AP - 111

AGWMR

2017

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
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Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 1, 2020

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

RE: RESPONSE TO COMMENTS JANUARY 29, 2020 APPROVAL WITH MODIFICATIONS, RESPONSE TO APPROVAL WITH MODIFICATIONS 2017 ANNUAL GROUNDWATER MONITORING REPORT
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 *Response to Comments January 29, 2020 Approval with Modifications, Response to Approval with Modifications 2017 Annual Groundwater Monitoring Report* (Response), dated April 17, 2020 and submitted on behalf of Marathon Petroleum Company dba Western Refining Southwest Inc., Gallup Refinery (the Permittee). The Permittee must address the following comment.

Comment 1

The Permittee's response to NMED's *Approval with Modifications* Comment 4, states, "[t]he Work Plan [*SMW-2 and GWM-1 Areas*, dated August 2019] has not been implemented yet, pending review and approval by NMED." The referenced work plan adequately addressed the NMED's comments in the *Disapproval Investigation Work Plan [SMW-2] and [GWM]-1 Areas*, dated February 20, 2019. The work plan presents the location of proposed wells in Figure 5. One of groundwater monitoring wells is proposed to be installed halfway between the eastern

perimeter of pond EP-2 and well GWM-1. The proposed location is appropriate to delineate downgradient extent of the SPH from well GWM-1. NMED hereby issues an approval for the work plan. The Permittee must implement the field investigation in accordance with the approved work plan and submit an investigation report upon completion of the investigation. An approval for the work plan will be issued under separate cover. No response required.

If you have questions regarding this letter, please contact Michiya Suzuki of my staff at 505-476-6046.

Sincerely,

Kevin Pierard
Chief
Hazardous Waste Bureau

cc: 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 2020 File

Marathon Petroleum Company LP

April 17, 2020

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

RE: Second Response to Approval with Modifications
2017 Annual Groundwater Monitoring Report
Marathon Petroleum Company LP, Gallup Refinery
(dba Western Refining Southwest, Inc.)
EPA ID# NMD000333211
HWB-WRG-18-014

Dear Mr. Pierard:

Gallup Refinery is submitting the enclosed response to comments received from NMED on January 29, 2020 regarding Marathon Petroleum Company's (MPC) previous response to NMED's Approval with Modifications of 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
Refinery General Manager

Enclosure

cc D. Cobrain NMED
C. Chavez NMOCD
B. Moore Marathon Gallup Refinery

RESPONSE TO COMMENTS
January 29, 2020 Approval with Modifications, Response to Approval with Modifications 2017 Annual Groundwater Monitoring Report Gallup Refinery
(June 2019)

NMED Comment 1:
NMED's Approval with Modifications Comment 3 states, "[t]he NMED's *Screening Guidance for Human Health Risk Assessments* (Guidance) was updated on February 2019 and the groundwater screening level for unknown oil was revised as 85.8 µg/L. Accordingly, use the updated screening level for DRO and GRO for future reports and work plans." The groundwater screening level for unknown oil was increased from 0.0398 mg/L to 0.0858 mg/Land a groundwater screening level for gasoline (0.0101 mg/L) was established in the 2019 Guidance. The Report is not required to be revised at this time. However, the Permittee must include the groundwater screening level of 0.0101 mg/L for TPH-GRO in all future reports and work plans.

MPC Response 1:
The comment is acknowledged and the new groundwater screening level will be used in future reports and work plans.

NMED Comment 2:
The Permittee's response to NMED's Approval with Modifications Comment 4, Item a, states, "[w]ells OW-61 through OW-65 were installed in 2018 and a separate Well Installation Report has been prepared as requested." The referenced report will be reviewed as a separate submittal. Comments pertaining to the well installations are not included in this correspondence.

MPC Response 2:
The comment is acknowledged.

NMED Comment 3:
The Permittee's response to NMED's Approval with Modifications Comment 4, Item b, states, "[t]he pumps were placed into operation upon receiving NMED's approval on August 6, 2019. However, problems with automated shutoff valves delayed full operation of the pumps and prevented us from completing any useful recovery tests before the pumps had to be removed from service due to freezing temperatures." The Permittee must submit an interim status report no later than 90 days after the recovery system start up. Include the test results in the interim status report.

MPC Response 3:
The comment is acknowledged.

NMED Comment 4:
The Permittee's response to NMED's Approval with Modifications Comment 4, Item d, states, "[o]n the morning of October 21st, 0.19 feet of SPH was measured in GWM-1 and approximately eight ounces of product [were] removed with a bailer. The fluid levels were measured through the afternoon of October 21st with only 0.02' recovering to the well. By the end of the second day, the product thickness had returned to 0.19'." SPH is persistent in the vicinity of GWM-1. SPH may be migrating downgradient from the aeration lagoons. The downgradient extent of the SPH must be delineated. The Permittee proposed to install a monitoring well halfway between the eastern perimeter of pond EP-2 and well GWM-1 in the *Investigation Work Plan SMW-1 [sic] and GMW-1*

[sic] Areas, dated September 2018. Provide information regarding the current status of the investigation in a response letter.

MPC Response 4:
The referenced Investigation Work Plan, which was originally submitted in September 2018 as noted, was revised in August 2019 and resubmitted to NMED on October 1, 2019. A copy of the FedEx delivery receipt is attached. The Work Plan has not been implemented yet, pending review and approval by NMED.

NMED Comment 5:
The Permittee's response to NMED's Approval with Modifications Comment 7 states, "[t]he values in Table 2.1 are correctly labelled and are reported in% dissolved oxygen, which is the units used at the time the measurements were recorded in 2017." The instrument used to collect the dissolved oxygen data was YSI Model 556 MPS Multi Probe System according to the 2017 Report. The manual for the instrument shows the reporting unit for DO readings as mg/L, rather than %DO. Regardless, all future DO data must be reported as mg/L, rather than %DO.

MPC Response 5:
The comment is acknowledged.

NMED Comment 6:
The Permittee's response to NMED's Approval with Modifications Comment 15 states, "MPC desires to submit the discussion in a separate submittal, as NMED notes, the evaluation of natural attenuation of chlorinated solvents pertains to a much larger area than just in the immediate vicinity of OW-10." NMED concurs with the Permittee' s response. In the response letter, provide the date when the discussion will be submitted to NMED.

MPC Response 6:
The evaluation of natural attenuation is anticipated to be completed by June 30, 2020 and it is anticipated the report will be submitted in July 2020.

NMED Comment 7:
The Permittee's response to NMED's Approval with Modifications Comment 17 states, " [t)he relationship between %DO and Mg/l is complex involving barometric pressure, salinity and temperature. We refer you to the United States Geological Survey's website for possible methods to make such corrections if NMED desires to pursue this further; https://water.usgs.gov/admin/ memo/QW/qw81.11.html and https://water.usgs.gov/admin/memo/QW/qw81.15.html." The referenced websites do not provide the explanation for the relationship between %DO and mg/L. All future DO data must be reported as mg/L, rather than %DO (see Comment 5).

MPC Response 7:
The comment is acknowledged.

Allie Sheftall

From: TrackingUpdates@fedex.com
Sent: Tuesday, October 1, 2019 10:33 AM
To: Allie Sheftall
Subject: FedEx Shipment 776374569927 Delivered

Your package has been delivered

Tracking # 776374569927

Ship date:
Mon, 9/30/2019

Scott Crouch
DiSorbo Consulting
AUSTIN, TX 78759
US

Delivered

Delivery date:
Tue, 10/1/2019 9:29 am

John Kieling, Chief
NM Environment Dept Haz Waste Burea
2905 Rodeo Park Drive East
Bldg 1
SANTA FE, NM 87505
US

Shipment Facts

Our records indicate that the following package has been delivered.

Tracking number:	776374569927
Status:	Delivered: 10/01/2019 09:29 AM Signed for By: M.JUAREZ
Reference:	WEST19039: SMW-2/Boundary Well
Signed for by:	M.JUAREZ
Delivery location:	SANTA FE, NM
Delivered to:	Receptionist/Front Desk
Service type:	FedEx Priority Overnight®
Packaging type:	Your Packaging
Number of pieces:	1
Weight:	10.00 lb.
Special handling/Services:	Deliver Weekday
Standard transit:	10/1/2019 by 10:30 am

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
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Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

January 29, 2020

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

RE: RESPONSE TO APPROVAL WITH MODIFICATIONS
SECOND RESPONSE TO COMMENT NO. 39 ON 2017 ANNUAL GROUNDWATER 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 *Response to Approval with Modifications Second Response to Comment 39 on 2017 Annual Groundwater Monitoring Report (dated March 21, 2019)* (Response), dated December 9, 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 Approval with Modifications Comment 2 states, "[t]he excavations were completed by the Refinery Maintenance group as a quick temporary measure to assess potential release locations and the excavations subsequently were backfilled without measuring the depth or dimensions." Unless the information regarding the depth and dimensions of the excavations are provided, NMED will not be able to evaluate the viability of

the investigation. During future investigations, ensure data is collected regarding the depth and dimensions of excavations. No response required.

Comment 2

The Permittee's response to NMED's Approval with Modifications Comment 4 states, "[t]he comment is acknowledged and MPC understands the purpose of the work completed at the time was focused on gathering information to help identify the source of the release and there was no immediate effort made to delineate the extent of hydrocarbon in soils." The extent of hydrocarbons associated with the discharge of hydrocarbons from the drain line to the STP-1 French drain must be investigated. Submit a work plan to investigate the extent of hydrocarbons related to the drain line to the STP-1 French drain no later than **June 30, 2020**.

Comment 3

The Permittee's response to NMED's Approval with Modifications Comment 5 states, "[w]e have not been able to confirm what the red and green colors shown on the map represent." The red may represent the presence of hydrocarbons. Although the Permittee's response to NMED's Approval with Modifications Comment 3 states, "[h]ydrocarbons were not present in excavation #10," the figure depicting the excavations highlighted excavations #9 and #10 in red and the rest of the excavations in green. The Permittee must keep all records of findings for future investigations. No response required.

Comment 4

The Permittee's response to NMED's Approval with Modifications Comment 8 states, "[a]dditionally, as the NMED is aware, MPC recently conducted a Laser Induced Fluorescence (LIF) study in the tank farm area in an effort to identify potential sources of hydrocarbons in the subsurface. A report documenting these activities will be provided to the NMED upon completion." Unless the sources of hydrocarbons in the vicinity of the French drain were identified through the LIF study and appropriately documented in the referenced report, the sources of hydrocarbons must be investigated. Submit a work plan to investigate the sources of hydrocarbons no later than **June 30, 2020**, if necessary.

The Permittee must address all comments in this letter and submit a work plan required by Comments 2 and 4 no later than **June 30, 2020**.

If you have questions regarding this Approval with Modifications, please contact Michiya Suzuki of my staff at 505-476-6059.

Sincerely,

Kevin Pierard
Chief
Hazardous Waste Bureau

cc: 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 2020 File

Marathon Petroleum Company LP

December 9, 2019

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

RE: Response to Approval with Modifications
Second Response to Comment No. 39 on 2017 Annual Groundwater Monitoring Report (Dated March 21, 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 Approval with Modifications dated October 18, 2019 on the referenced Comment 39 on the 2017 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
Refinery General Manager

Enclosure

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

92 Giant Crossing Road
Jamestown, NM 87347

RESPONSE TO APPROVAL WITH MODIFICATOINS
October 18, 2019 Comments on the Second Response to Comment No. 39 on 2017 Annual Ground Water Monitoring Report (Dated March 27, 2019)

NMED 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.

MPC Response 1:
Enclosed you will find a figure showing the location of the French drain on the east side of STP-1 and the drain line, which drains the water that accumulates in the French drain as well as storm water collected in the area of the wastewater treatment plant.

NMED 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.

MPC Response 2:
The excavations were completed by the Refinery Maintenance group as a quick temporary measure to assess potential release locations and the excavations subsequently were backfilled without measuring the depth or dimensions.

NMED 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.

MPC Response 3:
Hydrocarbons were not present in excavation #10.

NMED 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.

MPC Response 4:
The comment is acknowledged and MPC understands the purpose of the work completed at the time was focused on gathering information to help identify the source of the release and there was no immediate effort made to delineate the extent of hydrocarbon in soils.

NMED 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.

MPC Response 5:
The purple color shown at the boreholes #1, #2, and #3 indicates the presence of hydrocarbons. We have not been able to confirm what the red and green colors shown on the map represent.

NMED 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.

MPC Response 6:
The storm drains were checked and as noted in response #5 above we have been able to confirm that the use of the color purple on the map indicates the presence of hydrocarbon. Apparently, at the time the map was prepared hydrocarbons were not found to be present in the storm drains.

NMED 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.

MPC Response 7:
The hand excavations were completed in a random manner as a quick check to see if hydrocarbon could be identified at shallow depths along the drainage pathway east of STP-1 and as such, the locations were not recorded. The general area of the hand excavations is shown on the enclosed figure. Similarly, the locations of the hand excavations near the listed tanks were not recorded, but their general locations are shown on the enclosed figure.

NMED 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.

MPC Response 8:
At this time, there is not sufficient information to explain the distribution of hydrocarbons observed near the French drain. If oily water drain lines are "leaky", then this could be a source of hydrocarbon contamination. However, this has not been observed to-date near the French drain, but was identified as a potential source in the far southwestern corner of the tank farm. In association with the interim measures at the Hydrocarbon Seep Area, dye tracer testing conducted in May 2016 on the oily water drain lines on the south side of the tank farm (western end) confirmed a potential source (see the July 2016 Interim Measures Report Hydrocarbon Seep Area).

Additionally, as the NMED is aware, MPC recently conducted a Laser Induced Fluorescence (LIF) study in the tank farm area in an effort to identify potential sources of hydrocarbons in the subsurface. A report documenting these activities will be provided to the NMED upon completion.

NMED 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.

MPC Response 9:
The comment is acknowledged.

OHE

STP – 1

EP – 1

NORTH

Approx #DPE liners. 2ea w/ rock between.

3ea Perforated 4" dia PVC pipe

Solid 4" dia PVC pipe

08/08/17

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

0 200
SCALE IN FEET

NEW MEXICO

GALLUP SITE LOCATION

LEGEND

OW-61 ● FRENCH DRAIN RELEASE MONITORING WELL LOCATION AND IDENTIFICATION NUMBER

SB-FD-1 ⊗ SOIL BORING LOCATION AND IDENTIFICATION NUMBER

GENERAL AREA OF HAND EXCAVATION

MARATHON PETROLEUM COMPANY
GALLUP REFINERY

PROJ. NO.: Marathon | DATE: 12/03/19 | FILE: Mathon-dB234

HAND EXCAVATION LOCATION MAP

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

Marathon Petroleum Company LP

November 12, 2019

Mr. John E. Kieling, Chief
New Mexico Environmental Department
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, NM 87505-6303

RE: Response to Approval with Modifications
2017 Annual Groundwater Report
OW-61 Through OW-65 Well Installation Report
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 August 23, 2019 on the referenced Groundwater Report and the *OW-61 Through OW-65 Well Installation 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
Refinery General Manager

Enclosure

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

92 Giant Crossing Road
Jamestown, NM 87347

RESPONSE TO COMMENTS
August 23, 2019 Approval with Modifications, Response to Disapproval Annual Groundwater Monitoring Report Gallup Refinery - 2017
(June 2019)

NMED Comment 1:
The Permittee's response to NMED's Disapproval Comment 1 states, "MPC does not concur with MED's recommendation that three sets of nested wells should be installed in locations 1,500 feet, 2,000 feet and 2,500 feet west of pond EP-9 ... " To clarify, the Permittee is responsible for delineating the extent of groundwater contamination even if constituent concentrations do not exceed applicable standards, if constituents are detected above detection limits. The contaminant concentrations have been detected below the applicable standards in groundwater samples collected from well OW-1. Since there are no groundwater monitoring wells west of well OW-1, the extent of the plumes is not currently delineated and must be investigated. The Permittee must evaluate whether the plume is expanding further west and potentially off-site. Propose to submit a work plan to investigate the extent of the contaminant migration in the Sonsela west of well OW-1 in a response letter. Also, refer to Comment 6 in NMED's *Approval with Modifications Response to Disapproval Work Plan 2015 Annual Groundwater Report Comments.*

MPC Response 1:
The request for additional wells west of OW-10 was also included in NMED's comments on the Work Plan that was prepared to address comments received on the 2015 Annual Groundwater Monitoring Report. This was most recently addressed in the response to Comment 9c, which responded to NMED's letter of August 23, 2019 *Second Disapproval Work Plan 2015Annual Groundwater Monitoring Report* (HWB -WRG-18-012). See the October 2019 revision to *Work Plan 2015 Annual Groundwater Report Comments*, which includes additional wells west of OW-1.

We note that as explained in the referenced response, the new well locations are approximately 500 feet down-gradient of OW-1 and not 1,500, 2,000, and 2,500 feet west of OW-1. MPC recently received comments from NMED on the investigation in the area of the North Drainage Ditch wherein NMED stated that it did not make sense to install additional down-gradient wells as proposed along the abandoned runway, as apparently the locations were too far down-gradient. Those locations ranged from approximately 170 feet down-gradient of NDD-16 and OW-52, up to approximately 850 feet down-gradient of NDD-4 and NDD-6. If those proposed locations were too far down-gradient in NMED's opinion, then we are uncertain why it would make sense to step out 1,500 feet, 2,000, and 2,500 feet down-gradient of OW-1. Therefore, we proposed locations approximately 500 feet down-gradient of OW-1 as a compromise between the minimum of 1,500 feet as directed in this letter and the maximum spacing of 200 feet as NMED required at the North Drainage Ditch area.

NMED Comment 2:
The Permittee's response to NMED's Disapproval Comment 3 states, "[t]he revised work plan will address Comment 8 in NMED's Disapproval Investigation Work Plan [SMW-2] and [GWM-1] Areas, dated February 20, 2019. At the time of this letter sent out, the document was not yet submitted. Submit the revised work plan or submit an extension request in accordance with Permit Section I.J.12.

MPC Response 2:
The subject Investigation Work Plan was revised and submitted to NMED on 8/14/2019.

NMED Comment 3:
The Permittee's response to NMED's Disapproval Comment 4 states, "Tables 8.1.1, 8.2.1, 8.3.1, 8.4.1, 8.5.1, 8.6, 8.7.1, 8.8.1, 8.9.1, 8.10, 8.11.1, 8.12.1, 8.13.1, 8.14, 8.16, and 8.17.1 were revised with the

screening level of 0.0398 mg/L for DRO and GRO." The NMED's *Screening Guidance for Human Health Risk Assessments* (Guidance) was updated on February 2019 and the groundwater screening level for unknown oil was revised as 85.8 µg/L. Accordingly, use the updated screening level for DRO and GRO for future reports and work plans. No revision is necessary.

MPC Response 3:
The comment is acknowledged.

NMED Comment 4a:
The Permittee's response to NMED's Disapproval Comment 5 states, "[o]n May 13, 2019, MPC submitted an email to NMED discussing the collection of field measurements, SPH samples, and groundwater samples." Resolve the following issues regarding the May 13, 2019 email:

> The email states, "[p]ursuant to recent requests from NMED and OCD, which are provided in the attached file, NMED Comments Requesting SPH Analyses, with the relevant sections underlined, Marathon recently collected samples of separate phase hydrocarbon (SPH) that was present in monitoring wells located in the tank farm or to the west near the former Aeration Basin. This included GMW-1, NAPIS-1, RW-1, RW-5, RW-6, OW-61, and OW-65 and a sample of SPH was collected from the discharge from the French drain at the STP-1." Figure 6 (Facilities and Well Groups - 2017) does not depict well OW-61 or OW-65; provide a figure showing the location of the wells. If these wells were installed prior to 2018, revise the Report to include all data collected from the wells. In addition, provide a reference to the information regarding the installation of these wells, if previously submitted. Otherwise, submit a report that presents information regarding the well installations to NMED no later than **November 8, 2019.**

MPC Response 4a:
Figure 6 (Facilities and Well Groups – 2017) does not show the location of wells OW-61 through OW-65, as these wells did not exist in 2017. Wells OW-61 through OW-65 were installed in 2018 and a separate Well Installation Report has been prepared as requested. The requested figure is included in the Well Installation Report, which is enclosed.

NMED Comment 4b:

> The email states, "[n]ew pumps have been installed in recovery wells RW-1, RW-5 and RW-6 and Marathon plans to use these pumps to conduct the requested yield tests upon approval by NMED and OCD to initiate recovery with the new pumps." NMED's Disapproval Comment 5 states, "[i]f SPH is present in 2018, purge the well completely, and check the well [NAPIS-1] regularly and report to NMED and OCD by email whether SPH returns to the well and if SPH is present, then report the length of time it takes for the SPH to return." The *Response to Disapproval (Response to Approval with Modifications May 1, 2019) Interim Groundwater Recovery System Work Plan* was approved on August 6, 2019. Accordingly, the Permittee may initiate the test on recovery wells RW-1, RW-5 and RW-6. Submit a report summarizing the test results no later than **December 6, 2019.**

MPC Response 4b:
The pumps were placed into operations upon receiving NMED's approval on August 6, 2019. However, problems with automated shutoff valves delayed full operation of the pumps and prevented us from completing any useful recovery tests before the pumps had to be removed from service due to freezing temperatures.

NMED Comment 4c:

The email states, "[a] similar product (gasoline, which appears pretty fresh) is shown to be present at NAPIS-1, the French drain sample, RW-5, RW-6, and RW-1. A slightly different material (gasoline with some diesel) is represented by the samples collected at OW-61 and OW-65, which were both installed in the central portion of the Tank Farm when the SPH was first detected in the discharge from the French drain. A notably different material (diesel to motor oil range) was found to be present in GWM-1." According to the chromatograms included in the email, the SPH collected from OW-61 is also similar to SPH collected from NAPIS-1, French Drain, RW-5, RW-6 and RW-1. The SPH collected from OW-65 and GWM-1 predominantly contain diesel range organics; however, each SPH appears to originate from a different source.

MPC Response 4c:

The comment is acknowledged.

NMED Comment 4d:

The email includes the results of NAPIS-1 and GWM-1 bail down test conducted April 2019. A small amount of SPH returned to the wells after the test was completed. Conduct the bail down test again if SPH is still present in the wells and submit a report summarizing the test results no later than **December 13, 2019.**

MPC Response 4d:

The requested additional bail down tests were conducted on October 21, 2019. The field measurements of recovered product and fluids are provided on the table below. On the morning of October 21st, 0.2 feet of SPH was measured in NAPIS-1 and slightly less than 16 ounces of product was removed with a bailer. The fluid levels were measured through the afternoon of October 22nd with only 0.09' recovering to the well. On the morning of October 21st, 0.19 feet of SPH was measured in GWM-1 and approximately eight ounces of product was removed with a bailer. The fluid levels were measured through the afternoon of October 21st with only 0.02' recovering to the well. By the end of the second day, the product thickness had returned to 0.19'.

Well Id	Date	Time	Depth to SPH (ft-btoc)	Depth to Water (ft-btoc)	SPH Thickness (ft)
NAPIS-1	10/21/2019	8:55	7.66	7.86	0.2
	10/21/2019	9:09	ND	8.53	0.00
	10/21/2019	10:10	7.70	7.78	0.08
	10/21/2019	11:47	7.71	7.80	0.09
	10/21/2019	13:21	7.70	7.78	0.08
	10/21/2019	15:10	7.70	7.79	0.09
	10/21/2019	17:00	7.70	7.79	0.09
	10/22/2019	8:15	7.75	7.83	0.08
	10/22/2019	17:34	7.72	7.81	0.09
GWM-1	10/21/2019	9:19	20.64	20.83	0.19
	10/21/2019	9:43	ND	23.41	0.00
	10/21/2019	10:29	22.71	22.72	0.01
	10/21/2019	11:54	22.63	22.64	0.01

	10/21/2019	13:30	22.59	22.61	0.02
	10/21/2019	15:18	22.55	22.57	0.02
	10/21/2019	17:09	22.50	22.52	0.02
	10/22/2019	8:22	22.10	22.26	0.16
	10/22/2019	17:38	21.95	22.14	0.19

ND - not detected
ft-btoc – feet below top of casing

NMED Comment 5:
The Permittee's response to NMED's Disapproval Comment 14 states, "Figure 18 has been added to the report and depicts the flow path of wastewater from evaporation pond EP-2 through the last evaporation ponds." Figure 18 is not included in the Report. Provide the figure with the response letter.

MPC Response 5:
The new Figure 18 is enclosed.

NMED Comment 6:
The Permittee's response to NMED's Disapproval Comment 17 states, "[t]he only line that is underground is a portion of the line that feeds to tanks T-27, T-28 and T-35." NMED's Disapproval Comment 17 states, "[explain] how deep the pipe is buried in the revised Report." The Permittee did not provide the information, provide the pipe depth in the response letter.

MPC Response 6:
The depth to the pipeline is unknown.

NMED Comment 7:
The Permittee's response to NMED's Disapproval Comment 19 states, "[i]ncluded in the revised Report is Table 2.1 which summarizes the final water quality readings collected in 2017." According to Table 2.1, dissolved oxygen (DO) is still reported as a percent (%). The Permittee's September 30, 2018 *Response to Comments Disapproval 2015 Annual Ground Water Monitoring Report* explained that the DO reporting unit (%) was intended to be milligrams per liter (mg/L). In the response letter, provide a clarification on the unit of the DO readings. If the unit of DO is in mg/L, the measurement is not reliable because several values of DO exceeded the solubility limit of oxygen at the given temperature.

MPC Response 7:
NMED refers to a response to comments dated September 30, 2018 on the 2015 *Annual Ground Water Monitoring Report*, while this Table 2.1 provides information for the 2017 *Annual Ground Water Monitoring Report*. The values in Table 2.1 are correctly labelled and are reported in % dissolved oxygen, which is the units used at the time the measurements were recorded in 2017.

NMED Comment 8:
The Permittee's response to NMED's Disapproval Comment 20 states, "Figure 18 has been added to the report and depicts sampling locations for the evaporation ponds." Figure 18 is not included in the Report. Provide the figure with the response letter.

MPC Response 8:
Figure 18 is enclosed.

NMED Comment 9:
The Permittee's response to NMED's Disapproval Comment 22 states, "[t]herefore, it is generally only possible to perform nitrate/nitrite analysis which has a longer holding time (28 days). So, the type of analysis is dependent upon the ability of the lab to meet the holding time requirements. It has nothing to do with MPC requesting alternate analytical methods." The Permittee must propose to conduct separate nitrate and nitrite analyses in the response letter. Nitrate samples may be submitted to the analytical laboratory; however, nitrite must be analyzed on site using appropriate field test kits.

MPC Response 9:
MPC has already addressed the inclusion of separate analyses for nitrate and nitrite incorporating the use of field test kits. See the response to Comment 18 in the September 11, 2019 Response to Disapproval Facility-Wide Ground Water Monitoring Work Plan – Updates for 2019.

NMED Comment 10:
The Permittee's response to NMED's Disapproval Comment 27 states, "[i]f it appears that the capture zone does not adequately prevent the migration of impacted groundwater, a new well [north of OW-52] will be proposed at that time." Since the proposed groundwater recovery system is not designed to depress the water table in contiguous areas and is expected to influence only localized areas around the extraction wells, the extent of MTBE plume will not likely be affected by the system. As stated by NMED in Disapproval Comment 27, groundwater samples collected from OW-52 are consistently demonstrating an increase in MTBE concentrations and there are no wells located downgradient. This comment also applies to the response to NMED's Disapproval Comment 28. If the Permittee cannot demonstrate control of contaminant migration, a work plan must be submitted to install additional monitoring wells.

MPC Response 10:
The comment is acknowledged.

NMED Comment 11:
The Permittee's response to NMED's Disapproval Comment 32 states, "[a] discussion on the analyses for EDB has been added to Section 6.4.2." The referenced revision in Section 6.4.2 was not identified in the RLSO version of the revised Report and it appears Section 6.4.2 was not revised. Provide a replacement page that includes the revision. In addition, the Permittee's response further states, "the 2019 *Facility-wide Groundwater Work Plan* was submitted to NMED on May 10, 2019 and it includes the analysis for samples collected at OW-1 and OW-10." NMED's Disapproval Comment 32 states, "if EDC was newly detected in groundwater samples collected from wells during 2017 and EDB analysis was not yet proposed for the wells in the *2018 Facility-wide Groundwater Work Plan,* propose to conduct EDB analysis using EPA Method 8011 in the *2019 Facility-wide Groundwater Work Plan."* The Permittee's response does not sufficiently address NMED's comment. Explain whether or not EDC was newly detected in groundwater monitoring well(s) where EDB analysis using EPA Method 8011 has not been conducted in the response letter.

MPC Response 11:
Section 6.4.2 has been revised (see enclosed replacement page #40 and redline copy showing changes). We do not find any examples of where EDC was newly detected in 2017 where the sample was not already included for analysis of EDB by Method 8011.

NMED Comment 12:
The Permittee's response to NMED's Disapproval Comment 36 states, "[t]he wells where the exceedances were detected are identified in Section 6.5 of the revised Report." Section 6.5 (Constituent Levels in Group E Monitoring Wells) identifies many wells where chlorinated solvents were detected. The

Permittee must analyze groundwater samples collected from all monitoring wells where chlorinated solvents have been detected within the past ten years for 1,4-dioxane using EPA Method 8270 Selective Ion Monitoring (SIM). Propose to analyze for 1,4-dioxane for two consecutive events in the upcoming revision of the Interim Facility-Wide Groundwater Monitoring Plan.

MPC Response 12:
The comment is acknowledged and the revision will be included in the 2020 updates to the Facility-Wide Groundwater Monitoring Plan.

NMED Comment 13:
The Permittee's response to NMED's Disapproval Comment 37 states, "[t]he Report has been revised to include the discussion regarding the exceedance of e-coli concentration in the samples collected from ponds EP-2, EP-3, EP-4, and EP-12B." The referenced revision was not identified in the Report. Provide a replacement page that includes the discussion regarding the exceedance of e-coli concentrations.

MPC Response 13:

The requested revision is included in Section 6.7.1 (page 46 and 47 to maintain page spacing). The replacement pages and redline showing changes are enclosed. Is it noted that the criteria used for comparison are from 20 NMAC 6.2.2101 and are general requirements applicable to a discharge to a watercourse.

20 NMAC 6.2.2101 - GENERAL REQUIREMENTS:
A. Except as otherwise provided in Sections 20.6.2.2000 through 20.6.2.2201 NMAC, no person shall cause or allow effluent to discharge to a watercourse if the effluent as indicated by:
(1) any two consecutive daily composite samples;
(2) more than one daily composite sample in any thirty-day period (in which less than ten (10) daily composite samples are examined);
(3) more than ten percent (10%) of the daily composite samples in any thirty-day period (in which ten (10) or more daily composite samples are examined); or
(4) a grab sample collected during flow from an intermittent or infrequent discharge does not conform to the following:
(a) Bio-chemical Oxygen Demand (BOD) Less than 30 mg/l
(b) Chemical Oxygen Demand (COD) Less than 125 mg/l
(c) Settleable Solids Less than 0.5 mg/l
(d) Fecal Coliform Bacteria Less than 500 organisms per 100 ml
(e) pH, Between 6.6 and 8.6.

NMED Comment 14:
The Permittee's response to NMED's Disapproval Comment 40 states, "[a)dditional explanation needs to be added to Section 7.3." The referenced additional explanation was not identified in the Report. Provide a replacement page that includes the additional explanation.

MPC Response 14:
After further review, none of the related inspections of tanks and underground piping occurred during the subject reporting period of 2017. These actions were completed in 2018 after SPH was discovered in the French drain at STP-1. No revision is made to Section 7.3.

NMED Comment 15:
NMED's Disapproval Comment 41 required the Permittee add discussion regarding chlorinated solvents and daughter products. The Permittee's response states, "(a)s OW-10 is downgradient of the larger Hydrocarbon Seep area, this will be part of the evaluation of natural attenuation throughout this area." The response needs clarification. NMED's comment was not meant to focus solely on OW-10, but all wells containing chlorinated solvents. Groundwater monitoring wells where chlorinated solvents and their degradation products were detected must be included as part of an evaluation of natural attenuation. Since the discussion was not provided in the revised Report, provide the discussion and existing data to support the discussion in the response letter. Alternatively, the Permittee may provide the discussion in a separate submittal.

MPC Response 15:
MPC desires to submit the discussion in a separate submittal, as NMED notes, the evaluation of natural attenuation of chlorinated solvents pertains to a much larger area than just in the immediate vicinity of OW-10. In addition to OW-10, which is completed in the Sonsela aquifer, we believe it would also make sense to include wells completed in the Alluvium/Chinle Interface zone that also have had detections of chlorinated solvents. This of course will be a significant undertaking and beyond the current effort of preparation of the 2017 Annual Ground Water Monitoring Report.

NMED Comment 16:
The Permittee's response to NMED's Disapproval Comment 46 states, "[t]he revised figures are included in the report." As required, most groundwater elevation figures depicted in Figures 11A through 11J are correctly revised to include ground surface, groundwater and SPH elevations. However, some figures (e.g., for MKTF-09, MKTF-10) do not include ground surface elevations. Correct these figures and provide revised figures or explain why ground surface elevations are not included in these figures.

MPC Response 16:
The additional elevations requested by NMED (i.e., ground surface and SPH elevations) to help evaluate the SPH smear zone are included for wells that have measurable SPH. Wells such as MKTF-04 and MKTF-09 referenced by NMED do not have measurable SPH and the additional elevation information was not added to these figures. This was explained in Section 5 (page 24) of the revised Report.

NMED Comment 17:
The Permittee's response to NMED's Disapproval Comment 48 states, "[w]e are not aware of previous comments on this monitoring report addressing the units for dissolved oxygen." The Permittee's *Response to Comments Disapproval 2015 Annual Ground Water Monitoring Report,* dated September 30, 2018 states, "[a]lthough the sampling form indicates that the units of dissolved oxygen are"%", it is actually recorded in mg/L. Gallup Refinery will request that the form be modified to reflect the units as mg/L." Accordingly, insert a note for the corrected DO unit in the field forms in Appendix B and provide a replacement Appendix B. Additionally, refer to Comment 7 above.

MPC Response 17:
The comment to which NMED refers regarding the *2015 Annual Ground Water Monitoring Report* is dated September 30, 2018. This is well after the field measurements were recorded in 2017 in % DO and we cannot now go back in time and reliably report the field readings in different units. The relationship between % DO and Mg/l is complex involving barometric pressure, salinity and temperature. We refer you to the United States Geological Survey's website for possible methods to make such corrections if NMED desires to pursue this further; https://water.usgs.gov/admin/memo/QW/qw81.11.html and https://water.usgs.gov/admin/memo/QW/qw81.15.html.

We note that some corrections were made to the field sheets in Appendix B, where an error was identified after rechecking each sheet. There were only a few of these corrections. As an example, see the log sheet for the 1st QTR 2017 for OW-1. As noted on this form, the measurements for DO in % were inadvertently recorded in the column for ORP and the ORP measurements were shown in the DO column. We marked the forms, as necessary, to correct these errors.

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

N

0 500

SCALE IN FEET

LEGEND

SAMPLE LOCATION

FLOW DIRECTION

UNDERGROUND LINE

NEW MEXICO

SITE LOCATION

MARATHON PETROLEUM COMPANY
GALLUP REFINERY

PROJ. NO.: Marathon	DATE: 06/26/19	FILE: Mathon-dA162

FIGURE 18
EVAPORATION PONDS
FLOW PATH OF WASTEWATER
AND SAMPLING LOCATIONS

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OW-61 Through OW-65 Well Installation Report

Marathon Petroleum Company LP

Gallup Refinery
Marathon Petroleum Company
Gallup, New Mexico

EPA ID# NMD000333211

NOVEMBER 2019

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Appendices

List of Acronyms

API	American Petroleum Institute
bgl	below ground level (bgl)
btoc	below top of casing
DRO	diesel range organics
EPA	Environmental Protection Agency
HSA	hollow-stem auger
IDW	investigation derived waste
MCL	maximum contaminant level
msl	mean sea level
MW	monitor well
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
RCRA	Resource Conservation and Recovery Act
PID	photoionization detector
PPM	parts per million
PVC	polyvinyl chloride
SPH	separate phase hydrocarbon
SVOC	semi volatile organic compound
SWMUs	Solid Waste Management Units
TPH	total petroleum hydrocarbon
TCLP	toxicity characteristic leaching procedure
USCS	unified soil classification system
VOC	volatile organic compound
WQCC	Water Quality Control Commission

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 report documents installation of wells OW-61, OW-62, OW-63, OW-64, and OW-65. These wells were installed in March 2018 on a voluntary basis after hydrocarbons were observed in the French drain near the pond STP-1.

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 property covers approximately 810 acres. Figure 1 presents the refinery location and the regional vicinity, which is characterized as high desert plain comprised primarily of public lands used for grazing by cattle and sheep.

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, isomerization, sulfur recovery, merox treater, and hydrotreating. Current and past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, and residual fuel.

The locations of the new observation wells (OW-61, OW-62, OW-63, OW-64, and OW-65) are shown on Figure 2. These wells were installed on a voluntary basis without prior approval of a specific Work Plan in order to determine the possible presence of separate-phase hydrocarbon (SPH) in the vicinity of the tank farm after SPH was found in the discharge from the French drain located near STP-1. The occurrence of SPH was identified on February 6, 2018. The associated Form C-141 is provide in Appendix D. The wells were installed in March 2018.

Section 2
Background

After the discovery of SPH near STP-1, Andeavor began an effort to locate the source for SPH and as STP-1 is located down-gradient of the tank farm, the tank farm became the immediate focus. Six locations were selected as shown on Figure 1 for the installation of soil borings to search for the presence of SPH. Five of the locations yielded groundwater and permanent wells were installed at these locations (OW-61, OW-62, OW-63, OW-64, and OW-65). The sixth location (SB-FD-1) north of STP-1 did not yield water after being left open for two days and was plugged on March 9, 2018.

Section 3
Scope of Activities

3.1 Monitor Well Installation

Five permanent monitoring wells were installed throughout the western half of the tank farm and to the west on the north side of the Wastewater Treatment Plant (Figure 2). The following list provides a summary of the five permanent wells advanced using hollow stem augers:

- OW-61; screened from 8 feet below ground level (bgl) to 28 feet bgl;
- OW-62; screened from 8 feet bgl to 28 feet bgl;
- OW-63; screened from 9 feet bgl to 29 feet bgl;
- OW-64; screened from 4 feet bgl to 24 feet bgl; and
- OW-65; screened from 17 feet bgl to 37 feet bgl.

After installation and development, all wells were gauged and checked for the presence of SPH. The initial fluid level measurements are summarized in Table 1. SPH was present in OW-61 (0.09 feet) and OW-65 (0.20 feet). Groundwater samples were not collected for chemical analysis.

3.2 Collection and Management of Investigation Derived Waste

Drill cuttings, excess sample material and decontamination fluids, and all other investigation derived waste (IDW) associated with the installation of the permanent wells were contained and characterized using methods based on the boring locations and type of contaminants suspected or encountered. All drill cuttings generated during the boundary well installations were collected and placed into 55-gallon drums. All purge water and decontamination water was disposed in the refinery wastewater system upstream of the API Separator.

3.3 Surveys

A global positioning system receiver was used to record the coordinates of each permanent monitor well. These coordinates were recorded on the field boring logs. Surveys were completed by a registered land surveyor for the five permanent wells to include geographic position and surface elevations.

Section 4
Field Investigation Results

This section provides a summary of the installation of the permanent monitoring wells.

4.1 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 6,860 feet to 7,040 feet above mean sea level (msl). The surface elevation in the western portion of the tank farm generally ranges from 6,937 to 6,956 feet above mean seal level.

Surface soils within most of the area of investigation are primarily Simitarq-Celavar. The soils are well drained with a conservative permeability of 0.20 inches/hour and minimal salinity. Simitarq soils have nearly neutral pH values ranging from 7.2 to 7.4 standard units with salinity values as low as approximately 0 mmhos/cm (nonsaline). The Celavar soils have a salinity maximum of 2 mmhos/ cm (USDA, 2017).

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.

4.2 Subsurface Conditions

The shallow subsurface soils consist of fluvial and alluvial deposits comprised of clay and silt with minor inter-bedded sand layers. 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 gravelly sands immediately overlying the Petrified Forest Formation to 10^{-8} cm/sec in the clay soils located near the surface (Western Refining, 2009). Generally, shallow groundwater at the refinery follows the upper contact of the Chinle Group (i.e., Chinle/Alluvial Interface zone) with prevailing flow from the southeast to the northwest, with some flow potentially to the northeast on the northeastern portion of the refinery property. In the northwestern portion of the facility there are

thin intermittent sand layers above the Chinle/Alluvial Interface zone, which may be saturated. These intervals are referred to as the Upper Sands with groundwater flow directions downdip to the northwest.

Figure 3 shows the location of a cross-section that runs along the northern portion of the tank farm and extends west to near STP-1. The cross-section included as Figure 4, incorporates OW-62 and OW-63.

4.3 Subsurface Investigations

No underground pipelines were detected during clearance of utilities in the area of the well installations. This subsection provides a detailed description of subsurface soil investigations conducted during the installation of the five permanent monitoring wells.

A description of the field screening procedures is presented in Appendix B – Field Methods. The boring/well construction logs are provided in Appendix A. The soil boring logs describe the subsurface lithology, the presence of saturation, the field screening results, and permanent well construction details. In addition to being included on the soil boring logs, the soil vapor (i.e., headspace) screening results are summarized in Table 4. The locations of the soil borings/monitor wells appear on Figure 2 and Figure 3.

4.3.1 Well Installation

Six soil borings were advanced using the hollow-stem auger (HSA) method. The drilling equipment was decontaminated between each borehole, as described in Appendix B. The well development is also discussed in Appendix B. The drilling of the soil borings and well installation is discussed below in numerical order.

SB-FD-1

On Mach 7, 2018 the drilling rig was set up on location SB-FD-1. Sample collection was accomplished using the HSA drilling method and split spoon samplers. No discrete soil samples were retained for laboratory analysis since the field screening results did not indicate potential contamination and the focus of this effort was the identification of SPH. The lithology encountered consisted of the following:

- The 0 to 10 foot interval was not logged due to use of hydroexcavation to clear the location;

- Silty Clay: 10 – 14 feet below ground level (bgl) (low plasticity, very stiff, dry to damp, reddish brown, calcareous at base no odor);
- Silty Clay: 14 – 24 feet bgl (low plasticity, firm/crumbly, damp, light reddish brown, very calcareous 15.75 – 16.0 feet, no odor, increase in silt lower 2 feet);
- Silty Clay: 24 – 38 feet bgl (low plasticity, very stiff, dry to damp, reddish brown with greenish gray color from 24 to 26 feet bgl, thin 1" sandstone lense at 25.75 feet and calcareous 34 to 36 feet bgl, no odor);

The boring was left open for two days but did not produce water and was plugged on March 9, 2018.

OW-61

On March 13, 2018 the drilling rig was set up on location OW-61. Sample collection was accomplished using the HSA drilling method and split spoon samplers. No discrete soil samples were retained for laboratory analysis since the purpose was to identify the presence of SPH. The lithology encountered consisted of the following:

- The 0 to 10 foot interval was not logged due to use of hydroexcavation to clear the location;
- Sandy Silt: 10 – 12 feet bgl (very fine, loose, moist, gravel present, brown, strong chemical odor);
- Gravelly Silty Sand: 12 – 18 feet bgl (fine, loose, moist, 20 millimeters (mm) gravel present, strong odor, increasing gravel with depth);
- Gravelly Clayey Sand: 18 – 20 feet bgl (fine to coarse sand, soft, very damp, gravel (10-20 mm), brown, saturated at base);
- Silty Sand: 20 – 23 feet bgl (medium grain, loose, trace clay and gravel, dark brown, saturated, strong odor);
- Gravelly Sandy Clay: 23 – 24 feet bgl (low plasticity, soft gravel throughout, brown, damp to saturated in seams, strong odor);
- Gravelly Clay: 24 – 28 feet bgl (low plasticity, firm, dark blueish gray, damp to saturated in seams, strong odor); and
- Silty Clay: 28 – 32 feet bgl (low plasticity, very stiff, trace sand and very small gravel, grey to light grey, damp, odor).

The drilling was terminated at 32 feet bgl. Sand was placed from 5 to 32 feet bgl and the well screen installed from 8 feet to 28 feet bgl. The screen interval was chosen to provide a direct

hydraulic connection between the well and the higher transmissive materials (silt and sand) that were logged above the clay starting at a depth of 24 feet bgl and remain above the static fluid level. The bentonite seal was placed from 2 – 5 feet bgl. The annular seal (bentonite grout) was installed on March 14, 2018.

The surface completion consists of a stickup completion, which included a protective steel cover secured in a concrete pad. The protective steel cover is equipped with a lid that is locked. Bollards were installed around the concrete pad. The surface completion and bollards were installed on March 20, 2018.

OW-62

On March 15, 2018 the drilling rig was set up on location OW-62. Sample collection was accomplished using the HSA drilling method and split spoon samplers. No discrete soil samples were retained for laboratory analysis since the purpose was to identify the presence of SPH. The lithology encountered consisted of the following:

- The 0 to 10 foot interval was not logged due to use of hydroexcavation to clear the location;
- Clayey Silt: 10 – 12 feet bgl (stiff, firm, dry, crumbly, light brown, no odor);
- Silty Clay: 12 – 14 feet bgl (stiff, firm, dry, crumbly, light brown, no odor);
- Sandy Silty Clay: 14 – 16 feet bgl (low plasticity, firm, brown, dry, no odor, very fine grain sand seams);
- Sandy Clay: 16 – 17 feet bgl (low plasticity, firm, brown, damp, no odor);
- Sandy Gravel: 17 – 18 feet bgl (10 to 20 mm gravel with coarse sand, loose, brown, damp, no odor);
- Clayey Sandy Gravel: 18 – 22 feet bgl (10 to 20 mm gravel with coarse sand and minor clay, loose, brown, damp to very moist, hydrocarbon odor);
- Silty Clay: 22 – 24 feet bgl (low plasticity, soft, trace sand, calcareous, reddish brown, damp to moist, hydrocarbon odor);
- Silty Clay: 24 – 28 feet bgl (low plasticity, stiff, calcareous towards bottom, reddish brown, damp, hydrocarbon odor);
- Clay: 28 – 30 feet bgl (high plasticity, very stiff, reddish brown, damp, faint odor); and
- Silty Clay: 30 – 40 feet bgl (low plasticity, firm/crumbly, reddish brown with trace grey, damp, no odor).

The drilling was terminated at 40 feet bgl. Sand was placed from 5 to 40 feet bgl and the well screen installed from 8 feet to 28 feet bgl. The screen interval was chosen to provide a direct hydraulic connection between the well and the higher transmissive materials (silt and gravel) that were logged above the clay starting at a depth of 28 feet bgl and remain above the static fluid level. The bentonite seal was placed from 2 – 5 feet bgl. The annular seal (bentonite grout) was installed on March 15, 2018.

The surface completion consists of a stickup completion, which included a protective steel cover secured in a concrete pad. The protective steel cover is equipped with a lid that is locked. Bollards were installed around the concrete pad. The surface completion and bollards were installed on March 21, 2018.

OW-63

On March 14, 2018 the drilling rig was set up on location OW-63. Sample collection was accomplished using the HSA drilling method and split spoon samplers. No discrete soil samples were retained for laboratory analysis since the purpose was to identify the presence of SPH. The lithology encountered consisted of the following:

- The 0 to 10 foot interval was not logged due to use of hydroexcavation to clear the location;
- Silty Clay: 10 – 16 feet bgl (low plasticity, firm, brown with light tan silt in seams, damp, no odor);
- Silty Sand: 16 – 18 feet bgl (fine, compact, brown, very moist to saturated, no odor);
- Sandy Silty Clay: 18 – 20 feet bgl (low plasticity, firm, occasional gravel, brown, damp, odor);
- Silty Sandy Clay: 20 – 23.5 feet bgl (low plasticity, firm, occasional gravel, brown, moist in sand seams at base, odor)
- Clay: 23.5 – 25 feet bgl (high plasticity, soft to firm, brown, damp, odor)
- Clayey Gravel: 25 – 28 feet bgl (sandstone gravel in pink/brown/olive green clay and silt, coarse sand present, saturated, odor); and
- Weathered Sandstone: 28 – 32 feet bgl (very dense, grey to purple, dry, faint odor in upper two feet).

The drilling was terminated at 32 feet bgl. Sand was placed from 6 to 32 feet bgl and the well screen installed from 9 feet to 29 feet bgl. The screen interval was chosen to provide a direct hydraulic connection between the well and the higher transmissive materials (sand and gravel) that

were logged above the sandstone bedrock starting at a depth of 28 feet bgl and remain above the static fluid level. The bentonite seal was placed from 3 – 6 feet bgl. The annular seal (bentonite grout) was installed on March 14, 2018.

The surface completion consists of a stickup completion, which included a protective steel cover secured in a concrete pad. The protective steel cover is equipped with a lid that is locked. Bollards were installed around the concrete pad. The surface completion and bollards were installed on March 20, 2018.

OW-64

On March 5, 2018 the drilling rig was set up on location OW-64. Sample collection was accomplished using the HSA drilling method and split spoon samplers. No discrete soil samples were retained for laboratory analysis since the purpose was to identify the presence of SPH. The lithology encountered consisted of the following:

- The 0 to 10 foot interval was not logged due to use of hydroexcavation to clear the location;
- Silty Clay: 10 – 14 feet bgl (low plasticity, firm, brown and grey, damp, faint hydrocarbon odor);
- Silty Clay: 14 – 18 feet bgl (low to moderate plasticity, stiff, grey to greyish white with trace brown at bottom of interval, damp, faint hydrocarbon odor);
- Silty Clay: 18 – 24 feet bgl (moderate plasticity, firm, brown to grey near bottom of interval, damp, faint odor);
- Silty Clay: 24 – 28 feet bgl (moderate plasticity, stiff, reddish brown to grey, calcareous at base, damp, faint odor);
- Silty Clay: 28 – 34 feet bgl (low plasticity, stiff to very stiff, reddish brown and grey, black shale at base, damp, no odor);
- Clayey Silt: 34 – 36 feet bgl (sandstone gravel at top, low plasticity, firm/crumbly, brown, dry to damp, no odor; and
- Silty Clay: 34 – 44 feet bgl (low plasticity, very stiff, brown, dry to damp, no odor).

The drilling was terminated at 44 feet bgl. Sand was placed from 44 to 1 feet bgl and the well screen installed from 4 feet to 24 feet bgl. The screen interval was chosen to extend above the top of the static fluid level observed after drilling and extended for 20 feet to provide a direct hydraulic connection between the well and reasonably as long a section as practicable. The sand filer pack

was extended to within 1 feet of the land surface and a bentonite seal placed from 0 – 1 feet bgl. The annular seal (bentonite grout) was installed on March 16, 2018.

The surface completion consists of a stickup completion, which included a protective steel cover secured in a concrete pad. The protective steel cover is equipped with a lid that is locked. Bollards were installed around the concrete pad. The surface completion and bollards were installed on March 21, 2018.

OW-65

On March 9, 2018 the drilling rig was set up on location OW-65. Sample collection was accomplished using the HSA drilling method and split spoon samplers. No discrete soil samples were retained for laboratory analysis since the purpose was to identify the presence of SPH. The lithology encountered consisted of the following:

- Silty Clay: 0 to 5 feet bgl (low plasticity, stiff, mixed with gravelly sand, brown, damp, no order;
- Gravelly Sand: 5 – 8 feet bgl (fine to coarse, loose, gravel < 10 mm, brown, damp, no odor, clayey sand at base of interval and becoming very damp with an odor);
- Silty Sand: 8 – 10 feet bgl (medium to coarse, loose, brown, very damp, odor);
- Clayey Gravelly Sand: 10 – 12 feet bgl (fine to coarse, compact, gravelly clay lense 2 inches thick at 11 feet bgl, brown, odor);
- Silty Sand: 12 – 14 feet bgl (medium, loose, brown, very damp, odor);
- Clayey Gravel: 14 -16 feet bgl (< 10 mm gravel in brown clay, coarse sand throughout, very damp, odor);
- Silty Sand: 16 – 18 feet bgl (fine, loose, very damp to moist, hydrocarbon odor);
- Clayey Gravel: 18 – 22 feet bgl (40 mm sandstone cobbles (tan and green) in brown clay, coarse sand throughout, damp becoming moist to saturated near base, odor);
- Clayey Gravelly Sand: 22 – 24 feet bgl (coarse sand with 10 mm gravel, loose, very soft, trace gravel, brown, saturated, odor);
- Clayey Sand: 24 – 26 feet bgl (coarse, loose, very soft, trace gravel, brown, saturated, odor);
- Clayey Sand: 26 – 28 feet bgl (fine to medium, compact, dark brown, moist, hydrocarbon odor);
- Silty Clay: 28 – 29 feet bgl (low plasticity, very soft, dark brown, damp, strong hydrocarbon odor);

- Clayey Sand: 29 – 34 feet bgl (fine, compact, dark brown, saturated/oily);
- Silty Sand: 34 – 36 feet bgl (medium to coarse, gravelly (< 5mm) at base, loose, dark brown, saturated, hydrocarbon odor;
- Gravelly Sand: 36 – 37 feet bgl (coarse, loose, trace clay-gravel, dark brown, saturated, hydrocarbon odor); and
- Sandy Clay: 37 – 40 feet bgl (low plasticity, firm, trace gravel, dark brown, damp, hydrocarbon).

The drilling was terminated at 40 feet bgl. Sand was placed from 13.4 to 40 bgl and the well screen installed from 17 feet to 37 feet bgl. The screen interval was chosen to provide a direct hydraulic connection between the well and the higher transmissive materials (sand and gravel) that were logged above the clay starting at a depth of 37 feet bgl and remain above the static fluid level. The bentonite seal was placed from 10 – 13.5 feet bgl. The annular seal (bentonite grout) was installed on March 12, 2018.

The surface completion consists of a stickup completion, which included a protective steel cover secured in a concrete pad. The protective steel cover is equipped with a lid that is locked. Bollards were installed around the concrete pad. The surface completion and bollards were installed on March 22, 2018.

Section 5
Site Impacts

The initial fluid level measurements are presented in Table 1. Quarterly fluid level measurements collected during 2018 are summarized in Table 2 (Marathon, 2019). Wells OW-61 and OW-65 were the only wells to have SPH during the initial fluid measurements; however, SPH was first detected in OW-64 in the last quarterly measurement completed in November 2018. The measured SPH thickness increased in OW-61 from the first through the third quarter of 2018, with a decrease in the last quarter of 2018. The measured SPH thickness in OW-65 increased from the first quarter to the second quarter of 2018, but decreased in the third quarterly, only to increase to an even greater thickness in the fourth quarter of 2018.

In April 2019, all wells were checked for the presence of SPH and where present (OW-61 and OW-65), samples of the product were collected and sent to Hall Environmental Analysis Laboratory for analysis by EPA Method 8015B. The laboratory interpreted the results to show that the product collected at OW-61 was "mostly fresh fairly fresh gasoline with a small amount of diesel range hydrocarbons present as well." The laboratory interpreted the results to show that the product collected at OW-65 was "fairly fresh gasoline mixed with diesel range hydrocarbons." The laboratory report is provided in Appendix C.

Although not required under the *Facility Wide Ground Water Monitoring Work Plan* that was in effect at the time the routine quarterly groundwater sampling events were conducted in 2018, samples were voluntarily collected from wells OW-61 through OW-65. The results were provided and discussed in the 2018 *Annual Ground Water Monitoring Report* (Marathon, 2019). The results are included as Table 3.

Section 6
References

Marathon Petroleum Company, 2019, *Facility Wide Ground Water Monitoring Report 2018*

USDA, 2017, Soil Resource Report for McKinley County Area, New Mexico, McKinley County and Parts of Cibola and San Juan Counties, Gallup Refinery; Natural Resources Conservation Service, Web Soil Survey 2.0, p. 23. http://websoilsurvey.sc.egov.usda.gov/app/HomePage.htm.

Western Refining, 2009, *Facility Wide Groundwater Monitoring Work Plan*, Western Refining Company Southwest, Inc., p. 78.

Tables

Table 1
Initial Fluid Level Measurements

Well Number	date	Depth to SPH (ft BTOC)	Depth to Groundwater (ft BTOC)	SPH Thickness (ft)	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

Table 2
2018 Quarterly Fluid Level Measurements

Date of Installation	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	Ground Level Elevation (ft)	Well Casing Rim Elevation (ft)	Stick-up length (ft)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation (ft)	Corrected Water Table [1] Elevation (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
		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
		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
		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
		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
		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
		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
		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
		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
		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
		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
		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
		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
		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
		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
		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
* Wells also checked for Artesian flow conditions.

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.
Dry indicates no water was detected.

NOTES:

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

Table 3
Groundwater Analyses

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

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

Table 3
Groundwater Analyses

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

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

Table 3
Groundwater Analyses

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

Table 3
Groundwater Analyses

STANDARDS			PARAMETERS										
			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

NOTES

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

Table 3
Groundwater Analyses

STANDARDS			Benzoic Acid (mg/L)	Bis(2-ethylhexyl) phthalate (mg/L)	1-Methyl-naphthalene (mg/L)	2-Methyl-naphthalene (mg/L)	Naphthalene (mg/L)	Phenol (mg/L)
WQCC 20 NMAC 6.2.3103 (DEC 2018)			NE	NE	NE	NE	**0.03**	**0.005**
40 CFR 141.61 MCL			NE	**0.006**	NE	NE	NE	NE
NMED TAP WATER (MAR 2019)			NE	0.0556	**0.0114**	**0.035**	0.00165	5.76
EPA RSL for Tap Water (NOV 2018)			**75**	0.0056	0.0011	0.036	0.00017	5.8
WELL ID	**DATE SAMPLED**	**METHOD**						
OW-62	11/29/18	8270C	0.017	<0.01	<0.02	<0.02	<0.01	**0.0064**
	08/22/18	8270C	0.0092	<0.01	**0.092**	**0.11**	**0.33**	**0.029**
	04/29/18	8270C	<0.02	<0.01	<0.004	<0.004	0.0029	**0.072**
OW-63	12/03/18	8270C	0.12	<0.05	**0.075**	**0.088**	**0.23**	<0.05
	08/22/18	8270C	0.039	<0.01	**0.077**	**0.091**	**0.21**	**0.025**
	04/29/18	8270C	<0.02	<0.01	**0.057**	**0.069**	**0.19**	**0.017**
OW-64	08/22/18	8270C	0.011	<0.01	0.0091	<0.01	0.017	<0.01
	04/29/18	8270C	<0.02	<0.01	<0.01	<0.01	0.018	<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
NOTES
OW-64 - No samples collected in the 4th Quarter 2019 - SPH detected.

Table 4 - Vapor Screening Results
Marathon Petroleum Company - Gallup Refinery
Gallup, New Mexico

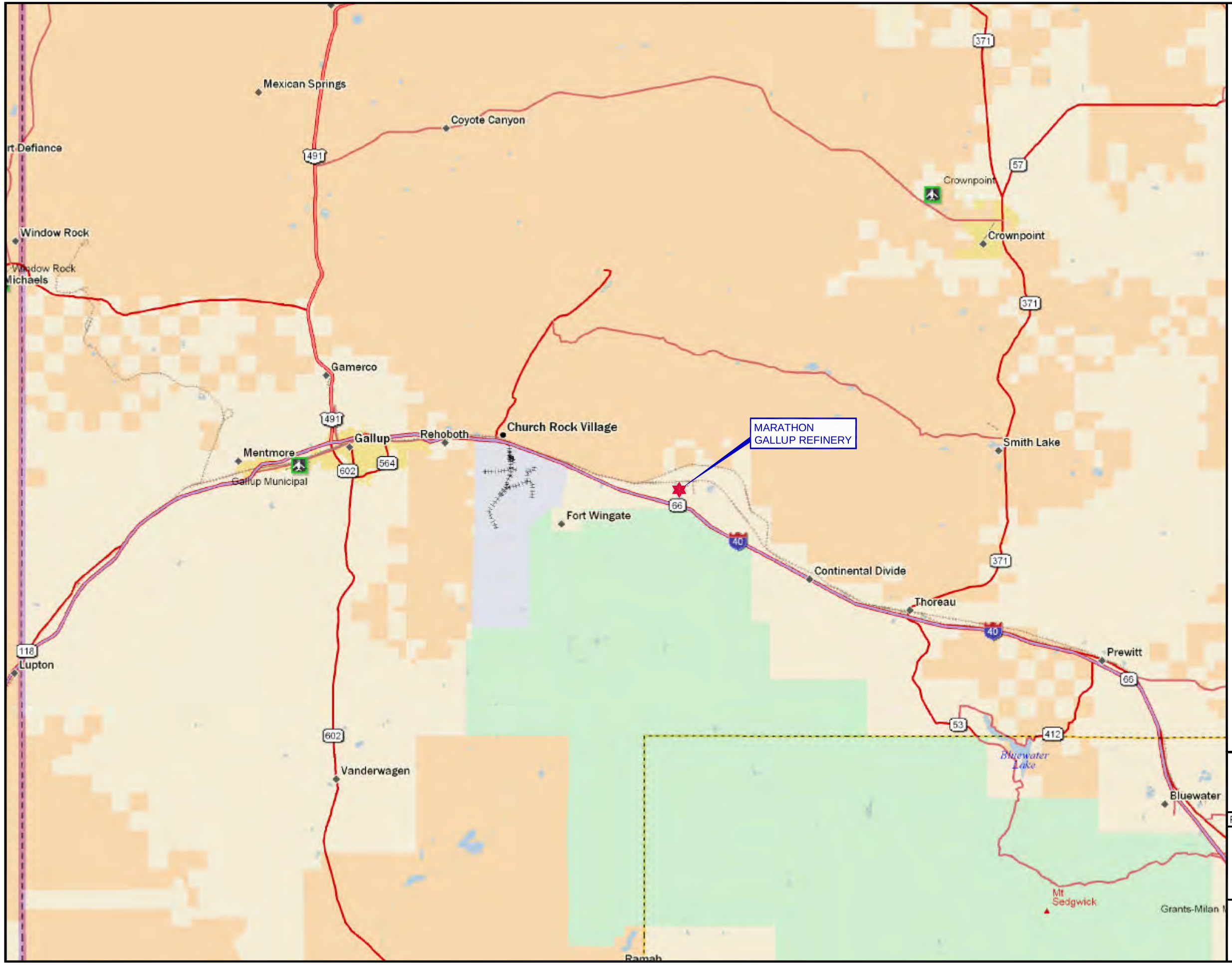
Sample Interval Depth (ftbgl)	SB-FD-1 (ppm)	OW-61 (ppm)	OW-62 (ppm)	OW-63 (ppm)	OW-64 (ppm)	OW-65 (ppm)
0 - 2	NR - NR	NR - NR	NR - NR	NR - NR	NR - NR	NR - NR
2 - 4	NR - NR	NR - NR	NR - NR	NR - NR	NR - NR	NR - NR
4 - 6	NR - NR	NR - NR	NR - NR	NR - NR	NR - NR	NR - NR/17.4
6 - 8	NR - NR	NR - NR	NR - NR	NR - NR	NR - NR	23
8 - 10	NR - NR	NR - NR	NR - NR	NR - NR	NR - NR	12
10 - 12	3	1563	0	1.2	280	16
12 - 14	5	869	0.1	0.9	267	66
14 - 16	5	1081	0.3	1.3	308	822
16 - 18	3	1115	0.3	2.5	137	885
18 - 20	1	1702	3380	428	47	1195
20 - 22	1	1269	82.9	652	133	SAT. - NR
22 - 24	1	1638	33	275	20	SAT. - NR
24 - 26	0	1538	800	39 / 28	17	SAT. - NR
26 - 28	0	377	555	150	75	SAT. - NR
28 - 30	0	298	56	40	74	SAT. - NR
30 - 32	0	60.9	351	10.9	35	SAT. - NR
32 - 34	0	TD @ 32 ftbgl	125	TD @ 32 ftbgl	20	SAT. - NR
34 - 36	0		159		30	SAT. - NR
36 - 38	0		91		8	SAT. - NR
38 - 40	TD @ 38 ftbgl		44		12	SAT. - NR
40 - 42			TD @ 40 ftbgl		8	TD @ 40 ftbgl
42 - 44					6	
44 - 46					TD @ 44 ftbgl	

ftbgl - feet below ground level ppm - parts per million

NR - NR - No sample recovery. No reading was collected.

SAT. - NR - Interval was saturated. No reading was collected.

Figures



Map Source: DeLorme Street Atlas USA 2007 Plus.

N

0 5
SCALE IN MILES

MARATHON PETROLEUM COMPANY
GALLUP REFINERY

PROJ. NO.: Marathon | DATE: 03/24/19 | FILE: Mathon–dB206

FIGURE 1
SITE LOCATION MAP
GALLUP REFINERY

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Suite 300
Austin, Texas 78759

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

MARATHON PETROLEUM COMPANY
GALLUP REFINERY

PROJ. NO.: Marathon	DATE: 11/03/19	FILE: Mathon-dB161

FIGURE 2
WELL LOCATION MAP

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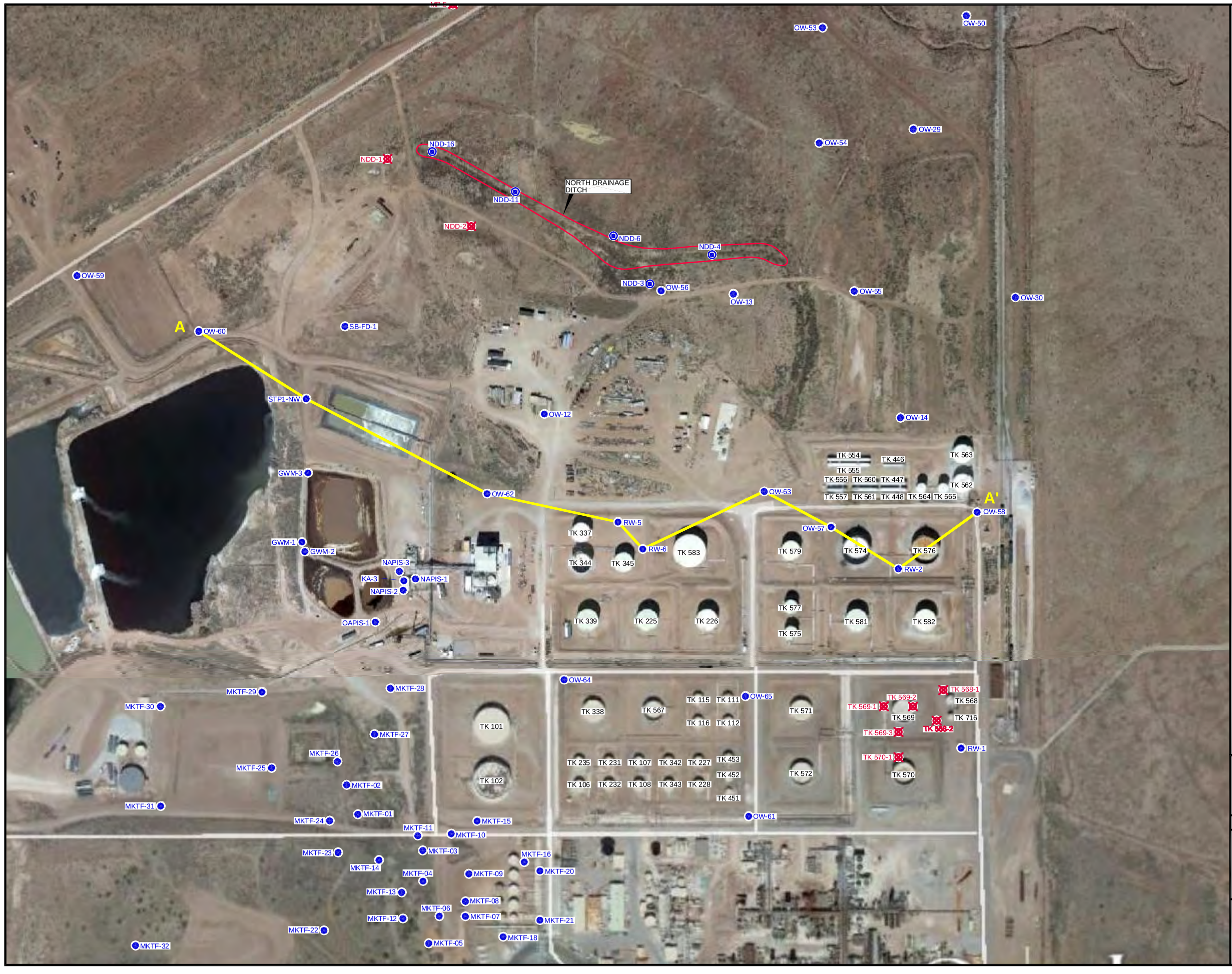
Suite 300
Austin, Texas 78759



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

0 300
SCALE IN FEET

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
A — A'	LINE OF CROSS-SECTION

MARATHON PETROLEUM COMPANY
GALLUP REFINERY

PROJ. NO.: Marathon	DATE: 11/03/19	FILE: Mathon-dB162

FIGURE 3
CROSS SECTION A - A'
LOCATION MAP

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WEST
A

EAST
A'

ELEVATION (FT MSL)

6940
6920
6900
6880
6860
6840

OW-60
SILTY CLAY
SILT

STP1-NW
CLAY

OW-62
CLAYEY SILT
SILTY CLAY
CLAYEY, SANDY GRAVEL
SILTY CLAY

RW-5
SAND
CLAY
CLAY SAND SEAMS
SAND
CLAY W/GRAVEL (24'-25')
SAND/ GRAVEL
SHALE

RW-6
GRAVEL
CLAY
SAND
SANDY CLAY
SAND
SHALE

OW-63
SILTY CLAY
SILTY SAND
SILTY, SANDY CLAY
CLAYEY GRAVEL
SANDSTONE

OW-57
CLAY, SILTY
SANDY SILT
CLAY, SILTY
SAND/SANDSTONE
GRAVELLY, SANDY CLAY
CLAYSTONE

RW-2
CLAY
SAND
CLAY
SAND
CLAY
SAND
CLAY
SAND
CLAY
GRAVEL/ SAND
SHALE

OW-58
SILTY
CLAY
SANDY
SILTY
SANDY CLAY / CLAYEY SAND
SILTY SAND
SILTY CLAY
SANDY GRAVEL
SHALE

20
0
200
SCALE IN FEET
VERTICAL EXAGGERATION = 10X

LEGEND

OW-60 ← WELL IDENTIFICATION

WELL

WELL SCREEN INTERVAL

LITHOLOGIC CONTACTS (DASHED WHERE INFERRED)

WATER LEVEL DEC 2017,
OW-62 & OW-63 WATER LEVELS MEASURED
FROM GROUND LEVEL MARCH 2018

MARATHON PETROLEUM COMPANY
GALLUP REFINERY

PROJ. NO.: Marathon | DATE: 11/03/19 | FILE: Mathon-dB163

FIGURE 4
CROSS SECTION A - A'
WEST TO EAST

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Appendix A

Well Logs

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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 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)

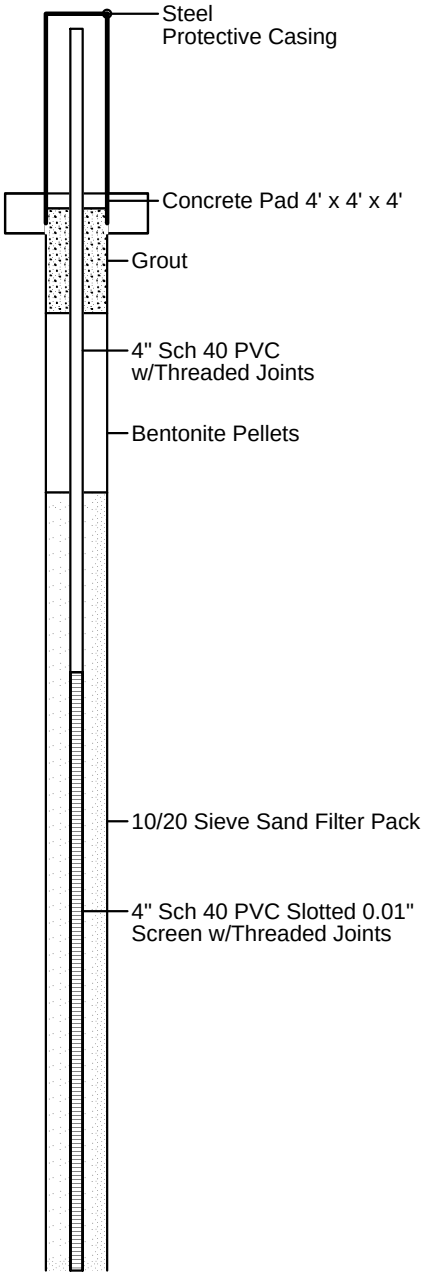
Elev., TOC (ft.msl)	: 6963.57
Elev., PAD (ft. msl)	: 6960.91
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1633887.74
E	: 2546702.36

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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DiSorbo
Environmental Consulting Firm

Andeavor
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 2 of 2)

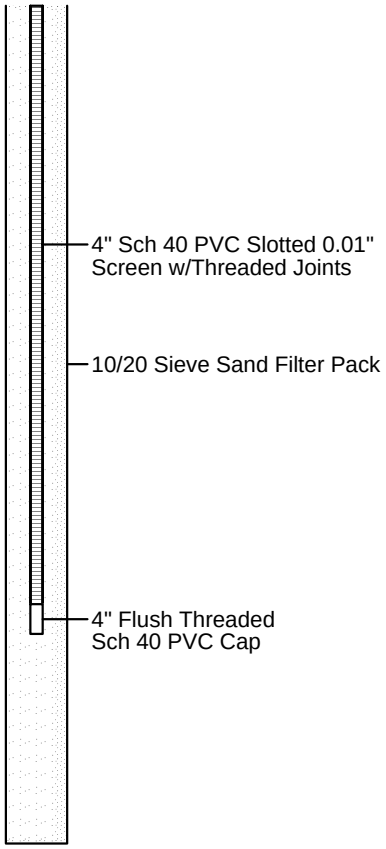
Elev., TOC (ft.msl)	: 6963.57
Elev., PAD (ft. msl)	: 6960.91
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1633887.74
E	: 2546702.36

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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Andeavor
Gallup Refinery - French Drain Release
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

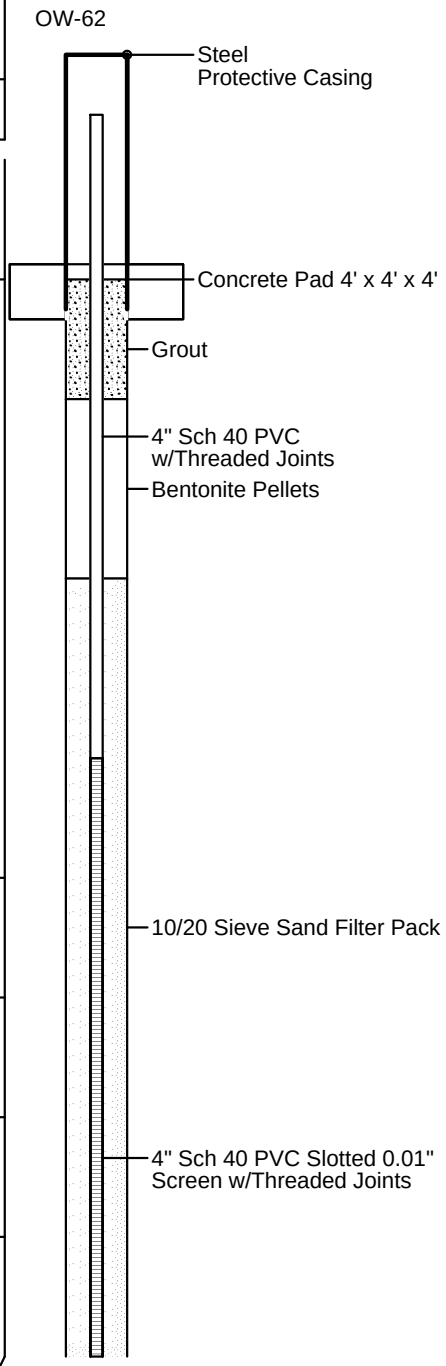
(Sheet 1 of 3)

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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Andeavor
Gallup Refinery - French Drain Release
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 2 of 3)

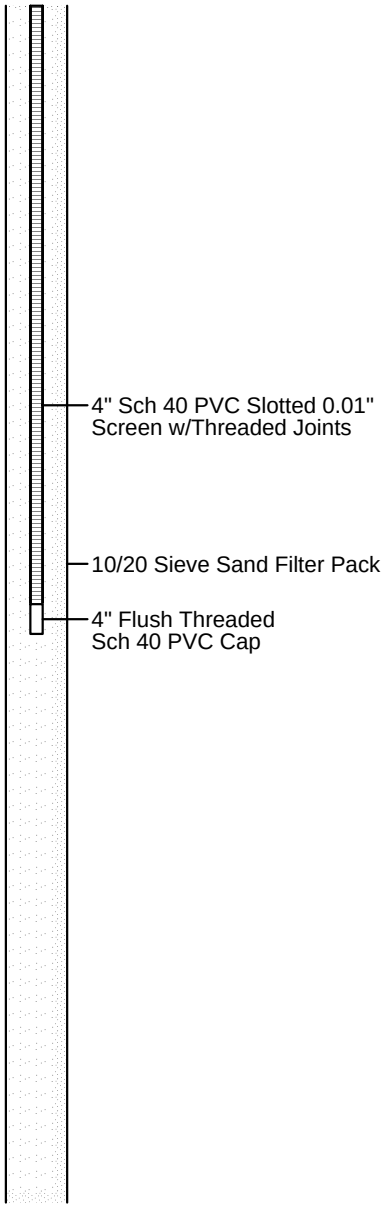
Elev., TOC (ft.msl)	: 6937.36
Elev., PAD (ft. msl)	: 6934.73
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634866.14
E	: 2545914.00

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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Andeavor
Gallup Refinery - French Drain Release
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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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 1 of 2)

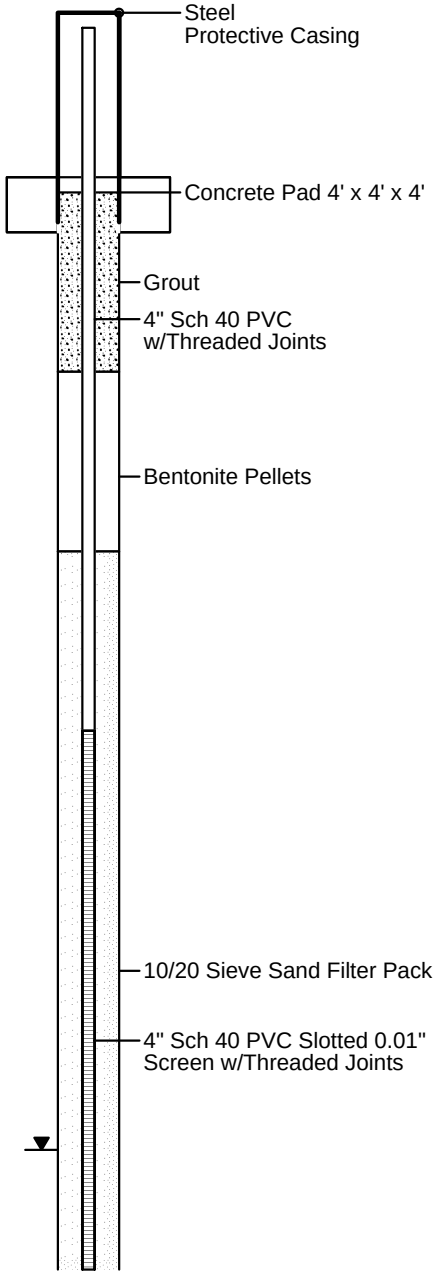
Elev., TOC (ft.msl)	: 6935.06
Elev., PAD (ft. msl)	: 6932.34
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634859.73
E	: 2546756.41

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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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)

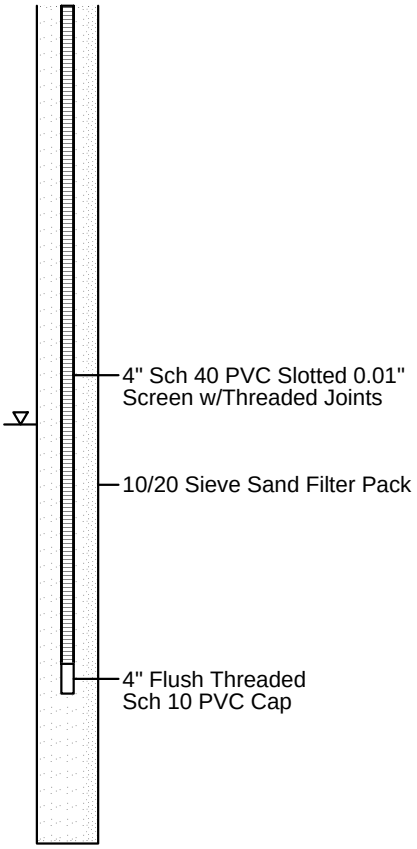
Elev., TOC (ft.msl)	: 6935.06
Elev., PAD (ft. msl)	: 6932.34
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634859.73
E	: 2546756.41

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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Houston, Texas 77002
713-955-1230

DiSorbo Consulting, LLC

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

DiSorbo
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 1 of 3)

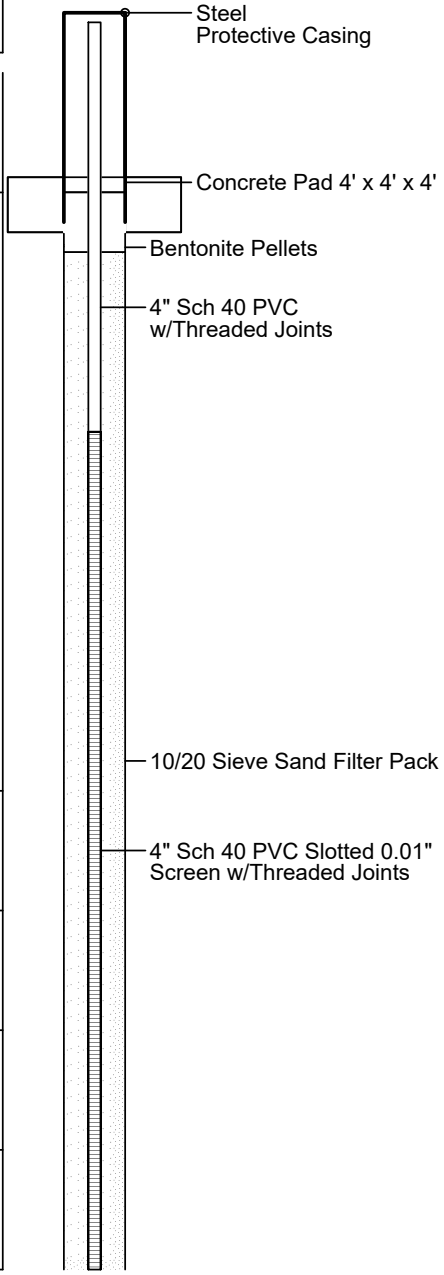
Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N 35° 29' 25.1"
E	: W 108° 25' 39.9"

Saturation
▼ Saturation

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

Completion Results

OW-64



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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)

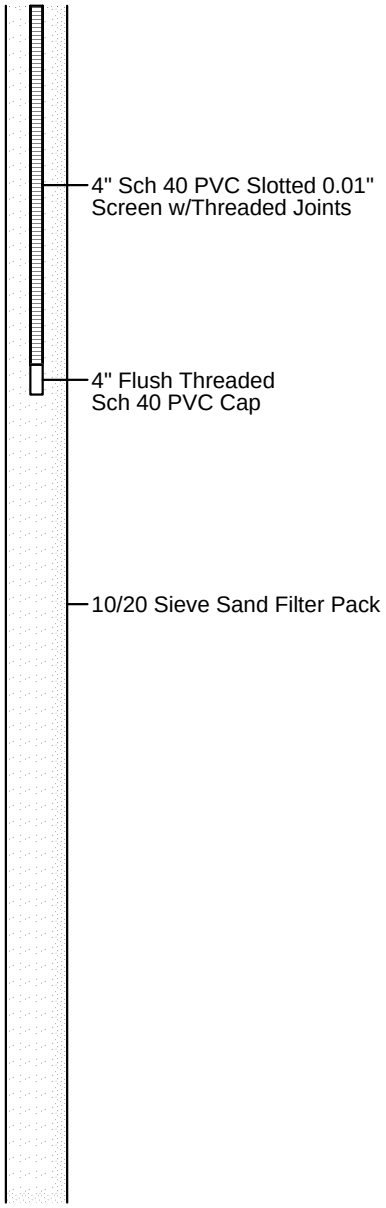
Elev., TOC (ft.msl)	: 6947.40
Elev., PAD (ft. msl)	: 6945.07
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634301.36
E	: 2546150.80

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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Gallup Refinery - French Drain Release
WEST18012

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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

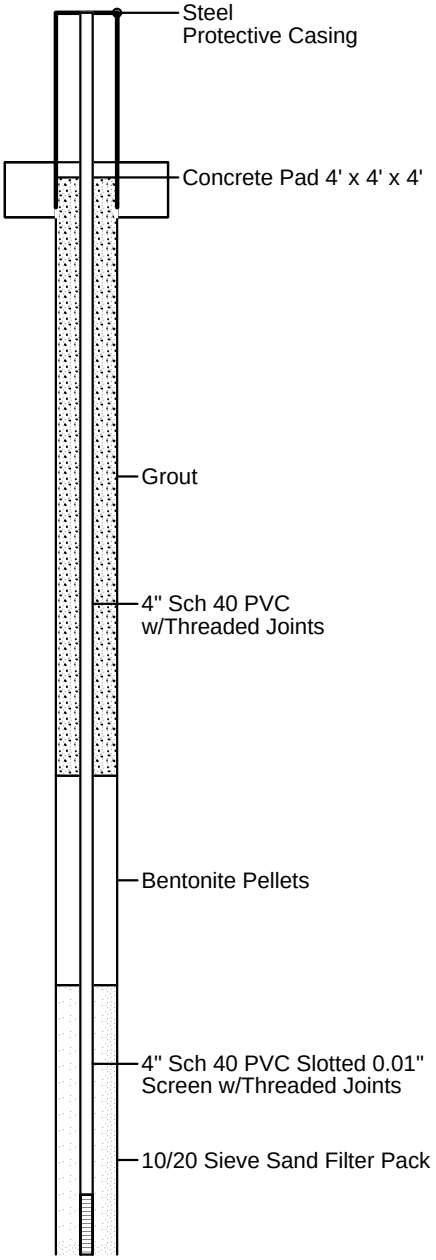
Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
-2							
-1							
0							Cleared borehole to 5', 1" asphalt and base, SILTY CLAY, low, stiff, damp, mixed with gravelly sand, brown, no order,
1							
2				CL	100		
3							
4							
5							
6	17.4			SW	100		GRAVELLY 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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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)

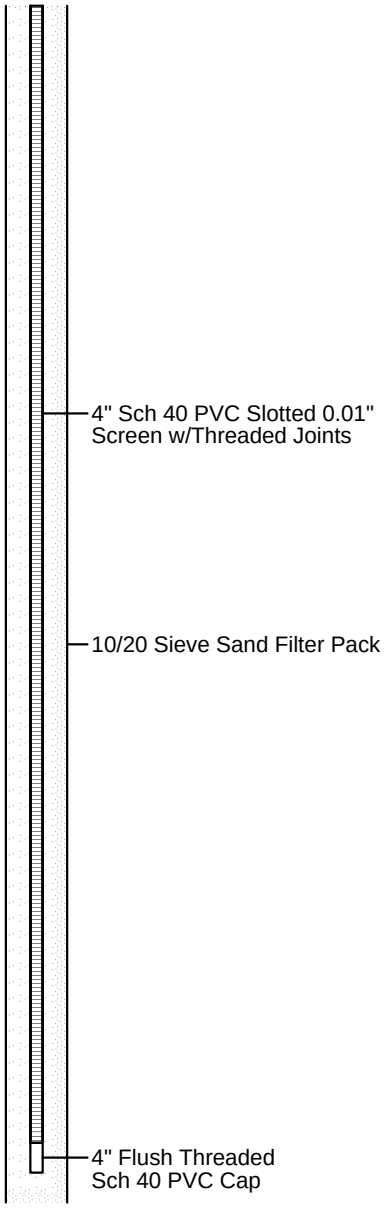
Elev., TOC (ft.msl)	: 6954.05
Elev., PAD (ft. msl)	: 6951.62
Elev., GL (ft. msl)	: NS
Site Coordinates	:
N	: 1634238.38
E	: 2546692.01

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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Geologist	: Tracy Payne
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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

DiSorbo Consulting, LLC

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Appendix B
Field Methods

Field Methods

The field methods are described below and individual discussions are presented for the following activities:

- Drilling procedures;
- Soil screening;
- Decontamination procedures;
- Monitor well development;
- Fluid level measurements;
- Sample collection and handling procedures;
- Equipment calibration; and
- Management of investigation derived waste.

Drilling Procedures

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

Soil Screening

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

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

the ambient air temperature were recorded on the field boring log for each sample. Field screening results and any conditions that were considered to be capable of influencing the results of the field screening were recorded on the field logs.

Decontamination Procedures

The drilling equipment (e.g., hollow-stem augers) was decontaminated between each borehole using a high pressure potable water wash. The sampling equipment coming in direct contact with the samples (e.g., hand augers and split-spoon samplers) were decontaminated using a brush, as necessary, to remove larger particulate matter followed by a rinse with potable water, wash with non-phosphate detergent, rinse with potable water, and double rinse with deionized water.

Fluid Level Measurements

The depth to separate phase hydrocarbon, if present, and groundwater was measured prior to purging the wells of potentially stagnant groundwater. A Geotech Interface Probe was used to measure fluid levels to 0.01 foot. Fluid level measurements collected during the field activities are presented in Tables 1 and 2.

Well Development/Purging

All wells were developed/purged using a new disposable bailer attached to the end of the clean rope. The groundwater and sediment removed from the wells were transported to the bundle cleaning pad in sealed 5-gallon buckets or in a plastic tote.

The purge volumes are calculated as follows:

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

Well (Date)	Water Column Thickness (ft)	Calculated Purge Volume (gallons) – 3 well volumes	Actual Purge Volume (gallons)
OW-61	20.37	39.8	110
OW-62	22.00	43.0	Bailed down at 15
OW-63	10.95	21.4	100
OW-64	43.00	84.1	Bailed down at 30

OW-65	22.50	44.0	100

Field measurements of groundwater stabilization parameters (e.g., pH, specific conductance and temperature) were not recorded as the well were initially installed for the purpose of determining where SPH was present.

Sample Collection and Handling Procedures

SPH samples were collected using clean disposable bailers and clean rope. The samples were maintained in the custody of the sampler until the chain-of-custody form was completed and the ice chest was sealed for delivery to the laboratory.

Equipment Calibration

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

The instruments used to measure groundwater stabilization parameters included an YSI Professional Series Data Logger and YSI Quatro Sonde. The calibration solutions used at the beginning of each day are as follows:

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

Management of Investigation Derived Waste

The drilling rig and drilling equipment were decontaminated on the bundle cleaning pad. The water is diverted to the Refinery's wastewater treatment system up-stream of the API Separator. The decontamination water generated from sampling equipment was collected in buckets and disposed at the bundle cleaning pad at the end of each day of sampling. All development/purge water was collected in five gallon buckets and disposed at the bundle cleaning pad.

Soil cuttings were placed into open top 55-gallon drums and were sealed when not in use. Each drum of soils was labeled and temporarily stored in a concrete curbed area pending waste characterization and disposal.

Appendix C

SPH Analytical Report

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Brian Moore
Marathon
92 Giant Crossing Rd
Gallup, NM 87301
TEL: (505) 722-3833
FAX:

RE: SPH Investigation

OrderNo.: 1904681

Dear Brian Moore:

Hall Environmental Analysis Laboratory received 6 sample(s) on 4/12/2019 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Case Narrative

WO#: **1904681**

Date:

CLIENT: Marathon
Project: SPH Investigation

Hall Environmental has analyzed OW-61, OW-65, RW-1, French Drain, RW-5 and RW-6 for hydrocarbons using EPA Method 8015D. Our interpretation of the type of hydrocarbons present in each sample is detailed below. Copies of the chromatograms for each sample and standards are provided after this narrative.

OW-61 - This product sample appears to be mostly fairly fresh gasoline with a small amount of diesel range hydrocarbons present as well.

OW-65 - This product sample appears to be fairly fresh gasoline mixed with diesel range hydrocarbons.

RW-1 - This product sample appears to be fairly fresh gasoline.

French Drain - This product sample appears to be fairly fresh gasoline.

RW-5 - This product sample appears to be fairly fresh gasoline.

RW-6 - This product sample appears to be fairly fresh gasoline.

Chain-of-Custody Record

Client: **Marathon Petroleum Company**
Gallup Refinery
Mailing Address: **92 Giant Crossing Road**
Gallup, NM 87301
Phone #: **505-726-9745**
email or Fax#: BMoore1@Marathonpetroleum.com
QA/QC Package:
~~X~~ Standard
☐ Other _____
X EDD (Type) **EXCEL**

Turn-Around Time:
X Standard ☐ Rush _____
Project Name: **SPH Investigation**
Project #:
Project Manager: **Brian Moore**
Sampler: **Tracy Payne**
On Ice: ~~X~~ Yes ☐ No
Sample Temperature: 4.2°c

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

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1904681	BTEX+MTBE	BTEX+MTBE+TPH(Gas only)	TPH 8015B (Fingerprint Analysis)	TPH (Method 418.1)	EDB & EDC (Method 8011)	PAH (8310 or 8270SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B	8270 (Semi-VOA)	WQCC Metals(Total & Dissolved)	Major Cations/Anions*			Air Bubbles (Y or N)
4/9/19	1420	HC	OW-61	40mL VOA	—	-001			X													
	1455	HC	OW-65		—	-002			X													
	1535	HC	RW-1		—	-003			X													
	1700	HC	FRENCH DRAIN		—	-004			X													
4/10/19	0845	HC	RW-5		—	-005			X													
	0910	HC	RW-6		—	-006			X													

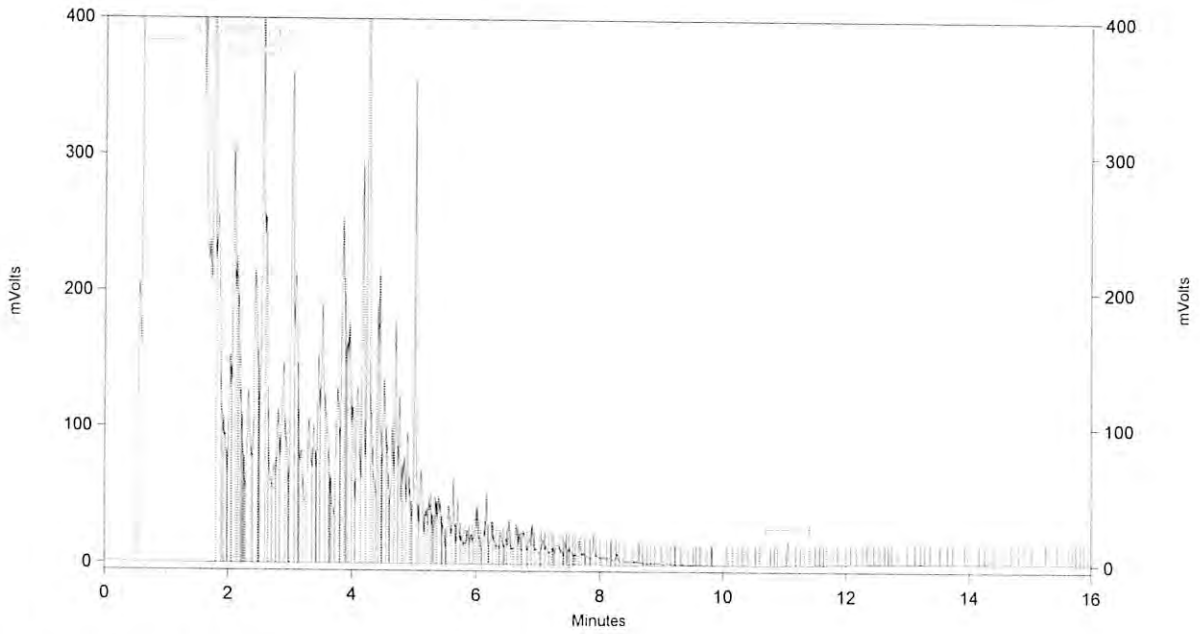
Date:	Time:	Relinquished by:	Received by:	Date	Time
4/10/19			Courier	4/12/19	9:00
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

OW-61

Instrument: **SmaugFID (Offline)** Vial #: **29** User: **System**
Sample ID: **1904681-001A** Data Description: **PRODUCT X10**

Method: H:\EZsemi\8015dro\DATA\Smaug\Methods\032719.met
File: H:\EZsemi\8015dro\DATA\Smaug\Data\2019\APRIL 2019\041519\PROD RE-INT's\1904681-001A X10 4-15-2019 9-40-29 PM.dat
Aquired: 4/15/2019 9:46:31 PM



FID-2010 Plus Results

Name	Retention Time	Area	ug/ml
DNOP	11.056	25491	0.865
DRO		6925429	226.070
MRO		3903	16.315

Analyst _____

Reviewed By _____

OW-65

Instrument: **SmaugFID (Offline)** Vial #: **30** User: **System**
Sample ID: **1904681-002A** Data Description: **PRODUCT X10**

Method: H:\EZsemi\8015dro\DATA\Smaug\Methods\032719.met
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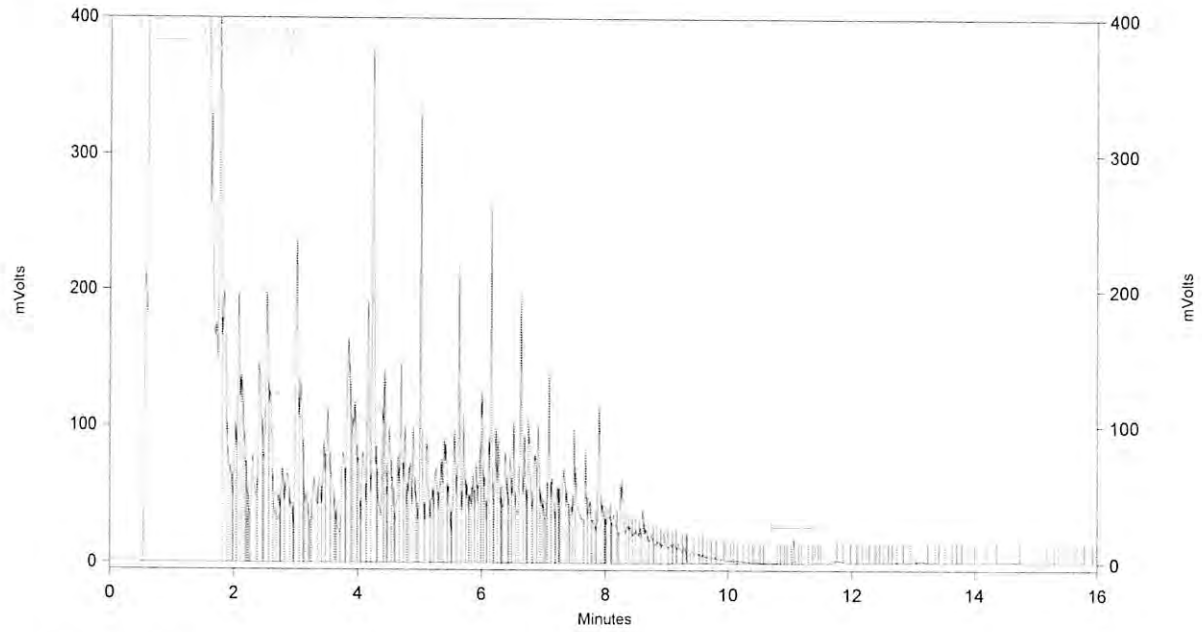
Aquired: 4/15/2019 10:53:11 PM



FID-2010 Plus Results

Name	Retention Time	Area	ug/ml
DNOP	11.056	25727	0.874
DRO		13398081	428.927
MRO		14352	16.674

Analyst _____

Reviewed By _____

RW-1

Instrument: **SmaugFID (Offline)** Vial #: **31** User: **System**
Sample ID: **1904681-003A** Data Description: **PRODUCT X10**

Method: H:\EZsemi\8015dro\DATA\Smaug\Methods\032719.met
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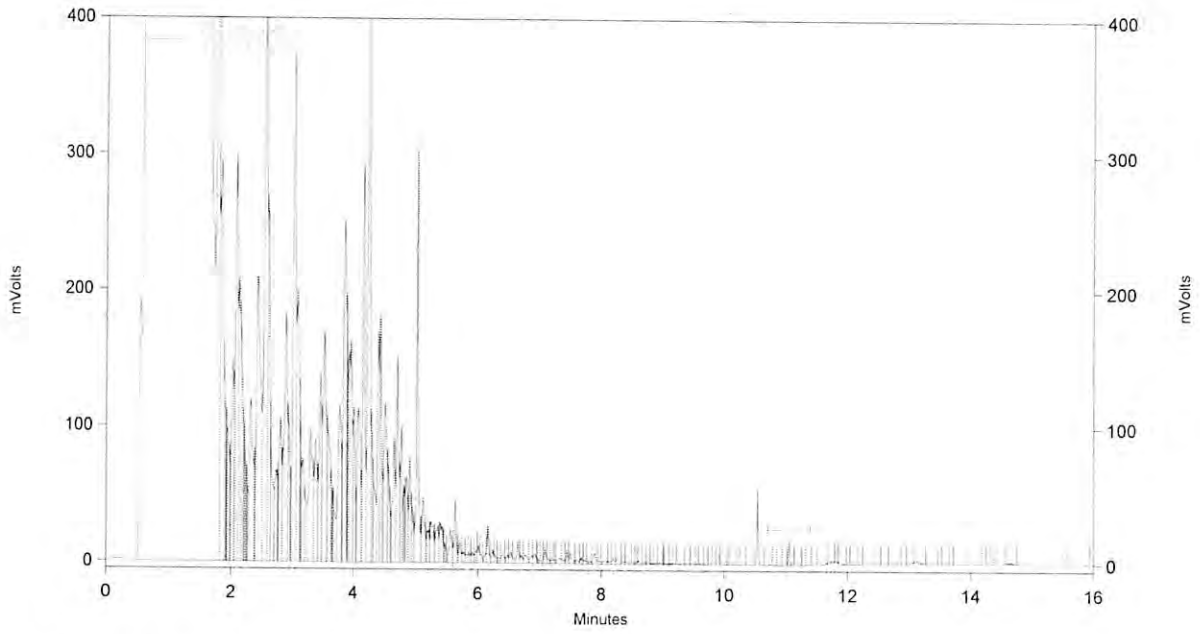
Aquired: 4/15/2019 11:59:30 PM



FID-2010 Plus Results

Name	Retention Time	Area	ug/ml
DNOP	11.051	24746	0.836
DRO		4587805	150.804
MRO		21627	16.924

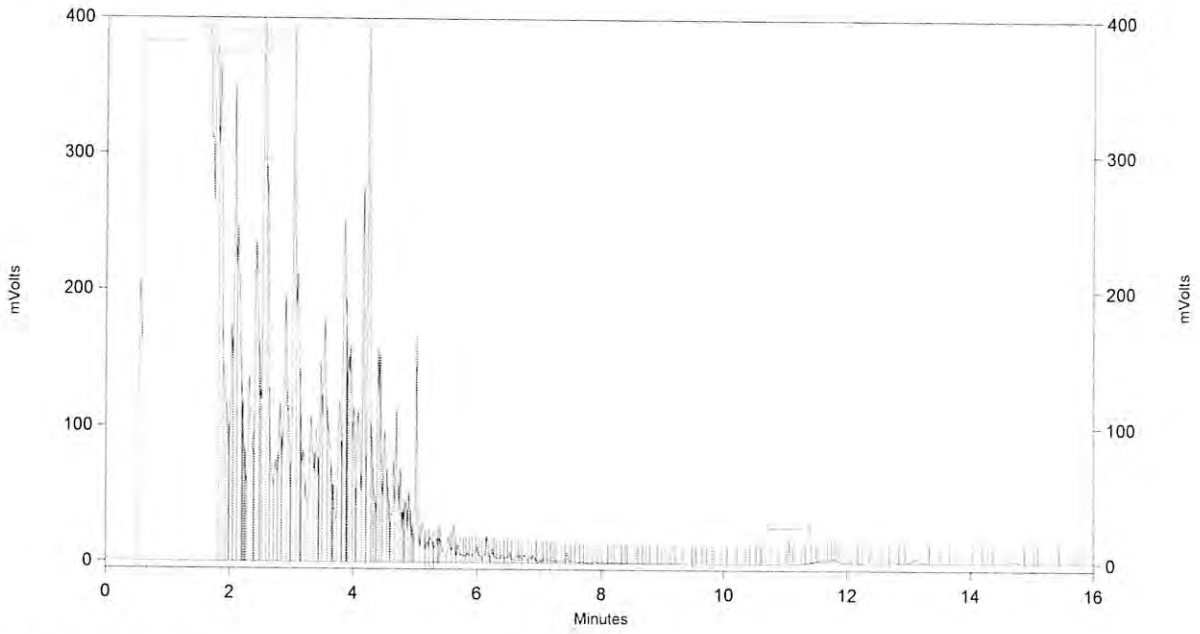
Analyst _____

Reviewed By _____

French Drain

Instrument: **SmaugFID (Offline)** Vial #: **32** User: **System**
Sample ID: **1904681-004A** Data Description: **PRODUCT X10**

Method: H:\EZsemi\8015dro\DATA\Smaug\Methods\032719.met
File: H:\EZsemi\8015dro\DATA\Smaug\Data\2019\APRIL 2019\041519\PROD RE-INT's\1904681-004A X10 4-16-2019 12-59-50 AM.dat
Aquired: 4/16/2019 1:05:58 AM



FID-2010 Plus Results

Name	Retention Time	Area	ug/ml
DNOP	11.051	25050	0.848
DRO		3251280	107.294
MRO		48768	17.857

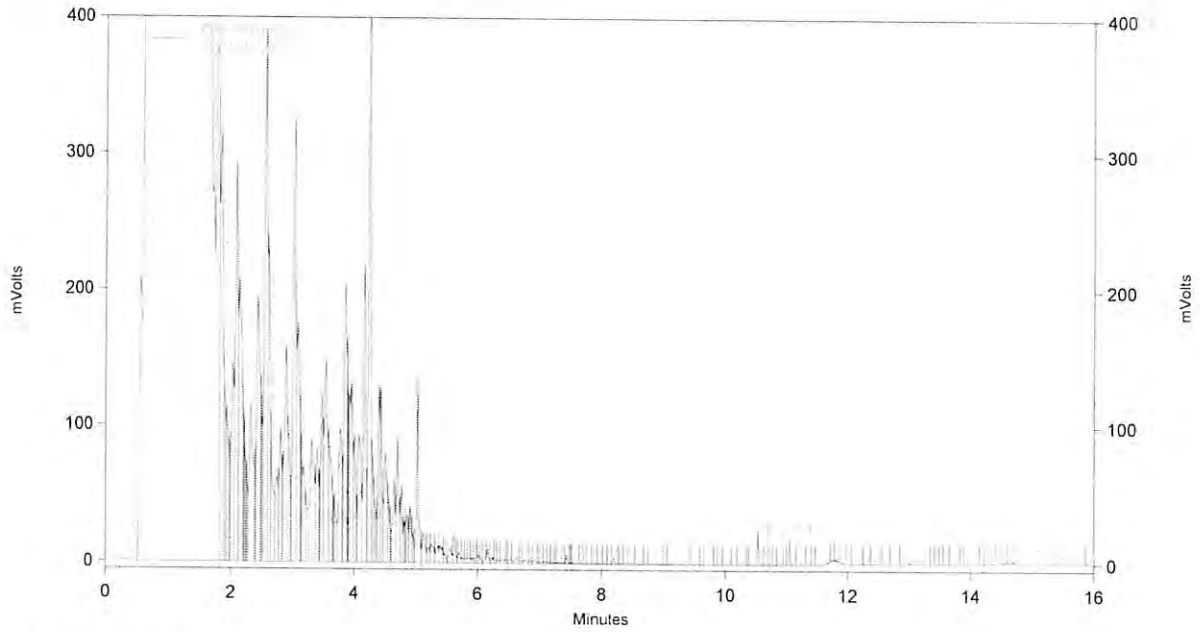
Analyst _____

Reviewed By _____

RW-5

Instrument: **SmaugFID (Offline)** Vial #: **33** User: **System**
Sample ID: **1904681-005A** Data Description: **PRODUCT X10**

Method: H:\EZsemi\8015dro\DATA\Smaug\Methods\032719.met
File: H:\EZsemi\8015dro\DATA\Smaug\Data\2019\APRIL 2019\041519\PROD RE-INT's\1904681-005A X10 4-16-2019 2-06-11 AM.dat
Aquired: 4/16/2019 2:12:07 AM



FID-2010 Plus Results

Name	Retention Time	Area	ug/ml
DNOP	11.051	24730	0.836
DRO		2535510	83.850
MRO		37189	17.459

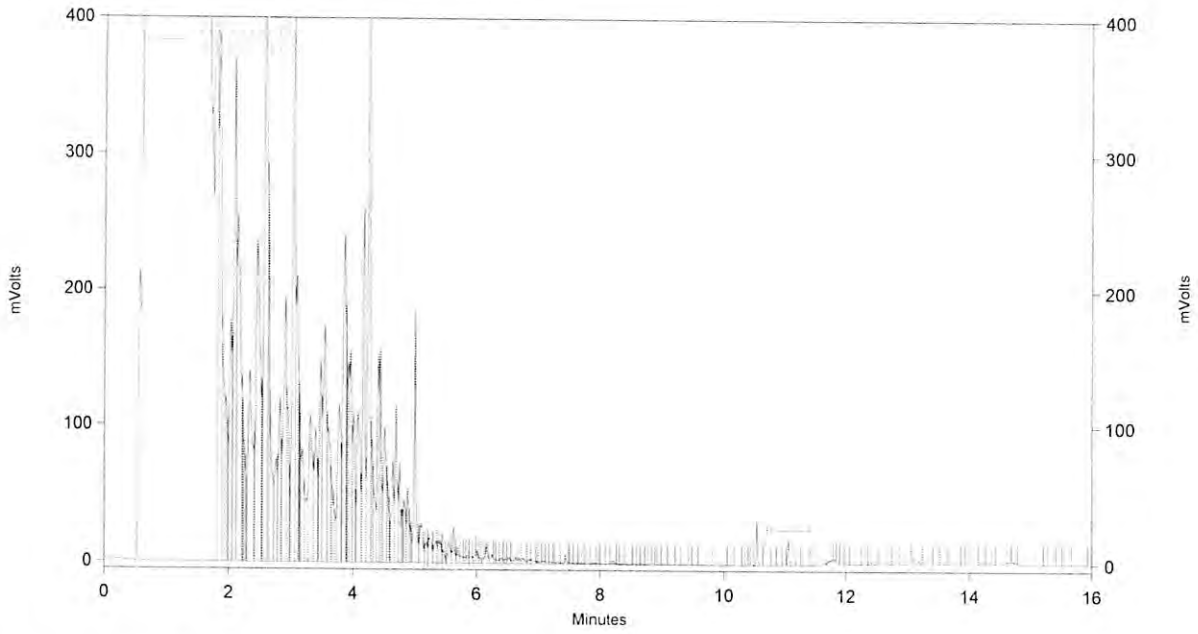
Analyst _____

Reviewed By _____

RW-6

Instrument: **SmaugFID (Offline)** Vial #: **34** User: **System**
Sample ID: **1904681-006A** Data Description: **PRODUCT X10**

Method: H:\EZsemi\8015dro\DATA\Smaug\Methods\032719.met
File: H:\EZsemi\8015dro\DATA\Smaug\Data\2019\APRIL 2019\041519\PROD RE-INT's\1904681-006A X10 4-16-2019 3-12-09 AM.dat
Aquired: 4/16/2019 3:18:14 AM



FID-2010 Plus Results

Name	Retention Time	Area	ug/ml
DNOP	11.051	25267	0.856
DRO		3190027	105.292
MRO		20575	16.888

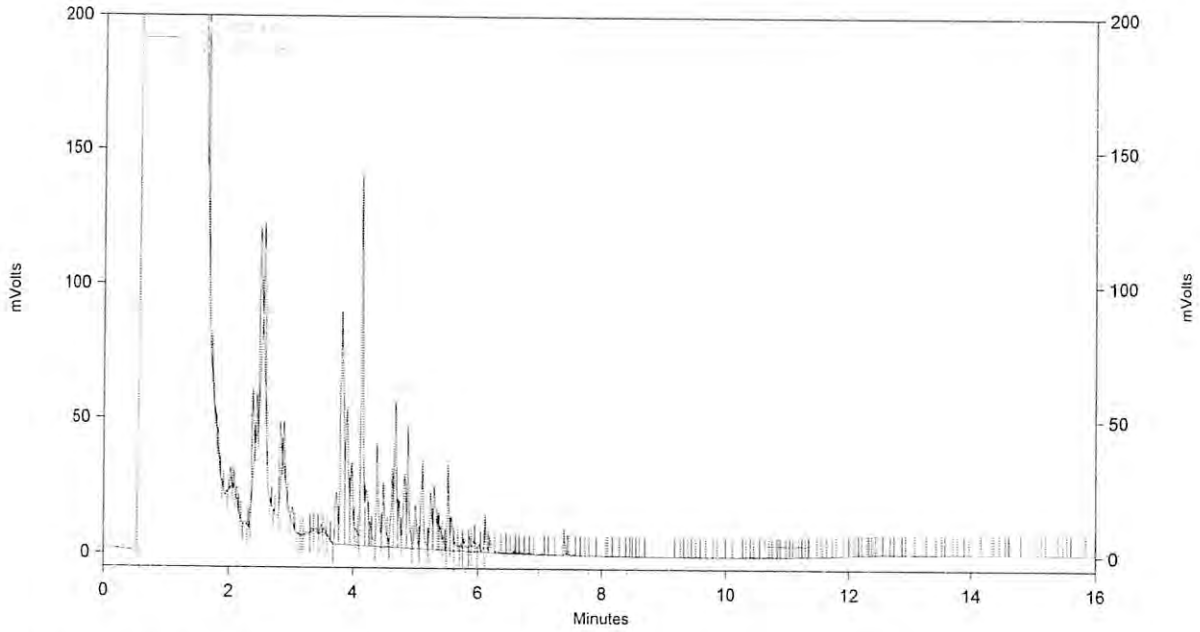
Analyst _____

Reviewed By _____

500 ppm Gasoline standard

Instrument: **SmaugFID (Offline)** Vial #: **23** User: **System**
Sample ID: **CONDITIONER** Data Description: **~500 ppm Gasoline**

Method: H:\EZsemi\8015dro\DATA\Smaug\Methods\032719.met
File: H:\EZsemi\8015dro\DATA\Smaug\Data\CONDITIONER 4-25-2019 10-53-34 AM.dat
Aquired: 4/25/2019 10:58:57 AM



FID-2010 Plus Results

Name	Retention Time	Area	ug/ml
DNOP	10.997	182	0.000
DRO		1058065	35.142
MRO		2753	16.275

Analyst _____

Reviewed By _____

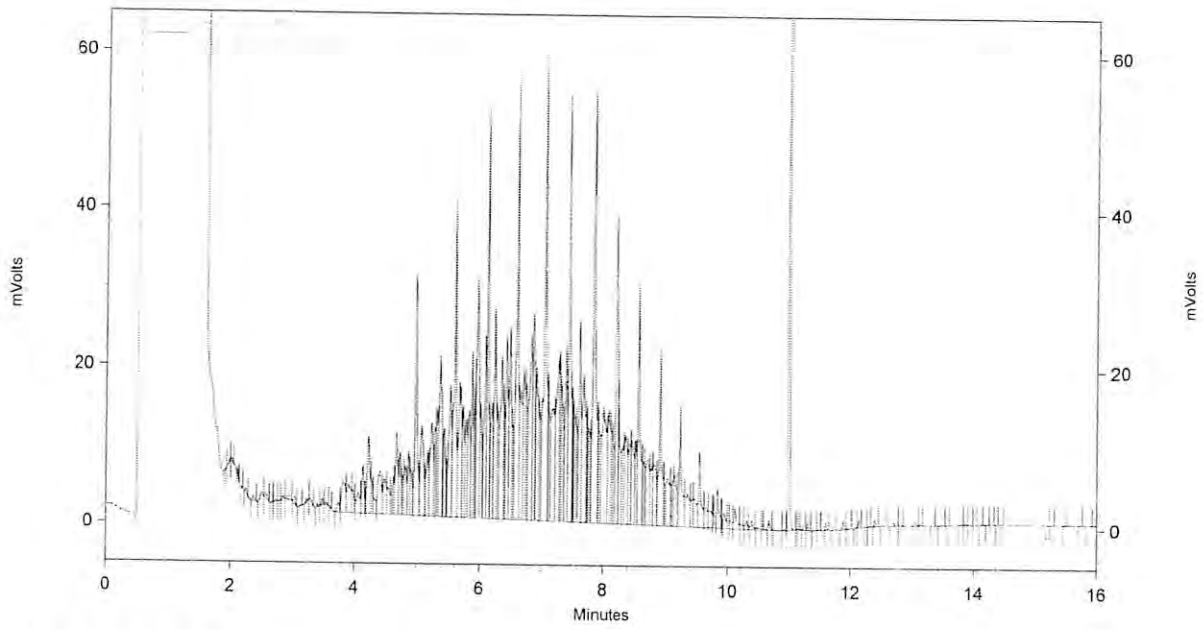
100 ppm Diesel Standard

Instrument: **SmaugFID (Offline)**
Sample ID: **100 PPM DRO CCV**

Vial #: **3**
Data Description: **SV195-3268**

User: **System**

Method: H:\EZsemi\8015dro\DATA\Smaug\Methods\032719.met
File: H:\EZsemi\8015dro\DATA\Smaug\Data\042519\100 PPM DRO CCV 4-25-2019 7-32-54 AM.dat
Aquired: 4/25/2019 7:38:35 AM



FID-2010 Plus Results

Name	Retention Time	Area	ug/ml
DNOP	10.992	288719	10.819
DRO		3552010	117.115
MRO		11316	16.570

Analyst _____

Reviewed By _____

Appendix D

C-141 Form

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

ENTERED

Form C-141
Revised April 3, 2017

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Western Refining	Contact: Jessica O'Brien
Address: I-40 Exit 39, Jamestown, NM 87347	Telephone No: (505) 722-0287
Facility Name: Gallup Refinery	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	API No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
	28	15N	15W					McKinley

Latitude 35°29'20.29"N Longitude 108°25'41.13"N NAD83

NATURE OF RELEASE

Type of Release: Naphtha	Volume of Release >25bbls, on-going	Volume Recovered: On-going
Source of Release: Under investigation, (4" diameter PVC pipe)	Date and Hour of Occurrence 02/6/2018 @ 11:00 am	Date and Hour of Discovery 02/7/2018 @ 8:30 pm
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Carl Chavez, OCD District 3 (left voicemail)	
By Whom? Jessica O'Brien	Date and Hour 02/07/2018 @ 9:15pm	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*N/A

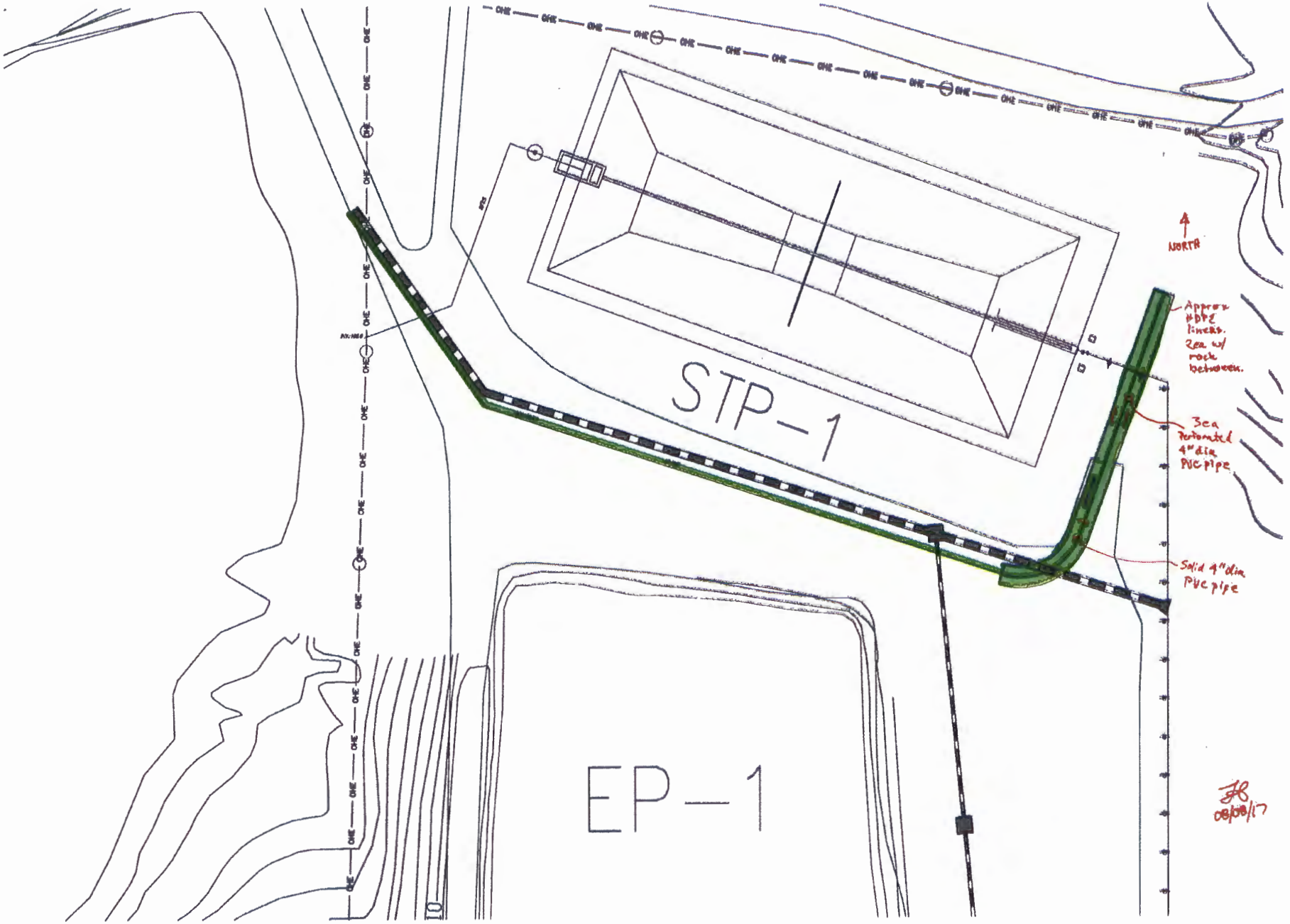
Describe Cause of Problem and Remedial Action Taken.* On February 6, 2018 at approximately 11:00am a mixture of petroleum product (20%) and water was found releasing out of a 4" diameter PVC pipe that discharges into a stormwater drainage ditch south of STP-1. Sample analysis indicated the product to be naphtha. The flow from the pipe was estimated to be 1.7 gallons per minute. The drainage ditch feeds into a small collection pond that is equipped with a drain valve. This valve has remained closed and no product has been discharged from the pond. A catch basin was placed beneath the PVC pipe to prevent any further release of product to the ground. Site personnel continue to monitor the catch basin and utilize a vacuum truck to transfer its contents back into the process. Based on the flow rate and 20% percent content of naphtha, the release to ground was estimated to be less than 25 bbls. Investigations into the source upstream of the discharge point continued into the following day (February 7, 2018). After obtaining some drawings of project work that had taken place near STP-1, site personnel began excavating a suspect area. At approximately 5 feet below substrate hydrocarbon-saturated soil was encountered in the area east of STP-1. At 08:30 pm, it was determined that the catch basins were not preventing any further release to ground. According to the initial calculations, the on-going release is estimated to be >25bbls shortly after 10am on February 8, 2018. Due to safety concerns, excavation work was stopped. Investigative work will continue.

Describe Area Affected and Cleanup Action Taken.* Affected area is near southeast corner and east side of STP-1. Release from 4" PVC pipe is being contained and recycled back into the process.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: Jessica L. O'Brien	OIL CONSERVATION DIVISION	
Printed Name: Jessica O'Brien	Approved by Environmental Specialist:	
Title: Environmental Supervisor	Approval Date:	Expiration Date:
E-mail Address: Jessica.l.o'brien@andeavor.com	Conditions of Approval:	Attached ☐
Date: February 8, 2019 Phone: (505) 722-0287		

* Attach Additional Sheets If Necessary


NORTH
Approx HDPE liners. Sea w/ rock between.
3ea Perforated 4" dia PVC pipe
Solid 4" dia PVC pipe
STP-1
EP-1
08/08/17

Marathon Petroleum Company LP

May 23, 2019

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

RE: Response to Comment No. 39 on 2017 Annual Ground Water Monitoring Report (dated March 21, 2019)
Marathon Petroleum Company LP, Gallup Refinery
(dba Western Refining Southwest, Inc.)
EPA ID# NMD000333211
HWB-WRG-18-014

Dear Mr. Kieling:

Gallup Refinery is submitting the enclosed response to your comment No. 39 in the referenced comment letter. If there are any questions, please call John Moore at 505-722-0205.

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

Enclosure

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

RESPONSE TO COMMENTS
March 21, 2019 Notice of Disapproval – 2017 Annual Groundwater Monitoring Report (Oct. 2018)

NMED Comment 39

In Section 7.2, *Group B - Groundwater Monitoring, Recommendation,* page 49, the Permittee states, "[a]n investigation of the source of SPH that was identified in NAPIS-1 is on-going." Submit a work plan before conducting any investigations regarding the detection of SPH in well NAPIS-1. Any investigation work without an approval from NMED is considered conducted at risk which could result in additional cost to the Permittee if the work is determined to be incomplete or otherwise unacceptable to NMED.

Gallup Response:
The investigation of the source of SPH, which was detected in NAPIS-1 during the quarterly sampling event on September 5, 2017, was actually part of a larger assessment to identify the source of SPH that appeared in several locations over a relatively short period of time. It was observed that SPH was also detected for the first time in a number of years at RW-5 and RW-6 on June 20, 2017. On February 6, 2018 a release of petroleum product was discovered at the discharge from the French drain at STP-1. Notification of the release was reported to NMED and OCD on February 7, 2018.

Initial evaluations of the product from each of these three locations using a distillation analysis indicated very similar product types (naphtha/gasoline) at all three locations. This suggested a possible common source and following notification to NMED and OCD, an effort was immediately implemented to identify any active sources possibly from within the area of the tank farm. A work plan was not prepared for review by the agencies as time was critical to identify any on-going releases. This initial emergency response included a number of measures as described below:

- A series of excavations were conducted using a backhoe to help identify the presence or absence of product where groundwater was potentially shallow enough to be reached with a backhoe;
- Underground pipelines crossing beneath roads and/or tank dikes were excavated for inspection;
- Storage tank inventory records were reviewed to identify any possible discrepancies that could be associated with a possible leak;
- Storage tanks were isolated and fluid levels measured to determine if there was any indication of a leak; and
- Six soil borings were drilled within and near the tank farm to help identify the presence of SPH, five of which were later completed as permanent monitoring wells OW-61 through OW-65, (see enclosed Well Location Map). Information on the installation of wells OW-61 through OW-65 was provided in the 2019 Updates to the Facility-Wide Ground Water Monitoring Work Plan and new chemical analyses of groundwater samples collected at these wells will be provided in the 2019 Annual Ground Water Monitoring Report. Well OW-64 is located on the western end of the tank farm and generally up-gradient of NAPIS-1, thus providing information on the potential source of SPH detected in NAPIS-1.

Despite all of these efforts, an active leak of the identified SPH was not located. The refinery continues to monitor the discharge of SPH at the French Drain and measured thickness at individual monitoring wells. In regards to the SPH detected at NAPIS-1, a summary of the fluid level measurements is provided in the enclosed table.

Recently an evaluation was conducted to determine of the amount of SPH present in NAPIS-1 and potential recovery rates of SPH to the well. While the measured thickness of SPH was as high as 1.95 feet in 2018, 0.26 feet was present when the well was gauged on April 8, 2019. After gauging the fluid levels, 1.25 gallons of water and approximately 0.25 gallon of SPH was bailed from the well. After 20 minutes the water level recovered within 0.31 feet of the initial elevation with no SPH observed in the well. After approximately 3.5 hours 0.1 feet of SPH was measured in the well. The well was checked again the next morning after approximately 16 hours and the same measurement of 0.1 feet of SPH was recorded. The well was bailed of approximately 0.75 gallons of water and less than 0.1 gallon of SPH. The well was checked in 10 minutes and no SPH had reentered the well. After four hours the well was rechecked and 0.06 feet of SPH was present. The measured thickness of 0.06 feet of SPH remained constant through the next morning after approximately 25.5 hours. Based on this limited evaluation, there may be a small volume of SPH in the vicinity of NAPIS-1. Samples of the SPH in NAPIS-1 and other wells with SPH present were recently collected and analyzed using SW-846 method 8015. These analyses, which are consistent with the earlier distillation runs, indicated the SPH appears to be relatively fresh gasoline in most locations, including NAPIS-1. This information was submitted to NMED via email on May 13, 2019.

In addition to the existing information summarized above for NAPIS-1 and information available from OW-64, Gallup has already proposed another nearby up-gradient monitoring well in the *Investigation Work Plan Up-Gradient MKTF Wells* (January 2019). Figure 7 from that work plan has been revised to show the location of OW-64, the NAPI and well NAPIS-1 (see enclosed figure). We 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).

NAPIS-1 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)
03/14/08	NAPIS-1	02/21/17	2.00	6,913.62	6,913.86	0.24	6,900.33	13.53	ND	NA	6.70	6,907.16	NA	3.7 - 13.7
		06/02/17	2.00	6,913.62	6,913.86	0.24	6,900.33	13.53	ND	NA	6.85	6,907.01	NA	3.7 - 13.7
		09/05/17	2.00	6,913.62	6,913.86	0.24	6,900.33	13.53	6.32	0.86	7.18	6,906.68	6907.37	3.7 - 13.7
		12/04/17	2.00	6,913.62	6,913.86	0.24	6,900.33	13.75	6.20	0.65	6.85	6,907.01	6907.53	3.7 - 13.7
		02/12/18	2.00	6,913.62	6,913.86	0.24	6,900.33	13.53	6.15	1.95	8.10	6,905.76	6907.32	3.7 - 13.7
		04/25/18	2.00	6,913.62	6,913.86	0.24	6,900.33	13.76	6.58	1.24	7.82	6,906.04	6907.03	3.7 - 13.7
		08/15/18 [5]	2.00	6,913.62	6,913.86	0.24	6,900.33	NM	NM	NA	NM	NA	NA	3.7 - 13.7
		11/08/18 [5]	2.00	6,913.62	6,913.86	0.24	6,900.33	NM	NM	NA	NM	NA	NA	3.7 - 13.7
		04/08/19	2.00	6,913.62	6,913.86	0.24	6,900.33	13.76	7.95	0.26	8.21	6,905.65	6905.86	3.7 - 13.7

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. *Elevation data from NMED's "Approval with Modifications, Requirement to Resurvey Groundwater Monitoring Wells and Recovery Wells", dated 9/26/12.*
2. *Groundwater elevation - Depth to SPH = SPH Column Thickness.*
3. *2011 Survey Well Casing Rim elevation - depth to water measurement.*
4. *Corrected Water Table Elevation applies only if SPH thickness column measurement exists. (0.8 X SPH thickness + Groundwater Elevation)*
5. *Was not able to gauge or sample wells around the NAPIS Unit due to high H2S readings.*

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

0 200
SCALE IN FEET

NEW MEXICO

GALLUP SITE LOCATION

LEGEND

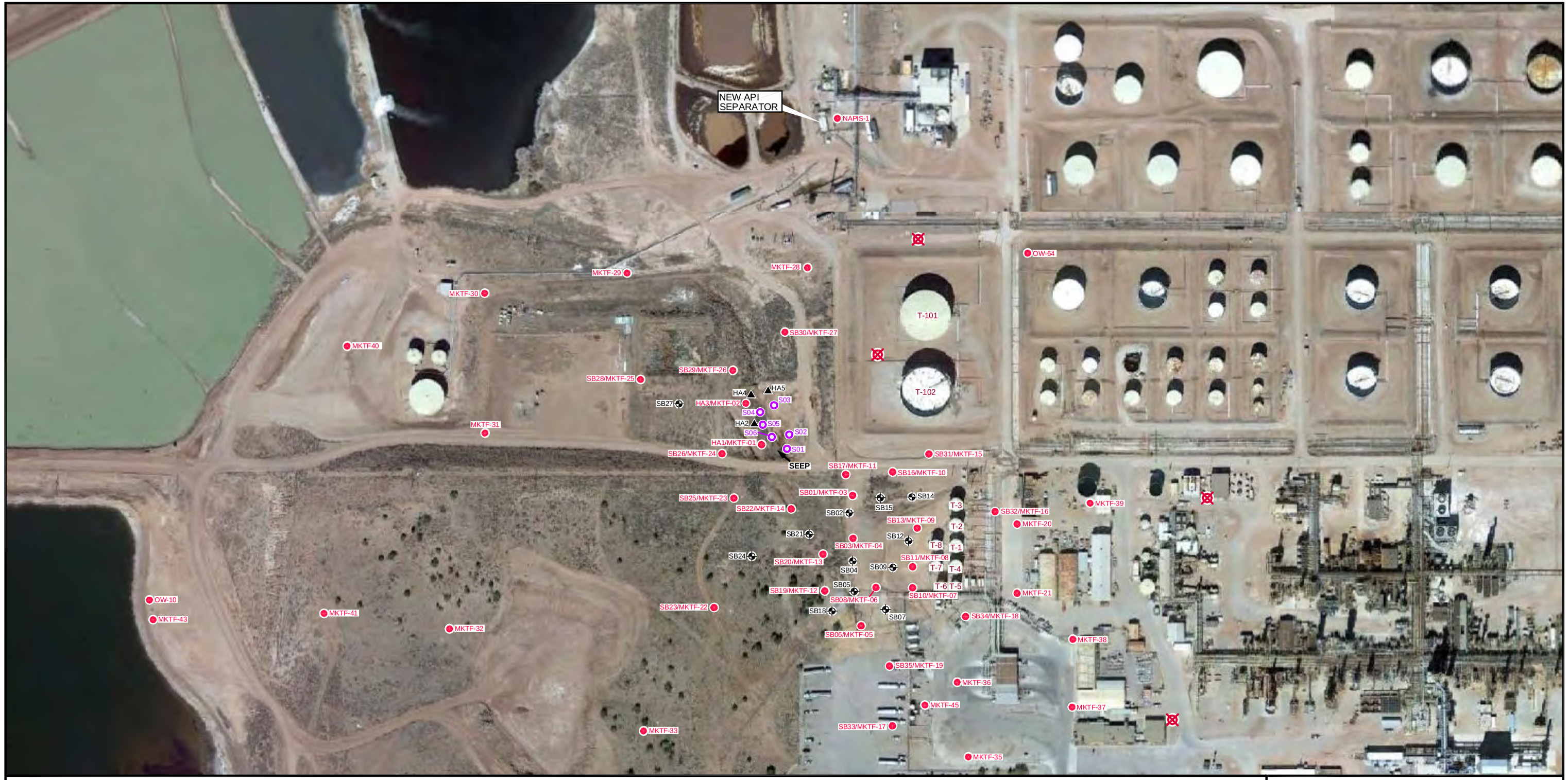
OW-61 ● MONITORING WELL LOCATION AND IDENTIFICATION NUMBER

Western Refining
GALLUP REFINERY

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

WELL LOCATION MAP

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



Aerial Map Source: Google Map, 3/18/2016.

0 220
SCALE IN FEET

LEGEND

- PROPOSED WELL LOCATION
- SB01 — TEMPORARY WELL LOCATION (PLUGGED)
- HA1 — HAND AUGER LOCATION (PLUGGED)
- S01 — TEMPORARY SUMP
- MKTF-34 — MONITORING WELL LOCATION (PERMANENT WELL)

NEW MEXICO

QUADRANGLE LOCATION

MARATHON PETROLEUM COMPANY
GALLUP REFINERY

PROJ. NO.: Marathon | DATE: 05/22/19 | FILE: Mathon-dB216

FIGURE 7
PROPOSED WELL LOCATIONS MAP

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

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

March 21, 2019

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

RE: DISAPPROVAL
ANNUAL GROUNDWATER MONITORING REPORT
GALLUP REFINERY – 2017
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 *Annual Groundwater Monitoring Report: Gallup Refinery - 2017* (Report), dated October 30, 2018, submitted on behalf of Marathon Petroleum Company dba Western Refining Southwest Inc., Gallup Refinery (the Permittee). NMED hereby issues this Disapproval. The Permittee must address the following comments provided by both NMED and the New Mexico Energy Minerals and Natural Resources Department Oil Conservation Division (OCD):

Comment 1

In the Executive Summary, *Group A – Wells,* page 3, and Section 6.1.1, *Boundary Wells, BW-1A/1B/1C, BW-2A/2B/2C, BW-3A/3B/3C, BW-4A/4B, and BW-5A/5B/5C,* page 26, the Permittee states, "[l]ow concentrations of toluene and [methyl tert-butyl ether (MTBE)] were detected in samples collected from BW-5B in December 2017. MTBE was detected in the sample collected from BW-5C in December 2017." According to Section 6.1.1, well BW-5B is screened in the Chinle/Alluvium interface while well BW-5C is screened in the Sonsela formation. Similarly, MTBE was detected from the groundwater samples collected from nearby groundwater

monitoring well OW-1 screened across the Sonsela in 2017. The MTBE detections in wells BW-5B, BW-5C, and OW-1 indicate that the MTBE plume is migrating further west. Comment 5 in NMED's *Disapproval Work Plan 2015 Annual Groundwater Report Comments*, dated January 28, 2019 states, "[p]ropose to install a sentinel groundwater monitoring well west of well OW-1 in the revised Work Plan." Although no revision is required to the Report, the Permittee must address the MTBE detection in wells BW-5B and 5C as well as in OW-1. The location of the sentinel wells must be proposed further west of wells BW-5B and 5C and OW-1 and screened across the Chinle/Alluvium interface and within the Sonsela formation. NMED recommends installing nested sentinel wells in three locations 1,500 feet, 2,000 feet and 2,500 feet west of pond EP-9. Submit a work plan that proposes to install additional wells to evaluate for contaminant migration.

Comment 2
In the Executive Summary, *Group A – Wells,* page 3, and Section 6.1.1, *Boundary Wells, BW-1A/1B/1C, BW-2A/2B/2C, BW-3A/3B/3C, BW-4A/4B, and BW-5A/5B/5C,* page 26, the Permittee states that uranium exceeds the standard in samples collected at BW-5B and BW-5C. It should be noted that uranium is not regulated under RCRA as a constituent of concern. No revision required.

Comment 3
In the Executive Summary, *Group A – Wells,* page 3, and Section 6.1.2, *Land Treatment Unit, MW-1, MW-2, MW-4, MW-5, SMW-2, AND SMW-4,* page 27, the Permittee states that chloride and sulfate have been detected above the WQCC standards in SMW-2 since 2011. Comment 8 in NMED's *Disapproval Investigation Work Plan [SMW-2] and [GWM-1] Areas*, dated February 20, 2019 states, "[i]f the OCD Landfarm is determined to be the source of chloride and sulfate in groundwater, propose to submit a work plan to mitigate the issue (e.g., source removal via excavation)." Although no revision is required to this Report, the Permittee must address the exceedances of chloride and sulfate in the response to the February 20, 2019 *Disapproval.*

Comment 4
In the Executive Summary, *Group A – Wells,* page 3, and Section 6.1.2, *Land Treatment Unit, MW-1, MW-2, MW-4, MW-5, SMW-2, and SMW-4,* page 27, the Permittee states, "[diesel range organics] DRO and [gasoline range organics] GRO were detected in SWM-2 above screening levels." The screening levels of DRO and GRO are 0.0452 mg/L and 0.055 mg/L, respectively, in Table 8.3.1. According to the NMED's March 2017 *Soil Screening Guidance for Human Health Risk Assessments* (Guidance), 0.0452 mg/L and 0.055 mg/L are the screening levels for #3/#6 fuel oil and kerosene/jet fuel, respectively. However, since specific sources of hydrocarbon constituents are unknown, the Permittee must compare the DRO and GRO concentrations to the screening level of unknown oil (39.8 ug/L) in the Guidance. Please note that NMED's Guidance has been updated. Reference the updated guidance in future submittals. Revise all applicable sections and tables of the Report accordingly.

Comment 5
In the Executive Summary, page 3, and Section 6.2.2, *Groundwater Monitoring Wells, NAPIS-1, NAPIS-2, NAPIS-3, and KA-3,* page 29, the Permittee states, "[s]eparate phase hydrocarbon

[SPH] was detected in NAPIS-1 in the third and fourth quarters." This is the first time SPH was detected in well NAPIS-1. NMED considers the discovery of SPH in well NAPIS-1 to be a discovery of a release and subject to RCRA Permit Section II.C.2.c. The Permittee should have notified NMED when it was discovered. In the future, if a monitoring well is discovered to contain SPH for the first time, the Permittee must notify NMED and OCD within 24 hours. The thickness of the SPH column in NAPIS-1 during the third and fourth quarters of 2017 is reported as 0.86 and 0.65 feet, respectively. SPH was not detected in either of the New API Separator Leak Detection Units (LDUs) or wells NAPIS-2, NAPIS-3, and KA-3. The source of the SPH is not clear; however, SPH in wells RW-5 and RW-6 may have migrated to well NAPIS-1. If SPH is present in 2018, purge the well completely, and check the well regularly and report to NMED and OCD by email whether SPH returns to the well and if SPH is present, then report the length of time it takes for the SPH to return. Also, check the downgradient wells for the presence of SPH. Report through email regarding the SPH in well NAPIS-1. Furthermore, collect SPH from wells RW-5, RW-6 and NAPIS-1 and compare to see if the SPH originates from the same source.

Comment 6

In the Executive Summary, *Group B – Wells,* page 4, and Section 6.2.3, *Leak Detection Units (LDU), East LDU, West LDU, and Oil Sump LDU,* page 30, the Permittee states, "[b]enzene (all four quarters) and total xylenes (third quarter) were detected in the East LDU at concentration levels above the applicable standard," and "[i]n the West LDU, benzene exceeded applicable standards in all four quarters of 2017." The construction schematic of the NAPIS/LDUs is included in the Permittee's letter titled *API Separator Leak Detection Units,* dated August 5, 2013. The construction schematic indicates that the detection pipe is connected from the secondary containment wall of each bay through the six-inch thick sump-wall to the mid-section of the LDU. The detection pipe appears to be screened or perforated within the six-inch thick sump-wall. The LDUs themselves are not screened. Therefore, when water is present in LDU, the six-inch thick sump-wall may be saturated with water that is stored in the bay that may be leaking through the secondary containment. Since water is detected in the East and West LDUs, both the east and west bays appear to be leaking through the secondary containment wall. Although some parts of the NAPIS were repaired in 2018, the NAPIS must be re-inspected for potential leaks and repaired as necessary. A report that summarizes the results of the inspection and repair of the NAPIS must be submitted to NMED no later than **June 7, 2019**.

Comment 7

In the Executive Summary, *Group B – Wells,* page 4, and Section 6.2.5, *STP1-NW, STP1-SW, OW-59, and OW-60,* page 32, the Permittee discusses the detection of constituents in wells OW-59 and OW-60. The DRO and GRO concentrations exceed the applicable standards in the groundwater samples collected from well OW-59 in 2017. There are no apparent potential sources present upgradient of the well except the contamination associated with North Drainage Ditch. Discuss potential sources of constituents detected in OW-59 in the revised Report. In addition, Comment 7 in NMED's *Disapproval Investigation Work Plan [SMW-2] and [GWM-1] Areas*, dated February 20, 2019 states, "[s]ubmit the investigation report [associated with the installation of wells OW-59 and OW-60] to NMED for review no later than April 5, 2019."

Although no revision is required to the Report, the Permittee must provide the results of the soil sampling and laboratory analyses for borings OW-59 and OW-60 in an investigation report.

Comment 8
In the Executive Summary, *Group C – Wells,* page 5, and Section 6.3.1, *Observation Wells, OW-13, OW-14, OW-29, OW-30, OW-50, OW-52, OW-53, OW-54, OW-55, OW-56,* page 34, the Permittee states, "[l]ow concentrations of MTBE [in the groundwater samples collected from OW-13] continue to be detected at values below the applicable standard." In order to address the issue of MTBE detections in well OW-13, Comment 7 in NMED's *Disapproval Work Plan 2015 Annual Groundwater Report Comments,* dated January 28, 2019 was provided with the direction to install a well screened in the Sonsela formation at a location halfway between wells OW-12 and OW-13. Although no revision is required to the Report, the Permittee must submit the required work plan to propose to investigate the extent of the MTBE plume in the Sonsela formation in response to the January 28, 2019 *Disapproval.*

Comment 9
In the Executive Summary, *Group C – Wells,* page 5, and Section 6.3.1, *Observation Wells, OW-13, OW-14, OW-29, OW-30, OW-50, OW-52, OW-53, OW-54, OW-55, OW-56,* page 34, the Permittee states that the MTBE concentrations in groundwater samples collected from well OW-30 exceeded the applicable standard in 2017. In order to delineate the eastern extent of the MTBE plume, the Permittee proposed to install a monitoring well northeast of OW-30 in the *Work Plan 2015 Annual Groundwater Report Comments,* dated October 2018. No revision to the Report is necessary.

Comment 10
In the Executive Summary, *Group C – Wells,* page 5, and Section 6.3.2, *Observation Wells, OW-57 and OW-58,* page 36, the Permittee states, "[b]enzene concentrations exceeded the applicable standard in both OW-57 and OW-58." The benzene concentrations in the groundwater samples collected from well OW-58 range from 29 mg/L to 38 mg/L in 2017 according to Table 8.13. The benzene concentrations significantly exceeded the screening level of 0.005 mg/L. Comment 31 in NMED's *Disapproval Facility-wide Ground Water Monitoring Work Plans – Updates for 2016, 2017 and 2018,* dated June 5, 2018 states that well OW-58 is appropriately positioned to monitor the SPH plume; however, its screened interval is submerged approximately 12 feet below the water table and submerged well screens are not appropriate to detect SPH. Accordingly, the Permittee submitted a work plan to reinstall well OW-58 on August 24, 2018. NMED issued the *Disapproval Investigation Work Plan OW-58 Twin Well* on October 19, 2018 and directed the Permittee to submit the revised work plan by December 31, 2018. However, the Permittee has not submitted the revised work plan or requested an extension for the submittal date which constitutes noncompliance with Permit Section I.J.12. The revised work plan must be submitted to NMED no later than **April 1, 2019**.

Comment 11
In the Executive Summary, *Group C – Wells,* page 6, and Section 6.3.3, *Recovery Wells, RW-1, RW-2, RW-5, and RW-6,* page 38, the Permittee states, "[n]o samples were collected from RW-5 and RW-6 during the second, third and fourth quarters of 2017 due to the detection of SPH in the

wells." The discovery of SPH in wells RW-5 and RW-6 is subject to RCRA Permit Section II.C.2.c. The Permittee should have notified NMED when SPH was discovered. In the future, if a monitoring well is discovered to contain SPH after being absent for more than one year or for the first time, the Permittee must notify NMED and OCD within 24 hours. The column thickness of SPH in well RW-5 ranged from 6.19 to 9.25 feet and RW-6 from 5.08 to 9.02 feet in 2017. According to Appendix A, *Separate Phase Hydrocarbon Recovery Logs,* the recorded SPH column thickness in 2017 is significantly more compared to the previously recorded thicknesses in the wells. The previous maximum SPH thicknesses were recorded as 1.78 feet in RW-5 in 2006 and 1.38 feet in RW-6 in 2005. In addition, SPH has not been measured in well RW-5 since February 2009 and in RW-6 since November 2011. A sudden decrease in groundwater levels between the first and second quarter of 2017 may have contributed to the resurgence of SPH. However, the significant increase in the current SPH thicknesses in comparison to the previous measurements is not explained by the decrease in groundwater levels alone since historic groundwater levels were recorded at elevations lower than the current levels prior to 2010. The detection of SPH in wells RW-5 and RW-6 suggests a new release. Collect SPH samples from wells RW-5 and RW-6 for hydrocarbon fingerprint analysis to compare to SPH in NAPIS-1, purge the wells completely, and after purging the wells, check the wells regularly and report the rate at which SPH returns to the wells. The Permittee must report the length of time it took for the SPH to return. In addition, in Section 2.7, *Remediation Activities,* page 20, the Permittee states that the change in conditions was evaluated in 2018 and the [recovery] effort will be discussed in the *2018 Annual Ground Water Monitoring Report* as the activities did not occur during the 2017 reporting period. However, since SPH appeared in 2017, the discussion regarding the evaluation of the site conditions and recovery effort is relevant and must be included in the Report. Revise the Report accordingly.

Comment 12

In the Executive Summary, *Group D – Wells,* page 6, the Permittee states, "[t]wo organic constituents were detected at levels below applicable standards in 2017 (bis (2-ethylhexyl) phthalate and di-n-octylphthalate)." However, the bis (2-ethylhexyl) phthalate concentration in well PW-4 exceeded the applicable screening level in 2017. Section 6.4.1, *Process Wells, PW-2, PW-3, and PW-4,* page 39, addresses the exceedance correctly. However, the statement in Executive Summary must be corrected for accuracy. In addition, the laboratory report identified as 1703F34 in Appendix G, *Hall Laboratory Analytical Data*, indicates that benzoic acid and acetone were also detected in the groundwater sample collected from well PW-4 in 2017. Include the discussions for all detected constituents in the revised Report.

Comment 13

In the Executive Summary, *Group D – Wells,* page 6, and Section 6.4.2, *Observation Wells, OW-1 and OW-10,* page 41, the Permittee states, "[l]ow concentrations of cations were detected in OW-1 throughout 2017 at concentration levels below the applicable standard. OW-10 had exceedances of chloride in all of 2017." The discussion here is related to anions, rather than cations. Correct the typographical error in the revised Report.

Comment 14
In the Executive Summary, *Additional Sites Monitored,* page 7, and Section 6.6.1, *Evaporation Ponds EP-1 through EP-12B,* page 45, the Permittee states, "[b]enzene was detected above the applicable standard in evaporation ponds EP- 2 and EP-12B in 2017. Toluene, ethylbenzene, and total xylenes were detected at concentration levels below applicable standards in evaporation ponds EP-2, EP- 3, EP-4 and EP-12B." The benzene, DRO and GRO concentrations in the wastewater samples collected from the outlet of pond STP-1 (inlet of pond EP-2) also exceeded the applicable standards in 2017. The wastewater treatment system is underperforming. Benzene concentrations detected in wastewater treatment samples collected from downstream of the carbon canister system were less than the hazardous characteristic level of 0.5 mg/L; however, it appears that the aerators in STP-1 are not effectively treating the benzene that reaches STP-1. The wastewater from the outlet of pond STP-1 must not contain organic contaminant concentrations exceeding the applicable standards. STP-1 should have sufficient aerators running to remove VOCs. Benzene should not be present in the evaporation ponds. Submit a separate letter to explain why benzene is not being effectively treated in STP-1. In addition, explain why the benzene concentrations in the wastewater sample collected from pond EP-12B also exceeded the applicable standard. Furthermore, provide information regarding the flow path of wastewater from pond EP-2 through the last evaporation ponds in the revised Report as required by Comment 19 in NMED's *Disapproval 2015 Revised Annual Groundwater Monitoring Report*, dated January 4, 2019.

Comment 15
In the Executive Summary, *Additional Sites Monitored,* page 7, and Section 6.6.1, *Evaporation Ponds EP-1 through EP-12B,* page 45, the Permittee states that bromomethane was detected in ponds EP-2 and EP-12B above the NMED Tap Water standard in 2017. Comment 26 in NMED's *Disapproval 2016 Annual Groundwater Monitoring Report,* dated June 4, 2018 states, "[w]hen bromomethane is detected in surface water bodies, pesticides may have been used extensively nearby. Collect water samples from ponds EP-3, EP-12A and EP-12B for pesticides analysis using EPA Method 8081A during the 2018 sampling events." The Permittee's response to the comments dated September 30, 2018 states, "[s]amples from ponds EP-3, EP-12A and EP-12B will be analyzed for pesticides using EPA Method 8081A during the next sampling event and each sampling event at the Evaporation Ponds thereafter for the remainder of 2018." Since bromomethane was also detected in the wastewater sample collected from pond EP-2, the Permittee must also collect wastewater sample from pond EP-2 for pesticide analysis using EPA Method 8081A.

Comment 16
In the Executive Summary, *Additional Sites Monitored,* page 7, and Section 6.6.5, *Outfall STP-1 to EP-2 Inlet,* page 47, the Permittee states, "[biological oxygen demand (BOD)] and [chemical oxygen demand (COD)] concentrations exceeded the applicable standards in 2017." The BOD concentrations ranged from 470 to 1,400 mg/L and the COD concentrations ranged from 1,100 to 2,100 mg/L in the wastewater samples collected from outlet of STP-1 in 2017. These concentrations are similar to those in the samples collected from pond EP-2. The e-coli concentrations in wastewater samples collected from pond EP-2 exceeded 24,196 CFU/100 ml in 2017. The Permittee previously explained that the elevated e-coli concentrations in the

evaporation ponds were possibly caused by feces from birds. Evaluate whether the e-coli concentrations in wastewater from STP-1 outlet are similar to those in wastewater from pond EP-2. The aerator in STP-1 may not be providing sufficient aeration to treat sewage water. Propose to collect a wastewater sample from STP-1 outlet for e-coli analysis during the 2019 sampling events in the revised Report.

Comment 17

In Section 1.2, *Background Information,* page 11, the Permittee states, "[t]he waste water effluent flows into T-27, T-28 and into T-35 (which works in parallel to T-27 and T-28) and into the NAPIS which provides the first stage oil-water separation where the removal of free oil is separated from waste water by gravity." From the Permittee's description, it is not clear how wastewater is conveyed into tanks T-27, T-28 and T-35 from the refinery. Provide a figure showing the location of pipes connecting from the refinery to the wastewater storage tanks (T-27, T-28 and T-35) in the revised Report. Also, explain whether the pipe is below ground and if so, how deep the pipe is buried in the revised Report. In addition, the Permittee states, "[t]he clarified water [from the NAPIS] is routed to the waste water treatment plant (WWTP) Dissolved Gas Flotation (DGF) system which provides the second stage oil-water separation process." Provide a figure showing the location of the DGF system. In addition, provide a process schematic of the wastewater treatment system including NAPIS, DGF, carbon canister system and STP-1 in the revised Report. Furthermore, the Permittee states, "[t]he DGF process involves the pressurization of waste water in the presence of air or nitrogen, creating a super-saturated solution called coagulates that are carried to the surface. The float is removed to disposal by mechanical float scrapers and the effluent is recycled back to the flotation chamber." According to Table 8.16, the total dissolved solids (TDS) concentrations in outlet of STP-1 consistently exceed the applicable standard. TDS level is often proportional to the level of total suspended solids (TSS). In order to evaluate effectiveness of the DGF system, propose to collect wastewater samples from the STP-1 outlet for TSS analysis during the 2019 sampling events in the revised Report.

Comment 18

In Section 1.2, *Background Information,* page 11, the Permittee states, "[f]low rates up to 500 [gallons per minute (GPM)] can now be achieved through the carbon system. The waste water that passes through the carbon canisters discharges into the sanitary treatment pond (STP-1). STP-1 has two bays, north and south and each bay is equipped with five aerators." Since the concentrations of organic constituents exceeded in wastewater samples collected from the outlet of STP-1, the wastewater treatment system may be underperforming. The benzene concentrations in the effluent samples collected from the carbon canister system have been recorded below the characteristic hazardous waste limit of 0.5 mg/L and the carbon canister system appears to be capable of treating the wastewater stream; however, STP-1 may be underperforming because of the excessive influent flowrate or insufficient aeration. Wastewater that was characteristically hazardous for benzene has been discharged to STP-1 in the past. Explain whether all 10 aerators are operating at all times and demonstrate that STP-1 is theoretically capable of reducing benzene from 0.5 mg/L to 0.005 mg/L at a flowrate of 500 GPM in a response letter.

Comment 19
In Section 2.2, *Sampling Method and Procedures,* page 17, the Permittee states, "[f]ield water quality measurements must stabilize for a minimum of three consecutive readings taken at 2 to 5-minute intervals, within the following limits before purging will be discontinued and sampling may begin: dissolved oxygen (DO) (10%), specific conductance (10%), temperature (10%), and pH (10%)." The sampling protocol was not always followed according to Appendix B, *Field Inspection Logs.* For example, during the first quarter of the 2017 sampling event, groundwater samples were collected from well MKTF-39 before the water quality parameters were stabilized within the criteria. Only two consecutive readings were collected. The DO readings were recorded as 108.4% [sic] and 14.5% [sic], equivalent to a 645% difference. The specific conductance readings were recorded as 205 uS, mS [sic] and 3,916 uS, mS [sic], equivalent to a 1,810% difference. The temperature readings were recorded as 20.68 °C and 14.15 °C, equivalent to a 46% difference. Finally, the pH readings were recorded as 7.89 and 7.08, equivalent to a 11.4% difference. None of the readings were within the stabilization criteria. The Permittee must instruct field personnel to follow the sampling protocol in future sampling events and provide an explanation for why the sampling protocol was not followed during the 2017 sampling events in the revised Report. In addition, provide a table summarizing final (stabilized readings of all groundwater parameters (e.g., DO, pH) as required by Comment 25 in NMED's *Disapproval 2015 Revised Annual Groundwater Monitoring Report,* dated January 4, 2019.

Comment 20
In Section 2.4, *Collection of Surface Water Samples,* page 19, the Permittee states, "[a]t the evaporation ponds, grab samples were collected near the inlets (pond edge). This location was noted in the field notebooks." The description of the locations where grab samples were collected is not included in the field notes in Appendix B. Include the referenced field notebooks in the revised Report or otherwise identify the sample locations.

Comment 21
In Section 5, *Groundwater Elevations,* page 24, the Permittee did not include a discussion regarding the groundwater elevation and flow direction shown in Figure 10, *Alluvium/Chinle Gp Interface Water Elevation Map.* Include the discussion in the revised Report. In addition, although it is appropriate to include a map that depicts groundwater flow direction over the entire facility (Figure 10), parts of contour lines are subjectively interpreted or extrapolated because monitoring wells are either far apart or not present at all in some areas. In order to indicate that some parts of contour lines are subjectively interpreted, distinguish them with dotted lines. Revise Figure 10 and all applicable figures accordingly. Furthermore, the groundwater flow direction at the northeastern facility is generally depicted from south to north while the groundwater flow direction at the northwestern facility is generally depicted from east to west. Although the revision in flow directions shown in Figure 10 is not required, note that the flow directions as shown may not be accurate because groundwater monitoring wells are too widely spaced in the area.

Comment 22
In Section 6, *Groundwater Monitoring Results,* page 25, the Permittee states, "[d]ue to requirements for field preservation of samples, some samples have the results for nitrite and nitrate reported as a single value of nitrogen," and "[m]odifications to the field sampling program have been made to allow reporting of both nitrate and nitrite in future reports." Comment 11 in NMED's *Disapproval 2015 Annual Groundwater Monitoring Report,* dated January 31, 2018 directs the Permittee to conduct separate nitrate and nitrite analyses in groundwater samples and report the concentrations separately. The Permittee did not include the modifications that allowed separate reporting of nitrate and nitrite in the Report. Include the discussion regarding the modifications in the revised Report, rather than in the future reports.

Comment 23
In Section 6.1.1, *Boundary Wells, BW-1A/1B/1C, BW-2A/2B/2C, BW-3A/3B/3C, BW-4A/4B, and BW-5A/5B/5C*, page 25, the Permittee states, "BW-1A, BW-2A, BW-3A, BW-4A, and BW-5A are screened within the Upper Sand stratigraphic unit (Figure 12); BW-1B, BW-2B, BW-3B, BW-4B and BW-5B are screened in the Chinle/Alluvium Interface stratigraphic unit (Figure 10); and BW-1C, BW-2C, BW-3C, and BW-5C are screened within the Sonsela stratigraphic unit (Figure 9)." Figure 9, *Sonsela Water Elevation Map – 2017*, does not present the groundwater elevations measured in each well. Revise the figure to present the groundwater elevations in the revised Report.

Comment 24
In Section 6.1.1, *Boundary Wells, BW-1A/1B/1C, BW-2A/2B/2C, BW-3A/3B/3C, BW-4A/4B, and BW-5A/5B/5C,* page 25, the Permittee states, "[t]he boundary wells are sampled on an annual basis and evaluated for the following analytes: 8260B plus MTBE, gasoline range organics, (GRO), diesel range organics (DRO) and motor oil range organics (MRO), major cations/anions, and WQCC metals (total and dissolved)." EPA Method 8260B includes the analysis of MTBE. Revise the statement for accuracy. Similarly, in Section 6.1.2, *Land Treatment Unit, MW-1, MW-2, MW-4, MW-5, SMW-2, and SMW-4,* page 26, the Permittee states, "[a]nnual samples were analyzed for the following analytes: 8260B plus MTBE, DRO, GRO, MRO, major cations/anions, WQCC metals (total and dissolved), cyanide, VOCs, and SVOCs." Revise the statement for accuracy throughout the revised Report.

Comment 25
In Section 6.2.1, *Groundwater Monitoring Boundary Wells, GWM-1. GWM-2, and GWM-3,* page 28, the Permittee states, "SPH was found to be present in GMW-1 during all four quarterly gauging events in 2017 and thus no groundwater samples were collected for chemical analysis." If SPH is still present, purge the well completely. After purging the well, check the well regularly and report whether SPH returns to the well and if SPH is present, then report the length of time it took for the SPH to return. Section 7.2, *Group B – Groundwater Monitoring, Recommendations,* page 49, also discusses inspection of GWM-1. Provide the information by email with the data from NAPIS-1 and the RW-wells as well as include the information in the next annual report.

Comment 26
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, "[n]o organic compounds detected were exceeding applicable standards in OW-29 and OW-30 in all of 2017." The concentrations of various organic compounds (e.g., MTBE) exceeded applicable screening levels. Remove the statement from the revised Report.

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.

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.

Comment 29
In Section 6.3.3, *Recovery Wells, RW-1, RW-2, RW-5, and RW-6,* page 37, the Permittee states, "[q]uarterly inspections for the RW wells include product recovery of SPH using disposable bailers in RW-5 and RW-6, and a portable 2-inch bladder pump for RW-1." Appendix A, *Separate Phase Hydrocarbon Recovery Logs,* indicates that SPH was recovered with a bailer from well RW-1 during the fourth quarter of 2017. Provide an explanation for the variance in the revised Report.

Comment 30
In Section 6.3.3, *Recovery Wells, RW-1, RW-2, RW-5, and RW-6,* page 39, the Permittee states, "[t]he recovery well was never completely purged dry due to suction of the submersible pump

being at the top, which left approximately 24" of product/water level remaining in RW-1." The pump is presumably a 24-inch top-loading submersible pump and placed at the bottom of the well. Well RW-1 is screened from 25 to 40 feet bgs; therefore, the SPH/groundwater interface has brought to the depth of 38 feet bgs by continuous pumping, where SPH has not been introduced by a natural fluctuation of groundwater elevations. This is an issue because SPH may potentially have contaminated the soils where SPH was initially absent. In order to prevent SPH from potentially contaminating clean deep soils and groundwater via pumping, the position of pump inlet must not be set lower than the lowest groundwater elevation among historical groundwater elevation data. Propose to change the depth of the pump inlet in the revised Report.

Comment 31

In Section 6.4.1, *Process Wells, PW-2, PW-3, and PW-4,* page 40, the Permittee states, "[t]wo semi-volatile organic compounds [(SVOCs)] were reported in concentrations above the detection limits (Table 8.6.3) [in the PW wells]." The PW wells were advanced to the depth of approximately 1,000 feet bgs and within the San Andres/Yeso aquifer. Explain potential causes of the SVOC detections from the groundwater samples collected from the PW wells (e.g., materials used during sampling, well construction). Provide the discussion in the revised Report.

Comment 32

Section 6.4.2, *Observation Wells, OW-1 and OW-10,* page 41, discusses detection of 1,2-dichloroethane (EDC) in the groundwater samples collected from wells OW-1 and OW-10. The Permittee appropriately conducted 1,2-dibromoethane (EDB) analysis using EPA Method 8011 for the groundwater samples collected from the wells. EDB was not detected in either well in 2017. Since the detection of EDC raises a question for the presence of EDB, include the discussion of EDB analytical results in the revised Report. In addition, if EDC was newly detected in groundwater samples collected from wells during 2017 and EDB analysis was not yet proposed for the wells in the *2018 Facility-wide Groundwater Work Plan,* propose to conduct EDB analysis using EPA Method 8011 in the *2019 Facility-wide Groundwater Work Plan.*

Comment 33

In Section 6.5, *Constituent Levels in Group E Monitoring Wells,* page 42, the Permittee states, "[w]ells that had a hydrocarbon layer were not sampled." Identify the MKTF wells that contained SPH during the 2017 monitoring events. In addition, provide the criterion (e.g., SPH column thickness) for whether or not groundwater samples are collected from the wells. Revise the Report accordingly.

Comment 34

In Section 6.5, *Constituent Levels in Group E Monitoring Wells,* page 42, the Permittee states, "[t]he highest benzene concentration (24 mg/L) during 2017 occurred in well MKTF-15 during the fourth quarter (Table 8.17)." According to Table 8.17, the highest benzene concentration in the groundwater sample collected from well MKTF-15 was detected during the first quarter of 2017. Revise the Report accordingly.

Comment 35
In Section 6.5, *Constituent Levels in Group E Monitoring Wells,* page 43, the Permittee states, "[t]otal xylenes concentrations exceeded the standard of 0.62 mg/L in the following wells: MKTF-4, MKTF-10, MKTF-11, MKTF-13, MKTF-15, MKTF-16, MKTF-19, MKTF-20, MKTF-21, MKTF-23, and MKTF-37." According to Table 8.17, groundwater samples were not collected from well MKTF-23 in 2017. Revise the Report accordingly.

Comment 36
In Section 6.5, *Constituent Levels in Group E Monitoring Wells,* page 44, the Permittee states, "[s]even semi-volatile organic compounds were detected that exceeded applicable standards in 2017," and "[e]leven volatile organic compounds were detected in the MKTF wells in 2017 at concentration levels above the applicable standards." The compounds detected above the standards are listed in the Report; however, the designation of wells where the exceedances were detected is not identified. Identify the wells where these exceedances were detected in the revised Report.

Comment 37
Section 6.6.1, *Evaporation Ponds EP-1 through EP-12B*, page 45 does not include discussion regarding the exceedance of e-coli concentrations in wastewater samples collected from ponds EP-2, EP-3, EP-4, and EP-12B. Include the discussion in the revised Report.

Comment 38
In Section 6.7.5, *Outfall STP1 to EP-2 Inlet,* page 46, the Permittee states, "STP-1 effluent now flows into the northeast corner of EP-2." The e-coli concentrations in wastewater samples collected from pond EP-2 exceeded the applicable standard. Propose to collect wastewater samples from the STP-1 effluent and influent(s) for e-coli analysis in the revised Report.

Comment 39
In Section 7.2, *Group B – Groundwater Monitoring, Recommendation,* page 49, the Permittee states, "[a]n investigation of the source of SPH that was identified in NAPIS-1 is on-going." Submit a work plan before conducting any investigations regarding the detection of SPH in well NAPIS-1. Any investigation work without an approval from NMED is considered conducted at risk which could result in additional cost to the Permittee if the work is determined to be incomplete or otherwise unacceptable to NMED.

Comment 40
In Section 7.3, *Group C – Groundwater Monitoring, Recommendation,* page 51, the Permittee states, "SPH appeared in RW-5 and RW-6, after not being present for a number of years, suggesting a potential new source of SPH in the tank farm." Discuss whether tanks and lines have been recently tested and inspected, the dates of the tests and inspections, and associated results in the revised Report. In the email response to NMED Comment 11, discuss whether the fingerprint analysis identified potential sources within the tank farm.

Comment 41
In Section 7.4, *Group D – Groundwater Monitoring,* page 51, the Permittee states, "[f]our organic compounds were detected in 2017: 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane (EDC) and cis-1,2-DCE, all at concentration levels below the applicable standards [in groundwater samples collected from well OW-10 which is screened within the Sonsela]." Chlorinated solvents were used at the facility and are also present in wells screened in the Chinle/Alluvium. The occurrence of anaerobic dechlorination and potential accumulation of related daughter products must be evaluated using the existing data (e.g., concentrations of chlorinated compounds, groundwater quality parameters, and anion concentrations). Include the discussion in the revised Report.

Comment 42
In Section 7.5, *Group E – Groundwater Monitoring, Recommendations,* page 52, the Permittee states, "[i]t is recommended to reduce the monitoring frequency in 2019, as many of the analytical results indicate little change, such that continued quarterly monitoring is not warranted at all MKTF wells." There are on-going investigations in the vicinity of MKTF wells and the Hydrocarbon Seep Investigation is on-going, and activities associated with the investigations will likely affect groundwater conditions in the vicinity of MKTF wells. Therefore, NMED does not concur with the recommendation for reducing the monitoring frequency. The Permittee must continue to conduct quarterly monitoring and sampling of all MKTF wells in 2019. Revise the Report accordingly.

Comment 43
In Section 9, *Well Data DTW/DTB Measurements,* page 54, the Permittee states, "[t]he Well Data Table is attached as Section 9.1." Although Tables 9.1 and 9.2 present the 2017 DTB/DTW measurement data are included in Section 9, the referenced Section 9.1 is not included in the Report. Revise the Report as necessary.

Comment 44
Table 9.1, *2017 DTB/DTW Measurements,* indicates that a decrease of groundwater levels was observed in wells RW-5 and RW-6 while an increase was observed in wells RW-1, RW-2, OW-58. DTW in wells RW-5 and RW-6 was not measured below 30 feet bgs between 2013 and the second quarter of 2017. Provide an explanation for the sudden decrease of groundwater level in wells RW-5 and RW-6 (e.g., if there are any site activities that may have affected the groundwater levels in the vicinity), if known.

Comment 45
Table 9.1, *2017 DTB/DTW Measurements,* and Table 9.2, *2017 DTB/DTW Measurements for Wells MKTF-01 through MKTF-45,* present the 2017 DTW data. However, in order to evaluate present data relative to historic trends, it is essential to examine previous data. Revise the table to include the data from the three previous monitoring events, where applicable, in accordance with RCRA Permit Section IV.L.4.K. Revise the Report accordingly.

Comment 46
Figure 11, *Groundwater Elevation vs. Time – 2017* does not include the ground surface or SPH elevations. The charts with ground surface, groundwater and SPH elevations provide information regarding the extent of the SPH smear zone. The information is an important design parameter for a SPH recovery system, if needed in the future. Include ground surface, groundwater and SPH elevations in the figures as also required by Comment 23 in NMED's *Disapproval 2015 Revised Annual Groundwater Monitoring Report*, dated January 4, 2019. Revise the Report accordingly.

Comment 47
In Appendix A, *Separate Phase Hydrocarbon Recovery Logs,* the estimated recovery volume of SPH from well RW-6 is recorded as 34 gallons in 2013; however, SPH was not detected in well RW-6 during the 2013 gauging events. Resolve the discrepancy in the revised Report.

Comment 48
In Appendix B, *Field Inspection Logs,* the unit of dissolved oxygen (DO) in the sampling forms is still indicated as "%". Although the Permittee previously provided a statement explaining that the DO reporting unit (%) was intended to be milligrams per liter (mg/L), the sampling forms were not corrected in the Report. Previously, similar comments were provided to correct the DO units in the sampling forms. If making the correction on each field form is impracticable, insert a note for the corrected DO unit in Appendix B of the revised Report. All future sampling forms must be corrected to report DO in mg/L.

Comment 49
In Appendix B, *Field Inspection Logs,* the reported DO concentrations often significantly exceed the solubility limit of oxygen at the given temperature. For example, the DO concentrations in well STP1-NW were reported from 101.4 [mg/L] to 113.8 [mg/L] at an average temperature of approximately 25 °C. The solubility limit of oxygen in fresh water at a temperature of 25 °C under the atmospheric pressure is approximately 8 mg/L. The solubility limit of oxygen in more saline water, which may be more representative of site's groundwater conditions, is even lower than the solubility limit in fresh water. The field instrument must be calibrated daily (according to manufacturer specifications) prior to conducting the measurements in all future sampling events. The required calibration procedure for the instrument must be described in the appropriate section of the revised Report. If the issue cannot be resolved, investigate alternate instruments for measuring DO concentrations. Note any changes to the instrument used in future reports.

Comment 50
In Appendix B, *Field Inspection Logs,* the conductivity readings have two different units, uS and mS. Correct the unit of conductivity readings in the revised Report. It should be noted that the SI unit of conductivity is siemens per meter (S/m) or micro or milli siemens per meter (uS/m or mS/m).

The Permittee must address all comments in this Disapproval and submit a revised Report. Two bound hard copies and electronic versions must be submitted to NMED. In addition, include a red-line strikeout version in electronic format showing where all revisions to the Report have been made. The revised Report must be accompanied with a response letter that details where revisions have been made, cross-referencing NMED's numbered comments. The revised Report must be submitted to NMED no later than **May 7, 2019**.

An inspection and repair report regarding the NAPIS required by Comment 6 must be submitted to NMED no later than **June 7, 2019**.

A revised *Work Plan OW-58 Twin Well* required by Comment 10 must be submitted to NMED no later than **April 1, 2019**.

A letter providing an explanation for why benzene is not effectively treated in STP-1 required by Comment 14 must be submitted to NMED no later than **May 7, 2019**.

A work plan required by Comments 27 and 28 must be submitted to NMED no later than **August 30, 2019**.

A work plan to address Comment 39 must be submitted to NMED no later than **May 31, 2019**.

An email response regarding SPH in NAPIS-1 (Comment 5), RW-wells (Comments 11 and 40), and GWM-1 (Comment 25) must be submitted to NMED no later than **May 7, 2019**.

If you have questions regarding this Disapproval, please contact Michiya Suzuki of my staff at 505-476-6059.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: K. Van Horn, NMED HWB
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