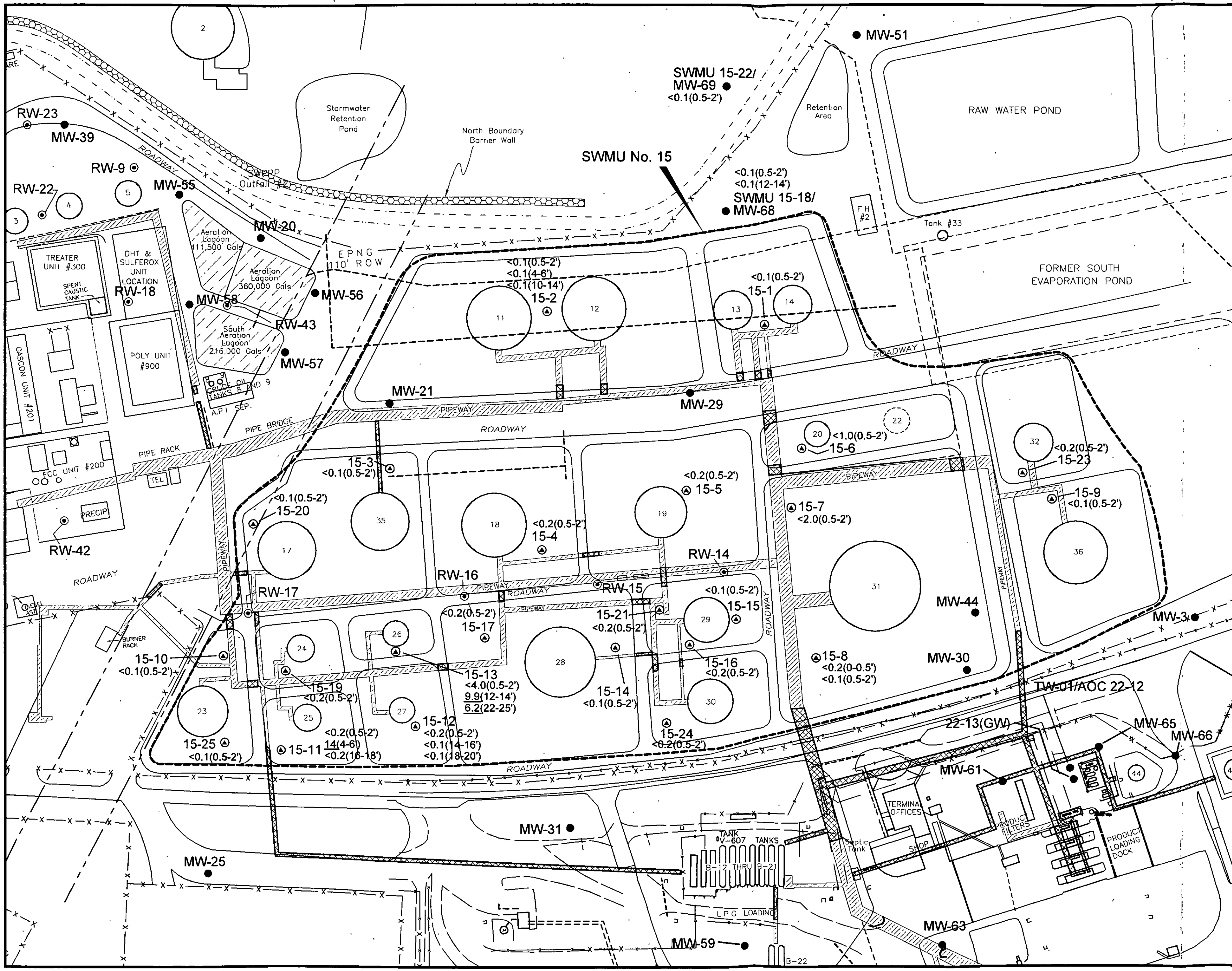

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.1(0.5-2')	1-METHYLNAPHTHALENE CONCENTRATION, mg/kg (SAMPLE DEPTH, FT.)
0.169	CONCENTRATION EXCEEDS SCREENING LEVEL
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 12

GROUP No. 5 - SWMU No. 15
1-METHYLNAPHTHALENE SOILS MAP
BLOOMFIELD REFINERY

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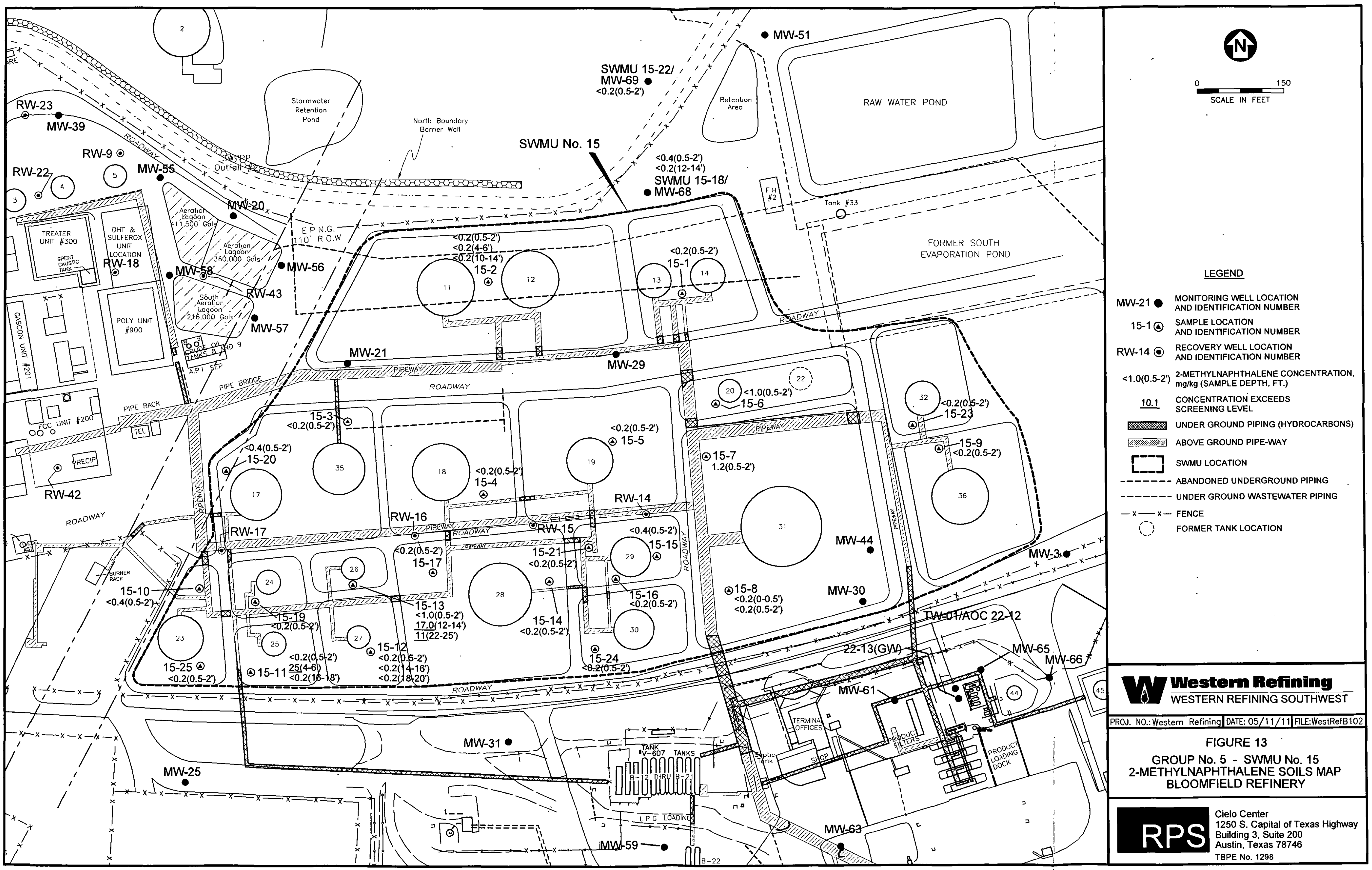

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FIGURE 13
GROUP No. 5 - SWMU No. 15
2-METHYLNAPHTHALENE SOILS MAP
BLOOMFIELD REFINERY

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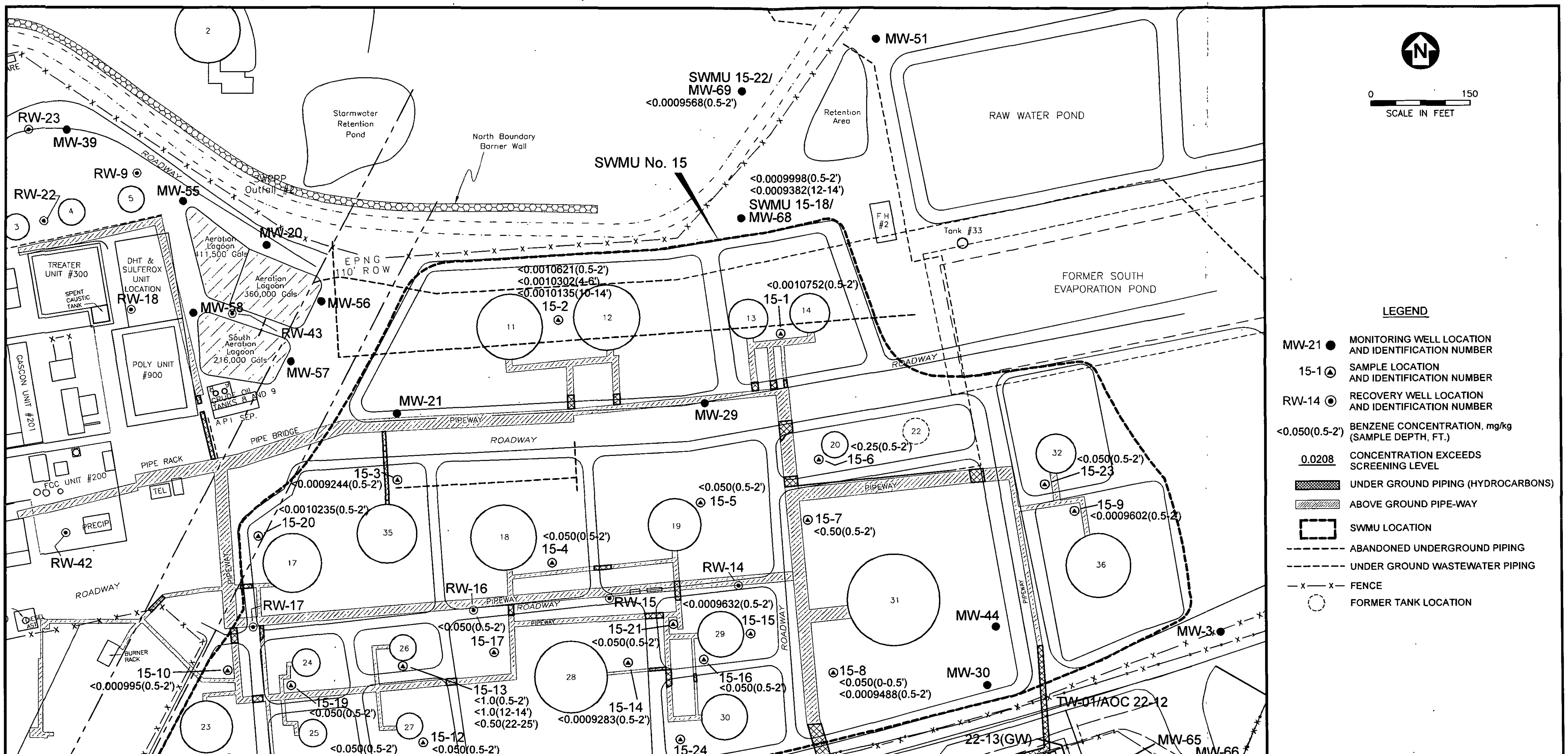

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FIGURE 14
GROUP No. 5 - SWMU No. 15
BENZENE SOILS MAP
BLOOMFIELD REFINERY

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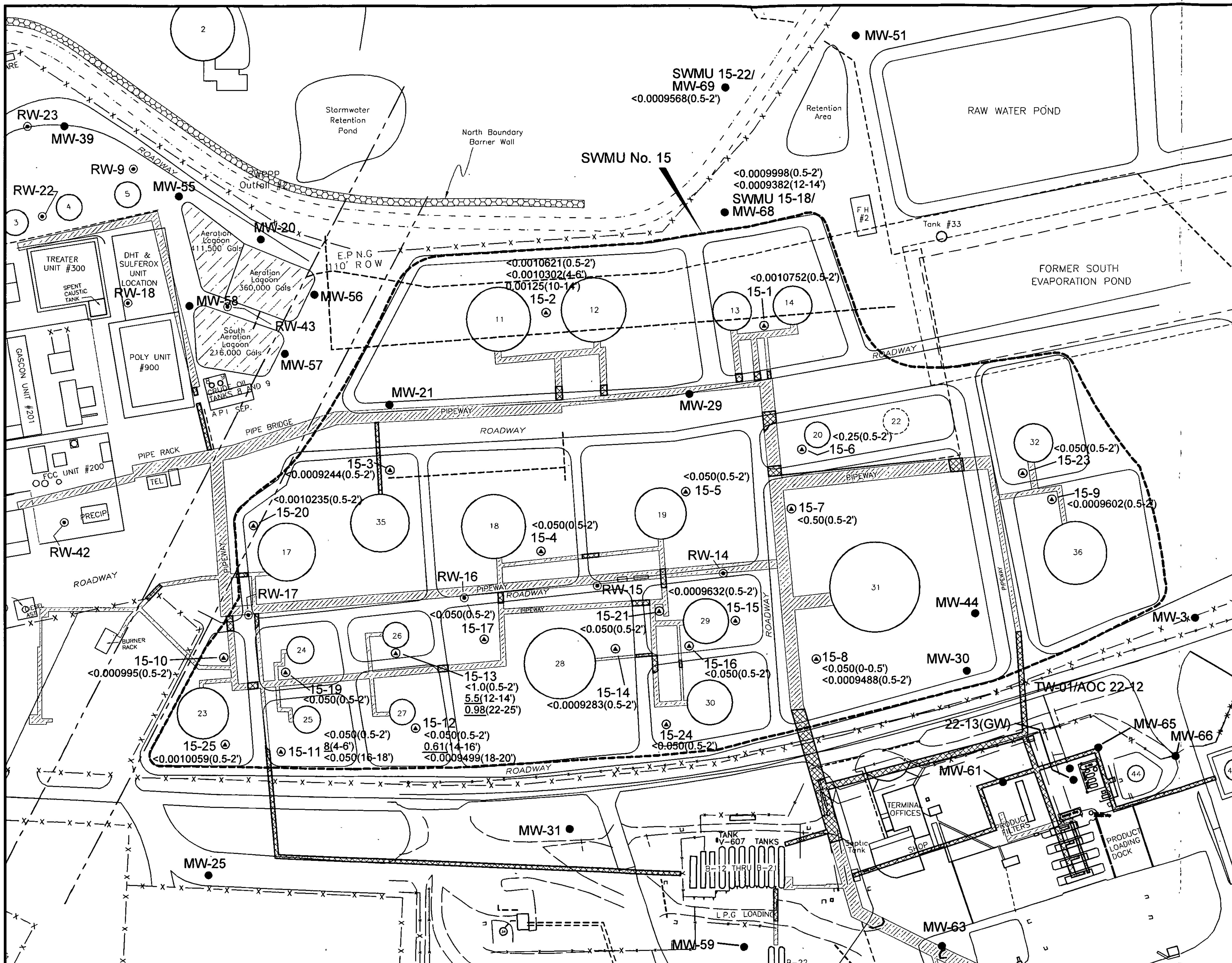

N

0 150
SCALE IN FEET

LEGEND

- MW-21 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- 15-1 ◉ SAMPLE LOCATION AND IDENTIFICATION NUMBER
- RW-14 ◉ RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- <0.050(0.5-2') ETHYLBENZENE CONCENTRATION, mg/kg (SAMPLE DEPTH, FT.)
- 0.164 CONCENTRATION EXCEEDS SCREENING LEVEL
- UNDER GROUND PIPING (HYDROCARBONS)
- ABOVE GROUND PIPE-WAY
- SWMU LOCATION
- ABANDONED UNDERGROUND PIPING
- UNDER GROUND WASTEWATER PIPING
- —x—x— FENCE
- FORMER TANK LOCATION

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FIGURE 15

GROUP No. 5 - SWMU No. 15
ETHYLBENZENE SOILS MAP
BLOOMFIELD REFINERY

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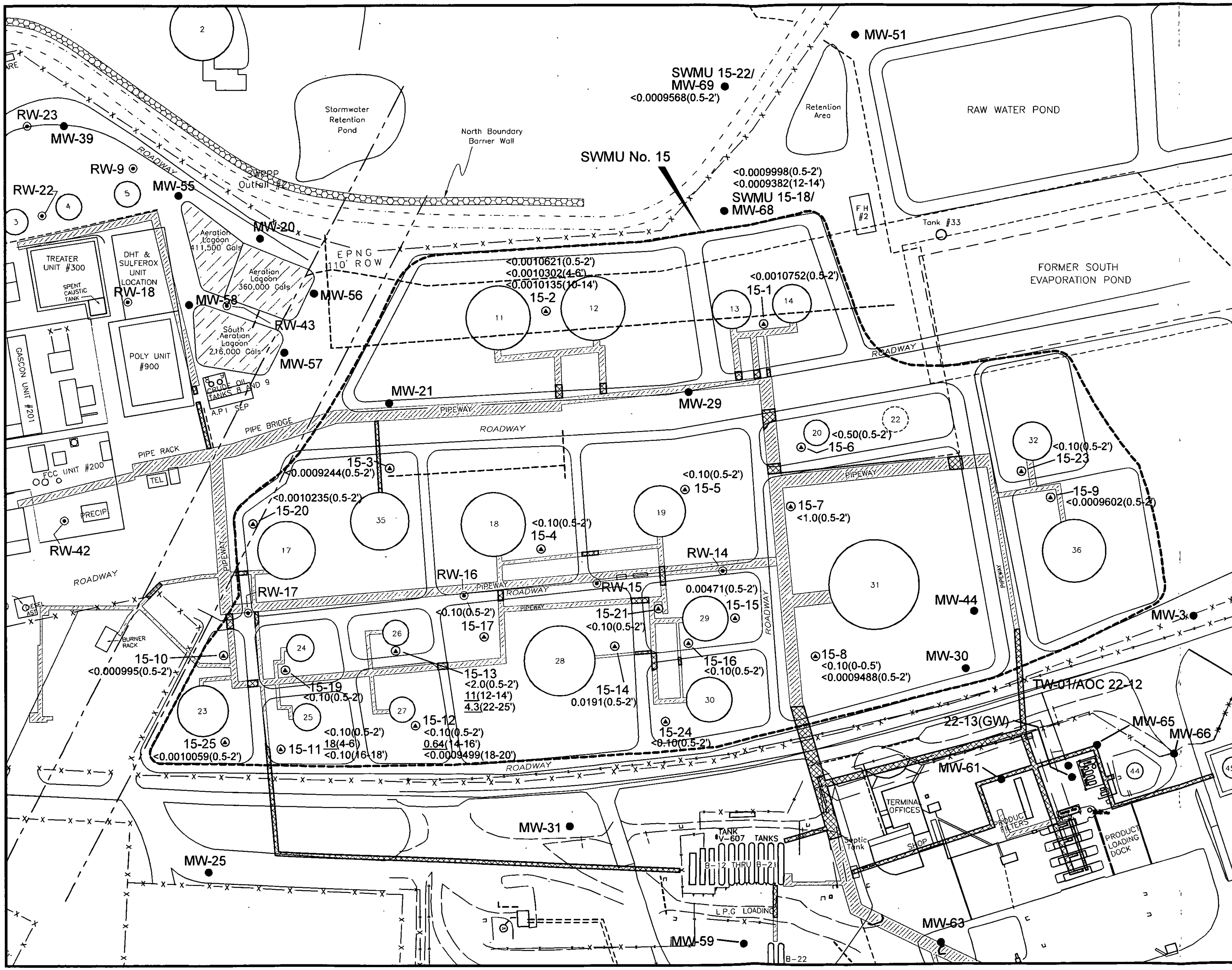

N

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◎	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.10(0.5-2')	NAPHTHALENE CONCENTRATION, mg/kg (SAMPLE DEPTH, FT.)
0.0472	CONCENTRATION EXCEEDS SCREENING LEVEL
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 16
GROUP No. 5 - SWMU No. 15
NAPHTHALENE SOILS MAP
BLOOMFIELD REFINERY

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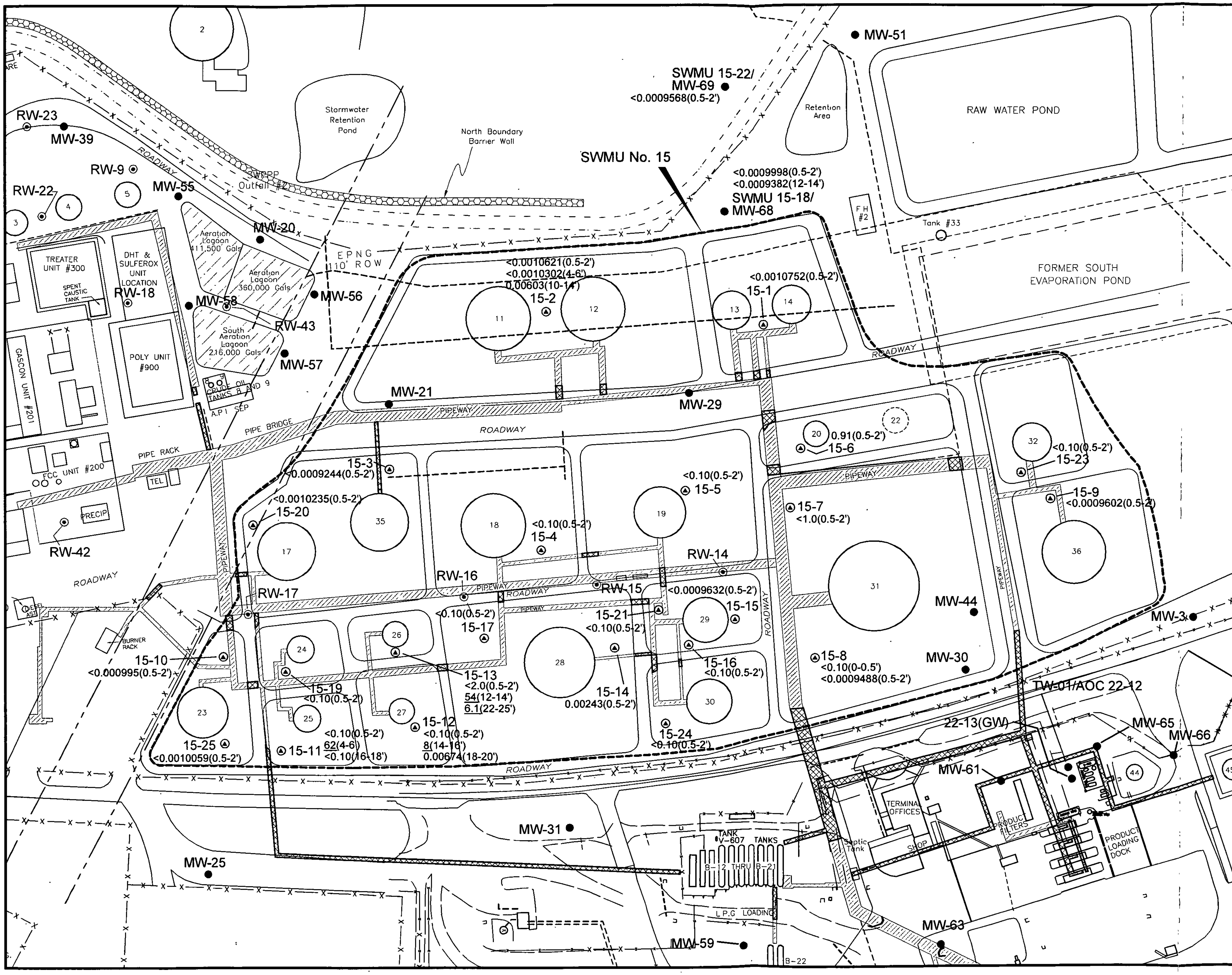

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◬	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ⊙	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.10(0.5-2')	XYLENES CONCENTRATION, mg/kg (SAMPLE DEPTH, FT.)
1.98	CONCENTRATION EXCEEDS SCREENING LEVEL
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 17
GROUP No. 5 - SWMU No. 15
XYLENES SOILS MAP
BLOOMFIELD REFINERY

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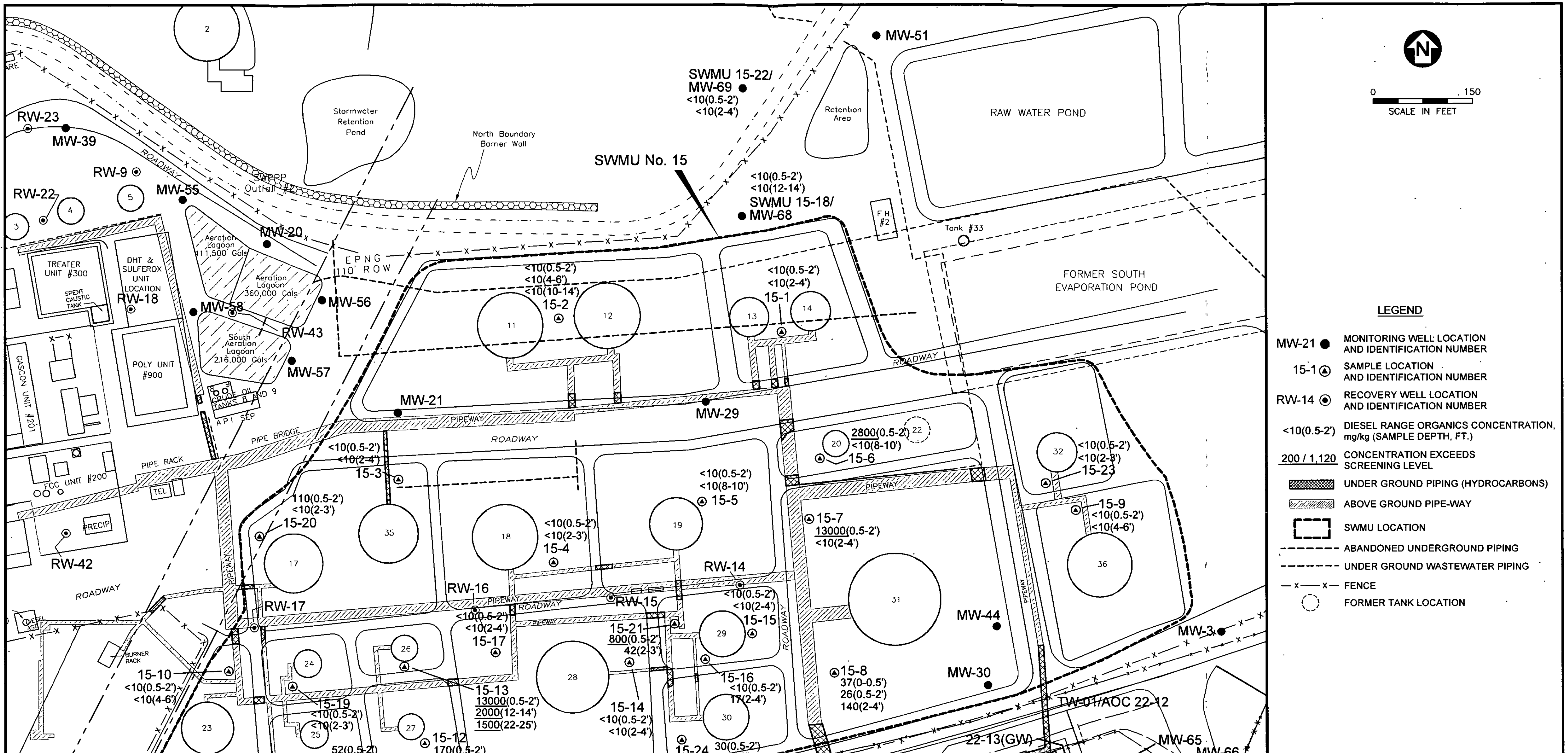

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FIGURE 18
GROUP No. 5 - SWMU No. 15
DIESEL RANGE ORGANICS SOILS MAP
BLOOMFIELD REFINERY

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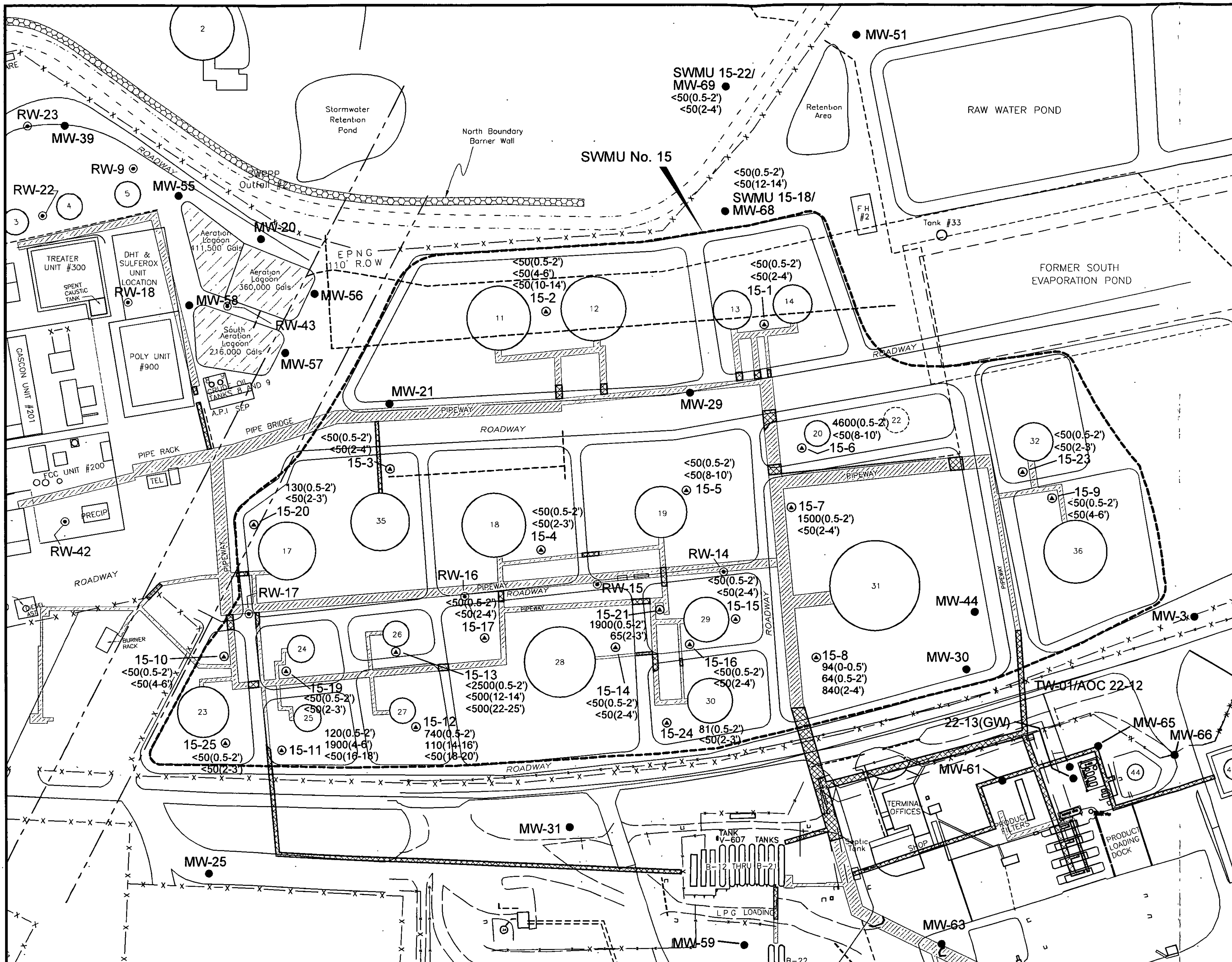

LEGEND

- MW-21 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- 15-1 ◬ SAMPLE LOCATION AND IDENTIFICATION NUMBER
- RW-14 ◉ RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- <50(0.5-2') MOTOR OIL RANGE ORGANICS CONCENTRATION, mg/kg (SAMPLE DEPTH, FT.)
- 5,000 CONCENTRATION EXCEEDS SCREENING LEVEL
- UNDER GROUND PIPING (HYDROCARBONS)
- ABOVE GROUND PIPE-WAY
- SWMU LOCATION
- ABANDONED UNDERGROUND PIPING
- UNDER GROUND WASTEWATER PIPING
- —x—x— FENCE
- FORMER TANK LOCATION

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FIGURE 19
GROUP No. 5 - SWMU No. 15
MOTOR OIL RANGE ORGANICS SOILS MAP
BLOOMFIELD REFINERY

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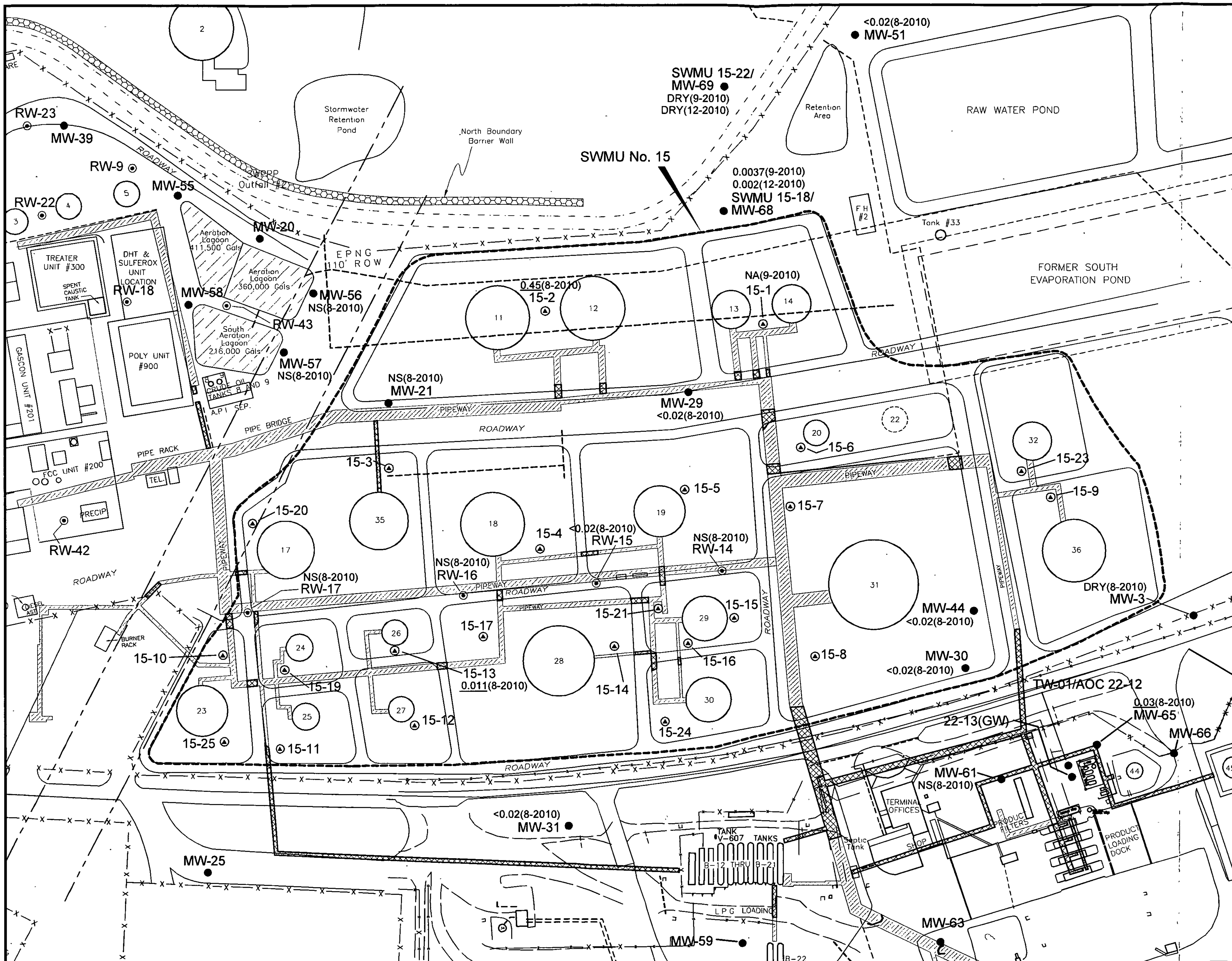

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◬	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
0.002	ARSENIC CONCENTRATION, mg/l (SAMPLE DATE)
0.01	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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PROJ. NO.: Western Refining | DATE: 05/14/11 | FILE: WestRefB103

FIGURE 20
GROUP No. 5 - SWMU No. 15
ARSENIC
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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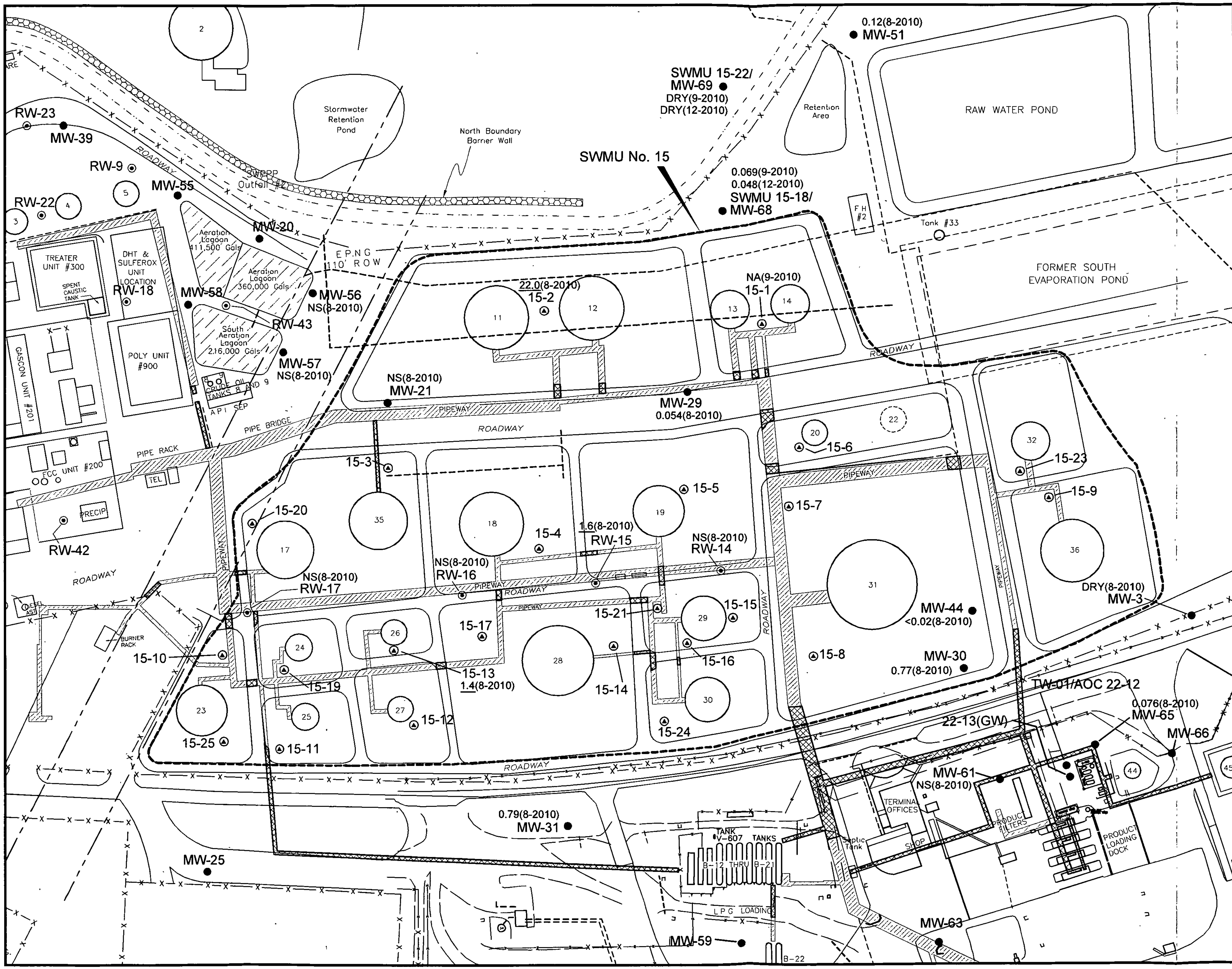

N

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
1.4	BARIUM CONCENTRATION, mg/l (SAMPLE DATE)
1.0	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 21
GROUP No. 5 - SWMU No. 15
BARIUM
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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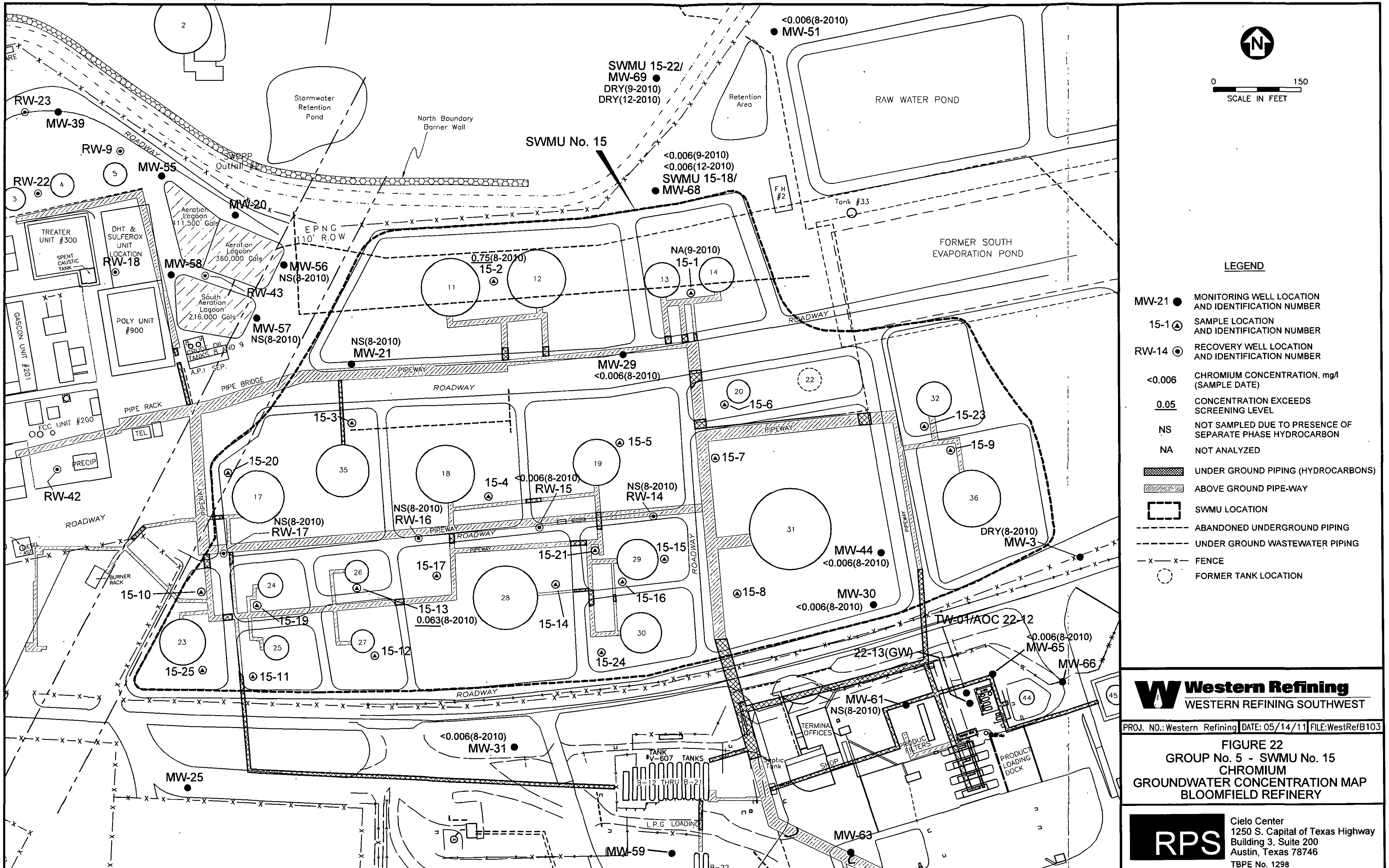
SWMU No. 15
SWMU 15-22/
MW-69
DRY(9-2010)
DRY(12-2010)
<0.006(8-2010)
MW-51
<0.006(9-2010)
<0.006(12-2010)
SWMU 15-18/
MW-68
RAW WATER POND
FORMER SOUTH EVAPORATION POND
Stormwater Retention Pond
North Boundary Barrier Wall
Retention Area
Tank #33
0.75(8-2010)
15-2
NA(9-2010)
15-1
NS(8-2010)
MW-21
MW-29
<0.006(8-2010)
MW-56
NS(8-2010)
MW-57
NS(8-2010)
MW-58
RW-43
MW-20
MW-55
RW-9
RW-23
MW-39
RW-22
RW-18
RW-42
TREATER UNIT #300
DHT & SULFEROX UNIT LOCATION
POLY UNIT #900
GASCON UNIT #201
FCC UNIT #200
South Aeration Lagoon 216,000 Gals
Aeration Lagoon 360,000 Gals
Aeration Lagoon 11,500 Gals
EPNG 110' R.O.W
ROADWAY
PIPEWAY
PIPE BRIDGE
PIPE RACK
15-3
15-4
15-5
15-6
15-7
15-8
15-9
15-10
15-11
15-12
15-13
0.063(8-2010)
15-14
15-15
15-16
15-17
15-19
15-20
15-21
15-23
15-24
15-25
<0.006(8-2010)
RW-15
NS(8-2010)
RW-14
NS(8-2010)
RW-16
NS(8-2010)
RW-17
MW-44
<0.006(8-2010)
MW-30
<0.006(8-2010)
DRY(8-2010)
MW-3
TW-01/AOC 22-12
<0.006(8-2010)
MW-65
MW-66
22-13(GW)
MW-61
NS(8-2010)
<0.006(8-2010)
MW-31
MW-25
MW-59
MW-63
TERMINAL OFFICES
PRODUCT LOADING DOCK
TANK V-607
TANKS B-12 THRU B-21
L.P.G. LOADING
0 150
SCALE IN FEET
LEGEND
MW-21 MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.006 CHROMIUM CONCENTRATION, mg/l (SAMPLE DATE)
0.05 CONCENTRATION EXCEEDS SCREENING LEVEL
NS NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA NOT ANALYZED
UNDER GROUND PIPING (HYDROCARBONS)
ABOVE GROUND PIPE-WAY
SWMU LOCATION
ABANDONED UNDERGROUND PIPING
UNDER GROUND WASTEWATER PIPING
FENCE
FORMER TANK LOCATION
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FIGURE 22
GROUP No. 5 - SWMU No. 15
CHROMIUM
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY
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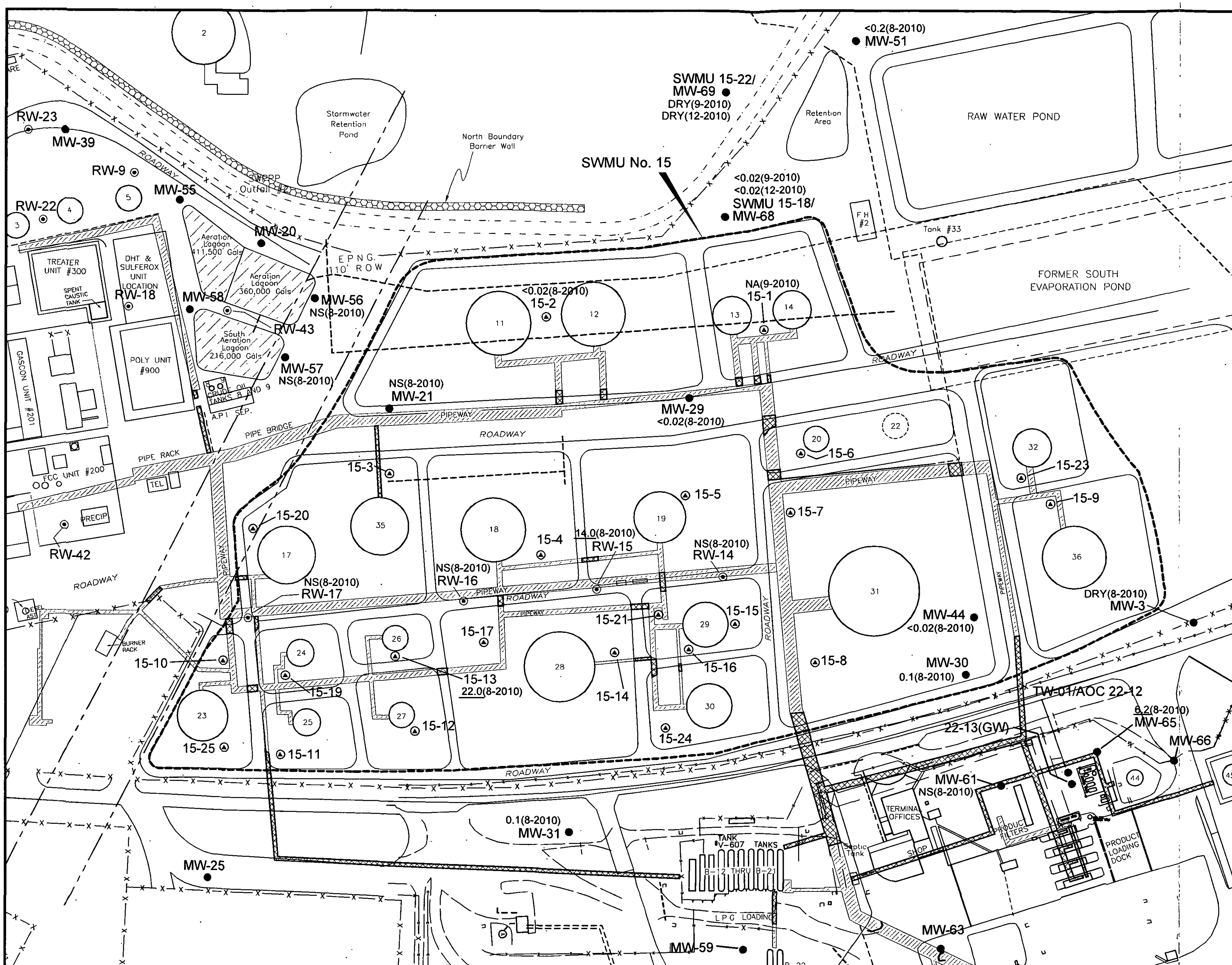

N

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◎	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.02	DISSOLVED IRON CONCENTRATION, mg/l (SAMPLE DATE)
1.0	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 23
GROUP No. 5 - SWMU No. 15
DISSOLVED IRON
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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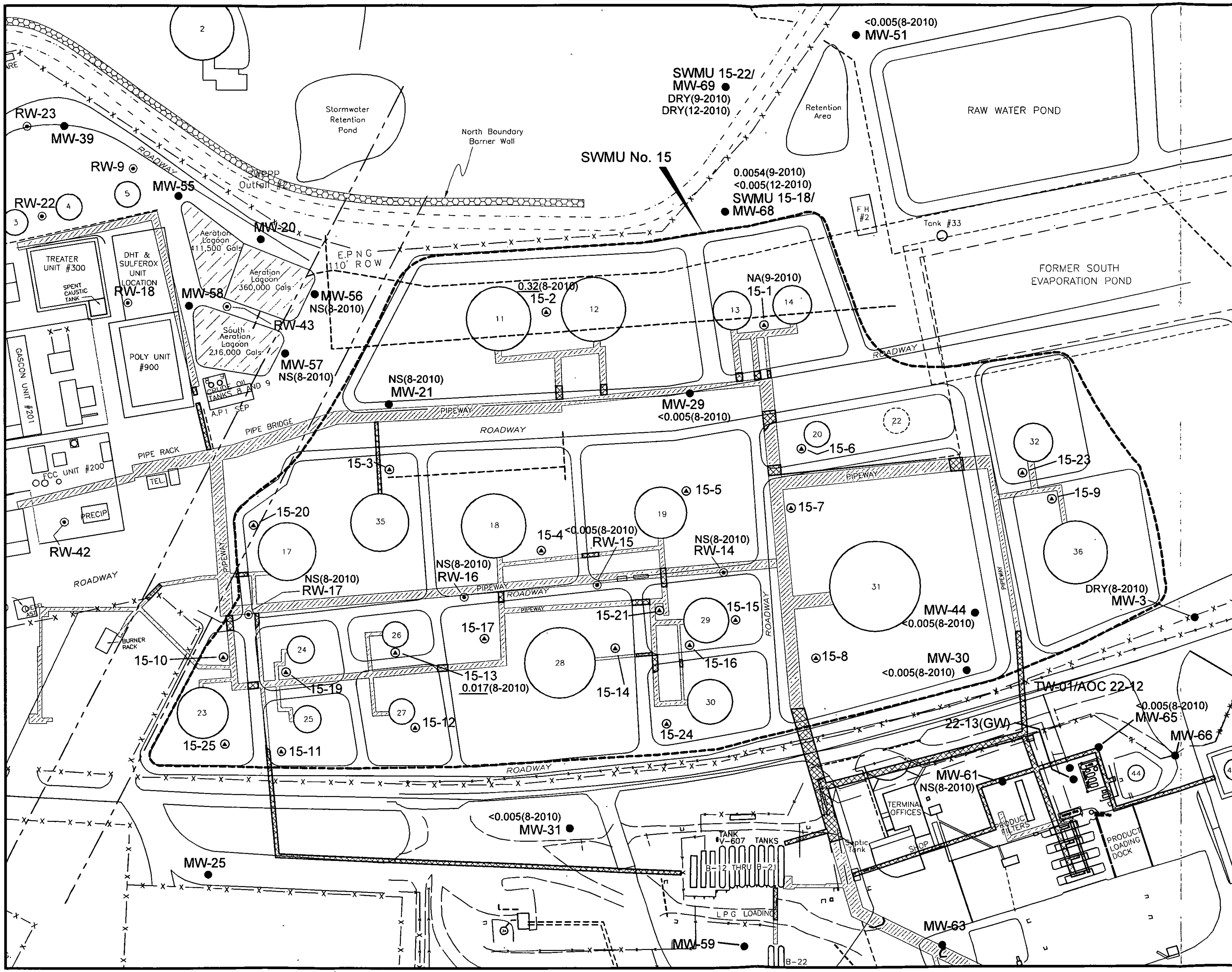

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◬	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
0.0054	LEAD CONCENTRATION, mg/l (SAMPLE DATE)
<u>0.015</u>	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 24
GROUP No. 5 - SWMU No. 15
LEAD
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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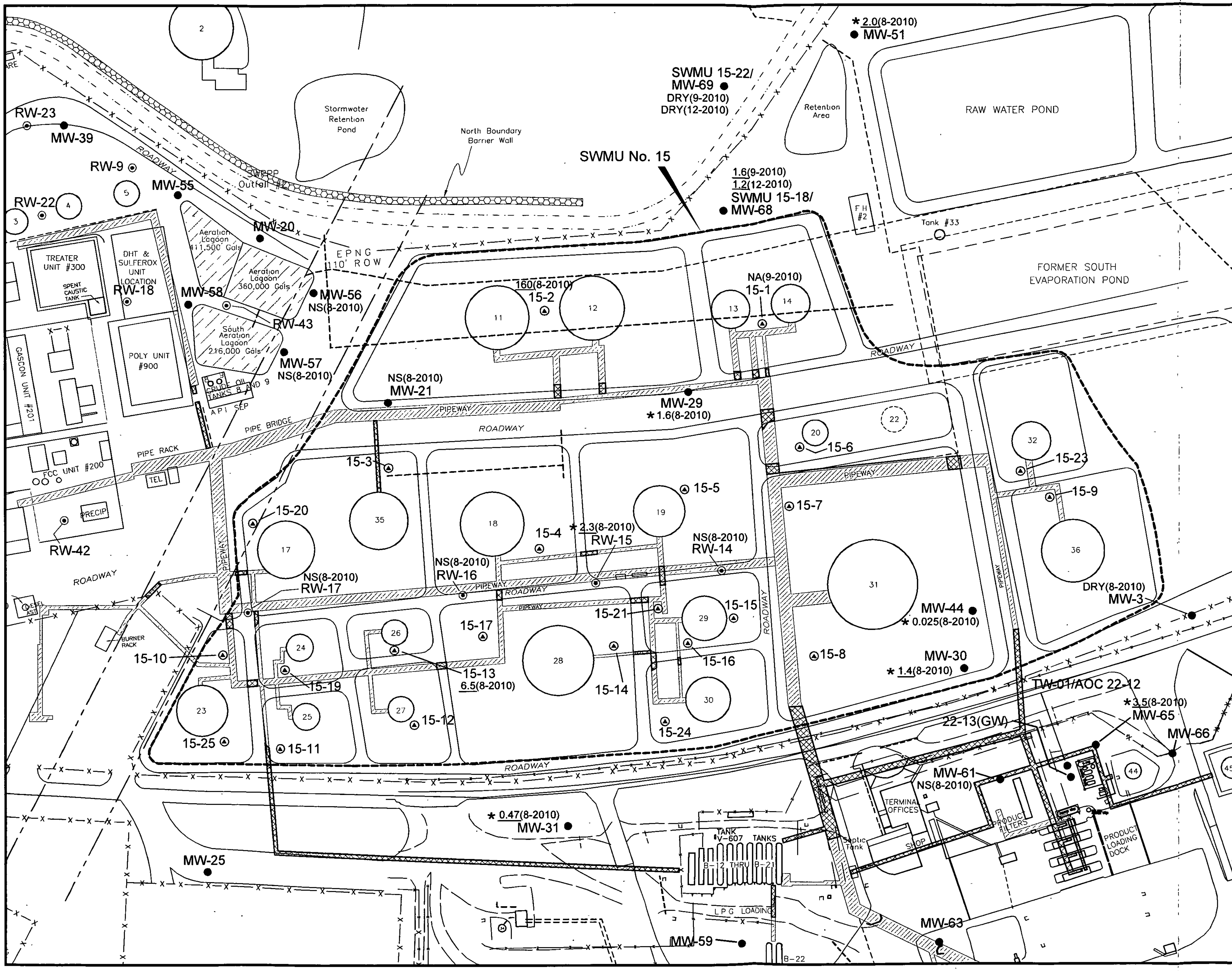

N

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
2.0	MANGANESE CONCENTRATION, mg/l (SAMPLE DATE)
0.2	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
*	DISSOLVED ANALYSIS
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 25
GROUP No. 5 - SWMU No. 15
MANGANESE
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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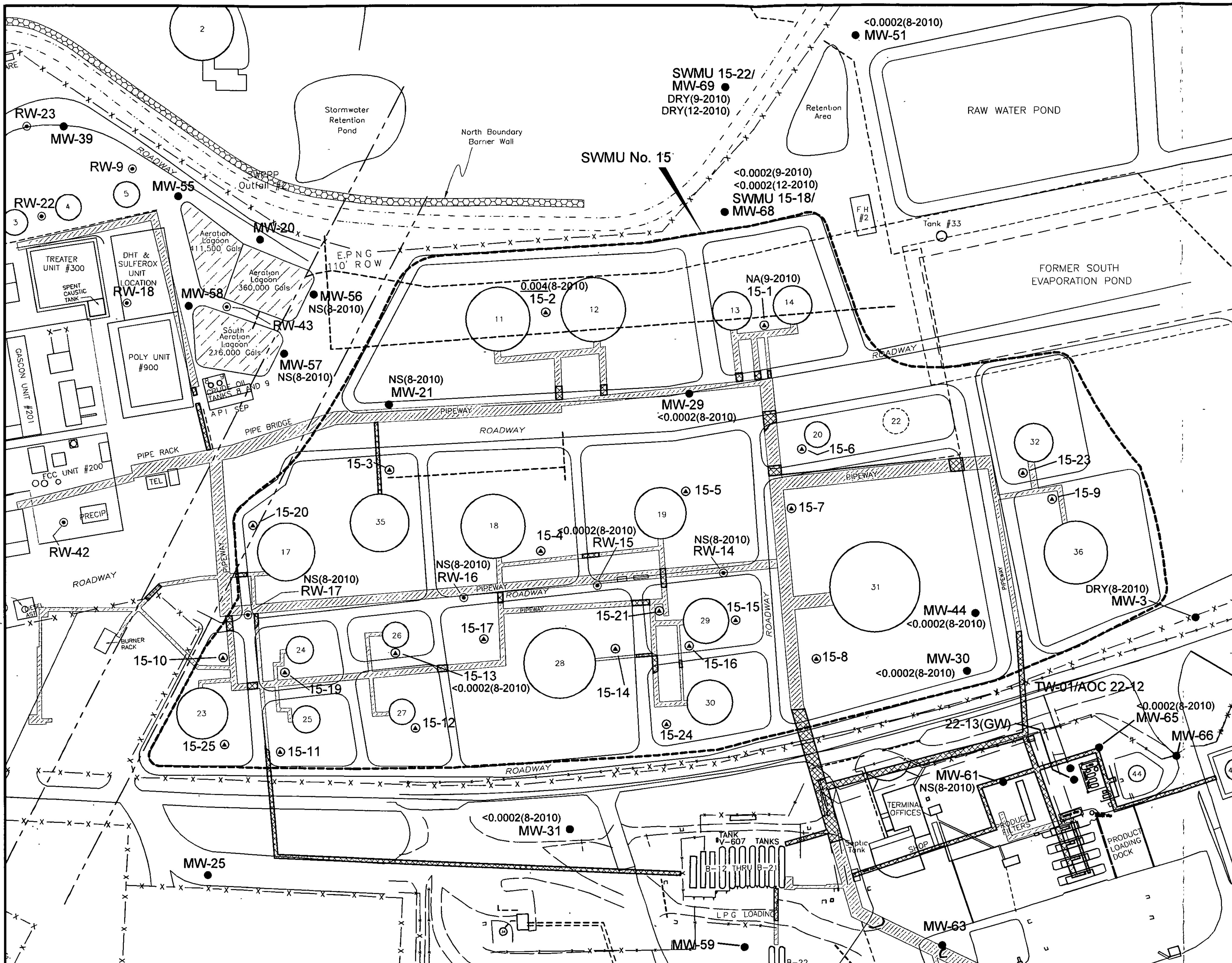

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◬	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.0002	MERCURY CONCENTRATION, mg/l (SAMPLE DATE)
0.002	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 26
GROUP No. 5 - SWMU No. 15
MERCURY
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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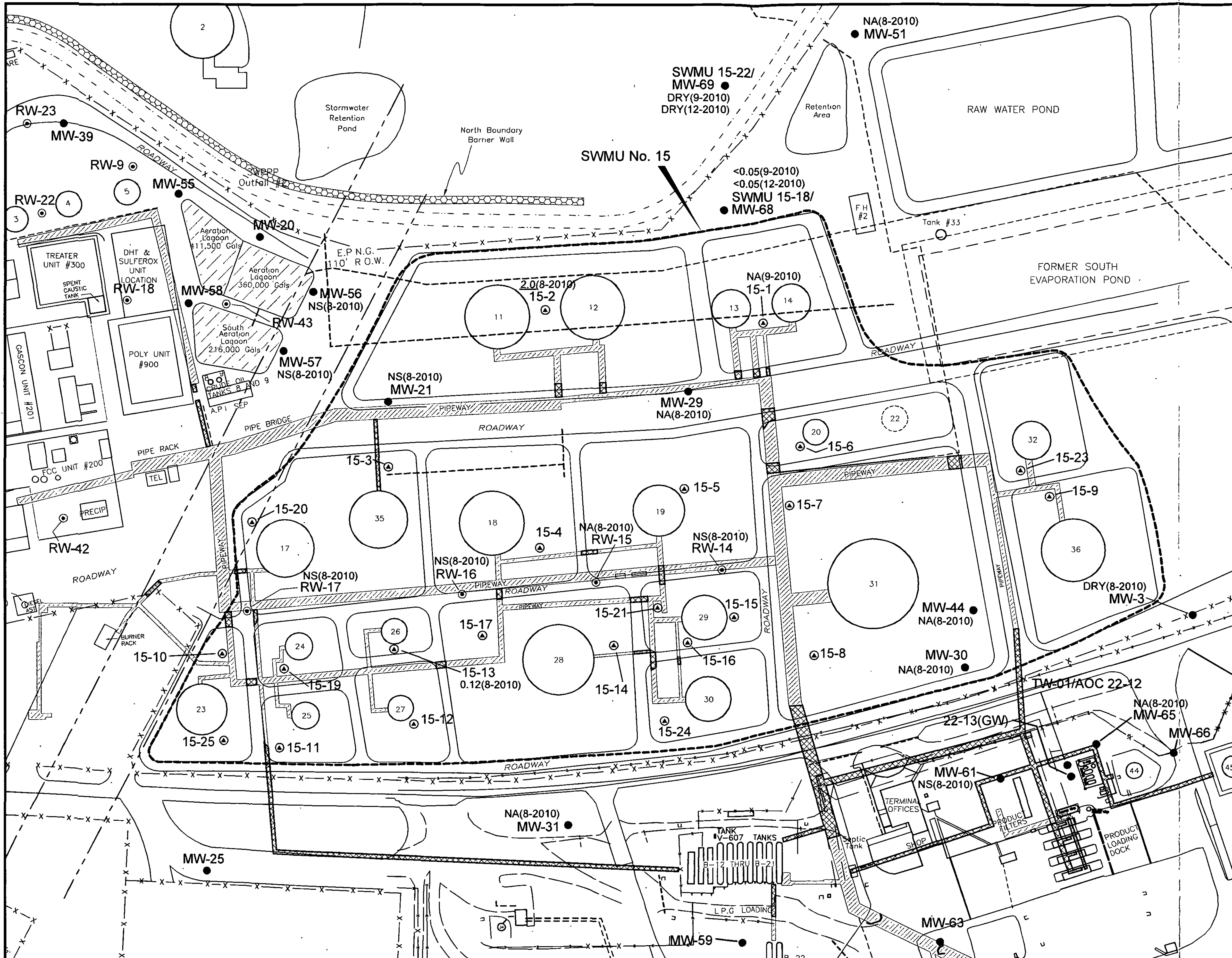

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
0.12	VANADIUM CONCENTRATION, mg/l (SAMPLE DATE)
0.183	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

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FIGURE 27
GROUP No. 5 - SWMU No. 15
VANADIUM
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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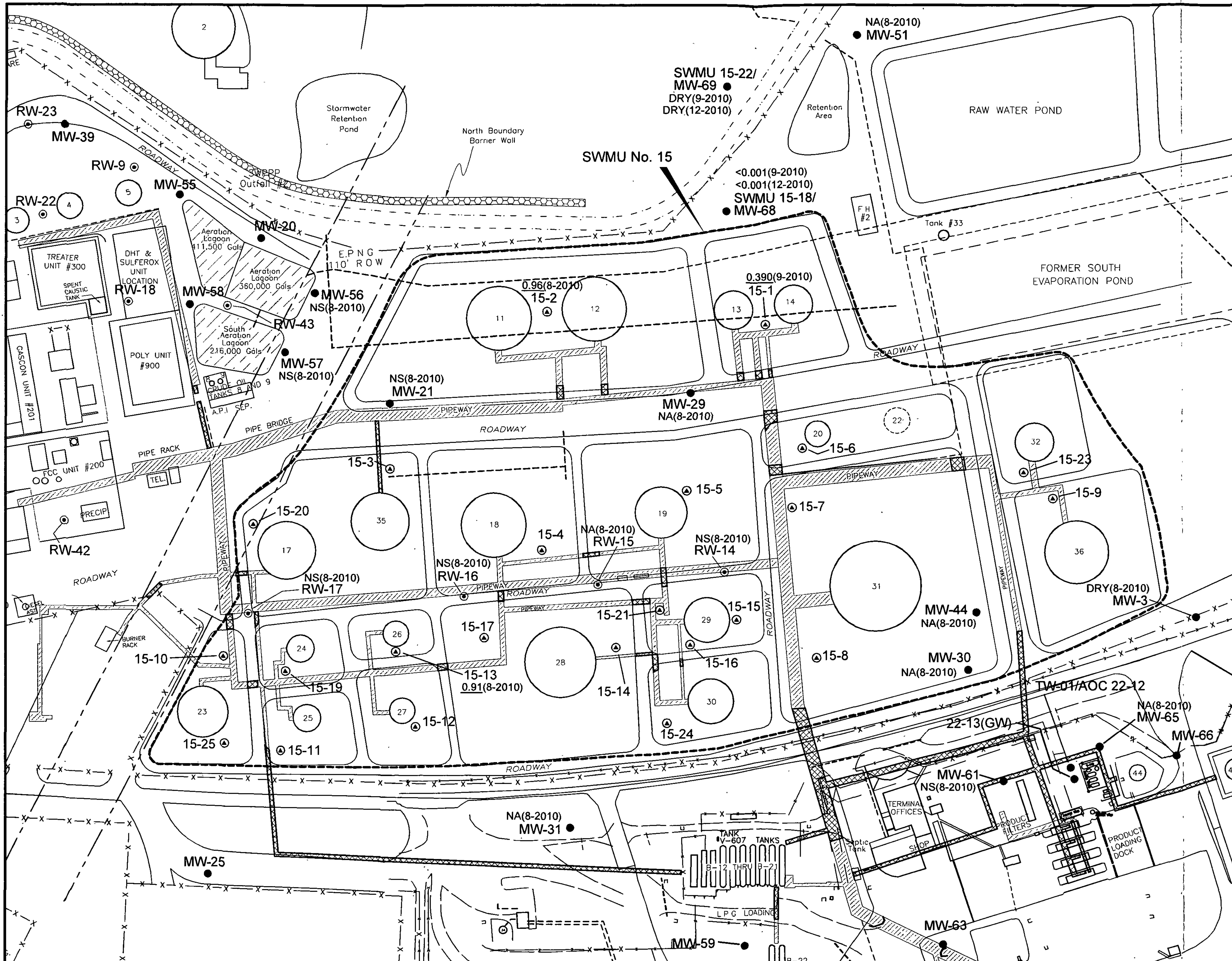

N

0 150

SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.001	1,2,4-TRIMETHYLBENZENE CONCENTRATION, mg/l (SAMPLE DATE)
0.015	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 05/14/11	FILE: WestRefB103

FIGURE 28
GROUP No. 5 - SWMU No. 15
1,2,4-TRIMETHYLBENZENE
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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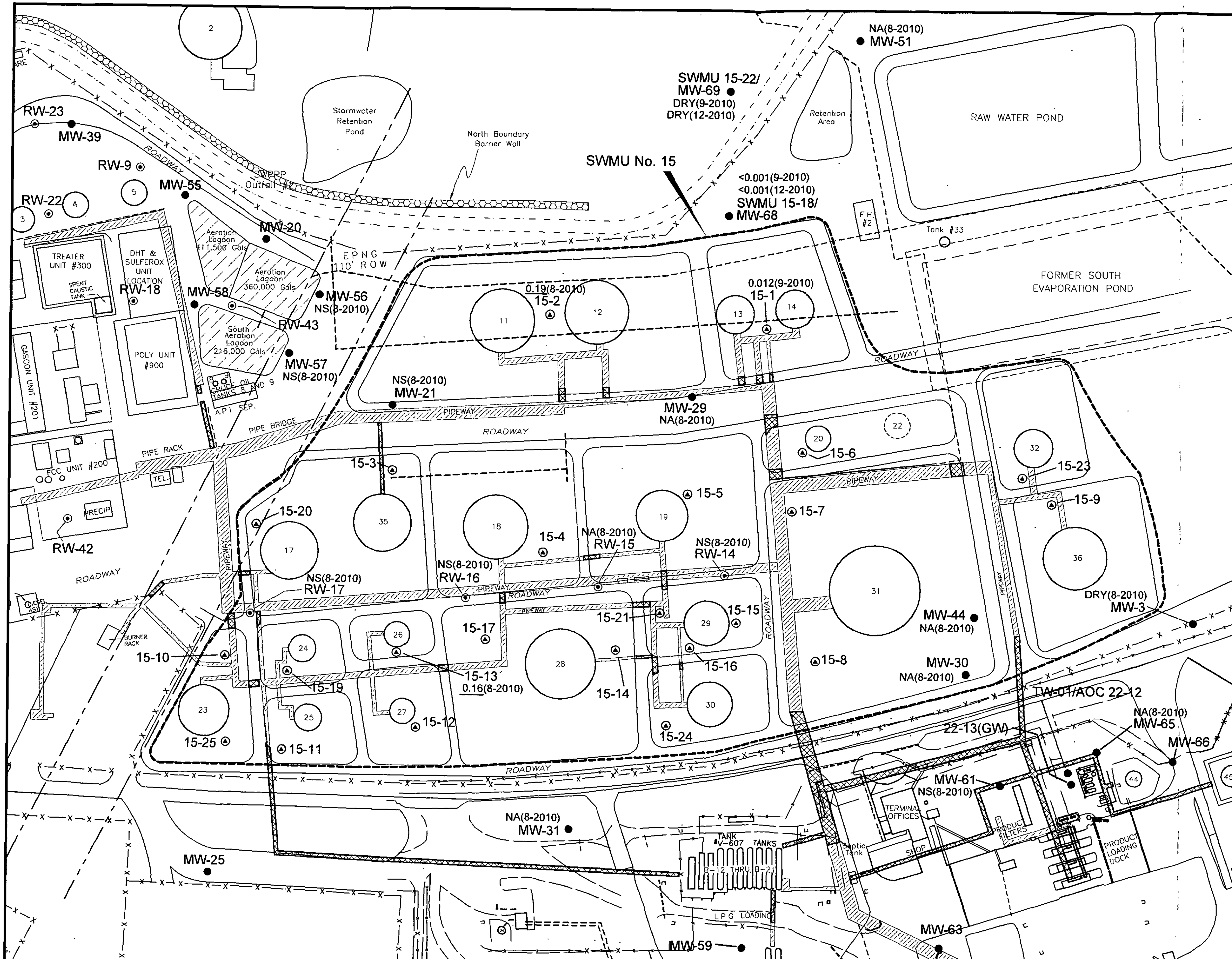

LEGEND

- MW-21 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- 15-1 ◉ SAMPLE LOCATION AND IDENTIFICATION NUMBER
- RW-14 ◎ RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- <0.001 1,3,5-TRIMETHYLBENZENE CONCENTRATION, mg/l (SAMPLE DATE)
- <u>0.012</u> CONCENTRATION EXCEEDS SCREENING LEVEL
- NS NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
- NA NOT ANALYZED
- UNDER GROUND PIPING (HYDROCARBONS)
- ABOVE GROUND PIPE-WAY
- SWMU LOCATION
- ABANDONED UNDERGROUND PIPING
- UNDER GROUND WASTEWATER PIPING
- —x—x— FENCE
- FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 05/14/11	FILE: WestRefB103

FIGURE 29
GROUP No. 5 - SWMU No. 15
1,3,5-TRIMETHYLBENZENE
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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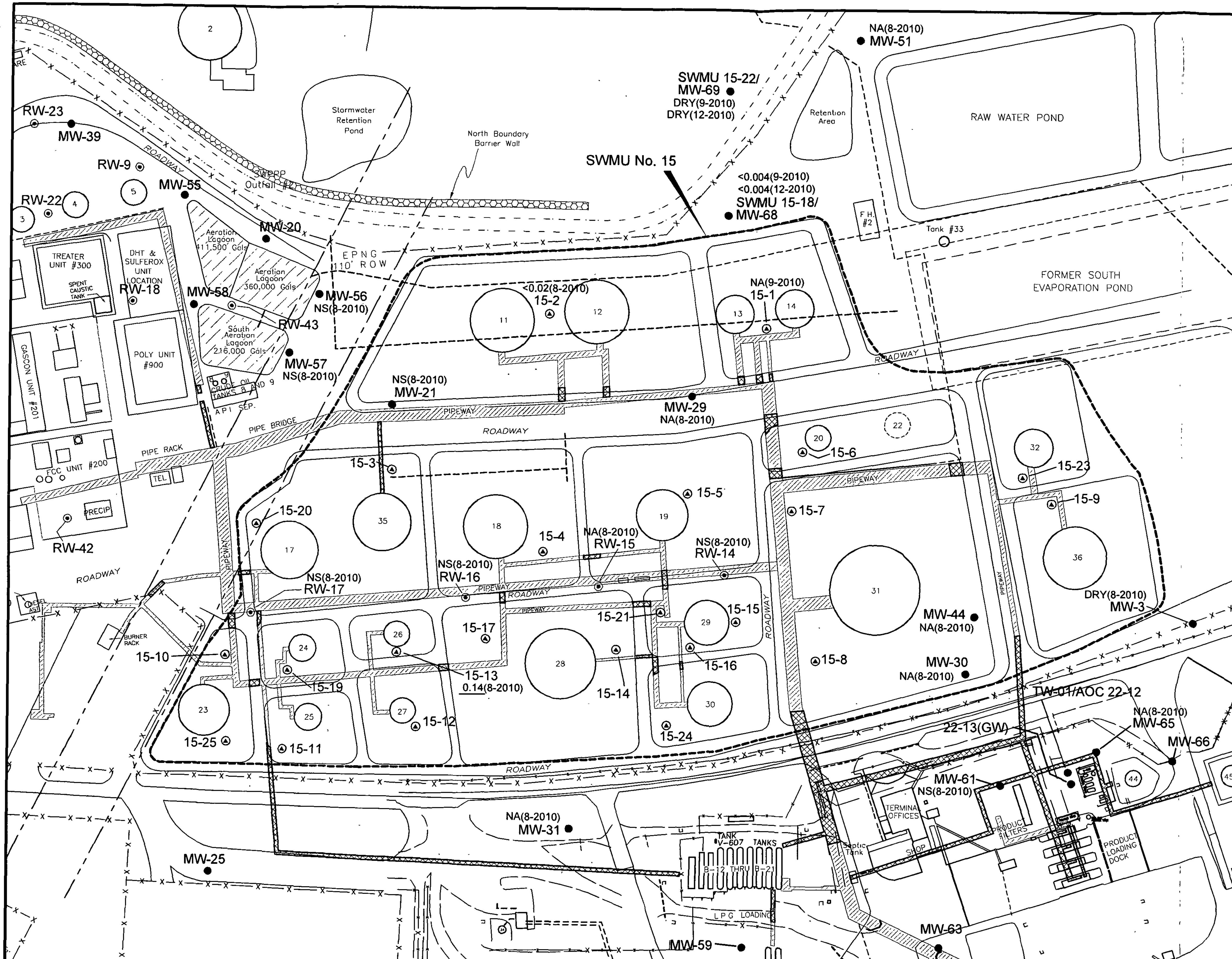

N

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ⊙	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.004	1-METHYLNAPHTHALENE CONCENTRATION, mg/l (SAMPLE DATE)
0.0023	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/14/11 | FILE: WestRefB103

FIGURE 30
GROUP No. 5 - SWMU No. 15
1-METHYLNAPHTHALENE
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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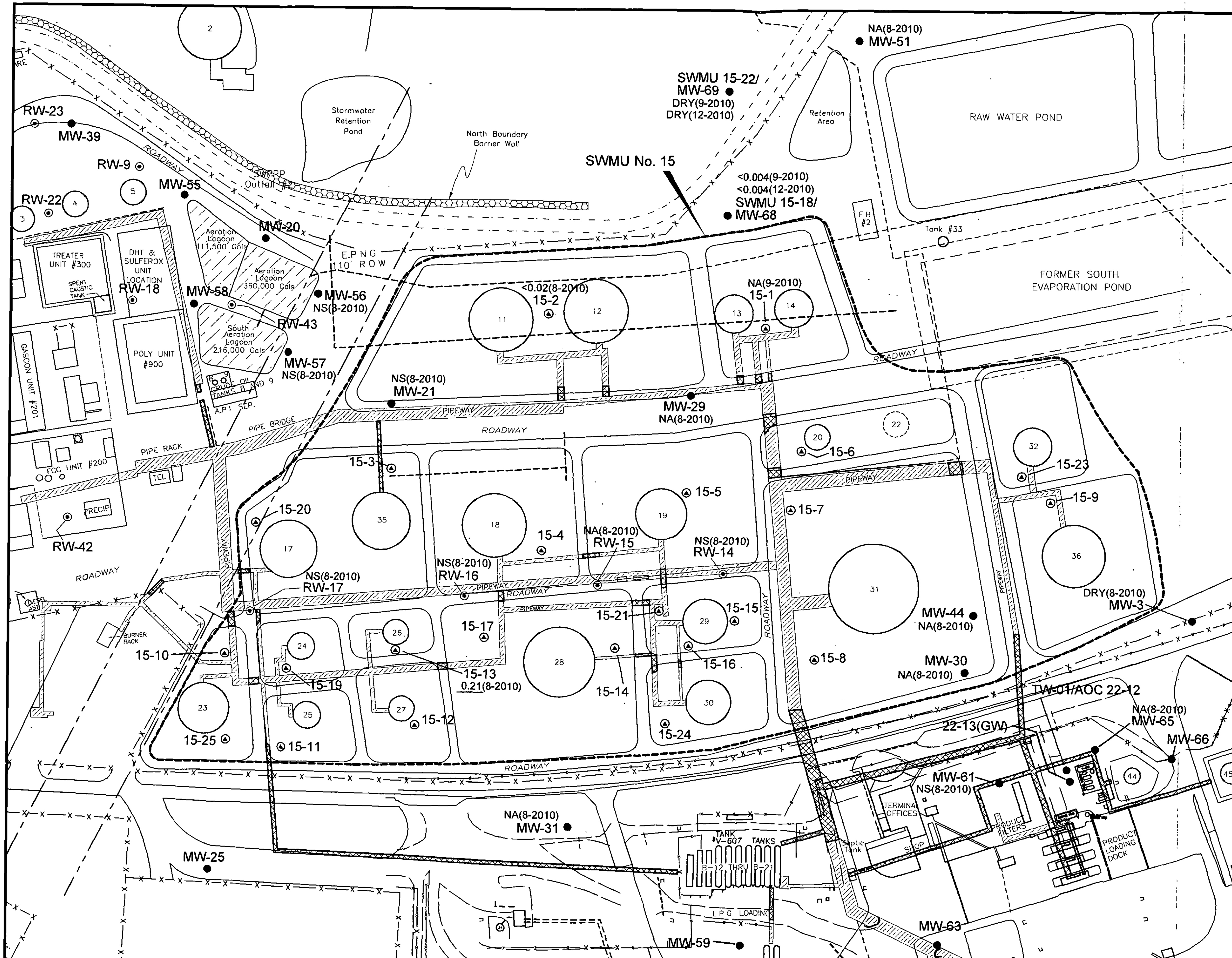

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ⊙	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.004	2-METHYLNAPHTHALENE CONCENTRATION, mg/l (SAMPLE DATE)
0.150	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	*NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON*
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

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FIGURE 31
GROUP No. 5 - SWMU No. 15
2-METHYLNAPHTHALENE
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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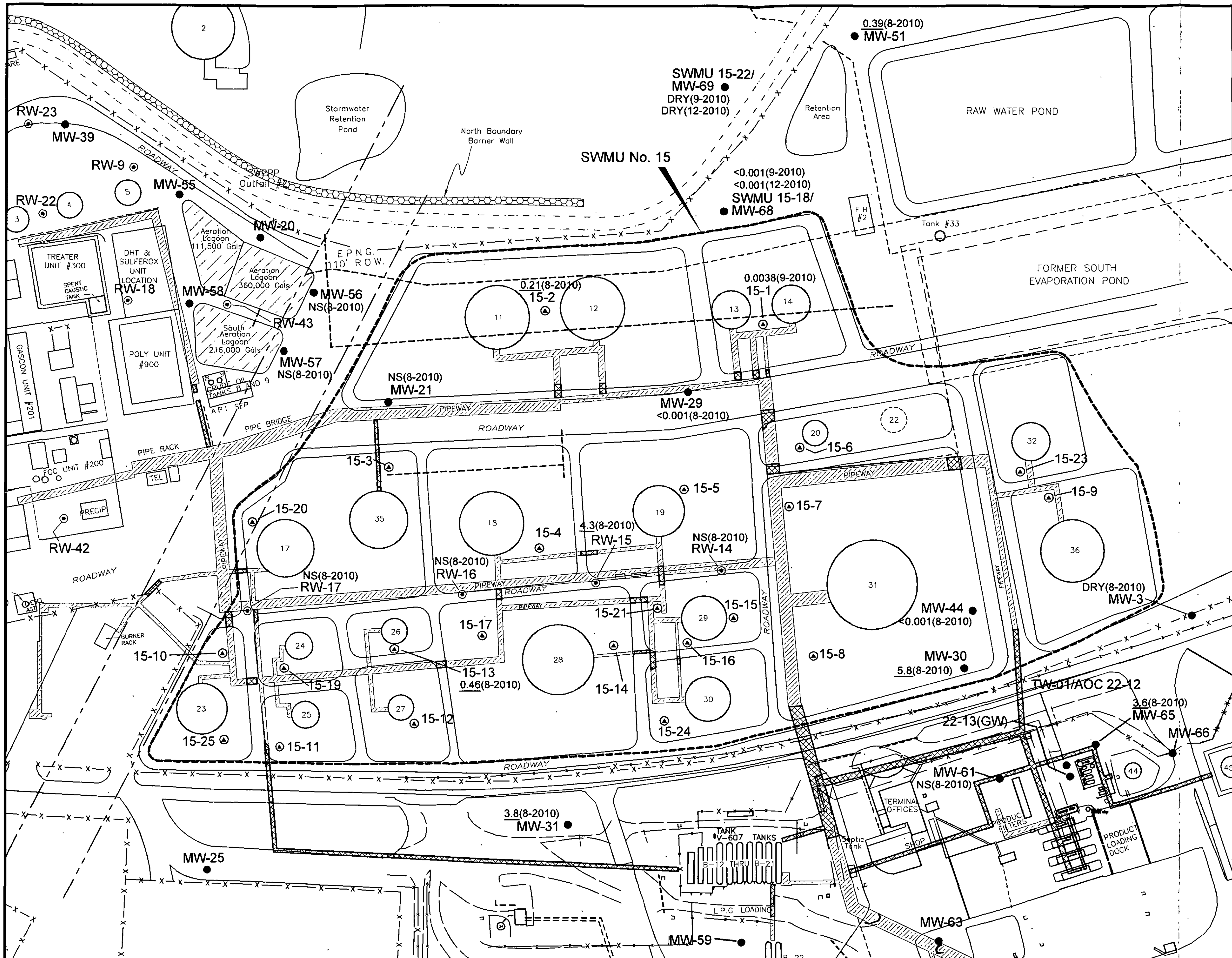

Western Refining
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FIGURE 32
GROUP No. 5 - SWMU No. 15
BENZENE
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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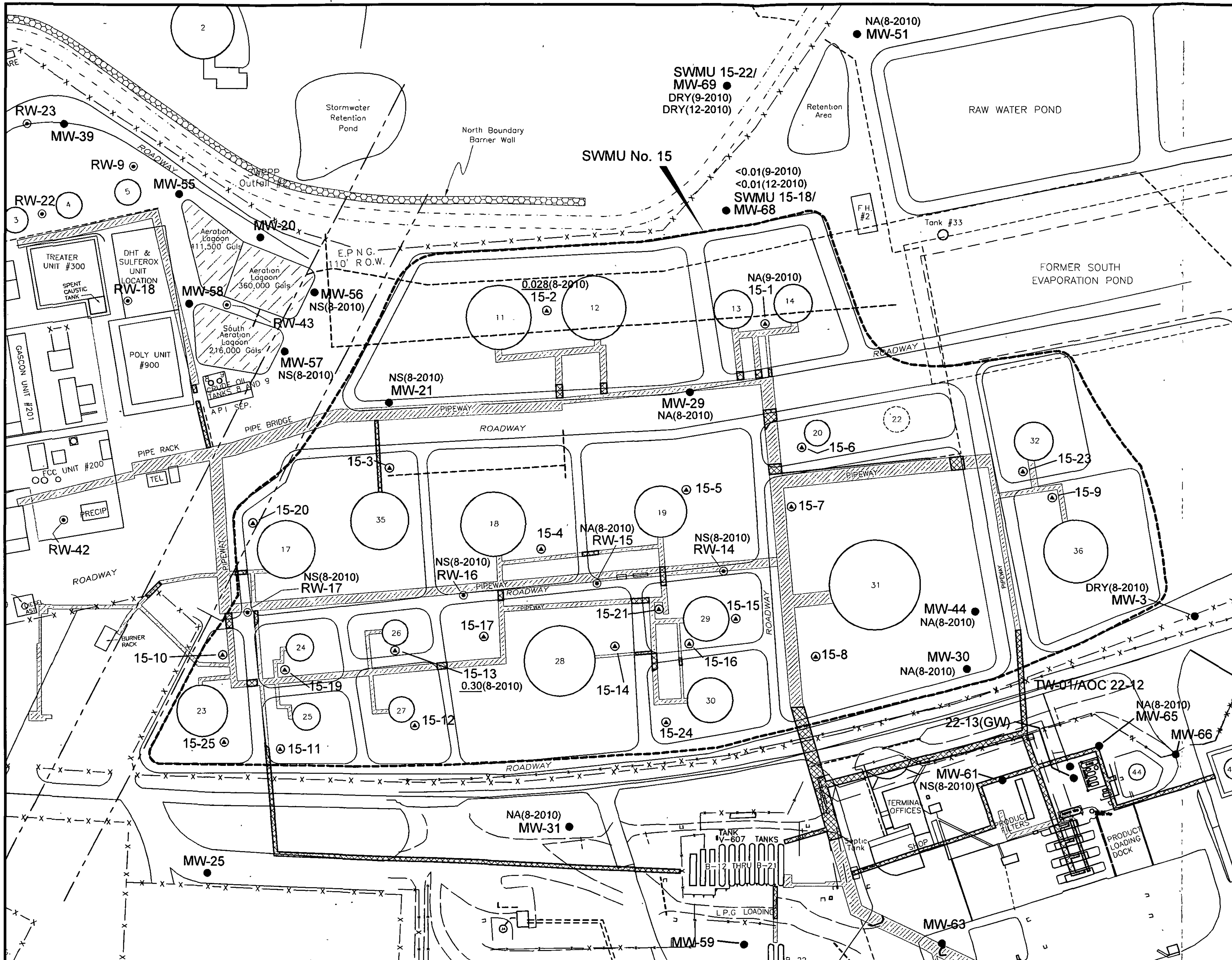

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◬	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.01	NAPHTHALENE CONCENTRATION, mg/l (SAMPLE DATE)
0.00143	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/14/11 | FILE: WestRefB103

FIGURE 33
GROUP No. 5 - SWMU No. 15
NAPHTHALENE
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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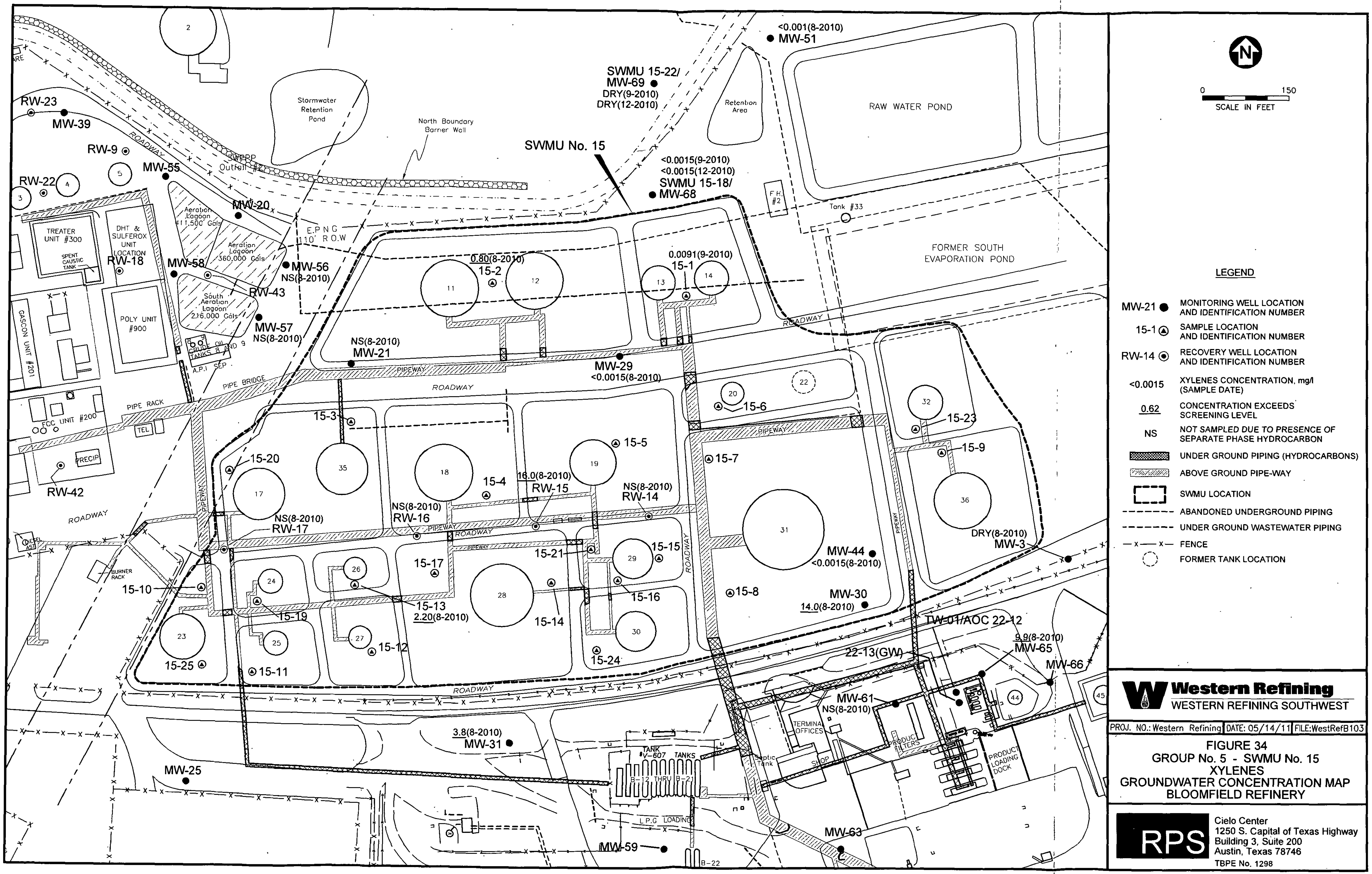

SWMU No. 15
SWMU 15-22/
MW-69
DRY(9-2010)
DRY(12-2010)
<0.001(8-2010)
MW-51
<0.0015(9-2010)
<0.0015(12-2010)
SWMU 15-18/
MW-68
Stormwater Retention Pond
North Boundary Barrier Wall
Retention Area
RAW WATER POND
FORMER SOUTH EVAPORATION POND
Tank #33
RW-23
MW-39
RW-9
MW-55
RW-22
MW-20
TREATER UNIT #300
DHT & SULFEROX UNIT LOCATION
RW-18
MW-58
MW-56
NS(8-2010)
RW-43
MW-57
NS(8-2010)
GASCON UNIT #201
POLY UNIT #900
FCC UNIT #200
RW-42
0.80(8-2010)
15-2
0.0091(9-2010)
15-1
NS(8-2010)
MW-21
MW-29
<0.0015(8-2010)
15-3
15-6
15-23
15-20
15-5
15-7
15-9
15-4
16.0(8-2010)
RW-15
NS(8-2010)
RW-14
NS(8-2010)
RW-16
NS(8-2010)
RW-17
DRY(8-2010)
MW-3
15-10
15-17
15-21
15-15
MW-44
<0.0015(8-2010)
15-13
2.20(8-2010)
15-19
15-16
15-14
15-8
MW-30
14.0(8-2010)
15-12
15-24
15-25
15-11
TW-01/AOC 22-12
9.9(8-2010)
MW-65
MW-66
22-13(GW)
MW-61
NS(8-2010)
3.8(8-2010)
MW-31
MW-25
MW-59
MW-63
ROADWAY
PIPEWAY
PIPE BRIDGE
PIPE RACK
E.P.N.G 110' R.O.W
TERMINAL OFFICES
PRODUCT FILTERS
PRODUCT LOADING DOCK
L.P.G LOADING
0 150 SCALE IN FEET
LEGEND
MW-21 MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.0015 XYLENES CONCENTRATION, mg/l (SAMPLE DATE)
0.62 CONCENTRATION EXCEEDS SCREENING LEVEL
NS NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
UNDER GROUND PIPING (HYDROCARBONS)
ABOVE GROUND PIPE-WAY
SWMU LOCATION
ABANDONED UNDERGROUND PIPING
UNDER GROUND WASTEWATER PIPING
FENCE
FORMER TANK LOCATION
Western Refining
WESTERN REFINING SOUTHWEST
PROJ. NO.: Western Refining
DATE: 05/14/11
FILE:WestRefB103
FIGURE 34
GROUP No. 5 - SWMU No. 15
XYLENES
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY
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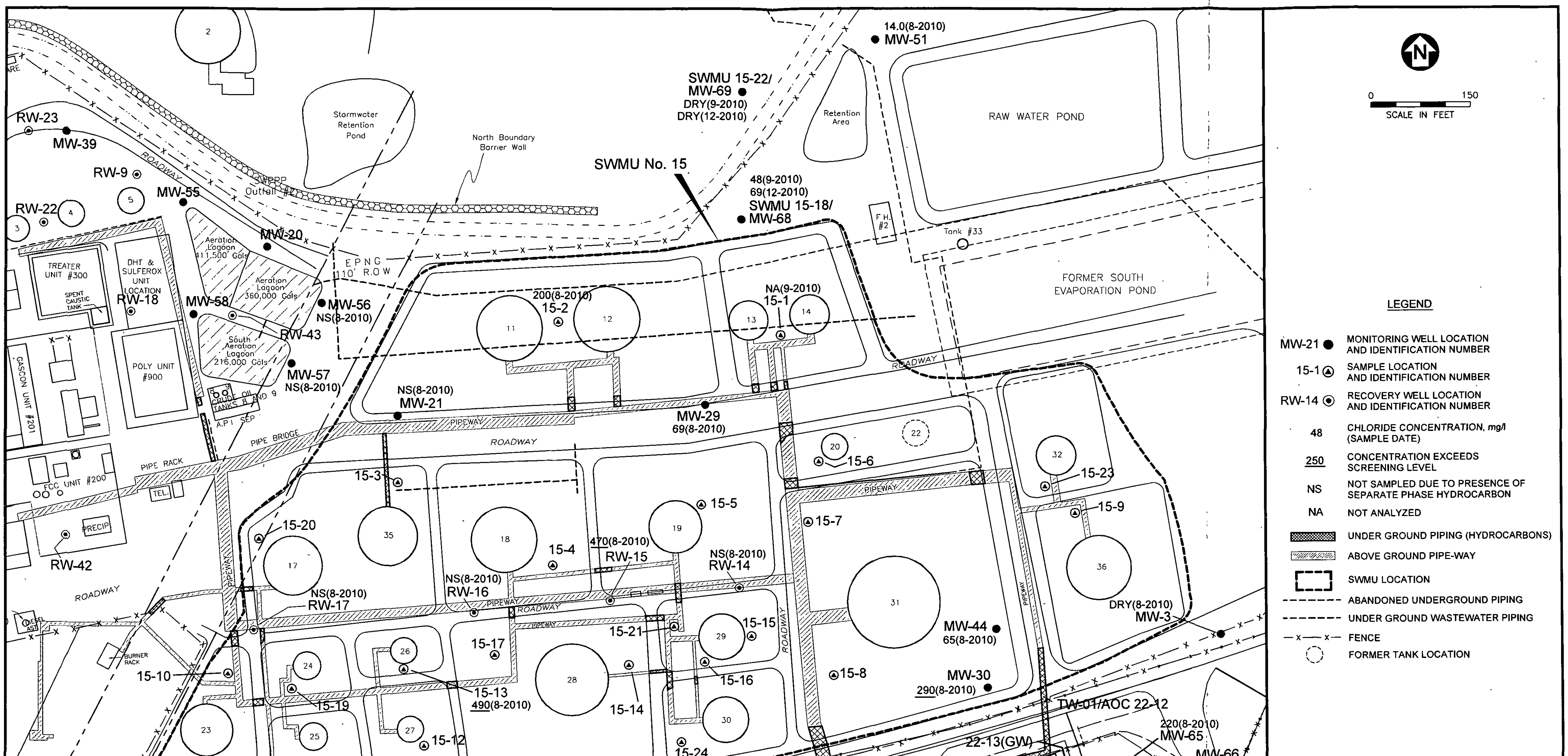

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FIGURE 35
GROUP No. 5 - SWMU No. 15
CHLORIDE
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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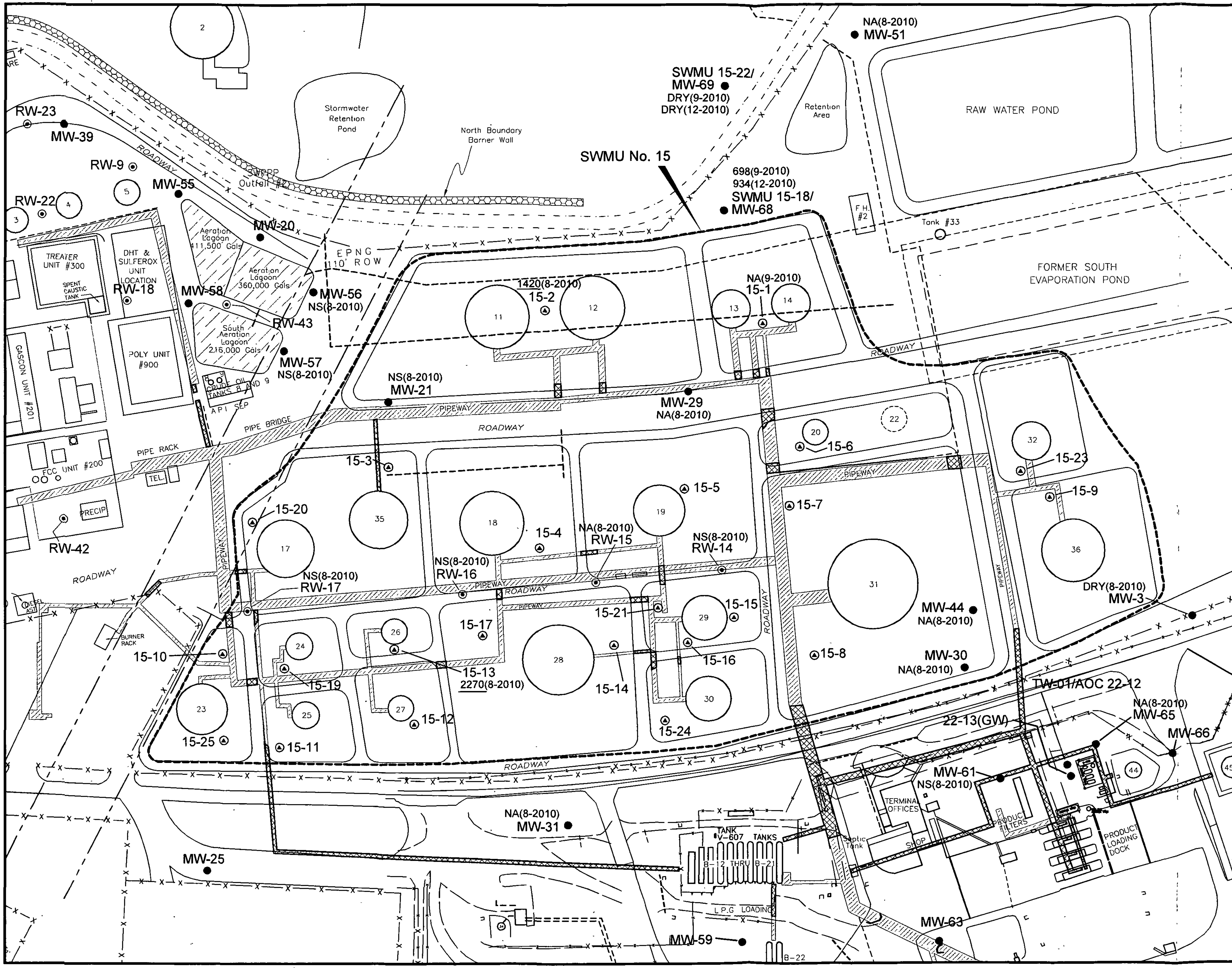

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◬	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
698	TOTAL DISSOLVED SOLIDS CONCENTRATION, mg/l (SAMPLE DATE)
1,000	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/14/11 | FILE: WestRefB103

FIGURE 36
GROUP No. 5 - SWMU No. 15
TOTAL DISSOLVED SOLIDS
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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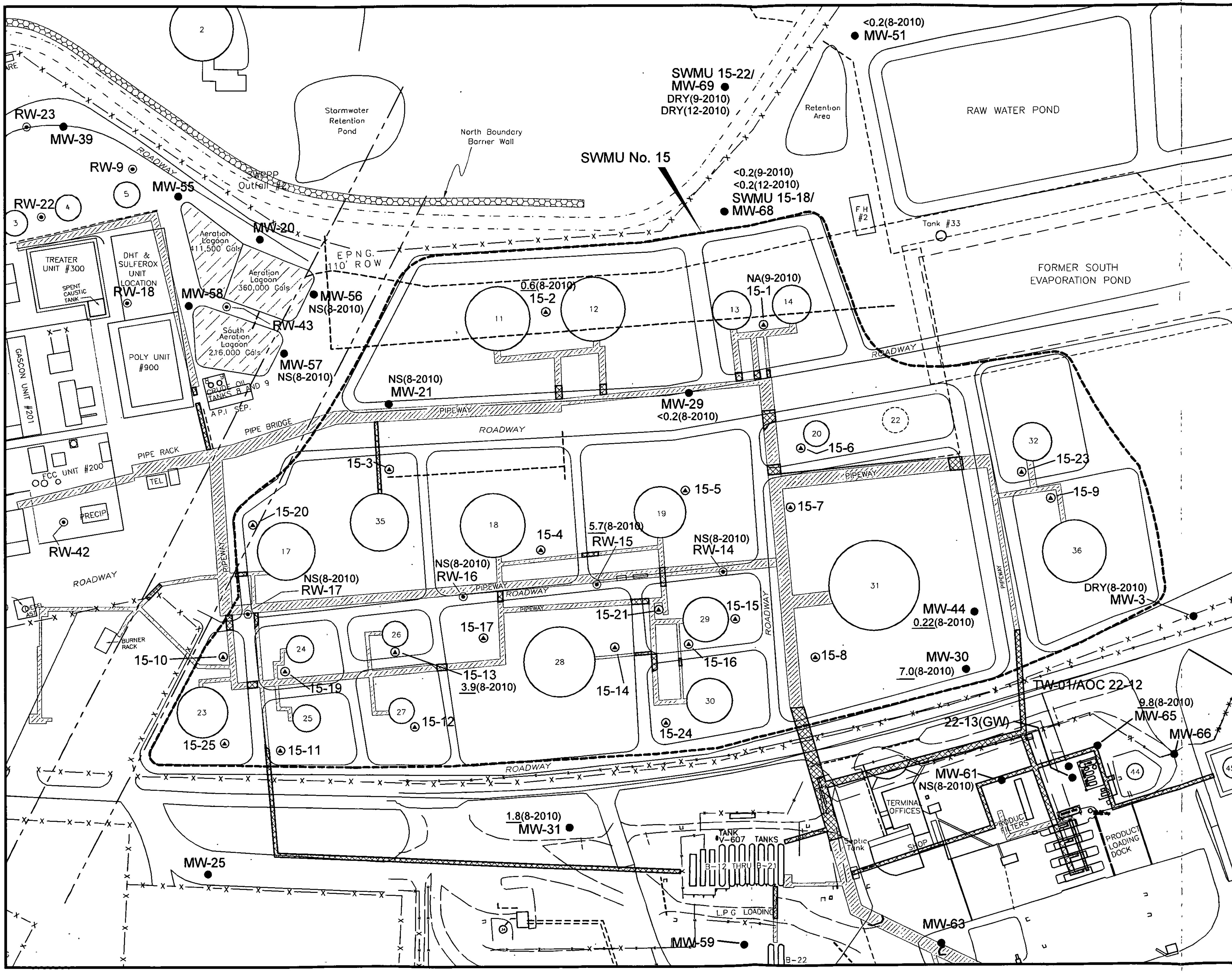

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◬	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◉	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.2	DIESEL RANGE ORGANICS CONCENTRATION, mg/l (SAMPLE DATE)
0.2 (underlined)	CONCENTRATION EXCEEDS SCREENING LEVEL
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/14/11 | FILE: WestRefB103

FIGURE 37
GROUP No. 5 - SWMU No. 15
DIESEL RANGE ORGANICS
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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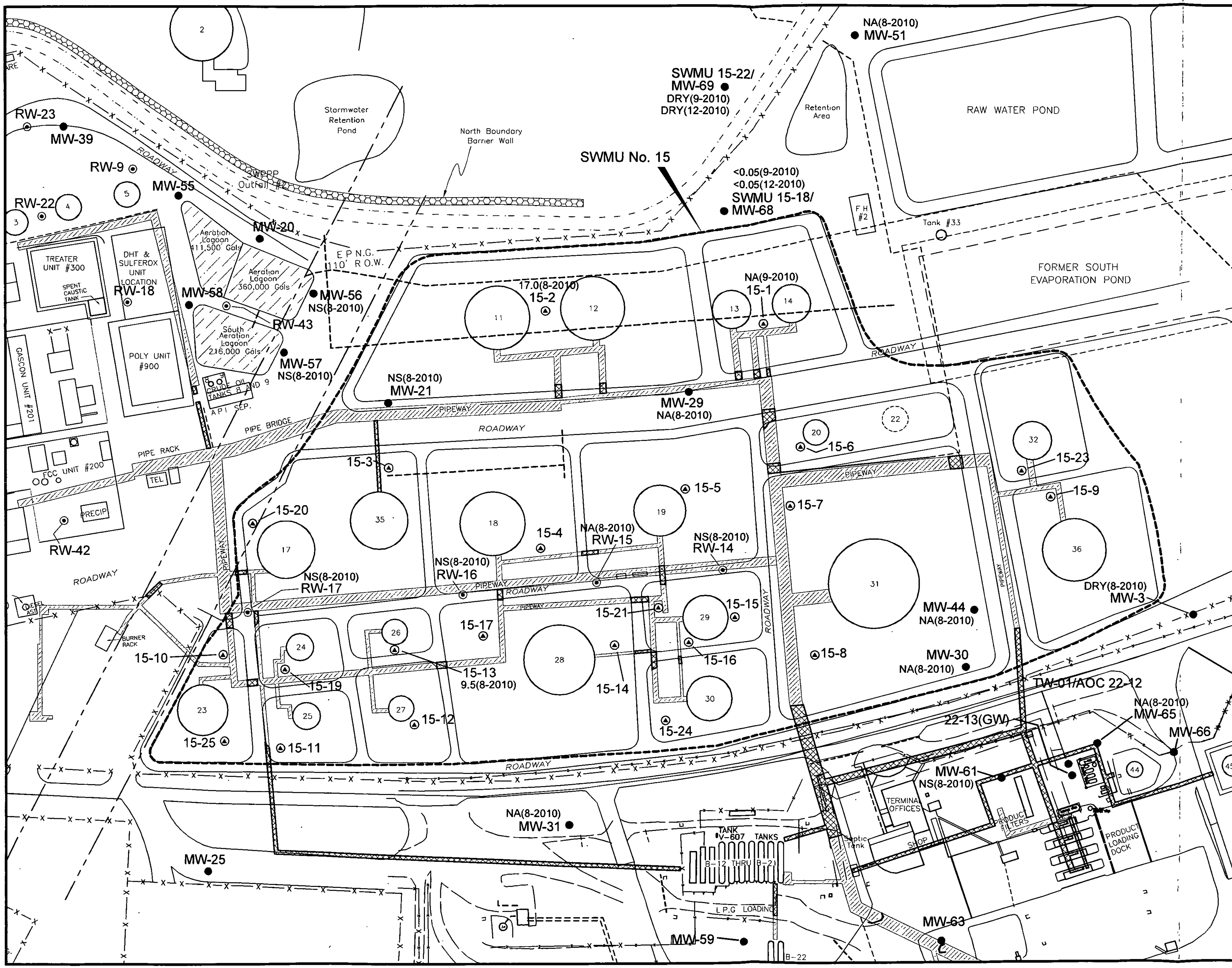

0 150
SCALE IN FEET

LEGEND

MW-21 ●	MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
15-1 ◉	SAMPLE LOCATION AND IDENTIFICATION NUMBER
RW-14 ◎	RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
<0.05	MOTOR OIL RANGE ORGANICS CONCENTRATION, mg/l (SAMPLE DATE)
NS	NOT SAMPLED DUE TO PRESENCE OF SEPARATE PHASE HYDROCARBON
NA	NOT ANALYZED
	UNDER GROUND PIPING (HYDROCARBONS)
	ABOVE GROUND PIPE-WAY
	SWMU LOCATION
	ABANDONED UNDERGROUND PIPING
	UNDER GROUND WASTEWATER PIPING
—x—x—	FENCE
	FORMER TANK LOCATION

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/14/11 | FILE: WestRefB103

FIGURE 38
GROUP No. 5 - SWMU No. 15
MOTOR OIL RANGE ORGANICS
GROUNDWATER CONCENTRATION MAP
BLOOMFIELD REFINERY

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Appendix A

Field Methods

Field Methods

Pursuant to Section IV of the Order, an investigation of soils and groundwater was conducted to determine and evaluate the presence, nature, extent, fate, and transport of contaminants. To accomplish this objective, soil borings and monitoring wells were installed at the SWMU No. 15 Tank Farm. The field methods are described below and individual discussions are presented for the following activities:

- Drilling procedures;
- Soil screening;
- Decontamination procedures;
- Monitoring well development;
- Fluid level measurements;
- Purging of monitoring wells/groundwater sample collection;
- Sample collection and handling procedures;
- Vadose zone vapor sampling;
- Equipment calibration; and
- Management of investigation derived waste.

Drilling Procedures

The soil borings were drilled using the hollow-stem auguring (HSA) method or a hand auger was used for shallow (three-foot) borings. 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 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 2000 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 3. 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 drilling equipment (e.g., hollow-stem augers) was decontaminated between each borehole using a high pressure potable water wash. The sampling equipment coming in direct contact with the samples (e.g., hand augers and split-spoon samplers) 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 SWMU was investigated during the day a new batch of wash water and rinse water was prepared prior to decontamination.

Monitoring Well Development

Following monitoring well completion activities, the new monitoring well (MW-68) and piezometer (SWMU 15-1) were developed using a combination of mechanical surging and air-lift techniques. Using a surge block attached to the end of the drill rod, groundwater was forced to flow in and out of the well screen by the repeated upward and downward motion of the surge block along the entire length of the well screen. The repeated plunging motion drew filter pack fines and loosened sediment into the well casing, improving the water quality within the surrounding formation and filter pack.

Once the well was surged for a minimum of 20-minutes, the surge block was removed and the air-lift apparatus was used to remove the loosened sediment and fines from inside the well casing. Using an air compressor and dedicated 1-inch PVC eductor piping, compressed air was injected into the well. The air flow rate was manually adjusted to produce a continuous flow of water/sediment mixture out the top of the well casing via the 1-inch eductor piping. The groundwater/sediment mixture discharged directly into a 55-gallon drum. A glass jar was used to capture a sample of the purge water every 15 minutes to monitor the improving clarity of the purge water. Air lifting ceased once the purge water was relatively clear.

Fluid Level Measurements

The depth to separate phase hydrocarbon, if present, and groundwater was measured prior to purging the wells of potentially stagnant groundwater. The measurements are presented in Table 10. A Keck KIR Interface Probe was used to measure fluid levels to 0.01 foot.

Purging of Monitoring Wells/Groundwater Sample Collection

The permanent monitoring well (MW-68) was purged of a minimum of three well volumes prior to sample collection. SWMU 15-1/piezometer was installed as a piezometer but a water sample was collected during the first sampling event and the piezometer was purged of slightly less than three well volumes due to a very slow recovery rate. All potentially stagnant water was removed from SWMU 15-1 prior to sample collection. The purge volumes are calculated as follows:

Volume (gallons) = water column thickness (ft) x 3.14 x radius of well casing^2 (ft) x 7.48 (gals/ft). The calculated purge volumes and actual volumes removed from each well are presented below.

Well (date)	Water Column Thickness (ft)	Calculated Purge Volume (gallons) – 3 Well Volumes	Actual Purge Volume (gallons)
MW-68 (9/7/2010)	4.69	9.27	10.0
MW-68 (12/1/2010)	4.45	8.82	10.0
SWMU 15-1/piezometer (9/7/2010)	5.19	2.64	2.0

Field measurements of groundwater stabilization parameters included pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, and temperature. These measurements are presented in Table 9. A disposable bailer was used to remove groundwater from the well during the purging procedures.

Sample Collection and Handling Procedures

Soil samples were collected using split-spoon samplers 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.

Groundwater samples were collected with disposable bailers and immediately poured directly into clean laboratory supplied sample containers with the exception of samples collected for dissolved analyses. Samples specified for dissolved analyses were filtered in the field using a disposable 0.45 micron filter. A new filter and syringe enclosure were used for each sample. All 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.

Vadose Zone Vapor Sampling

Field vapor monitoring of the vadose zone was completed using a multi-gas Eagle Meter manufactured by RKI Instruments, Inc. The vapor monitoring was completed by sealing the top of the well with a cap containing a sample port. MW-68 was purged of stagnant vapor for 40 minutes and SWMU 15-1/piezometer was purged for 30 minutes at a rate of approximately 1 liter per 10 seconds using a vacuum pump. Polyethylene tubing was inserted through the sample port and attached to a low-velocity pump and the Eagle Meter.

Equipment Calibration

Soil vapor screening was conducted using a MiniRae 2000 portable VOC monitor PGM-7600. The instrument was calibrated at the beginning of each work day to a concentration of 100 ppm isobutylene.

The instruments used to measured groundwater stabilization parameters included a YSI 550A dissolved oxygen probe and an Ultrameter 6P made by the Myron L Company. The calibration solutions used at the beginning of each day are as follows:

- 4.0 pH solution;
- 7.0 pH solution;
- 10.0 pH solution;
- 1.413 mS/cm conductivity solution; and
- 220 for ORP.

The multi-gas Eagle Meter manufactured by RKI Instruments, Inc. was calibrated with 15% CO_2, 12.0% O_2, and 100 ppm isobutylene each work day. There were no field conditions encountered during the sampling event that affected procedural or sample testing results.

Management of Investigation Derived Waste

The decontamination water from the drilling equipment was collected on a mobile decon trailer 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. Purge water was also collected in a 55-gallon drum. The decon and purge water was disposed in the Refinery's wastewater treatment system up-stream of the API Separator. Soil cuttings were also placed into eight open top 55-gallon drums and were sealed when not in use. Each drum of soils was labeled and temporarily stored in a concrete curbed area pending waste characterization and disposal.

Appendix B

Survey Data

Fixed width point lat/long/elevation listing

Project : WESTERN REFINERY

User name	hwilleto	**Date & Time**	2:20:57 PM 12/6/2010
Coordinate System	Projection from data collector	**Zone**	Zone from data collector
Project Datum	(WGS 84)		
Vertical Datum		**Geoid Model**	GEOID03
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

Point listing

Name	Latitude	Longitude	Elevation	Feature Code
9113	36°41'59.50904"N	107°58'08.60416"W	5523.239	16-1
9114	36°41'59.58054"N	107°58'08.52166"W	5522.760	16-1-E
9115	36°41'59.43900"N	107°58'08.51756"W	5522.988	16-1-S
9116	36°41'59.43800"N	107°58'08.68525"W	5523.930	16-1-W
9117	36°41'59.57791"N	107°58'08.69429"W	5523.538	16-1-N
9118	36°41'58.89879"N	107°58'09.27725"W	5525.166	16-2
9119	36°41'58.93875"N	107°58'08.56987"W	5524.314	16-3
9120	36°41'58.39736"N	107°58'08.52726"W	5522.309	16-4
9121	36°41'58.95029"N	107°58'07.82215"W	5520.749	16-5
9122	36°41'58.83651"N	107°58'10.16051"W	5526.345	10-3
9123	36°41'59.13477"N	107°58'11.03927"W	5524.990	10-1
9124	36°41'59.71607"N	107°58'11.48194"W	5522.455	10-5
9125	36°42'00.17613"N	107°58'11.43910"W	5521.873	10-6
9126	36°42'00.33842"N	107°58'11.36630"W	5521.902	10-7
9127	36°42'01.13638"N	107°58'11.43181"W	5518.366	10-8
9128	36°42'01.75810"N	107°58'11.52999"W	5520.542	MW-67 GRADE
9129	36°42'01.74769"N	107°58'11.53712"W	5520.676	MW-67 PAD
9130	36°42'01.73369"N	107°58'11.54409"W	5523.312	MW-67 TOP OF CASING
9131	36°42'00.50906"N	107°58'09.96200"W	5524.781	10-4
9132	36°42'00.30540"N	107°58'10.20673"W	5524.865	10-2
9133	36°41'56.28295"N	107°58'18.79552"W	5524.839	TP-14 TOP OF CASING
9134	36°41'56.62962"N	107°58'18.34100"W	5524.242	7-1
9135	36°41'56.70417"N	107°58'17.18846"W	5525.770	BOB-E TOP OF CASING
9136	36°41'56.48809"N	107°58'16.23843"W	5525.363	7-2
9137	36°41'57.48590"N	107°58'13.84689"W	5526.593	7-3
9138	36°41'57.52934"N	107°58'21.99216"W	5517.696	BOB-W TOP OF CASING
9139	36°41'57.49071"N	107°58'22.48460"W	5514.304	MW-68 GRADE
9140	36°41'57.47888"N	107°58'22.47743"W	5514.291	MW-68 PAD
9141	36°41'57.46756"N	107°58'22.47236"W	5517.372	MW-68 TOP OF CASING
9142	36°41'55.34018"N	107°58'21.65433"W	5516.208	15-1 GRADE
9143	36°41'55.33454"N	107°58'21.65532"W	5512.578	15-1 TOP OF CASING
9144	36°41'55.90394"N	107°58'25.97324"W	5515.596	15-2
9145	36°41'52.52834"N	107°58'31.44763"W	5526.326	15-20
9146	36°41'53.40282"N	107°58'28.91692"W	5521.158	15-3
9147	36°41'52.33652"N	107°58'26.28613"W	5521.682	15-4
9148	36°41'53.32539"N	107°58'23.17706"W	5523.628	15-5
9149	36°41'53.65788"N	107°58'20.65622"W	5529.863	15-6
9150	36°41'53.43339"N	107°58'16.75040"W	5530.911	15-23

GROUP 5

9151	36°41'52.82001"N	107°58'16.52954"W	5530.600	15-9
9152	36°41'52.81569"N	107°58'21.14797"W	5529.894	15-7
9153	36°41'50.92519"N	107°58'21.02367"W	5530.482	15-8
9154	36°41'51.43956"N	107°58'22.49477"W	5529.270	15-15
9155	36°41'51.48961"N	107°58'23.83081"W	5530.185	15-21
9156	36°41'50.87342"N	107°58'23.55023"W	5529.639	15-16
9157	36°41'49.56294"N	107°58'23.53449"W	5529.992	15-24
9158	36°41'51.22151"N	107°58'25.34714"W	5527.515	15-14
9159	36°41'51.71890"N	107°58'25.07331"W	5536.378	RW-15 TOP OF CASING
9160	36°41'50.94745"N	107°58'27.31975"W	5525.498	15-17
9161	36°41'50.71277"N	107°58'28.81921"W	5526.490	15-13
9162	36°41'49.39326"N	107°58'28.70265"W	5527.325	15-12
9163	36°41'49.37134"N	107°58'31.07068"W	5527.413	15-11
9164	36°41'50.33526"N	107°58'31.21802"W	5527.071	15-19
9165	36°41'50.53280"N	107°58'32.10957"W	5525.992	15-10
9166	36°41'49.28491"N	107°58'31.89329"W	5527.098	15-25
9167	36°41'59.32042"N	107°58'22.31552"W	5505.201	MW-69 GRADE
9168	36°41'59.30993"N	107°58'22.32522"W	5505.487	MW-69 PAD
9169	36°41'59.30045"N	107°58'22.33410"W	5508.513	MW-69 TOP OF CASING

Back to top

Appendix C

Boring Logs

WELL CONSTRUCTION

Well No.: SWMU 15-1/Piezometer

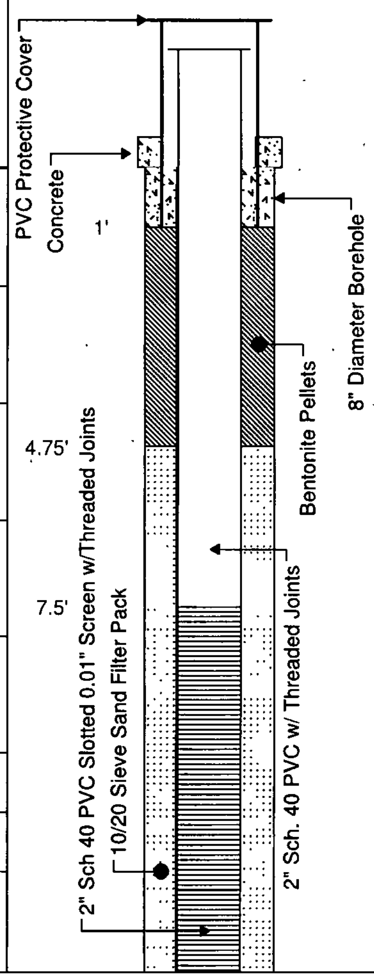
Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.922' W107º58.361'

Total Depth: 24' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 5512.578
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5516.208
Site Coordinates:
N 36º41'55.33454
W 107º58'21.65532

Start Date: 8/19/2010 0800
Finish Date: 8/24/2010 1700

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
-3								
-1								Ground Surface
1	0.5-2'	8/19 0830	G/2V/2E/3J		7.0 81ºF 8.5 81ºF		90	**Silty/Clayey Sand (SC/SM)** Fine grain, loose to compact, damp, brown, no odor, gravel present
3	2-4'	8/24 1510	G/1J		10.6 81ºF		90	**Silty Sand/Clayey Sand (SC/SM)** Similar to above
5					9.6 81ºF		90	**Silty Sand/Clayey Sand (SC/SM)** Similar to above
7					0.9 81ºF		50	**Gravelly Sand (SW)** Fine to medium grain, compact, damp to very damp, gray, no odor
9					0.7 81ºF		50	**Gravelly Sand (SW)** Similar to above, no odor
11					1.0 85ºF		50	**Gravelly Sand (SW)** Similar to above, no odor
							0	No recovery
13					2.0 84ºF		90	**Gravelly Sand (SW)** Similar to above, no odor

Completion Results



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WELL CONSTRUCTION

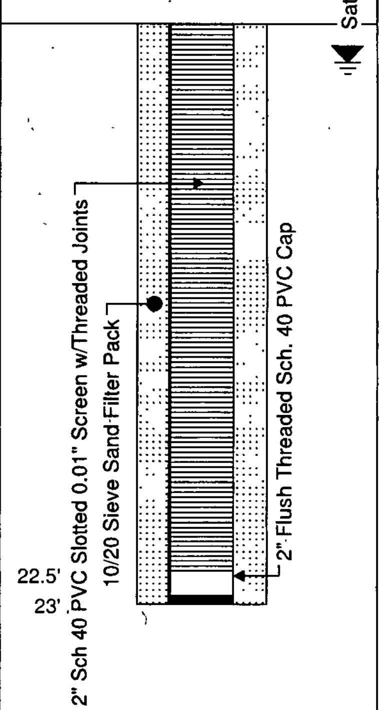
Well No.: SWMU 15-1/Piezometer
Start Date: 8/19/2010 0800
Finish Date: 8/24/2010 1700

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.922' W107º58.361'

Total Depth: 24' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 5512.578
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5516.208
Site Coordinates:
N 36º41'55.33454
W 107º58'21.65532

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/Container/No	14 Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
15					1849 84ºF		80	**Gravelly Sand/Sandy Gravel (SW/GW)** Similar to above, saturated, strong odor, dark gray, well graded sands and gravels
17					689 84ºF		80	**Gravelly Sand/Sandy Gravel (SW/GW)** Similar to above, strong odor
19					30 84ºF		50	**Gravelly Sand (SW)** Fine grain, loose, saturated, brown, no odor, greater than 1/2-inch gravel
21							50	**Gravelly Sand (SW)** Fine to large grain, loose, saturated, grayish brown, no odor, clayey at base, non-saturated sand, weathered Nacimiento
23							100	**Weathered Sandstone (SS)** Dense, damp, brown, no odor, Nacimiento
25								Total Depth = 24' BGL
27								
29								

Completion Results



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LOG OF BORING

Boring No.: SWMU 15-2
Start Date: 8/19/2010 0850
Finish Date: 8/19/2010 1230

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

Total Depth: 19' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5515.596
Site Coordinates: N 36º41'55.90394" W 107º58'25.97324"

Comments: Temporary well installed to collect groundwater samples. N 36º41.928' W107º58.440'

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
0–2	0.5-2'	0910	G/2V/ 2E/3J		8.8 68ºF 29.8 68ºF	SM	100	**Silty Sand (SM)** Fine grain, loose, damp, odor 1 to 2 feet	
2–4					11.9 68ºF	SM	100	**Silty Sand (SM)** Similar to above, faint odor to no odor at base	2
4–6	4-6'	0920	G/2V/ 2E/3J		7.0 68ºF	SW	70	**Gravelly Sand (SW)** Fine grain, loose, damp, gray, no odor, 1/2-inch gravel present	4
6–8					8.4 68ºF	SW	70	**Gravelly Sand (SW)** Similar to above, damp, no odor	6
8–10					41.1 70ºF	SW	80	**Gravelly Sand (SW)** Similar to above, damp to slightly moist, odor, dark gray sand	8
10–12					77.9 75ºF	SW / SP	90	**Gravelly Sand (SW)** Similar to above, damp, odor	10
								Sand (SP) Medium grain, compact, damp, dark gray to black, odor	
12–14	10-14'	1045	G/2V/ 2E/3J		53.5 76ºF	SP	20	**Sand (SP)** Similar to above	12
14–16				14'		SP	20	**Sand (SP)** Similar to above, saturated, strong odor	14
16–19						SP	--	**Sand (SP)** Similar to above, saturated	16
19								Total Depth = 19' BGL	18
20									20
22									22

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LOG OF BORING

Boring No.: SWMU 15-3
Start Date: 8/19/2010 1300
Finish Date: 8/19/2010 1340

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.886' W107º58.477'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5521.158
Site Coordinates: **N** 36º41'53.40282"
W 107º58'28.91692"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0–2	0.5-2'	8/19 1325	G/2V/ 2E/3J		2.4 83ºF 4.9 83ºF	ML	90	**Sandy Silt (ML)** Very fine grain, compact, damp, brown, no odor	0–2
2–4	2-4'	8/24 1350	G/1J		1.4 83ºF	ML	90	**Sandy Silt (ML)** Similar to above, no odor	2–4
4–6					1.4 83ºF	CL	90	**Silty Clay (CL)** Low plasticity, firm, damp, brown, no odor	4–6
								Total Depth = 6' BGL	

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LOG OF BORING

Boring No.: SWMU 15-4
Start Date: 8/19/2010 1355
Finish Date: 8/19/2010 1430

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.871' W107º58.440'

Total Depth: 10' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5521.682
Site Coordinates: N 36º41'52.33652"
W 107º58'26.28613"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0.5-1.5'	8/19 1420	G/2V/ 2E/3J		1.2 86ºF 6.3 86ºF	ML	90	**Sandy Silt (ML)** Very fine grain, compact, damp, brown, no odor	0
2	2-3'	8/24 1405	G/1J		5.3 86ºF	CL	90	**Silty Clay (CL)** Low plasticity, firm, damp, brown, no odor	2
4					9.9 86ºF	ML	60	**Sandy Silt (ML)** Very fine grain, loose to compact, damp, brown, no odor	4
6					0.9 86ºF	ML / CL	90	**Sandy Silt (ML)** Similar to above; **Silty Clay (CL)** Low plasticity, firm, damp, brown, no odor	6
8					0 6 86ºF	ML/SM	90	**Sandy Silt/Silty Sand (ML/SM)** Very fine grain, loose, damp, brown, no odor	8
10								Total Depth = 10' BGL	10
12									12
14									14
16									16

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LOG OF BORING

Boring No.: SWMU 15-5
Start Date: 8/19/2010 1450
Finish Date: 8/19/2010 1545

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.890' W107º58.386'

Total Depth: 10' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5523.628
Site Coordinates: N 36º41'53.32539" W 107º58'23.17706"

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
0–1	0.5-2'	1520	G/2V/2E/3J		0.6 87ºF; 0.5 87ºF	CL / ML	70	**Silty Clay (CL)** Low plasticity, stiff, damp, brown, no odor; **Silt (ML)** Very fine grain, compact, damp, brown, no odor	
2–4					0.6 87ºF	ML	80	**Silt (ML)** Similar to above, no odor	2
4–6					0.9 87ºF	ML	80	**Silt (ML)** Similar to above, trace sand, no odor	4
6–8					1.0 87ºF	SM	80	**Silty Sand (SM)** Fine grain, loose, damp, brown, no odor	6
8–10	8-10'	1530	G/2V/2E/3J		0.9 87ºF	SM	100	**Silty Sand (SM)** Similar to above, no odor	8
10								Total Depth = 10' BGL	10
12									12
14									14
16									16

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LOG OF BORING

Boring No.: SWMU 15-6
Start Date: 8/19/2010 1600
Finish Date: 8/19/2010 1700

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.897' W107º58.345'

Total Depth: 10' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5529.863
Site Coordinates: **N** 36º41'53.65788"
W 107º58'20.65622"

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0–2	0.5-2' & Dup	1630	G/4V/ 4E/6J		1.5 81ºF 108 81ºF	CL	90	**Silty Clay (CL)** Low plasticity, firm, damp, brown, staining at 1 to 2 feet, hydrocarbon odor	0–2
2–4					28.4 81ºF	ML	90	**Clayey Silt (ML)** Very fine grain, compact, damp, dark brown, faint odor	2–4
4–6					6.7 81ºF	CL	90	**Silty Clay (CL)** Low plasticity, firm to soft, damp, brown, no odor	4–6
6–8					4.7 81ºF	SM	90	**Silty Sand (SM)** Fine grain, loose, damp, brown, no odor	6–8
8–10	8-10'	1640	G/1J		3.1 81ºF	ML/CL	90	**Silty Clay/Clayey Silt (ML/CL)** Very fine grain, soft, damp, brown	8–10
								Total Depth = 10' BGL	

LOG OF BORING

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Boring No.: SWMU 15-7
Start Date: 8/20/2010 0745
Finish Date: 8/20/2010 0825

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.880' W107º58.356'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5529.894
Site Coordinates: N 36º41'52.81569" W 107º58'21.14797"

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
0–2	0.5-2'	0810	G/2V/2E/3J		4.1 58ºF 3.2 58ºF	CL	90	**Silty Clay (CL)** Low plasticity, stiff to firm, damp, brown, slightly stained, faint odor	0–2
2–4	2-4'	0820	G/2V/2E/3J		4.8 58ºF	ML	90	**Clayey Silt (ML)** Very fine grain, compact, damp, brown, no odor	2–4
4–6					5.0 58ºF	ML	90	**Clayey Silt (ML)** Similar to above, no odor	4–6
6								Total Depth = 6' BGL	6

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LOG OF BORING

Boring No.: SWMU 15-8
Start Date: 8/20/2010 0835
Finish Date: 8/20/2010 0920

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.849' W107º58.348'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5530.482
Site Coordinates: **N** 36º41'50.92519"
W 107º58'21.02367"

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
0–2	0-0.5'	0900	G/2V/ 2E/3J		32 63ºF	SM	90	**Silty Sand (SM)** Fine grain, loose, damp, brown, no odor, gravel present	
	0.5-2'	0910	G/2V/ 2E/3J		7.4 63ºF				
2–4	2-4'	0920	G/2V/ 2E/3J		18.7 63ºF	ML	90	**Clayey Silt (ML)** Very fine grain, compact, brown, damp, no odor	2
4–6					9.7 63ºF	ML	90	**Clayey Silt (ML)** Similar to above, no odor	4
6								Total Depth = 6' BGL	6

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16

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LOG OF BORING

Boring No.: SWMU 15-9
Start Date: 8/20/2010 0940
Finish Date: 8/20/2010 1030

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.883' W107º58.274'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5530.600
Site Coordinates: N 36º41'52.82001" W 107º58'16.52954"

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0					2.6 73ºF			Ground Surface	0
	0.5-2'	1005	G/2V/2E/3J		3.4 73ºF	ML	90	**Clayey Silt (ML)** Very fine grain, compact, damp, brown	
						SM		**Silty Sand (SM)** Fine grain, loose, damp, brown, no odor	
2					4.8 73ºF	SM	90	**Silty Sand (SM)** Similar to above, no odor	2
4	4-6' &Dup	1015	G/4V/4E/6J		4.0 73ºF	SM	90	**Silty Sand (SM)** Similar to above, no odor	4
6								Total Depth = 6' BGL	6
8									8
10									10
12									12
14									14
16									16

LOG OF BORING

RPS

Boring No.: SWMU 15-10
Start Date: 8/20/2010 1045
Finish Date: 8/20/2010 1130

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.842' W107º58.538'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5525.992
Site Coordinates: **N** 36º41'50.53280" **W** 107º58'32.10957"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0–2	0.5-2'	1105	G/2V/2E/3J		1.7 71ºF 3.1 71ºF		90	**Clayey Silt (ML)** Very fine grain, compact, damp, brown, no odor	0–2
2–4					4.8 71ºF		90	**Clayey Silt (ML)** Similar to above, no odor	2–4
4–6	4-6'	1115	G/2V/2E/3J		2.8 71ºF		90	**Clayey Silt (ML)** Similar to above, no odor	4–6
								Total Depth = 6' BGL	

LOG OF BORING

RPS

Boring No.: SWMU 15-11
Start Date: 8/23/2010 1245
Finish Date: 8/23/2010 1430

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.824' W107º58.519'

Total Depth: 18' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5527.413
Site Coordinates: N 36º41'49.37134" W 107º58'31.07068"

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
0–2	0.5-2'	1345	G/2V/2E/3J		1.2 86ºF 4.9 86ºF	CL	80	**Silty Clay (CL)** Low plasticity, stiff, damp, brown, no odor	2
2–4					104 86ºF	ML	80	**Clayey Silt (ML)** Very fine grain, compact, damp, brown to gray, odor	4
4–6	4-6'	1400	G/2V/2E/3J		1600 86ºF	ML	80	**Clayey Silt (ML)** Similar to above, gray, odor	6
6–8					1517 86ºF	ML	80	**Clayey Silt (ML)** Similar to above, gray, odor	8
8–10					342 86ºF	CL	80	**Silty Clay (CL)** Low plasticity, firm, damp, dark brown, faint odor	10
10–12					312 86ºF	ML	80	**Clayey Silt (ML)** Very fine grain, compact, damp, dark brown, faint odor	12
12–14					35 86ºF	SM	70	**Silty Sand (SM)** Very fine grain, loose, damp, gray, odor	14
14–16					85 86ºF	SM	70	**Silty Sand (SM)** Similar to above, odor, clayey at base	16
16–18	16-18'	1410	G/2V/2E/3J		25.7 86ºF	SW	60	**Gravelly Sand (SW)** Fine to medium grain, compact, damp, gray, 1/2 to 3/4-inch gravel	18
18								Total Depth = 18' BGL	
20									20
22									22

LOG OF BORING

RPS

Boring No.: SWMU 15-12
Start Date: 8/23/2010 1430
Finish Date: 8/23/2010 1645

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.823' W107º58.481'

Total Depth: 20' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5527.325
Site Coordinates: N 36º41'49.39326"
W 107º58'28.70265"

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
0–2	0.5-2'	1600	G/2V/ 2E/3J		2.9 83ºF 2.8 83ºF	ML	90	**Clayey Silt (ML)** Very fine grain, compact, damp, brown, no odor	2
2–4					3.2 83ºF	ML	80	**Clayey Silt (ML)** Similar to above, no odor	4
4–6					2.9 83ºF	ML	80	**Clayey Silt (ML)** Similar to above, no odor	6
6–8					2.3 83ºF	ML	80	**Clayey Silt (ML)** Similar to above, no odor	8
8–10					60 83ºF	ML	80	**Clayey Silt (ML)** Similar to above, gray, hydrocarbon odor at 9.5 feet bgl	10
10–12					280 83ºF	CL	70	**Silty Clay (CL)** Low to moderate plasticity, stiff, damp, dark brown with tan silt seams, fissured, odor	12
12–14					660 83ºF	CL	70	**Silty Clay (CL)** Similar to above, odor	14
14–16	14-16'	1610	G/2V/ 2E/3J		1325 83ºF	CL	70	**Silty Clay (CL)** Similar to above, gray, odor, becomes sandy at base	16
16–18					1058 83ºF	SM	60	**Silty Sand (SM)** Fine grain, compact, dark gray, odor, gravelly at base	18
18–20	18-20'	1620	G/2V/ 2E/3J		235 83ºF	SW	--	**Gravelly Sand (SW)** Fine to medium grain, compact, damp, gray, no odor	20
20–22								Total Depth = 20' BGL	22

LOG OF BORING

RPS

Boring No.: SWMU 15-13

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

Total Depth: 28' bgl
Ground Water: Saturated @ 26' bgl
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5526.490
Site Coordinates: N 36º41'50.71277" W 107º58'28.81921"

Start Date: 8/23/2010 1645
Finish Date: 8/23/2010 1900

Comments: Temporary well installed to collect groundwater samples. N 36º41.847' W107º58.483'

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
0–2	0.5-2'	1820	G/2V/ 2E/3J		6.7 87ºF; 334 87ºF		90	**Silt (ML)** Very fine grain, compact, damp, brown, odor at base	2
2–4					717 87ºF		90	**Silt (ML)** Similar to above, odor	4
4–6					800 87ºF		90	**Silt (ML)** Similar to above, odor	6
6–8					1168 87ºF		90	**Silt (ML)** Similar to above, odor	8
8–10					1070 87ºF		80	**Clayey Silt (ML)** Fine grain, compact, damp, brown, odor	10
10–12					1512 87ºF		80	**Clayey Silt (ML)** Similar to above, odor	12
12–14	12-14'	1830	G/2V/ 2E/3J		1727 87ºF		80	**Silty Sand (SM)** Very fine grain, loose, damp, brown, odor	14
14–16					1686 87ºF		80	**Silty Sand (SM)** Similar to above, odor, gray, silty clay at base	16
16–18					1326 87ºF		60	**Gravelly Sand (SW)** Fine to medium grain, loose, damp, gray, gravel 1/2 to 1-inch, odor	18
18–20					--		--	No recovery	20
20–22					1425 85ºF		70	**Gravelly Sand (SW)** Fine to medium grain, loose, damp, gray, odor, gravel 1/2 to 1-inch	22

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LOG OF BORING

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Boring No.: SWMU 15-13
Start Date: 8/23/2010 1645
Finish Date: 8/23/2010 1900

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

Total Depth: 28' bgl
Ground Water: Saturated @ 26' bgl
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5526.490
Site Coordinates: **N** 36º41'50.71277"
W 107º58'28.81921"

Comments: Temporary well installed to collect groundwater samples. N 36º41.847' W107º58.483'

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
24	22-25'	1840	G/2V/2E/3J		725 85ºF		60	**Gravelly Sand (SW)** Fine to medium grain, loose, damp, gray, odor, gravel 1/2 to 1-inch	24
					882 85ºF		50	**Gravelly Sand (SW)** Similar to above	
				26				Not sampled	
26					--		30	**Gravelly Sand (SW)** Similar to above, saturated, dark gray to black, odor	26
28								Total Depth = 28' BGL	28
30									30
32									32
34									34
36									36
38									38
40									40
42									42
44									44

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LOG OF BORING

Boring No.: SWMU 15-14
Start Date: 8/24/2010 1055
Finish Date: 8/24/2010 1130

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.849' W107º58.414'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5527.515
Site Coordinates: **N** 36º41'51.22151" **W** 107º58'25.34714"

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
0–2	0.5-2'	1115	G/2V/2E/3J		1.9 85ºF 1.9 85ºF		90	**Silt (ML)** Very fine grain, compact, damp, brown, no odor	2
2–4	2-4'	1120	G/1J		1.9 85ºF		80	**Silt (ML)** Similar to above, no odor	4
4–6					1.9 85ºF		80	**Silt (ML)** Similar to above, no odor	6
6								Total Depth = 6' BGL	

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LOG OF BORING

Boring No.: SWMU 15-15
Start Date: 8/24/2010 1145
Finish Date: 8/24/2010 1205

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.857' W107º58.370'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5529.270
Site Coordinates: **N** 36º41'51.43956" **W** 107º58'22.49477"

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0.5-2'	1155	G/2V/2E/3J		0.9 86ºF 0.7 86ºF		90	**Clayey Silt (ML)** Very fine grain, compact, damp, brown, no odor	0
2	2-4'	1205	G/1J		0.7 86ºF		80	**Silt (ML)** Similar to above, no odor	2
4					0.8 86ºF		80	**Silt (ML)** Similar to above, no odor	4
6								Total Depth = 6' BGL	6
8									8
10									10
12									12
14									14
16									16

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LOG OF BORING

Boring No.: SWMU 15-16
Start Date: 8/24/2010 1205
Finish Date: 8/24/2010 1240

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.844' W107º58.381'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5529.639
Site Coordinates: N 36º41'50.87342" W 107º58'23.55023"

Depth (ft.)	Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0								Ground Surface	0
0–2	0.5-2'	1225	G/2V/2E/3J		1.7 88ºF 0.8 88ºF		90	**Clayey Silt (ML)** Very fine grain, compact, damp, brown, no odor	2
2–4	2-4'	1235	G/1J		1.3 88ºF		80	**Silt (ML)** Similar to above, no odor	4
4–6					1.7 88ºF		80	**Silt (ML)** Similar to above, no odor	6
6								Total Depth = 6' BGL	6

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16

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LOG OF BORING

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Boring No.: SWMU 15-17
Start Date: 8/24/2010 1300
Finish Date: 8/24/2010 1320

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.849' W107º58.449'

Total Depth: 6' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5525.498
Site Coordinates: N 36º41'50.94745" W 107º58'27.31975"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0–2	0.5-2'	1305	G/2V/2E/3J		1.9 92ºF 1.7 92ºF		90	**Silt (ML)** Very fine grain, compact, damp, brown, no odor	0–2
2–4	2-4'	1315	G/1J		1.1 92ºF		80	**Silt (ML)** Similar to above, no odor	2–4
4–6					1.0 92ºF		80	**Silt (ML)** Similar to above, no odor	4–6
								Total Depth = 6' BGL	

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16

RPS

WELL CONSTRUCTION

Well No.: MW-68 (SWMU 15-18)

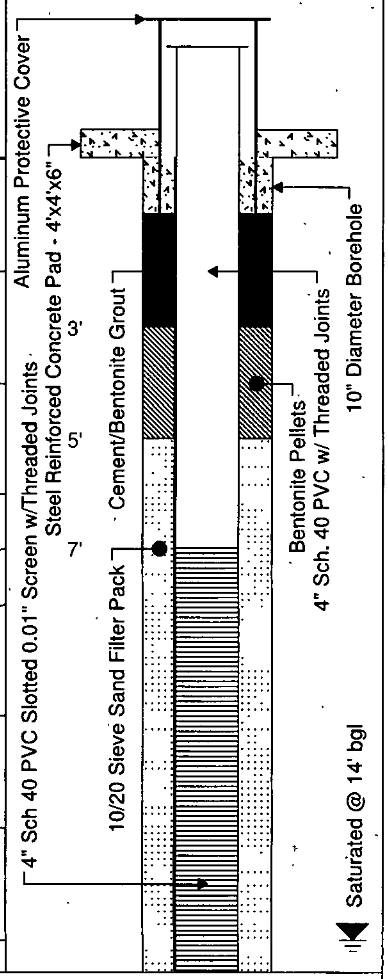
Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.957' W107º58.374'

Total Depth: 18' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 5517.372
Elev., PAD (ft. msl): 5514.291
Elev., GL (ft. msl): 5514.304
Site Coordinates:
N 36º41'57.46756"
W 107º58'22.47236"

Start Date: 8/27/2010 0845
Finish Date: 8/27/2010 1100

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
-3								
-1								Ground Surface
0–2	1.5-2'	1030	G/2V/2E/3J		0.1 72ºF; 0.2 72ºF	SM	90	**Silty Sand (SM)** Fine grain, loose, damp, brown, no odor
2–4					0.5 72ºF	SM	80	**Silty Sand (SM)** Similar to above, no odor
4–6					0.1 72ºF	SW	10	**Gravelly Sand (SW)** Fine grain, loose, gray, damp, no odor
6–7					0.1 72ºF	SW	10	**Gravelly Sand (SW)** Similar to above, no odor
7–8						SW	--	**Gravelly Sand (SW)** No recovery, similar to above
8–10					2.0 75ºF	SW	60	**Gravelly Sand (SW)** Similar to above, no odor
10–12					1.5 75ºF	SW	50	**Gravelly Sand (SW)** Similar to above, no odor
12–14	12-14'	1040	G/2V/2E/3J	14'	1.3 79ºF	SW	80	**Gravelly Sand (SW)** Similar to above, no odor, very moist to saturated at 14' bgl

Completion Results



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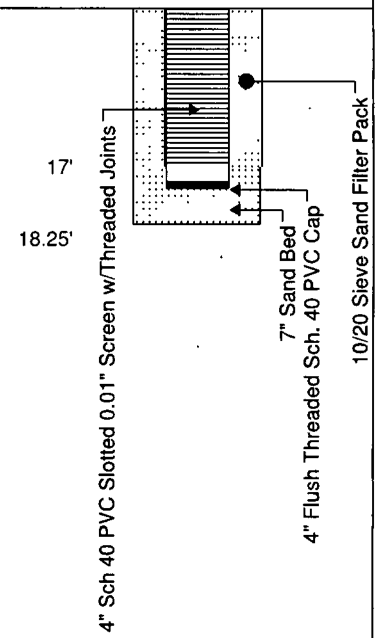
WELL CONSTRUCTION

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

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.957' W107º58.374'

Total Depth: 18' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 5517.372
Elev., PAD (ft. msl): 5514.291
Elev., GL (ft. msl): 5514.304
Site Coordinates:
N 36º41'57.46756"
W 107º58'22.47236"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Completion Results
							30	**Gravelly Sand (SW)** Similar to above, saturated, no odor	
16							80	**Gravelly Sand (SW)** Similar to above, saturated, no odor	
							100	**Weathered Sandstone (SS)** Fine to medium grain, dense, friable, damp, light brown to tan	
18								Total Depth = 18' BGL	
20									
22									
24									
26									
28									
30									



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LOG OF BORING

Boring No.: SWMU 15-19
Start Date: 8/30/2010 1530
Finish Date: 8/30/2010 1620

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: RPS
Drilling Rig: NA
Drilling Method: Hand Auger
Sampling Method: Auger Bucket
Comments: N 36º41.840' W107º58.522'

Total Depth: 3' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5527.071
Site Coordinates: N 36º41'50.33526" W 107º58'31.21802"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0					0.9 83ºF			Ground Surface	0
	0.5-2' &Dup	1600	G/4V/ 4E/6J		0.9 83ºF	SM	100	**Silty Sand (SM)** Fine grain, loose to compact, damp, brown, no odor	
2	2-3'	1610	G/1J		1.2 83ºF				2
								Total Depth = 3' BGL	
4									4
6									6
8									8
10									10
12									12
14									14
16									16

RPS

LOG OF BORING

Boring No.: SWMU 15-20
Start Date: 8/30/2010 1620
Finish Date: 8/30/2010 1710

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: RPS
Drilling Rig: NA
Drilling Method: Hand Auger
Sampling Method: Auger Bucket
Comments: N 36º41.879' W107º58.526'

Total Depth: 3' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5526.326
Site Coordinates: N 36º41'52.52834"
W 107º58'31.44763"

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
	0.5-2'	1650	G/2V/2E/3J		0.8 82ºF 0.9 82ºF	SM	100	**Silty Sand (SM)** Very fine grain, compact, damp, brown, no odor	
2	2-3'	1700	G/1J		1.7 82ºF				2
								Total Depth = 3' BGL	
4									4
6									6
8									8
10									10
12									12
14									14
16									16

RPS

LOG OF BORING

Boring No.: SWMU 15-21

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: RPS
Drilling Rig: NA
Drilling Method: Hand Auger
Sampling Method: Auger Bucket
Comments: N 36º41.860' W107º58.398'

Total Depth: 3' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5530.185
Site Coordinates: **N** 36º41'51.48961" **W** 107º58'23.83081"

Start Date: 8/30/2010 1715
Finish Date: 8/30/2010 1745

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0					1.5 83ºF			**Clayey Silt (ML)** Very fine grain, compact, damp, dark brown, no odor	0
	0.5-2'	1730	G/2V/2E/3J		1.3 83ºF		100		
2	2-3'	1740	G/1J		1.4 83ºF				2
								Total Depth = 3' BGL	
4									4
6									6
8									8
10									10
12									12
14									14
16									16

RPS

WELL CONSTRUCTION

Well No.: MW-69 (SWMU15-22)

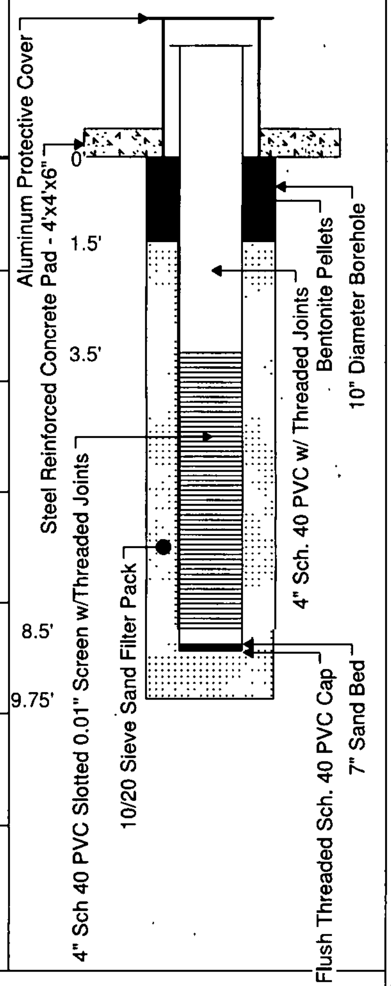
Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger
Sampling Method: Split Spoon
Comments: N 36º41.987' W107º58.372'

Total Depth: 12' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 5508.513
Elev., PAD (ft. msl): 5505.487
Elev., GL (ft. msl): 5505.201
Site Coordinates:
N 36º41'59.30045"
W 107º58'22.33410"

Start Date: 8/31/2010 0830
Finish Date: 8/31/2010 1130

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
-3 to 0								Ground Surface
0–2	0.5-2'	1005	G/2V/2E/3J		1.3 70ºF	SW	90	**Gravelly Sand (SW)** Fine grain, loose, damp, gray, no odor
2–4	2-4'	1015	G/2V/2E/3J		1.7 71ºF; 2.2 73ºF	SW	60	**Gravelly Sand (SW)** Similar to above, no odor, gravel 1/4-inch to 1-inch
4–6					2.2 74ºF	SW	50	**Gravelly Sand (SW)** Similar to above, no odor
6–8					2.8 74ºF	SW	10	**Gravelly Sand (SW)** Similar to above, no odor
8–10					2.9 79ºF	SS	100	**Weathered Sandstone (SS)** Fine grain, compact/dense, damp, light tan, no odor
10–12					2.7 79ºF	SS	100	**Weathered Sandstone (SS)** Similar to above
12								Total Depth = 12' BGL

Completion Results



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LOG OF BORING

Boring No.: SWMU 15-23
Start Date: 9/1/2010 0720
Finish Date: 9/1/2010 0740

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: RPS
Drilling Rig: NA
Drilling Method: Hand Auger
Sampling Method: Auger Bucket
Comments: N 36º41.890' W107º58.276'

Total Depth: 3' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5530.911
Site Coordinates: N 36º41'53.43339"
W 107º58'16.75040"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0	0.5-2' &Dup	0730	G/4V/ 4E/6J		0 3 52ºF 0.4 52ºF	SM/SC	100	**Silty Sand/Clayey Sand (SM/SC)** Very fine grain, compact, brown, damp, no odor	0
2	2-3'	0740	G/1J		0.8 52ºF				2
								Total Depth = 3' BGL	
4									4
6									6
8									8
10									10
12									12
14									14
16									16

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

361/855-7335
361/855-7410 fax

RPS

LOG OF BORING

Boring No.: SWMU 15-24
Start Date: 9/1/2010 0800
Finish Date: 9/1/2010 0825

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: RPS
Drilling Rig: NA
Drilling Method: Hand Auger
Sampling Method: Auger Bucket
Comments: N 36º41.825' W107º58.391'

Total Depth: 3' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5529.992
Site Coordinates: N 36º41'49.56294" W 107º58'23.53449"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
0					0.4 58ºF			Ground Surface	0
	0.5-2'	0815	G/2V/2E/3J		0.5 58ºF	SM/SC	100	**Silty Sand/Clayey Sand (SM/SC)** Very fine grain, compact, damp, brown, no odor	
2	2-3'	0825	G/1J		0.5 58ºF				2
3								Total Depth = 3' BGL	
4									4
6									6
8									8
10									10
12									12
14									14
16									16

RPS

LOG OF BORING

Boring No.: SWMU 15-25

Client: Western Refining Southwest, Inc.
Site: SWMU Group #5, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: RPS
Drilling Rig: NA
Drilling Method: Hand Auger
Sampling Method: Auger Bucket
Comments: N 36º41.824' W107º58.531'

Total Depth: 3' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 5527.098
Site Coordinates: **N** 36º41'49.28491" **W** 107º58'31.89329"

Start Date: 9/1/2010 0835
Finish Date: 9/1/2010 0855

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/ Containe/No.	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description	Depth (ft.)
								Ground Surface	
0					0.9 62ºF			**Silty Sand (SM)** Very fine grain, compact, damp, brown, no odor	0
	0.5-2'	0845	G/2V/2E/3J		1.1 62ºF		100		
2	2-3'	0855	G/1J		1.0 62ºF				2
								Total Depth = 3' BGL	
4									4
6									6
8									8
10									10
12									12
14									14
16									16

Appendix D

Site-Specific Dilution/Attenuation Factor Calculations

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   in - inch
C- Celsius   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

NO PICTURE AVAILABLE

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.

- Overview of the Western Regional Climate Center
- Roles of the Regional Climate Centers in Climate Sevices
- Pricing and Formats
- DRI Home Page
- Weather Info (DRI ACCESS ONLY)
- WRCC Software Library (restricted access)
- DRI LDM Logs (ldmd, netcheck and syscheck)

Division of Atmospheric Sciences

DRI
Desert Research Institute

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

$8.4 \frac{\text{miles}}{\text{hr}} \times \frac{1 \text{ kilo}}{.62 \text{ miles}} = 13.5$ km/hr

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

Appendix E

TPH Screening Level Calculations

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 9
Combined Exposures to Noncarcinogenic Contaminants in Soil
Non-Residential Scenario - Commercial/Industrial Scenario

$$C = \frac{THQ \times AT_N \times BW_A}{EF_{CI} \times ED_{CI}\left[\left(\frac{IR_{CI}}{RfD_o \times 10^6}\right) + \left(\frac{SA_{CI} \times AF_{CI} \times ABS}{RfD_o \times 10^6}\right) + \left(\frac{ET_{CI}}{RFC \times (VF + PEF)}\right)\right]}$$

Parameter	Definition (units)	NMED Default	TPH C11-C21 Aromatics
C	Contaminant concentration (mg/kg)	--	**2.05E+04**
THQ	Target hazard quotient	1	1
BW_a	Body weight, adult(kg)	70	70
AT_n	Averaging time, noncarcinogens, ED x 365 (days)	9125	9125
EF_{CI}	Exposure frequency, commercial/industrial (days/yr)	225	225
ED_{CI}	Exposure duration, commercial/industrial(yr)	25	25
IR_{CI}	Soil ingestion rate, commercial/industrial (mg/day)	100	100
RfDo	Oral reference dose (mg/kg-day)	--	**0.03**
SA_{CI}	Dermal surface area, commercial/industial (cm^2/day)	3300	3300
AF_{CI}	Soil adherance factor, commercial/industrial (mg/cm^2)	0.2	0.2
ABS	Skin absorbtion factor (unitless)	--	**0.1**
ET_{CI}	Exposure time (8 hrs/day per 1 day/24 hr)	0.33	0.33
RfC	Reference concentration (mg/m^3)	--	**0.33**
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
34066.66667	51616.16162	7.51E+11

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 11
Combined Exposures to Noncarcinogenic Contaminants in Soil
Non-Residential Scenario - Construction Worker Scenario

$$C = \frac{THQ \times AT_N \times BW_A}{EF_{CW} \times ED_{CW}\left[\left(\frac{IR_{CW}}{RfD_o \times 10^6}\right) + \left(\frac{SA_{CW} \times AF_{CW} \times ABS}{RfD_o \times 10^6}\right) + \left(\frac{ET_{CW}}{RFC \times (VF + PEF)}\right)\right]}$$

Parameter	Definition (units)	NMED Default	TPH C11-C21 Aromatics
C	Contaminant concentration (mg/kg)	--	**7.15E+03**
THQ	Target hazard quotient	1	1
BW_a	Body weight, adult(kg)	70	70
AT_n	Averaging time, noncarcinogens, ED x 365 (days)	365	365
EF_{CW}	Exposure frequency, commercial/industrial (days/yr)	250	250
ED_{CW}	Exposure duration, commercial/industrial(yr)	1	1
IR_{CW}	Soil ingestion rate, commercial/industrial (mg/day)	330	330
RfDo	Oral reference dose (mg/kg-day)	--	**0.03**
SA_{CW}	Dermal surface area, commercial/industial (cm^2/day)	3300	3300
AF_{CW}	Soil adherance factor, commercial/industrial (mg/cm^2)	0.3	0.3
ABS	Skin absorbtion factor (unitless)	--	**0.1**
ET_{CW}	Exposure time (8 hrs/day per 1 day/24 hr)	0.33	0.33
RfC	Reference concentration (mg/m^3)	--	**0.33**
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
9290.9091	30969.7	6.76E+11

Equations and Default values from New Mexico Enviroment Department's Technical Background
Toxicity factors from Massachusetts Department of Environmental Protection Masschusetts

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

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

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

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 ($n-\Theta_w$)	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

Appendix F

Analytical Data Reports

Chain-of-Cust[redacted]ecord

Client: Western Refining - Bloomfield Refinery

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other______

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush______

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: X Yes ☐ No

Sample Temperature: 1.5

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

15

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1008323	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
8/20/10	810	Soil	SWMU 15-7 (0.5-2.0')	2 encore	None	1	X								
↓	↓	↓	↓	2 vials	MeOH	1	X								
↓	↓	↓	↓	3 Jars	None	1	X	X	X	X	X	X			
8/20/10	820	Soil	SWMU 15-7 (2-4')	1 Jar	↓	2			X	X	X				
8/20/10	900	Soil	SWMU 15-8 (0-0.5')	2 encore		3	X								
↓	↓	↓	↓	2 vials		3	X								
↓	↓	↓	↓	3 Jars		3	X	X	X	X	X	X			
8/20/10	910	Soil	SWMU 15-8 (0.5-2.0')	2 encore		4	X								
↓	↓	↓	↓	2 vials		4	X								
↓	↓	↓	↓	3 Jars		4	X	X	X	X	X	X			
↓	920	Soil	SWMU 15-8 (2-4')	1 Jar		5			X	X	X				

Date:	Time:	Relinquished by:	Received by:	Date	Time
			[signature]	8/20/10	1510
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: See Attachment for analyte 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

Client: Western Refining - Bloomfield Refinery

Mailing Address: 50 Road 4990

Phone #: 505-632-4166

email or Fax#: kelly.robinson@wnr.com

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

Accreditation:
☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:
X Standard ☐ Rush

Project Name:
RCRA Investigation - GROUP 5

Project #:

Project Manager:
Kelly Robinson

Sampler: Tracy Payne / Kelly Robinson

On Ice: Yes No

Sample Temperature

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

f6

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1008[illegible]	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
	1005	Soil	SWMU 15-9 (0.5-2.0')	2 encore	None	6	X								
	↓	↓	↓	2 vials	MeOH	6	X								
				3 Jars	None	6	X	X	X	X	X	X			
	1015	Soil	SWMU 15-9 (4-6')	1 Jar	None	7			X	X	X				
	1015	Soil	SWMU 15-9 (4-6') DUP	1 Jar	↓	8			X	X	X				
	1105	Soil	SWMU 15-10 (0.5-2.0')	2 encore		9	X								
	↓	↓	↓	2 vials		9	X								
				1 Jar		9	X	X	X	X	X	X			
	1115	Soil	SWMU 15-10 (4-6')	1 Jar		10			X	X	X				
			MeOH Blank			11									

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/20/10	1300	Kelly Robinson	[signature]	8/20/10	
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:
See attachment

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.

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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.

Groundwater and 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

Total Metals

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

Chain-of-Custody Record

Cooler #2 8/20/10

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

13

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

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

Accreditation:
☐ NELAP ☐ Other
X EDD (Type) Excel

Turn-Around Time:
X Standard ☐ Rush

Project Name:
RCRA Investigation - GROUP 5

Project #:

Project Manager:
Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: Yes No

Sample Temperature:

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1008356	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)								Air Bubbles (Y or N)
8/19/10	1325	Soil	SWMU 15-3 (0.5-2.0')	2 encore	None	1	X															
↓	↓	↓	↓	2 vials	MeOH	1	X															
↓	↓	↓	↓	3 Jars	None	1	X	X	X	X	X	X										
↓	1420	Soil	SWMU 15-4 (0.5-2.0')	2 encore	↓	2	X															
↓	↓	↓	↓	2 vials	MeOH	2	X															
↓	↓	↓	↓	3 Jars	None	2	X	X	X	X	X	X										
↓	1520	Soil	SWMU 15-5 (0.5-2.0')	2 encore	↓	3	X															
↓	↓	↓	↓	2 vials	MeOH	3	X															
↓	↓	↓	↓	3 Jars	None	3	X	X	X	X	X	X										
↓	1530	Soil	SWMU 15-5 (8-10')	1 Jar	None	4			X	X	X											

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/20/10	1300	Kelly Robinson	[signature]	8/20/10	1515
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:
See attached for analyte 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

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: Yes No

Sample Temperature:

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

14

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1008[illegible]	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
8/19/10	1630	Soil	Swmu 15-6 (0.5-2.0')	2 encore	None	5	X								
	↓	↓	↓	2 vials	MeOH	5	X								
	↓	↓	↓	3 Jars	None	5	X	X	X	X	X	X			
	1630	Soil	Swmu 15-6 (0.5-2.0) DUP	2 encore	↓	6	X								
	↓	↓	↓	2 vials	MeOH	6	X								
	↓	↓	↓	3 Jars	None	6	X	X	X	X	X	X			
	~~1640~~	~~Soil~~	~~Swmu 15-6 (8-10')~~	~~2 encore~~											
	~~↓~~	~~↓~~	~~↓~~	~~2 vials~~											
	~~↓~~	~~↓~~	~~↓~~	~~3 jars~~											
	1640	Soil	Swmu 15-6 (8-10')	1 Jar		7			X	X	X				

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/20/10	1300	Kelly Robinson	[signature]	8/20/10	1520
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: See attached for analyte 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.

SWMU 15 – TANK FARM

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- 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

Groundwater and 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

Total Metals

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

N/A

Chain-of-Custody Record

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

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

Accreditation:
☐ NELAP ☐ Other
X EDD (Type) Excel

Turn-Around Time:
X Standard ☐ Rush

Project Name:
RCRA Investigation - GROUP 5

Project #:

Project Manager:
Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**
On Ice: Yes No
Sample Temperature:

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

11

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1008853	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remark	Air Bubbles (Y or N)
8/19/10	830	Soil	SWMU 15-1 (0.5-2.0')	2 encore	None	1	X								
↓	↓	↓	↓	2 VIALS	MeOH	1	X								
↓	↓	↓	↓	3 Jars	None	1	X	X	X	X	X	X			
↓	910	Soil	SWMU 15-2 (0.5-2.0')	2 encore	↓	2	X								
↓	↓	↓	↓	2 VIALS	MeOH	2	X								
↓	↓	↓	↓	3 Jars	None	2	X	X	X	X	X	X			
↓	920	Soil	SWMU 15-2 (4-6')	2 encore	↓	3	X								
↓	↓	↓	↓	2 VIALS	MeOH	3	X								
↓	↓	↓	↓	3 Jars	None	3	X	X	X	X	X	X			
↓	1045	Soil	SWMU 15-2 (10-14')	2 encore	↓	4	X								
↓	↓	↓	↓	2 VIALS	MeOH	4	X								
↓	↓	↓	↓	3 Jars	None	4	X	X	X	X	X	X			

Date: 8/20/10 Time: 1400 Relinquished by: Kelly Robinson
Received by: [signature] Date 8/20/10 Time 1510

Date: Time: Relinquished by:
Received by: Date Time

Remarks:
See Attachment for full analyte list

Chain-of-Custody Record

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: Yes No

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. 1008353	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Cyanide	Air Bubbles (Y or N)
8/19/10	11:10	GW	SWMU 15-2 (GW)	6 VOAs	HCl	5	X			X						
				1 amber	None	5		X	X		X					
				1 Poly	NaOH	5									X	
				3 Poly	HNO_3	5						X	X			
				1 Poly	H_2SO_4	5										
				1 Poly	None	5								X		
—	—	GW	Trip Blank	3 VOAs	HCl	6	X									
~~8/19/10~~	~~10:45~~	~~Soil~~	~~SWMU 15-2 (10-11')~~	~~2 amber~~	~~None~~	~~7~~	~~X~~									
				2 vials	MeOH	~~7~~	~~X~~									
AT 8/20/10				3 Jars	None	~~7~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~				
		AT 8/20/10 MeOH Blank				-8										

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/20/10	1400	Kelly Robinson	[signature]	8/20/10	1500
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

See attachment for full analyte 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.

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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 and GW

Groundwater and soil samples will also be analyzed for the following metals and cyanide using the indicated analytical methods.

For Soil and Groundwater

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

Total Metals Analysis

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

Total Metals Only

For Groundwater Samples

Chain-of-Custody Record

Client: **Western Refining - Bloomfield Refinery**

Mailing Address: **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: Yes No

Sample Temperature:

HALL ENVIRONMENTAL ANALYSIS LABORATORY (17)

www.hallenvironmental.com Monday 8/23

4901 Hawkins NE - Albuquerque, NM 87109 Sent Today

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1008412	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
8/23/10	1345	Soil	SWMU 15-11 (0.5-2.0')	2 encore	None	1	X								
↓	↓	↓	↓	2 vials	MeOH	1	X								
	↓	↓	↓	3 Jar	None	1	X	X	X	X	X	X			
	1400	Soil	SWMU 15-11 (4-6')	2 encore	↓	2	X								
	↓	↓	↓	2 vials	MeOH	2	X								
	↓	↓	↓	3 Jar	None	2	X	X	X	X	X	X			
	1410	Soil	SWMU 15-11 (16-18')	2 encore	↓	3	X								
	↓	↓	↓	2 vials	MeOH	3	X								
	↓	↓	↓	2 Jar	None	3	X	X	X	X	X	X			
	1600	Soil	SWMU 15-12 (0.5-2.0')	2 encore	↓	4	X								
	↓	↓	↓	2 vials	MeOH	4	X								
	↓	↓	↓	3 Jars	None	4	X	X	X	X	X	X			

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/24/10	1500	Kelly Robinson	[signature]	8/25/10	10:15
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: See attached for analyte list. SWMU 15-11 (16-18') limited soil for analysis. Jar may not be needed for VOC analysis.

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.

1

Chain-of-Custody Record

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

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

Accreditation:
☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:
X Standard ☐ Rush

Project Name:
RCRA Investigation - GROUP 5

Project #:

Project Manager:
Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: Yes No

Sample Temperature: [illegible]

(18)

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Sent Tues

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1008412	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
8/23/10	1610	Soil	SWMU 15-12 (14-16')	2 encore	None	5	X								
	↓	↓	↓	2 vials	MeOH	5	X								
	↓	↓	↓	3 Jars	None	5	X	X	X	X	X	X			
	1620	Soil	SWMU 15-12 (18-20')	2 encore	↓	6	X								
	↓	↓		2 vials	MeOH	6	X								
	↓	↓		3 Jars	None	6	X	X	X	X	X	X			
	1820	Soil	SWMU 15-13 (0.5-2.0')	2 encore	↓	7	X								
	↓	↓	↓	2 vials	MeOH	7	X								
	↓	↓	↓	3 Jars	None	7	X	X	X	X	X	X			
	1930	Soil	SWMU 15-13 (12-14')	2 encore	↓	8	X								
	↓	↓	↓	2 vials	MeOH	8	X								
	↓	↓	↓	3 Jars	None	8	X	X	X	X	X	X			

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/24/10	1500	Kelly Robinson	[signature]	8/25/10	10:15
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:
See attached for analyte 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.

[redacted]

Chain-of-Custody Record

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: X Yes No

Sample Temperature: [illegible]

(19)

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. [illegible]	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
8/23/10	1840	Soil	SWMU 15-13 (22-25')	2 encore		9	X								
↓	↓	↓	↓	2 vials		9	X								
				3 Jars		9	X	X	X	X	X	X			

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/24/10	1500	Kelly Robinson		8/25/10	10:15
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

See attached for analyte 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 the analytical report.

For COC 17-19

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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 and Groundwater

Groundwater and 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

Total Metals

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

Chain-of-Custody Record

Client: Western Refining - Bloomfield Refinery

Mailing Address 50 Road 4990

Phone #: 505-632-4166

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: Tracy Payne / Kelly Robinson

HALL ENVIRONMENTAL ANALYSIS LABORATORY

20

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		VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remark	Cyanide	Nitrate, Nitrite						Air Bubbles (Y or N)
8/24/10	0800	GW	SWMU 15-13 (GW)	6 VOAs	HCl	1	X			X	X											
				1 amber	None	1		X	X													
				1 Poly	NaOH	1									X							
				3 Poly	HNO_3	1						X	X									
				1 Poly	H_2SO_4	1										X						
				1 Poly	None	1								X								
8/24/10	1115	Soil ~~HS~~	SWMU 15-14 (0.5-2.0')	2 encore	None	2	X															
				2 vials	MeOH	2	X															
				3 Jars	None	2	X	X	X	X	X	X										
8/24/10	1125	Soil	SWMU 15-14 (2-4')	1 Jar	None	3			X	X	X											
8/24/10	1405	Soil	SWMU 15-4 (2-3')	1 Jar		4			X	X	X											
8/24/10	1350	Soil	SWMU 15-3 (2-4')	1 Jar		5			X	X	X											

Date: 8/24/10 Time: 1500 Relinquished by: Kelly Robinson

Received by: [signature] 10:15 Date 8/25/10 Time

Date: Time: Relinquished by:

Received by: Date Time

Remarks: See attached for analyte 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.

[redacted]

Chain-of-Custody Record

Client: Western Refining - Bloomfield Refinery

Mailing Address: 50 Road 4990

Phone #: 505-632-4166

email or Fax#: kelly.robinson@wnr.com

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

Accreditation:
☐ NELAP ☐ Other ______
X EDD (Type) Excel

Turn-Around Time:
X Standard ☐ Rush ______

Project Name:
RCRA Investigation - GROUP 5

Project #:

Project Manager:
Kelly Robinson

Sampler: Tracy Payne / Kelly Robinson

21

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	[illegible]	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
8/24/10	1155	Soil	SWMU 15-15 (0.5-2.0')	2 encore	None	6	X								
	↓	↓	↓	2 vials	MeOH	6	X								
				3 Jar	None	6	X	X	X	X	X	X			
	1205	Soil	SWMU 15-15 (2-4')	1 Jar	None	7			X	X	X				
	1225	Soil	SWMU 15-16 (0.5-2.0')	2 encore	None	8	X								
	↓	↓	↓	2 vials	MeOH	8	X								
				3 Jar	None	8	X	X	X	X	X	X			
	1235	Soil	SWMU 15-16 (2-4')	(1) Jar	None	9			X	X	X				
	1305	Soil	SWMU 15-17 (0.5-2.0')	2 encore	None	10	X								
	↓	↓	↓	2 vials	MeOH	10	X								
				3 Jar	None	10	X	X	X	X	X	X			
	1315	Soil	SWMU 15-17 (2-4')	1 Jar	None	11			X	X	X				

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/24/10	1500	Kelly Robinson	[signature]	8/25/10	10:15
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: Trip Blank - 11
See attached for analyte 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.

MeOH Blank 12 AT 8/25/10

FOR COC 20 -21

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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.

GW and Soil Samples

Groundwater and soil samples will also be analyzed for the following metals and cyanide using the indicated analytical methods.

TOTAL Metals Analysis

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

GW and Soil Samples

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

	Analyte	Analytical Method
	Total Dissolved Solids	SM-2540C
	Bicarbonate	SM-2320B
	Chloride	EPA method 300.0
	Sulfate	EPA method 300.0
	Calcium	EPA method 6010/6020
Total Metals	Magnesium	EPA method 6010/6020
	Sodium	EPA method 6010/6020
	Potassium	EPA method 6010/6020
Total Metals	Manganese	SW-846 method 6010/6020
	Nitrate/nitrite	EPA method 300.0
	Ferric/ferrous iron	SW-846 method 6010/6020 & SM 3500Fe2+

Chain-of-Custody Record

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: Yes No

Sample Temperature:

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

22

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)								Air Bubbles (Y or N)
8/24/10	1510	Soil	SWMU 15-1 (2-4')	(1) Jar ~~2 encore~~	None	1008B18			X	X	X											
				~~2 vials~~																		
				~~3 Jars~~																		

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/25/10	1500	Kelly Robinson	M. Walters	8/26/10	10:00
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: Analyze for TPHs only.

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

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: Yes No

Sample Temperature:

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

38

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
8/27/10	1030	Soil	SWMU 15-18 (0.5-2.0')	2 encore	None	1008B30-1	X								
↓	↓	↓	↓	2 vials	MeOH	-1	X								
↓	↓	↓	↓	3 Jars	None	-1	X	X	X	X	X	X			
8/27/10	1040	Soil	SWMU 15-18 (12-14')	2 encore	↓	-2	X								
↓	↓	↓	↓	2 vials	MeOH	-2	X								
↓	↓	↓	↓	3 Jars	None	-2	X	X	X	X	X	X			

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/27/10	1200	Kelly Robinson	[signature]	8/27/10	1530
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

See attached

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

For COC 32

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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.

Groundwater and 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

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

NA

Chain-of-Custody Record

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: X Yes No

Sample Temperature: [illegible]

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. [illegible]	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Air Bubbles (Y or N)
8/30/10	1600	Soil	SWMU 15-19 (0.5-2.0')	2 encore	None	1	X								
↓	↓	↓	↓	2 vials	MeOH	1	X								
				3 Jars	None	1	X	X	X	X	X	X			
	1600	Soil	SWMU 15-19 (0.5-2.0)	Dup 2 encore	↓	2	X								
	↓	↓	↓	2 vials	MeOH	2	X								
				3 Jars	None	2	X	X	X	X	X	X			
	1610	Soil	SWMU 15-19 (2-3')	(1) Jar	None	3			X	X	X				
	1650	Soil	SWMU 15-20 (0.5-2.0')	2 encore	↓	4	X								
	↓	↓	↓	2 vials	MeOH	4	X								
				3 Jars	None	4	X	X	X	X	X	X			
↓	1700	Soil	SWMU 15-20 (2-3')	1 Jar	None	5			X	X	X				

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/31/10	1500	Kelly Robinson	To UPS - overnight		
Date:	Time:	Relinquished by:	Received by: [signature]	9/1/10	10:00

Remarks:

See attached for analyte 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

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other________

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush________

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice ☐ Yes ☐ No

Sample Temperature

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. [illegible]	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)								Air Bubbles (Y or N)
8/30/10	1730	Soil	SWMU 15-21 (0.5-2.0')	2 encore		6	X															
↓	↓	↓	↓	2 vials		6	X															
				3 Jar		6	X	X	X	X	X	X										
	1740	Soil	SWMU 15-21 (2-3')	1 Jar		7			X	X	X											
8/31/10	1005	Soil	SWMU 15-22 (0.5-2.0')	2 encore		8	X															
↓	↓	↓	↓	2 vials		8	X															
				3 Jar		8	X	X	X	X	X	X										
8/31/10	1015	Soil	SWMU 15-22 (2-4')	1 Jar		9			X	X	X											
			~~Meoh Blank~~			~~-10~~																

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/31/10	1500	Kelly Robinson	To UPS - overnight		
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: See attached for analyte 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.

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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

Groundwater and 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

Total Metals

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

NA

Chain-of-Custody Record

Client: Western Refining - Bloomfield Refinery

Mailing Address: 50 Road 4990

Phone #: 505-632-4166

email or Fax#: kelly.robinson@wnr.com

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

Accreditation:
☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:
X Standard ☐ Rush

Project Name:
RCRA Investigation - GROUP 5

Project #:

Project Manager:
Kelly Robinson

Sampler: Tracy Payne / Kelly Robinson

On Ice: X Yes No

Sample Temperature: 3.3

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. 1009101	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)								Air Bubbles (Y or N)
9/1/10	730	Soil	SWMU 15-23 (0.5-2.0')	2 encore	None	1	X															
↓	↓	↓	↓	2 vials	MeOH	1	X															
↓	↓	↓	↓	3 Jars	None	1	X	X	X	X	X	X										
↓	↓	Soil	SWMU 15-23 (0.5-2.0) DUP	~~encore~~	↓	2	X															
↓	↓	↓	↓	2 vials	MeOH	2	X															
↓	↓	↓	↓	3 Jars	None	2	X	X	X	X	X	X										
↓	740	Soil	SWMU 15-23 (2-3')	1 Jar	None	3			X	X	X											
↓	815	Soil	SWMU 15-24 (0.5-2.0')	2 encore	None	4	X															
↓	↓	↓	↓	2 vials	MeOH	4	X															
↓	↓	↓	↓	3 Jars	None	4	X	X	X	X	X	X										
↓	825	Soil	SWMU 15-24 (2-3')	1 Jar	↓	5			X	X	X											

Date:	Time:	Relinquished by:	Received by:	Date	Time
9/1/10	1500	[signature]	[signature]	9/2/10	18:25
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:
See Attached for Analyte 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

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other______

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush______

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice X Yes ☐ No

Sample Temperature 2.5

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. [illegible]	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)								Air Bubbles (Y or N)
9/1/10	845	Soil	SWMU 15-25 (0.5-2.0')	2 encore		6	X															
↓	↓	↓	↓	2 vials		6	X															
↓	↓	↓	↓	3 Jars		6	X	X	X	X	X	X										
↓	855	Soil	SWMU 15-25 (2-3')	1 Jar		~~6~~ 7			X	X	X											
						8																
			MeOH Blank																			

Date:	Time:	Relinquished by:	Received by:	Date	Time
9/1/10	1500	Kelly Robinson	[signature]	9/2/10	10:25
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: See attached for analyte 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.

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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.

*

Groundwater and 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

*

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

Chain-of-Custody Record

Client: **Western Refining - Bloomfield Refinery**

Mailing Address **50 Road 4990**

Phone #: **505-632-4166**

email or Fax#: kelly.robinson@wnr.com

QA/QC Package:

☐ Standard X Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:

X Standard ☐ Rush

Project Name:

RCRA Investigation - GROUP 5

Project #:

Project Manager:

Kelly Robinson

Sampler: **Tracy Payne / Kelly Robinson**

On Ice: X Yes ☐ No

Sample Temperature: 3.4

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. 1009355	VOCs - 8260	SVOCs - 8270	TPH - DRO (8015B)	TPH - GRO (8015B)	TPH - MRO (8015B)	Total Metals (See Remarks)	Dissolved Metals (See Remarks)	General Chemistry (See Remarks)	Cyanide	Nitrate / Nitrite	Air Bubbles (Y or N)
9/7/10	1230	GW	MW-68	6 VOAs	HCl	1	X			X							
				1 amber	None	1		X	X		X						
				3 Poly	HNO_3	1						X	X				
				1 Poly	None	1								X			
				1 Poly	NaOH	1									X		
				1 Poly	H_2SO_4	1										X	
9/7/10	1230	GW	MW-68 (DUP)	6 VOAs	HCl	2	X			X							
				1 amber	None	2		X	X		X						
				3 Poly	HNO_3	2						X	X				
				1 Poly	None	2								X			
				1 Poly	NaOH	2									X		
				1 Poly	H_2SO_4	2										X	

Date:	Time:	Relinquished by:	Received by:	Date	Time
9/7/10	1500	Kelly Robinson	TO UPS		
Date:	Time:	Relinquished by:	Received by:	Date	Time
			[signature]	9/8/10	11:05

Remarks: Run as a stand alone report. See attached for full analyte 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.

SWMU 15 – TANK FARM – Group 5

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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.

Groundwater and 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

Total Metals.

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

Total Metals

Total Metals.

COC 1 of 1

Chain-of-Custody Record

Client: Western Refining - Bloomfield Refinery

Mailing Address: 50 Road 4990

Phone #: 505-632-4166

email or Fax#:

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

Accreditation
☐ NELAP ☐ Other

☒ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: RCRA Investigation

Project #:

Project Manager: Kelly Robinson

Sampler: Kelly Robinson

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.4°

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. 1012099	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (~~Method 418.1~~) GRO DRO MRO	EDB (Method 504.1)	8310 (PNA or PAH)	~~RCRA 8~~ Metals (Dissolved)	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Total Metals (see attached)	General Chemistry	Nitrate/Nitrite	Cyanide	Air Bubbles (Y or N)
12/1/10	1430	GW	FB-120110	6 VOAs	HCl	-1				X						X						
				1 amber	None	-1				X							X					
				3 Poly	HNO_3	-1							X					X				
				1 Poly	None	-1													X			
				1 Poly	NaOH	-1															X	
				1 Poly	H_2SO_4	-1														X		

Date	Time	Relinquished by	Received by	Date	Time
12/1/10	1500	Kelly Robinson	TO UPS		
			Michelle Garcia	12/2/10	10:15

Remarks: See Attached

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.

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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.

Groundwater and 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

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

Chain-of-Custody Record

1 of 1

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

Phone #: 505-632-4166
email or Fax#: Kelly.robinson@wnr.com
QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)
Accreditation
☐ NELAP ☐ Other
☒ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush
Project Name: RCRA INVESTIGATION - Group 5
Project #:
Project Manager: Kelly Robinson
Sampler: Kelly Robinson
On Ice: ☒ Yes ☐ No
Sample Temperature: 1.4°

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1012096	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (~~Method 418.1~~) GRO/DRO/MRO	EDB (Method 504.1)	8310 (PNA or PAH)	~~RCRA 8~~ Metals (Dissolved)	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Total Metals (See attached)	General Chemistry	Nitrate/Nitrite	Cyanide	Air Bubbles (Y or N)
12/1/10	1300	GW	MW-68	6 VOAs	HCl	-1				X						X						
				1 Amber	None	-1				X							X					
				3 Poly	HNO_3	-1							X					X				
				1 Poly	None	-1													X			
				1 Poly	NaOH	-1															X	
				1 Poly	H_2SO_4	-1														X		
			MW-68 (DUP)	6 VOAs	HCl	-2				X						X						
				1 Amber	None	-2				X							X					
				3 Poly	HNO_3	-2							X					X				
				1 Poly	None	-2													X			
				1 Poly	~~H~~NaOH	-2															X	
				1 Poly	H_2SO_4	-2														X		

Date:	Time:	Relinquished by:	Received by:	Date	Time
12/1/10	1500	Kelly Robinson	TOUPS		
Date:	Time:	Relinquished by:	Received by: Michelle Garcia	12/2/10	10:15

Remarks: Trip Blank - 3 ~~AT~~ 12/02/10
See attached for analyte list
Separate Report

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.

SWMU 15 – TANK FARM

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.

Soil samples collected below a depth of two feet from soils without any indication of impacts, which may be used to determine vertical delineation, will be analyzed only by SW-846 Method 8015B for gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics. All other soil and all groundwater 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.

Groundwater and soil samples will also be analyzed for the following metals and cyanide using the indicated analytical methods.

TOTAL metals

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

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

COC 1 of 1

Chain-of-Custody Record

Client: Western Refining

Mailing Address: 50 Road 4990
Bloomfield, NM 87413

Phone #:

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 5-RCRA INVESTIGATION

Project #:

Project Manager: Kelly Robinson

Sampler: Kelly Robinson

On Ice: ☒ Yes ☐ No

Sample Temperature: 3.5

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. 1011134	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 - TCLP	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	BTEX + MTBE (8021B)	PAHs (8310)	TPH - GRO, DRO, MRO		Air Bubbles (Y or N)
11/8/10	1300	Soil	SWMU 15-IDW	(2) 8oz Jar	None	1								X				X	X	X		

Date	Time	Relinquished by:	Received by:	Date	Time
11/9/10	1500	Kelly Robinson	To UPS		
		[signature]	[signature]	11/10/10	1030

Remarks: Send Results to Kelly Robinson @ Kelly.robinson@wnr.com - Stand Alone Report -

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) ______

Turn-Around Time: ☒ Standard ☐ Rush ______

Project Name: East Refinery

Project #:

Project Manager: Kelly Robinson

Sampler:

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.6

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. 1009...	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)	8270 (Semi-VOA)					Air Bubbles (Y or N)
9/7/10	1200	GW	EXP-1	3 VOAS	HCl	1	X															
9/7/10	1300	GW	EXP-2	3 VOAS	HCl	2	X															
—	—	GW	TRIP BLANK	3 VOAS	HCl	3	X															

Date	Time	Relinquished by	Received by	Date	Time
9/7/10	1500	Kelly Robinson	To UPS		
			[signature]	9/8/10	11:15

Remarks: Call Kelly with questions

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.

Appendix G

Quality Assurance/Quality Control Review

1.0 DATA VALIDATION INTRODUCTION

This summary presents data verification results for soil and ground water samples collected from soil boring and monitoring wells installed at the Bloomfield Refinery in accordance with the approved Investigation Work Plan - Group 5. 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 55 soil samples and 5 ground water samples were collected between August 2010 and December 2011 in accordance with the Group 5 Investigation Work Plan. Soil and ground water 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 6010/6020;
- Cyanide by SW-846 method 9012; and
- Mercury by EPA Method 7470.

In addition as stated in the approved Work Plan, ground water samples submitted to Hall Environmental Analysis Laboratory were analyzed for the following additional analytes:

- Anions (chloride, Nitrate/Nitrite, and sulfate) by USEPA Method 300.0;
- Alkalinity (total alkalinity, carbonate, and bicarbonate) by USEPA Method 310.1;
- Total metals (iron, calcium, magnesium, manganese, potassium, and sodium) by USEPA Method 6010B;
- Dissolved metals (iron) by USEPA Method 6010B;
- Total dissolved solids by SM-2540C

Additional analytes reported by the lab were not required by the Work Plan, and therefore are not listed in their entirety in the summary above.

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 with the exception of the following:

- Alkalinity for sample SWMU 15-2 (GW) was analyzed past its holding time of 14 days. The associated field sample results were qualified "J-" due to the potential low bias.

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:

- Mercury was detected in method blanks for analytical batch 23538 and 23605. Associated field sample SWMU 15-4 (0.5-2.0'), SWMU 15-6 (0.5-2.0'), and SWMU 15-6 (0.5-2.0') DUP were qualified "J+" to account for a potential high bias.
- 4-Methyl-2-pentanone was detected at concentration 1.541 ug/kg and 1.540 ug/kg in the method blank associated with analytical batch 23554. 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 5 Investigation Work Plan. Target compounds were not detected in the field blanks and equipment rinsate blank.

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. Field analytical results were qualified if detected concentrations in the method blanks were less than 10 times the sample concentrations.

- Chloromethane was detected in several soil samples at concentrations less than 10 times the methanol field blank; therefore the associated field data results were qualified "J+" due to potential laboratory contamination.
- The laboratory narratives indicated that methylene chloride detection in field soil samples should be considered the result of laboratory contamination; therefore the associated field data results were qualified "J+" due to potential laboratory contamination.

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 DNOP and 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 (77.8%) was below the lower acceptance limit of 79.4% for sample SWMU 15-11 (0.5-2.0). Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for 4-Bromofluorobenzene (77.2%) was below the lower acceptance limit of 79.4% for sample SWMU 15-11 (16-18'). Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for 4-Bromofluorobenzene (68.7%) was below the lower acceptance limit of 70.0% for sample SWMU 15-12 (18-20'). Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for 4-Bromofluorobenzene (120.0%) was above the upper acceptance limit of 113.0% for sample SWMU 15-13 (0.5-2.0'). Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.
- Surrogate recovery for 4-Bromofluorobenzene (113% and 111%) was above the upper acceptance limit of 106% for groundwater samples MW-68 and MW-68 DUP, respectively. Data qualification was not required because remaining acid and base/neutral fractions were within acceptance limits.

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 except for the following:

- The LCS duplicate percent recoveries for Pentachlorophenol (53.4%) and 4-Nitrophenol (56.6%) were above the upper limit of 49% and 36.3%, respectively, for analytical batch 23542. Data qualification was not required since the recoveries for the associated LCS sample were within limits.

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 low 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 duplicate relative percent difference for diesel range organics (DRO) (26.4%) was above the upper limit of 17.4% for analytical batch 23502. Data qualification was not required since the percent recoveries for both the MS and MS duplicate samples were within limits.
- The MS/MSD percent recoveries for Antimony (38.0% / 37.1%) were below the lower acceptance limit of 75% for analytical batch 23827. 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 percent recovery for Barium (62.1 %) was below the lower acceptance limit of 75 % for analytical batch 23827. Data qualification was not required since the recovery for the associated MS duplicated was within acceptance limits.
- The MS recoveries for Chromium and Zinc (127% and 145%, respectively) were above the upper recovery limit of 125% for analytical batch 23827. Data qualification was not necessary since the associated MS duplicate recoveries were within acceptable limits.
- The MS/MS duplicate percent recoveries for Antimony (22.9%/18.3%) were below the lower acceptance limit of 75% for analytical batch 23677 and 23678. The following associated field samples were qualified "UJ" to indicate a potential low bias:

- SWMU 15-11 (0.5-2.0')	- SWMU 15-11 (4-6')
- SWMU 15-11 (16-18')	- SWMU 15-12 (0.5-2.0')
- SWMU 15-12 (14-16')	- SWMU 15-12 (18-20')
- SWMU 15-13 (0.5-2.0')	- SWMU 15-13 (12-14')
- SWMU 15-13 (22-25')	- SWMU 15-18 (0.5-2.0')
- SWMU 15-18 (12-14')	

- The MS/MSD percent recoveries for Antimony (36.2% / 28.2%) were below the lower acceptance limit of 75% for analytical batch 23828. Results of associated field sample SWMU 15-23 (0.5-2.0'), SWMU 15-23 (0.5-2.0')DUP results for Antimony were non-detect. Data qualification "UJ" was required to indicate a potential bias for the associated samples.

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:

- TPH-DRO, TPH-MRO, 1,2,4-Trimethylbenzene, and 1,3,5-Trimethylbenzene for field sample SWMU 15-6 (0.5-2.0');
- Lead for field sample SWMU 15-19 (0.5-2.0');
- Barium for field sample SWMU 15-23 (0.5-2.0'); and
- Barium and Iron for sample MW-68.

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 94 percent for soil analysis and 96 percent for ground water analysis. The technical completeness attained for Group 5 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 5 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
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

Sample ID	Lab ID	Date Collected	Sample Type
SWMU 15-7 (0.5-2.0')	1008828-01	8/20/2010	N
SWMU 15-7 (2-4')	1008828-02	8/20/2010	N
SWMU 15-8 (0-0.5')	1008828-03	8/20/2010	N
SWMU 15-8 (0 5-2 0')	1008828-04	8/20/2010	N
SWMU 15-8 (2-4')	1008828-05	8/20/2010	N
SWMU 15-9 (0.5-2.0')	1008828-06	8/20/2010	N
SWMU 15-9 (4-6')	1008828-07	8/20/2010	N
SWMU 15-9 (4-6') DUP	1008828-08	8/20/2010	N
SWMU 15-10 (0 5-2.0')	1008828-09	8/20/2010	N
SWMU 15-10 (4-6')	1008828-10	8/20/2010	N
Meoh Blank	1008828-11	8/20/2010	MB
SWMU 15-3 (0.5-2.0')	1008836-01	8/19/2010	N
SWMU 15-4 (0.5-2.0')	1008836-02	8/19/2010	N
SWMU 15-5 (0.5-2.0')	1008836-03	8/19/2010	N
SWMU 15-5 (8-10')	1008836-04	8/19/2010	N
SWMU 15-6 (0.5-2.0')	1008836-05	8/19/2010	N
SWMU 15-6 (0.5-2 0') DUP	1008836-06	8/19/2010	N
SWMU 15-6 (8-10')	1008836-07	8/19/2010	N
SWMU 15-1 (0.5-2.0')	1008838-01	8/19/2010	N
SWMU 15-2 (0.5-2.0')	1008838-02	8/19/2010	N
SWMU 15-2 (4-6')	1008838-03	8/19/2010	N
SWMU 15-2 (10-14')	1008838-04	8/19/2010	N
SWMU 15-2 (GW)	1008838-05	8/19/2010	N
TRIP BLANK	1008838-06	NA	TB
Meoh Blank	1008838-08	NA	MB
SWMU 15-11 (0.5-2.0')	1008992-01	8/23/2010	N
SWMU 15-11 (4-6')	1008992-02	8/23/2010	N
SWMU 15-11 (16-18')	1008992-03	8/23/2010	N
SWMU 15-12 (0.5-2 0')	1008992-04	8/23/2010	N
SWMU 15-12 (14-16')	1008992-05	8/23/2010	N
SWMU 15-12 (18-20')	1008992-06	8/23/2010	N
SWMU 15-13 (0.5-2.0')	1008992-07	8/23/2010	N
SWMU 15-13 (12-14')	1008992-08	8/23/2010	N
SWMU 15-13 (22-25')	1008992-09	8/23/2010	N
Meoh Blank	1008992-10	NA	MB
SWMU 15-13 (GW)	1008994-01	8/24/2010	GW
SWMU 15-14 (0.5-2.0')	1008994-02	8/24/2010	N
SWMU 15-14 (2-4')	1008994-03	8/24/2010	N
SWMU 15-4 (2-3')	1008994-04	8/24/2010	N
SWMU 15-3 (2-4')	1008994-05	8/24/2010	N
SWMU 15-15 (0.5-2.0')	1008994-06	8/24/2010	N
SWMU 15-15 (2-4')	1008994-07	8/24/2010	N
SWMU 15-16 (0.5-2.0')	1008994-08	8/24/2010	N
SWMU 15-16 (2-4')	1008994-09	8/24/2010	N
SWMU 15-17 (0.5-2.0')	1008994-10	8/24/2010	N
SWMU 15-17 (2-4')	1008994-11	8/24/2010	N
Trıp Blank	1008994-12	NA	TB
Methanol Blank	1008994-13	NA	MB
SWMU 15-1 (2-4')	1008B18-01	8/24/2010	N
SWMV 15-18 (0.5-2.0')	1008B30-01	8/27/2010	N
SWMU 15-18 (12-14')	1008B30-01	8/27/2010	N
SWMU 15-19 (0.5-2.0')	1009025-01	8/30/2010	N
SWMU 15-19 (0.5-2.0') DUP	1009025-02	8/30/2010	N
SWMU 15-19 (2-3')	1009025-03	8/30/2010	N
SWMU 15-20 (0.5-2.0')	1009025-04	8/30/2010	N
SWMU 15-20 (2-3')	1009025-05	8/30/2010	N
SWMU 15-21 (0.5-2.0')	1009025-06	8/30/2010	N
SWMU 15-21 (2-3')	1009025-07	8/30/2010	N
SWMU 15-22 (0.5-2.0')	1009025-08	8/30/2010	N
SWMU 15-22 (2-4')	1009025-09	8/31/2010	N
Meoh Blank	1009025-10	NA	MB
SWMU 15-23 (0.5-2.0')	1009106-01	9/1/2010	N
SWMU 15-23 (0.5-2 0') DUP	1009106-02	9/1/2010	N
SWMU 15-23 (2-3')	1009106-03	9/1/2010	N

Table A-1
Sampling and Analysis Schedule
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

Sample ID	Lab ID	Date Collected	Sample Type
SWMU 15-24 (0.5-2.0')	1009106-04	9/1/2010	N
SWMU 15-24 (2-3')	1009106-05	9/1/2010	N
SWMU 15-25 (0.5-2.0')	1009106-06	9/1/2010	N
SWMU 15-25 (2-3')	1009106-07	9/1/2010	N
Meoh Blank	1009106-08	NA	MB
MW-68	1009356-01	9/7/2011	N
MW-68 (DUP)	1009356-02	9/7/2011	N
FB0120110	1012099-01	12/1/2010	FB
MW-68	1012096-01	12/2/2011	N
MW-68 (DUP)	1012096-02	12/2/2011	N

Notes:

VOCs = Volatile Organic Compounds
N = Normal field sample
FD = Field duplicate
na = not applicable
FB = Field Blank

TB = Trip Blank
EB = Equipment Blank
MB = Methanol Blank
GW = Groundwater

TABLE A-2
Qualified Data

Table A-2
Qualified Data
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

Sample ID	Date Collected	Analyte	Result	Units	Matrix	Qualifier	Comments
SWMU 15-2 (GW)	8/19/2010	Alkalinity, Total (As CaCO3)	340	mg/L CaCO3	Gw	J-	Qualified due to analysis past holding time
SWMU 15-11 (0 5-2 0')	8/23/2010	Antimony	< 13	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-11 (16-18')	8/23/2010	Antimony	< 2 5	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-11 (4-6')	8/23/2010	Antimony	< 5.0	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-12 (0.5-2 0')	8/23/2010	Antimony	< 5.0	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-12 (14-16')	8/23/2010	Antimony	< 2 5	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-12 (18-20')	8/23/2010	Antimony	< 5 0	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-13 (0.5-2 0')	8/23/2010	Antimony	< 5.0	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-13 (12-14')	8/23/2010	Antimony	< 2.5	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-13 (22-25')	8/23/2010	Antimony	< 2 5	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-18 (12-14')	8/27/2010	Antimony	<2 5	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-23 (0.5-2.0')	9/1/2010	Antimony	< 13	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-23 (0.5-2.0') DUP	9/1/2010	Antimony	< 13	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-24 (0.5-2 0')	9/1/2010	Antimony	< 13	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-25 (0.5-2.0')	9/1/2010	Antimony	< 13	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-6 (0 5-2.0')	8/19/2010	Antimony	< 13	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-6 (0.5-2.0') DUP	8/19/2010	Antimony	< 13	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMV 15-18 (0.5-2.0')	8/27/2010	Antimony	<0 5	mg/Kg	Soil	UJ	Qualified due to low MS/MSD recovery
SWMU 15-2 (GW)	8/19/2010	Bicarbonate	340	mg/L CaCO3	Gw	J-	Qualified due to analysis past holding time
SWMU 15-11 (0.5-2.0')	8/23/2010	Chloromethane	0 087	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-11 (16-18')	8/23/2010	Chloromethane	0 10	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-11 (4-6')	8/23/2010	Chloromethane	1 3	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-12 (0.5-2 0')	8/23/2010	Chloromethane	0 072	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-16 (0.5-2 0')	8/24/2010	Chloromethane	0 080	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-17 (0.5-2 0')	8/24/2010	Chloromethane	0.075	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-19 (0.5-2 0')	8/30/2010	Chloromethane	0 087	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-21 (0.5-2 0')	8/30/2010	Chloromethane	0 088	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-23 (0.5-2 0')	9/1/2010	Chloromethane	0 084	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-24 (0 5-2 0')	9/1/2010	Chloromethane	0 084	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-4 (0 5-2.0')	8/19/2010	Chloromethane	0 095	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-5 (0 5-2.0')	8/19/2010	Chloromethane	0 093	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-7 (0 5-2.0')	8/20/2010	Chloromethane	0 65	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-8 (0-0.5')	8/20/2010	Chloromethane	0.071	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-4 (0.5-2.0')	8/19/2010	Mercury	0 062	mg/kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-6 (0.5-2.0')	8/19/2010	Mercury	0.06	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-6 (0.5-2.0') DUP	8/19/2010	Mercury	0 05	mg/Kg	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-14 (0 5-2 0')	8/24/2010	Methylene chloride	9.28	µg/Kg-dry	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-15 (0 5-2 0')	8/24/2010	Methylene chloride	8.08	µg/Kg-dry	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-19 (0.5-2 0') DUP	8/30/2010	Methylene chloride	2 72	µg/Kg-dry	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-20 (0 5-2 0')	8/30/2010	Methylene chloride	2.75	µg/Kg-dry	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-22 (0 5-2.0')	8/31/2010	Methylene chloride	2 60	µg/Kg-dry	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-23 (0.5-2.0') DUP	9/1/2010	Methylene chloride	2 97	µg/Kg-dry	Soil	J+	Qualified due to potential laboratory contaminant
SWMU 15-25 (0 5-2 0')	9/1/2010	Methylene chloride	4 28	µg/Kg-dry	Soil	J+	Qualified due to potential laboratory contaminant

ug/L - microgram per liter
mg/L - milligrams per liter
J - potential bias
Notes:
UJ - Estimated reporting limit

MS/MSD - Matrix spike/matrix spike duplicate
RPD - Relative Percent Difference

TABLE A-3
Field Duplicate Summary

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-9 (4-6') Sample Result	SWMU 15-9 (4-6') DUP Field Duplicate	RPD (%)
TPH (mg/kg-dry)	Diesel Range Organics (DRO)	< 10	< 10	NC
	Motor Oil Range Organics (MRO)	< 50	< 50	NC
	Gasoline Range Organics (GRO)	< 5.0	< 5.0	NC

Notes:
RPD = Relative percent difference; [(difference)/(average)]* 100
NC = Not calculated; RPD values were not calculated for non-detects
mg/kg-dry = milligrams per kilogram

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-6 (0 5-2 0') Sample Result	SWMU 15-6 (0.5-2.0') DUP Field Duplicate	RPD (%)
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	2800	5200	**60 ***
	Motor Oil Range Organics (MRO)	4600	9300	**68 ***
	Gasoline Range Organics (GRO)	65	53	20.3
VOCs (ug/kg-dry)	1,1,1,2-Tetrachloroethane	< 0.25	< 0 25	NC
	1,1,1-Trichloroethane	< 0.25	< 0 25	NC
	1,1,2,2-Tetrachloroethane	< 0.25	< 0 25	NC
	1,1,2-Trichloroethane	< 0.25	< 0.25	NC
	1,1-Dichloroethane	< 0.50	< 0.50	NC
	1,1-Dichloroethene	< 0.25	< 0.25	NC
	1,1-Dichloropropene	< 0.50	< 0.50	NC
	1,2,3-Trichlorobenzene	< 0.50	< 0.50	NC
	1,2,3-Trichloropropane	< 0.50	< 0.50	NC
	1,2,4-Trichlorobenzene	< 0.25	< 0 25	NC
	1,2,4-Trimethylbenzene	0.84	0.51	**49 ***
	1,2-Dibromo-3-chloropropane	< 0.50	< 0.50	NC
	1,2-Dibromoethane (EDB)	< 0 25	< 0.25	NC
	1,2-Dichlorobenzene	< 0.25	< 0.25	NC
	1,2-Dichloroethane (EDC)	< 0.25	< 0 25	NC
	1,2-Dichloropropane	< 0.25	< 0 25	NC
	1,3,5-Trimethylbenzene	0 87	0.59	**38 ***
	1,3-Dichlorobenzene	< 0 25	< 0.25	NC
	1,3-Dichloropropane	< 0.25	< 0.25	NC
	1,4-Dichlorobenzene	< 0 25	< 0.25	NC
	1-Methylnaphthalene	< 1 0	< 1.0	NC
	2,2-Dichloropropane	< 0.50	< 0 50	NC
	2-Butanone	< 2 5	< 2.5	NC
	2-Chlorotoluene	< 0 25	< 0.25	NC
	2-Hexanone	< 2 5	< 2 5	NC
	2-Methylnaphthalene	< 1 0	< 1 0	NC
	4-Chlorotoluene	< 0 25	< 0.25	NC
	4-Isopropyltoluene	< 0 25	< 0.25	NC
	4-Methyl-2-pentanone	< 2.5	< 2.5	NC
	Acetone	< 3 8	< 3.8	NC
	Benzene	< 0 25	< 0.25	NC
	Bromobenzene	< 0 25	< 0.25	NC
	Bromodichloromethane	< 0.25	< 0.25	NC
	Bromoform	< 0.25	< 0.25	NC
	Bromomethane	< 0.50	< 0.50	NC
	Carbon disulfide	< 2 5	< 2.5	NC
	Carbon tetrachloride	< 0 50	< 0.50	NC
	Chlorobenzene	< 0 25	< 0.25	NC
	Chloroethane	< 0.50	< 0.50	NC
	Chloroform	< 0 25	< 0.25	NC
	Chloromethane	< 0 25	< 0.25	NC
	cis-1,2-DCE	< 0 25	< 0.25	NC
	cis-1,3-Dichloropropene	< 0 25	< 0 25	NC
	Dibromochloromethane	< 0.25	< 0.25	NC
	Dibromomethane	< 0.50	< 0.50	NC
	Dichlorodifluoromethane	< 0.25	< 0.25	NC
	Ethylbenzene	< 0 25	< 0.25	NC
	Hexachlorobutadiene	< 0 50	< 0.50	NC
	Isopropylbenzene	< 0.25	< 0 25	NC
	Methyl tert-butyl ether (MTBE)	< 0.25	< 0 25	NC
	Methylene chloride	< 0 75	< 0 75	NC
	Naphthalene	< 0.50	< 0 50	NC
	n-Butylbenzene	< 0 25	< 0 25	NC
	n-Propylbenzene	< 0.25	< 0.25	NC
	sec-Butylbenzene	< 0.25	< 0.25	NC
	Styrene	< 0 25	< 0.25	NC
	tert-Butylbenzene	< 0.25	< 0.25	NC
	Tetrachloroethene (PCE)	< 0.25	< 0 25	NC
	Toluene	< 0.25	< 0.25	NC
	trans-1,2-DCE	< 0.25	< 0.25	NC
	trans-1,3-Dichloropropene	< 0.25	< 0.25	NC
	Trichloroethene (TCE)	< 0 25	< 0 25	NC
	Trichlorofluoromethane	< 0.25	< 0.25	NC
	Vinyl chloride	< 0.25	< 0.25	NC
	Xylenes, Total	0 91	< 0 50	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-6 (0.5-2.0') Sample Result	SWMU 15-6 (0.5-2.0') DUP Field Duplicate	RPD (%)
SVOCs (mg/kg-dry):	1,2,4-Trichlorobenzene	< 1.0	< 1.0	NC
	1,2-Dichlorobenzene	< 1.0	< 1.0	NC
	1,3-Dichlorobenzene	< 1.0	< 1.0	NC
	1,4-Dichlorobenzene	< 1.0	< 1.0	NC
	2,4,5-Trichlorophenol	< 1.0	< 1.0	NC
	2,4,6-Trichlorophenol	< 1.0	< 1.0	NC
	2,4-Dichlorophenol	< 2.0	< 2.0	NC
	2,4-Dimethylphenol	< 1.5	< 1.5	NC
	2,4-Dinitrophenol	< 2.0	< 2.0	NC
	2,4-Dinitrotoluene	< 2.5	< 2.5	NC
	2,6-Dinitrotoluene	< 2.5	< 2.5	NC
	2-Chloronaphthalene	< 1.3	< 1.3	NC
	2-Chlorophenol	< 1.0	< 1.0	NC
	2-Methylnaphthalene	< 1.0	< 1.0	NC
	2-Methylphenol	< 2.5	< 2.5	NC
	2-Nitroaniline	< 1.0	< 1.0	NC
	2-Nitrophenol	< 1.0	< 1.0	NC
	3,3´-Dichlorobenzidine	< 1.3	< 1.3	NC
	3+4-Methylphenol	< 1.0	< 1.0	NC
	3-Nitroaniline	< 1.0	< 1.0	NC
	4,6-Dinitro-2-methylphenol	< 2.5	< 2.5	NC
	4-Bromophenyl phenyl ether	< 1.0	< 1.0	NC
	4-Chloro-3-methylphenol	< 2.5	< 2.5	NC
	4-Chloroaniline	< 2.5	< 2.5	NC
	4-Chlorophenyl phenyl ether	< 1.0	< 1.0	NC
	4-Nitroaniline	< 1.3	< 1.3	NC
	4-Nitrophenol	< 1.0	< 1.0	NC
	Acenaphthene	< 1.0	< 1.0	NC
	Acenaphthylene	< 1.0	< 1.0	NC
	Aniline	< 1.0	< 1.0	NC
	Anthracene	< 1.0	< 1.0	NC
	Azobenzene	< 1.0	< 1.0	NC
	Benz(a)anthracene	< 1.0	< 1.0	NC
	Benzo(a)pyrene	< 1.0	< 1.0	NC
	Benzo(b)fluoranthene	< 1.0	< 1.0	NC
	Benzo(g,h,i)perylene	< 1.0	< 1.0	NC
	Benzo(k)fluoranthene	< 1.0	< 1.0	NC
	Benzoic acid	< 2.5	< 2.5	NC
	Benzyl alcohol	< 1.0	< 1.0	NC
	Bis(2-chloroethoxy)methane	< 1.0	< 1.0	NC
	Bis(2-chloroethyl)ether	< 1.0	< 1.0	NC
	Bis(2-chloroisopropyl)ether	< 1.0	< 1.0	NC
	Bis(2-ethylhexyl)phthalate	< 2.5	< 2.5	NC
	Butyl benzyl phthalate	< 1.0	< 1.0	NC
	Carbazole	< 1.0	< 1.0	NC
	Chrysene	< 1.0	< 1.0	NC
	Dibenz(a,h)anthracene	< 1.0	< 1.0	NC
	Dibenzofuran	< 1.0	< 1.0	NC
	Diethyl phthalate	< 1.0	< 1.0	NC
	Dimethyl phthalate	< 1.0	< 1.0	NC
	Di-n-butyl phthalate	< 2.5	< 2.5	NC
	Di-n-octyl phthalate	< 1.3	< 1.3	NC
	Fluoranthene	< 1.0	< 1.0	NC
	Fluorene	< 1.0	< 1.0	NC
	Hexachlorobenzene	< 1.0	< 1.0	NC
	Hexachlorobutadiene	< 1.0	< 1.0	NC
	Hexachlorocyclopentadiene	< 1.0	< 1.0	NC
	Hexachloroethane	< 1.0	< 1.0	NC
	Indeno(1,2,3-cd)pyrene	< 1.0	< 1.0	NC
	Isophorone	< 2.5	< 2.5	NC
	Naphthalene	< 1.0	< 1.0	NC
	Nitrobenzene	< 2.5	< 2.5	NC
	N-Nitrosodi-n-propylamine	< 1.0	< 1.0	NC
	N-Nitrosodiphenylamine	< 1.0	< 1.0	NC
	Pentachlorophenol	< 2.0	< 2.0	NC
	Phenanthrene	< 1.0	< 1.0	NC
	Phenol	< 1.0	< 1.0	NC
	Pyrene	< 1.0	< 1.0	NC
	Pyridine	< 2.5	< 2.5	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-6 (0 5-2 0') Sample Result	SWMU 15-6 (0.5-2 0') DUP Field Duplicate	RPD (%)
Metals (mg/kg-dry):	Antimony	< 13	< 13	NC
	Arsenic	< 13	< 13	NC
	Barium	200	190	5.1
	Beryllium	< 0.75	< 0 75	NC
	Cadmium	< 0 50	< 0.50	NC
	Chromium	13	18	32
	Cobalt	5.1	5 3	3 8
	Cyanide	< 0.50	< 0 50	NC
	Lead	6 5	8.1	21 9
	Mercury	0 060	0 050	18 2
	Nickel	7 9	8.7	9 6
	Selenium	< 13	< 13	NC
	Silver	< 1 3	< 1.3	NC
	Vanadium	27	27	0
	Zinc	40	49	20

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 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-19 (0.5-2.0') Sample Result	SWMU 15-19 (0 5-2 0') DUP Field Duplicate	RPD (%)
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	< 10	< 10	NC
	Motor Oil Range Organics (MRO)	< 50	< 50	NC
	Gasoline Range Organics (GRO)	< 5.0	< 5 0	NC
VOCs (ug/kg-dry)	1,1,1,2-Tetrachloroethane	< 0 050	< 1.00	NC
	1,1,1-Trichloroethane	< 0 050	< 1.00	NC
	1,1,2,2-Tetrachloroethane	< 0 050	< 1 00	NC
	1,1,2-Trichloroethane	< 0 050	< 1.00	NC
	1,1-Dichloroethane	< 0.10	< 1.00	NC
	1,1-Dichloroethene	< 0 050	< 1.00	NC
	1,1-Dichloropropene	< 0 10	< 1.00	NC
	1,2,3-Trichlorobenzene	< 0 10	< 1.00	NC
	1,2,3-Trichloropropane	< 0 10	< 1.00	NC
	1,2,4-Trichlorobenzene	< 0 050	< 1.00	NC
	1,2,4-Trimethylbenzene	< 0 050	< 1.00	NC
	1,2-Dibromo-3-chloropropane	< 0 10	< 1.00	NC
	1,2-Dibromoethane (EDB)	< 0 050	< 1.00	NC
	1,2-Dichlorobenzene	< 0 050	< 1.00	NC
	1,2-Dichloroethane (EDC)	< 0.050	< 1.00	NC
	1,2-Dichloropropane	< 0 050	< 1 00	NC
	1,3,5-Trimethylbenzene	< 0.050	< 1.00	NC
	1,3-Dichlorobenzene	< 0 050	< 1 00	NC
	1,3-Dichloropropane	< 0 050	< 1.00	NC
	1,4-Dichlorobenzene	< 0 050	< 1.00	NC
	1-Methylnaphthalene	< 0 20	< 1.00	NC
	2,2-Dichloropropane	< 0 10	< 1 00	NC
	2-Butanone	< 0 50	< 1.00	NC
	2-Chlorotoluene	< 0.050	< 1 00	NC
	2-Hexanone	< 0 50	< 1 00	NC
	2-Methylnaphthalene	< 0 20	< 1.00	NC
	4-Chlorotoluene	< 0 050	< 1.00	NC
	4-Isopropyltoluene	< 0 050	< 1 00	NC
	4-Methyl-2-pentanone	< 0 50	< 1 00	NC
	Acetone	< 0.75	< 2.01	NC
	Benzene	< 0.050	< 1 00	NC
	Bromobenzene	< 0.050	< 1 00	NC
	Bromodichloromethane	< 0 050	< 1.00	NC
	Bromoform	< 0 050	< 1.00	NC
	Bromomethane	< 0 10	< 1.00	NC
	Carbon disulfide	< 0.50	< 1 00	NC
	Carbon tetrachloride	< 0 10	< 1 00	NC
	Chlorobenzene	< 0 050	< 1 00	NC
	Chloroethane	< 0 10	< 1 00	NC
	Chloroform	< 0 050	< 1.00	NC
	Chloromethane	0.088	< 1.00	NC
	cis-1,2-DCE	< 0 050	< 1 00	NC
	cis-1,3-Dichloropropene	< 0.050	< 1 00	NC
	Dibromochloromethane	< 0 050	< 1.00	NC
	Dibromomethane	< 0 10	< 1 00	NC
	Dichlorodifluoromethane	< 0 050	< 1 00	NC
	Ethylbenzene	< 0 050	< 1.00	NC
	Hexachlorobutadiene	< 0 10	< 1.00	NC
	Isopropylbenzene	< 0 050	< 1.00	NC
	Methyl tert-butyl ether (MTBE)	< 0 050	< 1.00	NC
	Methylene chloride	< 0 15	2 72	NC
	Naphthalene	< 0 10	< 1.00	NC
	n-Butylbenzene	< 0 050	< 1.00	NC
	n-Propylbenzene	< 0 050	< 1.00	NC
	sec-Butylbenzene	< 0.050	< 1.00	NC
	Styrene	< 0.050	< 1.00	NC
	tert-Butylbenzene	< 0 050	< 1.00	NC
	Tetrachloroethene (PCE)	< 0 050	< 1.00	NC
	Toluene	< 0 050	< 1.00	NC
	trans-1,2-DCE	< 0.050	< 1.00	NC
	trans-1,3-Dichloropropene	< 0.050	< 1.00	NC
	Trichloroethene (TCE)	< 0.050	< 1 00	NC
	Trichlorofluoromethane	< 0 050	< 1.00	NC
	Vinyl chloride	< 0.050	< 1 00	NC
	Xylenes, Total	< 0 10	< 1 00	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-19 (0 5-2 0') Sample Result	SWMU 15-19 (0 5-2 0') 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
	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	< 1.0	< 1 0	NC
	2,6-Dinitrotoluene	< 1 0	< 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	< 1 0	< 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	< 1.0	< 1 0	NC
	4-Bromophenyl phenyl ether	< 0 40	< 0.40	NC
	4-Chloro-3-methylphenol	< 1 0	< 1.0	NC
	4-Chloroaniline	< 1.0	< 1 0	NC
	4-Chlorophenyl phenyl ether	< 0 40	< 0 40	NC
	4-Nitroaniline	< 0.50	< 0.50	NC
	4-Nitrophenol	< 0 40	< 0 40	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	< 1.0	< 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	< 1 0	< 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	< 1.0	< 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	< 1 0	< 1 0	NC
	Naphthalene	< 0.40	< 0.40	NC
	Nitrobenzene	< 1.0	< 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	< 1.0	< 1 0	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-19 (0.5-2.0') Sample Result	SWMU 15-19 (0.5-2.0') DUP Field Duplicate	RPD (%)
Metals (mg/kg-dry):	Antimony	< 13	< 13	NC
	Arsenic	< 13	< 13	NC
	Barium	230	230	0.0
	Beryllium	< 0 75	< 0 75	NC
	Cadmium	< 0 50	< 0 50	NC
	Chromium	9 8	10	2.0
	Cobalt	6 1	5.7	6 8
	Cyanide	< 0.50	< 0 50	NC
	Lead	6	5.8	**39 ***
	Mercury	< 0 033	< 0 033	NC
	Nickel	9.2	8.9	3.3
	Selenium	< 13	< 13	NC
	Silver	< 1 3	< 1.3	NC
	Vanadium	31	28	10 2
	Zinc	41	40	2.5

Notes:
RPD = Relative percent difference, [(difference)/(average)]* 100
NC = Not calculated, RPD values were not calculated for non-detec
ug/kg-dry = micrograms per kilogram dry
mg/kg-dry = milligrams per kilogram
* = Field Duplicate RPD Outlier

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-23 (0.5-2.0') **Sample Result**	SWMU 15-23 (0 5-2 0') DUP **Field Duplicate**	**RPD (%)**
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	< 10	18	NC
	Motor Oil Range Organics (MRO)	< 50	< 50	NC
	Gasoline Range Organics (GRO)	< 5 0	< 5 0	NC
VOCs (ug/kg-dry)	1,1,1,2-Tetrachloroethane	< 0.050	< 0 950	NC
	1,1,1-Trichloroethane	< 0.050	< 0 950	NC
	1,1,2,2-Tetrachloroethane	< 0.050	< 0 950	NC
	1,1,2-Trichloroethane	< 0.050	< 0 950	NC
	1,1-Dichloroethane	< 0.10	< 0 950	NC
	1,1-Dichloroethene	< 0.050	< 0.950	NC
	1,1-Dichloropropene	< 0 10	< 0.950	NC
	1,2,3-Trichlorobenzene	< 0 10	< 0.950	NC
	1,2,3-Trichloropropane	< 0.10	< 0 950	NC
	1,2,4-Trichlorobenzene	< 0 050	< 0 950	NC
	1,2,4-Trimethylbenzene	< 0.050	< 0 950	NC
	1,2-Dibromo-3-chloropropane	< 0.10	< 0 950	NC
	1,2-Dibromoethane (EDB)	< 0 050	< 0.950	NC
	1,2-Dichlorobenzene	< 0 050	< 0.950	NC
	1,2-Dichloroethane (EDC)	< 0 050	< 0.950	NC
	1,2-Dichloropropane	< 0 050	< 0.950	NC
	1,3,5-Trimethylbenzene	< 0 050	< 0 950	NC
	1,3-Dichlorobenzene	< 0 050	< 0 950	NC
	1,3-Dichloropropane	< 0.050	< 0 950	NC
	1,4-Dichlorobenzene	< 0.050	< 0 950	NC
	1-Methylnaphthalene	< 0.20	< 0.950	NC
	2,2-Dichloropropane	< 0.10	< 0 950	NC
	2-Butanone	< 0.50	< 0 950	NC
	2-Chlorotoluene	< 0.050	< 0 950	NC
	2-Hexanone	< 0.50	< 0.950	NC
	2-Methylnaphthalene	< 0.20	< 0 950	NC
	4-Chlorotoluene	< 0.050	< 0 950	NC
	4-Isopropyltoluene	< 0.050	< 0 950	NC
	4-Methyl-2-pentanone	< 0.50	< 0.950	NC
	Acetone	< 0.75	< 1.90	NC
	Benzene	< 0.050	< 0 950	NC
	Bromobenzene	< 0.050	< 0.950	NC
	Bromodichloromethane	< 0 050	< 0.950	NC
	Bromoform	< 0 050	< 0 950	NC
	Bromomethane	< 0 10	< 0 950	NC
	Carbon disulfide	< 0 50	< 0 950	NC
	Carbon tetrachloride	< 0 10	< 0 950	NC
	Chlorobenzene	< 0 050	< 0 950	NC
	Chloroethane	< 0 10	< 0.950	NC
	Chloroform	< 0.050	< 0 950	NC
	Chloromethane	0 084	< 0 950	NC
	cis-1,2-DCE	< 0 050	< 0.950	NC
	cis-1,3-Dichloropropene	< 0 050	< 0.950	NC
	Dibromochloromethane	< 0 050	< 0.950	NC
	Dibromomethane	< 0 10	< 0 950	NC
	Dichlorodifluoromethane	< 0 050	< 0.950	NC
	Ethylbenzene	< 0 050	< 0.950	NC
	Hexachlorobutadiene	< 0 10	< 0.950	NC
	Isopropylbenzene	< 0.050	< 0.950	NC
	Methyl tert-butyl ether (MTBE)	< 0 050	< 0 950	NC
	Methylene chloride	< 0.15	2 97	NC
	Naphthalene	< 0 10	< 0.950	NC
	n-Butylbenzene	< 0 050	< 0 950	NC
	n-Propylbenzene	< 0 050	< 0 950	NC
	sec-Butylbenzene	< 0 050	< 0.950	NC
	Styrene	< 0 050	< 0.950	NC
	tert-Butylbenzene	< 0 050	< 0.950	NC
	Tetrachloroethene (PCE)	< 0 050	< 0.950	NC
	Toluene	< 0 050	< 0 950	NC
	trans-1,2-DCE	< 0 050	< 0.950	NC
	trans-1,3-Dichloropropene	< 0.050	< 0 950	NC
	Trichloroethene (TCE)	< 0 050	< 0.950	NC
	Trichlorofluoromethane	< 0 050	< 0.950	NC
	Vinyl chloride	< 0 050	< 0.950	NC
	Xylenes, Total	< 0.10	< 0 950	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-23 (0.5-2.0') **Sample Result**	SWMU 15-23 (0.5-2.0') 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
	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	< 0.25	< 0.25	NC
	4-Nitrophenol	< 0.20	< 0.20	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 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	SWMU 15-23 (0 5-2 0') Sample Result	SWMU 15-23 (0 5-2 0') DUP Field Duplicate	RPD (%)
Metals (mg/kg-dry):	Antimony	< 13	< 13	NC
	Arsenic	< 13	< 13	NC
	Barium	490	210	**80.0***
	Beryllium	< 0.75	< 0.75	NC
	Cadmium	< 0.50	< 0.50	NC
	Chromium	9 1	8 9	2.2
	Cobalt	5.4	5.2	3.8
	Cyanide	< 0.50	< 0 50	NC
	Lead	5 7	5 3	7
	Mercury	< 0.033	< 0 033	NC
	Nickel	8.1	7.7	5.1
	Selenium	< 13	< 13	NC
	Silver	< 1.3	< 1.3	NC
	Vanadium	27	25	7 7
	Zinc	36	35	2.8

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 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	MW-68 Sample Result	MW-68 (DUP) Field Duplicate	RPD (%)
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	< 0.20	< 0.20	NC
	Motor Oil Range Organics (MRO)	< 2.5	< 2.5	NC
	Gasoline Range Organics (GRO)	< 0.050	< 0.050	NC
VOCs (ug/kg-dry)	1,1,1,2-Tetrachloroethane	< 1.0	< 1.0	NC
	1,1,1-Trichloroethane	< 1.0	< 1.0	NC
	1,1,2,2-Tetrachloroethane	< 2.0	< 2.0	NC
	1,1,2-Trichloroethane	< 1.0	< 1.0	NC
	1,1-Dichloroethane	< 1.0	< 1.0	NC
	1,1-Dichloroethene	< 1.0	< 1.0	NC
	1,1-Dichloropropene	< 1.0	< 1.0	NC
	1,2,3-Trichlorobenzene	< 1.0	< 1.0	NC
	1,2,3-Trichloropropane	< 2.0	< 2.0	NC
	1,2,4-Trichlorobenzene	< 1.0	< 1.0	NC
	1,2,4-Trimethylbenzene	< 1.0	< 1.0	NC
	1,2-Dibromo-3-chloropropane	< 2.0	< 2.0	NC
	1,2-Dibromoethane (EDB)	< 1.0	< 1.0	NC
	1,2-Dichlorobenzene	< 1.0	< 1.0	NC
	1,2-Dichloroethane (EDC)	< 1.0	< 1.0	NC
	1,2-Dichloropropane	< 1.0	< 1.0	NC
	1,3,5-Trimethylbenzene	< 1.0	< 1.0	NC
	1,3-Dichlorobenzene	< 1.0	< 1.0	NC
	1,3-Dichloropropane	< 1.0	< 1.0	NC
	1,4-Dichlorobenzene	< 1.0	< 1.0	NC
	1-Methylnaphthalene	< 4.0	< 4.0	NC
	2,2-Dichloropropane	< 2.0	< 2.0	NC
	2-Butanone	< 10	< 10	NC
	2-Chlorotoluene	< 1.0	< 1.0	NC
	2-Hexanone	< 10	< 10	NC
	2-Methylnaphthalene	< 4.0	< 4.0	NC
	4-Chlorotoluene	< 1.0	< 1.0	NC
	4-Isopropyltoluene	< 1.0	< 1.0	NC
	4-Methyl-2-pentanone	< 10	< 10	NC
	Acetone	< 10	< 10	NC
	Benzene	< 1.0	< 1.0	NC
	Bromobenzene	< 1.0	< 1.0	NC
	Bromodichloromethane	< 1.0	< 1.0	NC
	Bromoform	< 1.0	< 1.0	NC
	Bromomethane	< 1.0	< 1.0	NC
	Carbon disulfide	< 10	< 10	NC
	Carbon Tetrachloride	< 1.0	< 1.0	NC
	Chlorobenzene	< 1.0	< 1.0	NC
	Chloroethane	< 2.0	< 2.0	NC
	Chloroform	< 1.0	< 1.0	NC
	Chloromethane	< 1.0	< 1.0	NC
	cis-1,2-DCE	< 1.0	< 1.0	NC
	cis-1,3-Dichloropropene	< 1.0	< 1.0	NC
	Dibromochloromethane	< 1.0	< 1.0	NC
	Dibromomethane	< 1.0	< 1.0	NC
	Dichlorodifluoromethane	< 1.0	< 1.0	NC
	Ethylbenzene	< 1.0	< 1.0	NC
	Hexachlorobutadiene	< 1.0	< 1.0	NC
	Isopropylbenzene	< 1.0	< 1.0	NC
	Methyl tert-butyl ether (MTBE)	< 1.0	< 1.0	NC
	Methylene Chloride	< 3.0	< 3.0	NC
	Naphthalene	< 2.0	< 2.0	NC
	n-Butylbenzene	< 1.0	< 1.0	NC
	n-Propylbenzene	< 1.0	< 1.0	NC
	sec-Butylbenzene	< 1.0	< 1.0	NC
	Styrene	< 1.0	< 1.0	NC
	tert-Butylbenzene	< 1.0	< 1.0	NC
	Tetrachloroethene (PCE)	< 1.0	< 1.0	NC
	Toluene	< 1.0	< 1.0	NC
	trans-1,2-DCE	< 1.0	< 1.0	NC
	trans-1,3-Dichloropropene	< 1.0	< 1.0	NC
	Trichloroethene (TCE)	< 1.0	< 1.0	NC
	Trichlorofluoromethane	< 1.0	< 1.0	NC
	Vinyl chloride	< 1.0	< 1.0	NC
	Xylenes, Total	< 1.5	< 1.5	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	MW-68 Sample Result	MW-68 (DUP) Field Duplicate	RPD (%)
SVOCs (mg/kg-dry):	1,2,4-Trichlorobenzene	< 10	< 10	NC
	1,2-Dichlorobenzene	< 10	< 10	NC
	1,3-Dichlorobenzene	< 10	< 10	NC
	1,4-Dichlorobenzene	< 10	< 10	NC
	2,4,5-Trichlorophenol	< 10	< 10	NC
	2,4,6-Trichlorophenol	< 10	< 10	NC
	2,4-Dichlorophenol	< 20	< 20	NC
	2,4-Dimethylphenol	< 10	< 10	NC
	2,4-Dinitrophenol	< 20	< 20	NC
	2,4-Dinitrotoluene	< 10	< 10	NC
	2,6-Dinitrotoluene	< 10	< 10	NC
	2-Chloronaphthalene	< 10	< 10	NC
	2-Chlorophenol	< 10	< 10	NC
	2-Methylnaphthalene	< 10	< 10	NC
	2-Methylphenol	< 10	< 10	NC
	2-Nitroaniline	< 10	< 10	NC
	2-Nitrophenol	< 10	< 10	NC
	3,3′-Dichlorobenzidine	< 10	< 10	NC
	3+4-Methylphenol	< 10	< 10	NC
	3-Nitroaniline	< 10	< 10	NC
	4,6-Dinitro-2-methylphenol	< 20	< 20	NC
	4-Bromophenyl phenyl ether	< 10	< 10	NC
	4-Chloro-3-methylphenol	< 10	< 10	NC
	4-Chloroaniline	< 10	< 10	NC
	4-Chlorophenyl phenyl ether	< 10	< 10	NC
	4-Nitroaniline	< 20	< 20	NC
	4-Nitrophenol	< 10	< 10	NC
	Acenaphthene	< 10	< 10	NC
	Acenaphthylene	< 10	< 10	NC
	Aniline	< 10	< 10	NC
	Anthracene	< 10	< 10	NC
	Azobenzene	< 10	< 10	NC
	Benz(a)anthracene	< 10	< 10	NC
	Benzo(a)pyrene	< 10	< 10	NC
	Benzo(b)fluoranthene	< 10	< 10	NC
	Benzo(g,h,i)perylene	< 10	< 10	NC
	Benzo(k)fluoranthene	< 10	< 10	NC
	Benzoic acid	< 20	< 20	NC
	Benzyl alcohol	< 10	< 10	NC
	Bis(2-chloroethoxy)methane	< 10	< 10	NC
	Bis(2-chloroethyl)ether	< 10	< 10	NC
	Bis(2-chloroisopropyl)ether	< 10	< 10	NC
	Bis(2-ethylhexyl)phthalate	< 10	< 10	NC
	Butyl benzyl phthalate	< 10	< 10	NC
	Carbazole	< 10	< 10	NC
	Chrysene	< 10	< 10	NC
	Dibenz(a,h)anthracene	< 10	< 10	NC
	Dibenzofuran	< 10	< 10	NC
	Diethyl phthalate	< 10	< 10	NC
	Dimethyl phthalate	< 10	< 10	NC
	Di-n-butyl phthalate	< 10	< 10	NC
	Di-n-octyl phthalate	< 10	< 10	NC
	Fluoranthene	< 10	< 10	NC
	Fluorene	< 10	< 10	NC
	Hexachlorobenzene	< 10	< 10	NC
	Hexachlorobutadiene	< 10	< 10	NC
	Hexachlorocyclopentadiene	< 10	< 10	NC
	Hexachloroethane	< 10	< 10	NC
	Indeno(1,2,3-cd)pyrene	< 10	< 10	NC
	Isophorone	< 10	< 10	NC
	Naphthalene	< 10	< 10	NC
	Nitrobenzene	< 10	< 10	NC
	N-Nitrosodimethylamine	< 10	< 10	NC
	N-Nitrosodi-n-propylamine	< 10	< 10	NC
	N-Nitrosodiphenylamine	< 10	< 10	NC
	Pentachlorophenol	< 20	< 20	NC
	Phenanthrene	< 10	< 10	NC
	Phenol	< 10	< 10	NC
	Pyrene	< 10	< 10	NC
	Pyridine	< 10	< 10	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	MW-68 Sample Result	MW-68 (DUP) Field Duplicate	RPD (%)
Metals (mg/L):	Antimony	< 0.0010	< 0.0010	NC
	Arsenic	0.0037	0.0040	7.8
	Selenium	0.0017	0.0017	0.0
	Barium	0.069	0.078	12.2
	Beryllium	< 0.0030	< 0.0030	NC
	Cadmium	< 0.0020	< 0.0020	NC
	Calcium	96	110	13.5
	Chromium	< 0.0060	< 0.0060	NC
	Cobalt	< 0.0060	< 0.0060	NC
	Cyanide	< 0.010	< 0.010	NC
	Iron	2.2	2.6	17
	Lead	0.0054	0.0052	4
	Mercury	< 0.00020	< 0.00020	NC
	Magnesium	21	22	4.6
	Manganese	1.6	1.9	17.1
	Nickel	0.010	0.010	0.0
	Potassium	4.0	4.3	7.2
	Silver	< 0.0050	< 0.0050	NC
	Sodium	110	110	0.0
	Vanadium	< 0.050	< 0.050	NC
	Zinc	< 0.020	0.023	NC
General Chemistry (mg/L):	Total Dissolved Solids	698	704	0.8
	Chloride	48	47	2.1
	Nitrate (As N)+Nitrite (As N)	3.8	3.8	0.0
	Sulfate	260	260	0.0
	Alkalinity, Total (As CaCO3)	210	210	0.0
	Bicarbonate	210	210	0.0
	Carbonate	< 2.0	< 2.0	NC
	Iron	< 0.020	< 0.020	NC

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 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	MW-68 **Sample Result**	MW-68 (DUP) **Field Duplicate**	**RPD (%)**
TPH (mg/kg-dry):	Diesel Range Organics (DRO)	< 0.20	< 0.20	NC
	Motor Oil Range Organics (MRO)	< 2.5	< 2.5	NC
	Gasoline Range Organics (GRO)	< 0.050	< 0.050	NC
VOCs (ug/kg-dry)	1,1,1,2-Tetrachloroethane	< 1.0	< 1.0	NC
	1,1,1-Trichloroethane	< 1.0	< 1.0	NC
	1,1,2,2-Tetrachloroethane	< 2.0	< 2.0	NC
	1,1,2-Trichloroethane	< 1.0	< 1.0	NC
	1,1-Dichloroethane	< 1.0	< 1.0	NC
	1,1-Dichloroethene	< 1.0	< 1.0	NC
	1,1-Dichloropropene	< 1.0	< 1.0	NC
	1,2,3-Trichlorobenzene	< 1.0	< 1.0	NC
	1,2,3-Trichloropropane	< 2.0	< 2.0	NC
	1,2,4-Trichlorobenzene	< 1.0	< 1.0	NC
	1,2,4-Trimethylbenzene	< 1.0	< 1.0	NC
	1,2-Dibromo-3-chloropropane	< 2.0	< 2.0	NC
	1,2-Dibromoethane (EDB)	< 1.0	< 1.0	NC
	1,2-Dichlorobenzene	< 1.0	< 1.0	NC
	1,2-Dichloroethane (EDC)	< 1.0	< 1.0	NC
	1,2-Dichloropropane	< 1.0	< 1.0	NC
	1,3,5-Trimethylbenzene	< 1.0	< 1.0	NC
	1,3-Dichlorobenzene	< 1.0	< 1.0	NC
	1,3-Dichloropropane	< 1.0	< 1.0	NC
	1,4-Dichlorobenzene	< 1.0	< 1.0	NC
	1-Methylnaphthalene	< 4.0	< 4.0	NC
	2,2-Dichloropropane	< 2.0	< 2.0	NC
	2-Butanone	< 10	< 10	NC
	2-Chlorotoluene	< 1.0	< 1.0	NC
	2-Hexanone	< 10	< 10	NC
	2-Methylnaphthalene	< 4.0	< 4.0	NC
	4-Chlorotoluene	< 1.0	< 1.0	NC
	4-Isopropyltoluene	< 1.0	< 1.0	NC
	4-Methyl-2-pentanone	< 10	< 10	NC
	Acetone	< 10	< 10	NC
	Benzene	< 1.0	< 1.0	NC
	Bromobenzene	< 1.0	< 1.0	NC
	Bromodichloromethane	< 1.0	< 1.0	NC
	Bromoform	< 1.0	< 1.0	NC
	Bromomethane	< 3.0	< 3.0	NC
	Carbon disulfide	< 10	< 10	NC
	Carbon Tetrachloride	< 1.0	< 1.0	NC
	Chlorobenzene	< 1.0	< 1.0	NC
	Chloroethane	< 2.0	< 2.0	NC
	Chloroform	< 1.0	< 1.0	NC
	Chloromethane	< 3.0	< 3.0	NC
	cis-1,2-DCE	< 1.0	< 1.0	NC
	cis-1,3-Dichloropropene	< 1.0	< 1.0	NC
	Dibromochloromethane	< 1.0	< 1.0	NC
	Dibromomethane	< 1.0	< 1.0	NC
	Dichlorodifluoromethane	< 1.0	< 1.0	NC
	Ethylbenzene	< 1.0	< 1.0	NC
	Hexachlorobutadiene	< 1.0	< 1.0	NC
	Isopropylbenzene	< 1.0	< 1.0	NC
	Methyl tert-butyl ether (MTBE)	< 1.0	< 1.0	NC
	Methylene Chloride	< 3.0	< 3.0	NC
	Naphthalene	< 2.0	< 2.0	NC
	n-Butylbenzene	< 1.0	< 1.0	NC
	n-Propylbenzene	< 1.0	< 1.0	NC
	sec-Butylbenzene	< 1.0	< 1.0	NC
	Styrene	< 1.0	< 1.0	NC
	tert-Butylbenzene	< 1.0	< 1.0	NC
	Tetrachloroethene (PCE)	< 1.0	< 1.0	NC
	Toluene	< 1.0	< 1.0	NC
	trans-1,2-DCE	< 1.0	< 1.0	NC
	trans-1,3-Dichloropropene	< 1.0	< 1.0	NC
	Trichloroethene (TCE)	< 1.0	< 1.0	NC
	Trichlorofluoromethane	< 1.0	< 1.0	NC
	Vinyl chloride	< 1.0	< 1.0	NC
	Xylenes, Total	< 1.5	< 1.5	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	MW-68 **Sample Result**	MW-68 (DUP) **Field Duplicate**	**RPD (%)**
SVOCs (mg/kg-dry):	1,2,4-Trichlorobenzene	< 10	< 10	NC
	1,2-Dichlorobenzene	< 10	< 10	NC
	1,3-Dichlorobenzene	< 10	< 10	NC
	1,4-Dichlorobenzene	< 10	< 10	NC
	2,4,5-Trichlorophenol	< 10	< 10	NC
	2,4,6-Trichlorophenol	< 10	< 10	NC
	2,4-Dichlorophenol	< 20	< 20	NC
	2,4-Dimethylphenol	< 10	< 10	NC
	2,4-Dinitrophenol	< 20	< 20	NC
	2,4-Dinitrotoluene	< 10	< 10	NC
	2,6-Dinitrotoluene	< 10	< 10	NC
	2-Chloronaphthalene	< 10	< 10	NC
	2-Chlorophenol	< 10	< 10	NC
	2-Methylnaphthalene	< 10	< 10	NC
	2-Methylphenol	< 10	< 10	NC
	2-Nitroaniline	< 10	< 10	NC
	2-Nitrophenol	< 10	< 10	NC
	3,3'-Dichlorobenzidine	< 10	< 10	NC
	3+4-Methylphenol	< 10	< 10	NC
	3-Nitroaniline	< 10	< 10	NC
	4,6-Dinitro-2-methylphenol	< 20	< 20	NC
	4-Bromophenyl phenyl ether	< 10	< 10	NC
	4-Chloro-3-methylphenol	< 10	< 10	NC
	4-Chloroaniline	< 10	< 10	NC
	4-Chlorophenyl phenyl ether	< 10	< 10	NC
	4-Nitroaniline	< 20	< 20	NC
	4-Nitrophenol	< 10	< 10	NC
	Acenaphthene	< 10	< 10	NC
	Acenaphthylene	< 10	< 10	NC
	Aniline	< 10	< 10	NC
	Anthracene	< 10	< 10	NC
	Azobenzene	< 10	< 10	NC
	Benz(a)anthracene	< 10	< 10	NC
	Benzo(a)pyrene	< 10	< 10	NC
	Benzo(b)fluoranthene	< 10	< 10	NC
	Benzo(g,h,i)perylene	< 10	< 10	NC
	Benzo(k)fluoranthene	< 10	< 10	NC
	Benzoic acid	< 20	< 20	NC
	Benzyl alcohol	< 10	< 10	NC
	Bis(2-chloroethoxy)methane	< 10	< 10	NC
	Bis(2-chloroethyl)ether	< 10	< 10	NC
	Bis(2-chloroisopropyl)ether	< 10	< 10	NC
	Bis(2-ethylhexyl)phthalate	< 10	< 10	NC
	Butyl benzyl phthalate	< 10	< 10	NC
	Carbazole	< 10	< 10	NC
	Chrysene	< 10	< 10	NC
	Dibenz(a,h)anthracene	< 10	< 10	NC
	Dibenzofuran	< 10	< 10	NC
	Diethyl phthalate	< 10	< 10	NC
	Dimethyl phthalate	< 10	< 10	NC
	Di-n-butyl phthalate	< 10	< 10	NC
	Di-n-octyl phthalate	< 10	< 10	NC
	Fluoranthene	< 10	< 10	NC
	Fluorene	< 10	< 10	NC
	Hexachlorobenzene	< 10	< 10	NC
	Hexachlorobutadiene	< 10	< 10	NC
	Hexachlorocyclopentadiene	< 10	< 10	NC
	Hexachloroethane	< 10	< 10	NC
	Indeno(1,2,3-cd)pyrene	< 10	< 10	NC
	Isophorone	< 10	< 10	NC
	Naphthalene	< 10	< 10	NC
	Nitrobenzene	< 10	< 10	NC
	N-Nitrosodimethylamine	< 10	< 10	NC
	N-Nitrosodi-n-propylamine	< 10	< 10	NC
	N-Nitrosodiphenylamine	< 10	< 10	NC
	Pentachlorophenol	< 20	< 20	NC
	Phenanthrene	< 10	< 10	NC
	Phenol	< 10	< 10	NC
	Pyrene	< 10	< 10	NC
	Pyridine	< 10	< 10	NC

Table A-3
Field Duplicate Summary
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	MW-68 Sample Result	MW-68 (DUP) Field Duplicate	RPD (%)
Metals (mg/L):	Antimony	0	0	0.0
	Arsenic	0.0020	0 0020	0.0
	Selenium	0 0020	0.0010	**67 ***
	Barium	0.048	0.050	4.0
	Beryllium	< 0.0030	< 0 0030	NC
	Cadmium	< 0.0020	< 0 0020	NC
	Calcium	120	110	8 6
	Chromium	< 0.0060	< 0 0060	NC
	Cobalt	< 0 0060	< 0 0060	NC
	Cyanide	< 0.0050	< 0 0050	NC
	Iron	0 49	0.74	**41 ***
	Lead	< 0.0050	< 0.0050	NC
	Mercury	< 0.00020	< 0.00020	NC
	Magnesium	24	24	0 0
	Manganese	1 2	1 2	0 0
	Nickel	0.011	0.011	0 0
	Potassium	4 4	4.2	4.6
	Silver	< 0 0050	< 0 0050	NC
	Sodium	140	130	7.4
	Vanadium	< 0.050	< 0.050	NC
	Zinc	< 0.020	< 0.020	NC
General Chemistry (mg/L):	Total Dissolved Solids	934	900	3 7
	Chloride	69	72	4 2
	Nitrate (As N)	5.0	5.0	0 0
	Nitrite (As N)	< 0 10	< 0.10	NC
	Sulfate	390	390	0 0
	Alkalinity, Total (As CaCO3)	210	210	0 0
	Bicarbonate	210	210	0 0
	Carbonate	< 2.0	< 2.0	NC
	Iron	< 0.020	< 0.020	NC

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 5 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)	55	54 [d]	100	55	100
	Motor Oil Range Organics (MRO)	55	54 [d]	98.2	55	100
	Gasoline Range Organics (GRO)	55	55	100.0	55	100
VOCs (ug/kg-dry)	Chloromethane	35	21 [f]	60.0	35	100
	Methylene chloride	35	30 [f]	85.7	35	100
	1,2,4-Trimethylbenzene.	35	34 [d]	97.1	35	100
	1,3,5-Trimethylbenzene	35	34 [d]	136.0	35	100
	All remaining VOC analytes	35	35	100.0	35	100
SVOCs (mg/kg-dry):	All SVOCs	35	35	100	35	100
Metals (mg/kg-dry):	Antimony	35	25 [e]	71.4	35	100
	Mercury	35	33 [f]	94.3	35	100
	Lead	35	34 [d]	97.1	35	100
	Barium	35	34 [d]	97.1	35	100
	All remaining metals	35	35	100.0	35	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 low surrogate recoveries
b = Qualified due to high surrogate recoveries
c = Qualified due to low LCS recovery
d = Qualified due to high field duplicate relative percent difference.
e = Qualified due to low MS/MSD recovery
f = Qualified due to potential laboratory contamination.

Table A-4
Completeness Summary - Groundwater Samples
Group 5 Investigation Report
Western Refining Southwest, Inc. - Bloomfield Refinery

	Parameter	Total Number of Samples	Number of Contractual Compliance	Percent Contractural Compliance	Number of Usable Results	Percent Technical Compliance
TPH (mg/L):	Diesel Range Organics (DRO)	4	4	100	4	100
	Motor Oil Range Organics (MRO)	4	4	100	4	100
	Gasoline Range Organics (GRO)	4	4	100	4	100
VOCs (ug/L):	1,2,4-Trimethylbenzene	5	5	100	5	100
	1,3,5-Trimethylbenzene	5	5	100	5	100
	Benzene	5	5	100	5	100
	Ethylbenzene	5	5	100	5	100
	MTBE	5	5	100	5	100
	Toluene	5	5	100	5	100
	Xylenes, Total	5	5	100	5	100
	All analytes	4	4	100	4	100
SVOCs (ug/L):	All analytes	4	4	100	4	100
Anions (mg/L):	All anion analytes	4	4	88 9	4	100
Alkalinity (mg/L as CaCO3):	Alkalinity, Total (As CaCO3)	4	3 [a]	75	4	100
	Bicarbonate	4	3 [a]	75	4	100
	Carbonate	4	4	100	4	100
Total Metals (mg/L):	Barium	4	3 [c]	75	4	100
	Iron	4	3 [c]	75	4	100
	All other metal analytes	4	4	100	4	100
Dissolved Metals (mg/L):	All dissolved metal anlytes	4	4	100	4	100
Inorganics (mg/L):	All inorganic analytes	4	4	100	4	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 analysis past holding time.
b = Qualified due to low matrix spike/matrix spike duplicate recoveries
c = Qualified due to high field duplicate relative percent difference.
d = Qualified due to associated blank detection.
e = Qualified due to detection outside calibration limits.
f = Qualified due to potential laboratory contamination.
g= Qualified due to high matriz spike/matrix spike duplicate recoveries
h = Qualified due to low LCS recovery
i = Qualified due to high LCS recovery

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us

DAVE MARTIN
Secretary

RAJ SOLOMON, P.E.
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

June 1, 2011

Mr. Randy Schmaltz
Health, Safety, Environmental, & Regulatory Director
Western Refining, Southwest, Inc.
Bloomfield Refinery
P.O. Box 159
Bloomfield, New Mexico 87413

RE: APPROVAL EXTENSION REQUEST
GROUP 5 INVESTIGATION REPORT
WESTERN REFINING SOUTHWEST INC., BLOOMFIELD REFINERY
EPA ID# NMD089416416
HWB-GRCB-09-005

Dear Mr. Schmaltz:

The New Mexico Environment Department (NMED) received Western Refining Southwest, Inc., Bloomfield Refinery (Western) extension request for submitting the Group 5 Investigation Report, due June 1, 2011. Western requests an extension to incorporate any applicable changes affecting the Group 5 Investigation Report provided in NMED's comments to the Group 2 Investigation Report, which will be received after the June 1, 2011 deadline.

Western has shown good cause for this request. NMED approves the extension request. The Group 5 Investigation Report must be submitted to NMED on or before August 5, 2011.

If you have any questions regarding this letter, please contact Hope Petrie of my staff at (505) 476-6045.

Sincerely,

John E. Kieling
Acting Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
H. Petrie, NMED HWB
C. Chavez, OCD
A. Hains, Western
File: Reading 2011

Western Refining

BLOOMFIELD REFINERY

WNR LISTED NYSE

June 25, 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 Order No. HWB 07-34 (CO)
Solid Waste Management Unit (SWMU) Group No. 5 Investigation Work Plan

Dear Mr. Bearzi:

Giant Refining Company, 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. 5, which includes the refinery tank farm located east of the processing units, which is identified as SWMU No. 15. 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 JDC

404 Camp Craft Rd., Austin, Texas 78746
Tel: (512) 347 7588 Fax: (512) 347 8243
Internet: www.rpsgroup.com/energy

INVESTIGATION WORK PLAN
Group 5 (SWMU No. 15 Tank Farm Area)

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

June 2009

James R. Schmaltz
Environmental Manager

Western Refining Southwest, Inc.
Bloomfield Refinery

Scott T. Crouch, P.G.
Senior Consultant

RPS JDC, Inc.
404 Camp Craft Rd.
Austin, Texas 78746

RPS JDC

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RPS JDC

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 SWMUs designated as Group 5. 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 and groundwater 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.

SWMU Group 5 covers the refinery tank farm located east of the processing units, which is identified as SWMU No. 15 Tank Farm Area 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 SWMU. 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 Solid Waste Management Unit (SWMU) designated as Group 5 in the Order, which includes SWMU No. 15 Tank Farm Area. The location of SWMU No. 15 is shown on Figure 2. Photographs of select locations within the tank farm 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.

RPS JDC

Section 2
Background

This section presents background information for the SWMU, 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 SWMU;
- known and possible sources of contamination;
- history of releases; and
- known extent of contamination.

SWMU No. 15 Tank Farm Area

The crude oil and product storage tanks were constructed when the refinery was built in the late 1950s. There is no information available on exactly which tanks were first constructed or what materials were stored in each tank but the tank farm has always been located in the same general area and has only been used to store crude oil and refined petroleum products. The main portion of the tank farm lies just east of the processing units and along the north side of County Road #4990. In addition, there are three smaller tanks located on the north side of the processing units that are identified as SWMU No. 14 Tanks 3, 4, and 5 but these tanks are not part of the Group 5 investigation.

Currently, there are 17 tanks used to store petroleum products and three tanks used to store crude oil in SWMU No. 15. One additional tank (Tank #22) was used to store gasoline and has since been removed from the Refinery. A list of each of the tanks with the type of material stored in each is provided below:

- Tank #11 – reformate;
- Tank #12 – cat/poly gas;
- Tank #13 – unleaded gasoline;
- Tank #14 – unleaded gasoline;
- Tank #17 – reduced crude oil;
- Tank #18 – off-road diesel;
- Tank #19 – ultra low sulfur diesel;
- Tank #20 – sweet naphtha;
- Tank #22 – gasoline (tank removed);
- Tank #23 – base gas;
- Tank #24 – ultra low sulfur diesel;
- Tank #25 – ultra low sulfur diesel;

- Tank #26 – sweet naphtha (kerosene prior to 1988);
- Tank #27 – slurry oil;
- Tank #28 – crude oil;
- Tank #29 – light cycle oil (earlier storage of leaded gasoline);
- Tank #30 – low sulfur diesel (earlier storage of leaded gasoline);
- Tank #31 – crude oil;
- Tank #32 – reformate;
- Tank #35 – reformer feed; and
- Tank #36 – gasoline.

There have been several documented surface spills within the tank farm, as described below:

- 1984 – 880 barrels of naphtha spilled within tank dike (individual tank not specified) with 800 barrels recovered;
- 1985 – 400 barrels of unleaded gasoline released and all but 20 barrels recovered - location not specified other than within tank farm;
- 1985 – 140 barrels of diesel spilled inside the diked area around Tank 19 with 60 barrels recovered;
- 1986 – 20 barrels of naphtha spilled with over 19 barrels recovered - no specific location;
- 1987 – 290 barrels of regular gasoline spilled with "most" reported as recovered - no specific location;
- 1989 – 100 barrels of unidentified product spilled at Tank 22 with 99+ barrels recovered;
- 1991 – 180 barrels of Jet A spilled at Tank 26 with 120 barrels recovered; and
- 2008 - 20 barrels of diesel/water mix spilled at Tank 18 with 16 barrels recovered.

Additional possible sources of releases within the tank farm are leaks from the bottom of storage tanks. Based on the permeable nature of the subsurface soils and general lack of laterally continuous low permeable strata within the tank farm, it is likely that leaks from tank floors would migrate vertically and have little, if any, expression in soils beyond the footprint of the tank. Tanks with possible subsurface releases identified from inspection of the floors include Tanks 17, 18, 19, 20, 23, 24, 25, 26, 29, 30, and 31.

Past investigations completed as part of the RCRA Facility Investigation conducted pursuant to the Administrative Consent Order issued on April 10, 1992 by the United States Environmental Protection Agency evaluated potential impacts to soil and ground water at the tank farm area. The soil investigation consisted of a soil gas survey, which included the installation of 33 borings within and near the tank farm area (Figure 8). Soil gas samples were collected from two depth horizons, shallow (3 to 4 feet) and deep (7.5 to 10 feet). The samples were analyzed using a portable gas chromatograph for benzene, toluene, ethylbenzene, and xylene (BTEX) and for total volatile organic content (TVOC). The results for the samples collected in the area of the tank farm are provided in Table 1. Most of the samples contained very low to non-detect concentrations of volatile organics with the highest levels measured in the deeper sample interval in the southwestern portion of the tank farm at locations PH-22, PH-24, and PH-25, which are near Tanks 24, 25, and 27.

Impacts to ground water within the tank farm were documented in the 1980s and recovery wells (RW-14, RW-15, RW-16, and RW-17) were installed in August, 1990. Additional monitoring wells (MW-21, MW-29, MW-30, and MW-44) were installed in 1994 and 1998 within the tank farm to further delineate impacts to ground water. The locations of these wells are shown on Figure 9 and the historical analytical results from ground water samples collected from these wells are summarized in Table 2.

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, 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 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, soil and groundwater samples will be collected at the SWMU No. 15 Tank Farm Area. Soil borings will be installed and samples collected as discussed in Section 5.2. The installation of a monitoring well and collection of groundwater samples are described in Section 5.3.

4.2 Background Information Research

Documents containing the results of previous investigations and subsequent routine groundwater monitoring data from monitoring wells 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 SWMU-specific information regarding contaminant occurrence and distribution within soils and groundwater.

4.3 Collection and Management of Investigation Derived Waste

Drill cuttings, excess sample material and decontamination fluids, and all other investigation derived waste (IDW) associated with soil borings will be contained and characterized using methods based on the boring location, boring depth, drilling method, and type of contaminants suspected or encountered. All purged groundwater and 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 surface sampling location; the surface coordinates and elevation of each boring or test pit; the top of each monitoring well casing, and the ground surface at each monitoring well 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

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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.

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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 Drilling Activities

Soil and monitoring well borings will be drilled using either hollow-stem auger or if necessary, air rotary methods including ODEX. Monitoring well construction/completions will be conducted in accordance with the requirements of Section IX of the Order. The preferred method will be hollow-stem auger to increase the ability to recover undisturbed samples and potential contaminants. The drilling equipment will be properly decontaminated before drilling 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 to the specified depths or at planned sampling locations. Appropriate actions (e.g., installation of protective surface casing or relocation of borings to a less threatening location) will be taken to minimize any negative impacts from investigative borings. If contamination is detected at the water table, then the boring will be drilled five feet below the water table or to refusal, whichever is reached first. The soil boring to be completed as a permanent monitoring well will be drilled to the top of bedrock (Nacimiento Formation) at an anticipated completion depth ranging between 20 to 30 feet. Soil samples will be collected continuously and logged by a qualified geologist or engineer. Slotted (0.01 inch) PVC well screen will be placed at the bottom of the well and will extend for 10 to 15 feet to ensure that the well is screened across the water table and, to the extent possible the entire saturated zone is open to the well, with approximately five feet of screen above the water table. A 10/20 sand filter pack will be installed to two feet over the top of the well screen.

The drilling and 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 SWMU No. 15, a judgmental sampling design is appropriate. Examples of these areas are documented spills that accumulated in low areas within tank dikes and areas with previous subsurface soil vapor samples (see discussion in Section 2) indicating the presence of petroleum hydrocarbons. Six soil borings are proposed for locations that have documented spills from individual tanks (Tanks 18, 19, 26, the former location of Tank 22, and the roof drain collection area between Tanks 11 and 12) and the location with the highest subsurface soil vapor concentrations at Tank 27 (Figure 9). Thirty four surface soil samples (0-6" and 18-24") will be collected at 17 other potential areas of concern (e.g., low areas within tank dikes where historical undocumented spilled materials would have collected) as shown on Figure 9.

The six soil borings will be drilled to a minimum depth of ten feet, or five feet below the deepest detected contamination, whichever is deeper, unless saturation is encountered at a shallower depth which will result in termination of the soil sample collection effort. The 17 surface soil sample locations will terminate at a depth of 24", unless Western elects to extend the sampling deeper based on field screening results. A decontaminated split-barrel sampler or continuous five-foot core barrel will be used to obtain samples during the drilling of each boring. Surface samples may be collected using decontaminated, hand-held stainless steel sampling device, shelby tube, or thin-wall sampler, 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 5.4.

Discrete soil samples will be collected for laboratory analyses at the following intervals:

- 0-6" (all soil borings and surface soil sample locations);
- 18-24" (all soil borings and surface soil sample locations);
- from the 6" interval at the top of saturation;

- 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.

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 2.5 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. Additional screening for site- or release-specific characteristics such as pH or for specific compounds using field test kits may be conducted where appropriate.

Visual screening includes examination of soil samples for evidence of staining caused by petroleum-related compounds or other substances that may cause staining of natural soils such as elemental sulfur or cyanide 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 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 Groundwater Water Monitoring

5.3.1 Groundwater Levels

Groundwater level and SPH thickness measurements will be obtained at the new monitoring well prior to purging in preparation for a sampling event. Measurement data and the date and time of each measurement will be recorded on a site monitoring data sheet. The depth to groundwater and SPH thickness levels will be measured to the nearest 0.01 ft. The depth to groundwater and SPH thickness will be recorded relative to the surveyed well casing or other surveyed datum. A corrected water table elevation will be provided in wells containing SPH by adding 0.8 times the measured SPH thickness to the measured water table elevation.

Groundwater level and SPH thickness measurements will also be obtained at each new monitoring well during the next regularly scheduled facility-wide groundwater sampling event to facilitate preparation of a facility-wide potentiometric surface map.

5.3.2 Groundwater and Vadose Zone Vapor Sampling

Groundwater has been sampled at monitoring wells located within and adjacent to the tank farm and analyzed for potential site-related constituents from as early as 1984. Based on the fact that there are numerous wells that provide information on water quality across the tank farm, only one new permanent monitoring well is proposed for the northeast corner of the tank farm as shown on Figure 9. In addition, if any of the other six soil borings encounter groundwater, then a groundwater sample will be collected for analysis prior to plugging the boring.

The new permanent monitoring well will be developed once all new soil borings have been completed or possibly earlier. Groundwater samples will initially be obtained from the newly constructed monitoring well no later than five days after the completion of well development. Prior to collection of groundwater samples from the new monitoring well, a total well vapor sample will be field monitored for percent carbon dioxide and oxygen. Pursuant to Section VIII.A.8. of the Order, the vapor monitoring will be conducted by sealing the top of the well with a cap containing a sample port. Polyethylene tubing will be used to connect the sample port to a low-velocity pump, if necessary, or directly to a field instrument that is capable of measuring percent carbon dioxide and oxygen. The field vapor measurements, date and time of each measurement, and the instrument used will be recorded on a vapor monitoring data sheet.

A second round of groundwater sampling will be conducted no sooner than 30 days and not later than 75 days of the initial sampling event. Subsequent sampling events will be dependent upon the analytical results of the first two sampling events and as specified by the NMED.

5.3.3 Well Purging

The new permanent monitoring well will be purged by removing groundwater with a dedicated bailer or disposable bailer prior to sampling in order to ensure that formation water is being sampled. Purge volumes (a minimum of three well volumes including filter pack) will be determined by monitoring the groundwater pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, and temperature after every two gallons or each well volume, whichever is less, has been purged from the well. Purging will continue, as needed, until the specific conductance, pH, and temperature readings are within 10 percent between readings for three consecutive measurements. Field water quality parameters will also be compared to historical data provided in Table 3 to ensure that the measurements are indicative of formation water. The volume of groundwater purged, the instruments used, and the readings obtained at each interval will be recorded on the field-monitoring log. Well purging may also be conducted in accordance with the NMED's Position Paper *Use of Low-Flow and other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring* (October 30, 2001, as updated).

5.3.4 Groundwater Sample Collection

Groundwater samples will be collected within 24 hours of the completion of well purging using dedicated bailers or disposal bailers. Alternatively, well sampling may also be conducted in accordance with the NMED's Position Paper *Use of Low-Flow and other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring* (October 30, 2001, as updated). Sample collection methods will be documented in the field monitoring reports. The samples will be transferred to the appropriate, clean containers prepared by the analytical laboratory. Sample handling and chain-of-custody procedures will be in accordance with the procedures presented below in Section 5.4.

Groundwater samples intended for metals analysis will be submitted to the laboratory as total metals samples. QA/QC samples will be collected to monitor the validity of the groundwater sample collection procedures as follows:

- Field duplicate water samples will be obtained at a frequency of ten percent, with a minimum, of one duplicate sample per sampling event;
- Field blanks will be obtained at a minimum frequency of one per day. Field blanks will be generated by filling sample containers in the field with deionized water and submitting the samples, along with the groundwater samples, to the analytical laboratory for the appropriate analyses.
- Equipment rinsate blanks will be obtained for chemical analysis at the rate of ten percent or a minimum of one rinsate blank per sampling day. Equipment rinsate blanks will be collected at a rate of one per sampling day if disposable sampling equipment is used. Rinsate samples will be generated by rinsing deionized water through unused or decontaminated sampling equipment. The rinsate sample will be placed in the appropriate sample container and submitted with the groundwater samples to the analytical laboratory for the appropriate analyses.
- Trip blanks will accompany laboratory sample bottles and shipping and storage containers intended for VOC analyses. Trip blanks will consist of a sample of analyte-free deionized water prepared by the laboratory and placed in an appropriate sample container. The trip blank will be prepared by the analytical laboratory prior to the sampling event and will be kept with the shipping containers and placed with other water samples obtained from the site each day. Trip blanks will be analyzed at a frequency of one for each shipping container of samples to be analyzed for VOCs.

5.4 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. Temperature blanks will be included with each shipping container.

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.

5.5 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 drilling equipment, reusable sampling equipment and well materials. The drilling rig will be decontaminated prior to entering the site or unit. Drilling equipment or other exploration equipment that may come in contact with the borehole will be decontaminated by high pressure washing prior to drilling each new boring.

Sampling or measurement equipment, including but not limited to, stainless steel sampling tools, split-barrel or core samplers, non-dedicated well developing or purging equipment, groundwater quality measurement instruments, and water level measurement instruments, 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.

5.6 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.

5.7 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.

5.8 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.

Groundwater and 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.

Groundwater and 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

In addition, groundwater samples will also be analyzed for the following general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Chloride	EPA method 300.0
Sulfate	EPA method 300.0
Calcium	EPA method 6010/6020
Magnesium	EPA method 6010/6020
Sodium	EPA method 6010/6020
Potassium	EPA method 6010/6020
Manganese	SW-846 method 6010/6020
Nitrate/nitrite	EPA method 300.0
Ferric/ferrous Iron	SW-846 method 6010/6020 & SM 3500Fe2+

As discussed in section 5.3.3, field measurements will be obtained for pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, and temperature.

5.9 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 SWMUs. 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 SWMUs.

The quantity of data is SWMU 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 SWMU 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 and 5.3.2 for groundwater. In addition, sample collection techniques (e.g., purging of monitoring wells to collect formation water) will be utilized to help ensure representative results. An evaluation of on-going groundwater monitoring results will be performed to assess representativeness.

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 base 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

After the initial investigation activities are completed, a second round of groundwater samples will be collected to confirm the initial groundwater analyses for samples collected at new monitoring wells. The groundwater samples will be collected no sooner than 30 days after the initial sampling event and no later than 75 days after the initial sampling event. If possible, the second sampling event will be timed to coincide with the regularly scheduled semiannual groundwater sampling events. The samples will be analyzed for the same constituents for which the first samples were analyzed.

Any subsequent sampling events will be based on the results of the first two analyses and will be approved by the NMED prior to implementation.

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 and initial groundwater sampling) -- four weeks;
- laboratory analyses for initial sampling event – four weeks;
- data reduction and validation (soils and initial groundwater event) – three weeks;
- second groundwater sampling event – one week;
- laboratory analyses for second groundwater sampling event – three weeks;
- data reduction and validation (second groundwater event) – two 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.

RPS JDC

Tables

Table 1
Subsurface Soil Vapor Concentrations
SWMU Group 5 Investigation Work Plan
Western Refining Southwest - Bloomfield Refinery

SAMPLE ID	PROBE HOLE	DEPTH (FEET)	DATE	BENZENE	TOLUENE	ETHYL-BENZENE	m&p-XYLENE	o- XYLENE	TVOC	COMMENTS
BLANK-01	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-02	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-Probe Rod Blank
SG-09	PH-05	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-10	PH-05	8	12/9/93	<1	<1	<1	<1	<1	1	
SG-10(D)	PH-05	8	12/9/93	<1	<1	<1	<1	<1	1	QC-Injection Duplicate
BLANK-03	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-11	PH-06	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-12	PH-06	7.5	12/9/93	<1	<1	<1	<1	<1	3	
SG-13	PH-07	3	12/9/93	<1	<1	<1	<1	<1	1	
SG-14	PH-07	9	12/9/93	<1	<1	<1	<1	<1	1	
SG-15	PH-08	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-16	PH-08	8	12/9/93	<1	<1	<1	<1	<1	0	
SG-17	PH-09	3	12/9/93	<1	1	<1	<1	<1	2	
SG-18	PH-09	10	12/9/93	<1	<1	<1	<1	<1	0	
SG-19	PH-10	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-20	PH-10	10	12/9/93	<1	<1	<1	<1	<1	0	
SG-20(D)	PH-10	10	12/9/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-04	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-21	PH-11	3	12/9/93	<1	<1	<1	<1	<1	1	
SG-22	PH-11	10	12/9/93	<1	<1	<1	<1	<1	3	
SG-23	PH-12	3	12/9/93	<1	<1	<1	<1	<1	1	
SG-24	PH-12	10	12/9/93	<1	<1	<1	<1	<1	1	
SG-25	PH-13	3	12/9/93	<1	<1	<1	<1	<1	0	
SG-26	PH-13	10	12/9/93	<1	<1	<1	<1	<1	0	
SG-27	PH-14	3	12/9/93	<1	<1	<1	<1	<1	1	
SG-28	PH-14	10	12/9/93	<1	<1	<1	<1	<1	0	

Table 1
Subsurface Soil Vapor Concentrations
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SAMPLE ID	PROBE HOLE	DEPTH (FEET)	DATE	BENZENE	TOLUENE	ETHYL-BENZENE	m&p-XYLENE	o- XYLENE	TVOC	COMMENTS
SG-28(D)	PH-14	10	12/9/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-05	NA	NA	12/9/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-06	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-07	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-Probe Rod Blank
SG-29	PH-15	3	12/10/93	<1	2	<1	<1	<1	25	
SG-30	PH-15	9	12/10/93	<1	61	<1	19	9	1108	
SG-31	PH-16	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-32	PH-16	9	12/10/93	<1	<1	<1	<1	<1	0	
SG-33	PH-17	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-34	PH-17	9	12/10/93	<1	<1	<1	1	<1	2	
SG-35	PH-18	3	12/10/93	<1	2	<1	1	<1	3	
SG-36	PH-18	9	12/10/93	<1	<1	<1	<1	<1	0	
SG-37	PH-19	3	12/10/93	<1	3	<1	2	<1	3	
SG-38	PH-19	9	12/10/93	<1	<1	<1	<1	<1	0	
SG-38(D)	PH-19	9	12/10/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-08	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-39	PH-20	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-40	PH-20	9	12/10/93	<1	77	13	39	14	345	
SG-41	PH-21	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-42	PH-21	9	12/10/93	<1	<1	<1	<1	<1	0	
SG-43	PH-22	3	12/10/93	<1	<1	<1	<1	<1	0	
SG-44	PH-22	9	12/10/93	35	1508	199	2260	95	6474	
SG-45	PH-23	3	12/10/93	<1	11	3	8	2	23	
SG-46	PH-23	9	12/10/93	<1	2	<1	1	<1	3	
SG-47	PH-24	3	12/10/93	16	115	27	145	36	721	
SG-48	PH-24	9	12/10/93	88	271	63	331	62	1571	

Table 1
Subsurface Soil Vapor Concentrations
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Western Refining Southwest - Bloomfield Refinery

SAMPLE ID	PROBE HOLE	DEPTH (FEET)	DATE	BENZENE	TOLUENE	ETHYL-BENZENE	m&p-XYLENE	o- XYLENE	TVOC	COMMENTS
SG-48(D)	PH-24	9	12/10/93	91	272	60	313	60	1547	QC-Duplicate Injection
BLANK-09	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-49	PH-25	3	12/10/93	91	76	9	55	7	41	
SG-50	PH-25	9	12/10/93	447	532	82	538	61	2519	
SG-51	PH-26	3	12/10/93	1	<1	2	11	2	36	
SG-52	PH-26	9	12/10/93	27	14	<1	16	2	97	
SG-52(D)	PH-26	9	12/10/93	27	15	1	17	2	100	QC-Duplicate Injection
BLANK-10	NA	NA	12/10/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-11	NA	NA	12/11/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-12	NA	NA	12/11/93	<1	<1	<1	<1	<1	0	QC-Probe Rod Blank
SG-53	PH-27	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-54	PH-27	9	12/11/93	<1	<1	<1	<1	<1	1	
SG-55	PH-28	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-56	PH-28	9	12/11/93	<1	<1	<1	<1	<1	0	
SG-57	PH-29	3	12/11/93	<1	<1	<1	1	<1	1	
SG-58	PH-29	9	12/11/93	<1	<1	<1	<1	<1	0	
SG-61	PH-31	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-62	PH-31	9	12/11/93	<1	<1	<1	<1	<1	0	
SG-62(D)	PH-31	9	12/11/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-13	NA	NA	12/11/93	<1	<1	<1	<1	<1	0	QC-System Blank
SG-63	PH-32	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-64	PH-32	9	12/11/93	<1	<1	<1	2	<1	2	
SG-65	PH-33	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-66	PH-33	10	12/11/93	<1	<1	<1	<1	<1	0	
SG-67	PH-34	3	12/11/93	<1	<1	<1	<1	<1	1	

Table 1
Subsurface Soil Vapor Concentrations
SWMU Group 5 Investigation Work Plan
Western Refining Southwest - Bloomfield Refinery

SAMPLE ID	PROBE HOLE	DEPTH (FEET)	DATE	BENZENE	TOLUENE	ETHYL-BENZENE	m&p-XYLENE	o- XYLENE	TVOC	COMMENTS
SG-68	PH-34	9	12/11/93	<1	<1	<1	<1	<1	0	
SG-71	PH-36	3	12/11/93	<1	<1	<1	<1	<1	0	
SG-72	PH-36	9	12/11/93	7	6	2	12	<1	35	
SG-72(D)	PH-36	9	12/11/93	7	7	2	12	<1	37	QC-Duplicate Injection
BLANK-14	NA	NA	12/11/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-15	NA	NA	12/12/93	<1	<1	<1	<1	<1	0	QC-System Blank
BLANK-16	NA	NA	12/12/93	<1	<1	<1	<1	<1	0	QC-Probe Rod Blank
SG-78	PH-40	3	12/12/93	<1	<1	<1	<1	<1	0	
SG-79	PH-40	8.5	12/12/93	<1	<1	<1	<1	<1	0	
SG-80	PH-41	3	12/12/93	<1	<1	<1	<1	<1	0	
SG-81	PH-41	8.5	12/12/93	<1	<1	<1	<1	<1	0	
SG-82	PH-42	3	12/12/93	<1	<1	<1	<1	<1	0	
SG-83	PH-42	9	12/12/93	<1	<1	<1	<1	<1	0	
SG-83(D)	PH-42	9	12/12/93	<1	<1	<1	<1	<1	0	QC-Duplicate Injection
BLANK-17	NA	NA	12/12/93	<1	<1	<1	<1	<1	0	QC-System Blank

Notes: NA = Not applicable
QC = Quality Control
D = Duplicate analysis
<1 = Not detected at lower quanitfiable limit
units = Micrograms per liter of headspace vapor analyzed
TVOC = Total volatile organic content

Table 2
Historical Groundwater Analyses
SWMU Group 5 Investigation Work Plan
Western Refining Southwest - Bloomfield Refinery

Sample Location	Date	Benzene	Toluene	EthylBen	Xylene	MTBE	Acenaphthene	Bis(2-ethylexyl) phthalate	2,4 Dimethyl phenol	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Phenol
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.005 [2]	0.75 [1]	0.7 [2]	0.62 [1]	0.012 [3]	2.2 [3]	0.006 [3]	0.73 [3]	1.5 [3]	0.15 [3]	0.14 [3]	–	0.005 [1]
MW-3	Apr-99	0.005	ND	0.005	0.029	–	–	–	–	–	–	–	–	–
	Oct-99	ND	0.001	ND	ND	–	–	–	–	–	–	ND	–	–
	Sep-00	ND	ND	ND	ND	–	–	–	–	–	–	ND	–	–
	Sep-01	ND	ND	ND	ND	–	–	–	–	–	–	ND	–	–
	Aug-02	<0.001	<0.001	<0.001	0.003	NR[2]	–	–	–	–	–	ND	–	–
	Aug-03	<0.001	<0.001	<0.001	<0.001	<0.001	–	–	–	–	–	–	–	–
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-04	<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	–	–	–	–	–	–	–	–
	Apr-05	<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	–	–	–	–	–	–	–	–
	Aug-05	<0.001	<0.001	<0.001	<0.001	<0.001	–	–	–	–	–	–	–	–
	Apr-06	<0.001	<0.001	<0.001	<0.003	<0.0025	–	–	–	–	–	–	–	–
	Aug-06	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	–	–	–	–	–	–	–	–
	Apr-07	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	–	–	–	–	–	–	–	–
	Aug-07	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	–	–	–	–	–	–	–	–
	Apr-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	–	–	–	–	–	–	–	–
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	–	–	–	–	–	–	–	–
RW-15	Apr-99	14	25	6.9	35.4	–	–	–	–	–	–	–	–	–
	Oct-99	7.4	9.2	2.7	17.1	–	–	–	–	–	–	0.59	–	–
	Sep-00	7.6	14	3.3	14	–	–	–	–	–	–	0.89	–	–
	Sep-01	9	17	4.4	25	–	–	–	–	–	–	0.82	–	–
	Aug-02	12	19	3.8	22	NR[2]	–	–	–	–	–	0.58	–	–
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-04	9.4	15	2.8	22	<0.25	–	–	–	–	–	–	–	–
	Apr-05	9.0	11.0	2.5	19.0	<0.10	–	–	–	–	–	–	–	–
	Aug-05	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Apr-06	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Aug-06	20.0	20.0	7.2	43.0	<0.38	–	–	–	–	–	–	–	–
	Apr-07	6.8	2.9	3	15	<0.62	–	–	–	–	–	–	–	–
	Aug-07	6.9	6.2	3.5	20	0.03	<0.05	<0.075	0.078	<0.05	0.33	0.35	0.068	0.11
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	–	–	–	–	–	–	–	–
	Aug-08	6.0	1.0	4.1	21.0	0.03	<0.01	<0.01	0.013	<0.01	0.079	0.28	<0.01	0.018
RW-17	Aug-02	1.9	ND	1.3	11	–	–	–	–	–	–	1.4	–	–
MW-21	Aug-02	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Aug-03	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Mar-04	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Aug-04	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Apr-05	0.13	<0.0025	0.025	0.028	0.041	–	–	–	–	–	–	–	–
	Aug-05	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Apr-06	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Aug-06	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Aug-07	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	–	–	–	–	–	–	–	–
	Aug-08	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	–	–	–	–	–	–	–	–
MW-29	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-04	<0.0005	<0.0005	<0.0005	<0.0005	0.0026	–	–	–	–	–	–	–	–
	Apr-05	<0.0005	<0.0005	<0.0005	<0.0005	0.0037	–	–	–	–	–	–	–	–
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Apr-06	<0.001	<0.001	<0.001	<0.003	0.0045	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Apr-07	<0.001	<0.001	<0.001	<0.002	0.004	–	–	–	–	–	–	–	–
	Aug-07	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	–	–	–	–	–	–	–	–
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	–	–	–	–	–	–	–	–
	Aug-08	<0.001	<0.001	<0.001	<0.0015	0.001	–	–	–	–	–	–	–	–
MW-30	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-04	1.7	0.37	1.9	2.5	<0.10	–	–	–	–	–	–	–	–
	Apr-05	5.7	3.7	4.4	12.0	<0.10	–	–	–	–	–	–	–	–
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Apr-06	3.5	1.4	2.6	6.8	<0.620	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-07	6.0	2.9	4.0	16.0	<0.02	<0.01	<0.015	<0.01	<0.01	0.14	0.44	<0.01	<0.01
	Apr-08	6.0	2.4	3.5	13.0	<0.15	–	–	–	–	–	–	–	–
	Aug-08	6.7	6.7	4.5	18.0	<0.1	<0.01	<0.01	0.019	<0.01	0.21	0.59	<0.01	<0.01
MW-31	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Aug-04	3.7	0.4	0.32	1.2	<0.25	–	–	–	–	–	–	–	–
	Apr-05	2.6	0.0062	0.45	1.2	<0.25	–	–	–	–	–	–	–	–
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Apr-06	6.1	1.5	0.94	4.5	<0.120	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	–	–	–	–	–	–	–	–
	Apr-07	4.3	<0.10	1.4	4.7	<0.25	–	–	–	–	–	–	–	–
	Aug-07	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	–	–	–	–	–	–	–	–
	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	–	–	–	–	–	–	–	–
	Aug-08	4.0	0.018	1.4	3.0	<0.01	–	–	–	–	–	–	–	–

Sample Location	Date	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Potassium
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.01 [2]	1 [1]	0.005 [2]	–	0.05 [1]	–	1 [1]	0.015 [2]	–	0.2 [1]	–
MW-3	Apr-99	–	–	–	–	–	–	–	–	–	–	–
	Oct-99	–	–	–	–	–	–	–	–	–	–	–
	Sep-00	–	–	–	–	–	–	–	–	–	–	–
	Sep-01	–	–	–	–	–	–	–	–	–	–	–
	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	<0.02	0.3	<0.002	490	<0.006	<0.006	0.27	<0.005	140	0.58	10
	Mar-04	–	–	–	–	–	–	–	–	–	–	–
	Aug-04	NS[1]	NS[1]	NS[1]	–	NS[1]	–	–	NS[1]	–	–	–
	Apr-05	–	–	–	–	–	–	–	–	–	–	–
	Aug-05	<0.020	0.018	<0.002	480	<0.006	<0.006	0.047	<0.005	130	0.43	7.6
	Apr-06	–	–	–	–	–	–	–	–	–	–	–
	Aug-06	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-07	–	–	–	–	–	–	–	–	–	–	–
	Aug-07	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-08	–	–	–	–	–	–	–	–	–	–	–
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
RW-15	Apr-99	–	–	–	–	–	–	–	–	–	–	–
	Oct-99	–	–	–	–	–	–	23.8	–	–	–	–
	Sep-00	–	–	–	–	–	–	3.42	–	–	–	–
	Sep-01	–	–	–	–	–	–	5.7	–	–	–	–
	Aug-02	NR[2]	NR[2]	NR[2]	–	NR[2]	–	5.2	NR[2]	–	–	–
	Aug-03	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Mar-04	–	–	–	–	–	–	–	–	–	–	–
	Aug-04	<0.020	1.2	<0.002	–	<0.006	–	–	<0.005	–	–	–
	Apr-05	–	–	–	–	–	–	–	–	–	–	–
	Aug-05	NR[1]	NR[1]	NR[1]	–	NR[1]	–	–	NR[1]	–	–	–
	Apr-06	–	–	–	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	–	<0.006	–	–	<0.005	–	–	–
	Apr-07	–	–	–	–	–	–	–	–	–	–	–
	Aug-07	<0.020	1.8	<0.002	–	<0.006	–	–	<0.005	–	–	–
	Apr-08	–	–	–	–	–	–	–	–	–	–	–
	Aug-08	<0.020	1.5	<0.002	–	<0.006	–	–	NR[2]	–	–	–
RW-17	Aug-02	–	–	–	–	–	–	–	–	–	–	–
MW-21	Aug-02	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Aug-03	NR[1]	NR[1]	NR[1]	–	NR[1]	–	–	NR[1]	–	–	–
	Mar-04	–	–	–	–	–	–	–	–	–	–	–
	Aug-04	<0.020	0.029	<0.0020	–	<0.0060	–	–	<0.005	–	–	–
	Apr-05	–	–	–	–	–	–	–	–	–	–	–
	Aug-05	NR[1]	NR[1]	NR[1]	–	NR[1]	–	–	NR[1]	–	–	–
	Apr-06	–	–	–	–	–	–	–	–	–	–	–
	Aug-06	NR[1]	NR[1]	NR[1]	–	NR[1]	–	–	NR[1]	–	–	–
	Aug-07	NR[1]	NR[1]	NR[1]	–	NR[1]	–	–	NR[1]	–	–	–
	Apr-08	–	–	–	–	–	–	–	–	–	–	–
	Aug-08	NR[1]	NR[1]	NR[1]	–	NR[1]	–	–	NR[1]	–	–	–
MW-29	Aug-02	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Aug-03	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Mar-04	–	–	–	–	–	–	–	–	–	–	–
	Aug-04	<0.020	0.039	<0.002	–	<0.006	–	–	<0.005	–	–	–
	Apr-05	–	–	–	–	–	–	–	–	–	–	–
	Aug-05	NR[1]	NR[1]	NR[1]	–	NR[1]	–	–	NR[1]	–	–	–
	Apr-06	–	–	–	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Apr-07	–	–	–	–	–	–	–	–	–	–	–
	Aug-07	NS[3]	NS[3]	NS[3]	–	NS[3]	–	–	NS[3]	–	–	–
	Apr-08	–	–	–	–	–	–	–	–	–	–	–
	Aug-08	<0.020	0.072	<0.0020	–	<0.0060	–	–	<0.0050	–	–	–
MW-30	Aug-02	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Aug-03	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Mar-04	–	–	–	–	–	–	–	–	–	–	–
	Aug-04	<0.020	0.24	<0.002	–	0.0073	–	–	0.011	–	–	–
	Apr-05	–	–	–	–	–	–	–	–	–	–	–
	Aug-05	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Apr-06	–	–	–	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Aug-07	<0.020	0.89	<0.002	–	<0.006	–	–	<0.005	–	–	–
	Apr-08	–	–	–	–	–	–	–	–	–	–	–
	Aug-08	<0.020	0.72	<0.0020	–	<0.0060	–	–	<0.0050	–	–	–
MW-31	Aug-02	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Aug-03	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Mar-04	–	–	–	–	–	–	–	–	–	–	–
	Aug-04	<0.02	0.35	<0.002	–	<0.0088	–	–	<0.005	–	–	–
	Apr-05	–	–	–	–	–	–	–	–	–	–	–
	Aug-05	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Apr-06	–	–	–	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	–	NR[2]	–	–	NR[2]	–	–	–
	Apr-07	–	–	–	–	–	–	–	–	–	–	–
	Aug-07	NS[2]	NS[2]	NS[2]	–	NS[2]	–	–	NS[2]	–	–	–
	Apr-08	–	–	–	–	–	–	–	–	–	–	–
	Aug-08	<0.020	1.1	<0.0020	–	<0.0060	–	–	<0.0050	–	–	–

Sample Location	Date	Selenium	Silver	Mercury	DRO	GRO	Fluoride	Chloride	Nitrite	Bromide	NO3	Phosphorus	Sulfate	CO2	ALK
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.05 [1]	0.05 [1]	0.002 [1]	1.72 [1]	–	–	250 [1]	1 [2]	–	10 [2]	–	600 [1]	–	–
MW-3	Apr-99	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Oct-99	–	–	–	–	–	–	–	–	–	15.5	–	–	–	–
	Sep-00	–	–	–	–	–	–	–	–	–	41	–	980	–	–
	Sep-01	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	0.024	<0.005	–	NR[2]	NR[2]	0.17	1400	41	22	NS[1]	<0.50	NS[1]	NS[1]	–
	Mar-04	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-04	NS[1]	NS[1]	NS[1]	NR[2]	NR[2]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-05	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-05	<0.050	<0.005	–	NR[2]	NR[2]	0.33	1200	<0.50	4.5	42	<0.50	2300	680	680
	Apr-06	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-06	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-07	–	–	–	NS[1]	NS[1]	–	–	–	–	–	–	–	–	–
	Aug-07	NS[1]	NS[1]	NS[1]	NS[2]	NS[2]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-08	–	–	–	NS[1]	NS[1]	–	–	–	–	–	–	–	–	–
	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
RW-15	Apr-99	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Oct-99	–	–	–	–	–	–	–	–	–	ND	–	–	–	–
	Sep-00	–	–	–	–	–	–	–	–	–	ND	–	2.26	–	–
	Sep-01	–	–	–	–	–	–	–	–	–	4.2	–	ND	–	–
	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	4.9	NR[2]	50	NR[2]	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-04	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.3	460	<0.10	6.7	<0.10	<0.50	3.4	1100	NR[2]
	Apr-05	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-05	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-06	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	<0.50	370	<0.50	7.6	NS[2]	<2.5	<2.5	1200	1200
	Apr-07	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-07	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.32	400	<2.0	8.4	<0.10	<0.50	<0.50	1300	1300
	Apr-08	–	–	–	NS[2]	NS[2]	–	–	–	–	–	–	–	–	–
	Aug-08	<0.05	<0.005	<0.0002	2.3	62	0.29	420	<2.0	7.8	<0.10	<0.50	0.76	1200	1200
RW-17	Aug-02	–	–	–	–	–	–	–	–	–	–	–	–	–	–
MW-21	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Mar-04	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-04	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.18	420	<0.10	3.4	<0.10	<0.50	1400	600	NR[2]
	Apr-05	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-05	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-06	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-06	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Aug-07	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-08	–	–	–	NS[2]	NS[2]	–	–	–	–	–	–	–	–	–
	Aug-08	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
MW-29	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-04	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.31	35	<0.10	<0.10	0.6	<0.50	150	210	NR[2]
	Apr-05	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-05	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-06	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-07	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]
	Apr-08	–	–	–	NS[2]	NS[2]	–	–	–	–	–	–	–	–	–
	Aug-08	<0.25	<0.0050	<0.00020	<1.0	<0.05	0.36	57	<0.10	0.4	0.99	<0.50	160	200	210
MW-30	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-04	<0.05	<0.005	0.0002	NR[2]	NR[2]	0.18	360	<0.10	5.6	<0.10	<0.50	720	1200	NR[2]
	Apr-05	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-06	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-07	<0.05	<0.005	<0.0002	NR[2]	NR[2]	0.17	240	<0.10	4.7	<0.10	<0.50	76	1500	1400
	Apr-08	–	–	–	7.3	68	–	–	–	–	–	–	–	–	–
	Aug-08	<0.25	<0.0050	<0.00020	6.3	80	0.15	210	<0.10	5.6	<0.10	<0.50	12	1500	1400
MW-31	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Mar-04	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-04	<0.05	<0.005	0.0002	NR[2]	NR[2]	0.19	370	<0.10	7.2	0.14	<0.50	750	1200	1400
	Apr-05	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-06	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	–	–	–	NR[2]	NR[2]	–	–	–	–	–	–	–	–	–
	Aug-07	NS[2]	NS[2]	NS[2]	NS[3]	NS[3]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]
	Apr-08	–	–	–	NS[2]	NS[2]	–	–	–	–	–	–	–	–	–
	Aug-08	<0.050	<0.0050	<0.00020	<1.0	<0.05	0.15	740	<1.0	17	<0.10	<0.50	6.4	1100	1100

Table 2
Historical Groundwater Analyses
SWMU Group 5 Investigation Work Plan
Western Refining Southwest - Bloomfield Refinery

Sample Location	Date	Benzene	Toluene	EthylBen	Xylene	MTBE	Acenaphthene	Bis(2-ethylexyl) phthalate	2,4 Dimethyl phenol	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.005[2]	0.75[1]	0.7[2]	0.62[1]	0.012[3]	2.2[3]	0.006[3]	0.73[3]	1.5[3]	0.15[3]	0.14[3]	--
MW-44	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--
MW-44	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--
MW-44	Mar-04	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--
MW-44	Aug-04	<0.0005	<0.0005	<0.0005	<0.0005	0.0048	--	--	--	--	--	--	--
MW-44	Apr-05	<0.0005	<0.0005	<0.0005	<0.0005	0.0041	--	--	--	--	--	--	--
MW-44	Aug-05	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--
MW-44	Apr-06	<0.001	<0.001	<0.001	<0.003	0.0028	--	--	--	--	--	--	--
MW-44	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	--	--	--	--	--	--	--
MW-44	Apr-07	<0.001	0.006	0.003	0.034	<0.0025	--	--	--	--	--	--	--
MW-44	Aug-07	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	--	--	--	--	--	--	--
MW-44	Apr-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]	--	--	--	--	--	--	--
MW-44	Aug-08	<0.001	<0.001	<0.001	<0.0015	0.0018	--	--	--	--	--	--	--

Sample Location	Date	Phenol	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Potassium
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.005[1]	0.01[2]	1[1]	0.005[2]	--	0.05[1]	--	1[1]	0.015[2]	--	0.2[1]	--
MW-44	Aug-02	--	NR[2]	NR[2]	NR[2]	--	NR[2]	--	--	NR[2]	--	--	--
MW-44	Aug-03	--	NR[2]	NR[2]	NR[2]	--	NR[2]	--	--	NR[2]	--	--	--
MW-44	Mar-04	--	--	--	--	--	--	--	--	--	--	--	--
MW-44	Aug-04	--	<0.020	0.084	<0.0020	--	0.1	--	--	0.036	--	--	--
MW-44	Apr-05	--	--	--	--	--	--	--	--	--	--	--	--
MW-44	Aug-05	--	NR[1]	NR[1]	NR[1]	--	NR[1]	--	--	NR[1]	--	--	--
MW-44	Apr-06	--	--	--	--	--	--	--	--	--	--	--	--
MW-44	Aug-06	--	NR[2]	NR[2]	NR[2]	--	NR[2]	--	--	NR[2]	--	--	--
MW-44	Apr-07	--	--	--	--	--	--	--	--	--	--	--	--
MW-44	Aug-07	--	NS[3]	NS[3]	NS[3]	--	NS[3]	--	--	NS[3]	--	--	--
MW-44	Apr-08	--	--	--	--	--	--	--	--	--	--	--	--
MW-44	Aug-08	--	<0.020	<0.020	<0.0020	--	<0.0060	--	--	<0.0050	--	--	--

Sample Location	Date	Selenium	Silver	Mercury	DRO	GRO	Fluoride	Chloride	Nitrite	Bromide	NO3	Phosphorus	Sulfate	CO2	ALK
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Screening Level (mg/l)		0.05[1]	0.05[1]	0.002[1]	1.72[1]	--	--	250[1]	1[2]	--	10[2]	--	600[1]	--	--
MW-44	Aug-02	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
MW-44	Aug-03	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
MW-44	Mar-04	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
MW-44	Aug-04	<0.05	<0.0050	0.0003	NR[2]	NR[2]	0.3	210	<0.10	0.79	<0.10	<0.50	2800	400	NR[2]
MW-44	Apr-05	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
MW-44	Aug-05	NR[1]	NR[1]	NR[1]	NR[2]	NR[2]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
MW-44	Apr-06	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
MW-44	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
MW-44	Apr-07	--	--	--	NR[2]	NR[2]	--	--	--	--	--	--	--	--	--
MW-44	Aug-07	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]	NS[3]
MW-44	Apr-08	--	--	--	NS[2]	NS[2]	--	--	--	--	--	--	--	--	--
MW-44	Aug-08	<0.25	<0.0050	<0.00020	<1.0	<0.05	0.62	72	<0.10	0.28	<0.10	<0.50	3000	360	350

NS[1]= Well is Dry or Not Enough Water to Sample- No Sample
NS[2] = Not Sampled due to approved Facility-Wide Monitoring Plan
NS[3] = 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 pre-2007 Conditions
1 - New Mexico Water Quality Control Commission Standard for Ground Water
2 - Safe Drinking Water Act Maximum Contaminant Level
3 - EPA Region VI Human Health Medium-Specific Screening Levels -Tap Water

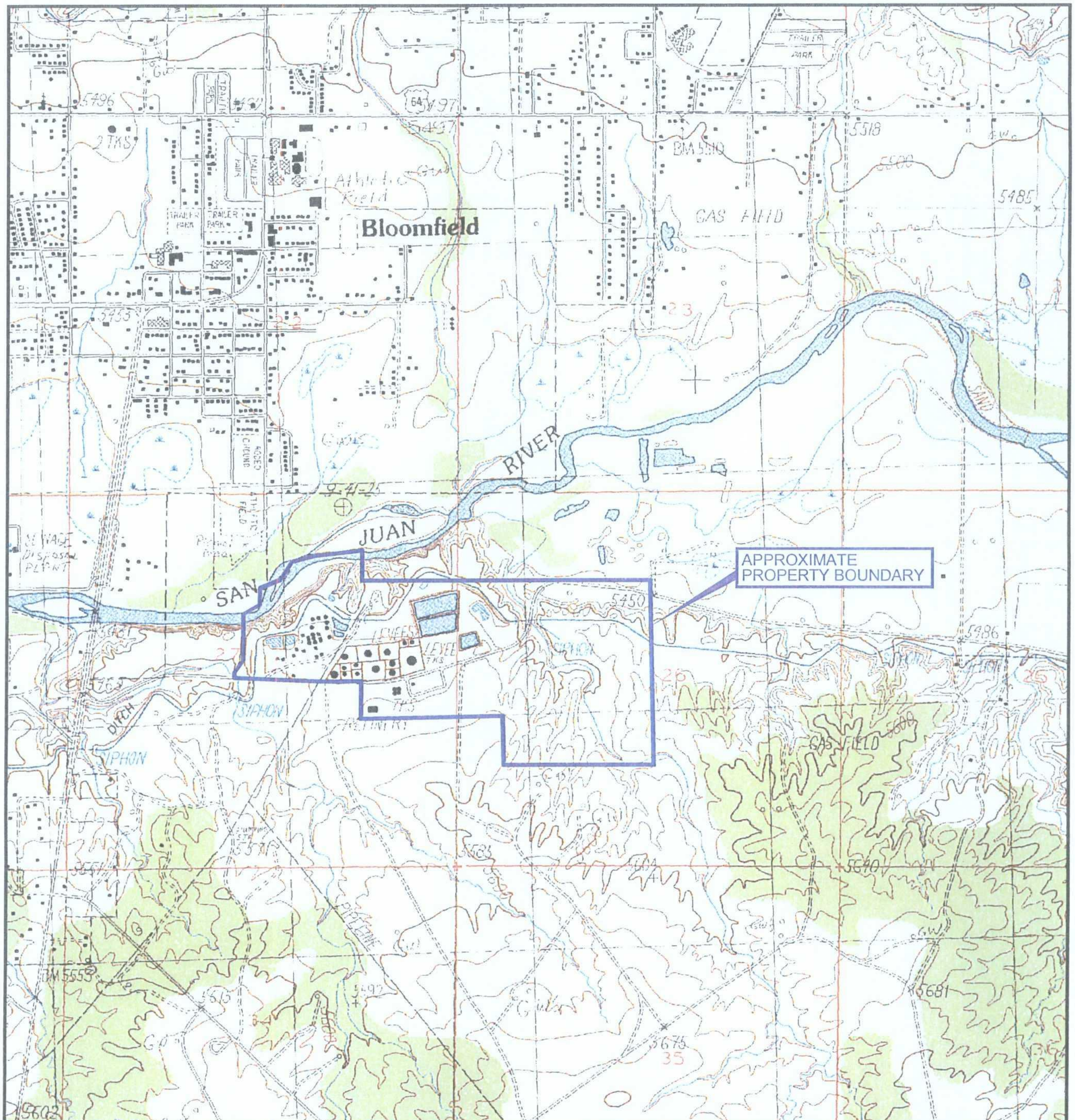
Table 3
Field Measurement Summary
SWMU Group 5 Investigation Work Plan
Western Refining Southwest - Bloomfield Refinery

Well ID:	Date Sampled:	E.C. (umhos/cm)	pH (s.u.)	Temperature (deg F)	DO (mg/L)	ORP (--)
MW-3	Aug-08	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Aug-07	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
	Apr-07	NS[1]	NS[1]	NS[1]	NR[2]	NR[2]
	Aug-06	NS[1]	NS[1]	NS[1]	NS[1]	NS[1]
RW-15	Aug-08	3206.0	6.90	62.0	NS[2]	NS[2]
	Aug-07	3181.0	7.00	64.8	0.7	248
	Apr-07	3220.0	6.79	59.7	NR[2]	NR[2]
	Aug-06	3149.3	7.0	61.0	3.3	231.0
RW-17	Aug-08	NS[2]	NS[2]	NS[2]	NS[2]	NS[2]
	Aug-07	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	3061	6.97	69.3	NR[2]	NR[2]
	Aug-06	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
MW-21	Aug-08	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Aug-07	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Apr-07	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
	Aug-06	NR[1]	NR[1]	NR[1]	NR[1]	NR[1]
MW-29	Aug-08	917.0	7.0	62.1	NS[2]	NS[2]
	Aug-07	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	1669	6.91	59.7	NR[2]	NR[2]
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
MW-30	Aug-08	2935	6.94	65.3	NS[2]	NS[2]
	Apr-08	2930	6.82	62.2	NS[2]	NS[2]
	Aug-07	2995	6.98	65.8	1.6	209
	Apr-07	3713	6.79	60.8	NR[2]	NR[2]
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
MW-31	Aug-08	4144.0	7.0	62.4	NS[2]	NS[2]
	Aug-07	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	4024	6.96	64.0	NR[2]	NR[2]
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
MW-44	Aug-08	5099.0	6.91	62.4	NS[2]	NS[2]
	Aug-07	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]
	Apr-07	5319	6.71	58.4	NR[2]	NR[2]
	Aug-06	NR[2]	NR[2]	NR[2]	NR[2]	NR[2]

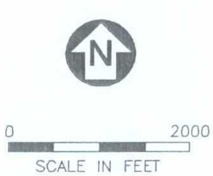
Notes:
deg F = degrees Fahrenheit
E.C. = electrical conductivity
mg/L = milligrams per liter
ORP = Oxidation Reduction Potential
DO - dissolved oxygen
s.u. = standard units (recorded by portable pH meter)
NS[1]= Well is Dry or Not Enough Water to Sample- No Sample
NS[2] = Not Sampled due to approved Facility-Wide Monitoring Plan
NR[1]= No Sample Required - Well Contains Separate Phase Hydrocarbon
NR[2] = No Sample Required per OCD and NMED pre-2007 Conditions

RPS JDC

Figures



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



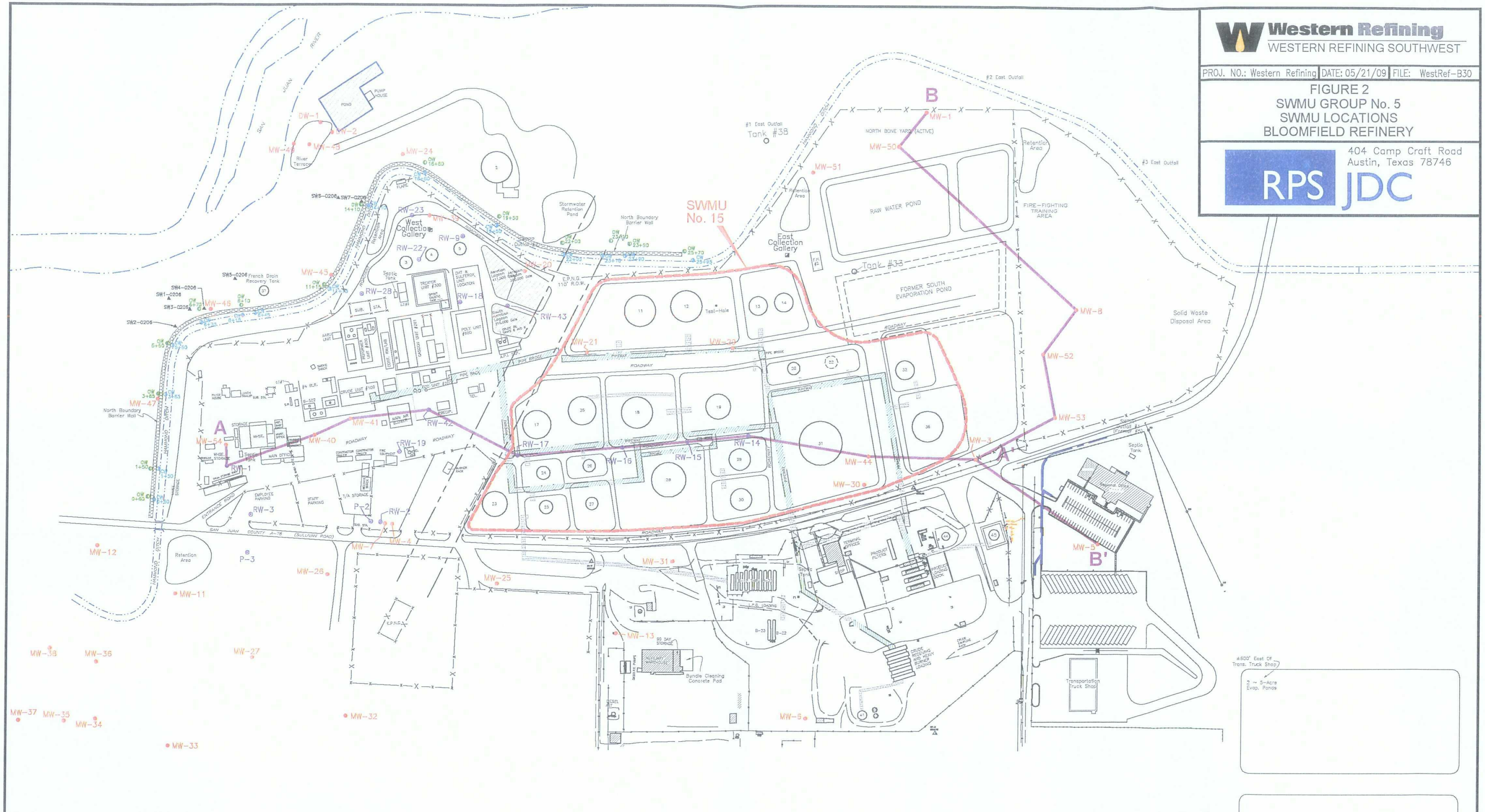
Western Refining

WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 6/19/08	FILE: WestRef-A25

FIGURE 1
SITE LOCATION MAP
BLOOMFIELD REFINERY

RPS JDC
404 Camp Craft Road
Austin, Texas 78746



Western Refining
WESTERN REFINING SOUTHWEST

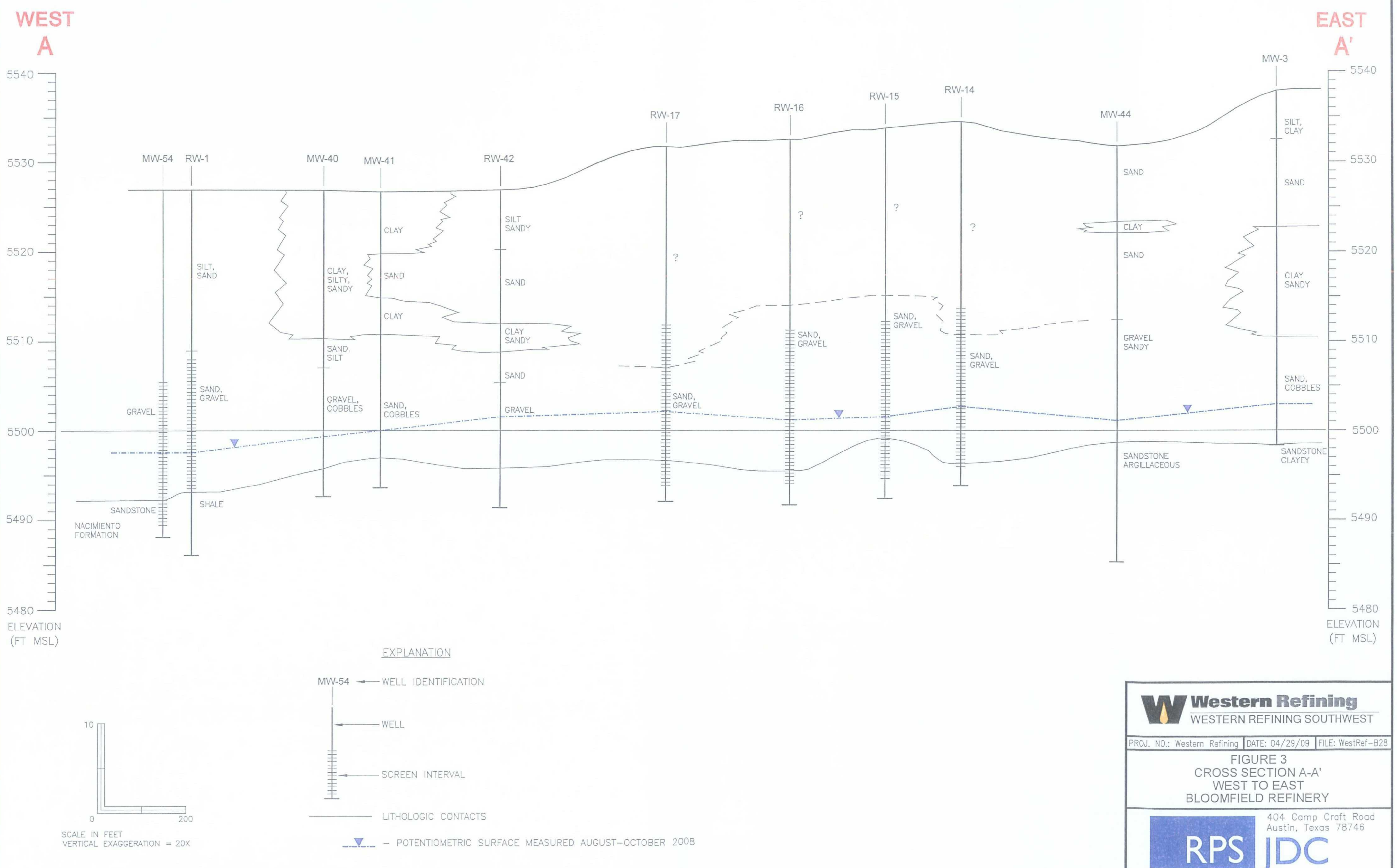
PROJ. NO.: Western Refining | DATE: 05/21/09 | FILE: WestRef-B30

FIGURE 2
SWMU GROUP No. 5
SWMU LOCATIONS
BLOOMFIELD REFINERY

RPS JDC
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
- UNDER GROUND PIPE-WAY
- ABOVE GROUND PIPE-WAY
- SLURRY BARRIER WALL
- A —— A' CROSS SECTION LINE
- FORMER TANK LOCATION



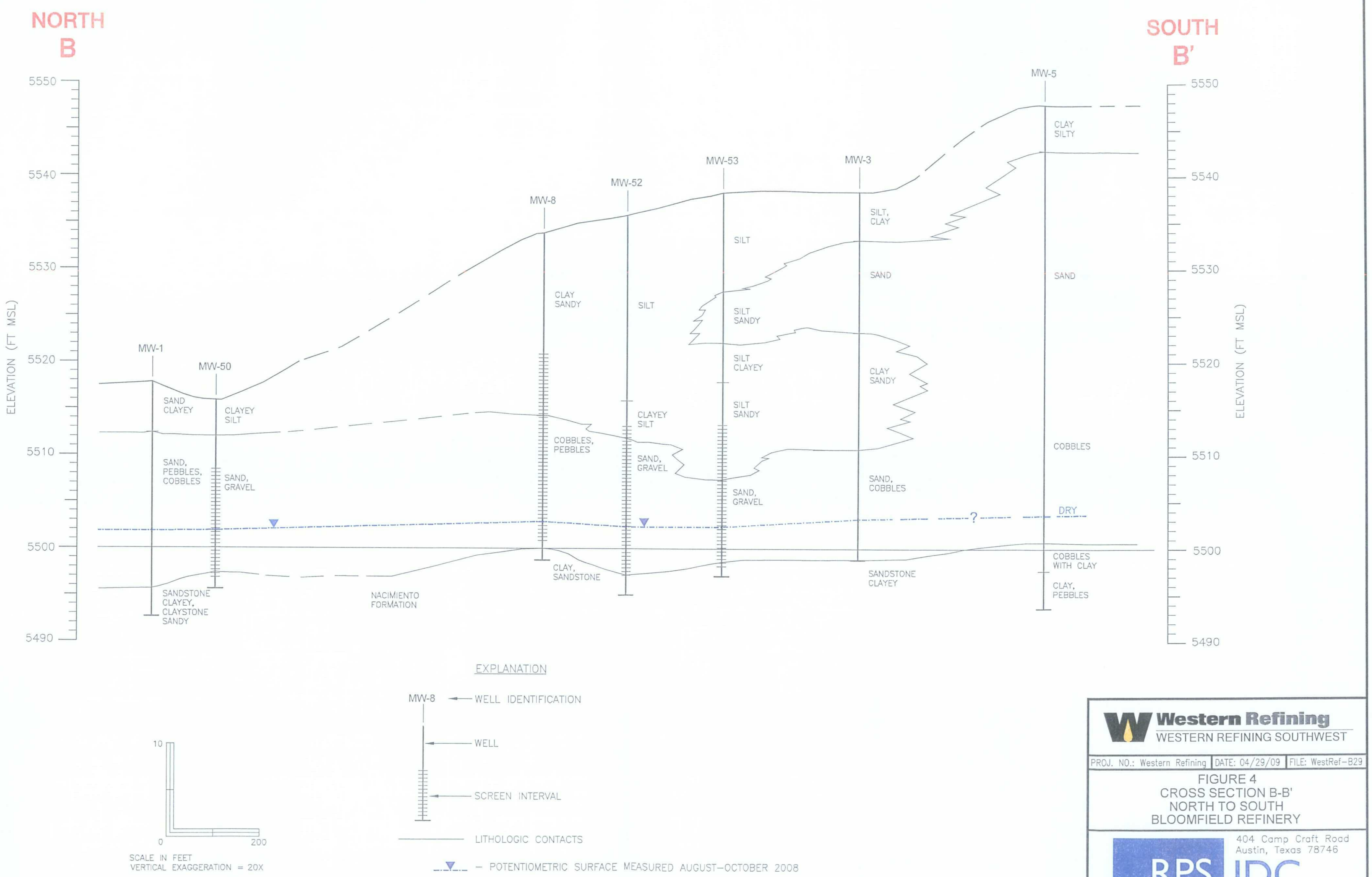
Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 04/29/09	FILE: WestRef-B28

FIGURE 3
CROSS SECTION A-A'
WEST TO EAST
BLOOMFIELD REFINERY

404 Camp Craft Road
Austin, Texas 78746

RPS JDC



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

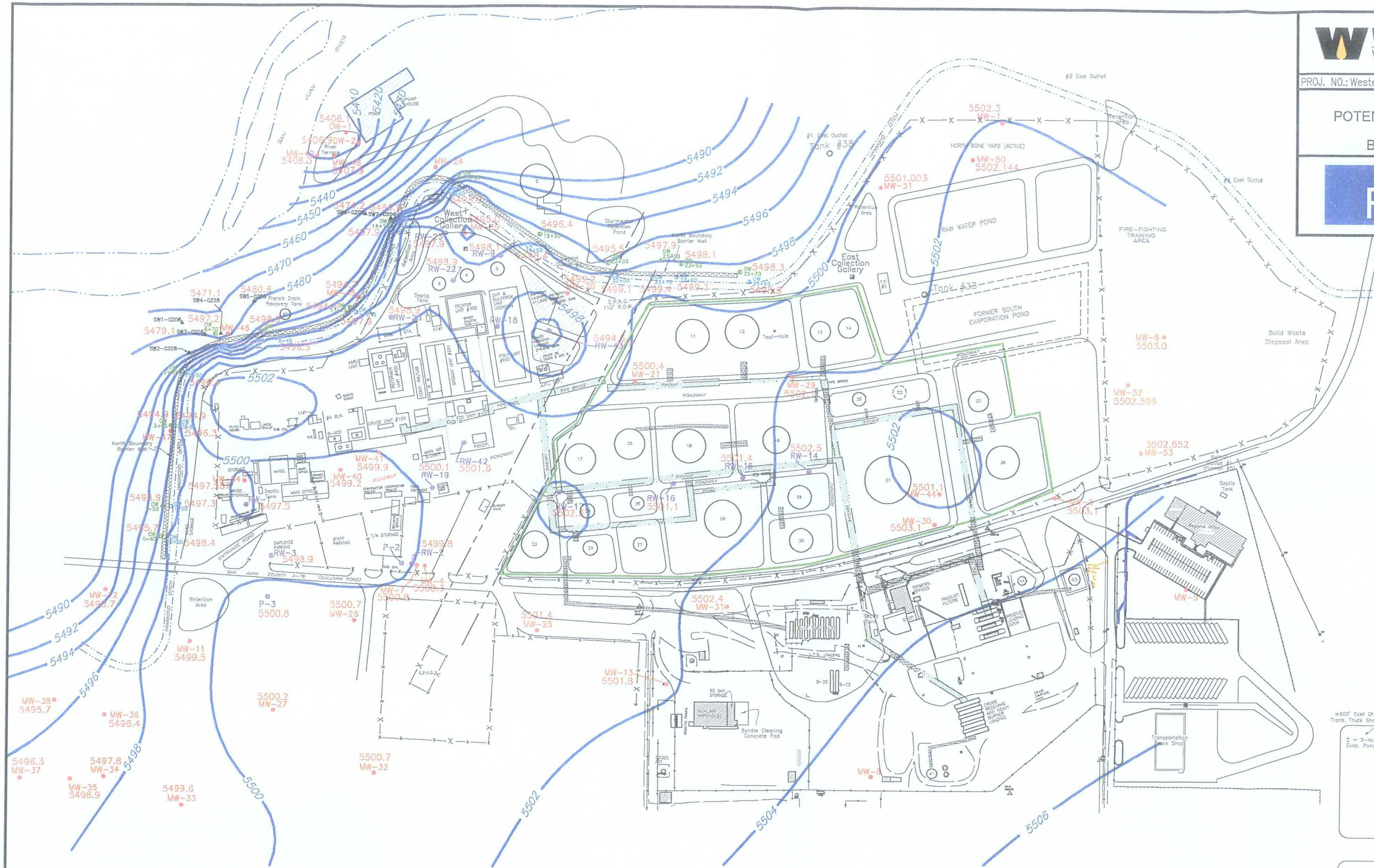
RPS JDC
404 Camp Craft Road
Austin, Texas 78746

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 05/21/09	FILE: WestRef-B19

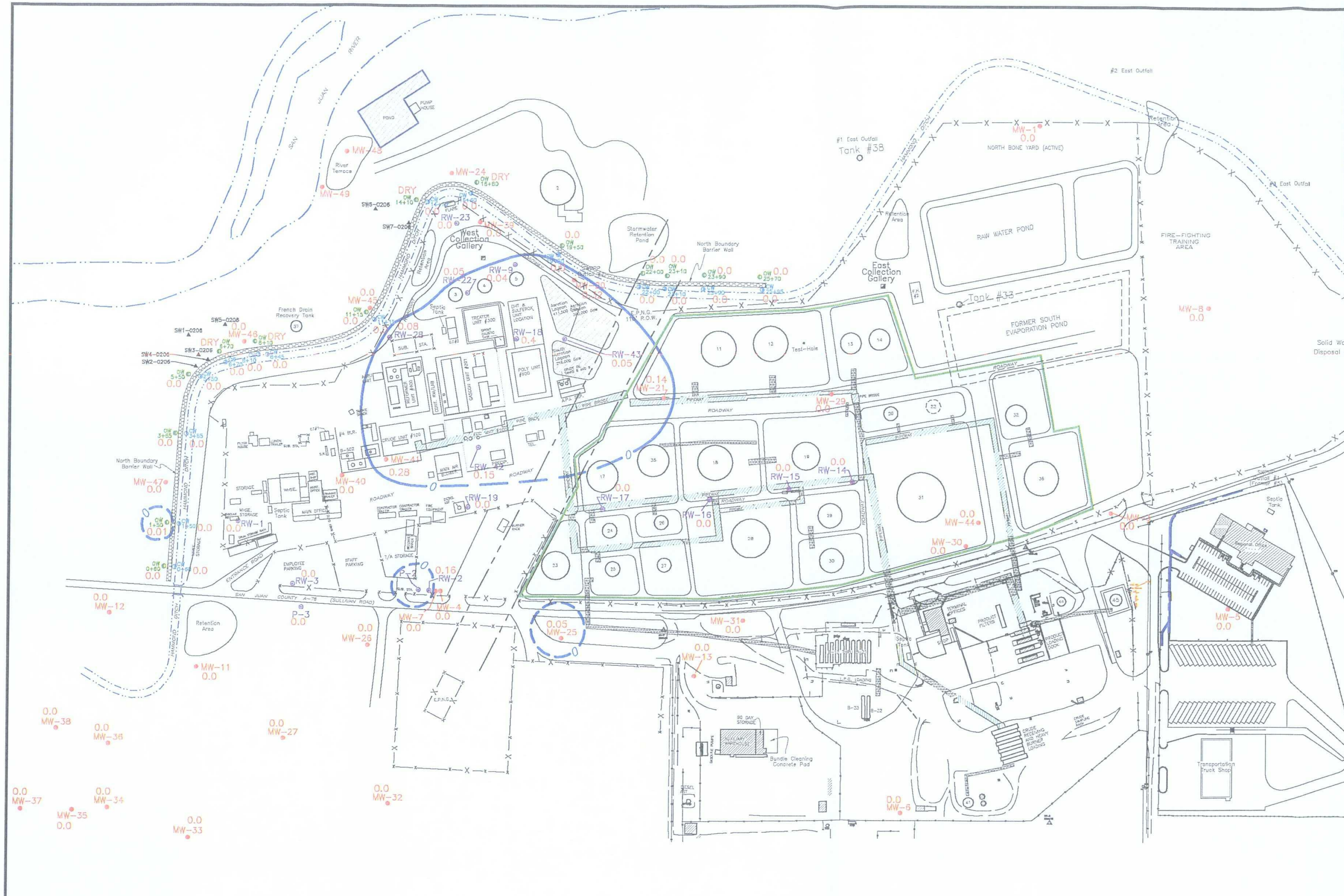
FIGURE 5
POTENTIOMETRIC SURFACE MAP
AUGUST 2008
BLOOMFIELD REFINERY

RPS JDC
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



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

404 Camp Craft Road
Austin, Texas 78746

RPS JDC

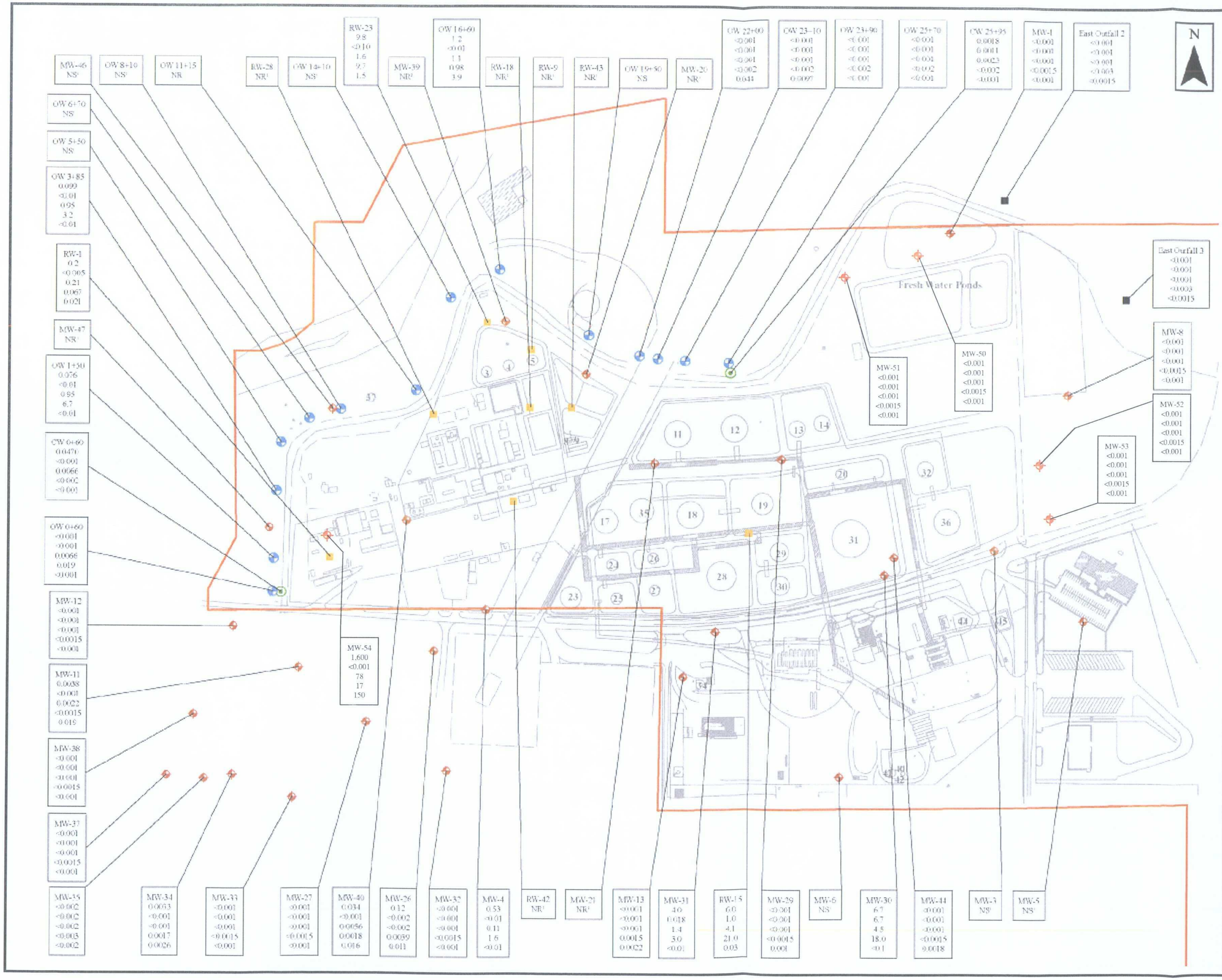
LEGEND

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

N

0 300
SCALE IN FEET



Map Source: Western Refining Southwest, Inc. 2008 Facility-Wide Groundwater Monitoring Report, Fig 14.

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)

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

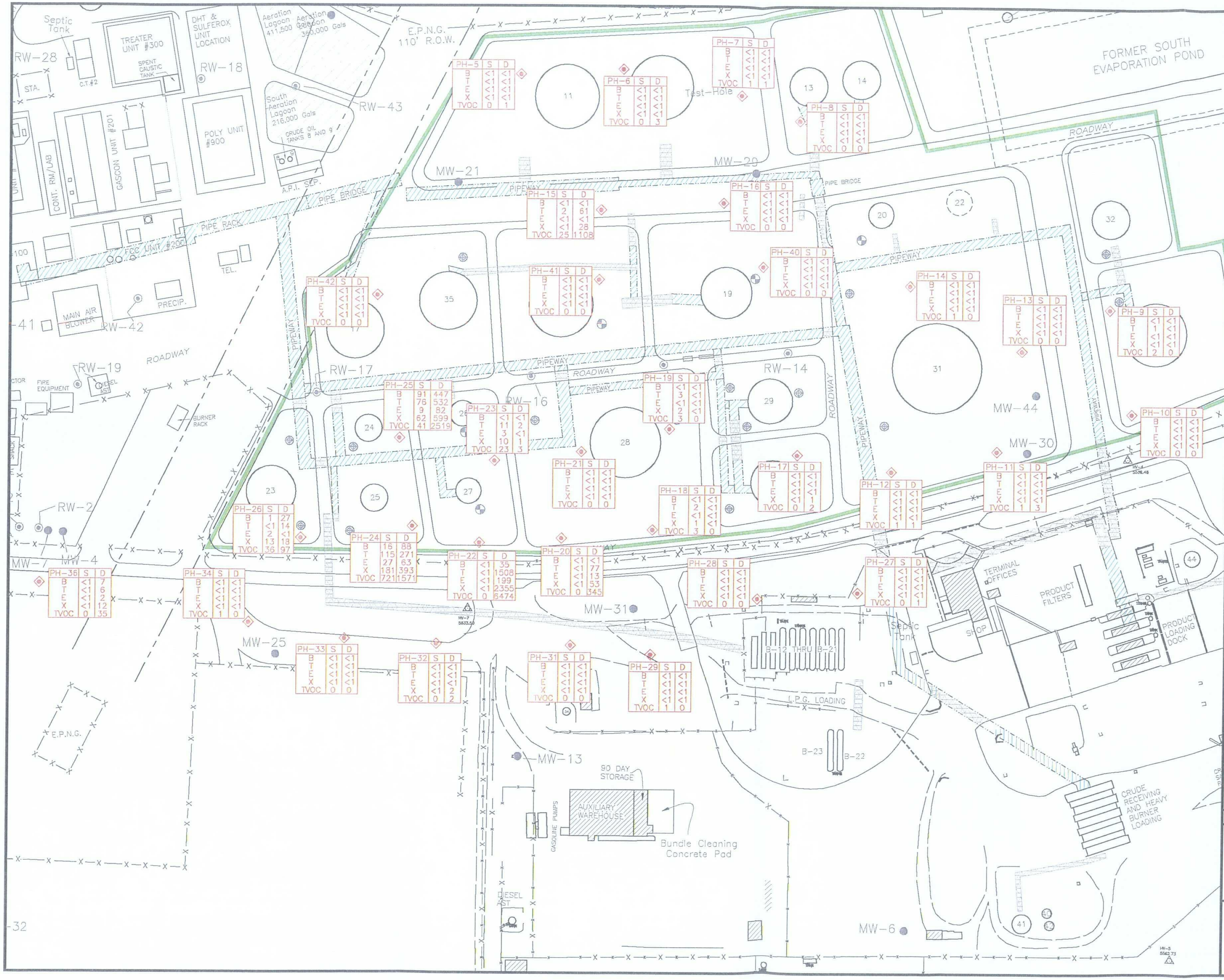
NR² = No Sample Required per OCD and NMED Conditions

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



SOURCE:
RCRA FACILITY INVESTIGATION / CORRECTIVE MEASURES STUDY REPORT, BLOOMFIELD REFINING COMPANY, #50 COUNTY RD 4990, BLOOMFIELD, NEW MEXICO; PROJ. No. 023353014, NOV. 8, 1994, GROUNDWATER TECHNOLOGY, INC.

LEGEND

- PH-10 — SOIL VAPOR SAMPLE LOCATION AND IDENTIFICATION NUMBER
- SURFACE SOIL SAMPLE LOCATION
- SOIL BORING LOCATION
- PROPOSED MONITORING WELL LOCATION
- MW-30 — MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- RW-14 — RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
- CW 22+00 — COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
- UNDER GROUND PIPE-WAY
- ABOVE GROUND PIPE-WAY
- SLURRY BARRIER WALL
- FORMER TANK LOCATION

S SHALLOW (3')
D DEEP (7.5'-10')
UNITS - µg/l OF HEADSPACE VAPOR ANALYZED

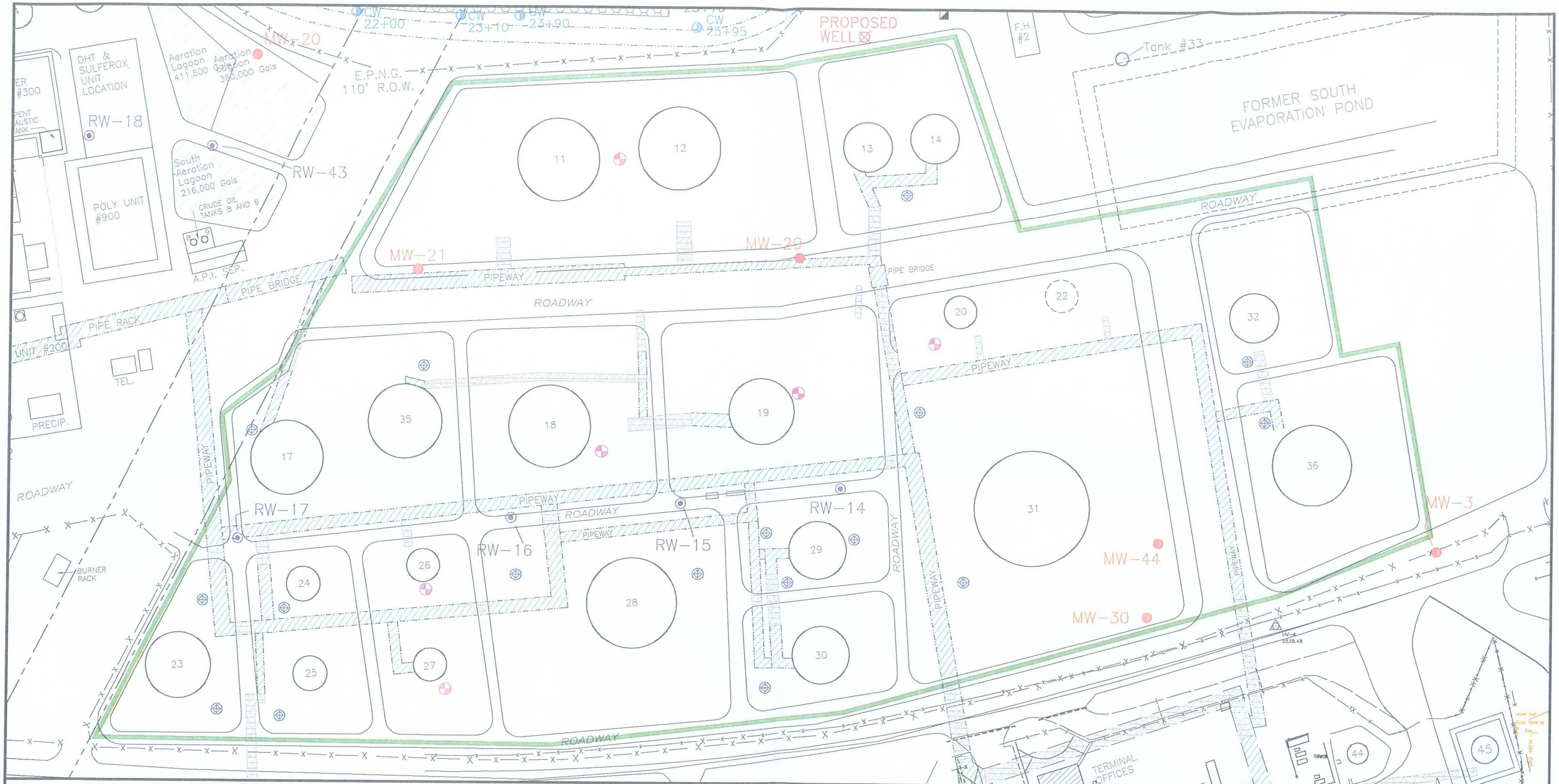
B - BENZENE
T - TOLUENE
E - ETHYLBENZENE
X - TOTAL XYLENES
TVOC - TOTAL VOLATILE ORGANIC CONTENT

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 05/26/09 | FILE: WestRef-B34

FIGURE 8
SUBSURFACE SOIL VAPOR CONCENTRATIONS
BLOOMFIELD REFINERY

RPS JDC
404 Camp Craft Road
Austin, Texas 78746



LEGEND

SURFACE SOIL SAMPLE LOCATION
SOIL BORING LOCATION
PROPOSED MONITORING WELL LOCATION
MW-30 MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
RW-14 RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER
CW 22+00 COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER
UNDER GROUND PIPE-WAY
ABOVE GROUND PIPE-WAY
SLURRY BARRIER WALL
FORMER TANK LOCATION

0 120
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 05/25/09	FILE: WestRef-B33

FIGURE 9
SWMU No. 15
SAMPLE LOCATION MAP
BLOOMFIELD REFINERY

RPS JDC
404 Camp Craft Road
Austin, Texas 78746

RPS JDC

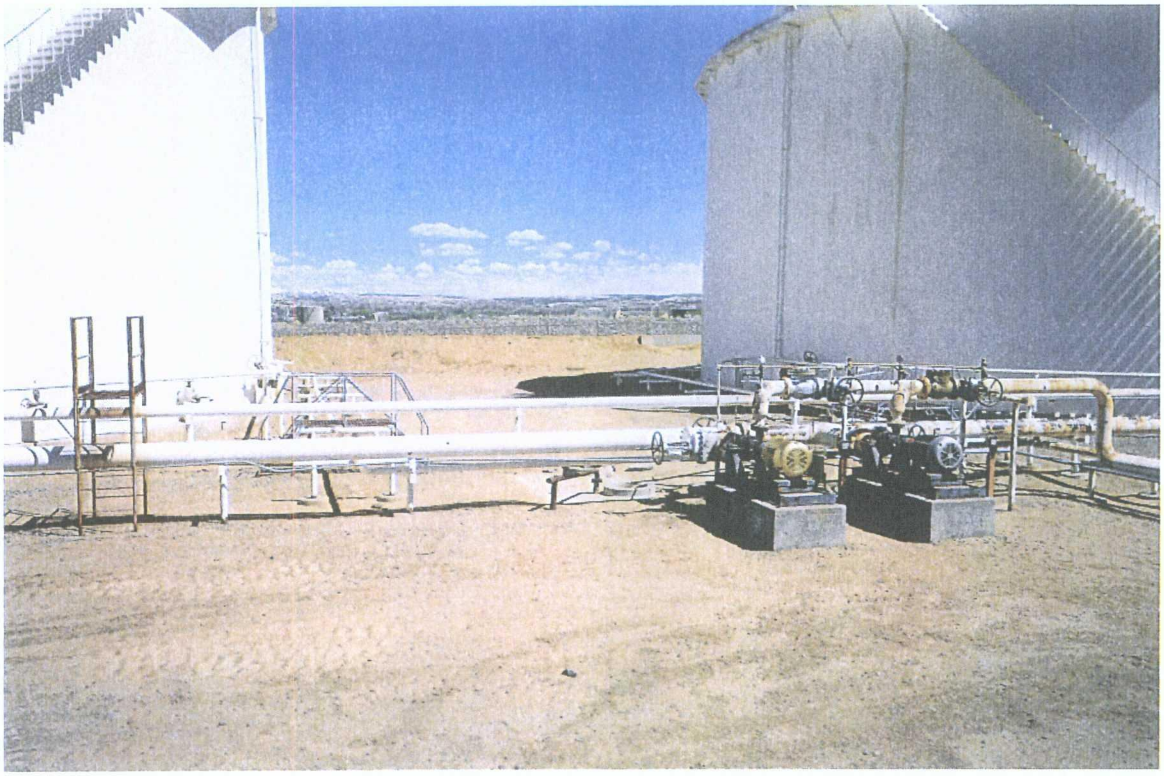
Appendix A

Photographs

Bloomfield Refinery
Looking northeast at Tank 20.

Bloomfield Refinery
East side of Tank 18, looking
southwest

Bloomfield Refinery
Photo taken from west side of Tank 26, looking southeast.



Bloomfield Refinery
Tank11 on left and Tank 12 on right, looking north

RPS JDC

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.

Drill cuttings generated during installation of soil borings and monitoring wells will be placed directly into 55-gallon drums and staged in the satellite accumulation area pending results of the waste characterization sampling. The portion of soil cores, which are not retained for analytical testing, will be placed into the same 55-gallon drums used to store the associated drill cuttings.

The solids (e.g., drill cuttings and 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.

Purge water generated during groundwater sampling activities will be containerized in 55-gallons drums and then disposed in the refinery wastewater treatment system upstream of the API separator. 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.