AP - 111

ANNUAL GW MONITORING REPORT 2017 (3)

2019

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

October 18, 2019

John Moore
Environmental Superintendent
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: APPROVAL WITH MODIFICATIONS
SECOND RESPONSE TO COMMENT NO. 39 ON 2017 ANNUAL GROUND WATER MONITORING REPORT (DATED MARCH 21, 2019)
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-18-014

Dear Mr. Moore:

The New Mexico Environment Department (NMED) has reviewed the *Second Response to Comment 39 on 2017 Annual Ground Water Monitoring Report (dated March 21, 2019)* (Response), dated August 23, 2019 submitted on behalf of Marathon Petroleum Company dba Western Refining Southwest Inc., Gallup Refinery (the Permittee). The Permittee must address the following comments.

Comment 1

The Permittee's response to NMED's Comment 1 states, "[t]he discharge of hydrocarbon from the drain line to the STP-1 French drain was discovered on February 6, 2018." Four figures are included in the Response; however, three of the figures do not have titles. On the first figure, the location of the STP-1 French drain is identified; however, the location of the drain line is not identified. Identify the location of the drain line in relation to the location of the STP-1 French drain in a revised figure.

Comment 2
The second paragraph on page 2 of the Permittee's response to NMED's Comment 1 states, "[e]xcavations #4, #5, and #8 were completed with a backhoe along the west end of the tank farm and no evidence of hydrocarbons was encountered in these locations, but groundwater was not reached in these excavations." Provide the depth and dimension of the excavations in a response letter. Also, provide the depth and dimension of excavations #6, #7, #9, #10, and #11.

Comment 3
The second paragraph on page 2 of the Permittee's response to NMED's Comment 1 states, "[e]xcavations #9 and #10 were completed between the wastewater treatment plant and STP-1. Hydrocarbon[s] were observed in excavation #9." The presence or absence of hydrocarbons in excavation #10 is not discussed in the Response. Since hydrocarbons were observed in boreholes BH #1, #2, and #3 and excavation #9, hydrocarbons may have also been present in excavation #10. Identify the presence or absence of hydrocarbons in excavation #10 in the response letter.

Comment 4
The western, northern and southern extent of the hydrocarbon contamination is not delineated. Hydrocarbons were observed in borehole BH #3, which was installed farthest to the west of the test pits and boreholes. More boreholes should have been advanced west of borehole BH #3 to define the western extent of the contamination since borehole BH #3 contained hydrocarbons. Similarly, hydrocarbons were observed in borehole BH #1, which was installed farthest to the north of the test pits and boreholes. Hydrocarbons were also observed in excavation #9. While excavation #7 was installed south of excavation #9 and hydrocarbon was not detected in excavation #7, the distance from excavation #9 to #7 was approximately 500 feet and appears to be too far to determine extent. The Permittee did not delineate the hydrocarbon contamination in soils north of the wastewater treatment plant.

Comment 5
The figure depicting the excavations highlighted excavations #9 and #10 in red and the rest of the excavations in green. Explain the basis for distinguishing the color of these excavations in the response letter.

Comment 6
The second paragraph on page 2 of the Permittee's response to NMED's Comment 1 states, "[t]he SD locations on the map are storm drains." Some of the storm drains are located close to the areas where hydrocarbons were detected. If the presence of hydrocarbons was investigated at the storm drain locations, include the discussion of the observations in the response letter.

Comment 7
The third paragraph on page 2 of the Permittee's response to NMED's Comment 1 states, "[i]n addition to the excavations completed using either a backhoe or hydroexcavation, smaller holes were hand excavated to the east of STP-1 along the natural drainage pathway, where hydrocarbons were encountered at shallow depths (e.g., 3 feet). Hand excavations were also completed on the northwest sides of Tanks 569, 570, 571, and 572, but no evidence of a release was found." The locations of the small excavations were not identified in the figures, revise a figure to depict the locations of the small excavations and indicate the presence or absence of hydrocarbons.

Comment 8
The fourth paragraph on page 2 of the Permittee's response to NMED's Comment 1 states, "[a]s requested, a map of the underground piping is attached. Most all [sic] of the product transfer piping is aboveground with limited exceptions where the pipeline passes through the tank dike walls. Otherwise, only the oily water drain lines are belowground in this area." The source of hydrocarbon contamination in the vicinity of the wastewater treatment plant and the French drain near Pond STP-1 was suggested to be Tank 570 according to the Mr. Brian Moore in a Marathon Petroleum Company email, dated August 1, 2019; however, hydrocarbons were observed in soils above the water table. The distance between the French drain and Tank 570 is more than 1,800 feet. The transport mechanism of hydrocarbons appears to be limited to groundwater flow. Explain why hydrocarbons were observed in soils above the water table in the vicinity of the French drain. The areas where the presence of hydrocarbons was observed may coincide with the location of the underground piping. Discuss whether leaky oily water drain lines may be a secondary source of hydrocarbon contamination in the vicinity of the tank farm and the French drain.

Comment 9
The fifth paragraph on page 3 of the Permittee's response to NMED's Comment 1 states, "[t]he boring [SB-FD-1] was plugged after no water was observed after two days." Boring SB-FD-1 was installed approximately 200 feet north of Pond STP-1 and hydrocarbons were not observed in the boring. The northern extent of hydrocarbon contamination has not reached boring SB-FD-1. However, the soils in closer proximity of the French drain, where hydrocarbons were detected, should have been investigated. No response required.

The Permittee must address all comments in this letter and submit a response letter no later than **December 13, 2019**.

This approval is based on the information presented in the document as it relates to the objectives of the work identified by NMED at the time of review. Approval of this document does not constitute agreement with all information or every statement presented in the document.

If you have questions regarding this Approval with Modifications, please contact Kristen Van Horn of my staff at 505-476-6046.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: K. Van Horn, NMED HWB
D. Cobrain, NMED HWB
M. Suzuki, NMED HWB
C. Chavez, OCD
L. King, EPA Region 6 (6LCRRC)
B. Moore, WRG

File: Reading File and WRG 2019 File

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ENVIRONMENT DEPARTMENT

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Deputy Secretary

October 2, 2019

John Moore
Environmental Superintendent
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: APPROVAL WITH MODIFICATIONS
WORK PLAN FOR INSTALLATION OF MONITORING WELLS PER 2017 ANNUAL GROUNDWATER REPORT COMMENTS
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-19-015

Dear Mr. Moore:

The New Mexico Environment Department (NMED) has reviewed the *Work Plan for Installation of Monitoring Wells per 2017 Annual Groundwater Report Comments* (Work Plan), dated August 2019, submitted on behalf of Marathon Petroleum Company dba Western Refining Southwest Inc., Gallup Refinery (the Permittee). NMED hereby issues this Approval with Modifications. The Permittee must address the following comments.

Comment 1

In the *Executive Summary* Section, the Permittee states, "[i]n a Disapproval letter dated March 21, 2019, the New Mexico Environment Department (NMED) requested additional wells be installed pursuant to Comments No. 27 and 28. In response to these comments, two new monitoring wells will be installed." Comment 1 in NMED's *Disapproval Annual Groundwater Monitoring Report: Gallup Refinery – 2017,* dated March 21, 2019 also states, "[p]ropose to install a sentinel groundwater monitoring well west of well OW-1 in the revised Work Plan." A

work plan that addresses Comment 1 has not been submitted to NMED. Comment 6 in NMED's *Disapproval Response to Disapproval Work Plan 2015 Annual Groundwater Report Comments,* dated August 23, 2019 also directed installation of the groundwater monitoring wells west of well OW-1 and required a revised work plan that proposes installation of the wells no later than **October 31, 2019**. The Permittee must propose to install the wells in the revised *Work Plan 2015 Annual Groundwater Report Comments.*

Comment 2

In Section 4.3 (Soil Sample Field Screening and Logging), the Permittee states, "[v]apors 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 or test pit log for each sample." If wells are installed in the winter and the ambient air temperature is very low, then volatile organic compounds in a soil sample may not volatilize and equilibrate, causing a low reading. If low ambient air temperature occurs during the well installation, then additional measures must be taken to more accurately measure VOCs in soil samples. Discuss the measures taken in the report.

Comment 3

In Section 4.5 (Collection and Management of Investigation Derived Waste), the Permittee states, "[d]rill 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." The waste containers must be clearly labeled with the date and material(s) filled if stored on site in accordance with RCRA Permit Section IV.J.2.m (Collection and Management of Investigation Derived Waste). The containers must be removed from the site and properly disposed within 90 days in accordance with 40CFR §262.34 (Accumulation Time), if the containers contain hazardous waste.

Comment 4

In Section 4.5 (Collection and Management of Investigation Derived Waste), the Permittee states, "[f]ield equipment requiring calibration will be calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures..." It is not clear why the statement is included in Section 4.5 because it is not relevant to the discussion of IDW. The statement may be more appropriately included in other sections (e.g., Section 4.6). No revision required.

This approval is based on the information presented in the document as it relates to the objectives of the work identified by NMED at the time of review. Approval of this document does not constitute agreement with all information or every statement presented in the document.

If you have questions regarding this Approval with Modifications, please contact Kristen Van Horn of my staff at 505-476-6046.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: K. Van Horn, NMED HWB
D. Cobrain, NMED HWB
M. Suzuki, NMED HWB
C. Chavez, OCD
L. King, EPA Region 6 (6LCRRC)
B. Moore, WRG

File: Reading File and WRG 2019 File
HWB-WRG-19-015

Marathon Petroleum Company LP

August 30, 2019

Mr. John E. Kieling, Chief
New Mexico Environment Department 2905
Rodeo Park Drive East, Bldg. 1
Santa Fe, NM 87SOS-6303

RE: Work Plan for Installation of Monitoring Wells per Disapproval
Annual Groundwater Monitoring Report Gallup Refinery - 2017
Marathon Petroleum Company LP, Gallup Refinery
(dba Western Refining Southwest, Inc.)
EPA ID# NMD000333211
HWB-WRG-18-014

Dear Mr. Kieling:

Marathon Petroleum Company LP (dba Western Refining Southwest, Inc.) Gallup Refinery is submitting the enclosed Work Plan in response to New Mexico Environment Department (NMED) comments No. 27 and 28 (dated March 21, 2019) on the referenced Groundwater Monitoring Report. Enclosed you will find two copies of the Work Plan and CD with an electronic copy of the Work Plan. If there are any questions, please contact Brian Moore at 505-726-9745.

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,
Marathon Petroleum Company LP, Gallup Refinery

Robert S Hanks

Robert S. Hanks
Refinery General Manager

Enclosure

cc K. Van Horn NMED
C. Chavez NMOCD
B. Moore Marathon Gallup Refinery

NMED Comment 27:
In Section 6.3.1, *Observation Wells, OW-13, OW-14, OW-29, OW-30, OW-50, OW-52, OW-53, OW-54, OW-55, and OW-56,* page 35, the Permittee states, "a low concentration of MTBE was detected in both wells [OW-50 and OW-52] in [the] 2016 and 2017 annual groundwater sampling events (Tables 8.5 and 8.5.1)." According to Table 8.5, the MTBE concentrations in the samples collected from wells OW-50 and OW-52 are consistently increasing. MTBE plume appears to be migrating in all directions including north of well OW-52. However, there is no sentinel monitoring well north of OW-52 to define the northern extent of the MTBE plume. Submit a work plan to install a sentinel well for MTBE plume north of well OW-52.

MPC Response 27:
No revision to the Report required. The requested work plan will be submitted no later than August 30, 2019.

NMED Comment 28:
In Section 6.3.1, *Observation Wells, OW-13, OW-14, OW-29, OW-30, OW-50, OW-52, OW-53, OW-54, OW-55, and OW-56,* page 35, the Permittee states, "[i]n OW-56 there were no detectable concentrations of benzene and MTBE that exceeded the applicable standards." However, according to the *Investigation Report North Drainage Ditch and OW-29 and OW-30 Areas,* dated August 2018, temporary well NDD-11 was installed approximately 600 feet northwest of well OW-56 along the Roger's Ditch; the benzene concentration in a groundwater sample collected from the temporary well was recorded as 8.2 mg/L, exceeding the benzene screening level of 0.005 mg/L. Since well OW-56 has not contained benzene and is located upgradient from temporary well NDD-11, the source of contaminants detected in temporary well NDD-11 may not be from a directly upgradient source. The detected benzene in temporary well NDD-11 may have originated from the vicinity of wells RW-5 and RW-6, where SPH was detected in 2017. SPH may be migrating from the vicinity of wells RW-5 and RW-6. Investigate the extent of the SPH plume north of wells RW-5 and RW-6. Submit a work plan to install a well north of wells RW-5 and RW-6 in the vicinity of well OW-12, screened in the Chinle/Alluvium interface, to delineate the extent of SPH plume.

MPC Response 28:
No revision to the Report required. The requested work plan will be submitted no later than August 30, 2019

Work Plan for Installation of Monitoring Wells per 2017 Annual Groundwater Report Comments

Marathon Petroleum Company LP

Gallup Refinery
Marathon Petroleum Company, LP
Gallup, New Mexico

EPA ID# NMD000333211

AUGUST 2019

Scott Crouch
Senior Geologist

DiSorbo
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Appendices

List of Acronyms

benzene, toluene, ethylbenzene, and xylene (BTEX)
Code of Federal Regulations (CFR)
Contract Laboratory Program (CLP)
data quality objective (DQO)
diesel range organics (DRO)
dilution attenuation factor (DAF)
Environmental Protection Agency (EPA)
investigation derived waste (IDW)
Maximum Contaminant Level (MCL)
mean sea level (msl)
monitoring well (MW)
motor oil range organics (MRO)
methyl tert butyl ether (MTBE)
New Mexico Administrative Code (NMAC)
New Mexico Environment Department (NMED)
New Mexico Oil Conservation Division (NMOCD)
photoionization detector (PID)
polynuclear aromatic hydrocarbon (PAH)
polyvinyl chloride (PVC)
quality assurance/quality control (QA/QC)
Resource Conservation and Recovery Act (RCRA)
separate-phase hydrocarbon (SPH)
semi-volatile organic compound (SVOC)
Solid Waste Management Unit (SWMU)
total petroleum hydrocarbon (TPH)
toxicity characteristic leaching procedure (TCLP)
volatile organic compound (VOC)

Executive Summary

The Gallup Refinery, which is located 17 miles east of Gallup, New Mexico, has been in operation since the 1950s. Pursuant to the terms and conditions of the facility Resource Conservation and Recovery Act (RCRA) Post-Closure Care Permit and 20.4.1.500 New Mexico Administrative Code, this Work Plan has been prepared to address comments received on the 2017 Annual Groundwater Monitoring Report for the Gallup Refinery. In a Disapproval letter dated March 21, 2019, the New Mexico Environment Department (NMED) requested additional wells be installed pursuant to Comments No. 27 and 28. In response to these comments, two new monitoring wells will be installed. Soil and groundwater samples will be collected and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), Skinner List metals, cyanide, iron, and manganese.

Section 1
Introduction

The Gallup Refinery is located approximately 17 miles east of Gallup, New Mexico along the north side of Interstate Highway I-40 in McKinley County. The physical address is I-40, Exit #39 Jamestown, New Mexico 87347. The Gallup Refinery is located on 810 acres. Figure 1 presents the refinery location and the regional vicinity.

The Gallup Refinery generally processes crude oil from the Four Corners area transported to the facility by pipeline or tanker truck. Various process units are operated at the facility, including crude distillation, reforming, fluidized catalytic cracking, alkylation, sulfur recovery, merox treater, and hydrotreating. Current and past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, and residual fuel.

This Work Plan addresses requests for additional site monitoring wells in the NMED Disapproval letter dated March 19, 2019 on the 2017 Annual Groundwater Monitoring Report. The specific comment numbers in the March 19, 2019 letter are Nos. 27 and 28. The actions to address these comments are described below:

- Comment 27 - A new monitoring well is proposed to the north of OW-52; and
- Comment 28 – A new monitoring well is proposed to the north of RW-5 and RW-6 in the vicinity of OW-12.

The investigation activities will be conducted in accordance with Section IV.H.5 of the Post-Closure Care Permit.

Section 2
Background

NMED's review of the 2017 Annual Groundwater Monitoring Report generated two requests for the installation of additional monitoring wells. The wells are basically located north of the main tank farm. There are no known potential sources in the immediate vicinity of where these wells will be located; however, as they are both potentially located down-gradient of the main tank farm it may be possible for contaminants sourced in the tank farm to migrate to these locations.

Section 3
Site Conditions

3.1 Surface Conditions

Site topographic features include high ground in the southeast gradually decreasing to a lowland fluvial plain to the northwest. Elevations on the refinery property range from 7,040 feet to 6,860 feet. Surface soils within most of the area of investigation are primarily Rehobeth silty clay loam. Rehobeth soil properties include a pH ranging from 8 to 9 standard units and salinity (naturally occurring and typically measuring up to approximately 8 mmhos/cm).

Regional surface water features include the refinery evaporation ponds and a number of small ponds (one cattle water pond and two small unnamed spring fed ponds). The site is located in the Puerco River Valley, north of the Zuni Uplift with overland flows directed northward to the tributaries of the Puerco River. The Puerco River continues to the west to the confluence with the Little Colorado River. The South Fork of the Puerco River is intermittent and retains flow only during and immediately following precipitation events.

3.2 Subsurface Conditions

The shallow subsurface soils consist of fluvial and alluvial deposits comprised of clay and silt with minor inter-bedded sand layers. Very low permeability bedrock (e.g., claystones and siltstones) underlie the surface soils and effectively form an aquitard. The Chinle Group, which is Upper Triassic, crops out over a large area on the southern margin of the San Juan Basin. The uppermost recognized local Formation is the Petrified Forest Formation and the Sonsela Sandstone Bed is the uppermost recognized regional aquifer. Aquifer test of the Sonsela Bed northeast of Prewitt indicated a transmissivity of greater than 100 ft^2/day (Stone and others, 1983). The Sonsela Sandstone's highest point occurs southeast of the site and slopes downward to the northwest as it passes under the refinery. The Sonsela Sandstone forms a water-bearing reservoir with artesian conditions throughout the central and western portions of the refinery property.

The diverse properties and complex, irregular stratigraphy of the surface soils across the site cause a wide range of hydraulic conductivity ranging from less than 10^{-2} cm/sec for gravel like sands immediately overlying the Petrified Forest Formation to 10^{-8} cm/sec in the clay soils located near the surface (Western, 2009). Generally, shallow groundwater at the refinery follows the upper contact of

the Petrified Forest Formation with prevailing flow from the southeast to the northwest, although localized areas may have varying flow directions (Figure 2).

Section 4
Scope of Services

The new monitoring wells will be installed pursuant Section IV.K. of the RCRA Post-Closure Care Permit. This includes two new wells to monitor groundwater conditions down-gradient refinery tank farm. The location specific activities are discussed further below. The well installation will commence upon approval of this work plan by NMED.

4.1 New Well Adjacent to OW-12

An investigation of groundwater conditions in the area north of RW-5 and RW-6 and south of the North Drainage Ditch is proposed to determine if separate-phase hydrocarbon (SPH) is present north of the tank farm (Figure 3). The well will be screened in the upper-most saturated interval(s) with a screen length of 20 feet to help ensure the top of the well screen is set above the potentiometric surface.

4.2 New Well North of OW-52

Concentrations of MTBE have been slowly increasing in groundwater samples collected at monitoring wells OW-50 and OW-52 since 2016 as shown in Table 1. Based on the reported concentrations through the end of 2018, there have not been any exceedances of the groundwater screening level for MTBE. However, the New Mexico Environment Department is requiring an additional monitoring well to the north of OW-52 to monitor concentrations of MTBE.

The well will be screened in the upper-most saturated interval(s) with a screen length of 20 feet. Based on conditions observed in OW-52, it is likely the water level in the new well will rise above the top of the well screen. During drilling of OW-52, water was not encountered until a depth of 70 feet, while the current measured water level is approximately 13 to 14 feet below ground level (bgl). The boring was advanced to a total depth of 79 feet with the screen placed from 64 to 79 feet bgl. A copy of the boring and well completion log is included in Appendix A. The proposed location for the new well is shown on Figure 3.

4.3 Soil Sample Field Screening and Logging

Samples obtained from the soil borings will be screened in the field on 2.0-foot intervals for evidence of contaminants. Field screening results will be recorded on the exploratory boring logs. Field

screening results will be used to aid in the possible selection of soil samples for laboratory analysis. The primary screening methods include: (1) visual examination, (2) olfactory examination, and (3) headspace vapor screening for volatile organic compounds.

Visual screening includes examination of soil samples for evidence of staining caused by petroleum-related compounds 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 or test pit log for each sample.

The monitoring instruments will be calibrated each day to the manufacturer's standard for instrument operation. A photoionization detector (PID) equipped with a 10.6 or higher electron volt (eV) lamp or a combustible gas indicator may 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, therefore, all conditions capable of influencing the results of field screening will be recorded on the field logs.

Soil samples will be collected for laboratory analysis from zones for which screening indicates the potential for site impacts. In addition, soil samples will be collected at the groundwater interface and termination depths of all soil borings. 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.

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; and
- Equipment blanks will be collected from all sampling apparatus at a frequency of one per day.

4.3.1 Drilling Activities

Soil borings will be drilled using hollow-stem augers. 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 the 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. Slotted (0.01 inch) PVC well screen will be placed at the bottom of the borings and 10/20 sand filter pack will be installed to two feet over the top of the well screen. Where possible, aboveground surface completions will be used; with in-ground vaults only used in areas where an aboveground completion is not practicable.

4.4 Groundwater Sample Collection

Groundwater samples shall initially be obtained from newly installed monitoring wells between ten and 30 days after completion of well development. Well development and purging prior to sample collection will be in accordance with procedures described in Appendix C. Prior to collection of groundwater samples for laboratory analyses, the fluid levels and the total depths of each well will be measured.

Groundwater samples will be collected from the new monitoring wells within 24 hours of the completion of well purging using 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, laboratory-prepared containers provided by the analytical laboratory. Sample handling and chain-of-custody procedures will be in accordance with the procedures presented below in Section 4.4.1.

Groundwater samples intended for metals analysis will be submitted to the laboratory as both total and dissolved 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;
- 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; and
- 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 groundwater samples to be analyzed for VOCs.

4.4.1 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.

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.

4.5 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 characterized prior to disposal unless it is disposed in the refinery wastewater treatment system upstream of the API Separator. An IDW management plan is included as Appendix B.

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.

4.6 Documentation of Field Activities

Daily field activities, including observations and field procedures, will be recorded in a field log book. 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.

4.7 Chemical Analyses

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

Groundwater and soil samples will be analyzed by the following methods:

- SW-846 Method 8260 for volatile organic compounds;
- SW-846 Method 8270 for 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 Skinner List metals and iron and manganese using the indicated analytical methods shown. The groundwater samples collected for metals analysis will be analyzed for total and dissolved concentrations.

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
Iron	SW-846 method 6010/6020

Manganese	SW-846 method 6010/6020

Groundwater field measurements will be obtained for pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, turbidity, and temperature.

4.8 Data Quality Objectives

The Data Quality Objectives (DQOs) were developed to ensure that newly collected data are of sufficient quality and quantity to address the project goals, including Quality Assurance/Quality Control (QA/QC) issues (EPA, 2006). The project goals are established 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 and groundwater to determine if there has been a release of contaminants.

The quantity of data is location specific and is based on the historical operations at individual locations. 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. In addition, sample collection techniques (e.g., field

monitoring and decontamination of sampling equipment) will be utilized to help ensure representative results.

Completeness is defined as the percentage of measurements taken that are actually valid measurements, considering field QA and laboratory QC problems. EPA Contract Laboratory Program (CLP) data has been found to be 80-85% complete on a nationwide basis and this has been extrapolated to indicate that Level III, IV, and V analytical techniques will generate data that are approximately 80% complete (EPA, 1987). As an overall project goal, the completeness goal is 85%; however, some samples may be critical based on location or field screening results and thus a sample-by-sample evaluation will be performed to determine if the completeness goals have been obtained.

Comparability is a qualitative parameter, which expresses the confidence with which one data set can be compared to another. Industry standard sample collection techniques and routine EPA analytical methods will be utilized to help ensure data are comparable to historical and future data. Analytical results will be reported in appropriate units for comparison to historical data and cleanup levels.

Section 5
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, 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.

NMED, 2019, Risk Assessment Guidance for Site Investigation and Remediation, New Mexico Environment Department.

Stone, W.J., Lyford, F.P., Frenzel, P.F., Mizel, N.H., and Padgett, E.T., 1983, Hydrogeology and Water Resources of San Juan Basin, New Mexico; Hydrogeologic Report 6, New Mexico Bureau of Mines and Mineral Resources, p. 70.

Western, 2009, Facility-wide Groundwater Monitoring Plan: Gallup Refinery, p. 97.

Tables

Table 1 Groundwater Concentrations

TABLE 1

Groundwater Concentrations

STANDARDS			PARAMETERS				
			Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Total Xylenes (mg/L)	MTBE (mg/L)
WQCC 20 NMAC 6.2.3103 (DEC 2018)			**0.005**	**1**	**0.7**	**0.62**	**0.1**
40 CFR 141.61 MCL			0.005	1.0	0.7	10	NE
NMED TAP WATER (MAR 2019)			0.00455	1.09	0.0149	0.193	0.143
EPA RSL for Tap Water (NOV 2018)			0.00046	1.1	0.0015	0.19	0.014
WELL ID	**DATE SAMPLED**	**METHOD**					
OW-50	11/07/18	8260B	<0.001	<0.001	<0.001	<0.0015	0.01
	09/17/18	8260B	<0.001	<0.001	<0.001	<0.0015	0.01
	09/11/17	8260B	<0.001	<0.001	<0.001	<0.0015	0.0059
	09/09/16	8260B	<0.001	<0.001	<0.001	<0.0015	0.00024
	08/11/15	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	09/15/14	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	09/04/13 [1]	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	11/27/12	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	08/23/12	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	06/13/12	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	03/22/12	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	12/15/11	8260B	<0.005	<0.005	<0.005	<0.0075	<0.005
	10/25/11	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	06/20/11	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	03/01/11	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	11/09/10	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	09/27/10	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	06/01/10	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	03/16/10	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
OW-52	11/07/18	8260B	<0.001	<0.001	<0.001	<0.0015	0.0015
	09/17/18	8260B	<0.001	<0.001	<0.001	<0.0015	0.001
	09/11/17	8260B	<0.001	<0.001	<0.001	<0.0015	0.001
	09/09/16	8260B	<0.001	<0.001	<0.001	<0.0015	0.00046
	08/11/15	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	09/15/14	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	09/04/13 [1]	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	11/27/12	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	08/23/12	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	06/13/12	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	03/22/12	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	12/13/11	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	10/25/11	8021B	<0.001	<0.001	<0.001	<0.0015	<0.001
	06/20/11	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	03/01/11	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	11/09/10	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	09/27/10	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	06/01/10	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001
	03/16/10	8260B	<0.001	<0.001	<0.001	<0.0015	<0.001

Figures

Map Source: DeLorme Street Atlas USA 2007 Plus.

N

0 5
SCALE IN MILES

WESTERN REFINING
GALLUP REFINERY

Mexican Springs
Coyote Canyon
Defiance
Window Rock
Window Rock
Michaels
Gamerco
Gallup
Rehoboth
Church Rock Village
Mentmore
Gallup Municipal
Fort Wingate
Crownpoint
Crownpoint
Smith Lake
Continental Divide
Thoreau
Prewitt
Lupton
Vanderwagen
Bluewater Lake
Bluewater
Mt Sedgwick
Grants-Milan
Ramah
491
371
57
66
40
602
564
118
53
412

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE:07/13/14 | FILE:WestRef-B198

FIGURE 1
SITE LOCATION MAP
GALLUP REFINERY

DiSorbo
Environmental Consulting Firm
8501 N. MoPac Expy.
Suite 300
Austin, Texas 78759

Aerial Map Source: Google Map, 03/18/2016.

0 240
SCALE IN FEET

NEW MEXICO

GALLUP SITE LOCATION

LEGEND

NDD-1	SOIL BORING LOCATION AND IDENTIFICATION NUMBER
NDD-1	TEMPORARY MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
OW-14	ALLUVIUM / CHINLE GP MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
OW-13	SONSELA MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
6900	CONTOUR OF POTENTIOMETRIC SURFACE DECEMBER 2017
6900.65	POTENTIOMETRIC SURFACE DECEMBER 2017
*	NOT USED TO CONTOUR

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE: 10/21/18 | FILE:WestRef-dB200

FIGURE 2
CHINLE / ALLUVIAL INTERFACE
POTENTIOMETRIC MAP

DiSorbo
Environmental Consulting Firm
8501 N. MoPac Expy.
Suite 300
Austin, Texas 78759

Aerial Map Source: Google Map, 03/18/2016.

0 300
SCALE IN FEET

NEW MEXICO

GALLUP SITE LOCATION

LEGEND

- PROPOSED WELL LOCATION
- NDD-1 — TEMPORARY MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- OW-14 — ALLUVIUM / CHINLE GP MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- OW-13 — SONSELA MONITORING WELL LOCATION AND IDENTIFICATION NUMBER

MARATHON PETROLEUM COMPANY
GALLUP REFINERY

PROJ. NO.: Marathon | DATE: 08/21/19 | FILE: Mathon-dB227

FIGURE 3
PROPOSED MONITORING WELL LOCATIONS

DiSorbo Environmental Consulting Firm
8501 N. MoPac Expy.
Suite 300
Austin, Texas 78759

Appendix A

Boring Logs

PROJECT Gallup Refinery Monitoring Wells
Gallup, New Mexico

DATE 10/5/09

AMEC PROJECT NO. 9517-000057

BORING NO. MW-1A (OW-52)

LOCATION See Site Plan
RIG TYPE CME-75
BORING TYPE HSA
SURFACE ELEV. 6823.00
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows/ft. 140 lb. 30" free-fall drop hammer	Dry Density lbs. per cubic foot	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SM		**SILTY SAND**, fine, reddish-brown, dry (0' - 3')
5								CH		**CLAY**, some silt, high plasticity, reddish-brown, dry (5' - 20')
10										
15										
20										some silt, dry (20' - 30')
25										
30										damp @ (30' - 40')
35										
40										**CLAY**, trace medium gravel, reddish-brown, high to medium plasticity, dry (40' - 50')
45										
50										

GEOTECH_BH 9517-057 GALLUP REFINERY GPJ GINT STD US JANNEY GDT 9/12/11

GROUNDWATER

	DEPTH	HOUR	DATE
▽	72.0		
▼			

SAMPLE TYPE
A-Auger cuttings, NR-No Recovery
BS-Bulk Sample
S-2" O.D. 1 38" I.D. tube sample
U-3" O.D. 2 42" I.D. tube sample
T-3" O.D. thin-walled Shelby tube
R-Ring Sample

PROJECT Gallup Refinery Monitoring Wells
Gallup, New Mexico
DATE 10/5/09
AMEC PROJECT NO. 9517-000057

BORING NO. MW-1A (OW-52)
LOCATION See Site Plan
RIG TYPE CME-75
BORING TYPE HSA
SURFACE ELEV. 6823.00
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows/ft. 140 lb. 30" free-fall drop hammer	Dry Density lbs. per cubic foot	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
50										
55										
60										**CLAY**< (shale), with calcareous cementation nodules, reddish-brown, dry (60' - 68')
65										**CLAY**< (shale), with calcareous cementation nodules, reddish-brown, dry (65' - 68")
70 ▽									split spoon sample	**SHALE**, reddish-brown, calcareous cementation nodules, dry (BGS 68' - 70') fine to medium silty sand, fine gravel, gray, reddish-brown, wet at 70' bgs (70' - 72' 5") **SILTY SAND**, gravel, calcareous cementation nodules, wet (72' 5" - 79')
75										
80										Stopped boring at 79'
85										
90										
95										
100										

GEOTECH_BH 9517-057 GALLUP REFINERY GPJ GINT STD US JANNEY GDT 9/12/11

GROUNDWATER

	DEPTH	HOUR	DATE
▽	72.0		
▼			

SAMPLE TYPE
A-Auger cuttings, NR-No Recovery
BS-Bulk Sample
S-2" O.D. 1 38" I.D. tube sample
U-3" O.D. 2.42" I.D. tube sample
T-3" O.D. thin-walled Shelby tube
R-Ring Sample

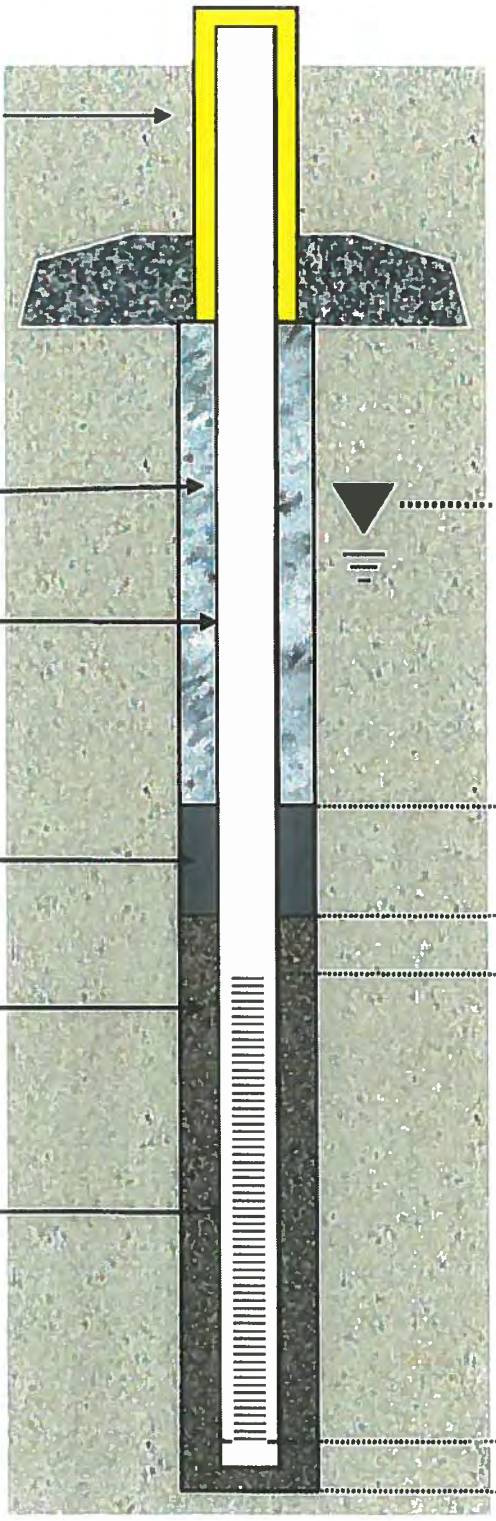
Project Name: Western Refining	
Project Number: 9-517-000057	

WELL CONSTRUCTION DIAGRAM

WELL NUMBER: OW-52 (MW-1A)
LOCATION: Western Refining Gallup, NM
DRILL METHODS: Air Rotary/HSA

DIAMETER: 2" ID
DATE INSTALLED: 10-06-09
DRILL COMPANY: GSI

NOT TO SCALE



Approximate Depth Below Ground Surface (feet)

ABOVE GROUND MONUMENT
3' Above Ground Surface w/ J-plug & locking lid

BACKFILL
TYPE: Expansive Grout
(Portland cement/bentonite slurry)

Static Water Depth 16.75

RISER
MATERIAL: SCH 40 PVC
DIAMETER: 2" ID

58.0

Pure Bentonite
Thickness: 4.0 '

62.0

64.0

SAND PACK
TYPE: 10/20 Silica Sand

SCREEN
MATERIAL: SCH 40 PVC
DIAMETER: 2" ID
SLOT: 0.010 "

79.0

79.5

Appendix B

Investigation Derived Waste Management Plan

Investigation Derived Waste (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. The IDW may be characterized for disposal based on the known or suspected contaminants potentially present in the waste.

A dedicated decontamination area will be setup prior to any sample collection activities. The decontamination pad will be constructed 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 pad 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 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 VOCs, TPH and polynuclear aromatic hydrocarbons (PAHs).

Appendix C

Well Development and Purging Procedures

Well Development

All monitoring wells will be developed to create an effective filter pack around the well screen, correct damage to the formation caused by drilling, remove fine particles from the formation near the borehole, and assist in restoring the natural water quality of the aquifer in the vicinity of the well. Newly installed monitoring wells will not be developed for at least 48 hours after the surface pad and outer protective casing are installed. This will allow sufficient time for the well materials to cure before the development procedures are initiated. A new monitoring well will be developed until the column of water in the well is free of visible sediment, and the pH, temperature, turbidity, and specific conductivity have stabilized. In most cases, the above requirements can be satisfied. However, in some cases, the pH, temperature, and specific conductivity may stabilize but the water remains turbid. In this case, continuous flushing may be necessary to complete the well development. If the well is pumped dry, the water level will be allowed to sufficiently recover before the next development period is initiated. The common methods used for developing wells include:

(1) pumping and over-pumping;

(2) backwashing;

(3) surging (with a surge block);

(4) bailing;

(5) jetting; and

(6) airlift pumping.

These development procedures will be used, either individually or in combination, to achieve the most effective well development. However, the most favorable well development methods include pumping, over-pumping, bailing, surging, or a combination of these methods. Well development methods and equipment that alter the chemical composition of the groundwater will not be used.

Development methods that involve adding water or other fluids to the well or borehole, or that use air to accomplish well development will be avoided, if possible. Approval will be obtained from the NMED prior to introducing air, water, or other fluids into the well for the purpose of well development. If water is introduced to a borehole during well drilling and completion, then the same or greater volume of water will be removed from the well during development. In addition, the volume of water withdrawn from a well during development will be recorded, and best efforts will be used to avoid pumping wells dry during development activities.

Well Purging

All zones in each monitoring well will be purged by removing groundwater prior to sampling and in order to ensure that formation water is being sampled. Purge volumes will be determined by monitoring, at a minimum, groundwater pH, specific conductance, dissolved oxygen concentrations, turbidity, redox potential, and temperature during purging of volumes and at measurement intervals of not less than ¼ the pre-purge well volume. The groundwater quality parameters and fluid levels will be measured using a YSI Professional Plus Multiparameter Meter, YSI Water Quality Sonde, Hach Portable Turbidimeter, and a Geotech Interface Meter. The volume of groundwater purged, the instruments used, and the readings obtained at each interval will be recorded on the field monitoring log. In general, water samples may be obtained from the well after the measured parameters of the purge water have stabilized to within ten percent for three consecutive measurements. 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). If necessary, a written request for a variance from the described methods of well purging for individual wells may be submitted to NMED no later than 90 days prior to scheduled sampling activities.

Marathon Petroleum Company LP

August 23, 2019

Mr. John E. Kieling, Chief
New Mexico Environmental Department
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, NM 87SOS-6303

RE: Second Response to Comment No. 39 on 2017 Annual Groundwater Monitoring Report (Dated March 221, 2009)
Marathon Petroleum Company LP, Gallup Refinery
(dba Western Refining Southwest, Inc.)
EPA ID# NMD000333211
HWB-WRG-18-014

Dear Mr. Kieling:

Marathon Petroleum Company LP (dba Western Refining Southwest, Inc.) Gallup Refinery is submitting the enclosed responses to your comments dated June 4, 2019 on the referenced Annual Groundwater Monitoring Report. If there are any questions, please call Brian Moore at 505-726-9745.

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,
Marathon Petroleum Company LP, Gallup Refinery

Robert S Hanks

Robert S. Hanks
Refinery General Manager

Enclosure

cc K. Van Horn NMED
C. Chavez NMOCD
B. Moore Marathon Gallup Refinery

RESPONSE TO COMMENTS
June 4, 2019 Comments on Response to Comment No. 39 on 2017 Annual Ground Water Monitoring Report (Dated March 27, 2019)

NMED Comment 1:
NMED's Comment 39 requires the Permittee to submit a work plan for an investigation regarding the source of separate petroleum hydrocarbon (SPH) in well NAPIS-1. The Response states, "[a] work plan was not prepared for review by the agencies as time was critical to identify any on-going releases." The Permittee implemented emergency investigations to identify the source of an active SPH leak; however, the source was not identified through the investigations. As part of the voluntary investigations, six soil borings were drilled within and near the tank farm to identify the presence of SPH, five of which were later completed as permanent monitoring wells (OW-61 through OW-65). The Permittee should have communicated with NMED prior to the installation of these borings and wells. The Permittee must submit a report that documents the locations of excavations, underground piping and provide the soil and groundwater analytical results, boring logs and well construction diagrams associated with the emergency response to NMED no later than **August 1, 2019.**

MPC Response 1:
We have reviewed site records to locate the requested information. You will find attached a map depicting the locations of the excavations, a map of underground piping in the tank farm, groundwater analytical results for samples collected from the new wells (OW-61 through OW-65), and boring/well construction logs for the new wells.

The discharge of hydrocarbon from the drain line to the STP-1 French drain was discovered on February 6, 2018. In an effort to find the source of the hydrocarbon, on February 8, 2018 boreholes and excavations were completed near STP-1, with additional excavations conducted through February 10, 2018 further into the tank farm. The locations of the excavations are shown on the attached maps and the individual excavations are numbered. The first three boreholes (BH#1 - BH#3) were conducted near the southeast corner and south side of STP-1, with hydrocarbons confirmed in the shallow subsurface near the southeast corner of STP-1. The boreholes were hydroexcavated and although depths were not recorded, it is estimated that they reached depths of 6 to 8 feet. Excavations #4, #5, and #8 were completed with a backhoe along the west end of the tank farm and no evidence of hydrocarbons was encountered at these locations, but groundwater was not reached in these excavations. Excavations #6 and #7 were completed southeast of the flare and north of the crude oil tanks. No evidence of hydrocarbons was identified in excavations #6 and #7. Excavations #9 and #10 were completed between the wastewater treatment plant and STP-1. Hydrocarbons were observed in excavation #9. Excavation #11 was completed northwest of Tank 571, but no hydrocarbons were identified; the excavation did not reach groundwater. The SD locations on the map are storm drains.

In addition to the excavations completed using either a backhoe or hydroexcavation, smaller holes were hand excavated to the east of STP-1 along the natural drainage pathway, where hydrocarbons were encountered at shallow depths (e.g., 3 feet). Hand excavations were also completed on the northwest sides of Tanks 569, 570, 571, and 572, but no evidence of a release was found.

During this same general time period, fluid levels were monitored in Tanks 570, 571, and 345 to determine if there was any evidence of loss from these tanks. Based on the fluid levels, no apparent leaks were detected. As requested, a map of the underground piping is attached. Most all of the product transfer piping is aboveground with limited exceptions where the pipeline passes through the tank dike walls. Otherwise, only the oily water drain lines are belowground in this area.

Due to the limited depths that could be reached with the backhoe and through hydroexcavation, starting on March 5, 2019 six deep soil borings were completed across the tank farm and to the north of STP-1. These locations are shown on the attached Well Location Map and are identified as SB-FD-1, OW-61, OW-62, OW-63, OW-64, and OW-65. Boring/well completion logs are attached. The boring identified as SB-FD-1, which is located north of STP-1, was drilled to a depth of 38 feet and terminated in a silty clay interval. Based on visual observations and field screening with a photoionization detector (PID), there were no indications of impacts from petroleum hydrocarbons. The boring was plugged after no water was observed after two days. OW-61 was drilled on the south side of the tank farm to a depth of 32 feet. Significant hydrocarbon impacts were observed at a depth of 10 feet extending through 26 feet. Well screen was placed from 8 feet to 28 feet below ground surface (bgs). OW-62 was drilled to a depth of 40 feet at a location to the north of the wastewater treatment plant and southeast of STP-1. It is located on the south side of an apparent historical drainage feature that trends east-west and extends to STP-1. A petroleum odor and elevated PID readings were observed in the 18-20 foot sample interval. The well screen was set from 8 feet to 28 feet bgs. OW-63 was drilled on the north side of the tank farm to a depth of 32 feet bgs. Elevated PID readings were observed from 18 to 24 feet bgs. Well screen was set from 9 to 29 feet bgs. OW-64 was drilled on the west end of the tank farm to a depth of 44 feet. Elevated PID readings and a faint hydrocarbon odor were observed primarily from 10 feet to 24 feet bgs. The well screen was set from 4 to 24 feet bgs. Well OW-65 was drilled in the center of the tank farm to a depth of 40 feet. Elevated PID readings and a hydrocarbon odor were observed from 14 feet to the depth of saturation at 20 feet bgs. The well screen was set at 17 feet to 37 feet bgs. The fluid levels in the wells were measured on March 21, 2018 and are shown below.

Well Number	date	Depth to Separate Phase Hydrocarbon (ft BTOC)	Depth to Groundwater (ft BTOC)	PSH Thickness	Total Depth (ft BTOC)
OW-61	3/21/2018	16.71	16.80	0.09	31.68
OW-62	3/21/2018	ND	22.93	0.00	31.57
OW-63	3/21/2018	ND	20.19	0.00	32.18
OW-64	3/21/2018	ND	7.72	0.00	27.62
OW-65	3/21/2018	23.40	23.60	0.20	41.66

The top of casing is approximately 3 feet above ground level.
measured 3-21-2018

The new wells were added to the routine quarterly groundwater sampling event in April 2018. Groundwater analyses for the second, third and fourth quarters of 2018 are summarized in the attached tables. A table of the associated fluid levels measurements during the 2018 quarterly sampling events is attached. No soil samples were collected during installation of these borings.

The following items are attached, as noted above:

- Maps showing locations of excavations;
- Map showing location of underground piping;
- Map showing locations of new wells;

- Soil boring/well completion logs;
- Summary table of groundwater analyses; and
- Fluid level measurements.

NMED Comment 2:
The Response further states, "[w]e propose to postpone any further wells in this area pending the results of the nearby well proposed in the *Investigation Work Plan Up-Gradient MKTF Wells* (January 2019)." NMED's *Approval with Modifications for the Investigation Work Plan UpGradient MKTF Wells,* dated March 7, 2019, requires a response letter to be submitted by May 3, 2019. However, neither the response letter or extension request letter was submitted by the due date. The response letter must be submitted to NMED no later than **June 28, 2019.** In addition, the statement indicates that the field work proposed in the *Investigation Work Plan Up-Gradient MKTF Wells* has already been executed. The investigation report must include the recommendation to further investigate the source of active SPH leak in the area. The investigation report must be submitted to NMED no later than **October 1, 2019.**

MPC Response 2:
We acknowledge the comment and seek to clarify any confusion on implementation of the *Investigation Work Plan Up-Gradient MTKF Wells*. The subject field work was not executed at the time of the last submission and in fact is currently scheduled to start the week of August 5th, 2019. We had the field work scheduled for the week of August 5th, but the drill crew was directed to install new soil borings around Tank 570 instead to address a new concern of a possible leak from Tank 570. Marathon requests to extend the due date for the Up-Gradient MKTF Wells Investigation Report to January 31, 2020.

1. Incident Name: Offsite Underground Leak	2. Operational Period:	Date From: 2/9/2018	Date To: 2/10/2018
		Time From: 1800	Time To: 0600

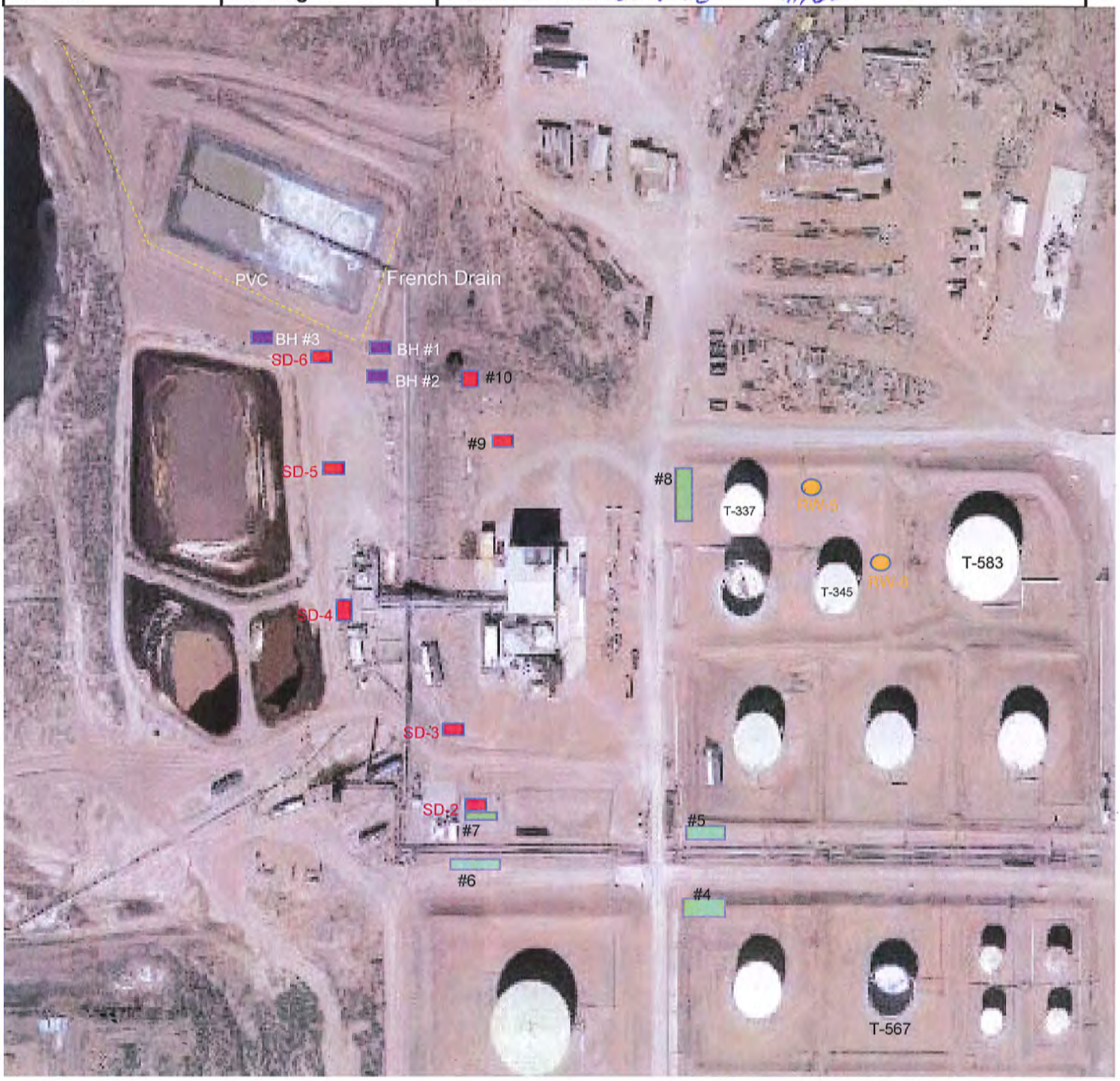
☐ ICS 205A ☐ Weather Forecast/Tides/Currents

☐ ICS 206

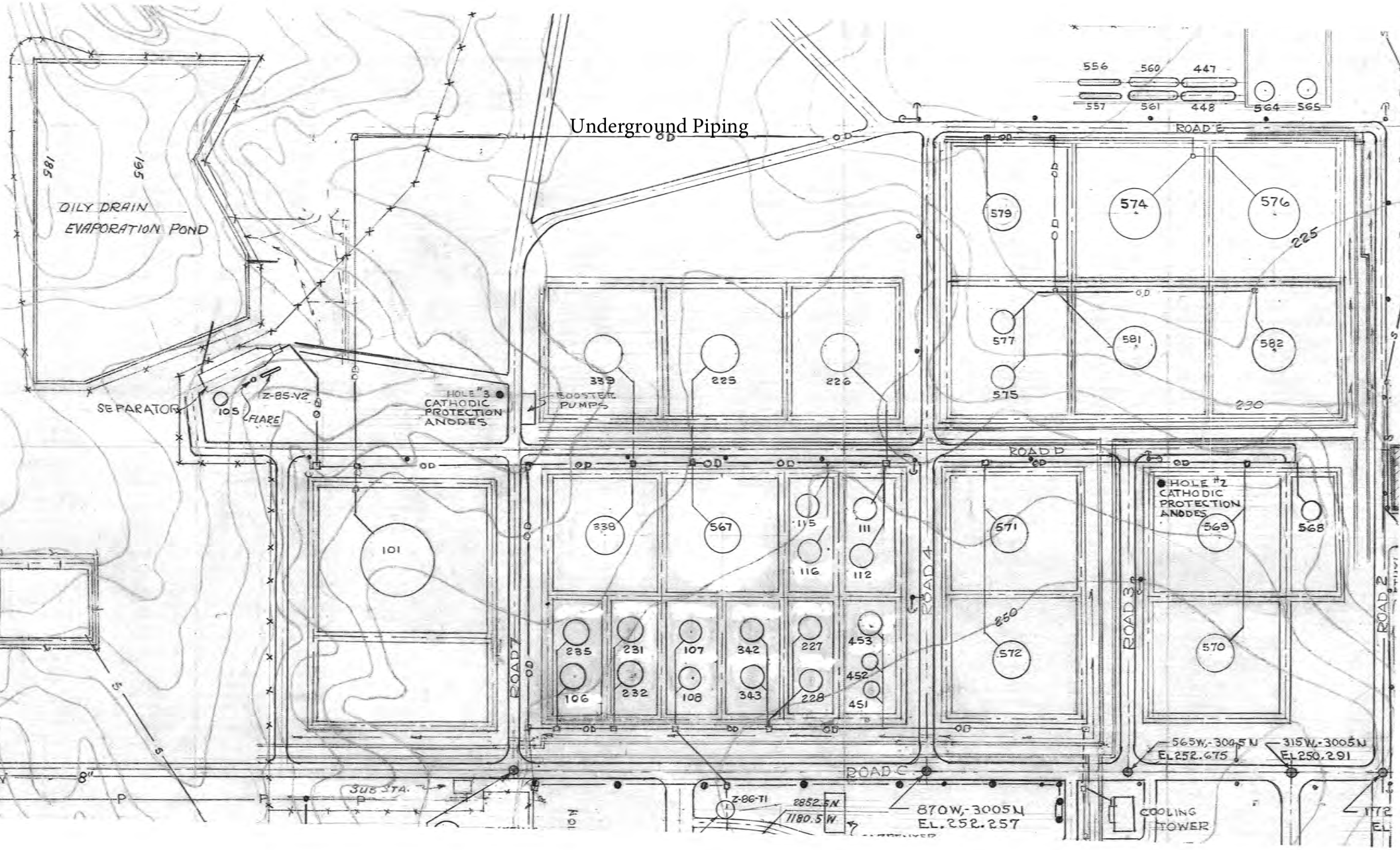
☐ _____

☐ _____

7. Prepared by:	Name: Jim Ward	Position/Title: Planner Coordinator	Signature:
8. Approved by Incident Commander:		Name: Frank Hevsne	Signature:
ICS 202	IAP Page	Date/Time: Date 2-9-18	4:10 PM




#11


Underground Piping
OILY DRAIN
EVAPORATION POND
SEPARATOR
105
Z-85-V2
FLARE
HOLE #3
CATHODIC
PROTECTION
ANODES
BOOSTER
PUMPS
HOLE #2
CATHODIC
PROTECTION
ANODES
ROAD B
ROAD C
ROAD D
ROAD 2
ROAD 3
ROAD 4
ROAD 7
SUB STA.
Z-86-T1
565W,-3045N
EL252.675
315W,-3005N
EL250.291
870W,-3005N
EL.252.257
COOLING
TOWER
556
560
447
557
561
448
564
565
579
574
576
577
581
582
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225
230
339
225
226
338
567
115
116
111
112
571
572
850
569
568
570
101
235
106
231
232
107
108
342
343
227
228
453
452
451

Aerial Map Source: Google Map, 03/18/2016.

0 200
SCALE IN FEET

NEW MEXICO

GALLUP SITE LOCATION

LEGEND

OW-61 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE: 03/14/18 | FILE: WestRef-dB161

WELL LOCATION MAP

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Gallup Refinery - French Drain Release
WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow-Stem Augers
Sampling Method	: Split Spoon 2'
Comments	:
Total Depth	: 32'
Ground Water	: 18' BGL
Start Date	: 3-13-2018
Finish Date	: 3-13-2018

WELL NO. OW-61

(Sheet 1 of 2)

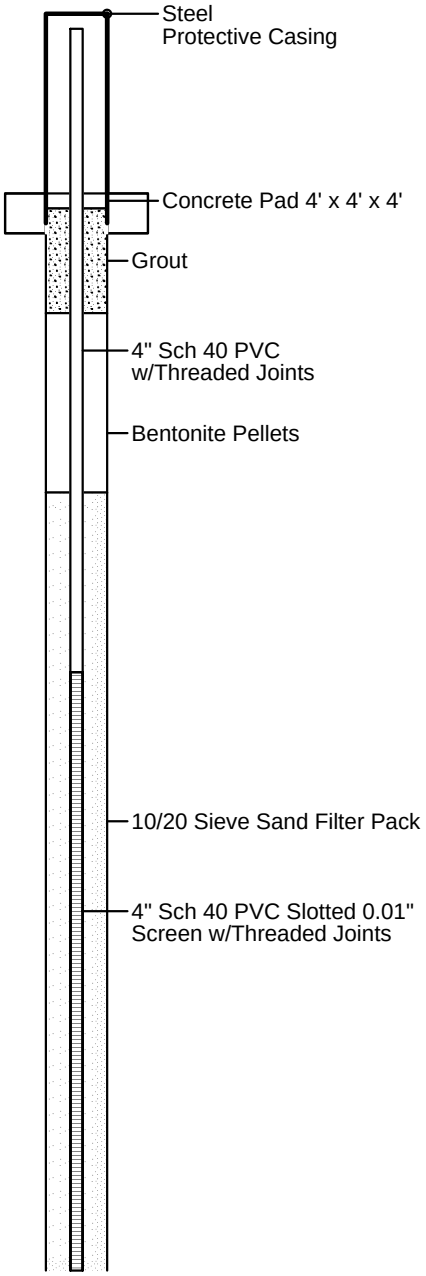
Elev., TOC (ft.msl)	: 6963.57
Elev., PAD (ft. msl)	: 6960.91
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1633887.74
E	: 2546702.36

Saturation
▼ Saturation

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
-2 to 0							
0 to 10					0		Hydroexcavated Location - Borehole open to 10' - no water
10	1563			ML	90		SANDY SILT, very fine, loose, moist, gravel present, brown, strong chemical odor,
12	869			SM	80		GRAVELLY SILTY SAND, fine, loose, moist, 20 mm gravel present, brown, strong odor,
14	1081			SM	70		GRAVELLY SILTY SAND, SIMILAR TO ABOVE (STA), very moist, tan and brown, strong odor,
16	1115	▼		SM	60		GRAVELLY SILTY SAND, STA, increase in gravel, large sandstone gravel in core, moist to very moist,very light tan, strong odor,
18							

Completion Results

OW-61



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Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow-Stem Augers
Sampling Method	: Split Spoon 2'
Comments	:
Total Depth	: 32'
Ground Water	: 18' BGL
Start Date	: 3-13-2018
Finish Date	: 3-13-2018

WELL NO. OW-61

(Sheet 2 of 2)

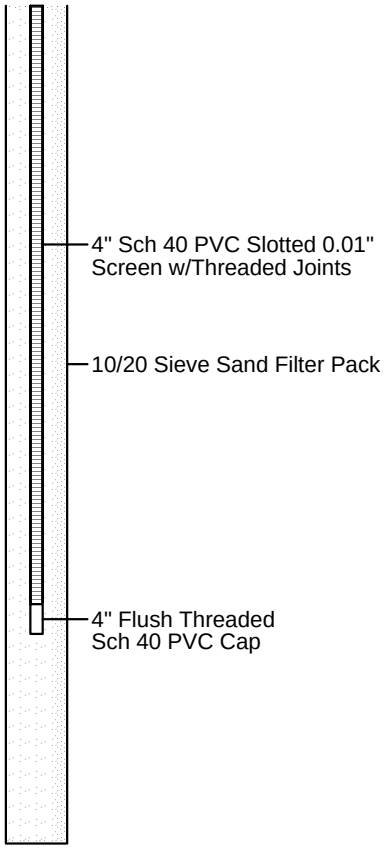
Elev., TOC (ft.msl)	: 6963.57
Elev., PAD (ft. msl)	: 6960.91
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1633887.74
E	: 2546702.36

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
18							
19	1702			SC	20		GRAVELLY CLAYEY SAND, fine to coarse grain sand with brown clay, soft, very damp gravel (10-20 mm), saturated at base,
20							
21	1269			SM	60		SILTY SAND, medium, loose, trace clay and gravel, saturated, dark brown, strong odor,
22				SM	60		SILTY SAND, STA, saturated,
23	1638			CL	60		GRAVELLY SANDY CLAY, low, soft, gravel throughout, damp to saturated in seams, brown, strong odor,
24							
25	1538			CL	50		GRAVELLY CLAY, low, firm, damp, dark blueish grey, strong odor,
26							
27	377			CL	40		GRAVELLY CLAY, STA, trace very fine grain sand, damp,very stiff, odor,
28							
29	298			CL	60		SILTY CLAY, low, very stiff, trace sand and very small gravel, damp, grey to light grey, odor,
30							
31	60.9			CL	70		SILTY CLAY, STA, damp, light grey and pink.
32							
33							
34							
35							
36							
37							
38							

Saturation
▼ Saturation

Completion Results

OW-61



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Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow-Stem Augers
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 40'
Ground Water	: Not Encountered
Start Date	: 03/15/2018
Finish Date	: 03/15/2018

WELL NO. OW-62

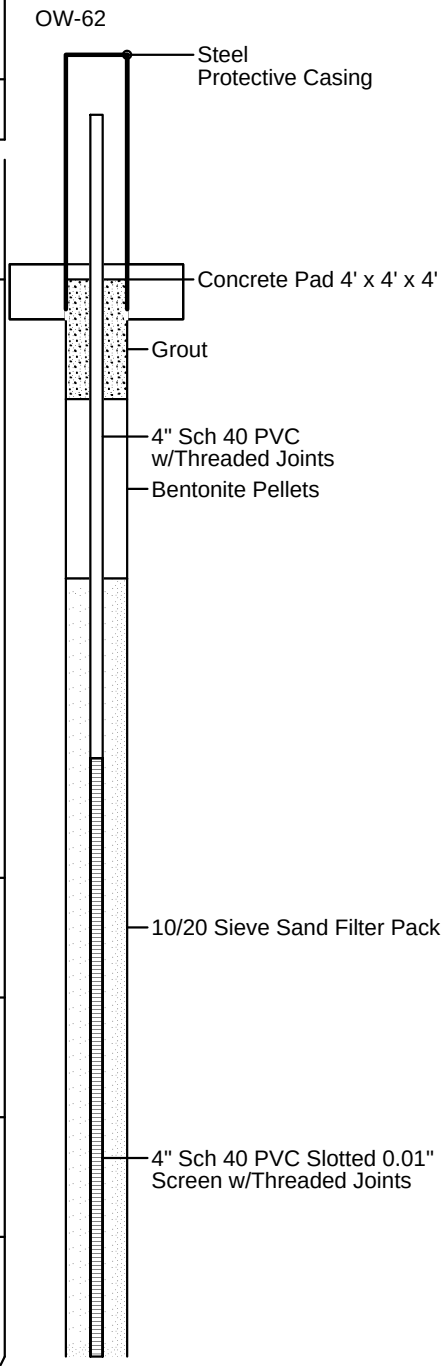
(Sheet 1 of 3)

Elev., TOC (ft.msl)	: 6937.36
Elev., PAD (ft. msl)	: 6934.73
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634866.14
E	: 2545914.00

Saturation
▼ Saturation

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Rec overy (%)	Sample	DESCRIPTION
-2 to 10							Hydroexcavated to 10' - Collapsed to 9' - no fluid,
10 – 11	0			ML	50		CLAYEY SILT, very fine, stiff, dry, crumbly, no odor, light brown,
12 – 13	0.1			CL	50		SILTY CLAY, SIMILAR TO ABOVE (STA), , increase in clay content,
14 – 15	0.3			CL	60		SANDY SILTY CLAY, low, firm, damp, very fine grain sand seams, brown, no odor,
16				CL	80		SANDY CLAY, low, firm, damp,brown, no odor,
17 – 18	0.3			GW	80		SANDY GRAVEL, 20 to10 mm gravel with coarse grain sand, loose, damp,brown, no odor,

Completion Results



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Gallup Refinery - French Drain Release
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Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow-Stem Augers
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 40'
Ground Water	: Not Encountered
Start Date	: 03/15/2018
Finish Date	: 03/15/2018

WELL NO. OW-62

(Sheet 2 of 3)

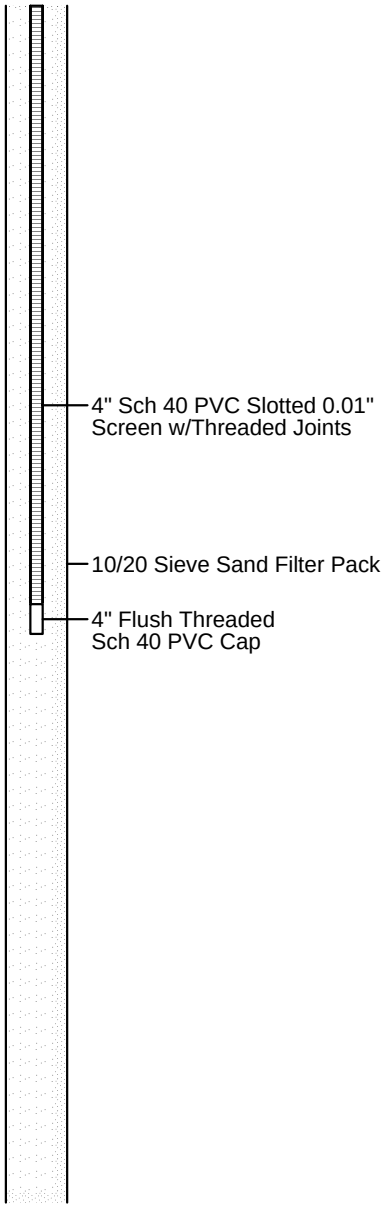
Elev., TOC (ft.msl)	: 6937.36
Elev., PAD (ft. msl)	: 6934.73
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634866.14
E	: 2545914.00

Saturation
▼ Saturation

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Rec overy (%)	Sample	DESCRIPTION
18							
19	3380			GC	80		CLAYEY SANDY GRAVEL, STA except clay present, very moist, hydrocarbon (HC) odor, ,
20							
21	82.9			GC	70		CLAYEY SANDY GRAVEL, STA, damp to moist, HC odor,
22							
23	33			CL	60		SILTY CLAY, low, soft, trace sand,calcareous, damp to moist, reddish brown, HC odor,
24							
25	800			CL	70		SILTY CLAY, low, stiff, damp,reddish brown, HC odor,
26							
27	555			CL	80		SILTY CLAY, STA, calcareous, odor,
28							
29	56			CH	90		CLAY, high, very stiff, damp,reddish brown, faint odor,
30							
31	351			CL	90		SILTY CLAY, low, firm/crumbly, damp,reddish brown, trace grey, no odor,
32							
33	125			CL	90		SILTY CLAY, STA,
34							
35	159			CL	90		SILTY CLAY, STA,
36							
37	91			CL	90		SILTY CLAY, STA,
38							

Completion Results

OW-62



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WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow-Stem Augers
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 40'
Ground Water	: Not Encountered
Start Date	: 03/15/2018
Finish Date	: 03/15/2018

WELL NO. OW-62

(Sheet 3 of 3)

Elev., TOC (ft.msl)	: 6937.36
Elev., PAD (ft. msl)	: 6934.73
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634866.14
E	: 2545914.00

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Rec overy (%)	Sample	DESCRIPTION
38							
39	44			CL	90		SILTY CLAY, STA.
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							

Saturation
▼ Saturation

Completion Results

OW-62

10/20 Sieve Sand Filter Pack

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Gallup Refinery - French Drain Release
WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollw-Stem Auger
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 32
Ground Water	: 16'/25'
Start Date	: 03/14/2018
Finish Date	: 03/14/2018

WELL NO. OW-63

(Sheet 1 of 2)

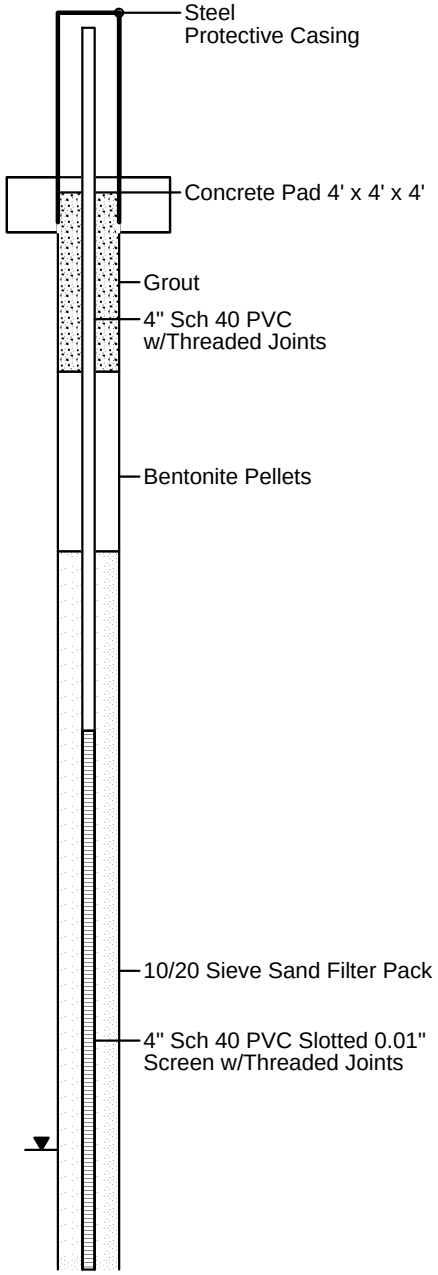
Elev., TOC (ft.msl)	: 6935.06
Elev., PAD (ft. msl)	: 6932.34
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634859.73
E	: 2546756.41

Saturation
▼ Saturation

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
0							Hydroexcavated to 10'-borehole open, no water
10							
11	1.2			CL	90		SILTY CLAY, low, firm, damp,brown with light tan silt in seams,
12							
13	0.9			CL	50		SILTY CLAY, SIMILAR TO ABOVE (STA),
14							
15	1.3			CL	60		SILTY CLAY, STA, trace fine sand in seams,
16		▼					
17	2.5			SM	80		SILTY SAND, fine, compact, very moist to saturated, brown,
18							

Completion Results

OW-63



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Andeavor
Gallup Refinery - French Drain Release
WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollw-Stem Auger
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 32
Ground Water	: 16'/25'
Start Date	: 03/14/2018
Finish Date	: 03/14/2018

WELL NO. OW-63

(Sheet 2 of 2)

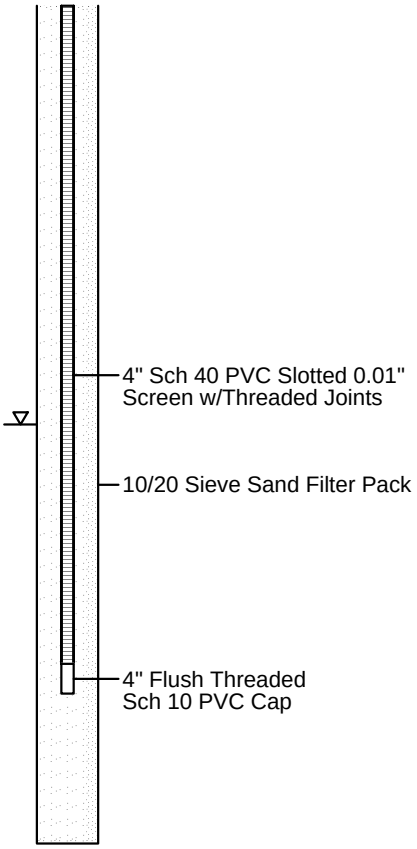
Elev., TOC (ft.msl)	: 6935.06
Elev., PAD (ft. msl)	: 6932.34
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634859.73
E	: 2546756.41

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
18–19	428			CL	80		SANDY SILTY CLAY, low, firm, damp, occasional gravel, brown, odor,
20–21	652			CL	80		SILTY SANDY CLAY, STA, moist in sand seams at base, odor,
22–23	275			CL	70		SILTY SANDY CLAY, STA, odor,
24				CH	70		CLAY, high, soft to firm,damp,brown, odor,
24–25	39			CH	90		CLAY, STA, odor,
25–26	28			GC	90		CLAYEY GRAVEL, sandstone gravel in pink/brown/olive green clay and silt, coarse sand present, saturated, odor,
26–27	150			GC	90		CLAYEY GRAVEL, STA, saturated, odor,
28–29	40				90		WEATHERED SANDSTONE, very dense, dry, grey to light purple, faint odor,
30–31	10.9				50		WEATHERED SANDSTONE, STA, grey and light purple.
32–38							

Saturation
▼ Saturation

Completion Results

OW-63



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Andeavor
Gallup Refinery - French Drain Release
WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Pilot Hole 7 1/4 HSA
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 44' BGL
Ground Water	: Not Encountered
Start Date	: 03/05/2018
Finish Date	: 03/05/2018

WELL NO. OW-64

(Sheet 1 of 3)

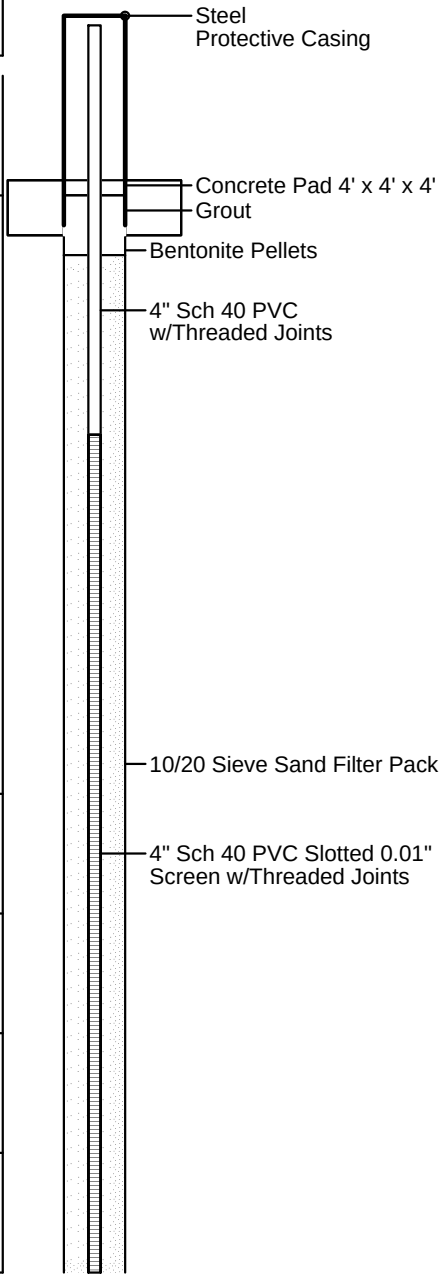
Elev., TOC (ft.msl)	: 6947.40
Elev., PAD (ft. msl)	: 6945.07
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634301.36
E	: 2546150.80

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
-2							
-1							
0							Hydroexcavated to 10' BGL, sloughed to 8' BGL, water in hole at 5.20' BGL, no separate phase hydrocarbon (SPH) detected,
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							SILTY CLAY, low, firm, damp, brown and grey, faint hydrocarbon (HC) odor,
11	280			CL	50		
12							SILTY CLAY, SIMILAR TO ABOVE (STA), faint HC odor,
13	267			CL	70		
14							SILTY CLAY, low to moderate, stiff, calcareous near and at base, damp,brown, grey to greyish white, faint HC odor,
15	308			CL	80		
16							SILTY CLAY, STA, increase in plasticity, mostly grey-trace brown,faint HC ordor,
17	137			CL	50		
18							

Saturation
▼ Saturation

Completion Results

OW-64



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Environmental Consulting Firm

Andeavor
Gallup Refinery - French Drain Release
WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Pilot Hole 7 1/4 HSA
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 44' BGL
Ground Water	: Not Encountered
Start Date	: 03/05/2018
Finish Date	: 03/05/2018

WELL NO. OW-64

(Sheet 2 of 3)

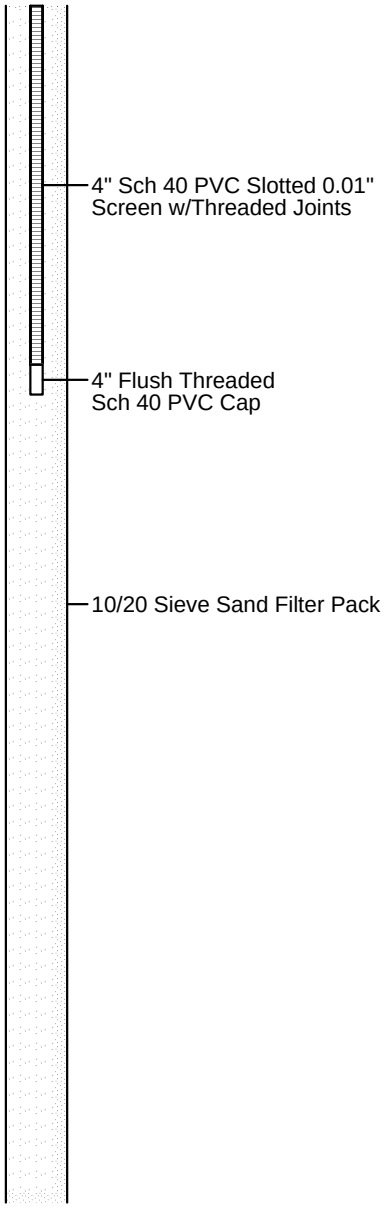
Elev., TOC (ft.msl)	: 6947.40
Elev., PAD (ft. msl)	: 6945.07
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634301.36
E	: 2546150.80

Saturation
▼ Saturation

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
18							
19	47			CL	70		SILTY CLAY, moderate, firm, damp, brown-trace grey, faint odor,
20							
21	133			CL	70		SILTY CLAY, STA, reddish brown to grey at 20.5', faint odor,
22							
23	20			CL	60		SILTY CLAY, moderate, firm to stiff, damp,grey, faint odor,
24							
25	17			CL	80		SILTY CLAY, STA, stiff,
26							
27	75			CL	70		SILTY CLAY, STA, stiff, calcareous at base, reddish brown and grey, greenish grey,
28							
29	74			CL	60		SILTY CLAY, low, stiff/crumbly, damp, dark reddish brown and grey, no odor,
30							
31	35			CL	60		SILTY CLAY, STA, very stiff, no odor,
32							
33	20			CL	40		SILTY CLAY, low, very stiff, damp, dark reddish brown, balck shale at base, no odor,
34							
35	30			ML	40		CLAYEY SILT, sandstone gravel (cobble) at top of interval, low, firm/crumbly, dry/damp, brown, no odor,
36							
37	8			ML	50		SILTY CLAY,low, very stiff, dry/damp, brown, no odor,
38							

Completion Results

OW-64



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WEST18012

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Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Pilot Hole 7 1/4 HSA
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 44' BGL
Ground Water	: Not Encountered
Start Date	: 03/05/2018
Finish Date	: 03/05/2018

WELL NO. OW-64

Elev., TOC (ft.msl)	: 6947.40
Elev., PAD (ft. msl)	: 6945.07
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634301.36
E	: 2546150.80

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
38							
39	12			ML	70		SILTY CLAY, STA,
40							
41	8			ML	60		SILTY CLAY, STA,
42							
43	6			ML	60		SILTY CLAY, STA.
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							

Saturation
▼ Saturation

Completion Results

OW-64

10/20 Sieve Sand Filter Pack

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Andeavor
Gallup Refinery - French Drain Release
WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow-Stem Auger
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 40' BGL
Ground Water	: 20' BGL
Start Date	: 03/09/2018
Finish Date	: 03/09/2018

WELL NO. OW-65

(Sheet 1 of 3)

Elev., TOC (ft.msl)	: 6954.05
Elev., PAD (ft. msl)	: 6951.62
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634238.38
E	: 2546692.01

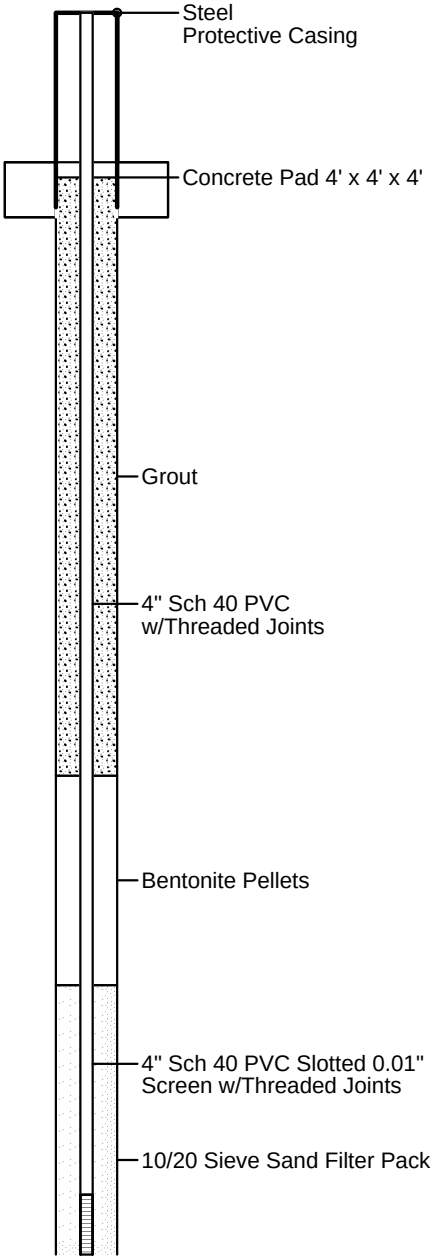
Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
-2							
-1							
0							Cleared borehole to 5', 1" asphalt and base, SILTY CLAY, low, stiff, damp, mixed with gravelly sand, brown, no order,
1							
2				CL	100		
3							
4							
5							
6	17.4			SW	100		GRAVELLY SAND, fine to coarse, loose, damp, gravel <10 mm, brown, no odor,
7	23			SW	80		GRAVELLY SAND, SIMILAR TO ABOVE (STA), clayey sand at base, very damp, brown, odor,
8							
9	12			SM	90		SILTY SAND, medium to coarse, loose, very damp, brown, odor,
10							
11	16			SM	80		CLAYEY GRAVELLY SAND, fine to coarse, compact, gravelly clay lense 2" thick at 11', brown, odor,
12							
13	66			SM	70		SILTY SAND, medium, loose, very damp, brown, odor,
14							
15	822			GC	60		CLAYEY GRAVEL, <10 mm gravel in brown clay, coarse sand throughout, very damp, odor,
16							
17	885			SM	60		SILTY SAND, fine, loose, very damp to moist, hydrocarbon (HC) odor,
18							

Saturation

▼ Saturation

Completion Results

OW-65



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Andeavor
Gallup Refinery - French Drain Release
WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow-Stem Auger
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 40' BGL
Ground Water	: 20' BGL
Start Date	: 03/09/2018
Finish Date	: 03/09/2018

WELL NO. OW-65

(Sheet 2 of 3)

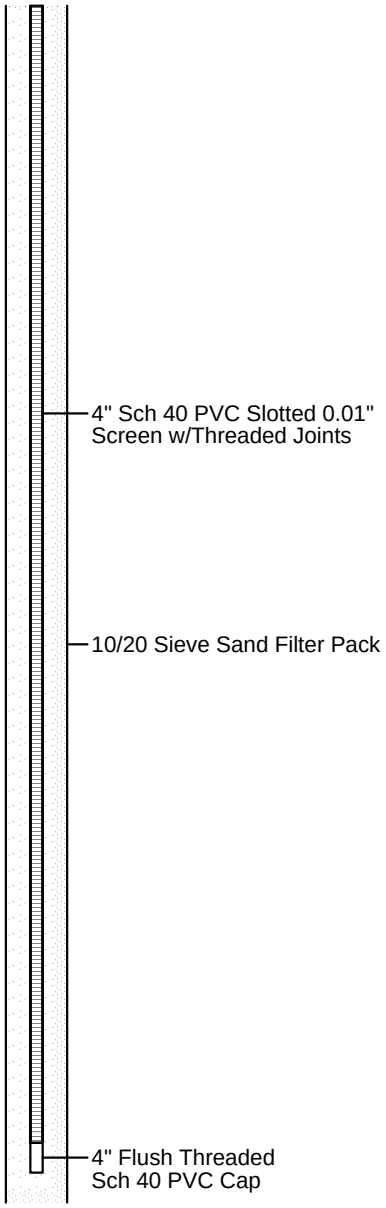
Elev., TOC (ft.msl)	: 6954.05
Elev., PAD (ft. msl)	: 6951.62
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634238.38
E	: 2546692.01

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
18–19	1195	▼		GC	50		CLAYEY GRAVEL, 40 mm sandstone cobbles (tan and green) in brown clay, coarse sand throughout, damp,odor,
20–21				GC	60		CLAYEY GRAVEL, STA, moist to saturated in sand, water in split spoon,
22–23				GC	90		CLAYEY GRAVELLY SAND, coarse sand with 10 mm gravel, loose/soft, saturated, brown, HC odor,
24–25				SC	80		CLAYEY SAND, coarse, loose, very soft, trace gravel, saturated, brown, odor,
26–27				SC	80		CLAYEY SAND, fine to medium, compact, moist, dark brown, HC odor,
28				CL	80		SILTY CLAY, low, very soft, damp,dark brown, strong HC odor,
29				SC	80		CLAYEY SAND, fine, compact, saturated/oily, dark brown, saturated/oily,
30–31				SC	60		CLAYEY SAND, STA, HC odor,
32–33				SC	80		CLAYEY SAND, STA, increase in clay at base, becomes moist,
34–35				SM	90		SILTY SAND, medium to coarse, loose, gravelly (<5 mm) at base, saturated, dark brown, HC odor,
36				SW	80		GRAVELLY SAND, coarse, loose, trace clay-gravel (10 mm), saturated, dark brown, HC odor,
37–38				CL	80		SANDY CLAY, low, firm, trace gravel, damp, dark brown, HC odor,

Saturation
▼ Saturation

Completion Results

OW-65



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Andeavor
Gallup Refinery - French Drain Release
WEST18012

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc./Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow-Stem Auger
Sampling Method	: 2' Split Spoon
Comments	:
Total Depth	: 40' BGL
Ground Water	: 20' BGL
Start Date	: 03/09/2018
Finish Date	: 03/09/2018

WELL NO. OW-65

(Sheet 3 of 3)

Elev., TOC (ft.msl)	: 6954.05
Elev., PAD (ft. msl)	: 6951.62
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634238.38
E	: 2546692.01

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
38							
39				CL	40		SANDY CLAY, STA.
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							

Saturation
▼ Saturation

Completion Results

OW-65

10/20 Sieve Sand Filter Pack

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SB-FD-1

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Client: ANDEAVOR	Project No.: WEST18012	Boring No. \ Well No.: ~~OW-61~~
Project Name: GALLUP REFINERY - FRENCH DRAIN RELEASE		Sheet: 1 of 1
Saturation Depth: NOT ENCOUNTERED / Total Depth: 38' BGL	GPS Coordinates: N 35° 29' 35.6" W 108° 25' 48.1"	Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: 7¼" HOLLOW STEM AUGERS	Drilling Rig: CME 75 / Driller: COHAGAN	Drilling Company: ENVIRO DRILL
Sampling Method \ Size of Sampler: 2' SPLIT SPOON		Sampling Start Date / Time: 3.7.18 / 1335
Comments: PLUGGED BOREHOLE ON MARCH 9, 2018		Sampling Finish Date / Time: 3.7.18 1800

Field Screening			Sample Disposition			Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Sample Depth (feet bgl)	Sample Type	No. & Container Type				
						0-10	-	-	HYDROEXCAVATED TO 10' - COLLAPSED TO 9.5'
10-12	3	55				10-12	CL	90	SILTY CLAY - LOW, VERY STIFF, DRY / DAMP, REDDISH BROWN, NO ODOR, CALCAREOUS AT BASE
12-14	5	55				12-14	CL	90	SILTY CLAY - STA, NO ODOR
14-16	5	55				14-16	CL	60	SILTY CLAY - LOW, FIRM / CRUMBLY, DAMP, LIGHT REDDISH BROWN, NO ODOR, VERY CALCAREOUS FROM 15.75-16.00'
16-18	3	55				16-18	CL	60	SILTY CLAY - STA, TRACE CALCAREOUS, NO ODOR, BECOMES STIFF
18-20	1	50				18-20	CL	70	SILTY CLAY - STA
20-22	1	50				20-22	CL	60	SILTY CLAY - STA
22-24	1	50				22-24	CL	70	SILTY CLAY - STA, INCREASE IN SILT
24-26	0	50				24-26	CL	70	SILTY CLAY - LOW, VERY STIFF, DRY / DAMP, REDDISH BROWN WITH GREENISH GREY, NO ODOR, SANDSTONE LENSE (1" THICK) AT 25.75' - SANDSTONE WAS REDDISH BROWN
26-28	0	50				26-28	CL	70	SILTY CLAY - LOW, VERY STIFF, DRY -> DAMP, LIGHT REDDISH BROWN
28-30	0	50				28-30	CL	70	SILTY CLAY - STA
30-32	0	49				30-32	CL	70	SILTY CLAY - STA
32-34	0	49				32-34	CL	60	SILTY CLAY - STA
34-36	0	49				34-36	CL	60	SILTY CLAY - STA, CALCAREOUS, TRACE GREY
36-38	0	49				36-38	CL	70	SILTY CLAY - STA

2018 Groundwater Analyses
OW-62, OW-63, OW-64

STANDARDS			PARAMETERS				
			Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Total Xylenes (mg/L)	MTBE (mg/L)
WQCC 20 NMAC 6.2.3103 (DEC 2018)			**0.005**	**1**	**0.7**	**0.62**	**0.1**
40 CFR 141.61 MCL			0.005	1.0	0.7	10	NE
NMED TAP WATER (MAR 2019)			0.00455	1.09	0.0149	0.193	0.143
EPA RSL for Tap Water (NOV 2018)			0.00046	1.1	0.0015	0.19	0.014
WELL ID	**DATE SAMPLED**	**METHOD**					
OW-62	11/29/18	8260B	**0.92**	0.013	**0.0019**	0.009	<0.005
	08/22/18	8260B	**2.7**	0.0095	**<0.005**	0.038	<0.005
	04/29/18	8260B	**3.9**	0.039	**0.0062**	0.12	0.0012
OW-63	12/03/18	8260B	**8.8**	0.07	**1.1**	0.43	0.033
	08/22/18	8260B	**9**	0.084	**1.1**	0.52	0.048
	04/29/18	8260B	**8.9**	0.12	**1.4**	**0.68**	0.037
OW-64	08/22/18	8260B	**0.18**	0.55	0.4	**1.5**	<0.005
	04/29/18	8260B	**0.59**	**1.6**	0.36	**3.2**	<0.005

DEFINITIONS

NA = Not analyzed; NE = Not established

Bold and highlighted values represent values above the applicable standards

STANDARDS

WQCC 20 NMAC 6.2.3103 - Standards for Ground Water of 10,000 mg/l TDS Concentration or Less.
a) Human Health Standards; b) Other Standards for Domestic Water

40 CFR 141.61 Maximum Contaminant Levels for Organic Contaminants

NMED Risk Assessment Guidance for Investigations and Remediations Table A-1

EPA Regional Screening Level (RSL) Summary Table

NOTES

1) Beginning in 2013, sampling frequency changed to annual per concurrence by NMED in Comment 6 of NMED Disapproval Facility Wide Ground Water Monitoring Work Plan 2011 Updates 9/24/12.

2018 Groundwater Analyses
OW-62, OW-63, OW-64

STANDARDS			PARAMETERS							
			Fluoride (mg/L)	Chloride (mg/L)	Nitrite (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	DRO (mg/L)	GRO (mg/L)	MRO (mg/L)
WQCC 20 NMAC 6.2.3103 (DEC 2018)			**1.6**	**250**	**1**	**10**	**600**	NE	NE	NE
40 CFR 141.62 MCL			4.0	NE	1	10	NE	NE	NE	NE
NMED TAP WATER (MAR 2019)			1.18	NE	1.97	31.59	NE	NE	NE	NE
EPA RSL for Tap Water (NOV 2018)			0.8	NE	2	32	NE	NE	NE	NE
NMED SSG (MAR 2019)			NE	NE	NE	NE	NE	**0.0858**	**0.0858**	**0.0858**
WELL ID	**DATE SAMPLED**	**METHOD**								
OW-62	11/29/18	8015D/300.0	<0.5	96	<0.5	<0.5	<2.5	**6.1**	**26**	<5.0
	08/22/18	8015D/300.0	0.39	0.88	<0.5	<0.5	<2.5	**5.9**	**35**	<5.0
	04/29/18	8015D/300.0	<0.5	94	<1.0	<1.0	<2.5	**5.6**	**29**	<5.0
OW-63	12/3/2018	8015D/300.0	<0.5	96	<0.5	<0.5	<2.5	**6.1**	**26**	<5.0
	08/22/18	8015D/300.0	0.39	0.88	<0.5	<0.5	<2.5	**5.9**	**35**	<5.0
	04/29/18	8015D/300.0	<0.5	94	<1.0	<1.0	<2.5	**5.6**	**29**	<5.0
OW-64	08/22/18	8015D/300.0	**4.4**	20	<0.5	<0.5	4.3	**1.3**	**14**	<5.0
	04/29/18	8015D/300.0	**3.7**	62	<1.0	<1.0	40	**2.8**	**17**	<5.0

DEFINITIONS

NA = Not analyzed; NE = Not established

Bold and highlighted values represent values above the applicable standards

STANDARDS

WQCC 20 NMAC 6.2.3103 - Standards for Ground Water of 10,000 mg/l TDS Concentration or Less.
a) Human Health Standards; b) Other Standards for Domestic Water

40 CFR 141.62 Maximum Contaminant Levels for Inorganic Contaminants

NMED Risk Assessment Guidance for Investigations and Remediations Table A-1

EPA Regional Screening Level (RSL) Summary Table

NMED Soil Screening Guidance Volume 1, Table 6-4 (groundwater)

NOTES

1) Sampling frequency changed to annual per concurrence by NMED in Comment 6 of NMED Disapproval Facility Wide Ground Water Monitoring Work Plan 2011 Updates, 9/24/12.

OW-64 - No samples collected in the 4th Quarter 2019 - SPH detected.

2018 Groundwater Analyses
OW-62, OW-63, OW-64

STANDARDS			PARAMETERS (Total Analyses)											
			Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Selenium (mg/L)	Silver (mg/L)	Mercury (mg/L)	Uranium (mg/L)	Zinc (mg/L)
WQCC 20 NMAC 6.2.3103 (DEC 2018)			**0.01**	**2**	**0.005**	**0.05**	**1**	**1**	**0.015**	**0.2**	**0.05**	**0.05**	**0.002**	**0.03**	**10**
40 CFR 141.62 MCL			0.01	2	0.005	0.1	1.3	NE	0.015	NE	0.05	NE	0.002	0.03	NE
NMED TAP WATER (MAR 2019)			0.000855	3.28	0.00624	0.0057	0.7898	13.8	NE	2.02	0.0987	0.0812	0.000626	0.0592	5.96
EPA RSL for Tap Water (NOV 2018)			0.000052	3.8	0.0092	NE	0.8	14	0.015	0.43	0.1	0.094	0.00063	0.004	6
WELL ID	**DATE SAMPLED**	**METHOD**													
OW-62	11/29/18	200.7/200.8	0.007	0.21	<0.002	0.0079	0.0086	**4.6**	0.0032	**0.45**	<0.001	<0.005	<0.0002	NA	0.024
	08/22/18	200.7/200.8	0.0068	0.12	<0.002	0.0025	0.0078	**1.4**	0.0012	**0.34**	<0.001	<0.005	0.000038	<0.0005	0.044
	04/29/18	200.7/200.8	0.014	0.24	<0.002	0.012	0.0092	**7.6**	0.0049	**0.44**	<0.001	<0.005	NA	0.035	0.024
OW-63	12/03/18	200.7/200.8	0.012	**3.7**	<0.002	<0.006	<0.006	**5.8**	0.00053	**1.2**	<0.001	0.0017	0.00015	NA	0.0056
	08/22/18	200.7/200.8	0.013	**3.8**	<0.002	<0.006	<0.006	**5.9**	0.00078	**1.6**	<0.001	0.002	0.000047	0.00037	0.0064
	04/29/18	200.7/200.8	0.014	**4**	<0.002	<0.006	<0.006	**5.8**	<0.0005	**1**	<0.001	<0.005	NA	<0.0005	<0.01
OW-64	08/22/18	200.7/200.8	0.0067	0.47	<0.002	0.0033	0.018	**2.6**	0.0022	**0.46**	<0.001	<0.005	0.000049	<0.0005	0.0089
	04/29/18	200.7/200.8	0.011	1.1	<0.002	0.02	0.032	**13**	0.015	**1**	<0.001	<0.005	NA	**0.031**	0.011

DEFINITIONS
NA = Not analyzed; NE = Not established
Bold and highlighted values represent values above the applicable standards
STANDARDS
WQCC 20 NMAC 6.2.3103 - Standards for Ground Water of 10,000 mg/l TDS Concentration or Less.
a) Human Health Standards; b) Other Standards for Domestic Water
40 CFR 141.62 Maximum Contaminant Levels for Inorganic Contaminants
NMED Risk Assessment Guidance for Investigations and Remediations Table A-1
EPA Regional Screening Level (RSL) Summary Table

2018 Groundwater Analyses
OW-62, OW-63, OW-64

STANDARDS			PARAMETERS (Dissolved Analses)										
			Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Selenium (mg/L)	Silver (mg/L)	Uranium (mg/L)	Zinc (mg/L)
WQCC 20 NMAC 6.2.3103 (DEC 2018)			**0.01**	**2**	**0.005**	**0.05**	**1**	**1**	**0.015**	**0.2**	**0.05**	**0.05**	**0.03**	**10**
40 CFR 141.62 MCL			0.01	2	0.005	0.1	1.3	NE	0.015	NE	0.05	NE	0.03	NE
NMED TAP WATER (MAR 2019)			0.000855	3.28	0.00624	0.0057	0.7898	13.8	NE	2.02	0.0987	0.0812	0.0592	5.96
EPA RSL for Tap Water (NOV 2018)			0.000052	3.8	0.0092	NE	0.8	14	0.015	0.43	0.1	0.094	0.004	6
WELL ID	**DATE SAMPLED**	**METHOD**												
OW-62	11/29/18	200.7/200.8	0.0063	0.08	<0.002	<0.006	<0.006	0.35	<0.0005	**0.33**	<0.001	<0.005	NA	0.018
	08/22/18	200.7/200.8	0.0061	0.087	<0.002	<0.006	<0.006	0.02	<0.0005	**0.31**	<0.001	<0.005	**0.046**	0.0077
	04/29/18	200.7/200.8	**0.012**	0.061	<0.002	<0.006	<0.006	0.067	<0.0005	0.18	<0.001	<0.005	**0.039**	<0.01
OW-63	12/3/2018	200.7/200.8	**0.011**	**3.7**	<0.002	<0.006	<0.006	**5.3**	<0.0005	**0.93**	<0.001	<0.005	NA	0.031
	08/22/18	200.7/200.8	**0.011**	**3.9**	<0.002	<0.006	<0.006	**5.8**	<0.0005	**1.2**	<0.001	0.0022	0.0002	0.011
	04/29/18	200.7/200.8	**0.012**	**4**	<0.002	<0.006	<0.006	**5.5**	<0.0005	**0.92**	<0.001	<0.005	<0.0005	0.011
OW-64	08/22/18	200.7/200.8	0.0068	0.33	<0.002	<0.006	<0.006	0.17	0.00019	**0.34**	<0.001	<0.005	0.012	0.011
	04/29/18	200.7/200.8	0.0089	0.35	<0.002	<0.006	0.009	0.93	0.0034	**0.44**	<0.001	<0.005	0.026	<0.01

DEFINITIONS

NA = Not analyzed; NE = Not established

Bold and highlighted values represent values above the applicable standards

STANDARDS

WQCC 20 NMAC 6.2.3103 - Standards for Ground Water of 10,000 mg/l TDS Concentration or Less.
a) Human Health Standards; b) Other Standards for Domestic Water

40 CFR 141.62 Maximum Contaminant Levels for Inorganic Contaminants

NMED Risk Assessment Guidance for Investigations and Remediations Table A-1

EPA Regional Screening Level (RSL) Summary Table

2018 Groundwater Analyses
OW-62, OW-63, OW-64

STANDARDS			PARAMETERS											
			Acenaphthene (mg/L)	Benzoic Acid (mg/L)	Bis(2-ethylhexyl) phthalate (mg/L)	Dimethyl phthalate (mg/L)	2,4-Dimethyl-phenol (mg/L)	Fluorene (mg/L)	1-Methyl-naphthalene (mg/L)	2-Methyl-naphthalene (mg/L)	2-Methyl-phenol (mg/L)	3+4-Methyl-phenol (mg/L)	Naphthalene (mg/L)	Phenan-threne (mg/L)	Phenol (mg/L)
WQCC 20 NMAC 6.2.3103 (DEC 2018)			NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	**0.03**	NE	**0.005**
40 CFR 141.61 MCL			NE	NE	**0.006**	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
NMED TAP WATER (MAR 2019)			**0.535**	NE	0.0556	**14.8**	**0.354**	**0.288**	**0.0114**	**0.035**	NE	NE	0.00165	**0.17**	5.76
EPA RSL for Tap Water (NOV 2018)			0.53	**75**	0.0056	15	0.36	0.29	0.0011	0.036	**0.93**	**0.93**	0.00017	NE	5.8
WELL ID	**DATE SAMPLED**	**METHOD**													
OW-62	11/29/18	8270C	<0.05	0.017	<0.01	<0.05	<0.01	<0.05	<0.02	<0.02	<0.05	<0.01	<0.01	<0.05	**0.0064**
	08/22/18	8270C	<0.01	0.0092	<0.01	<0.01	<0.01	<0.01	**0.092**	**0.11**	<0.01	<0.01	**0.33**	<0.01	**0.029**
	04/29/18	8270C	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.004	<0.004	<0.01	<0.01	0.0029	<0.01	**0.072**
OW-63	12/03/18	8270C	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	**0.075**	**0.088**	<0.05	<0.01	**0.23**	<0.05	<0.05
	08/22/18	8270C	<0.01	0.039	<0.01	<0.01	0.017	<0.01	**0.077**	**0.091**	<0.01	<0.01	**0.21**	<0.01	**0.025**
	04/29/18	8270C	<0.01	<0.02	<0.01	<0.01	0.013	<0.01	**0.057**	**0.069**	<0.01	<0.01	**0.19**	<0.01	**0.017**
OW-64	08/22/18	8270C	<0.01	0.011	<0.01	<0.01	0.024	<0.01	0.0091	<0.01	0.0099	<0.01	0.017	<0.01	<0.01
	04/29/18	8270C	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.031	<0.01	0.018	<0.01	<0.01

DEFINITIONS
NA = Not analyzed; NE = Not established
Bold and highlighted values represent values above the applicable standards
STANDARDS
WQCC 20 NMAC 6.2.3103 - Standards for Ground Water of 10,000 mg/l TDS Concentration or Less.
a) Human Health Standards; b) Other Standards for Domestic Water
40 CFR 141.61 Maximum Contaminant Levels for Organic Contaminants
NMED Risk Assessment Guidance for Investigations and Remediations Table A-1
EPA Regional Screening Level (RSL) Summary Table

HISTORICAL FLUID LEVEL MEASUREMENTS

Date of Installation	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	2011 Survey [1] Ground Level Elevations (ft)	2011 Survey [1] Well Casing Rim Elevations (ft)	Stick-up length (ft)	2011 Survey [1] Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation [3] (ft)	Corrected Water Table [4] Elevation (factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)
03/14/18	OW-61	03/21/18	4.00	6,960.91	6,963.57	2.66	6,992.59	31.68	16.71	0.09	16.80	6,946.77	6,946.84	8 - 28
	OW-61	04/24/18	4.00	6,960.91	6,963.57	2.66	6,992.58	31.67	17.22	0.82	18.04	6,945.53	6,946.19	8 - 28
	OW-61	08/16/18	4.00	6,960.91	6,963.57	2.66	6,992.61	31.70	17.40	4.70	22.10	6,941.47	6,945.23	8 - 28
	OW-61	11/29/18	4.00	6,960.91	6,963.57	2.66	6,992.91	32.00	17.95	4.05	22.00	6,941.57	6,944.81	8 - 28
03/15/18	OW-62	03/21/18	4.00	6,934.73	6,937.36	2.63	6,966.30	31.57	ND	NA	22.93	6,914.43	NA	8 - 28
	OW-62	04/24/18	4.00	6,934.73	6,937.36	2.63	6,966.31	31.58	ND	NA	23.14	6,914.22	NA	8 - 28
	OW-62	08/15/18	4.00	6,934.73	6,937.36	2.63	6,966.32	31.59	ND	NA	23.70	6,913.66	NA	8 - 28
	OW-62	11/29/18	4.00	6,934.73	6,937.36	2.63	6,966.32	31.59	ND	NA	23.99	6,913.37	NA	8 - 28
03/14/18	OW-63	03/21/18	4.00	6,932.34	6,935.06	2.72	6,964.52	32.18	ND	NA	20.19	6,914.87	NA	9 - 29
	OW-63	04/24/18	4.00	6,932.34	6,935.06	2.72	6,964.52	32.18	ND	NA	20.33	6,914.73	NA	9 - 29
	OW-63	08/16/18	4.00	6,932.34	6,935.06	2.72	6,964.54	32.20	ND	NA	20.60	6,914.46	NA	9 - 29
	OW-63	11/29/18	4.00	6,932.34	6,935.06	2.72	6,964.34	32.00	ND	NA	20.95	6,914.11	NA	9 - 29
03/16/18	OW-64	03/21/18	4.00	6,945.07	6,947.40	2.33	6,972.69	27.62	ND	NA	7.72	6,939.68	NA	4 - 24
	OW-64	04/24/18	4.00	6,945.07	6,947.40	2.33	6,972.70	27.63	ND	NA	7.85	6,939.55	NA	4 - 24
	OW-64	08/16/18	4.00	6,945.07	6,947.40	2.33	6,972.42	27.35	ND	NA	7.51	6,939.89	NA	4 - 24
	OW-64	11/29/18	4.00	6,945.07	6,947.40	2.33	6,972.42	27.35	8.06	0.05	8.11	6,939.29	6,939.33	4 - 24
03/12/18	OW-65	03/21/18	4.00	6,951.62	6,954.05	2.43	6,993.28	41.66	23.40	0.20	23.60	6,930.45	6,930.61	17 - 37
	OW-65	04/24/18	4.00	6,951.62	6,954.05	2.43	6,993.27	41.65	23.61	2.74	26.35	6,927.70	6,929.89	17 - 37
	OW-65	08/16/18	4.00	6,951.62	6,954.05	2.43	6,993.28	41.66	24.96	1.68	26.64	6,927.41	6,928.75	17 - 37
	OW-65	11/29/18	4.00	6,951.62	6,954.05	2.43	6,991.62	40.00	24.05	7.75	31.80	6,922.25	6,928.45	17 - 37

DEFINITIONS:

DTB - Depth to Bottom
DTW - Depth to Water
SPH = Separate Phase Hydrocarbons

NA = Not Applicable NS = Not Surveyed NM = Not Measured
Negative number in Stick up Length column indicates well is flushmount and located at or below ground level.
Depth to Water Column - if 0.00 is indicated - means water is at top of casing (full) under artesian flow conditions.

NOTES:

1. Corrected Water Table Elevation applies only if SPH thickness column measurement exists. (0.8 X SPH thickness + Groundwater Elevation)