

GW - 032

**Sanitary Lagoon
Investigation**

2021



Western Refining Southwest LLC

A subsidiary of Marathon Petroleum Corporation

I-40 Exit 39

Jamestown, NM 87347

June 30, 2021

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

**RE: Response to Approval with Modifications
Sanitary Lagoon Investigation Phase II Work Plan
Western Refining Southwest LLC, Gallup Refinery
EPA ID #NMD000333211
HWB-WRG-21-005**

Dear Mr. Pierard,

Attached please find the response to comments contained in the New Mexico Environment Department (NMED) *Approval with Modifications Sanitary Lagoon Investigation Phase II Work Plan*, (Work Plan) dated April 26, 2021. The Work Plan was drafted in response to Comments 1 and 14 of the “Approval with Modifications Investigation Report Sanitary Lagoon.” A timeline of the report and investigation for the Sanitary Lagoon is provided below.

Investigation Report, submitted February 17, 2020

- *Approval with Modifications*, received April 24, 2020
- *Response to Approval with Modifications*, submitted November 15, 2020

Phase II Investigation Work Plan, submitted March 31, 2021

- *Approval with Modifications*, received April 26, 2021

If you have any questions or comments regarding the information contained herein, please do not hesitate to contact Mr. John Moore at (915) 775-7864.



Western Refining Southwest LLC

A subsidiary of Marathon Petroleum Corporation

I-40 Exit 39

Jamestown, NM 87347

Certification

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

Sincerely,

Marathon Petroleum Company LP, Gallup Refinery

Robert S. Hanks

Robert S. Hanks
Refinery General Manager

Enclosure

cc: D. Cobrain, NMED HWB
M. Suzuki, NMED HWB
T. McDill, NMOCD
L. King, EPA Region 6
G. McCartney, Marathon Petroleum Corporation
K. Luka, Marathon Petroleum Corporation
J. Moore, Marathon Gallup Refinery
H. Jones, Trihydro Corporation

Attachment A: Response to Comments

New Mexico Environment Department (NMED) to Marathon Petroleum Company (MPC) Comment Letter “Response to Approval with Modifications Sanitary Lagoon Investigation Phase II Work Plan” (April 26, 2021)

NMED Comment	MPC Response
<p>Comment 1:</p> <p>In Section 4.1, <i>Investigation</i>, page 8, the Permittee states, “[a] total of 6 soil borings will be located at the base of the sanitary lagoon berms in locations shown in Figure 3. The borings will be located north of SL-3, east of SL-2, and south of SL-8. Soil samples will be collected at a depth of 2.0-2.5 feet below ground surface (bgs) and tested for TPH-DRO.” According to the <i>Investigation Report Sanitary Lagoon</i>, dated February 2020, the TPH-DRO concentrations in the soil samples collected from boring locations SL-2, SL-3, and SL-8 did not exceed the applicable screening levels at a depth interval of 2.0 - 2.5 feet below ground surface (bgs) where soil sampling is proposed. The exceedance of the TPH-DRO concentrations was detected between the ground surface (0.0) and 0.5 foot bgs. Propose to collect the soil samples at depths of 0.0 - 0.5 and 2.0 - 2.5 feet bgs at the proposed sample locations for TPH-DRO analysis. Revise the Work Plan and provide replacement pages as necessary.</p>	<p>Response 1:</p> <p>In response to NMED’s Comment 1, the Work Plan has been revised on page 8 in Section 4.1 to state, “[s]oil samples will be collected at depths of 0.0-0.5 and 2.0-2.5 feet below ground surface (bgs) and tested for TPH-DRO.”</p>
<p>Comment 2:</p> <p>In Section 4.4, <i>Collection and Management of Investigation Derived Waste</i>, page 10, the Permittee states, “[t]he soils produced from the pipeline location trenches will be temporarily placed beside the trenches. The majority of this material will be removed from above the pipeline and is not believed to be contaminated. If the soil shows potential impacts, then this soil will be managed separately and will be characterized as described below. Otherwise, non-impacted soil will be returned to the trench after the pipeline is located.” The soil placed beside the trenches may potentially contaminate the surface soil. In the revised Work Plan, propose to place plastic sheeting on the ground surface where excavated soils will be placed, if it appears to be contaminated.</p> <p>In addition, if the soils beneath the pipeline are found to be contaminated at unacceptable levels, additional soil removal will be required to eliminate the risks associated with the contamination. The trenches must</p>	<p>Response 2:</p> <p>In response to the first comment in NMED’s Comment 2, the Work Plan has been revised on page 10 in Section 4.4 to state, “[i]f the soil shows visual impacts (e.g stained soils) and elevated PID readings over 20 parts per million, then this soil will be placed on plastic sheeting to avoid potentially contaminating the surface soil. The soil will be managed separately and will be characterized as described below.”</p> <p>In response to the second comment in NMED’s Comment 2, the Work Plan has been revised on pages 10 and 11 in Section 4.4 to state, “[t]he trenches will be left open until the analytical results confirm that risks associated with contamination are eliminated. If necessary, additional soils will be removed and confirmation samples will be collected from the larger trenches per analytical results.”</p>

New Mexico Environment Department (NMED) to Marathon Petroleum Company (MPC) Comment Letter “Response to Approval with Modifications Sanitary Lagoon Investigation Phase II Work Plan” (April 26, 2021)

NMED Comment	MPC Response
<p>be left open until the analytical results confirm that such risks are eliminated. Propose to remove additional soils and collect confirmation samples from the larger trenches, if necessary, until such risks are eliminated. Include the provision in the revised Work Plan.</p> <p>Furthermore, whether or not the presence of contaminants is suspected, the excavated soils along the pipeline must be appropriately characterized. Discuss how the excavated soils will be characterized in the response letter.</p>	<p>In response to the third comment in NMED’s Comment 2, the Work Plan has been revised on page 11 in Section 4.4 to state, “[a]ll excavated soils will be appropriately characterized for disposal. Composite samples of the excavated soils will be collected and analyzed for VOCs (Method 8260, TCLP), SVOCs (Method 8270, TCLP), and RCRA 8 Metals (TCLP).”</p>

Attachment B: Replacement Pages



MARATHON PETROLEUM CORPORATION
GALLUP REFINING DIVISION
SANITARY LAGOON INVESTIGATION PHASE II
WORK PLAN
MARCH 31, 2021
REVISED MAY 18, 2021



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.

Name: Kateri Luka

Date

Title: Senior HSE Professional



3.2 Subsurface Conditions

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

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} centimeters per second (cm/sec) for gravely sands immediately overlying the Chinle 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 Formation with prevailing flow from the southeast to the northwest, with some flow to the northeast on the northeastern portion of the refinery property.

4.0 Scope of Work

The site investigation of soils will be conducted to define the nature and extent of impacts to the environment and facilitate remedy selection, as necessary. The investigation will commence upon approval of this investigation work plan by the New Mexico Environment Department.

4.1 Investigation

An investigation of soils/sediments along the north, south, and west berms of the sanitary lagoon will be conducted to define the extent of TPH-DRO impacts found within the lagoon. Additionally, soil samples will be collected from beneath the sanitary pipeline that had discharged to the lagoon. The following elements summarize the proposed sampling to be conducted near the sanitary lagoon and along the sanitary pipeline.

- A total of 6 soil borings will be located at the base of the sanitary lagoon berms in locations shown in Figure 3. The borings will be located north of SL-3, east of SL-2, and south of SL-8. Soil samples will be collected at depths of 0.0-0.5 and 2.0-2.5 feet below ground surface (bgs) and tested for TPH-DRO.
- Up to 13 trenches, at 50 ft intervals, will be completed southeast of the lagoon adjacent to the sanitary pipeline to allow for collection of soil samples beneath the pipeline.



boring will be completed in the field by a qualified person. Additional information, such as the presence of water-bearing zones and any unusual or noticeable conditions encountered during drilling, will be recorded on the logs.

Quality Assurance/Quality Control samples will be collected to monitor the validity of the soil sample collection procedures as follows:

- Field duplicates will be collected at a rate of 10 percent or at least one per day.
- Equipment blanks will be collected from all reusable sampling apparatus at a frequency of one per day.

4.3 Sampling Activities

Starting approximately 50 feet south of the sanitary lagoon, a maximum of 13 exploratory trenches will be dug using a track hoe to determine the depth of the pipeline and collect soil samples from 2 feet to 4 feet beneath the pipeline. The trenches will be spaced approximately every 50 feet along the length of the pipeline as shown in Figure 4. The equipment will be properly decontaminated before starting each trench and equipment blanks will be collected at a rate of 10 percent or at least one per day. For safety reasons, the soil sampling will be conducted using a decontaminated hand auger once the excavation reaches the target depth beneath the pipeline. The hand auger will have extensions reaching up to 15 ft and should be sufficient to collect the samples without entering the trench. If the sample cannot be directly obtained with a hand auger, then a discrete sample will be collected directly from the track hoe bucket.

During excavation of the trenches, the condition of the pipeline and any evidence of seeping (e.g., soil saturation levels) from the up-stream location where the pipeline was plugged will be recorded. If the pipeline is damaged, then the pipeline will be plugged upstream of the damaged section.

Known site features and/or site survey grid markers will be used as references to locate each boring. The boring locations will be measured to the nearest foot and locations will be recorded on a scaled site map upon completion of each boring.

4.4 Collection and Management of Investigation Derived Waste

The soils produced from the pipeline location trenches will be temporarily placed beside the trenches. The majority of this material will be removed from above the pipeline and is not believed to be contaminated. If the soil shows visual impacts (e.g. stained soils) and elevated PID readings over 20 parts per million, then this soil will be placed on plastic sheeting to avoid potentially contaminating the surface soil. The soil will be managed separately and will be characterized as described below. The trenches will be left open until the analytical results confirm that risks associated with contamination



are eliminated. If necessary, additional soils will be removed and confirmation samples will be collected from the larger trenches per analytical results. Otherwise, non-impacted soil will be returned to the trench after the pipeline is located.

Drill cuttings, excess sample material and decontamination fluids, contaminated soil, and all other investigation derived waste (IDW) associated with soil borings will be contained and characterized using methods based on the boring location, boring depth, drilling method, and type of contaminants suspected or encountered. All excavated soils will be appropriately characterized for disposal. Composite samples of the excavated soils will be collected and analyzed for VOCs (Method 8260, TCLP), SVOCs (Method 8270, TCLP), and RCRA 8 Metals (TCLP). IDW management plan is included as Appendix A.

4.5 Field Equipment Calibration

Field equipment requiring calibration will be calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures. At a minimum, calibration checks will be conducted daily and the instruments will be recalibrated, if necessary. Calibration measurements will be recorded in the daily field logs. If field equipment becomes inoperable, its use will be discontinued until the necessary repairs are made. In the interim, a properly calibrated replacement instrument will be used and noted in the field logs.

4.6 Documentation of Field Activities

Daily field activities, including observations and field procedures, will be recorded in a field log book. Copies of the completed forms will be maintained in a bound and sequentially numbered field file for reference during field activities. Indelible ink will be used to record all field activities. Photographic documentation of field activities will be performed, as appropriate.

4.7 Chemical Analyses

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

Soil/sediment samples collected from beneath the pipeline will be analyzed for the constituents listed in Table 1. Soil samples collected from the sanitary lagoon will be sampled and analyzed for TPH-DRO by SW-846 method 8015B.



Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

**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



James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

April 26, 2021

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

**RE: APPROVAL WITH MODIFICATIONS
SANITARY LAGOON INVESTIGATION PHASE II WORK PLAN
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-21-005**

Dear Mr. Moore:

The New Mexico Environment Department (NMED) has reviewed the *Sanitary Lagoon Investigation Phase II Work Plan* (Work Plan), dated March 31, 2021, submitted on behalf of Marathon Petroleum Company dba Western Refining Southwest Inc., Gallup Refinery (the Permittee). NMED hereby issues this Approval with Modifications with the following comments.

Comment 1

In Section 4.1, *Investigation*, page 8, the Permittee states, "[a] total of 6 soil borings will be located at the base of the sanitary lagoon berms in locations shown in Figure 3. The borings will be located north of SL-3, east of SL-2, and south of SL-8. Soil samples will be collected at a depth of 2.0-2.5 feet below ground surface (bgs) and tested for TPH-DRO." According to the *Investigation Report Sanitary Lagoon*, dated February 2020, the TPH-DRO concentrations in the soil samples collected from boring locations SL-2, SL-3, and SL-8 did not exceed the applicable

screening levels at a depth interval of 2.0 - 2.5 feet below ground surface (bgs) where soil sampling is proposed. The exceedance of the TPH-DRO concentrations was detected between the ground surface (0.0) and 0.5 foot bgs. Propose to collect the soil samples at depths of 0.0 - 0.5 and 2.0 - 2.5 feet bgs at the proposed sample locations for TPH-DRO analysis. Revise the Work Plan and provide replacement pages as necessary.

Comment 2

In Section 4.4, *Collection and Management of Investigation Derived Waste*, page 10, the Permittee states, "[t]he soils produced from the pipeline location trenches will be temporarily placed beside the trenches. The majority of this material will be removed from above the pipeline and is not believed to be contaminated. If the soil shows potential impacts, then this soil will be managed separately and will be characterized as described below. Otherwise, non-impacted soil will be returned to the trench after the pipeline is located." The soil placed beside the trenches may potentially contaminate the surface soil. In the revised Work Plan, propose to place plastic sheeting on the ground surface where excavated soils will be placed, if it appears to be contaminated.

In addition, if the soils beneath the pipeline are found to be contaminated at unacceptable levels, additional soil removal will be required to eliminate the risks associated with the contamination. The trenches must be left open until the analytical results confirm that such risks are eliminated. Propose to remove additional soils and collect confirmation samples from the larger trenches, if necessary, until such risks are eliminated. Include the provision in the revised Work Plan.

Furthermore, whether or not the presence of contaminants is suspected, the excavated soils along the pipeline must be appropriately characterized. Discuss how the excavated soils will be characterized in the response letter.

The Permittee must address the comments above and submit a response letter, replacement pages, and an electronic version of the revised Work Plan no later than **July 30, 2021**.

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

Mr. Moore
April 26, 2021
Page 3

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

Sincerely,



Dave Cobrain
Program Manager
Hazardous Waste Bureau

cc: M. Suzuki, NMED HWB
C. Chavez, OCD
T. McDill, OCD
L. King, EPA Region 6 (6LCRRC)

File: Reading File and WRG 2021 File



Western Refining Southwest LLC

A subsidiary of Marathon Petroleum Corporation

I-40 Exit 39
Jamestown, NM 87347

March 29, 2021

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

**RE: Sanitary Lagoon Investigation Phase II Workplan
Western Refining Southwest LLC, Gallup Refinery
EPA ID #NMD000333211
HWB-WRG-20-008**

Dear Mr. Pierard,

Attached please find the Sanitary Lagoon Investigation Phase II Workplan that has been drafted in response to Comments 1 and 14 of the *Approval with Modifications Investigation Report Sanitary Lagoon*, dated April 24, 2020.

If you have any questions or comments regarding the information contained herein, please do not hesitate to contact Mr. John Moore at (505) 879-7643.

Certification

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

Sincerely,
Marathon Petroleum Company LP, Gallup Refinery

Robert S. Hanks

Robert S. Hanks
Refinery General Manager

Enclosure

cc: D. Cobrain, NMED HWB
M. Suzuki, NMED HWB
C. Chavez, NMOCD
L. King, EPA Region 6

G. McCartney, Marathon Petroleum Corporation
K. Luka, Marathon Petroleum Corporation
J. Moore, Marathon Gallup Refinery
H. Jones, Trihydro Corporation



Western Refining Southwest LLC

A subsidiary of Marathon Petroleum Corporation

I-40 Exit 39

Jamestown, NM 87347

NMED Comment 1

In the Executive Summary, page E-i, the Permittee states, "[t]he Investigation Work Plan also included the installation of up to 13 trench locations southeast of the lagoon along the pipeline that discharged to the lagoon, with collection of soil and possibly groundwater samples. Because a recent release of gasoline from a pipeline leak at the Truck Loading Rack is migrating along the area of the pipeline, the investigation of this area is temporarily postponed. This was agreed to by NMED via correspondence dated January 6, 2020." The required investigation along the pipeline was temporarily suspended due to the migration of contaminants from the Truck Loading Rack. The nature of the investigation in the area was altered due to the new release from the Truck Loading Rack. An investigation work plan that addresses both potential sources originating from the Truck Loading Rack and along the pipeline in the pertinent areas must be submitted to NMED. The work plan must be submitted to NMED no later than April 1, 2021.

Marathon Petroleum Company (MPC) Response 1:

The Truck Loading Rack gasoline release investigation is currently being address through LIF investigations to the west and north of the truck loading rack. To address the potential for impacts along the sanitary pipeline MPC proposes to follow the existing work plan, (Revised) Investigation Work Plan Sanitary Lagoon, approved with modification on July 10, 2019.

NMED Comment 14:

In Section 7.2, *Recommendations*, page 7-2, the Permittee states, "[d]etections of DRO in soils above screening levels occur in the upper two feet and additional delineation sampling at similar depths is recommended to the south of SL-8 and east and north of SL-2 and SL-3." NMED concurs with the recommendation. Include the proposed work in the work plan for the investigation required by Comment 1 above.

MPC Response 14:

To further delineate DRO found in the sanitary lagoon, MPC proposes the attached addendum to the existing work plan.

Six shallow soil samples will be collected to the south of SL-8 and east and north of SL-2 and SL-3 to further delineate DRO found in the lagoon soils. The six samples will be collected along the base of the berms in the sanitary lagoon as shown in the attached figure. Samples will be collected using a hand auger at 2.0-2.5 foot depth. The samples will be lab analyzed for TPH-DRO. All samples collected for laboratory analysis will be submitted to an accredited laboratory. The laboratory will use the most recent standard Environmental Protection Agency (EPA) and industry-accepted analytical methods for target analytes as the testing methods for each medium sampled. Chemical analyses will be performed in accordance with the most recent EPA standard analytical methodologies and extraction methods.



Gallup Refining Division
Sanitary Lagoon Investigation Phase II Work Plan



MARATHON PETROLEUM CORPORATION
GALLUP REFINING DIVISION
SANITARY LAGOON INVESTIGATION PHASE II
WORK PLAN
MARCH 29, 2021



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.

A handwritten signature in blue ink, appearing to read 'Kateri A. Luka'.

Name: Kateri Luka

March 29, 2021

Date

Title: Senior HSE Professional



Executive Summary

The Gallup Refinery is located 17 miles east of Gallup, New Mexico, and has been in operation since the 1950s. It is currently in idle status. A sanitary sewer lagoon is located in the northwest portion of the refinery. This Investigation Work Plan is the second phase of the sanitary lagoon investigation. The sanitary sewer pipeline was not included in the initial investigation due to a gasoline release in the Truck Loading Rack. It is possible that gasoline has traveled along the pipeline to the north. The second phase will complete the investigation along the pipeline as originally planned. Soil samples are proposed to be collected from up to 13 trench locations southeast of the lagoon beneath the pipeline. Additionally, soil samples will be collected along the lagoon berms south of SL-8 and north and east of SL-2 and SL-3 to delineate DRO exceedances found in the phase I sanitary lagoon investigation. The soil samples from the lagoon will be analyzed for total petroleum hydrocarbons diesel range organics (TPH-DRO) and the soil samples from beneath the pipeline will be analyzed for Skinner List metals, volatile organic compounds, semi-volatile organic compounds, nitrite, nitrate, chemical oxygen demand, biological oxygen demand, total coliform, E-coli bacteria, and TPH-DRO.



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List of Appendices

- A. Investigation Derived Waste Management Plan

List of Acronyms and Abbreviations

bgs	below ground surface
cm/sec	centimeters per second
DQOs	Data quality objectives
EPA	Environmental Protection Agency
IDW	Investigation derived waste
TPH-DRO	total petroleum hydrocarbons-diesel range organics



1.0 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 is currently in idle status. It is a crude oil refinery owned by Marathon Petroleum Company. The Gallup Refinery generally processed crude oil from the Four Corners area transported to the facility by pipeline or tanker truck.

Various process units operated at the facility, including crude distillation, reforming, fluidized catalytic cracking, alkylation, isomerization, sulfur recovery, merox treater, and hydrotreating. Past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, and residual fuel. The refinery also produced commercial products of fertilizer and solid elemental sulfur.

The sanitary sewer lagoon is located in the northwest portion of the refinery. The location of the sanitary sewer lagoon is shown on Figure 2. The purpose of the site investigation is to determine the current concentrations of constituents in soil/sediments in the area of the pipeline that had fed the sanitary lagoon and to further delineate total petroleum hydrocarbons-diesel range organics (TPH-DRO) contaminates found in the sanitary lagoon.

2.0 Background

This section presents background information for the sanitary lagoon including a review of historical waste management activities to identify the following:

- Type and characteristics of all waste and all contaminants handled in the lagoon
- Known and possible sources of contamination
- History of releases
- Known extent of contamination

2.1 Sanitary Lagoon

The sanitary lagoon is a two-cell lagoon that was installed when the facility opened in 1957. The two cells are separated by an earthen berm. In the past both cells of the lagoon were used to store wastewater. Currently, the western cell is dry and used for storage. The eastern lagoon held raw sewage and other discharges prior to October 11, 2018 and has dried out since the November 2019 investigation. It is noted that the pipeline that discharged to the lagoon was cut and the up-stream portion plugged with concrete on October 11, 2018. The location where the pipeline was cut and plugged is shown on Figure 2. The only water entering the lagoon at this time is rainfall. The eastern



cell is approximately 145 feet x 115 feet. Based on reviews of sewer pipeline maps and dye-trace tests, the lab sanitary facilities, change house, warehouse, and the truck rack drivers lounge have sanitary sewer lines that had discharged to the sanitary lagoon. Sanitary sewage is now discharged to the sanitary treatment pond.

A portion of the pipeline to the south of the lagoon transmitted sanitary flows into the lagoon and was excavated between January 2014 and March 2016. The excavation extends for approximately 130 feet along a section north the dirt road that transverses the area and for another 50 feet on the south side of the road (Figure 2). It is believed the pipeline was excavated with the intent to possibly replace this section of pipeline, but the project was never completed. The pipeline was cut and plugged at the south end of the excavation in October 2018, thus terminating flow into the lagoon.

3.0 Site Conditions

The conditions at the site, including surface and subsurface conditions that could affect the fate and transport of any contaminants, are discussed below. This information is based on recent visual observations and historical subsurface investigations.

3.1 Surface Conditions

Local site topographic features in the area of the sanitary lagoon include high ground in the southeast gradually decreasing to a lowland fluvial plain in the northwest. Elevations on the refinery property range from 7,040 feet to 6,860 feet. The area of the site near the lagoon is at an approximate elevation of 6,913 feet above mean sea level.

Regional surface water features include the refinery evaporation ponds and aeration lagoons and a number of small ponds. The site is located in the Rio Puerco valley, north of the Zuni Uplift with overland flows directed northward to the tributaries of the Rio Puerco. The Rio Puerco continues to the east to the confluence with the Rio Grande. The South Fork of the Rio Puerco River is intermittent and retains flow only during and immediately following precipitation events.

The McKinley County soil survey identifies the soil in the area of the lagoon as the Simitarq-Celavar sandy loams (USDA, 2005). The Simitarq-Celavar soils are well drained with a conservative permeability of 0.20 inches per hour and minimal salinity. Simitarq soils have nearly neutral pH values ranging from 7.2 to 7.4 standard units.



3.2 Subsurface Conditions

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

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} centimeters per second (cm/sec) for gravely sands immediately overlying the Chinle 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 Formation with prevailing flow from the southeast to the northwest, with some flow to the northeast on the northeastern portion of the refinery property.

4.0 Scope of Work

The site investigation of soils will be conducted to define the nature and extent of impacts to the environment and facilitate remedy selection, as necessary. The investigation will commence upon approval of this investigation work plan by the New Mexico Environment Department.

4.1 Investigation

An investigation of soils/sediments along the north, south, and west berms of the sanitary lagoon will be conducted to define the extent of TPH-DRO impacts found within the lagoon. Additionally, soil samples will be collected from beneath the sanitary pipeline that had discharged to the lagoon. The following elements summarize the proposed sampling to be conducted near the sanitary lagoon and along the sanitary pipeline.

- A total of 6 soil borings will be located at the base of the sanitary lagoon berms in locations shown in Figure 3. The borings will be located north of SL-3, east of SL-2, and south of SL-8. Soil samples will be collected at a depth of 2.0-2.5 feet below ground surface (bgs) and tested for TPH-DRO.
- Up to 13 trenches, at 50 ft intervals, will be completed southeast of the lagoon adjacent to the sanitary pipeline to allow for collection of soil samples beneath the pipeline.



The proposed locations for soil samples are shown on Figure 3. The proposed locations for soil samples beneath the sanitary pipeline are shown on Figure 4.

4.2 Soil Sample Field Screening and Logging

All soil borings will be continuously logged, and samples will be field screened for evidence of contaminants. Field screening results will be recorded on the exploratory boring logs. Field screening results will be used to aid in the selection of soil samples for laboratory analysis. The primary screening methods include: (1) visual examination, (2) olfactory examination, and (3) headspace vapor screening for volatile organic compounds. Visual screening includes examination of soil samples for evidence of staining caused by petroleum-related compounds or other substances that may cause staining of natural soils such as elemental sulfur or cyanide compounds. Headspace vapor screening targets volatile organic compounds (VOC) and involves placing a soil sample in a plastic sample bag or a foil sealed container allowing space for ambient air. The container will be sealed and then shaken gently to expose the soil to the air trapped in the container. The sealed container will be allowed to rest for a minimum of 5 minutes while vapors equilibrate. A photo-ionization detector (PID) equipped with a 10.6 or higher electron volt (eV) lamp or a combustible gas indicator will be used for VOC field screening. Vapors present within the sample bag's headspace will then be measured by inserting the probe of the instrument in a small opening in the bag. The maximum value and the ambient air temperature will be recorded on the field boring log for each sample.

The monitoring instruments will be calibrated each day to the manufacturer's standard for instrument operation. Field screening results may be site- and boring-specific and the results may vary with instrument type, the media screened, weather conditions, moisture content, soil type, and type of contaminant, therefore, all conditions capable of influencing the results of field screening will be recorded on the field logs.

Discrete soil samples will be retained for laboratory analyses from within the following intervals:

- 2.0-2.5 feet bgs along the sanitary lagoon berms (Figure 3)
- 2.0-4.0 feet below the depth of the pipeline at trenches south of the Sanitary Lagoon (Figure 4)
- If the trenches along the pipeline reach a saturated zone, a sample will be collected 0.5 feet above saturation
- Any additional intervals as determined based on field screening results and the qualified field personnel

The physical characteristics of the samples (such as mineralogy, American Society for Testing and Materials soil classification, moisture content, texture, color, presence of stains or odors, and/or field screening results), depth where each sample was obtained, method of sample collection, and other observations will be recorded in the field log by a qualified geologist or engineer. Detailed logs of each



boring will be completed in the field by a qualified person. Additional information, such as the presence of water-bearing zones and any unusual or noticeable conditions encountered during drilling, will be recorded on the logs.

Quality Assurance/Quality Control samples will be collected to monitor the validity of the soil sample collection procedures as follows:

- Field duplicates will be collected at a rate of 10 percent or at least one per day.
- Equipment blanks will be collected from all reusable sampling apparatus at a frequency of one per day.

4.3 Sampling Activities

Starting approximately 50 feet south of the sanitary lagoon, a maximum of 13 exploratory trenches will be dug using a track hoe to determine the depth of the pipeline and collect soil samples from 2 feet to 4 feet beneath the pipeline. The trenches will be spaced approximately every 50 feet along the length of the pipeline as shown in Figure 4. The equipment will be properly decontaminated before starting each trench and equipment blanks will be collected at a rate of 10 percent or at least one per day. For safety reasons, the soil sampling will be conducted using a decontaminated hand auger once the excavation reaches the target depth beneath the pipeline. The hand auger will have extensions reaching up to 15 ft and should be sufficient to collect the samples without entering the trench. If the sample cannot be directly obtained with a hand auger, then a discrete sample will be collected directly from the track hoe bucket.

During excavation of the trenches, the condition of the pipeline and any evidence of seeping (e.g., soil saturation levels) from the up-stream location where the pipeline was plugged will be recorded. If the pipeline is damaged, then the pipeline will be plugged upstream of the damaged section.

Known site features and/or site survey grid markers will be used as references to locate each boring. The boring locations will be measured to the nearest foot and locations will be recorded on a scaled site map upon completion of each boring.

4.4 Collection and Management of Investigation Derived Waste

The soils produced from the pipeline location trenches will be temporarily placed beside the trenches. The majority of this material will be removed from above the pipeline and is not believed to be contaminated. If the soil shows potential impacts, then this soil will be managed separately and will be characterized as described below. Otherwise, non-impacted soil will be returned to the trench after the pipeline is located.



Drill cuttings, excess sample material and decontamination fluids, contaminated soil, and all other investigation derived waste (IDW) associated with soil borings will be contained and characterized using methods based on the boring location, boring depth, drilling method, and type of contaminants suspected or encountered. An IDW management plan is included as Appendix A.

4.5 Field Equipment Calibration

Field equipment requiring calibration will be calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures. At a minimum, calibration checks will be conducted daily and the instruments will be recalibrated, if necessary. Calibration measurements will be recorded in the daily field logs. If field equipment becomes inoperable, its use will be discontinued until the necessary repairs are made. In the interim, a properly calibrated replacement instrument will be used and noted in the field logs.

4.6 Documentation of Field Activities

Daily field activities, including observations and field procedures, will be recorded in a field log book. Copies of the completed forms will be maintained in a bound and sequentially numbered field file for reference during field activities. Indelible ink will be used to record all field activities. Photographic documentation of field activities will be performed, as appropriate.

4.7 Chemical Analyses

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

Soil/sediment samples collected from beneath the pipeline will be analyzed for the constituents listed in Table 1. Soil samples collected from the sanitary lagoon will be sampled and analyzed for TPH-DRO by SW-846 method 8015B.



5.0 References

USDA, 2005, Soil Survey of McKinley County Area, New Mexico, McKinley County and Parts of Cibola and San Juan Counties, p. 683.

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

Western Refining, 2009, Annual Ground Water Monitoring Report Gallup Refinery – 2009

Table

**TABLE 1. SOIL ANALYTE LIST
MARATHON PETROLEUM COMPANY
GALLUP REFINING DEVISION, GALLUP, NEW MEXICO**

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Chromium VI	SW-846 method 3060A
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.4/3352 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020
Iron	SW-846 method 6010/6020
Manganese	SW-846 method 6010/6020
Chloride	EPA Method 300
Fluoride	EPA Method 300
Nitrate	EPA Method 300
Nitrite	EPA Method 300.3
Sulfate	EPA Method 300.3
Total coliform	SM922SB
E. coli	SM92238
Skinner list VOC	SW-846 Method 8260
Skinner list SVOC	SW-846 Method 8270
TPH - GRO, DRO, and MRO	SW-846 Method 8015B

Notes:

EPA = Environmental Protection Agency

SW-846 = EPA Solid Waste Test Method

VOC = volatile organic compounds

SVOC = Semi-volatile organic compounds

TPH = Total petroleum hydrocarbons

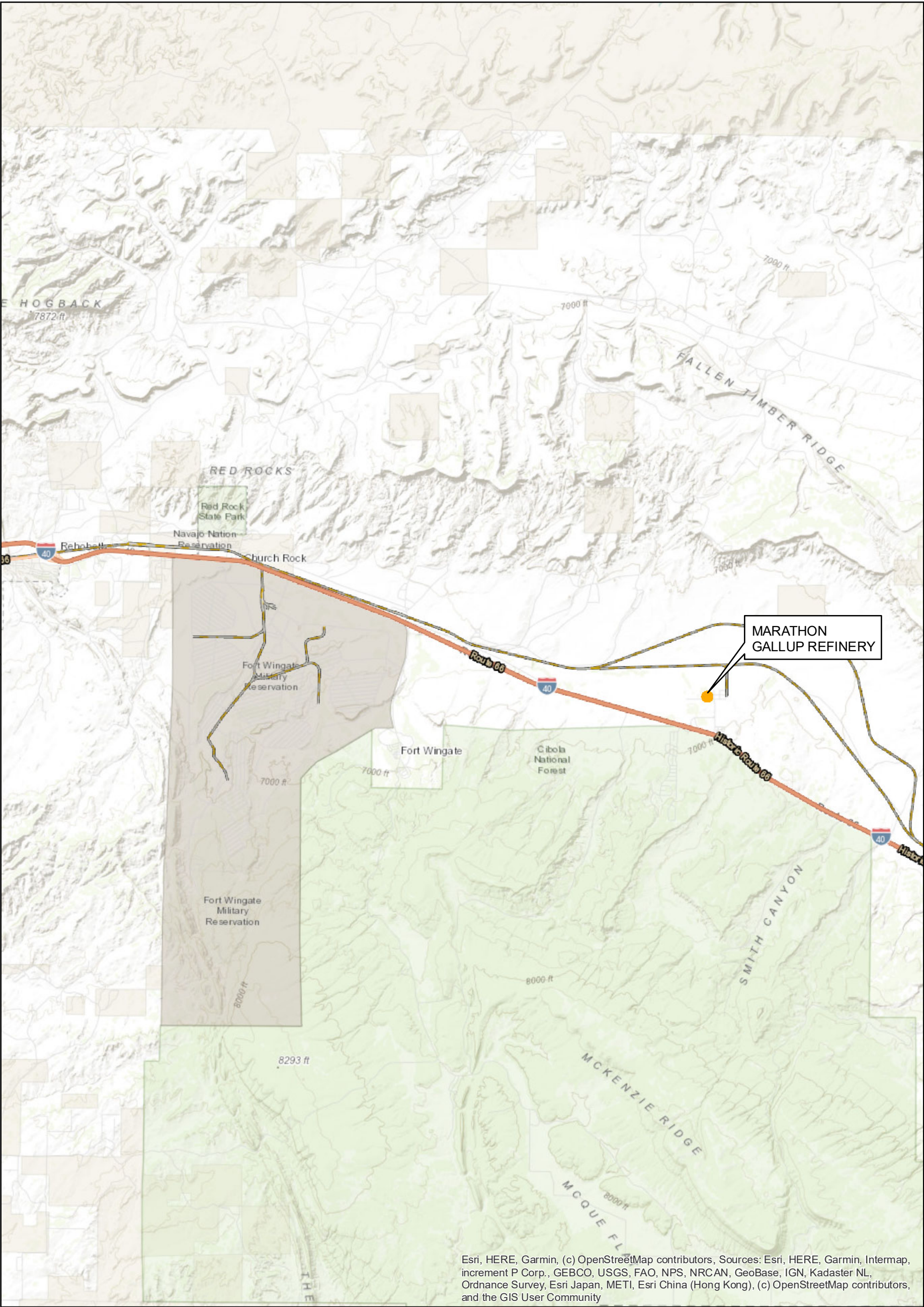
GRO = Gasoline range organics (C5-C10)

DRO = Diesel range organics (>C10-C28)

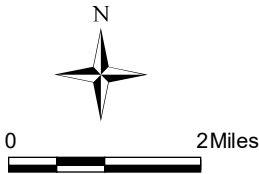
MRO = Motor oil range organics (>C28-C36)

Total and dissolved metals will be analyzed

Figures



Esri, HERE, Garmin, (c) OpenStreetMap contributors, Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



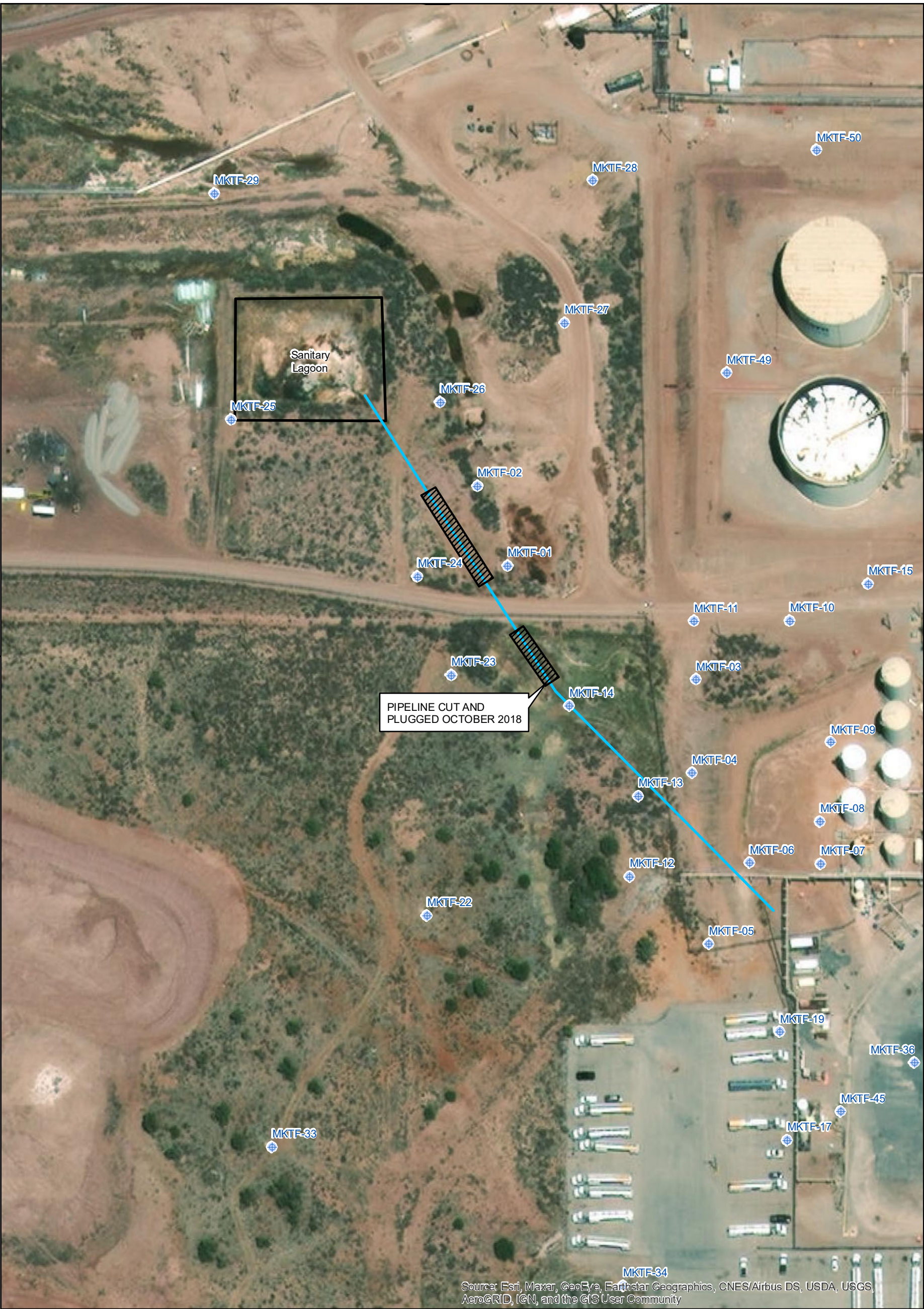
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 1

SITE LOCATION MAP





MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION
GALLUP, NEW MEXICO

Drawn By: KEJ Checked By: BM Scale: 1" = 2 miles Date: 3/18/21 File: 1_SiteLocation_Fig1.mxd



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

EXPLANATION

-  MONITORING WELL
-  ESTIMATED LOCATION OF THE SANITARY PIPELINE
-  PREVIOUSLY EXCAVATED PIPELINE
-  SITE FEATURE

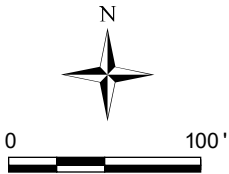


FIGURE 2

**OVERVIEW SANITARY LAGOON
AND PIPELINE LOCATIONS**

**MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION
GALLUP, NEW MEXICO**


1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

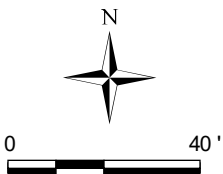
Drawn By: KEJ Checked By: BM Scale: 1" = 100' Date: 3/18/21 File: 2_Overview_SanitaryLagoon_Fig2.mxd



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

EXPLANATION

- ◆ PHASE I SOIL BORING
- PROPOSED SOIL BORING LOCATION
- ⊕ MONITORING WELL
- ▭ SITE FEATURE









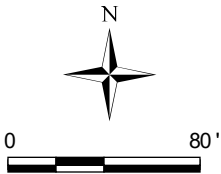
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 3				
SANITARY LAGOON SAMPLE LOCATIONS				
MARATHON PETROLEUM COMPANY GALLUP REFINING DIVISION GALLUP, NEW MEXICO				
Drawn By: KEJ	Checked By: BM	Scale: 1 " = 40 '	Date: 3/18/21	File: 3_SanitarySampLoc_Fig3.mxd



EXPLANATION

-  MONITORING WELL
-  ESTIMATED LOCATION OF THE SANITARY PIPELINE
-  ESTIMATED LOCATION OF TRENCHES AND SAMPLING LOCATIONS BENEATH PIPELINE
-  PREVIOUSLY EXCAVATED PIPELINE





1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 4

PROPOSED TRENCH AND SAMPLE LOCATIONS

**MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION
GALLUP, NEW MEXICO**

Appendices

Appendix A – Investigation Derived Waste Management Plan

Investigation Derived Waste (IDW) Management Plan

All IDW will be properly characterized and disposed of in accordance with all federal, State, and local rules and regulations for storage, labeling, handling, transport, and disposal of waste. The IDW may be characterized for disposal based on the known or suspected contaminants potentially present in the waste.

A dedicated decontamination area will be setup prior to any sample collection activities. The decontamination pad will be constructed so as to capture and contain all decontamination fluids (e.g., wash water and rinse water) and foreign materials washed off the sampling equipment. The fluids will be pumped directly into suitable storage containers (e.g., labeled 55-gallon drums), which will be located at satellite accumulation areas until the fluids are disposed in the refinery wastewater treatment system upstream of the API separator. The solids captured in the decontamination pad will be shoveled into 55-gallon drums and stored at the designated satellite accumulation area pending proper waste characterization for off-site disposal.

Drill cuttings generated during installation of soil borings will be placed directly into 55-gallon drums and staged in the satellite accumulation area pending results of the waste characterization sampling. The portion of soil cores, which are not retained for analytical testing, will be placed into the same 55-gallon drums used to store the associated drill cuttings.

The solids (e.g., drill cuttings and used soil cores) will be characterized by testing to determine if there are any hazardous characteristics in accordance with 40 Code of Federal Regulations (CFR) Part 261. This includes tests for ignitability, corrosivity, reactivity, and toxicity. If the materials are not characteristically hazardous, then further testing will be performed pursuant to the requirements of the facility to which the materials will be transported. Depending upon the results of analyses for individual investigation soil samples, additional analyses may include TPH and polynuclear aromatic hydrocarbons (PAHs).