WRG

ENTERED

Kieling, John, NMENV

From: Schmaltz, Randy [Randy.Schmaltz@wnr.com]
Sent: Thursday, April 28, 2011 8:07 AM
To: Kieling, John, NMENV
Cc: Monzeglio, Hope, NMENV; Hains, Allen; Robinson, Kelly; 'Scott T. Crouch'
Subject: Comments in regards to Public Notice Dated March 29, 2011
Attachments: Public Comment to NMED letter dated 03 09 2011_Agency Deliverable.pdf

Mr. Kieling,

Pursuant to the Public Notice Dated March 29, 2011, Western Refining Southwest, Inc. submits the attached comments regarding the final closure activities for the Aeration Lagoons at the Bloomfield Refinery.

If you have any questions or would like to discuss the attached comments, please feel free to contact me at your convenience.

Sincerely,

Randy Schmaltz
Health, Safety, Environmental, and Regulatory Director

Western Refining Southwest, Inc.
Bloomfield Refinery
#50 County Road 4990
Bloomfield, New Mexico 87413
(505) 632-4171
(505) 320-6989
email: randy.schmaltz@wnr.com

Western Refining

WNR
NYSE

Mr. John E. Kieling, Program Manager
Hazardous Waste Bureau – New Mexico Environment Depart
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

April 27, 2011

Delivery: Via e-mail

RE: Comment on Revised Final Closure Plan North and South Aeration Lagoons for Western Refining Southwest, Inc., Bloomfield Refinery

Dear Mr. Kieling:

Pursuant to the Public Notice Dated March 29, 2011, Western Refining Southwest, Inc. submits the enclosed comments regarding the final closure activities for the Aeration Lagoons at the Bloomfield Refinery. While the Closure Plan does not limit the excavation depth of impacted soils to any specific depth, it is necessary to assume a specific excavation depth for development of the cost estimate that is included in Appendix C. A depth of two feet was used based on available site-specific information and the enclosure presents this information.

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

Sincerely,

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

Enclosure

cc:

Hope Monzeglio – NMED HWB (without enclosure)
Allen Hains – Western Refining El Paso (without enclosure)
Scott Crouch – RPS Austin (without enclosure)

In support of Western's proposed excavation depth of two feet in the cost estimate for the Final Closure Plan – North and South Aeration Lagoons, the following description of the North and South Aeration Lagoons and their operational history is provided. In addition, a summary of previous remediation conducted in the area and sampling of soils from beneath and adjacent to the ponds is discussed.

While there are currently three separate cells (South Aeration Lagoon and North Aeration Lagoon, which is divided into an east and west cell), there were originally two impoundments occupying the same area known as the South and North Ponds. The initial ponds constructed in 1974 were earthen pits with bentonite-treated bottoms and were used to store freshwater. Refinery expansion in 1976 resulted in a change in operations with effluent discharging from the API Separator being directed to the South and North Ponds. Effluent from the API Separator was discharged to the two ponds until November 1982, when the ponds were taken out of service to allow for the installation of a high density polyethylene (HDPE) liner.

Prior to installation of the liner, the existing sludge like material that had accumulated in the bottom of the ponds was removed and the area was overexcavated to remove all visible impacted soils. Confirmation soil samples were subsequently collected from the beneath the new liner in October 1985 at the request of EPA and NMED to determine the efficacy of the removal activities. Documentation of these activities has been previously submitted to the EPA and NMED; however, additional copies are attached. Attachment A is an excerpt from the 1985 Bloomfield Refining Company's RCRA Part B Permit Application, which describes the sample collection process. Attachment B includes a letter addressing EPA's earlier questions regarding the sampling activities, maps of the sample collection locations, and copies of the analytical results. A summary table of the analytical results is included in Attachment B. All of the phenolic results are non-detect. The chromium results are generally low with values ranging from 2.3 mg/kg to 27.0 mg/kg. Lead concentrations are similarly low with values ranging from 3.0 mg/kg to 6.0 mg/kg. Of the analyses for benzene, ethylbenzene, toluene, and xylenes, there is only one sample with detected concentrations of xylenes, which are very low. One sample collected near the inlet to the South Pond was also analyzed for the entire Skinner List of organic constituents and all results are non-detect. Based on the initial removal actions and subsequent confirmation sampling, there does not appear to have been significant concentrations of constituents remaining in soils beneath the ponds after installation of the initial HDPE liner system in 1982.

The initial HDPE liner system installed in 1982 consisted of a composite liner with a 33% bentonite/soil bottom liner, a French drain system, and a 100 mill HDPE upper liner. To comply with new RCRA requirements, in the March and April 1994 the Bloomfield Refinery upgraded and retrofitted the lagoons with an additional set of RCRA double liners and leak detection/leachate collection system over the liner system that the Bloomfield Refinery installed in 1982. The new "RCRA" liners included an upper 100-mil liner, geonet leak detection and collection system, and a 60-mil lower liner. As of April 1994, the lagoons liners, from top to bottom, include:

- a 100-mil HDPE top liner;
- a geonet for collecting leaks that drain to a sump equipped with a 6" observation pipe;
- a 60-mil HDPE secondary liner;
- a composite geotextile/geonet with a 4" observation pipe;
- a cement amended sand that was compacted into a 1.5% slope;
- a 100-mil HDPE liner;
- a French drain system, which directs any collected fluids to a central sump; and
- a 6" layer of soil with 33% bentonite mixed into it.

Since installation of the lower 100-mil HDPE liner and associated French drain system in 1982-1983, there has never been an accumulation of liquids in the French drain. This indicates that since the ponds were originally cleaned out in 1982, there is no indication that any fluids have breached the multiple liner system and migrated beyond to impact either soils or groundwater.

More recently, four monitoring wells (MW-55, MW-56, MW-57, and MW-58) were installed around the perimeter of the two aeration lagoons. During the well installation, soil samples were continuously logged and screened for evidence of any impacts. The soil samples were collected for analysis from the intervals with the greatest potential for impacts based on the highest readings of organic vapors and visible evidence, and the interval just above saturation. A cross section is included in Attachment C, which shows the location of two of the wells near the South Aeration Lagoon. The soil sample intervals are indicated on the cross section and the analytical results are summarized in Table 1, is also included in Attachment C. Based on field screening and observations of the soil core from MW-57 a sample was collected from a depth of 4-6 feet below ground level (bgl) to represent worst case conditions. A second sample was collected from a depth of 15-17 feet bgl to represent conditions just above saturation. As shown in Table 1, there were several constituents with concentrations that while not particularly high are above soil-to-groundwater screening levels in the sample collected from 4-6 feet bgl. No constituents were detected above screening levels in the deeper sample. Of particular

importance, and as shown on the cross section, the impacted soils in the 4-6 foot sample interval are actually higher to slightly below the operational water level in the adjacent lagoon. Therefore, the impacts in the 4-6 foot sample could not have come from fluids leaking out of the adjacent lagoon. Based on field screening evidence recorded on the well completion log for MW-57, which is included in Attachment C, the potential impacts decreased with depth. If water had leaked from the lagoon in this area, then one would expect to see greater indications of potential impacts with depth as you drop below the water level in the lagoon.

A review of the field screening information at MW-58, which is located just west of the South Lagoon, indicates a similar occurrence. The sample interval with the greatest indication of potential impacts occurs at a depth of 2-4 feet bgl and is clearly higher in elevation than the operational water level of the nearby lagoon. Once again, field screening readings decrease significantly until reaching the depth of saturation where impacted groundwater is encountered.

The two monitoring wells located to the northwest and east of the North Lagoon are numbered MW-55 and MW-56, respectively. The field screening results for soil samples logged at MW-55 indicate elevated organic vapor readings from a depth of four feet to the depth of saturation (22 feet bgl). The highest readings of organic vapors were recorded just above the depth of saturation, which is consistent with a source of the groundwater impacts from an up-gradient location. Site operational information suggests the possibility of other potential nearby sources for the observed soil impacts near MW-55. At MW-56, field screening information indicated only slightly elevated organic vapor readings at a depth of 4 – 6 feet bgl and to a lesser extent just above the depth of saturation (19 feet bgl). The analytical results for soil samples collected from these intervals are presented in Table 1 and none of the results exceed the soil screening levels.

The impacted groundwater that is present in the four new monitoring wells is part of a larger plume that extends up-gradient from the aeration lagoons. The fact that the plume extends up-gradient means that a source must be located up-gradient of the lagoons. In addition, separate phase hydrocarbon has been measured in wells near the lagoons but separate phase hydrocarbon is not present in the lagoons. The API Separator, which was installed before wastewater was ever discharged to the original North and South Ponds and is in continuous operation, prevents separate phase hydrocarbon from reaching the lagoons. The separate phase hydrocarbon present in nearby wells was not sourced from the original ponds or the aeration lagoons. Based on the historical and more recent soil sampling beneath and adjacent

to the lagoons and the lack of any fluids accumulating in the French drain system, it appears likely the lagoons have not contributed to the observed groundwater impacts.

Regardless of the multiple lines of evidence presented above indicating soils beneath the lagoons may not require remediation, Western's cost estimate conservatively includes a soil excavation depth of two feet across the entire bottom of the area covered by the North and South Aeration Lagoons. As shown on the cross section in Attachment C, the final excavation depth after removing two feet of soils from beneath the lagoons would be less than five feet above the water table. Given the presence of other sources of groundwater contamination, there is no benefit from excavating below the top of the capillary fringe.

Attachment A

Bloomfield Refining Company RCRA Part B Permit Application Excerpt

handle such material as hazardous waste. BRC shall also comply with 40 CFR 262.11 and the equivalent New Mexico regulations at HWMR-2, and other requirements when and where applicable.

API Wastewater Ponds

Although all visible contaminated soil was removed from the API wastewater ponds when the pond liners were installed, EPA and NMEID expressed concern that some residual contamination remained. Therefore, the subsurface soils beneath the pond liners were tested for residual contamination during the week of October 14, 1985, after the removal of all hazardous waste from the ponds. Appendix A includes a closure certification by the sampler, a registered professional engineer. These materials were handled as hazardous wastes.

A total of 12 samples were collected by penetrating the liner at six approximately equally spaced locations in each pond and collecting two samples in each location with a clean split-spoon sampler. Sampling site locations are shown on Figures 2 and 3. The pond liner was penetrated for sampling purposes by cutting a clean hole of sufficient size to admit the split-spoon sampler. Following the collection of samples, the liner was repaired with a high-density polyethylene patch, joined to the existing liner with a hot (approximately 460°F) polyethylene resin weld. The sampling and liner repair was not conducted under wet conditions or inclement weather which could affect the integrity of the analytical results or weld. Each split-spoon sampler was cleaned prior to sampling with a detergent wash, followed by a distilled water rinse, acetone wash, and final distilled water rinse. The two samples in each location were collected at depths of 0-6 inches and 6-12 inches, respectively. Three samples were composited at each depth from pairs of the closest adjacent grab samples. The six total composite samples in each pond (three at each depth) were analyzed for the indicator parameters benzene, toluene, xylene, phenols, total lead, and total chromium. The analytical results for these parameters are included in Appendix B. Although small concentrations of xylenes were detected in a single composite sample in the south API pond, none of these data indicate significant residual BTX or phenolic contamination beneath the pond liners.

Attachment B

Historic Soil Sampling Information

GARDERE & WYNNE
ATTORNEYS AND COUNSELORS

1500 DIAMOND SHAMROCK TOWER
DALLAS, TEXAS 75201

214-979-4500

TELECOPIER 214 979 4667
CABLE: GARWYN
TELEX 73-0197

WRITER'S DIRECT DIAL NUMBER

(214) 979-4569

June 4, 1986

James L. Turner, Esq.
Assistant Regional Counsel
U.S. Environmental Protection Agency
Region VI
InterFirst Two Building
1201 Elm Street
Dallas, Texas 75270

Re: Bloomfield Refining Company
RCRA Docket No. VI-501-H;
Consent Agreement and Final Order

Dear Jim:

On May 20, 1986, I received your letter dated May 19, 1986 which requested certain information on sampling results submitted to you and the New Mexico Environmental Improvement Division (NMEID) on February 13, 1986. You also requested a status report on performance items in paragraphs 1 through 3 (including subparagraphs) of the above-referenced order. The purpose of this letter is to respond to both requests.

In connection with your questions about the sampling results, I am submitting the attached letter from Mr. James E. Rumbo of Engineering-Science, the Company's technical consultant. This letter responds to all five items listed in your information request.

I now turn to the requested status report, based on information provided to me by the Company. Our response focuses on those items which contemplate affirmative performance on the part of the Respondent.

Paragraph 1

The civil penalty of $5,700 has been paid.

Paragraph 2C

The API separator was thoroughly cleaned in November 1985. The material removed was handled and manifested as a hazardous waste. It was transported to U.S. Pollution Control, Inc.'s Grassy Mountain facility near Clive, Utah. On May 23, 1986, the sludge level was 0.5 feet.

Paragraph 2D

The prescribed documentation is available at the facility.

Paragraph 2E

Spent caustic is removed from the existing spent caustic tank in less than 90 days, and the standards established under 40 C.F.R. 262.34, and its New Mexico equivalent are being observed. However, an entirely new spent caustic tank system has been installed to further comply with the repair and maintenance obligations of this paragraph. It includes a substantial concrete slab, containment dike, and new piping to insure that no discharge of caustic can occur. This system is scheduled to be operational by June 13, 1986. The existing system will then be closed in accordance with 40 C.F.R. § 265.197 and its New Mexico equivalent.

Paragraph 2F

All of the material removed from the SOWP and NOWP in October 1985 was properly handled as a hazardous waste. The required engineering certification of removal will be submitted in conjunction with the final closure plan.

Paragraph 3

The activities specified in "A Sampling and Closure Proposal for the API Wastewater Ponds, Landfill, and Landfill Pond at the Bloomfield Refinery," attached to the above-referenced order as Exhibit B, have been completed. In accordance with the order, the Company submitted a closure plan and proof of financial responsibility on November 22, 1985. On February 13, 1986, the Company provided to EPA and NMEID copies of analytical results and analysis, as contemplated in Exhibit B and to supplement the November 22, 1985 closure plan. Following consultation with NMEID on the plan now before that agency, the Company expects to finalize the closure plan and move forward, as appropriate, on implementation.

If you have any questions or would like additional information, please contact me at your convenience.

Sincerely,

Joseph F. Guida

JFG:ta
8711S

Enclosures

cc: Ms. Denise Fort
Mr. Jack Ellvinger

bcc: Mr. Harry F. Mason
Mr. Chris Hawley

ES ENGINEERING-SCIENCE

2901 NORTH INTERREGIONAL • AUSTIN, TEXAS 78722 • 512/477-9901

CABLE ADDRESS: ENGINSCI
TELEX: 77-6442

June 2, 1986

Mr. James L. Turner
Assistant Regional Counsel
U.S. EPA, Region VI
Interfirst Two Building
1201 Elm Street
Dallas, TX 75270

Re: Bloomfield Refining Company, Inc.
Gary Refining Corp.
RCRA Docket No. VI-501-H; Consent Agreement and Final Order

Dear Mr. Turner:

Submitted herewith is a response to your letter dated 19 May 1986 to Joe Guida. The subject of your letter was the results obtained from a sampling effort performed by ES personnel at the Bloomfield Refinery pursuant to meeting mutually agreed on stipulations of the consent agreement. You noted concerns expressed by the NMEID director about the validity of sampling results and submitted a list of five requests for additional data which has been reproduced here for convenience:

(1) A list of the detection limits set for samples 51469-01 through 29, "Inorganic Parameters for Phenolics."

(2) A description of the protocol used to conduct sample analysis in all samples.

(3) A comprehensive description of the QA/QC for obtaining all samples and conducting the laboratory analysis of them.

(4) An explanation of how the detection limits were established for the "Skinner Base/Neutral Organics" and why these fluctuate from 400 to 4,000 ug/kg in some cases.

(5) A facility map detail of the landfill, landfill pond, and north and south API pond areas, showing all sample locations.

The field sampling effort was designed, planned, and executed carefully to provide representative samples from the areas of interest. The laboratory employed on the project performed state-of-the-art analyses of the samples and reported results in report form. Any "absence of compounds that would normally be present at a refinery" is likely to represent a lack

of compounds in the material that was sampled rather than deficient sampling or laboratory technique.

A revised report submitted by the contract laboratory is included in this submittal and should adequately address the first two requests for information. Pages 7 and 8 of the report should satisfy request number 1. The analytical methodology section (pages 18-20) should satisfy request number 2.

QA/QC procedures for the sampling effort were followed for both the local sampling sites and sampling equipment. Transport of samples to the laboratory was made in a timely and secure manner. In the case of the API ponds, the sampling locations within each pond were first cleaned with a series of washes consisting of (in chronological order) alconox soap solution, deionized water, methanol, and deionized water. Clean sampling equipment was utilized to extract and store samples. After each sample collection in all sampling areas, equipment was washed thoroughly using the same series of washes mentioned above. Samples were placed in the appropriate containers and individually enclosed in Zip-loc bags and stored in ice in a cooler. The cooler was sent to the contract laboratory via Federal Express utilizing standard chain-of-custody procedures.

Quality control measures utilized by the laboratory have been enumerated in previously submitted information but have been reiterated here for completeness:

> "A method blank was analyzed daily to determine any interferences in the system. Four samples were spiked with known amounts of the targeted compounds to determine the percent recovery. One of the samples was run in duplicate. All the results of the above were satisfactory.
>
> In addition to the above controls, all standards, samples, and blanks were analyzed with an internal standard present to ensure consistency in the system."

With regard to request number 4, detection limits are obviously based on a laboratory's ability to detect concentrations of a substance of interest using a selected laboratory technique. Some compounds are harder to detect than others due to the compound's inherent characteristics (e.g., molecular weight, polarity) and the relative degree to which other compounds interfere with interpretation of results (in the case of GC/MS). For example, in the laboratory report submitted for BRC, the detection limit for benzidine is listed to be 4,000 ug/kg compared with anthracene having a detection limit of 400 ug/kg. In this example, benzidine is harder to detect than anthracene, and the detection limit for benzidine is therefore higher than the detection limit for anthracene. It should also be noted that the detection limits utilized for analysis are typical of the analytical methods specified and are comparable to the analytical detection

limits for the same and similar compounds in soils analyzed under EPA's Contract Laboratory Program.

Figures 1 through 4 depict a facility map with details of sampling areas as solicited in request number 5. The specific sampling sites within the landfill area were not defined, however, due to the lack of a specific area with which to reference the sample locations. During the sampling effort, the area of the landfill observed to be contaminated was irregularly shaped and inconsistent in areal extent with the land area depicted on earlier facility plans. For this reason, that portion of the landfill area appearing to have some contamination was selected for sampling and divided into quadrants. The midpoint of each quadrant (selected by eye) was then sampled. Distances between sampling sites were measured with a tape and ranged from 25 to 65 feet. An approximation of the sampling area within the landfill has been shown on Figure 1.

I trust that the above information is sufficient to answer any questions you may have. If you have any additional questions, please do not hesitate to call.

Sincerely,

James E. Rumbo

James E. Rumbo, P.E.
Project Engineer

Enclosures

dg

ES ENGINEERING-SCIENCE

FIGURE 1
BLOOMFIELD REFINERY FACILITY MAP

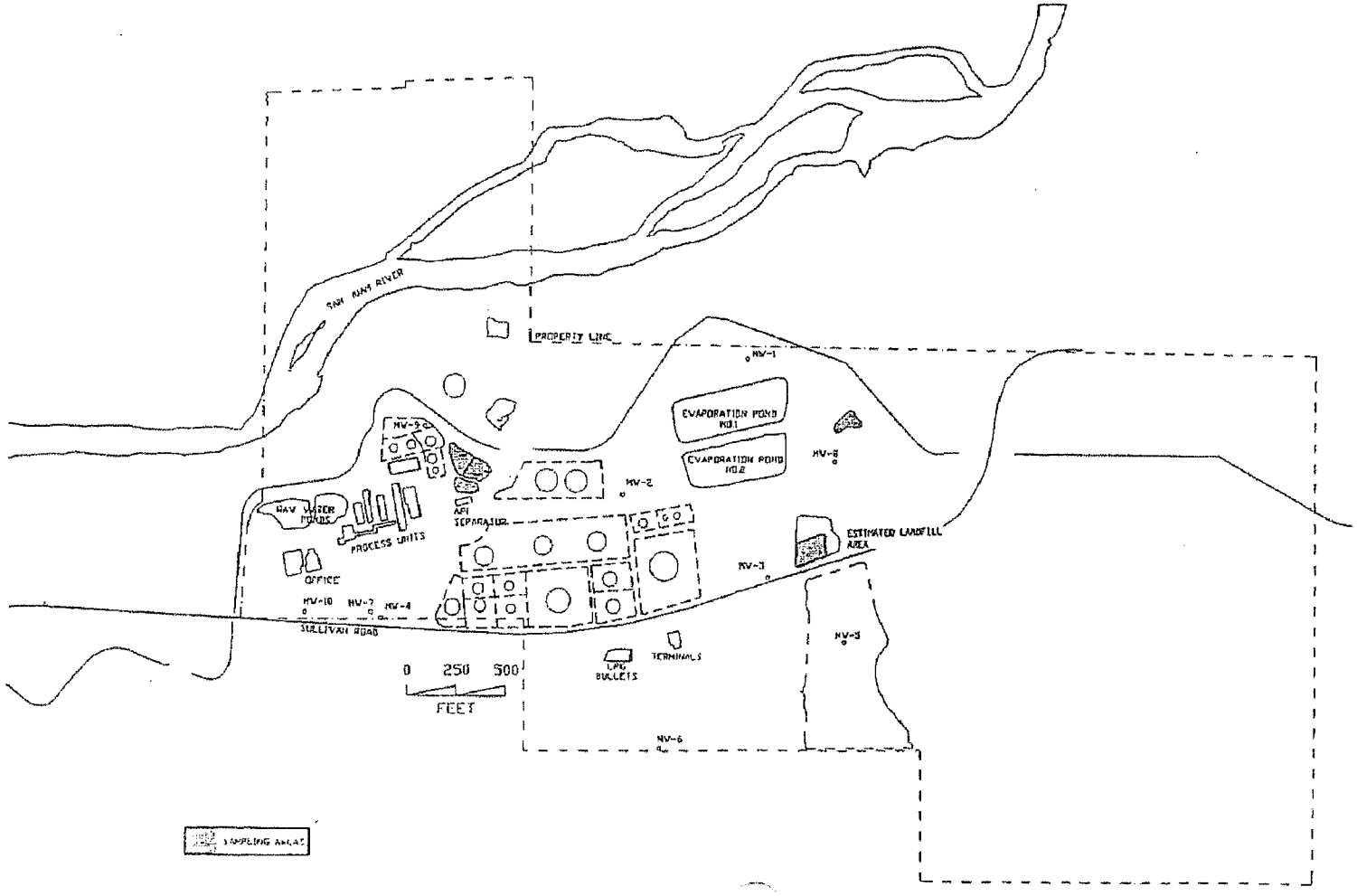


FIGURE 2
NORTH API POND

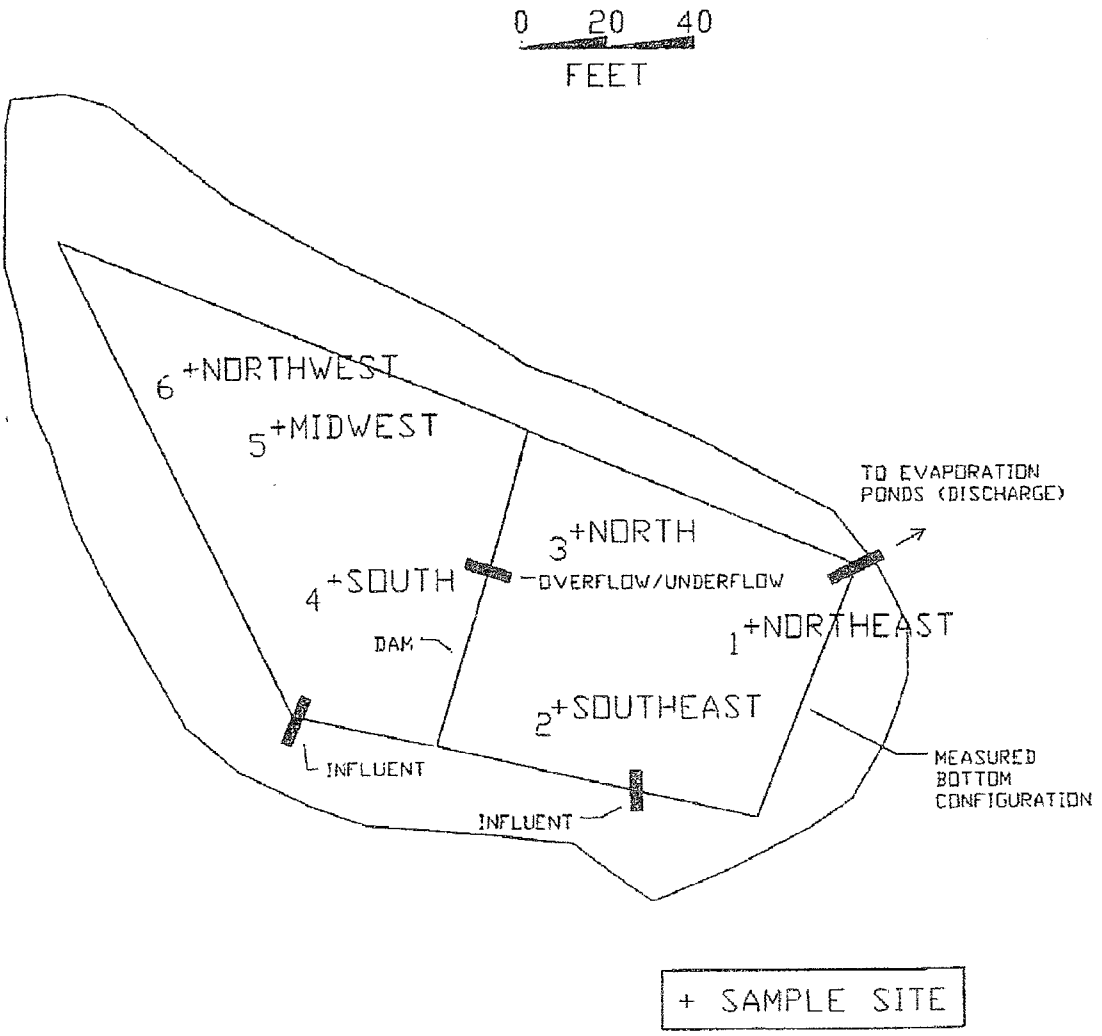


FIGURE 3
SOUTH API POND

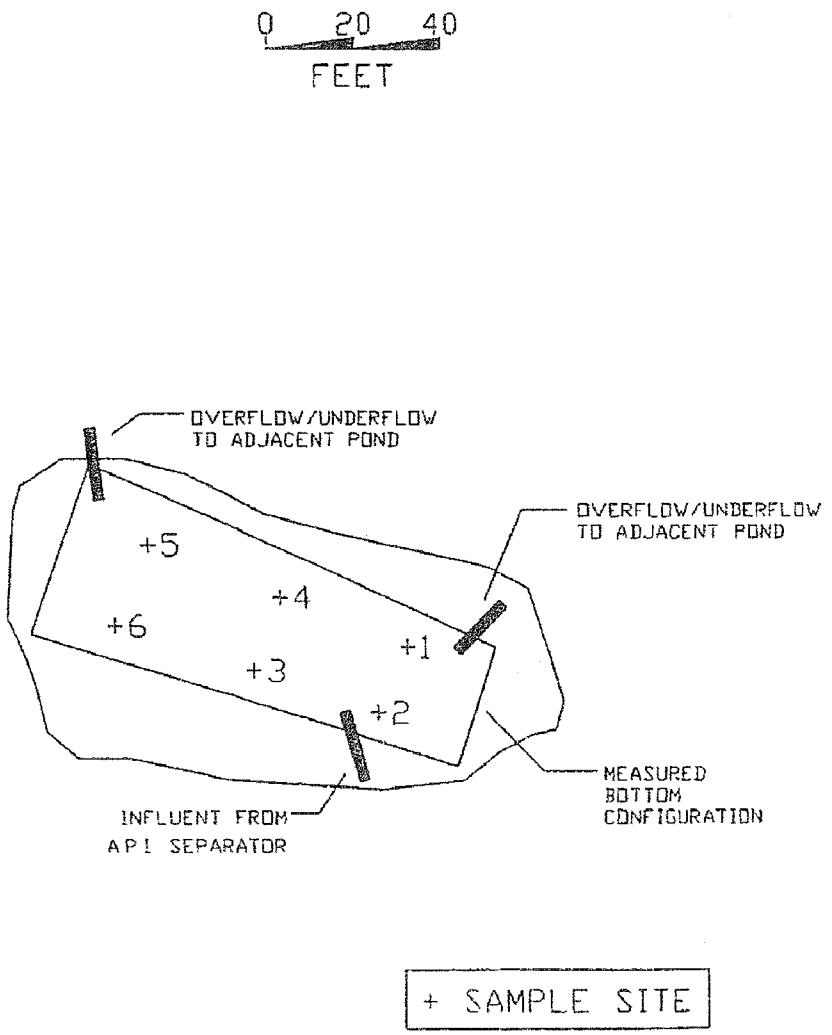
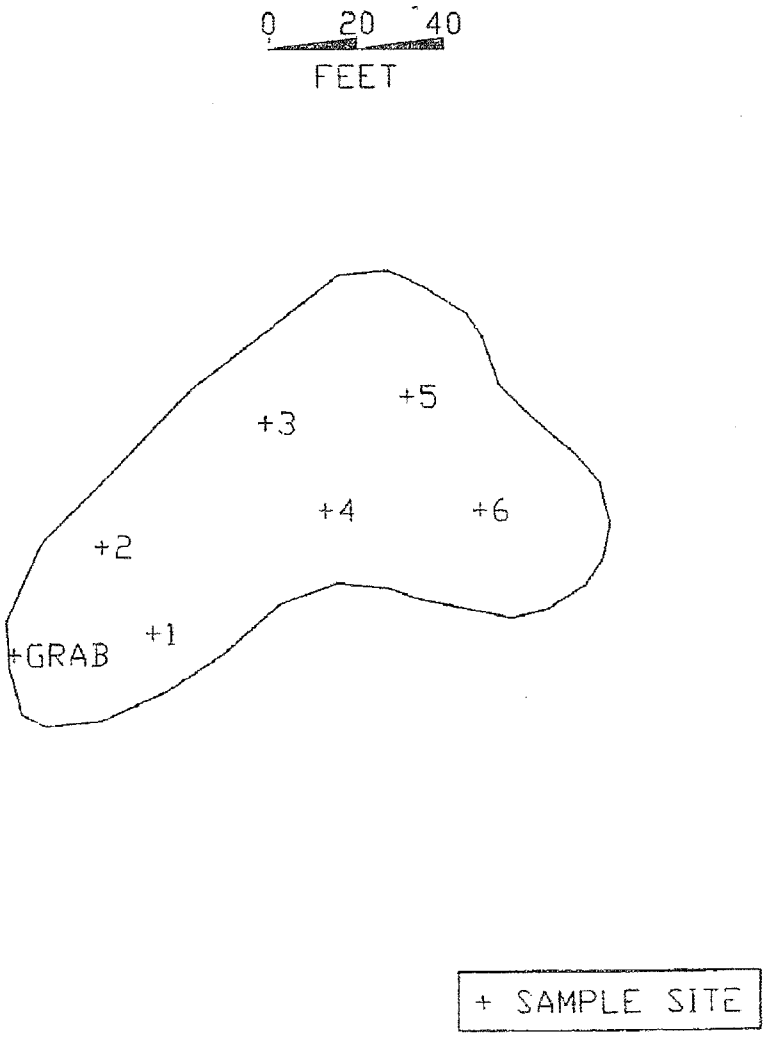


FIGURE 4
LANDFILL POND



REPORT OF ANALYTICAL RESULTS

FOR

ENGINEERING SCIENCE
BLOOMFIELD REFINING COMPANY

Prepared By:

Rocky Mountain Analytical Laboratory
5530 Marshall Street
Arvada, CO 80004

May 28, 1986

I. INTRODUCTION

On October 19, 1985 Rocky Mountain Analytical Laboratory received 29 soil samples from Bloomfield Refining Company, collected by Engineering Science. The analyses performed on these samples have been categorized as follows:

- Analyses for Appendix VIII organic constituents, and
- Analyses for selected constituents and phenolics.

Appendix VIII Constituents

The analytical parameters selected were based on recent communication with EPA concerning RCRA monitoring requirements for petroleum companies. The parameters selected were based on a subset of Appendix VIII hazardous constituents commonly referred to as the "Skinner" list. Communications from EPA in late 1984 contained various versions of this list. During this time RMAL, under contract to the American Petroleum Institute, performed several studies evaluating analytical methods proposed for measuring the constituents in these various lists. Due in part to efforts by RMAL and others, the EPA in early 1985 revised this list. The documents which were used by RMAL in defining the analytical parameters are listed in a bibliography at the end of this report. This list, as revised, contains 46 organic compounds and is presented in Table 1. The organic compounds are further subdivided into volatile and semivolatile (extractable) compounds.

Additional Tests

In addition to the tests for the full "Skinner" list, some samples were analyzed only for a specific subset of this list. The subset was benzene, toluene, xylene, lead, chromium and total phenolics.

All samples were shipped by air freight to RMAL's Denver, Colorado laboratory. Each sample was assigned a unique RMAL sample number as shown in the enclosed Sample Description Information sheet. These sample numbers were used throughout the project to track and control the analytical work and are used in this document for reporting the results from each analyses.

SAMPLE DESCRIPTION INFORMATION

for

Engineering Science - Bloomfield Refining Company

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
51469-01	L1 & L2, 0-6" Quadrant #1 - Landfill	Soil	10/16/85	10/19/85
51469-02	L3 & L4, 6-12" Quadrant #1 - Landfill	Soil	10/16/85	10/19/85
51469-03	L5 & L6, 0-6" Quadrant #2 - Landfill	Soil	10/16/85	10/19/85
51469-04	L7 & L8, 6-12" Quadrant #2 - Landfill	Soil	10/16/85	10/19/85
51469-05	L9 & L10, 0-6" Quadrant #3 - Landfill	Soil	10/16/85	10/19/85
51469-06	L11 & L12, 6-12" Quadrant #3 - Landfill	Soil	10/16/85	10/19/85
51469-07	L13 & L14, 0-6" Quadrant #4 - Landfill	Soil	10/16/85	10/19/85
51469-08	L15 & L16, 6-12" Quadrant #4 - Landfill	Soil	10/16/85	10/19/85
51469-09	LP1 & LP2, 0-6" Points 1 & 2 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-10	LP3 & LP4, 6-12" Points 1 & 2 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-11	LP5 & LP6, 0-6" Points 3 & 4 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-12	LP7 & LP8, 6-12" Points 3 & 4 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-13	LP9 & LP10, 0-6" Points 5 & 6 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-14	LP11 & LP12, 6-12" Points 5 & 6 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-15	LP13 & LP14, 0-6" S. Evaporation Pond - Landfill Pond	Soil	10/16/85	10/19/85
51469-16	MS1 & MS2, Mystery Sample	Soil	10/16/85	10/19/85
51469-17	APS1 & APS2, 0-6" NE & SE of South API Pond	Soil	10/15/85	10/19/85
51469-18	APS3 & APS4, 6-12" NE & SE of South API Pond	Soil	10/15/85	10/19/85
51469-19	APS5 & APS6, 0-6" N & S of South API Pond	Soil	10/15/85	10/19/85
51469-20	APS7 & APS8, 6-12" N & S of South API Pond	Soil	10/15/85	10/19/85

SAMPLE DESCRIPTION INFORMATION

for

Engineering Science - Bloomfield Refining Company

(Continued)

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
51469-21	APS9 & APS10, 0-6" NW & SW of South API Pond	Soil	10/15/85	10/19/85
51469-22	APS11 & APS12, 6-12" NW & SW of South API Pond	Soil	10/15/85	10/19/85
51469-23	APS13, 0-6" SE near influent S. API Pond	Soil	10/15/85	10/19/85
51469-24	APN1 & APN2, 0-6" NE & SE of North API Pond	Soil	10/15/85	10/19/85
51469-25	APN3 & APN4, 6-12" NE & SE of North API Pond	Soil	10/15/85	10/19/85
51469-26	APN5 & APN6, 0-6" N & S of North API Pond	Soil	10/15/85	10/19/85
51469-27	APN7 & APN8, 6-12" N & S of North API Pond	Soil	10/15/85	10/19/85
51469-28	APN9 & APN10, 0-6" NW & SW of North API Pond	Soil	10/15/85	10/19/85
51469-29	APN11 & APN12, 6-12" NW & SW of North API Pond	Soil	10/15/85	10/19/85

May 28, 1986

TABLE 1. APPENDIX VIII HAZARDOUS CONSTITUENT SUBSET FOR PETROLEUM REFINERY STUDIES*

Volatile Organics

Benzene
Carbon Disulfide
Chlorobenzene
Chloroform
1,2-Dibromoethane
1,2-Dichloroethane
1,4-Dioxane
Methyl ethyl ketone
Styrene
Ethyl Benzene
Toluene
Xylenes
  Xylenes, m
  Xylenes, o & p

Base/Neutral Organics

Anthracene
Benz(a)anthracene
Benzo(b)fluoranthene
Benzo(j)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Bis(2-ethylhexyl)phthalate
Butyl benzyl phthalate
Chrysene
Dibenz(a,h)acridine
Dibenz(a,h)anthracene
Di-n-butyl phthalate

Base/Neutral Organics (Cont.)

Dichlorobenzenes
  o-Dichlorobenzene
  m-Dichlorobenzene
  p-Dichlorobenzene
Diethyl phthalate
7,12-Dimethylbenz(a)anthracene
Dimethyl phthalate
Di-n-octyl phthalate
Fluoranthene
Indene
Methyl chrysene
1-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene
Pyridine
Quinoline

Acid Organics

Benzenethiol
Cresols
  o-Cresol
  p&m-Cresol
2,4-Dimethylphenol
2,4-Dinitrophenol
4-Nitrophenol
Phenol

*"Petitions to Delist Hazardous Wastes, A Guidance Manual," EPA/530-SW-85-003, April, 1985.

II. RESULTS

The analytical results are presented in the data tables in this section. The data are organized into the tables described below:

- Phenolics,
- Total Chromium and Lead,
- Skinner Volatile Organics,
- Skinner Base/Neutral Organics,
- Skinner Acid Organics, and
- Volatile Aromatics.

For each of the parameters in the phenolics and the metals tables, the result and detection limit is present for each sample. The term ND is used to indicate the parameter was not detected at the detection limit shown.

The term BDL (Below Detection Limit) is used in the skinner organic results tables to indicate that the compound is not present at the detection limit shown. The detection limits for the Appendix VIII organic compounds were obtained from a study of the analytical methods performed by RMAL under contract to the American Petroleum Institute (API)[1]. Analytical standards are not available for three compounds. These compounds cannot be measured; they have been listed in the results tables and have been footnoted to show that standards were not available.

As explained in more detail in the analytical methodology section, the samples were screened prior to analysis in order to optimize the detection limit for each sample and minimize instrumental problems associated with analyzing samples containing

[1]"Recovery and Detection Limits of Organic Compounds in Petroleum Refinery Wastes", January 25, 1985.

relatively high concentrations. This process resulted in high dilutions for several samples containing high concentrations of the target compounds. For these samples, the detection limits for compounds not detected are proportionately high. Also, the compounds which were reported close to (less than two times) the detection limits may be suspect.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

PHENOLICS

Parameter	Units	51469-01	51469-02	51469-03	51469-04
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-05	51469-06	51469-07	51469-08
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-09	51469-10	51469-11	51469-12
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-13	51469-14	51469-15	51469-16
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-17	51469-18	51469-19	51469-20
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-21	51469-22	51469-23	51469-24
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

ND = Not detected.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

PHENOLICS (Continued)

Parameter	Units	51469-25		51469-26		51469-27		51469-28	
Phenolics	mg/kg	ND	(0.1)	ND	(0.1)	ND	(0.1)	ND	(0.1)

Parameter	Units	51469-29	
Phenolics	mg/kg	ND	(0.1)

ND = Not detected.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

CHROMIUN AND LEAD

Parameter	Units	51469-01		51469-02		51469-03		51469-04	
Chromium	mg/kg	11	(0.5)	8.9	(0.5)	9.9	(0.5)	7.6	(0.5)
Lead	mg/kg	10	(2.5)	9.8	(2.5)	9.0	(2.5)	6.7	(2.5)

Parameter	Units	51469-05		51469-06		51469-07		51469-08	
Chromium	mg/kg	7.8	(0.5)	7.4	(0.5)	9.1	(0.5)	7.0	(0.5)
Lead	mg/kg	7.6	(2.5)	7.0	(2.5)	8.2	(2.5)	7.7	(2.5)

Parameter	Units	51469-09		51469-10		51469-11		51469-12	
Chromium	mg/kg	6.2	(0.5)	8.1	(0.5)	7.8	(0.5)	10	(0.5)
Lead	mg/kg	9.0	(2.5)	8.5	(2.5)	8.9	(2.5)	12	(2.5)

Parameter	Units	51469-13		51469-14		51469-15		51469-16	
Chromium	mg/kg	8.0	(0.5)	7.8	(0.5)	2.3	(0.5)	2.4	(0.5)
Lead	mg/kg	12	(2.5)	13	(2.5)	4	(2.5)	4	(2.5)

Parameter	Units	51469-17		51469-18		51469-19		51469-20	
Chromium	mg/kg	4.4	(0.5)	5.3	(0.5)	5.5	(0.5)	14	(0.5)
Lead	mg/kg	5	(2.5)	5	(2.5)	5	(2.5)	4	(2.5)

Detection limits in parentheses.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

CHROMIUM AND LEAD (Cont.)

Parameter	Units	51469-21		51469-22		51469-23		51469-24	
Chromium	mg/kg	6.8	(0.5)	27	(0.5)	4.9	(0.5)	7.8	(0.5)
Lead	mg/kg	5.1	(2.5)	5.9	(2.5)	6.0	(2.5)	4	(2.5)

Parameter	Units	51469-25		51469-26		51469-27		51469-28	
Chromium	mg/kg	3.2	(0.5)	3.6	(0.5)	2.3	(0.5)	2.9	(0.5)
Lead	mg/kg	3	(2.5)	5	(2.5)	3	(2.5)	3	(2.5)

Parameter	Units	51469-29	
Chromium	mg/kg	12	(0.5)
Lead	mg/kg	4	(2.5)

Detection limits in parentheses.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

VOLATILE AROMATICS - GC/PID

Parameter	Units	51469-01		51469-02		51469-03		51469-04	
Benzene	ug/kg	ND	(0.5)	ND	(0.5)	ND	(0.5)	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(2.0)	ND	(2.0)	ND	(2.0)	ND	(2.0)

Parameter	Units	51469-05		51469-06		51469-07		51469-08	
Benzene	ug/kg	ND	(0.5)	ND	(0.5)	ND	(0.5)	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(2.0)	ND	(2.0)	ND	(2.0)	ND	(2.0)

Parameter	Units	51469-09		51469-10		51469-11		51469-12	
Benzene	ug/kg	ND	(0.5)	ND	(0.5)	ND	(0.5)	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(2.0)	ND	(2.0)	ND	(2.0)	ND	(2.0)

Parameter	Units	51469-13		51469-14		51469-15		51469-16	
Benzene	ug/kg	1.3	(0.5)	ND	(0.5)	ND	(0.5)	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(2.0)	ND	(2.0)	ND	(2.0)	ND	(2.0)

ND = Not detected. Detection limits in parentheses.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

(Continued)

VOLATILE AROMATICS - GC/PID

Parameter	Units	51469-17		51469-18		51469-19		51469-20	
Benzene	ug/kg	ND	(0.5)	ND	(0.5)	ND	(0.5)	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylene, m	ug/kg	5.3	(1.0)	ND	(3.0)	ND	(4.0)	ND	(2.0)
Xylenes, o & p	ug/kg	2.1	(2.0)	ND	(3.0)	ND	(2.0)	ND	(4.0)

Parameter	Units	51469-21		51469-22		51469-23		51469-24	
Benzene	ug/kg	ND	(0.5)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(4.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(2.0)	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)	ND	(25)	ND	(1.0)	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(4.0)	ND	(25)	ND	(2.0)	ND	(2.0)

Parameter	Units	51469-25		51469-26		51469-27		51469-28	
Benzene	ug/kg	ND	(0.5)	ND	(0.5)	ND	(0.5)	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(2.0)	ND	(2.0)	ND	(2.0)	ND	(2.0)

Parameter	Units	51469-29	
Benzene	ug/kg	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)
Toluene	ug/kg	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(2.0)

ND = Not detected. Detection limits in parentheses. *Analyses incomplete.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

PERCENT MOISTURE

Sample Number	Percent Moisture	Sample Number	Percent Moisture
51469-01	4%	51469-16	4%
51469-02	5%	51469-17	9%
51469-03	4%	51469-18	10%
51469-04	3%	51469-19	10%
51469-05	3%	51469-20	8%
51469-06	3%	51469-21	6%
51469-07	6%	51469-22	6%
51469-08	4%	51469-23	8%
51469-09	23%	51469-24	5%
51469-10	14%	51469-25	5%
51469-11	18%	51469-26	7%
51469-12	13%	51469-27	5%
51469-13	22%	51469-28	4%
51469-14	14%	51469-29	4%
51469-15	28%		

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

SKINNER VOLATILE ORGANICS, SOIL

Parameter	Units	51469-15		51469-16		51469-23	
Acrolein	ug/kg	BDL	(30)	BDL	(30)	BDL	(30)
Acrylonitrile*	ug/kg	-	-	-	-	-	-
Benzene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Carbon disulfide	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Carbon tetrachloride	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Chlorobenzene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Chloromethane	ug/kg	BDL	(10)	BDL	(10)	BDL	(10)
1,2 Dibromoethane	ug/kg	BDL	(20)	BDL	(20)	BDL	(20)
Chloroform	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Dichloromethane	ug/kg	BDL	(10)	BDL	(10)	BDL	(10)
1,1-Dichloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,2-Dichloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,1-Dichloroethylene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Dichloropropane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Methyl ethyl ketone	ug/kg	BDL	(10)	53	(10)	BDL	(10)
Styrene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,1,2,2-Tetrachloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Tetrachloroethylene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Toluene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,2-trans-Dichloroethylene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,1,1-Trichloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,1,2-Trichloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Trichloroethylene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)

BDL = Below detection limit. Detection limits in parentheses.
*Not consistantly recovered using Method 8240.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

SKINNER BASE/NEUTRAL ORGANICS, SOILS

Parameter	Units	51469-15		51469-16		51469-23	
Anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Benzidine	ug/kg	BDL	(4000)	BDL	(4000)	BDL	(4000)
Benz(c)acridine**	ug/kg	-	-	-	-	-	-
Benzo(a)anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Benzo(a)pyrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Benzo (b) fluoranthene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Benzo (k) fluoranthene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Bis (2-chloroethyl)ether	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Bis (2-chloroisopropyl)ether	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Bis (2-ethylhexyl)phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Butyl benzyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2-Chloronaphthalene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Chrysene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Dibenz(a,h)acridine**	ug/kg	-	-	-	-	-	-
Dibenz(a,j)acridine	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
7,12-DimethylBenz(a)anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Dibenz(a,h) anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
7H Dibenzo(c,g)carbazole	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,2-Dichlorobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,3-Dichlorobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,4-Dichlorobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Diethyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Dimethyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Di-n-butyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2,4-Dinitrotoluene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2,6-Dinitrotoluene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Di-n-octyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,2-Diphenylhydrazine*	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Fluoranthene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)

BDL = Below detection limit. Detection limits in parentheses. *Measured as azobenzene.
**Not consistantly recovered using Method 8270, or no analytical standard available.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

SKINNER BASE/NEUTRAL ORGANICS, SOIL (Cont.)

Parameter	Units	51469-15		51469-16		51469-23	
Indene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Indeno(1,2,3-cd)pyrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Methyl Benz(c)phenanthrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
3-Methylcholanthrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Methyl Chrysene**	ug/kg	-	-	-	-	-	-
Naphthalene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Nitrobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
n-Nitrosodiethylamine	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
5-Nitroacenapthene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Quinoline	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Phenanthrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Pyrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,2,4-Trichlorobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Trimethyl Benz(a)anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)

SKINNER ACID ORGANICS

Parameter	Units	51469-15		51469-16		51469-23	
2-Chlorophenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
o-Cresol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
m/p-Cresol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2,4-Dimethylphenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
4,6-Dinitro-o-phenol	ug/kg	BDL	(2000)	BDL	(2000)	BDL	(2000)
2,4-Dinitrophenol	ug/kg	BDL	(4000)	BDL	(4000)	BDL	(4000)
2-Nitrophenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
4-Nitrophenol	ug/kg	BDL	(800)	BDL	(800)	BDL	(800)
p-Chloro-m-cresol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Pentachlorophenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Phenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2,4,6-Trichlorophenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)

BDL = Below detection limit. Detection limits in parentheses.
**Not consistantly recovered using Method 8270, or no analytical standard available.

III. ANALYTICAL METHODOLOGY

The methods for the metals and organic compounds were derived from three sources of EPA methods, 1) the methods promulgated in 40 CFR 136 for priority pollutants, 2) the methods published in SW-846 and 3) methods developed by the EPA-EMSL/LV for Superfund investigations, as well as several documents published by the EPA and RMAL in 1984 and 1985. These methods all use the same generic technology as summarized below:

- Metals, acid digestion followed by analysis by ICP supported by graphite furnace AA,
- Volatile Organics, purge and trap GC/MS, and
- Semivolatile (base/neutral and acid) organics, solvent extraction followed by capillary column GC/MS.

The EPA (40 CFR 136, SW-846 and Superfund) methods were, to a large degree, developed and validated to determine the priority pollutants in a broad spectrum of environmental samples. Between October 1983 and July 1985 the EPA released three methods manuals and a "Guidance Manual" which were compendiums of modified SW-846 methods specifically adapted for the analysis of Appendix VIII constituents in petroleum refining wastes (not water samples). The most useful of these documents was an October, 1984 draft methods manual which unfortunately was never formally distributed by EPA, apparently in order to avoid a conflict with a proposed rule in the October 1, 1984 Federal Register. However, even this document (as discussed by an RMAL review for API in December, 1984) lacked many important details that are critical to the successful analysis of environmental samples impacted by petroleum refineries.

Thus, although the methods used by RMAL were based on these various EPA documents, the actual details of each method were implemented by RMAL as explained in more detail below. The various documents which were used to establish RMAL's approach are listed in a bibliography. The discussion below references method numbers in SW-846. However, it should be noted that several different versions of these methods are cited in the various EPA documents. In addition to the documents listed in the bibliography, RMAL has continued a dialogue through phone conversations and meetings with EPA/OSW to ensure that this approach is in line with the Agency's expectations. Much of RMAL's approach is being incorporated in pending Agency promulgations.

Total Metals

Metals were determined using inductively coupled plasma-atomic emission spectroscopy (ICP). Prior to analysis, the samples were prepared using Method 3050. The ICP was preprogrammed to perform off peak background correction on both the high and low wavelength sides of the analytical peaks of interest as appropriate. One hundred interelemental corrections were also automatically applied to the analysis. A matrix spike is analyzed as a quality control check for the ICP analyses.

Skinner Volatile Organics

Volatile organic compounds were determined by purge and trap gas chromatography/mass spectrometry (GC/MS) using Method 8240 with the appropriate sample introduction procedure. The appropriate procedure was determined using a screening procedure consisting of a liquid-liquid extraction with hexadecane followed by direct injection of an aliquot of the extract into a gas chromatograph with flame ionization detection (GC/FID). All volatile samples were screened in this way before GC/MS analysis. The GC/FID screening results were evaluated to determine the amount of sample to use that provides the lowest detection limits possible without overloading the GC/MS system.

Skinner Semivolatile Organics

Semivolatile organics were determined by capillary column GC/MS using SW-846 Method 8270. Soil samples were extracted using SW-846 Sonication Method 3550. After extraction, the samples were subjected to Method 3530 to separate the extract into acidic and basic fractions. The basic fraction was then cleaned up using Method 3570 to generate aliphatic and aromatic fractions. GC/MS analyses were then performed on the acidic and aromatic fractions.

Identification and quantitation of the target compounds determined by GC/MS were performed according to the process described in Methods 8240 and 8270. In summary, this process has the following features:

- Multipoint calibration for each compound to establish instrument response using multiple internal standards,

- Identification of compounds using a computerized reverse search with selected key fragment ions, and

- Quantitation using the previously determined response factors.

Volatile Aromatics

The samples were analyzed for benzene, ethyl benzene, toluene, and xylenes using purge and trap methodology to extract and concentrate the volatile compounds. The samples were desorbed into a gas chromatograph equipped with a photoionization detector (P.I.D.). Identification and quantitation were determined using internal and external standards.

Phenolics

Phenolics were determined colorimetrically using SW-846 Method 9065.

V. BIBLIOGRAPHY

A. Documents Pertaining to Appendix VIII Constituents

1) January, 1984 letter form Myles Morse pertaining to delisting petitions as well as land treatment demonstrations, including sampling procedures and data requirements.

2) March, 1984 letter to delisting petitioners from Barbara Bush revising target parameters.

3) April, 1984 memo from John Skinner to Permit Branch Chiefs concerning land treatment containing target parameters and analytical methods.

4) May, 1984 memo from John Skinner clarifying previous memo.

5) September, 1984 letter to Petitioners from Barbara Bush distributing Refinery Handbook.

6) November, 1984 letter from Eileen Claussen to all delisting petitioners describing new RCRA requirements.

7) May 3, 1985 RMAL Memo.

8) January 8, 1985 RMAL letter to Eileen Claussen, EPA-OSW.

B. Documents Pertaining to Analytical Methods

1) "Handbook for the Analysis of Petroleum Refinery Residuals and Waste", October, 1984 - prepared by Radian Corporation for EPA/OSW.

2) "Evaluation of the Applicability of the SW-846 Manual To Support All RCRA Subtitle C Testing", December 20, 1984 - prepared by Rocky Mountain Analytical Laboratory for API.

3) "Comments on the 'Handbook for the Analysis of Petroleum Refinery Residuals and Waste, October, 1984'", December 12, 1984 - prepared by Rocky Mountain Analytical Laboratory for API.

4) "Comments on the 'Handbook for the Analysis of Petroleum Refinery Residuals and Waste, April 2, 1984", August 15, 1984 - prepared by Rocky Mountain Analytical Laboratory for API.

5) "Handbook for the Analysis of Petroleum Refinery Residuals and Waste", April 2, 1984 - prepared by S-Cubed for EPA/OSW.

6) EPA document "Guidance for the Analysis of Refinery Wastes", July 5, 1985.

7) "Recovery and Detection Limits of Organic Compounds in Petroleum Refinery Wastes", January 25, 1985.

8) SW-846 - "Test Methods for Evaluating Solid Waste, Physical Chemical Methods" USEPA, 2nd Edition, 1982.

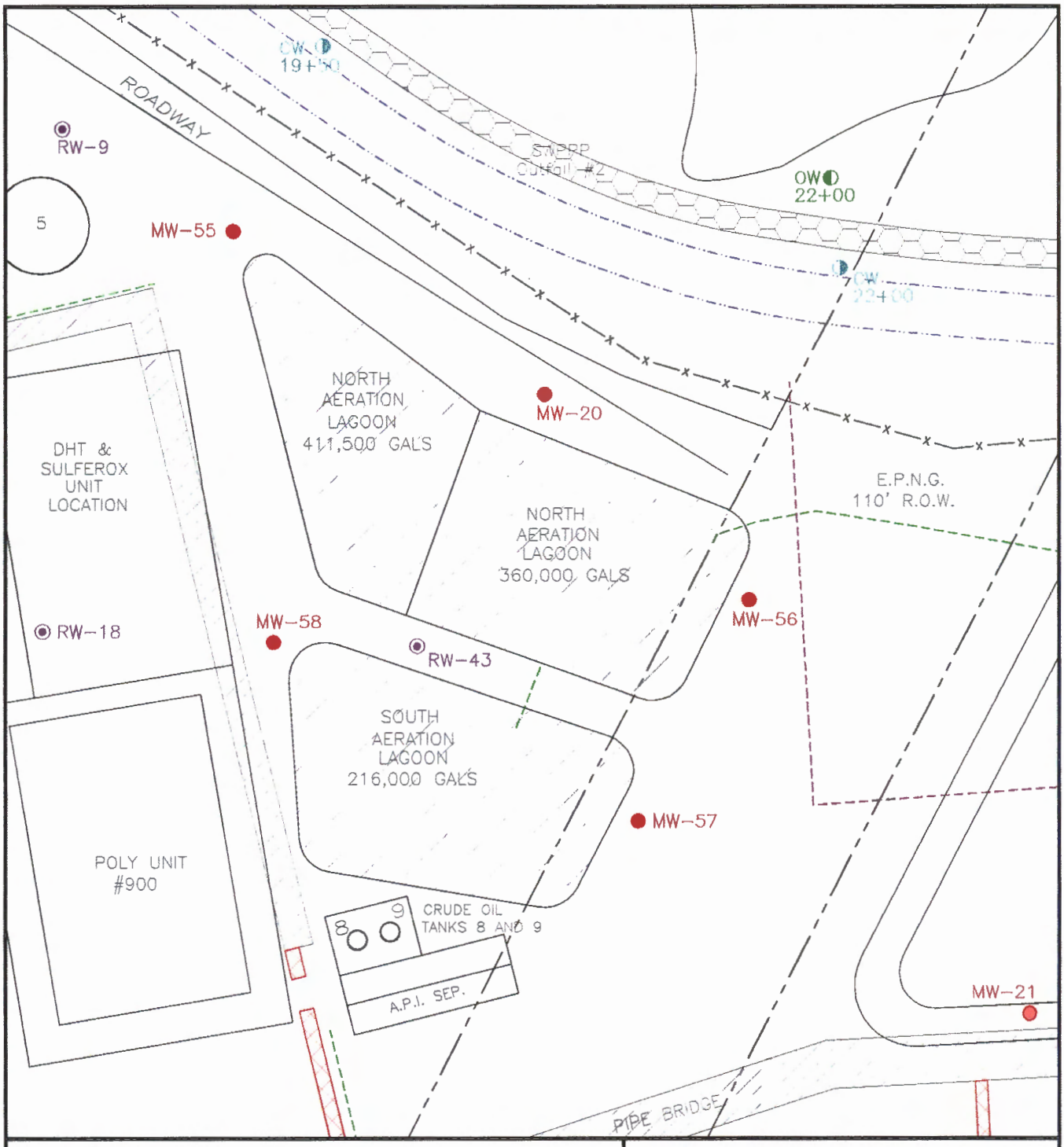
9) 40CFR136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act."

Summary of 1985 Soil Samping Data

Sample ID	Sample Description	Sample Date	Phenolics (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Benzene (ug/kg)	Ethylbenzne (ug/kg)	Toluene (ug/kg)	Xylene, m (ug/kg)	Xylenes, o & p (ug/kg)
51469-17	APS1 & APS2, 0-6" NE & SE of South API Pond	10/15/1985	<0.1	4.4	5	<0.5	<1	<1	5.3	2.1
51469-18	APS3 & APS4, 6-12" NE & SE of South API Pond	10/15/1985	<0.1	5.3	5	<0.5	<1	<1	<3	<3
51469-19	APS5 & APS6, 0-6" N & S of South API Pond	10/15/1985	<0.1	5.5	5	<0.5	<1	<1	<4	<2
51469-20	APS7 & APS8 , 6-12" N & S South of API Pond	10/15/1985	<0.1	14	4	<0.5	<1	<1	<2	<4
51469-21	APS9 & APS10, 0-6" NW & SW of South API Pond	10/15/1985	<0.1	6.8	5.1	<0.5	<1	<1	<1	<4
51469-22	APS11 & APS12, 6-12" NW & SW of South API Pond	10/15/1985	<0.1	27	5.9	<1	<4	<1	<25	<25
51469-23	APS12, 0-6" SE near influent S. API Pond	10/15/1985	<0.1	4.9	6	<1	<1	<2	<1	<2
51469-24	APN1 & APN2, 0-6" NE & SE of North API Pond	10/15/1985	<0.1	7.8	4	<1	<1	<1	<1	<2
51469-25	APN3 & APN4, 6-12" NE & SE of North API Pond	10/15/1985	<0.1	3.2	3	<0.5	<1	<1	<1	<2
51469-26	APN5 & APN6, 0-6" N & S of North API Pond	10/15/1985	<0.1	3.6	5	<0.5	<1	<1	<1	<2
51469-27	APN7 & APN8, 6-12" N & S of North API Pond	10/15/1985	<0.1	2.3	3	<0.5	<1	<1	<1	<2
51469-28	APN9 & API10, 0-6" NW & SW of North API Pond	10/15/1985	<0.1	2.9	3	<0.5	<1	<1	<1	<2
51469-29	APN11 & APN12, 6-12" NW & SW of North API Pond	10/15/1985	<0.1	12	4	<0.5	<1	<1	<1	<2

Attachment C

Recent Site Investigation Information



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
- UNDER GROUND PIPE-WAY
- ABOVE GROUND PIPE-WAY
- SLURRY BARRIER WALL
- —x——x— FENCE
- ABANDONED UNDERGROUND PIPING
- UNDER GROUND WASTEWATER PIPING

N

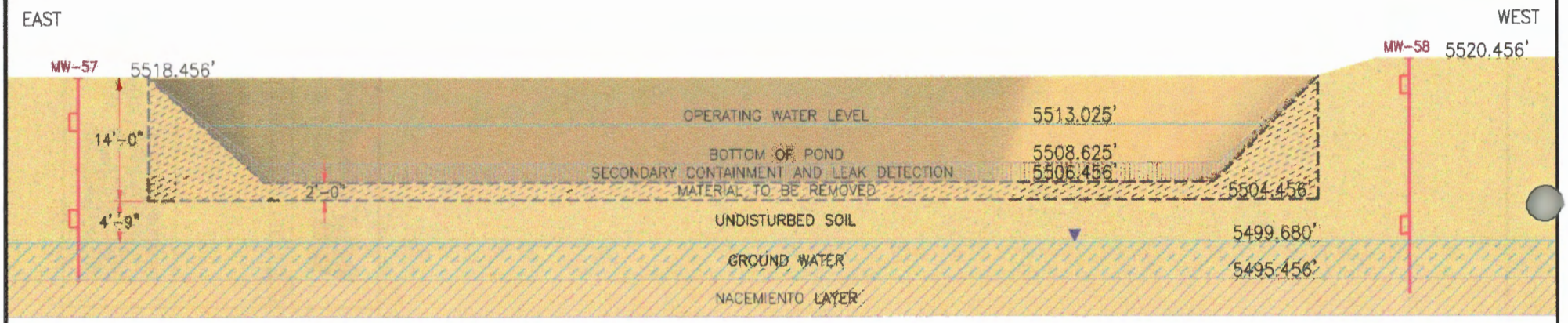
0 60
SCALE IN FEET

Western Refining
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining	DATE: 04/26/11	FILE:WestRef--A47

FIGURE 1
AERATION BASINS

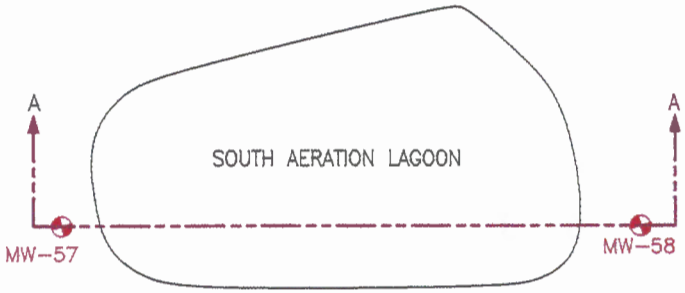
RPS
404 Camp Craft Road
Austin, Texas 78746



SECTION VIEW A–A

LEGEND

- SOIL SAMPLE
- POTENTIOMETRIC SURFACE



PLAN VIEW

Western Refining

South Aeration Lagoon
Section Details

April 2011

Table 1
Group 1 Soil Analytical Results Summary - North and South Aeration Lagoons
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	IM 1-1 (8-10') - MW-55	IM 1-1 (18-20') - MW-55	IM 1-1 (20-22') - MW-55	IM 1-2 (16-18') - MW-56	IM 1-2 (4-6') - MW-56	IM 1-3 (4-6') - MW-57	IM 1-3 (15-17') - MW-57	IM 1-4 (2-4') - MW-58	IM 1-4 (18-19.5') - MW-58
Sample Date							3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009
Metals (mg/kg)							0904060-07	0904060-08	0904060-09	0904060-04	0904060-05	0904032-02	0904032-01	0904085-01	0904085-02
Antimony	3.13E+01	(1)	1.24E+02	(2)	7.44E+00	(6)	--	--	--	--	--	--	--	--	--
Arsenic	3.90E+00	(1)	1.77E+01	(1)	1.48E-01	(6)	<2.5	<2.5	<2.5	<2.5	<2.5	2.5	<2.5	2.8	<2.5
Barium	1.56E+04	(1)	4.35E+03	(2)	3.39E+03	(6)	82	170	120	280	160	200	110	200	360
Beryllium	1.56E+02	(1)	1.44E+02	(2)	6.49E+02	(6)	--	--	--	--	--	--	--	--	--
Cadmium	7.79E+01	(1)	3.09E+02	(2)	1.55E+01	(6)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	1.13E+05	(1)	4.47E+05	(2)	1.11E+09	(6)	2	2.9	15	29	8.4	6.9	8.6	160	6.4
Cobalt	2.30E+01	(2)	3.00E+02	(3)	5.51E+00	(7)	--	--	--	--	--	--	--	--	--
Cyanide	1.56E+03	(1)	6.19E+03	(2)	8.37E+01	(6)	--	--	--	--	--	--	--	--	--
Lead	4.00E+02	(1)	8.00E+02	(1)	-	-	2.3	2.1	2	2.3	5.1	5.9	1.1	8.8	**6100**
Mercury	7.71E+00	(1)	4.99E+01	(1)	3.30E-01	(6)	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Nickel	1.56E+03	(1)	6.19E+03	(2)	5.36E+02	(6)	--	--	--	--	--	--	--	--	--
Selenium	3.91E+02	(1)	1.55E+03	(2)	1.09E+01	(6)	<13	<13	<13	<12	<12	<13	<12	<13	<12
Silver	3.91E+02	(1)	1.55E+03	(2)	1.76E+01	(6)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Vanadium	3.91E+02	(1)	1.55E+03	(2)	2.05E+03	(6)	--	--	--	--	--	--	--	--	--
Zinc	2.35E+04	(1)	9.29E+04	(2)	7.67E+03	(6)	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds - (EPA Method 8260B) mg/kg															
1,1,1,2-Tetrachloroethane	2.92E+01	(1)	1.61E+02	(1)	1.94E-02	(6)	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	2.18E+04	(1)	6.43E+04	(2)	3.35E+01	(6)	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	7.97E+00	(1)	4.33E+01	(1)	2.53E-03	(6)	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	1.72E+01	(1)	9.43E+01	(1)	7.58E-03	(6)	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	6.29E+01	(1)	3.50E+02	(1)	6.85E-02	(6)	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	6.18E+02	(1)	1.83E+03	(2)	1.34E+00	(6)	--	--	--	--	--	--	--	--	--
1,1-Dichloropropene	--		-		-	-	--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	--		-		-	-	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	9.15E-01	(1)	4.54E+00	(1)	4.01E-04	(6)	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	1.43E+02	(1)	4.27E+02	(2)	1.15E-01	(6)	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	6.70E+01	(2)	2.80E+02	(3)	2.70E-01	(7)	6	--	0.8	--	--	2.4	--	--	--
1,2-Dibromo-3-chloropropane	1.94E-01	(1)	1.09E+00	(1)	3.35E-05	(6)	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane (EDB)	5.74E-01	(1)	3.14E+00	(1)	1.78E-04	(6)	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	3.01E+03	(1)	9.71E+03	(2)	3.53E+00	(6)	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	7.74E+00	(1)	4.28E+01	(1)	4.11E-03	(6)	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	1.47E+01	(1)	8.17E+01	(1)	1.25E-02	(6)	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	4.70E+01	(2)	2.00E+02	(3)	2.25E-01	(7)	0.17	--	--	--	--	0.33	--	--	--
1,3-Dichlorobenzene	--		-		-	-	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	1.60E+03	(2)	2.00E+04	(3)	3.04E+00	(7)	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	3.21E+01	(1)	1.80E+02	(1)	4.02E-02	(6)	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	2.20E+02	(3)	9.90E+02	(3)	1.69E-01	(7)	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	--		-		-	-	--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	3.96E+04	(1)	1.48E+05	(2)	1.43E+01	(6)	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	1.56E+03	(1)	6.19E+03	(2)	7.02E+00	(6)	--	--	--	--	--	--	--	--	--
2-Hexanone	--		-	(1)	-	-	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	3.10E+02	(2)	4.10E+03	(3)	1.01E+01	(7)	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	5.50E+03	(2)	7.20E+04	(3)	3.15E+01	(7)	--	--	--	--	--	--	--	--	--
4-Isopropyltoluene	--		-		-	-	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone	--		-		-	-	--	--	--	--	--	--	--	--	--
Acetone	6.75E+04	(1)	2.63E+05	(2)	4.32E+01	(6)	--	--	--	--	<0.75	--	--	--	--
Benzene	1.55E+01	(1)	8.54E+01	(1)	2.08E-02	(6)	0.2	0.069	--	--	--	--	--	--	--
Bromobenzene	9.40E+01	(2)	4.10E+02	(3)	1.59E-01	(7)	--	--	--	--	--	--	--	--	--
Bromodichloromethane	5.25E+00	(1)	2.92E+01	(1)	3.11E-03	(6)	--	--	--	--	--	--	--	--	--

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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	IM 1-1 (8-10') - MW-55	IM 1-1 (18-20') - MW-55	IM 1-1 (20-22') - MW-55	IM 1-2 (16-18') - MW-56	IM 1-2 (4-6') - MW-56	IM 1-3 (4-6') - MW-57	IM 1-3 (15-17') - MW-57	IM 1-4 (2-4') - MW-58	IM 1-4 (18-19.5') - MW-58
Sample Date							3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009
Bromoform	6.10E+02	(3)	2.20E+03	(3)	2.59E-02	(7)	--	--	--	--	--	--	--	--	--
Bromomethane	2.23E+01	(1)	6.71E+01	(2)	2.18E-02	(6)	--	--	--	--	--	--	--	--	--
Carbon disulfide	1.94E+03	(1)	5.89E+03	(2)	2.84E+00	(6)	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	4.38E+00	(1)	2.43E+01	(1)	8.32E-03	(6)	--	--	--	--	--	--	--	--	--
Chlorobenzene	5.08E+02	(1)	1.58E+03	(2)	6.06E-01	(6)	--	--	--	--	--	--	--	--	--
Chloroethane	--		-		-	-	--	--	--	--	--	--	--	--	--
Chloroform	5.72E+00	(1)	3.19E+01	(1)	5.27E-03	(6)	--	--	--	--	--	--	--	--	--
Chloromethane	3.56E+01	(1)	1.98E+02	(1)	4.70E-02	(6)	--	--	--	--	--	--	--	--	--
cis-1,2-DCE	7.82E+02	(1)	3.10E+03	(2)	1.06E+00	(6)	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	2.35E+01	(1)	1.26E+02	(1)	1.52E-02	(6)	--	--	--	--	--	--	--	--	--
Dibromochloromethane	1.13E+01	(1)	6.13E+01	(1)	3.80E-03	(6)	--	--	--	--	--	--	--	--	--
Dibromomethane	7.80E+02	(2)	1.00E+04	(3)	1.02E+00	(7)	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane	4.81E+02	(1)	1.37E+03	(2)	8.14E+00	(6)	--	--	--	--	--	--	--	--	--
Ethylbenzene	6.97E+01	(1)	3.85E+02	(1)	1.64E-01	(6)	3.5	0.79	0.48	--	--	--	--	--	--
Hexachlorobutadiene	6.20E+01	(3)	2.20E+02	(3)	2.14E-02	(7)	--	--	--	--	--	--	--	--	--
Isopropylbenzene	3.21E+03	(1)	1.03E+04	(2)	1.11E+01	(6)	0.56	0.37	0.22	--	--	--	--	--	--
Methyl tert-butyl ether (MTBE)	8.62E+02	(1)	4.69E+03	(1)	2.58E-01	(6)	--	--	--	--	--	--	--	--	--
Methylene chloride	1.99E+02	(1)	1.09E+03	(1)	1.21E-01	(6)	--	--	--	--	--	--	--	--	--
Naphthalene	4.50E+01	(1)	2.52E+02	(1)	4.72E-02	(6)	0.81	2	1.4	--	--	<0.5	--	--	--
n-Butylbenzene	--		-		-	-	1.2	0.76	0.66	--	--	--	--	--	--
n-Propylbenzene	--		-		-	-	2.2	1.6	1.2	--	--	--	--	--	--
sec-Butylbenzene	--		-		-	-	0.46	0.45	0.31	--	--	--	--	--	--
Styrene	8.97E+03	(1)	3.03E+04	(2)	1.76E+01	(6)	--	--	--	--	--	--	--	--	--
tert-Butylbenzene	--		-		-	-	--	--	--	--	--	--	--	--	--
Tetrachloroethene (PCE)	6.99E+00	(1)	3.64E+01	(1)	5.05E-03	(6)	--	--	--	--	--	--	--	--	--
Toluene	5.57E+03	(1)	2.11E+04	(2)	1.56E+01	(6)	--	--	--	--	--	--	--	--	--
trans-1,2-DCE	2.73E+02	(1)	8.14E+02	(2)	3.39E-01	(6)	--	--	--	--	--	--	--	--	--
trans-1,3-Dichloropropene	2.35E+01	(1)	1.26E+02	(1)	1.52E-02	(6)	--	--	--	--	--	--	--	--	--
Trichloroethene (TCE)	4.57E+01	(1)	2.53E+02	(1)	5.96E-02	(6)	--	--	--	--	--	--	--	--	--
Trichlorofluoromethane	2.01E+03	(1)	5.82E+03	(2)	1.01E+01	(6)	--	--	--	--	--	--	--	--	--
Vinyl chloride	8.65E-01	(1)	2.59E+01	(1)	3.24E-03	(6)	--	--	--	--	--	--	--	--	--
Xylenes, Total	1.09E+03	(1)	3.13E+03	(2)	1.98E+00	(6)	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds - (EPA Method 8260B) µg/Kg-dry															
1,1,1,2-Tetrachloroethane	2.92E+04	(1)	1.61E+05	(1)	1.94E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,1,1-Trichloroethane	2.18E+07	(1)	6.43E+07	(2)	3.35E+04	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,1,2,2-Tetrachloroethane	7.97E+03	(1)	4.33E+04	(1)	2.53E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,1,2-Trichloroethane	1.72E+04	(1)	9.43E+04	(1)	7.58E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,1-Dichloroethane	6.29E+04	(1)	3.50E+05	(1)	6.85E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,1-Dichloroethene	6.18E+05	(1)	1.83E+06	(2)	1.34E+03	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,1-Dichloropropene	--		-		-	-	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,2,3-Trichlorobenzene	--		-		-	-	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,2,3-Trichloropropane	9.15E+02	(1)	4.54E+03	(1)	4.01E-01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,2,4-Trichlorobenzene	1.43E+05	(1)	4.27E+05	(2)	1.15E+02	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,2,4-Trimethylbenzene	6.70E+04	(2)	2.80E+05	(3)	2.70E+02	(7)	--	18	--	<0.928	<0.826	--	<0.928	<0.780	2.52
1,2-Dibromo-3-chloropropane	1.94E+02	(1)	1.09E+03	(1)	3.35E-02	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,2-Dibromoethane (EDB)	5.74E+02	(1)	3.14E+03	(1)	1.78E-01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,2-Dichlorobenzene	3.01E+06	(1)	9.71E+06	(2)	3.53E+03	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,2-Dichloroethane (EDC)	7.74E+03	(1)	4.28E+04	(1)	4.11E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,2-Dichloropropane	1.47E+04	(1)	8.17E+04	(1)	1.25E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,3,5-Trimethylbenzene	4.70E+04	(2)	2.00E+05	(3)	2.25E+02	(7)	--	<0.880	31.5	<0.928	<0.826	--	<0.928	<0.780	<0.949

Table 1
Group 1 Soil Analytical Results Summary - North and South Aeration Lagoons
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	IM 1-1 (8-10') - MW-55	IM 1-1 (18-20') - MW-55	IM 1-1 (20-22') - MW-55	IM 1-2 (16-18') - MW-56	IM 1-2 (4-6') - MW-56	IM 1-3 (4-6') - MW-57	IM 1-3 (15-17') - MW-57	IM 1-4 (2-4') - MW-58	IM 1-4 (18-19.5') - MW-58
Sample Date							3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009
1,3-Dichlorobenzene	--		-		-	-	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,3-Dichloropropane	1.60E+06	(2)	2.00E+07	(3)	3.04E+03	(7)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
1,4-Dichlorobenzene	3.21E+04	(1)	1.80E+05	(1)	4.02E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
2,2-Dichloropropane	--		-		-	-	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
2-Butanone	3.96E+07	(1)	1.48E+08	(2)	1.43E+04	(6)	30.9	23.7	20.7	<3.71	35.1	11.9	<3.71	9.06	5.55
2-Chlorotoluene	1.56E+06	(1)	6.19E+06	(2)	7.02E+03	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
2-Hexanone	--		-		-	-	<3.78	<3.52	<3.59	<3.71	<3.31	<3.10	<3.71	<3.12	<3.80
4-Chlorotoluene	5.50E+06	(2)	7.20E+07	(3)	3.15E+04	(7)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
4-Isopropyltoluene	--		-		-	-	34.1	<0.880	12.2	<0.928	<0.826	7.93	<0.928	<0.780	<0.949
4-Methyl-2-pentanone	-	(1)	-		-	-	<3.78	<3.52	<3.59	<3.71	14	<3.10	<3.71	<3.12	<3.80
Acetone	6.75E+07	(1)	2.63E+08	(2)	4.32E+04	(6)	--	--	--	10.3	--	--	7.73	52.9	26.6
Benzene	1.55E+04	(1)	8.54E+04	(1)	2.08E+01	(6)	--	--	32	<0.928	<0.826	22.5	<0.928	1.76	<0.949
Bromobenzene	9.40E+04	(2)	4.10E+05	(3)	1.69E+02	(7)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Bromodichloromethane	5.25E+03	(1)	2.92E+04	(1)	3.11E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Bromoform	6.10E+05	(3)	2.20E+06	(3)	2.59E+01	(7)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Bromomethane	2.23E+04	(1)	6.71E+04	(2)	2.18E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Carbon disulfide	1.94E+06	(1)	5.89E+06	(2)	2.84E+03	(6)	<3.78	<3.52	4.01	<3.71	<3.31	<3.10	<3.71	<3.12	<3.80
Carbon tetrachloride	4.38E+03	(1)	2.43E+04	(1)	8.32E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Chlorobenzene	5.08E+05	(1)	1.58E+06	(2)	6.06E+02	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Chloroethane	--		-		-	-	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Chloroform	5.72E+03	(1)	3.19E+04	(1)	5.27E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Chloromethane	3.56E+04	(1)	1.98E+05	(1)	4.70E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
cis-1,2-DCE	7.82E+05	(1)	3.10E+06	(2)	1.06E+03	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
cis-1,3-Dichloropropene	2.35E+04	(1)	1.26E+05	(1)	1.52E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Dibromochloromethane	1.13E+04	(1)	6.13E+04	(1)	3.80E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Dibromomethane	7.80E+05	(2)	1.00E+07	(3)	1.02E+03	(7)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Dichlorodifluoromethane	4.81E+05	(1)	1.37E+06	(2)	8.14E+03	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Ethylbenzene	6.97E+04	(1)	3.85E+05	(1)	1.64E+02	(6)	--	--	--	<0.928	<0.826	18	<0.928	2.27	1.55
Hexachlorobutadiene	6.20E+04	(3)	2.20E+05	(3)	2.14E+01	(7)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Isopropylbenzene	3.21E+06	(1)	1.03E+07	(2)	1.11E+04	(6)	--	--	--	<0.928	<0.826	6.23	<0.928	<0.780	<0.949
Methyl tert-butyl ether (MTBE)	8.62E+05	(1)	4.69E+06	(1)	2.58E+02	(6)	35.6	69.8	25.5	1.29	76.7	--	11.4	<0.780	2.63
Methylene chloride	1.99E+05	(1)	1.09E+06	(1)	1.21E+02	(6)	6.03	3.5	2.88	4.18	3.97	4.4	4.19	1.79	2.03
Naphthalene	4.50E+04	(1)	2.52E+05	(1)	4.72E+01	(6)	--	--	--	<0.928	<0.826	--	<0.928	<0.780	20.7
n-Butylbenzene	--		-		-	-	--	--	--	<0.928	<0.826	16.9	<0.928	<0.780	2.43
n-Propylbenzene	--		-		-	-	--	--	--	<0.928	<0.826	11.6	<0.928	0.819	1.87
sec-Butylbenzene	--		-		-	-	--	--	--	<0.928	<0.826	9.59	<0.928	<0.780	1.66
Styrene	8.97E+06	(1)	3.03E+07	(2)	1.76E+04	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
tert-Butylbenzene	--		-		-	-	5.09	2.32	2.02	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Tetrachloroethene (PCE)	6.99E+03	(1)	3.64E+04	(1)	5.05E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Toluene	5.57E+06	(1)	2.11E+07	(2)	1.56E+04	(6)	2.55	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
trans-1,2-DCE	2.73E+05	(1)	8.14E+05	(2)	3.39E+02	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
trans-1,3-Dichloropropene	2.35E+04	(1)	1.26E+05	(1)	1.52E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Trichloroethene (TCE)	4.57E+04	(1)	2.53E+05	(1)	5.96E+01	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Trichlorofluoromethane	2.01E+06	(1)	5.82E+06	(2)	1.01E+04	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Vinyl chloride	8.65E+02	(1)	2.59E+04	(1)	3.24E+00	(6)	<0.945	<0.880	<0.898	<0.928	<0.826	<0.775	<0.928	<0.780	<0.949
Xylenes, Total	1.09E+06	(1)	3.13E+06	(2)	1.98E+03	(6)	69.8	3.55	24.7	<0.928	<0.826	40.1	<0.928	<0.780	<0.949
Semi Volatile Organics - (EPA Method 8270) mg/kg															
1,2,4-Trichlorobenzene	1.43E+02	(1)	4.27E+02	(2)	1.15E-01	(6)	<0.2	--	--	--	--	<1	--	<1	--
1,2-Dichlorobenzene	3.01E+03	(1)	9.71E+03	(2)	3.53E+00	(6)	<0.2	--	--	--	--	<1	--	<1	--
1,3-Dichlorobenzene	--		-		0.00E+00	(6)	<0.2	--	--	--	--	<1	--	<1	--

Table 1
Group 1 Soil Analytical Results Summary - North and South Aeration Lagoons
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	IM 1-1 (8-10') - MW-55	IM 1-1 (18-20') - MW-55	IM 1-1 (20-22') - MW-55	IM 1-2 (16-18') - MW-56	IM 1-2 (4-6') - MW-56	IM 1-3 (4-6') - MW-57	IM 1-3 (15-17') - MW-57	IM 1-4 (2-4') - MW-58	IM 1-4 (18-19.5') - MW-58
Sample Date							3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009
1,4-Dichlorobenzene	3.21E+01	(1)	1.80E+02	(1)	4.02E-02	(6)	<0.2	--	--	--	--	<1	--	<1	--
2,4,5-Trichlorophenol	6.11E+03	(1)	2.38E+04	(2)	8.02E+01	(6)	<0.2	--	--	--	--	<1	--	<1	--
2,4,6-Trichlorophenol	6.11E+01	(1)	2.38E+02	(2)	8.02E-01	(6)	<0.2	--	--	--	--	<1	--	<1	--
2,4-Dichlorophenol	1.83E+02	(1)	7.15E+02	(2)	1.54E+00	(6)	<0.4	--	--	--	--	<2	--	<2	--
2,4-Dimethylphenol	1.22E+03	(1)	4.76E+03	(2)	1.03E+01	(6)	<0.3	--	--	--	--	<1.5	--	<1.5	--
2,4-Dinitrophenol	1.22E+02	(1)	4.76E+02	(2)	5.91E-01	(6)	<0.4	--	--	--	--	<2	--	<2	--
2,4-Dinitrotoluene	1.26E+01	(1)	1.03E+02	(1)	1.75E-02	(6)	<0.5	--	--	--	--	<2.5	--	<2.5	--
2,6-Dinitrotoluene	6.12E+01	(1)	2.39E+02	(2)	3.00E-01	(6)	<0.5	--	--	--	--	<2.5	--	<2.5	--
2-Chloronaphthalene	6.26E+03	(1)	2.48E+04	(2)	1.52E+02	(6)	<0.25	--	--	--	--	<1.25	--	<1.25	--
2-Chlorophenol	3.91E+02	(1)	1.55E+03	(2)	1.72E+00	(6)	<0.2	--	--	--	--	<1	--	<1	--
2-Methylnaphthalene	3.10E+02	(2)	4.10E+03	(3)	1.01E+01	(7)	0.58	--	--	--	--	1.3	--	<1.25	--
2-Methylphenol	3.10E+03	(2)	3.10E+04	(3)	2.25E+01	(7)	<0.5	--	--	--	--	<2.5	--	<2.5	--
2-Nitroaniline	1.80E+02	(2)	1.80E+03	(3)	3.71E-01	(7)	<0.2	--	--	--	--	<1	--	<1	--
2-Nitrophenol	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
3,3'-Dichlorobenzidine	8.71E+00	(1)	4.26E+01	(1)	1.92E-01	(6)	<0.25	--	--	--	--	<1.25	--	<1.25	--
3+4-Methylphenol	3.10E+02	(2)	3.10E+03	(3)	2.14E+00	(7)	<0.2	--	--	--	--	<1	--	<1	--
3-Nitroaniline	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
4,6-Dinitro-2-methylphenol	--		-		-	-	<0.5	--	--	--	--	<2.5	--	<2.5	--
4-Bromophenyl phenyl ether	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
4-Chloro-3-methylphenol	--		-		-	-	<0.5	--	--	--	--	<2.5	--	<2.5	--
4-Chloroaniline	2.40E+01	(3)	8.60E+01	(3)	1.35E-03	(7)	<0.5	--	--	--	--	<2.5	--	<2.5	--
4-Chlorophenyl phenyl ether	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
4-Nitroaniline	2.40E+02	(3)	8.60E+02	(3)	1.13E-02	(7)	<0.25	--	--	--	--	<1.25	--	<1.25	--
4-Nitrophenol	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
Acenaphthene	3.44E+03	(1)	1.86E+04	(2)	2.31E+02	(6)	<0.2	--	--	--	--	<1	--	<1	--
Acenaphthylene	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
Aniline	8.50E+02	(3)	3.00E+03	(3)	3.83E-02	(7)	<0.2	--	--	--	--	<1	--	<1	--
Anthracene	1.72E+04	(1)	6.68E+04	(2)	3.79E+03	(6)	<0.2	--	--	--	--	<1	--	<1	--
Azobenzene	4.90E+01	(3)	2.20E+02	(3)	5.74E-03	(7)	<0.2	--	--	--	--	<1	--	<1	--
Benz(a)anthracene	4.81E+00	(1)	2.34E+01	(1)	3.59E+00	(6)	<0.2	--	--	--	--	<1	--	<1	--
Benzo(a)pyrene	4.81E-01	(1)	2.34E+00	(1)	1.22E+00	(6)	<0.2	--	--	--	--	<1	--	<1	--
Benzo(b)fluoranthene	4.81E+00	(1)	2.34E+01	(1)	1.25E+01	(6)	<0.2	--	--	--	--	<1	--	<1	--
Benzo(g,h,i)perylene	--		-		-	-	<0.5	--	--	--	--	<2.5	--	<2.5	--
Benzo(k)fluoranthene	4.81E+01	(1)	2.34E+02	(1)	1.22E+02	(6)	<0.2	--	--	--	--	<1	--	<1	--
Benzoic acid	2.40E+05	(2)	2.50E+06	(3)	3.71E+02	(7)	<0.5	--	--	--	--	<2.5	--	<2.5	--
Benzyl alcohol	3.10E+04	(2)	3.10E+05	(3)	4.73E+01	(7)	<0.2	--	--	--	--	<1	--	<1	--
Bis(2-chloroethoxy)methane	1.80E+02	(2)	1.80E+03	(3)	2.59E-01	(7)	<0.2	--	--	--	--	<1	--	<1	--
Bis(2-chloroethyl)ether	2.56E+00	(1)	1.36E+01	(1)	2.62E-04	(6)	<0.2	--	--	--	--	<1	--	<1	--
Bis(2-chloroisopropyl)ether	9.15E+01	(1)	4.54E+02	(1)	2.88E-02	(6)	<0.2	--	--	--	--	<1	--	<1	--
Bis(2-ethylhexyl)phthalate	2.80E+02	(1)	1.37E+03	(1)	1.34E+02	(6)	<0.5	--	--	--	--	<2.5	--	<2.5	--
Butyl benzyl phthalate	2.60E+03	(3)	9.10E+03		7.54E+00	(7)	<0.2	--	--	--	--	<1	--	<1	--
Carbazole	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
Chrysene	4.81E+02	(1)	2.34E+03	(1)	3.67E+02	(6)	<0.2	--	--	--	--	<1	--	<1	--
Dibenz(a,h)anthracene	4.81E-01	(1)	2.34E+00	(1)	4.07E+00	(6)	<0.2	--	--	--	--	<1	--	<1	--
Dibenzofuran	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
Diethyl phthalate	4.89E+04	(1)	1.91E+05	(2)	1.19E+02	(6)	<0.2	--	--	--	--	<1	--	<1	--
Dimethyl phthalate	6.11E+05	(1)	2.38E+06	(2)	9.40E+02	(6)	<0.2	--	--	--	--	<1	--	<1	--
Di-n-butyl phthalate	6.11E+03	(1)	2.38E+04	(2)	9.70E+01	(6)	<0.5	--	--	--	--	<2.5	--	<2.5	--
Di-n-octyl phthalate	--		-		-	-	<0.2	--	--	--	--	<1	--	<1	--
Fluoranthene	2.29E+03	(1)	8.91E+03	(2)	1.75E+03	(6)	<0.25	--	--	--	--	<1.25	--	<1.25	--

Table 1
Group 1 Soil Analytical Results Summary - North and South Aeration Lagoons
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	IM 1-1 (8-10') - MW-55	IM 1-1 (18-20') - MW-55	IM 1-1 (20-22') - MW-55	IM 1-2 (16-18') - MW-56	IM 1-2 (4-6') - MW-56	IM 1-3 (4-6') - MW-57	IM 1-3 (15-17') - MW-57	IM 1-4 (2-4') - MW-58	IM 1-4 (18-19.5') - MW-58
Sample Date							3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009	3/31/2009
Fluorene	2.29E+03	(1)	8.91E+03	(2)	2.81E+02	(6)	<0.5	--	--	--	--	<2.5	--	<2.5	--
Hexachlorobenzene	2.45E+00	(1)	1.20E+01	(1)	2.48E-02	(6)	<0.2	--	--	--	--	<1	--	<1	--
Hexachlorobutadiene	6.20E+01	(3)	2.20E+02	(3)	2.14E-02	(7)	<0.2	--	--	--	--	<1	--	<1	--
Hexachlorocyclopentadiene	3.67E+02	(1)	8.11E+02	(2)	6.90E+00	(6)	<0.2	--	--	--	--	<1	--	<1	--
Hexachloroethane	6.11E+01	(1)	2.38E+02	(2)	2.17E-01	(6)	<0.2	--	--	--	--	<1	--	<1	--
Indeno(1,2,3-cd)pyrene	4.81E+00	(1)	2.34E+01	(1)	4.16E+01	(6)	<0.25	--	--	--	--	<1.3	--	<1.25	--
Isophorone	4.13E+03	(1)	2.02E+04	(1)	2.08E+00	(6)	<0.5	--	--	--	--	<2.5	--	<2.5	--
Naphthalene	4.50E+01	(1)	2.52E+02	(1)	4.72E-02	(6)	0.25	--	--	--	--	<1	--	<1	--
Nitrobenzene	4.94E+01	(1)	2.77E+02	(1)	7.72E-02	(6)	<0.5	--	--	--	--	<2.5	--	<2.5	--
N-Nitrosodi-n-propylamine	6.90E-01	(3)	2.50E+00	(3)	1.24E-04	(7)	<0.2	--	--	--	--	<1	--	<1	--
N-Nitrosodiphenylamine	8.00E+02	(1)	3.91E+03	(1)	1.45E+01	(6)	<0.2	--	--	--	--	<1	--	<1	--
Pentachlorophenol	2.07E+01	(1)	1.00E+02	(1)	3.30E-01	(6)	<0.4	--	--	--	--	<2	--	<2	--
Phenanthrene	1.83E+03	(1)	7.15E+03	(2)	9.39E+02	(6)	<0.2	--	--	--	--	1.1	--	<1	--
Phenol	1.83E+04	(1)	6.88E+04	(2)	7.09E+01	(6)	<0.2	--	--	--	--	<1	--	<1	--
Pyrene	1.72E+03	(1)	6.68E+03	(2)	1.26E+03	(6)	<0.2	--	--	--	--	<1	--	<1	--
Pyridine	7.80E+01	(2)	1.00E+03	(3)	-	-	<0.5	--	--	--	--	<2.5	--	<2.5	--
Total Petroleum Hydrocarbons - (EPA Method 8015B) mg/kg															
Diesel Range Organics (DRO)	1.80E+03	(4)	7.15E+03	(9)	1000	(5)	1400	510	360	<10	<10	4000	14	5700	50
Gasoline Range Organics (GRO)	-		-		-		92	<50	35	<5	<5	110	<5	26	<5
Motor Oil Range Organics (MRO)	1.80E+03	(4)	7.15E+03	(9)	1000	(5)	570	<50	61	<50	80	2000	<50	3700	<50
Ethanol							--	--	--	--	--	--	--	--	--

--* Laboratory inadvertently did not analyze for Cyanide for AOC (22-12 (36-37.75')
-- No screening level or analytical result available
NMED - Technical Background Document for Development of Soil Screening Levels -
EPA - Regional Screening Levels (April 2009)
(1) NMED Residential Screening Level
(2) EPA - Residential Screening Levels (April 2009)
(3) EPA - Residential Screening Levels (April 2009) multiplied by 10 pursuant to
(4) NMED Oct. 2006 TPH Screening Guidelines (updated with Masschusetts Department of Environmental Protection 2009 tox data - uknown oil, residential, direct contact pathways

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

(6) SoilGW NMED Dilution Attenuation Factor (DAF) = 11.25
(7) SoilGW Risk-based EPA DAF = 11.25
(8) SoilGW MCL-based EPA DAF = 11.25
(9) NMED Oct. 2006 TPH Screening Guidelines (updated with Masschusetts Department of Environmental Protection 2009 tox data - uknown oil, construction worker, direct contact pathways

Bold represents value above Non-Residential Screening Level

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

RPS

WELL CONSTRUCTION

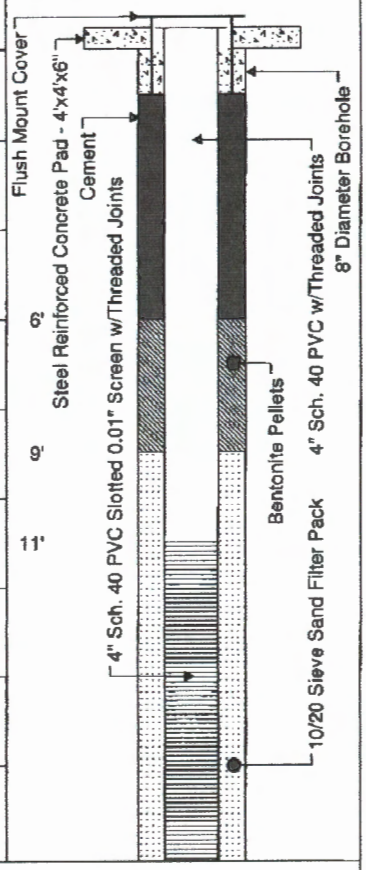
Well No.: MW-55 (IM1-1)
Start Date: 4/2/2009
Finish Date: 4/2/2009

Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36º41.964 W107º58.552

Total Depth: 27.25' bgl
Ground Water: Saturated @ 22' bgl
Elev., TOC (ft. msl): 5519.840
Elev., PAD (ft. msl): 5520.139
Elev., GL (ft. msl): 5519.938
Site Coordinates:
N 36º41'57.80286" W 107º58'33.06266"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
								Ground Surface
0					0.0 49ºF		70	**Fill/Clay (CL)** Low plasticity, soft, damp, brown
2					0.2 49ºF		50	**Fill/Clay (CL)** Similar to above
4					434 49ºF		70	**Fill/Clay (CL)** Low plasticity, soft, damp, brown and gray, hydrocarbon odor
6					623 49ºF		70	**Fill/Clay (CL)** Similar to above, grayish brown, hydrocarbon odor
8	8-10'	1045	G/2V/2E/3J		891 49ºF		60	**Fill/Sand (SP)** Fine grain, loose, damp, brown to dark brown, hydrocarbon odor
10					630 48ºF		90	**Fill/Sand (SP)** Similar to above, hydrocarbon odor
12					518 48ºF		90	**Gravelly Sand (SW)** Fine to coarse grain, loose, damp, dark gray, hydrocarbon odor
14					806 48ºF		50	**Gravelly Sand (SW)** Similar to above, hydrocarbon odor, black discoloration, not oily
16					432 48ºF		50	**Gravelly Sand (SW)** Similar to above, damp, odor, black discoloration, not oily

Completion Results



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WELL CONSTRUCTION

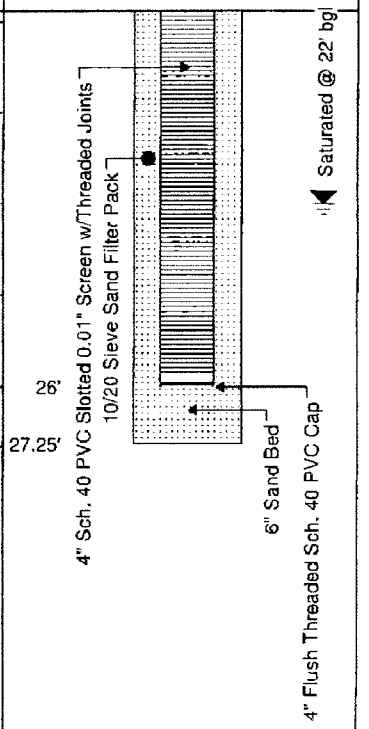
Well No.: MW-55 (IM1-1)
Start Date: 4/2/2009
Finish Date: 4/2/2009

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

Total Depth: 27.25' bgl
Ground Water: Saturated @ 22' bgl
Elev., TOC (ft. msl): 5519.840
Elev., PAD (ft. msl): 5520.139
Elev., GL (ft. msl): 5519.938
Site Coordinates:
N 36°41'57.80286" W 107°58'33.06266"

Depth (ft.)	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
19	18-20'	1100	G/2V/2E/3J		1085 48°F		50	**Gravelly Sand (SW)** Similar to above, damp, black discoloration, odor, not oily
21	20-22'	1115	G/2V/2E/3J	22'	1047 48°F		50	**Gravelly Sand (SW)** Fine to coarse grain, loose, damp, gray, black discoloration, hydrocarbon odor
23							50	**Gravelly Sand (SW)** Similar to above, oily, saturated
25							90	**Gravelly Sand (SW)** Similar to above, saturated, black, hydrocarbon odor
27								**Weathered Sandstone/Sand (SS)** Fine to medium grain, soft, damp, greenish gray, faint odor
29								Total Depth = 27.25' BGL
31								
33								
35								
37								

Completion Results



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WELL CONSTRUCTION

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Well No.: MW-56 (IM1-2)
Start Date: 4/1/2009 13:40
Finish Date: 4/1/2009

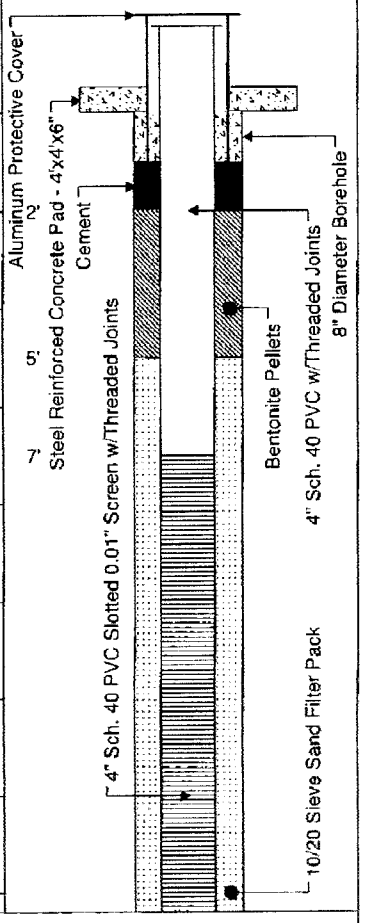
Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon

Total Depth: 23.75' bgl
Ground Water: Saturated @ 19' bgl
Elev., TOC (ft. msl): 5519.308
Elev., PAD (ft. msl): 5516.884
Elev., GL (ft. msl): 5516.737
Site Coordinates:
N 36º41'56.12123" **W** 107º58'30.28358"

Comments: N36º41.935 W107º58.507; Hydroexcavated to 8'

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

Completion Results



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WELL CONSTRUCTION

Well No.: MW-56 (IM1-2)
Start Date: 4/1/2009 13:40
Finish Date: 4/1/2009

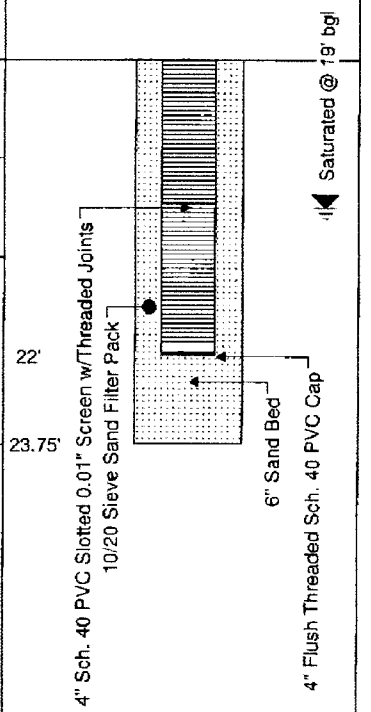
Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36º41.935 W107º58.507; Hydroexcavated to 8'

Total Depth: 23.75' bgl
Ground Water: Saturated @ 19' bgl
Elev., TOC (ft. msl): 5519.308
Elev., PAD (ft. msl): 5516.884
Elev., GL (ft. msl): 5516.737
Site Coordinates:
N 36º41'56.12123" W 107º58'30.28358"

Sampling

Depth (ft.)	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
	16-18'	1630	G/2V/2E/3J	19'	50 53ºF		80	**Gravelly Sand (SW)** Similar to above, fine to coarse, loose, moist at base, light gray, hydrocarbon odor
18							30	**Gravelly Sand (SW)** Medium to coarse, loose, saturated, black, hydrocarbon odor, coarse gravel
20							70	**Weathered Sandstone/Sand (SS)** Loose, damp to moist, faint odor, gray to brown, trace gray clay
22								
24								Total Depth = 23.75' BGL
26								
28								
30								
32								
34								

Completion Results



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WELL CONSTRUCTION

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

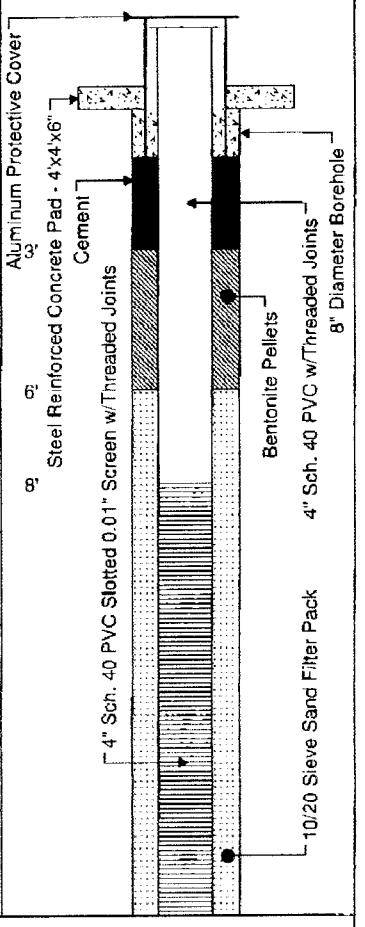
Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon

Total Depth: 24.25' bgl
Ground Water: Saturated @ 19' bgl
Elev., TOC (ft. msl): 5521.174
Elev., PAD (ft. msl): 5518.538
Elev., GL (ft. msl): 5518.456
Site Coordinates:
N 36°41'55.48996" W 107°58'30.93918"

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

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

Completion Results



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WELL CONSTRUCTION

RPS

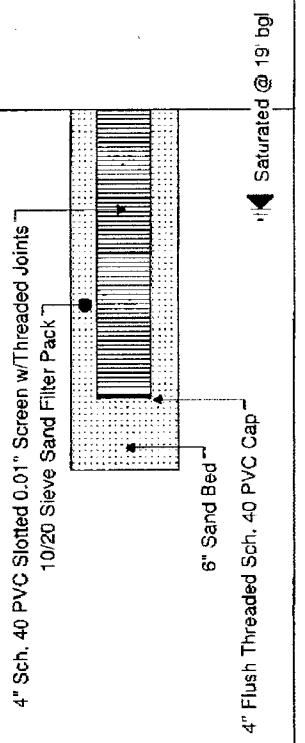
Well No.: MW-57 (IM1-3)
Start Date: 3/31/2009
Finish Date: 3/31/2009

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

Total Depth: 24.25' bgl
Ground Water: Saturated @ 19' bgl
Elev., TOC (ft. msl): 5521.174
Elev., PAD (ft. msl): 5518.538
Elev., GL (ft. msl): 5518.456
Site Coordinates:
N 36°41'55.48996" W 107°58'30.93918"

Depth (ft.)	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
18				19'				**Gravelly Sand (SW)** Fine to coarse grain, loose, moist to saturated, dark gray, strong hydrocarbon odor
20							90	**Gravelly Sand (SW)** Similar to above, saturated, strong hydrocarbon odor
22							100	**Gravelly Sand (SW)** Similar to above
24							100	**Clay (CH)** High plasticity, very stiff, damp, gray and light yellowish orange
26								Total Depth = 24.25' BGL
28								
30								
32								
34								
36								

Completion Results



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WELL CONSTRUCTION

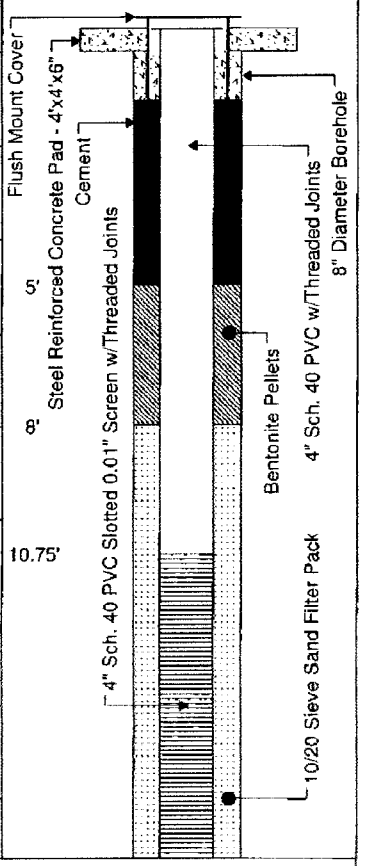
Well No.: MW-58 (IM1-4)
Start Date: 4/3/2009
Finish Date: 4/3/2009

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

Total Depth: 27' bgl
Ground Water: Saturated @ 19.5' bgl
Elev., TOC (ft. msl): 5520.289
Elev., PAD (ft. msl): 5520.554
Elev., GL (ft. msl): 5520.466
Site Coordinates:
N 36°41'55.88264" W 107°58'32.76780"

Depth (ft.)	Sampling: Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
								Ground Surface
0					1.1 57°F		80	**Fill/Clay (CL)** Low plasticity, soft, damp, brown
2	2-4'	1215	G/2V/ 2E/3J		395 57°F		80	**Fill/Clay (CL)** Similar to above, hydrocarbon odor, gray discoloration
4					380 57°F		80	**Fill/Clay (CH)** High plasticity, firm, damp, gray and brown, hydrocarbon odor, black discoloration
6					58 57°F		80	**Fill/Clay (CH)** Similar to above, hydrocarbon odor, black discoloration
8					80 57°F		80	**Fill/Clay (CH)** Similar to above
10					43 70°F		60	**Gravelly Sand (SW)** Medium to coarse grain, compact, damp, dark gray, faint hydrocarbon odor, trace clay, coarse gravel
12					29 70°F		80	**Gravelly Sand (SW)** Similar to above, hydrocarbon odor, damp to slightly moist, dark gray
14					17 70°F		80	**Gravelly Sand (SW)** Similar to above, damp, to slighly moist
16							--	**Gravelly Sand (SW)** Similar to above

Completion Results



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WELL CONSTRUCTION

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

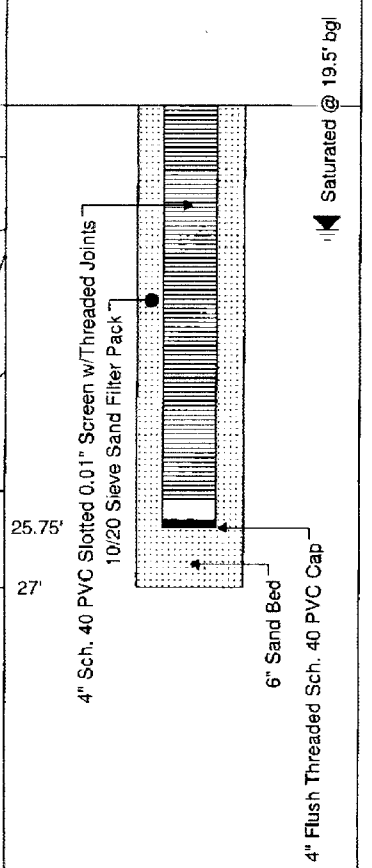
Client: Western Refining Southwest, Inc.
Site: SWMU Group #1, Bloomfield Refinery
Job No.: 354 - Bloomfield, NM
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow-Stem Auger/ODEX
Sampling Method: Split Spoon
Comments: N36°41.930 W107°58.548

Total Depth: 27' bgl
Ground Water: Saturated @ 19.5' bgl
Elev., TOC (ft. msl): 5520.289
Elev., PAD (ft. msl): 5520.554
Elev., GL (ft. msl): 5520.466
Site Coordinates:
N 36°41'55.88264" W 107°58'32.76780"

Sampling

Depth (ft.)	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class	Recovery (%)	Sample Description
18	18-19.5'	1230	G/2V/2E/3J	19.5'	312 70°F		90	**Gravelly Sand (SW)** Medium to coarse grain, compact, damp to moist, gray, hydrocarbon odor
20							90	**Sand (SP)** Medium grain, compact, moist to very moist, black, strong hydrocarbon odor
22							90	**Sand (SP)** Similar to above, saturated, strong hydrocarbon odor
24							--	**Sand/Clay (SP/CH)** No recovery
26							90	**Clay (CH)** High plasticity, firm, damp, moist in sand seams, olive brown, odor
28								Total Depth = 27' BGL
30								
32								
34								
36								

Completion Results



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