Western Refining Southwest LLC
A subsidiary of Marathon Petroleum Corporation
I-40 Exit 39
Jamestown, NM 87347

June 30, 2021

Mr. Kevin Pierard, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

RE: Response to Disapproval
Investigation Report Solid Waste Management Units (SWMU)
No. 4 Old Burn Pit and No. 5 Landfill Areas
Marathon Petroleum Company LP, Gallup Refinery
(dba Western Refining Southwest LLC)
EPA ID# NMD000333211
HWB-WRG-17-006

Dear Mr. Pierard:

Marathon Petroleum Company LP (dba Western Refining Southwest LLC) Gallup Refinery (MPC) is submitting this *Response to Comments Disapproval, Investigation Report Solid Waste Management Units (SWMU) No. 4 Old Burn Pit and No. 5 Landfill Areas.* New Mexico Environment Department (NMED) provided disapproval on June 7, 2018. A response to disapproval regarding Comments 4 and 7 was submitted to NMED on October 19, 2018. NMED resubmitted the *Disapproval* on March 15, 2021 and requested a response to the original June 7, 2018 *Disapproval* comments that were not addressed in the October 19, 2018 submittal. A timeline of the reports and investigations for the burn pits and landfill areas is provided below.

- Investigation Work Plan, submitted June 24, 2014
- Disapproval, received August 17, 2015
- Response to Disapproval, submitted November 19, 2015
- Approval with Modifications, submitted April 18, 2016
- Investigation Report, submitted March 13, 2017
- Disapproval, received June 7, 2018
- Response to Disapproval, submitted October 19, 2018
- Disapproval, received March 15, 2021

As requested in the March 13, 2021 *Disapproval*, a response to comments and redline/strikeout

text are provided in Attachments A and B, respectively. In addition, two hard copies and one electronic copy of the revised 2017 Investigation Report are enclosed. MPC would like to note that the NMED screening level for arsenic has changed since the report was initially prepared. The current arsenic screening level is 5.83 milligrams per kilogram, which is higher than any of the soil results reported at SWMU 5. No text changes have been implemented.

If there are any questions, please call Mr. John Moore at (915) 775-7864.

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
Refinery General Manager

Enclosures

cc: D. Cobrain, NMED HWB
M. Suzuki, NMED HWB
T. McDill, NMOCD
G. McCartney, Marathon Petroleum Corporation
K. Luka, Marathon Petroleum Corporation
J. Moore, Marathon Gallup Refinery
H. Jones, Trihydro Corporation

Attachment A: Response to Comments

New Mexico Environment Department to Marathon Petroleum Company Comment Letter "Response to Disapproval, SWMU No. 4 Old Burn Pit and No. 5 Landfill Areas Investigation Report" (March 15, 2021)

New Mexico Environment Department (NMED) Comment	Marathon Petroleum Company (MPC) Response
Comment 1:	**Response 1:**
In Section 2.1 (Old Burn Pit (SWMU No. 4)), the Permittee states, "[a] Visual Site Inspection (VSI) was conducted on November 19 and 20, 1986 as part of the RCRA Facility Assessment. During this inspection, 'An old metal box uphill from the pit' was described as being used to feed oil through a metal pipe to the burn pit. There is no subsequent mention of the steel box or pipe in the *SWMU Site-Specific Facility Investigation Workplan*, which provided a detailed discussion of site features and sampling locations (Applied Earth Sciences, Inc., 1990). Apparently, the metal box and pipe were removed after the VSI was conducted in 1986 and sometime before preparation of the *SWMU Site-Specific Facility Investigation Workplan* in 1990." The 1990 SWMU Site-Specific Facility Investigation Work Plan does not provide a detailed discussion of site features. While it is apparent that the metal box and pipe are no longer present, their removal cannot be verified using historic documents. No revision is necessary.	This comment is acknowledged.
Comment 2:	**Response 2:**
In Section 7.1 (Conclusions), regarding the Burn Pit, the Permittee states that, "[g]roundwater was not encountered and there was no evidence of historical impacts to groundwater beneath the Old Burn Pit." In the same section, the conclusion for the Landfill Areas, states, "[g]roundwater was not encountered at SWMU 5-2. Based on the borings completed per the Investigation Work Plan, there is no evidence of any threats to groundwater and the soil cap is preventing any potential direct contact exposures to buried waste materials." There are several issues regarding these statements: 1. The Permittee notes in Section 4.2.2 (Hydrogeology) that, "[s]hallow groundwater may be present in the general area of the two SWMUS, but its occurrence is sporadic." Which acknowledges the potential presence of intermittent groundwater situation.	1. This comment is acknowledged. 2. In response to NMED's comment regarding site-specific groundwater and the presence of intermittent saturation, Section 4.2.2 (Hydrogeology) pages 4-2 and 4-3 have been revised to state: "None of the three soil borings completed at SWMUs No. 4 and No. 5 encountered groundwater. Soil boring SWMU 4-1 encountered bedrock (mudstone/claystone) at a depth of 20 feet with a dry sandy clay on top of the bedrock. (Figure 9). Damp soil was observed in gravelly clay at an approximate depth of 17 feet. Soil Boring SWMU 5-1 was drilled to a depth of 20 feet pursuant to the Investigation Work Plan and was terminated in a dry sandy clay. As indicated on Figure 9, the depth to bedrock near SWMU 5-1 may be at depths of 35 to 40 feet. Bedrock was encountered at a depth of 14 feet in SWMU 5-2, with a dry stiff clay overlying the bedrock surface. Damp soil was observed at

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2. Figure 2 (SWMUs No. 4 & No. 5 Location Map) depicts the locations of the SWMUs, soil borings, a monitoring well (OW-56), a temporary monitoring well (NDD-2), and a cross-section A-A'. The Permittee did not include a boring log or well construction diagram for monitoring well OW-56 in the Report. However, Figure 9 (Cross Section A-A') includes a legend depicting monitoring well OW-56 that shows a general well diagram and lithologic information is included within the cross-section. The cross-section does not indicate saturation, but the lithologic information included for well OW-56 describes an interval from 6906 to 6904 ft msl as "clay, gravelly, sandy, moist". Additionally, "damp" intervals were encountered in borings SWMU 5-2 and boring SWMU 4-1 at similar intervals to the moist interval in well OW-56. The Permittee must discuss site-specific groundwater in Section 4.2 (Subsurface Conditions) and discuss the presence of intermittent saturation. As the Permittee is aware, tight clays often prevent timely recharge within borings and wells, so the presence of groundwater may not be immediately observed. 3. Other than well OW-56 and NDD-2, the closest monitoring wells are OW-12 to the south and OW-13 to the east (not depicted on the figures in the Report). These wells monitor the Sonsela aquifer with depths to water at 47.23 ft bgs and approximately 21.5 ft bgs, respectively. There may be water present within the Chinle/Alluvium interface, as recorded in other areas of the refinery, but the boring logs for OW-12 and OW-13 are not detailed enough to determine if saturated intervals were encountered in these wells. Also, because of the difference in reporting the elevation of the subsurface data (ft msl in the Report versus feet bgs on the OW-12 and OW-13 well logs), it is difficult to determine whether the saturated intervals in the OW-12 and OW-13 wells can be correlated to the moist and damp intervals in the monitoring well and borings installed as part of the investigation.	approximately 12 feet in a clayey gravel layer. The damp soil noted in soil borings SWMU 4-1 and SWMU 5-2 are at a depth similar to the water level depth measured in well OW-56. Well OW-56 is screened in a sandy, gravelly clay. Moisture observed in the gravelly clay/clayey gravel in soil borings SWMU 4-1 and SWMU 5-2 may represent shallow groundwater. Shallow groundwater may be present in the general area of the two SWMUs, but its occurrence is sporadic. The diverse properties and complex, irregular stratigraphy of the Quaternary alluvium across the refinery cause a wide range of hydraulic conductivity ranging from less than 10^{-2} cm/sec for gravelly sands immediately overlying the Painted Desert Member to 10^{-8} cm/sec in the clay soils located near the surface (Western Refining, 2009). Permeability tests performed on the Quaternary alluvium beneath the nearby Land Treatment Unit (LTU) indicated an average permeability of 1.9E-05 cm/sec (Appendix B). Permeability tests performed on soils in the area of the firewater pond indicated an average permeability of 1.1E-07 cm/sec (Appendix B). Because damp soil was observed in soil borings SWMU 4-1 and SWMU 5-2, it may be representative of shallow groundwater in the area. However, due to the tight clays the presence of groundwater may not be observed in the open boreholes in a timely manner. Neither of these soil borings was completed as a temporary well so the presence of groundwater cannot be confirmed." 3. This comment is acknowledged. 4. Figure 2 has been revised to show the locations of OW-12 and OW-13 and Figure 9 presents a revised cross section; these figures are provided in the revised Investigation Report. The boring log for OW-56 has been included in Appendix D of the revised Investigation Report. In response to NMED's comment regarding site-specific data, Section 4.2.2 (Hydrogeology) page 4-4 has been revised to state: "Sections 2.1 and 2.2 present the historical data collected for SWMU No. 4 and SWMU No. 5, respectively. In SWMU No. 4, two

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[4.] Based on this information, the Permittee cannot conclusively state there were no historic impacts to the groundwater. Additionally, prior to construction of the landfill covers in the late 1990s, both SWMUs were open pits. While the landfill covers likely inhibited leachate migration since the late 1990s, prior to their construction there was a potential for contaminants to migrate through the subsurface and encounter the intermittent groundwater which is a contaminant migration pathway as well as leach into undisturbed soils beneath the pits. This is the reason that NMED required further investigation. Revise Section 4.2 (Subsurface Conditions) to discuss site-specific data. Provide a figure depicting the locations of wells OW-12 and OW-13 and add the wells to the cross section, if appropriate. Also provide the boring logs and well construction diagram for well OW-56 in the revised Report.	constituents (ethylbenzene and naphthalene) were detected at concentrations above the soil screening levels developed to protect groundwater but less than the residential soil screening level for direct contact. The detections were observed in samples collected between 3 ft bgs and 4.5 ft bgs; samples collected at 6 ft bgs and 10 ft bgs were below detection limits. The samples depths are approximately 10 ft above the observed damp gravelly clay layer. In SWMU No. 5, arsenic was detected at concentrations above the soil screening levels developed to protect groundwater and was also reported at concentrations above the residential soil screening level for direct contact. The detections occurred between 0 ft bgs and 20 ft bgs. These samples depths are approximately 15 ft above the observed clayey gravel layer. No organic constituents were above any screening standards. Information regarding the current investigation is presented in Section 4.3." MPC would like to note that the NMED screening level for arsenic has changed since the report was initially prepared. The current arsenic screening level is 5.83 milligrams per kilogram, which is higher than any of the soil results reported at SWMU 5. No text changes have been implemented regarding the revised screening level.
Comment 3:	**Response 3:**
Figure 9 (Cross Section A-A') includes data from soil boring NDD-2, boring SMWU 5-2, boring SWMU 5-1, well OW-56, and boring SWMU 4-1. There are several issues regarding the cross-section and conclusions. The boring logs for several of the borings and well OW-56 were not included with the Report. However, the Permittee's *Response to Disapproval No Further Action Report and Supplemental Information* (Response), dated June 15, 2015, includes information regarding boring NDD-2 which was drilled as part of the investigation for the North Drainage Ditch. The boring log indicated that claystone was encountered at approximately 4 feet bgs. Additionally, a soil boring named NDD-3 was drilled a short	The boring logs for NDD-2, NDD-3, and OW-56 have been included in Appendix D of the revised Investigation Report. A cross section revised to include the borings requested by NMED has also been included as Figure 9 in the revised Investigation Report. The approximate locations of the SWMU 4 and SWMU 5 are shown on Figure 9. The depth of SWMU 4 was approximately 10 to 12 ft bgs. The depths of SWMU 5 landfills are unknown.

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distance north of the Burn Pit and east of boring NDD-2 as well. The description of NDD-3 in the Response states: "[i]n this boring, claystone was encountered at 12 feet below the land surface. Saturated clayey, gravely, sand was observed overlying (10'-12') the claystone and a temporary well completion was installed to facilitate collection of a groundwater sample. The analysis of the water sample indicates the presence of low concentrations of gasoline and diesel range organics, benzene, 1,2-dichloroethane, methyl tert butyl ether, isopropylbenzene, and sec-butylbenzene. Methyl tert butyl ether and 1,2-dichloroethane were detected at concentrations above screening levels." Saturation was observed at approximately 12 feet below ground level in a clayey gravelly sand directly above the claystone which correlates to historic boring logs for the Landfill Areas that indicate wet/water/water bearing zones between 6.5 and 17 feet below the ground surface. Historic boring logs for the Burn Pit indicate that no saturated interval was encountered during investigation. The boring logs demonstrate that intermittent groundwater within the Chinle/Alluvium interface is present. The Report did not provide adequate information: provide the boring logs for NDD-2, NDD-3, and OW-56 in the revised Report. Provide a cross-section that includes more information and borings SWMU 4-1, boring NDD-3, well OW-56, boring SWMU 5-2, and boring NDD-2. Evaluate the appropriateness of also including boring SWMU 5-1. Additionally, please mark the locations and depths of the landfills and burn pit on the cross-section.	
Comment 4:	**Response 4:**
In Section 4.3.1 (Soil Investigation), in the SWMU 5-1 boring discussion on page 4-5, the Permittee states, "0 feet bgl - 2 feet bgl – PID reading of 28.6 ppm – This sample was collected at the surface from fill material. The sediment exhibited a petroleum hydrocarbon odor. There was no visual evidence of impacted soils." In the revised Report, discuss uses of the area that may explain the	This comment was addressed in the October 19, 2018 *Response to Disapproval*.

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presence of petroleum odors on the surface soils. If the area is or has been used for facility operations, the landfill cover may be contaminated. If the facility used or is using the SWMU, then the Permittee must collect additional surface samples to demonstrate whether facility activities contaminated the landfill cover. Submit a work plan to propose to collect surface samples (see also Comment 7).	
Comment 5:	**Response 5:**
In the Executive Summary, page E-iii, the Permittee states, "[b]ased on a slightly elevated reading with a photo ionization detector (PID), a soil sample was collected from the land surface (0-2') where the highest arsenic concentration of 5.3 mg/kg was detected. This concentration exceeds the residential direct contact screening level and should be further evaluated upon completion of a site-specific evaluation of background concentrations." As NMED noted in its letter *Disapproval No Further Action Report and Supplemental Information* for SWMU 3, SWMU 4, SWMU 5, SWMU 7, SWMU 9, SWMU 10, and SWMU 13 and dated April 13, 2015: "The arsenic levels reported for some of the SWMUs in the analytical reports in the Phase I and Phase III Investigation Reports (specifically, samples from SWMU 10, SWMU 5 with results ranging from 4.3 mg/kg to 27.9 mg/kg) for the soil investigations are higher than the current residential soil screening level (4.25 mg/kg). According to the USGS, McKinley County arsenic levels generally range from 5.6 to 11 ppm. Because the concentrations of arsenic are significantly higher than the maximum concentration of the background range (11 ppm), the Permittee must conduct a soil background study to account for the higher levels of arsenic in order to reach corrective action complete status." Elevated arsenic levels must be addressed, because elevated arsenic levels are indicative of petroleum contamination and its degradation in the environment. The Permittee must submit a soil background	MPC will use the McKinley County arsenic levels in future reports until the soil background study has been completed and approved by NMED. The soil background work plan was approved by NMED on March 30, 2021. The report summarizing the investigation and presenting site-specific background values will be submitted to NMED by December 31, 2022.

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study work plan for NMED's review, if the Permittee wants to make a comparison to background concentrations for arsenic.	
Comment 6:	**Response 6:**
From the boring logs it does not appear that the Permittee encountered landfill debris. The SWMU 5-1 boring log indicates "FILL" from the surface to 7 feet below groundwater surface; however, it is not clear if this is the landfill cover or landfill material (there is no indication on the boring logs that debris was encountered). Historic boring logs indicate that the presence of metal, wood, rubber, general debris, and rusty material. The Permittee's boring location and samples do not appear to be representative of site conditions. No revision to the Report is required.	This comment is acknowledged.
Comment 7:	**Response 7:**
In Section 7.1 (Conclusions), the Permittee conducted a cumulative risk evaluation. The Permittee did not collect a sufficient number of samples to properly conduct a cumulative risk evaluation. The Permittee also used historical data in the calculation, which is not appropriate. Additionally, some of the historic data is questionable based on prior NMED review and comments. The Permittee states, "[t]he maximum concentration for metals includes both the historical analyses and recently collected data. These calculations are separated for carcinogenic risk is 1.08×10^{-5} assuming residential land use and 2.14×10^{-6} for non-residential land use 0.622. At the Landfill Areas, the cumulative carcinogenic risk is 8.25×10^{-5} assuming residential land use and 1.63×10^{-5} for non-residential land use. The hazard index for residential land use is 3.09 and for non-residential land use is 2.49." The Permittee's calculations demonstrate that the carcinogenic risk for the Burn Pit does not meet the 1×10^{-5} threshold for carcinogens and the Landfill Areas do not meet the acceptable criteria for either carcinogenic risk or the hazard index (HI) of 1 for non-carcinogens. Based on these calculations, the Permittee must conduct additional	This comment was addressed in the October 19, 2018 *Response to Disapproval*.

New Mexico Environment Department to Marathon Petroleum Company Comment Letter "Response to Disapproval, SWMU No. 4 Old Burn Pit and No. 5 Landfill Areas Investigation Report" (March 15, 2021)

site-specific refinements of the assessment (i.e., collect additional data) or implement corrective actions. The Permittee must collect additional soil data to provide sufficient data points to conduct an appropriate risk assessment to move the sites forward in the corrective action process. The Permittee must also submit a work plan proposing additional data collection for NMED review and approval.	
Comment 8:	**Response 8:**
Appendix E (Analytical Data Reports) includes three laboratory reports for aqueous samples collected on 9/21/2016, 9/29/2016, and 10/3/2016. The lab reports indicate that the samples were collected at "SWMUs 4 & 5" and the sample ID's are EB092116, EB092916, and EB100316. The aqueous sample collected under the EB092116 ID was analyzed for TPH as DRO and MRO and GRO, anions, dissolved metals, metals, mercury, semi-volatiles, and volatiles. The results demonstrate low levels of GRO (0.016 mg/L ((J)), bis (2-ethylhexyl)phthalate (20.9 ug/L) (J)), bis(2-ethylhexyl)phthalate (3.0 ug/L (J)), and benzoic acid (5.4 ug/L (J)) were reported. The sample labeled ID EB100316 contained low levels of benzoic acid (6.4 ug/L (J)), bis(2-chloroisopropyl)ether (2.1 ug/L (J)), and mercury (0.00013 mg/L (J)). The Report does not discuss collecting these samples and states that no groundwater was encountered during the investigation. In the revised Report, discuss the reasons why these aqueous samples were collected, where they were collected, and the methods used to collect them.	The three laboratory samples that were collected (EB092116, EB092916, and EB100316) were equipment blanks collected from the equipment on the three days of sampling. These samples are identified as equipment blanks in Appendix F, Table A-1 of the 2017 Investigation Report. Equipment blanks were collected following decontamination of the drilling equipment (described in Appendix C of the 2017 Investigation Report) and submitted for analysis. Equipment blanks are collected by running deionized water over the recently decontaminated equipment and submitting a sample of the water to the laboratory for analysis. No changes to the report are required.

Attachment B: Red-Line/Strike-Out Text

INVESTIGATION REPORT
Solid Waste Management Units (SWMU)
No. 4 Old Burn Pit and No. 5 Landfill Areas

Western Refining

Gallup Refinery
Western Refining Southwest, Inc.
Gallup, New Mexico

EPA ID# NMD000333211

JANUARY 2017

Revised JUNE 2021 by Trihydro Corporation

Scott Crouch, P.G
DiSorbo Consulting, LLC

DiSorbo
Environmental Consulting Firm

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area of the Old Burn Pit and the Landfill Areas, is mapped regionally as a narrow band trending west-northwest and running just north of I-40 (Figure 8). The Quaternary alluvium is thought to be the parent material of the Simitarq-Celavar soils discussed above in Section 4.1. A cross section of the shallow subsurface in the immediate vicinity of the Old Burn Pit and Landfill Areas is included as Figure 9. Figure 2 shows the location of the cross section. As shown on the cross section, the predominant lithology is silty clay.

Subcropping beneath the Quaternary alluvium is the Triassic Chinle Group (Figure 8). The stratigraphy of the Chinle Group was described in detail for the nearby Fort Wingate quadrangle by Lucas et al, 1997. The Painted Desert Member of the Petrified Forest Formation is the uppermost member of the Chinle Group present in the area of the refinery. The Painted Desert Member is described as reddish-brown and grayish red mudstone with minor beds of resistant, laminated or crossbedded, litharenite. This is consistent with the bedrock encountered at the refinery, as depicted on cross section A-A' (Figure 9). Beneath the Painted Desert Member is the Sonsela Member, which is described by Lucas et al (1997) as gray to yellowish-brown, fine-grained to conglomeratic, crossbedded sandstone. The base of the Sonsela Member is recognized as a basin wide unconformity, which was termed the Tr-4 unconformity (Heckert and Lucas, 1996). The Blue Mesa Member, which underlies the Sonsela Member, is the lowest member of the Petrified Forest Formation. The Blue Mesa Member is described as mostly purple and greenish-gray mudstone.

4.2.2 Hydrogeology

None of the three soil borings completed at SWMUs No. 4 and No. 5 encountered groundwater. Soil boring SWMU 4-1 encountered bedrock (mudstone/claystone) at a depth of 20 feet with a dry sandy clay on top of the bedrock. (Figure 9). Damp soil was observed in gravelly clay at an approximate depth of 17 feet. Soil Boring SWMU 5-1 was drilled to a depth of 20 feet pursuant to the Investigation Work Plan and was terminated in a dry sandy clay. As indicated on Figure 9, the depth to bedrock near SWMU 5-1 may be at depths of 35 to 40 feet. Bedrock was encountered at a depth of 14 feet in SWMU 5-2, with a dry stiff clay overlying the bedrock surface. Damp soil was observed at approximately 12 feet in a clayey gravel layer. The damp soil noted in soil borings SWMU 4-1 and SWMU 5-2 are at a depth similar to the water level depth measured in well OW-56. Well OW-56 is screened in a sandy, gravelly clay. Moisture observed in the gravelly clay/clayey gravel in soil borings SWMU 4-1 and SWMU 5-2 may represent shallow groundwater. Shallow groundwater may be present in the general area of the two SWMUs, but its occurrence is sporadic.

The diverse properties and complex, irregular stratigraphy of the Quaternary alluvium across the refinery cause a wide range of hydraulic conductivity ranging from less than 10^{-2} cm/sec for gravelly sands immediately overlying the Painted Desert Member to 10^{-8} cm/sec in the clay soils located near the surface (Western Refining, 2009). Permeability tests performed on the Quaternary alluvium beneath the nearby Land Treatment Unit (LTU) indicated an average permeability of 1.9E-05 cm/sec (Appendix B). Permeability tests performed on soils in the area of the firewater pond indicated an average permeability of 1.1E-07 cm/sec (Appendix B). Because damp soil was observed in soil borings SWMU 4-1 and SWMU 5-2, it may be representative of shallow groundwater in the area. However, due to the tight clays the presence of groundwater may not be observed in the open boreholes in a timely manner. None of the soil borings were completed as a temporary well so the presence of groundwater cannot be confirmed.

As described above, the bedrock (i.e., Petrified Forest Formation) is mainly composed of low permeability materials (e.g., mudstone) with the exception of the Sonsela Member and some thinner sandstones within the overlying Painted Desert Member. Yield tests, including slug tests and pumping tests have been performed at the refinery to estimate the hydraulic conductivity of the Painted Desert Member (Appendix B). A slug test performed on July 3, 1984 in well OW-4 indicated a hydraulic conductivity of 4.0E-7 cm/sec. A pump test was performed in well OW-24 on February 20, 1985 and it yielded a hydraulic conductivity of 2.5E-7 cm/sec. The Painted Desert Member appears to be a competent aquitard to reduce the potential for downward migration of contaminants from groundwater that may occur within the overlying Quaternary alluvium.

Generally, shallow groundwater at the refinery follows the upper contact of the Chinle Group with prevailing flow from the southeast to the northwest, with some flow potentially to the northeast on the northeastern portion of the refinery property. The Sonsela Member is identified as the uppermost aquifer for RCRA monitoring purposes at the LTU because the overlying groundwater bearing units are not capable of supplying sufficient quantities of groundwater to meet the definitions of an aquifer. Wells completed in a thinner permeable sandstone layer within the Painted Desert Member are also monitored near the LTU as a potential early warning network. The Sonsela's highest point occurs southeast of the site and slopes downward to the northwest as it passes under the refinery. The Sonsela Member forms a water-bearing reservoir with artesian conditions throughout the central and western portions of the refinery property (Western Refining, 2009). Aquifer test of the Sonsela Member conducted northeast of Prewitt indicated a transmissivity of

greater than 100 ft²/day (Stone and others, 1983). Yield tests conducted at the site have shown a much lower hydraulic conductivity of 0.34 ft/day (1.2E-04 cm/sec) (Appendix B).

Sections 2.1 and 2.2 present the historical data collected for SWMU No. 4 and SWMU No. 5, respectively. In SWMU No. 4, two constituents (ethylbenzene and naphthalene) were detected at concentrations above the soil screening levels developed to protect groundwater but less than the residential soil screening level for direct contact. The detections were observed in samples collected between 3 ft bgs and 4.5 ft bgs; samples collected at 6 ft bgs and 10 ft bgs were below detection limits. The samples depths are approximately 10 ft above the observed damp gravelly clay layer.

In SWMU No. 5, arsenic was detected at concentrations above the soil screening levels developed to protect groundwater and was also reported at concentrations above the residential soil screening level for direct contact. The detections occurred between 0 ft bgs and 20 ft bgs. These samples depths are approximately 15 ft above the observed clayey gravel layer. No organic constituents were above any screening standards.

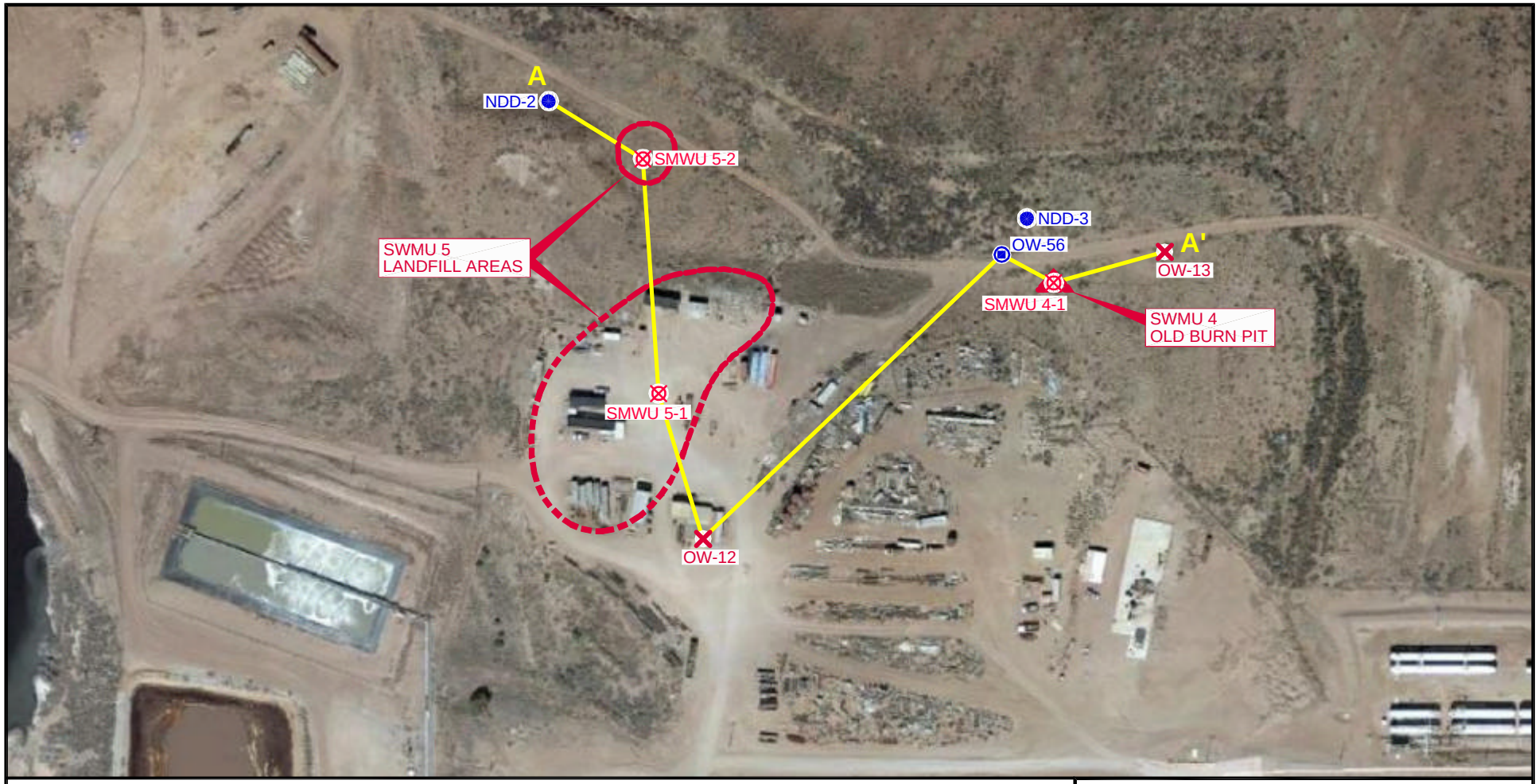
Information regarding the current investigation is presented in Section 4.3.

4.3 Exploratory Drilling Investigations, Soil Sampling and Boring Abandonment

This subsection provides a description of surface and subsurface investigations to define the vertical extent of any impacts to soil and evaluate the presence of and potential for impacts to groundwater. This includes soil field screening results, soil sampling intervals and methods for detection of surface and subsurface impacts in soils.

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

- From the interval in each soil boring with the greatest apparent degree of contamination, based on field observations and field screening;
- From the top of native soil immediately below the presence of any waste materials (e.g., burn residue in the Old Burn Pit or landfill waste in the Landfill Areas);
- From the bottom of each borehole;
- From the 6” interval at the top of saturation (applicable only to borings that reach saturation); and
- Any additional intervals as determined based on field screening results.



Aerial Source: Google Maps, 03/18/2016

LEGEND

SWMU 4-1	2016 SOIL BORING LOCATION AND IDENTIFICATION NUMBER
OW-12	SONSELA MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
NDD-2	TEMPORARY MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
OW-56	ALLUVIUM / CHINLE GP MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
A — A'	LINE OF CROSS-SECTION

N

0 200
SCALE IN FEET

NEW MEXICO
QUADRANGLE LOCATION

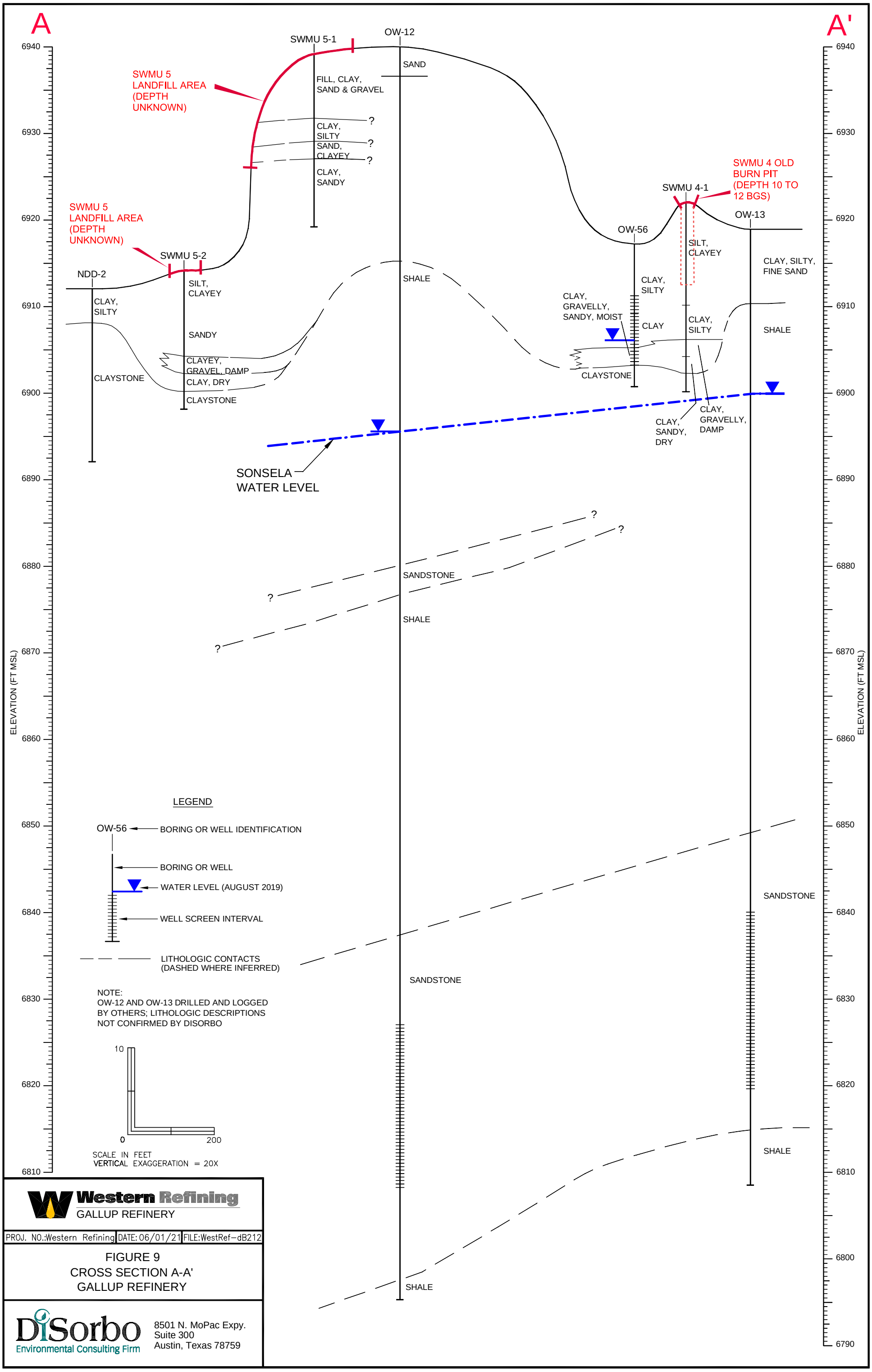
Western Refining
GALLUP REFINERY

PROJ. NO.:Western Refining	DATE:06/01/21	FILE:WestRef-dA154

FIGURE 2

SWMUs No. 4 & No. 5 LOCATION MAP
GALLUP REFINERY

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



Western Refining
GALLUP REFINERY

PROJ. NO.:Western Refining	DATE: 06/01/21	FILE:WestRef-dB212

FIGURE 9
CROSS SECTION A-A'
GALLUP REFINERY

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

Appendix D

Boring Logs

DiSorbo
Environmental Consulting Firm

Western Refining SW, Inc.
Gallup Refinery - North Drainage Ditch
Job No. WEST15005

Geologist	: Tracy Payne
Driller	: Aguirre
Drilling Rig	: CME75
Drilling Method	: 7.25" Hollow-Stem Auger
Sampling Method	: 2" Diameter Split Spoon
Comments	: 2' Long
Total Depth	: 20'
Ground Water	: Not Encountered
Start Date	: 5-11-2015
Finish Date	: 5-11-2015

WELL NO. NDD-2

(Sheet 1 of 1)

Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N35°29.469'
E	: W108°25.724'

Saturation
▼ Saturation

Completion Results

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
0							SILTY CLAY, low, soft to very stiff, damp to dry, reddish brown, no odor,
1	9.7			CL	50		
2							SILTY CLAY, SIMILAR TO ABOVE (STA), very stiff, no odor,
3	14.4			CL	50		
4							CLAYSTONE, low, very stiff, dry, reddish purple, no odor, trace grey,
5	17.1			CLST	50		
6							CLAYSTONE, STA, purple, no odor, very dense,
7	18.0			CLST	50		
8							CLAYSTONE, STA, no odor,
9	14.8			CLST	50		
10							CLAYSTONE, STA, purple and grey, no odor,
11	16.3			CLST	50		
12							CLAYSTONE, STA, no odor,
13	13.5			CLST	50		
14							CLAYSTONE, STA, no odor,
15	12.2			CLST	50		
16							CLAYSTONE, STA, no odor,
17	12.4			CLST	50		
18							CLAYSTONE, STA, no odor.
19	10.8			CLST	50		
20							

08-04-2015 C:\Users\cholmes\Documents\M-Tech\samples\WEST15005\NDD-2.bor

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713-955-1230

8501 N. MoPac Expy, Suite 300
Austin, Texas 78759
512-693-4190

DiSorbo
Environmental Consulting Firm

Western Refining SW, Inc.
Gallup Refinery - North Drainage Ditch
Job No. WEST15005

Geologist	: Tracy Payne
Driller	: Aguirre
Drilling Rig	: CME75
Drilling Method	: 7.25" Hollow-Stem Auger
Sampling Method	: 2" Diameter Split Spoon
Comments	: 2' Long
Total Depth	: 16'
Ground Water	: 10.52' BTOC on 5-14-2015
Start Date	: 5-11-2015
Finish Date	: 5-11-2015

WELL NO. NDD-3

(Sheet 1 of 1)

Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N35°29.612'
E	: W108°25.612'

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
1	14.2			CL	60		SILTY CLAY, low, soft, damp, brown, no odor,
3	12.2			CL	80		SILTY CLAY, SIMILAR TO ABOVE (STA), firm, no odor,
5	14.4			CL	70		SILTY CLAY, STA, no odor,
7	9.9			CH	90		SILTY CLAY, high, firm, damp, light tan and brown, black organics, no odor,
9	10.7			CH	80		CLAY, high, firm, damp, brown trace light tan, no odor,
10				CH	80		CLAY, STA,
11	11.9	▼		SC	80		CLAYEY GRAVELLY SAND, fine grain sand with sandstone gravel and low plastic clay, firm, moist to saturated, brown, no odor,
13	13.9			CLST	50		CLAYSTONE, very stiff, damp to dry, purple grey, no odor,
15	13.5			CLST	50		CLAYSTONE, STA, no odor.

Saturation
▼ Saturation

Completion Results

NDD-3

Top of Casing 2.83' Above Ground Level
2" Sch 40 PVC w/Threaded Joints
Bentonite Pellets
10/20 Sieve Sand Filter Pack
2" Sch 40 PVC Slotted 0.01" Screen w/Threaded Joints
2" Flush Threaded Sch 40 PVC Cap

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DiSorbo
Environmental Consulting Firm

Western Refining SW, Inc.
Gallup Refinery - Well Installations
Job No. WEST16006

Geologist	: Tracy Payne
Driller	: Enviro-Drill, Inc. / Cohagan
Drilling Rig	: CME 75
Drilling Method	: Hollw Stem Auger
Sampling Method	: Split Spoon
Comments	: Hand Augered to 3' BGL
Total Depth	: 16.5' BGL
Ground Water	: »12' BGL
Start Date	: 05/24/2016
Finish Date	: 05/24/2016

WELL NO. OW-56

(Sheet 1 of 1)

Elev., TOC (ft.msl)	: 6920.18
Elev., PAD (ft. msl)	: 6917.79
Elev., GL (ft. msl)	: NA
Site Coordinates	:
N	: N 35° 29' 36.56"
E	: W 108° 25' 36.64"

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
0							SILTY CLAY, low, soft, damp, brown, no odor,
1	10.5			CL	100		
2							SILTY CLAY, SIMILAR TO ABOVE (STA),
3	11.0			CL	100		
4							SILTY CLAY, moderate, firm, damp, brown, no odor,
5	11.4			CL	100		
6							SILTY CLAY, STA, sand/gravel seam at 7.5-7.75' BGL,
7	8.3			CL	100		
8							CLAY, high, firm, damp, brown, no odor,
9	13.6			CH	90		
10							CLAY, STA, traces light tan silt, no odor,
11	16.7			CH	90		
12		▼					GRAVELLY SANDY CLAY, low, firm, moist, yellowish green gravel (sandstone), brown clay, no odor,
13	19.1			CL	50		
14							CLAYSTONE, very stiff, damp to dry, brown, purple and grey, no odor.
15	13.6			CLST	50		
16							
17							

Saturation
▼ Saturation

Completion Results

OW-56

- Steel Protective Casing
- Concrete Pad - 4'x4'x4"
- Grout
- Bentonite Pellets
- 2" Sch 40 PVC w/Threaded Joints
- 10/20 Sieve Sand Filter Pack
- 2" Sch 40 PVC Slotted 0.01" Screen w/Threaded Joints
- 2" Flush Threaded Sch 40 PVC Cap

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State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 34312

CONDITIONS

Operator: Western Refining Southwest LLC 539 South Main Street Findlay, OH 45840	OGRID: 267595
	Action Number: 34312
	Action Type: [UF-DP] Discharge Permit (DISCHARGE PERMIT)

CONDITIONS

Created By	Condition	Condition Date
jburdine	Accepted for Record Retention Purposes-Only	11/22/2022