Marathon Petroleum Company LP

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Hazardous Waste Bureau

June 18, 2019

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

RE: Response to Disapproval
[Revised] Investigation Work Plan Sanitary Lagoon October 2018
Marathon Petroleum Company LP, Gallup Refinery
(dba Western Refining Southwest Inc.)
EPA ID# NMD000333211
HWB-WRG-18-004

Dear Mr. Kieling:

Marathon Petroleum Company LP (dba Wester Refining Southwest, Inc.) Gallup Refinery is submitting the enclosed responses to New Mexico Environment Department (NMED) comments (dated January 31, 2019) on the referenced Investigation Work Plan. Enclosed you will find two copies of a revised Investigation Work Plan and CD with a redline document showing changes and a final electronic copy of the Work Plan. If there are any questions, please contact Brian Moore at 505-726-9745.

Certification

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

Sincerely,
Marathon Petroleum Company LP, Gallup Refinery

Robert S. Hanks

Robert S. Hanks
Refinery General Manager

Enclosure

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

92 Giant Crossing Road
Jamestown, NM 87347

RESPONSE TO COMMENTS

January 31, 2019 Disapproval – Investigation Work Plan Sanitary Lagoon (Oct. 2018)

NMED Comment 1:

The Permittee's response to NMED's *Disapproval* Comment 1 states "[m]uch of the pipeline immediately south of the lagoon has been excavated with the trench partially collapsed." The purpose of this trenching is not apparent. NMED cannot provide appropriate comments for the Work Plan without an adequate description of the current status of site conditions. In the revised Work Plan, provide a more comprehensive site history. The Permittee must identify the current status of the discharge. If the discharge ceased, explain what measures were implemented to eliminate the discharge and the dates the measures were implemented in the revised Work Plan.
Clarify the purpose of the trench. The revised Work Plan must provide the information regarding all activities performed at the site to date. Finally, Figure 5, *Sanitary Lagoon Proposed Soil Boring Locations Adjacent to Pipeline,* does not show the excavated area south of the lagoon. Provide a figure showing the excavated areas in the revised Work Plan.

MPC Response 1:

The pipeline that discharged into the Sanitary Lagoon was cut and then plugged with concrete on October 10, 2018. The NMED and OCD were notified of this activity in an email dated October 10, 2018. This email was addressed to Kristen VanHorn and Carl Chavez and included a photograph of the plugged line. The discussion in Section 2.1 (page 2-1) has been revised to reflect current site conditions and provide additional information, to the extent it is known, on the history of the area. We reviewed Figure 5 *Sanitary Lagoon Proposed Soil Boring Locations Adjacent to Pipeline* and it does show the excavated area south of the lagoon. Possibly the comment was meant to refer to Figure 2, which has now been expanded to the south to include all of the area that was previously excavated south of the lagoon.

NMED Comment 2:

The Permittee's response to NMED's *Disapproval* Comment 1 states "[t]he trench is deep, with depths possibly as great as 15 feet, thus it is a health and safety concern to collect samples from within this unshored excavation." Clarify whether the trench was installed to the maximum depth of 15 feet below ground surface (bgs) because the pipeline was buried to the depth of 15 feet bgs or the trench was previously installed for different purposes (e.g., hydrocarbon seep recovery). In addition, clarify whether a part of the pipeline was exposed and removed or the entire pipeline is visible and remains in the trench. Explain why a method to sample depths below four feet below ground surface could not be devised.

MPC Response 2:

Additional discussion has been included in Section 2.1 regarding the original excavation along the pipeline. The excavation was solely for the purpose of exposing the pipeline and was not installed for any other purposes (e.g., hydrocarbon recovery). The pipeline was initially exposed, but then no further action was conducted. The sidewalls of the trench have partially collapsed such that the pipeline is not readily visible in the trench. The last sentence of the comment discusses collection of samples “four feet below ground surface.” As referenced in Comment 3 below, the concern was related to potential collapse of the trench while field personnel were present attempting to collect samples from beneath the pipeline. The Work Plan has been revised in Section 4.1 to include collection of samples from below the pipeline using a large number of trenches along the pipeline.

NMED Comment 3

The Permittee's response to NMED's *Disapproval* Comment 1 states "[i]n our recent meeting (September 19, 2018), we discussed this concern [safety issue due to the trench] and a suggestion was made to attempt angled borings. We will attempt angled borings, but the rig will need to be placed a safe distance from the excavation and it likely will not be possible to actually collect soil samples from directly below the depth of the pipe from the Sanitary Lagoon." The use of angled borings is not proposed or discussed within the text of the Work Plan; however, an angled boring may not be appropriate at the locations where the trench was installed because it may not allow to collect soil samples directly below the depth of the pipeline. If the trench is open, and the pipeline is visible, propose to use a backhoe to collect samples along the trench wall beneath the pipeline. Include the sampling protocol in the revised Work Plan.

MPC Response 3:

The pipeline does not appear to be visible and this comment appears to be superseded by Comment 10 below, which directs Gallup to install new trenches every 50 feet instead of the proposed soil borings. The discussion to use a backhoe is included below pursuant to Comment 10.

NMED Comment 4

NMED's *Disapproval* Comment 3 states, "[t]he Permittee must advance the soil borings to the water table and collect samples at 2.5-feet intervals to depths that cross the water table." The Permittee's response to NMED's *Disapproval* Comment 3 states "[p]erhaps the comment is anticipating the additional borings being added along the pipeline to the southeast." To clarify, the referenced soil borings are those to be installed within the boundary of the Sanitary Lagoon. The Permittee also states, "[t]he Work Plan calls for all borings completed with a hand auger to reach the depth of refusal or saturation, whichever occurs first." Since the surface soils are likely saturated within the boundary of the Sanitary Lagoon, "saturation" does not provide clear criteria to determine the depths of soil borings. The Permittee must install the soil borings to the water table and collect samples at 2.5-feet intervals to depths that cross the water table. Revise the Work Plan accordingly.

MPC Response 4:

The revised discussion in Section 4.1.2 explains the soil cores will be collected and logged continuously, and soil samples will be collected and screened on 2.0-feet intervals. The text in Section 4.1 has been revised to require that all soil borings be drilled to at least five feet below the water table.

NMED Comment 5:

The Permittee's response to NMED's *Disapproval* Comment 5 states, "[t]hird, the sample bottles used for the VOC analyses come from the laboratory with an acid preservative. It is very important to not flush the preservative from the sample bottle and placing the small bottle directly under the discharge, if still active, could greatly increase the chance of compromising the sample preservation." To clarify, Comment 5 did not direct the Permittee to flush the sample bottle. Comment 5 rather directs the Permittee to collect samples directly from the outfall. The Permittee's

Sanitary Lagoon Investigation, dated February 1, 2018, states that the flowrate into the lagoon varies from less than one gallon per minute to approximately three gallons per minute. The observed flowrate likely allows the Permittee to collect wastewater samples directly from the outfall without flushing the preservative in the bottles. If the outfall is removed or plugged at this time, this comment will not be applicable; however, acknowledge the direction for the sampling protocol in the Work Plan.

MPC Response 5:

The outfall is now plugged and this comment is no longer applicable. The related text in the Executive Summary and Sections 4.1, 4.1.1 and 4.1.9 has been revised to remove the reference to collecting a sample of the discharge. Although no longer relevant, the text in Section 4.1.1 acknowledges NMED's specified sampling protocol for discharge samples.

NMED Comment 6:

The Permittee's response to NMED's *Disapproval* Comment 5 states, "[l]astly, requiring someone to attempt to walk into the lagoon far enough to reach the end of the discharge pipe could subject them sinking into a very soft bottom of the lagoon and greatly increase their risk of exposure to pathogens likely present in the septic discharge." Section 4.1.1, *Discharge Water and Surface Water Sampling,* states, "[t]he water samples will be collected in a decontaminated water scoop... The samples will be transferred to the appropriate, clean, laboratory-prepared containers provided by the analytical laboratory." The Permittee proposes to use a water scoop to collect the water samples; however, the sampling method still requires a field personnel to walk to the outfall within the Sanitary Lagoon. The exposure risk does not appear to be eliminated by the Permittee's proposed sampling method. If the outfall is removed or plugged at this time, this comment will not be applicable; however, explain how the proposed sampling method is safer in comparison to the sampling method required by Comment 5 in the revised Work Plan.

MPC Response 6:

For clarification purposes only, we note the proposed methodology of using a scoop does not require the field personnel to walk into the Sanitary Lagoon. This is commonly done using a pole of appropriate length and attaching the scoop to the end of the pole so the field personnel do not physically enter the receiving water body. The references to collection of discharge samples in the Executive Summary and Section 4.1 have been deleted.

NMED Comment 7:

The Permittee's response to NMED's *Disapproval* Comment 6 states, "[a]s we have no experience dealing with microbial impacts and cannot find any obviously relevant regulatory standards for New Mexico, we are uncertain what the appropriate microbial analyses are for soils. Can you please specify the required [microbiological] analyses [for soils] and the relevant regulatory standards in your approval letter so that we can add these analyses?" The Permittee did not find any relevant standards for pathogens in soils; therefore, the Permittee is not required to compare the site concentrations to the standards. However, the Permittee is still required to propose an investigation to determine the source of pathogens within the Sanitary Lagoon. Soil may act as a reservoir for pathogens (e.g., e. coli); therefore, hot spots must be identified to minimize soil contamination and potential for soil-to-groundwater migration. One way to investigate hot spots is to inoculate coliforms from soil samples collected from the Sanitary Lagoon and compare the coliform levels among the samples. Propose to conduct

microbiological analyses in the revised Work Plan.

MPC Response 7:
We have revised the Work Plan in Section 4.1.9 to include the analysis of water and soil samples for total coliform and e. coli.

NMED Comment 8:
The Permittee's response to NMED's *Disapproval* Comment 7 states, "[t]he immediate health and safety concern was simply getting stuck in the mud and not being able to get out of the lagoon." The ground surface may be more stable since the discharge ceased. Examine the stability of the ground surface at the Sanitary Lagoon and report the current status of the ground surface in the Sanitary Lagoon in the revised Work Plan. If the ground surface is stable enough, all soil borings within the Sanitary Lagoon must be installed via mechanical means rather than by hand auger.

MPC Response 8:
Although the discharge into the lagoon has ceased, the area remains wet in some areas and very soft, as would be expected after having received wastewater flows since the late 1950s. While evapotranspiration rates were relatively low over the past winter months, conditions may be more favorable in the future, but we really have no way to know how long it may take for this area to support sample collection via direct mechanical means such as a drilling rig. Section 4.1.3 has been revised to remove the use of hand augers and instead, if possible, the locations will be accessed using a small rig capable of either direct push or hollow-stem augers. If that is not possible, then a long-reach trackhoe will be used to collect the soil samples.

NMED Comment 9:
The Permittee's response to NMED's *Disapproval* Comment 10 states, "[g]roundwater samples are already collected on a quarterly basis at all of the subject monitoring wells and analyzed for the additional analyses requested above [VOCs, SVOCs, TPH-GRO, DRO and ORO, metals, chloride, fluoride and sulfate]. We believe that the information that is already available, and that is continually being collected, will be sufficient to clearly establish concentrations of contaminants in the area." The Permittee may limit the groundwater analyses for nitrate, nitrite, COD, BOD, total coliform and e-coli analyses for the groundwater monitoring wells (MKTF-24, MKTF-25, MKTF-26, MKTF-29, MKTF-30, MKTF-31, MKTF-40, and OAPIS-1). However, the Permittee must include VOCs, SVOCs, TPH-GRO, DRO and ORO, metals, chloride, fluoride and sulfate analyses in addition to nitrate, nitrite, COD, BOD, total coliform and e-coli analyses for the groundwater samples collected from the soil borings. Include the provision in the revised Work Plan.

MPC Response 9:
Section 4.1.9 has been revised to include the requested additional analyses for the groundwater samples collected from soil borings and limit the analyses of groundwater samples collected from existing monitoring wells.

NMED Comment 10:
In Section 4.1.3, *Drilling Activities,* the Permittee states, "[a] minimum of two exploratory trenches will be dug using a trackhoe to determine the depth of the pipeline." Figure 5 depicts the location of the proposed exploratory trenches approximately 500 feet to 700 feet southeast of the Sanitary Lagoon. The location and depth where the pipeline was buried northwest of the proposed exploratory trenches is speculative based on the extrapolated data since exploratory trenches are not proposed along the northwest section of the pipeline. Although installation of soil borings is proposed along the projected location of the pipeline, the proposed borings may not be located close enough to collect representative soil samples adjacent to the pipeline. The sampling must be more accurate. The exploratory trenches must be excavated from the outfall at the Sanitary Lagoon (or the southern end of the existing excavated trench, if the pipeline is exposed) to proposed boring location PL-6, every 50 feet. A maximum of 13 exploratory trenches must be excavated along the pipeline. In addition, propose to use a backhoe to collect soil samples along the exploratory trench wall beneath the pipeline, rather than to collect samples using soil borings. Furthermore, if the pipeline is damaged during the installation of the trenches, plug the outlet of the undamaged pipeline that is closest to the release points. Revise the Work Plan accordingly.

MPC Response 10:
Section 4.1.3 has been revised to remove the installation of soil borings along the pipeline, increase the number of trenches along the pipeline, and include collection of soil samples from the trenches beneath the pipeline. If the pipeline is damaged, then the pipeline will be repaired or plugged upstream of the damaged section.

NMED Comment 11:
Since the outfall or the end of the pipeline has been already plugged, the Permittee must investigate any indications that the discharge may still be occurring at the plugged location and seeping from the pipeline upgradient of the blocked portion. Any indication of seeping at the upgradient location of the blocked portion of the pipe must be examined during the excavation of the exploratory trenches. All trenching must include observations of pipe conditions and soil saturation levels. In addition, if the pipeline is damaged during the excavation of the trenches, the outlet of the pipeline closest to the release points must be blocked and the trench must be left open for at a minimum of one month to ensure that no future discharge occurs from the blocked section. Include the provision in the revised Work Plan.

MPC Response 11:
Section 4.1.3 has been revised to include recording observations of pipe conditions and soil saturation levels. If damaged, the pipeline will be repaired or plugged up-stream of the damaged section and the trenches will be left open for a minimum of one month.

NMED Comment 12:
In Section 4.1, *Investigation,* the Permittee states, "[o]ne discharge water sample will be collected from the lagoon prior to commencement of the oil sampling." The text of the Work Plan suggests that the discharge samples may still be collected. Explain whether there is still a

possibility of the discharge samples being collected from the pipeline at this time. If the discharge samples are no longer available, revise the Work Plan to reflect the change in current status of the site.

MPC Response 12:
The last version of the Work Plan was revised prior to final plugging of the discharge line. There is no longer any discharge from the pipeline into the Sanitary Lagoon. The Work Plan has been accordingly revised to remove references to collection of a discharge sample in the Executive Summary and Sections 4.1, 4.1.1, and 4.1.9.

NMED Comment 13:
In Section 4.1.9, *Chemical Analyses,* the Permittee states, "[t]he discharge and surface water samples will also be analyzed for chloride, fluoride, nitrate, nitrite, sulfate, COD, BOD, total coliform, and E. coli bacteria." The listed anions are not included in the table titled as Inorganic Analytical Methods (page 4-8). Explain why these inorganic constituents are not included in the table or revise the table to include all inorganic constituents proposed for analysis in the revised Work Plan.

NMED Response 13:
The Work Plan text in Section 4.1.9 notes that the table includes the Skinner List metals and iron and manganese, which were added to the table pursuant to NMED's earlier comments on this same table in previously prepared work plans. The table is now revised to also include other target analytes as requested by NMED and the related text is also revised.

INVESTIGATION WORK PLAN
Sanitary Lagoon

Marathon Petroleum Company LP

Gallup Refinery
Andeavor
Gallup, New Mexico
EPA ID# NMD000333211

May 2018
(Revised October 2018)
(Revised June 2019)

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Executive Summary

The Gallup Refinery, which is located 17 miles east of Gallup, New Mexico, has been in operation since the 1950s. A sanitary sewer lagoon is located in the northwest portion of the refinery. This Investigation Work Plan proposes to collect samples of soil and groundwater to determine the current concentrations of constituents in the area of the sanitary sewer lagoon. A sample of the surface water in the Sanitary Lagoon, if present, will also be collected. Soil samples are proposed to be collected from eight locations within the lagoon and up to 13 trench locations southeast of the lagoon, beneath the pipeline. Groundwater samples will be collected from eight existing monitoring wells in the area of the lagoon and soil borings that encounter groundwater. The soil samples, groundwater samples collected from new soil borings, and surface water will be analyzed for Skinner List metals, VOCs, SVOCs, nitrite, nitrate, chemical oxygen demand (COD), biological oxygen demand (BOD), total coliform, and E-coli bacteria and total petroleum hydrocarbons. In addition, the groundwater samples collected from existing nearby monitoring wells will be analyzed for nitrite, nitrate, chemical oxygen demand (COD), biological oxygen demand (BOD), total coliform, and E-coli bacteria.

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 is a crude oil refinery currently owned and operated by Andeavor. The Gallup Refinery, was previously operated by Western Refining Southwest, Inc. ("Western"), formerly known as Giant Industries Arizona, Inc. and formerly doing business as Giant Refining Company Ciniza Refinery, an Arizona corporation. 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.

A sanitary sewer lagoon is located in the northwest portion of the refinery. The location of the sanitary sewer lagoon is shown on Figure 2. Photographs of the lagoon and the surrounding area are included in Appendix A. The purpose of the site investigation is to determine the current concentrations of constituents in soil/sediments and groundwater in the area of the sanitary lagoon.

Section 2
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; and
- 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 (see aerial photo - Figure 2) both cells of the lagoon were used to store wastewater. Currently, the western cell is dry and used for storage and the eastern lagoon holds raw sewage and other discharge. It is noted that the pipeline that discharged to the lagoon was cut in two 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 recent dye-trace tests, the lab sanitary facilities, change house, warehouse, and the truck rack drivers lounge have sanitary sewer lines that discharged to the sanitary lagoon.

A portion of the pipeline to the south of the lagoon, which did transmit sanitary flows into the lagoon, 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 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.

Section 3
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 include high ground in the southeast gradually decreasing to 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 (msl). The pictures in Appendix A show the land surface in the immediate area.

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 in/hr and minimal salinity. Simitarq soils have nearly neutral pH values ranging from 7.2 to 7.4 standard units.

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 Puerco River is intermittent and retains flow only during and immediately following precipitation events.

3.2 Subsurface Conditions

The shallow subsurface soils consist of fluvial and alluvial deposits comprised of clay and silt with minor inter-bedded sand layers. Very low permeability bedrock (e.g., claystones and siltstones) underlie the surface soils and effectively form an aquitard. The Chinle 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 ft^2/day (Stone and others, 1983). The Sonsela Sandstone's highest point occurs southeast of the site and slopes downward to the northwest as it passes under

the refinery. The Sonsela Sandstone forms a water-bearing reservoir with artesian conditions throughout the central and western portions of the refinery property. Groundwater within the Sonsela Sandstone flows downdip 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} 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.

Section 4
Scope of Activities

The site investigation of soils and groundwater 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 NMED.

4.1 Investigation

A focused investigation of soils/sediments within the sanitary lagoon will be conducted to characterize current concentrations of constituents and define the extent (as possible) of any such impacts. The following text summarizes the proposed sampling to be conducted at the sanitary lagoon.

- If any stagnant water is present, one surface water sample will be collected prior to commencement of the soil sampling;
- Eight soil borings will be located within the lagoon where standing water is not present. One of the soil borings will be located directly below the prior location of the sewage outfall. All soil borings will be drilled to a depth at least five feet below the water table. If the soil borings cannot be completed using either direct push or hollow-stem augers, alternative mechanical means will be used to collect the samples;
- Soil/sediment samples will be collected from locations that are not accessible to a drilling rig by alternative mechanical means (e.g., long-reach trackhoe). The trackhoe (or similar equipment) will be located outside the lagoon and used to reach inside the lagoon to retrieve a volume of soil/sediment from the target depth. A discrete soil/sediment will be collected for analysis from the volume of soil obtained by the mechanical device,
- Groundwater samples will be collected from eight existing monitor wells in the area of the sanitary lagoon; and
- Up to 13 trenches 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 wells locations to be sampled are shown on Figure 4. The proposed locations beneath the sanitary pipeline are shown on Figure 5.

4.1.1 Surface Water Sampling

If any stagnant water is present on the surface of the lagoon, then a surface water sample will be collected prior to the commencement of the soil sampling.

The surface water samples will be collected in a decontaminated water scoop. Sample collection methods will be documented in the field monitoring reports. It is noted that the NMED's sampling protocol for collection of discharge samples from pipelines requires that the water be collected directly from the end of the pipeline. The samples will be transferred to the appropriate, clean, laboratory-prepared containers provided by the analytical laboratory. Sample handling and chain-of-custody procedures will be in accordance with the procedures presented below in Section 4.1.5.

Water samples intended for metals analysis will be submitted to the laboratory as both total and dissolved metals samples. QA/QC samples will be collected to monitor the validity of the groundwater sample collection procedures as presented in Section 4.1.4.

4.1.2 Soil Sample Field Screening and Logging

All soil borings will be continuously logged and samples field screened. Samples obtained from the soil borings will be screened in the field on 2.0-foot intervals for evidence of contaminants. Field screening results will be recorded on the exploratory boring logs. Field screening results will be used to aid in the 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. Additional screening for site- or release-specific characteristics such as pH or for specific compounds using field test kits may be conducted where appropriate.

Visual screening includes examination of soil samples for evidence of staining caused by petroleum-related compounds or other substances that may cause staining of natural soils such as elemental sulfur or cyanide compounds. Headspace vapor screening targets volatile organic compounds and involves placing a soil sample in a plastic sample bag or a foil sealed container allowing space for ambient air. The container will be sealed and then shaken gently to expose the soil to the air trapped in the container. The sealed container will be allowed to rest for a minimum of 5 minutes while vapors equilibrate. Vapors present within the sample bag's headspace will then be measured by inserting the probe of the instrument in a small opening in the bag or through the foil. The maximum value and the ambient air temperature will be recorded on the field boring log for each sample.

The monitoring instruments will be calibrated each day to the manufacturer's standard for instrument operation. 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. 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:

- 0.0-0.5 feet at sample locations within the Sanitary Lagoon;
- 2.0-2.5 feet at sample locations within the Sanitary Lagoon;
- >2.5 feet at sample locations within the Sanitary Lagoon (from the interval in each soil boring with the greatest apparent degree of contamination, based on field observations and field screening);
- 2.0-4.0 feet below the depth of the pipeline at trenches south of the Sanitary Lagoon;
- 0.5 feet interval at the top of saturation (applicable only to those borings and trenches that reach saturation);
- From the bottom of each borehole located within the Sanitary Lagoon; and
- Any additional intervals as determined based on field screening results.

The physical characteristics of the samples (such as mineralogy, ASTM soil classification, moisture content, texture, color, presence of stains or odors, and/or field screening results), depth where each sample was obtained, method of sample collection, and other observations will be recorded in the field log by a qualified geologist or engineer. Detailed logs of each boring will be completed in the field by a qualified geologist. Additional information, such as the presence of water-bearing zones and any unusual or noticeable conditions encountered during drilling, will be recorded on the logs.

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

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

4.1.3 Drilling Activities

Soil borings within the Sanitary Lagoon will be drilled using direct push or hollow-stem augers to a depth of 5 feet below the water table. The equipment will be properly decontaminated before drilling each boring. The NMED will be notified as early as practicable if conditions arise or are encountered that do not allow the advancement of borings to the specified depths or at planned sampling locations. Where it is not possible to complete soil borings due to physical limitations accessing the area with a drilling rig, other mechanical means will be utilized (e.g., a long-reach track- hoe). The trackhoe (or similar equipment) will be used to collect an aliquot of soil/sediment, from which a discrete sample will be collected for analysis.

Starting approximately 50 feet south of the Sanitary Lagoon maximum of 13 exploratory trenches will be dug using a trackhoe to determine the depth of the pipeline and collect a soil sample 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 5. The equipment will be properly decontaminated before starting each trench. The soil sampling will be conducted using a decontaminated hand auger, if possible, once the excavation reaches the target depth beneath the pipeline. If the sample cannot be directly obtained with a hand auger, then a discrete sample will be collected directly from the trackhoe 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 repaired or 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.

4.1.4 Groundwater Sample Collection

Groundwater samples will be collected and analyzed for the constituents identified in Section 4.1.9. The temporary well completions installed in the soil borings within the Sanitary Lagoon will be developed and then left to stabilize for at least two weeks to allow separate phase hydrocarbon (SPH) to enter the well casing. After the stabilization period, fluid levels will be recorded and if SPH is not present in the well casing, then groundwater samples will be collected within 24 hours of the

completion of well purging using disposable bailers. Alternatively, well sampling may also be conducted in accordance with the NMED's Position Paper *Use of Low-Flow and other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring* (October 30, 2001, as updated). Sample collection methods will be documented in the field monitoring reports. The samples will be transferred to the appropriate, clean, laboratory-prepared containers provided by the analytical laboratory. Sample handling and chain-of-custody procedures will be in accordance with the procedures presented below in Section 4.1.5.

Water samples intended for metals analysis will be submitted to the laboratory as both total and dissolved metals samples. QA/QC samples will be collected to monitor the validity of the groundwater sample collection procedures as follows:

- Field duplicate water samples will be obtained at a frequency of ten percent, with a minimum, of one duplicate sample per sampling event;
- Equipment rinsate blanks will be obtained for chemical analysis at the rate of ten percent or a minimum of one rinsate blank per sampling day. Equipment rinsate blanks will be collected at a rate of one per sampling day if disposable sampling equipment is used. Rinsate samples will be generated by rinsing deionized water through unused or decontaminated sampling equipment. The rinsate sample will be placed in the appropriate sample container and submitted with the groundwater samples to the analytical laboratory for the appropriate analyses; and
- Trip blanks will accompany laboratory sample bottles and shipping and storage containers intended for VOC analyses. Trip blanks will consist of a sample of analyte-free deionized water prepared by the laboratory and placed in an appropriate sample container. The trip blank will be prepared by the analytical laboratory prior to the sampling event and will be kept with the shipping containers and placed with other water samples obtained from the site each day. Trip blanks will be analyzed at a frequency of one for each shipping container of groundwater samples to be analyzed for VOCs.

4.1.5 Sample Handling

At a minimum, the following procedures will be used at all times when collecting samples during investigation, corrective action, and monitoring activities:

1. Neoprene, nitrile, or other protective gloves will be worn when collecting samples. New disposable gloves will be used to collect each sample;

2. All samples collected of each medium for chemical analysis will be transferred into clean sample containers supplied by the project analytical laboratory with the exception of soil, rock, and sediment samples obtained in Encore® samplers. Sample container volumes and preservation methods will be in accordance with the most recent standard EPA and industry accepted practices for use by accredited analytical laboratories. Sufficient sample volume will be obtained for the laboratory to complete the method-specific QC analyses on a laboratory-batch basis; and
3. Sample labels and documentation will be completed for each sample following procedures discussed below. Immediately after the samples are collected, they will be stored in a cooler with ice or other appropriate storage method until they are delivered to the analytical laboratory. Standard chain-of-custody procedures, as described below, will be followed for all samples collected. All samples will be submitted to the laboratory soon enough to allow the laboratory to conduct the analyses within the method holding times.

Chain-of-custody and shipment procedures will include the following:

1. Chain-of-custody forms will be completed at the end of each sampling day, prior to the transfer of samples off site or prior to the transportation of samples to the lab.
2. Individual sample containers will be packed to prevent breakage and transported in a sealed cooler with ice or other suitable coolant or other EPA or industry-wide accepted method. The drainage hole at the bottom of the cooler will be sealed and secured in case of sample container leakage. Temperature blanks will be included with each shipping container.
3. Each cooler or other container will be delivered directly to the analytical laboratory.
4. Glass bottles will be separated in the shipping container by cushioning material to prevent breakage.
5. Plastic containers will be protected from possible puncture during shipping using cushioning material.
6. The chain-of-custody form and sample request form will be shipped inside the sealed storage container to be delivered to the laboratory.
7. Chain-of-custody seals will be used to seal the sample-shipping container in conformance with EPA protocol.
8. Signed and dated chain-of-custody seals will be applied to each cooler prior to transport of samples from the site.

9. Upon receipt of the samples at the laboratory, the custody seals will be broken, the chain-of-custody form will be signed as received by the laboratory, and the conditions of the samples will be recorded on the form. The original chain-of-custody form will remain with the laboratory and copies will be returned to the relinquishing party.
10. Copies of all chain-of-custody forms generated as part of sampling activities will be maintained on-site.

4.1.6 Collection and Management of Investigation Derived Waste

The soils produced from the two pipeline location trenches will be temporarily placed beside the trenches. The vast majority of this material will be removed from above the pipeline and there is no currently available information to indicate these soils are contaminated. If any of the soil indicates potential impacts, then this soil will be managed separately as described below for drill cuttings. Otherwise, non-impacted soil will be returned to the trench after the pipeline is located.

Drill cuttings, excess sample material and decontamination fluids, and all other investigation derived waste (IDW) associated with soil borings will be contained and characterized using methods based on the boring location, boring depth, drilling method, and type of contaminants suspected or encountered. All purged groundwater and decontamination water will be characterized prior to disposal unless it is disposed in the refinery wastewater treatment system upstream of the API Separator. An IDW management plan is included as Appendix B.

4.1.7 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, or at other intervals approved by the Department, and the instruments will be recalibrated, if necessary. Calibration measurements will be recorded in the daily field logs. If field equipment becomes inoperable, its use will be discontinued until the necessary repairs are made. In the interim, a properly calibrated replacement instrument will be used.

4.1.8 Documentation of Field Activities

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

documentation of field activities will be performed, as appropriate. The daily record of field activities will include the following:

1. Site or unit designation;
2. Date;
3. Time of arrival and departure;
4. Field investigation team members including subcontractors and visitors;
5. Weather conditions;
6. Daily activities and times conducted;
7. Observations;
8. Record of samples collected with sample designations and locations specified;
9. Photographic log, as appropriate;
10. Field monitoring data, including health and safety monitoring;
11. Equipment used and calibration records, if appropriate;
12. List of additional data sheets and maps completed;
13. An inventory of the waste generated and the method of storage or disposal; and
14. Signature of personnel completing the field record.

4.1.9 Chemical Analyses

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

Soil/sediment, groundwater samples collected from soil borings and surface water samples will be analyzed for the constituents listed in the table below and by the following methods:

- SW-846 Method 8260 for Skinner List volatile organic compounds;
- SW-846 Method 8270 for Skinner List semi-volatile organic compounds; and
- SW-846 Method 8015B gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics.

The groundwater samples collected from soil borings and surface water samples will also be analyzed for COD, BOD, total coliform, and E. coli bacteria.

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 335.4/335.2 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020
Iron	SW-846 method 6010/6020
Manganese	SW-846 method 6010/6020
Chloride	EPA Method 300.0
Fluoride	EPA Method 300.0
Nitrate	EPA Method 300.0
Nitrite	EPA Method 300.3
Sulfate	EPA Method 300.3
Total coliform	SM9223B
E. coli	SM9223B

Groundwater samples collected at existing monitoring wells (MKTF-24, MKTF-25, MKTF-26, MKTF-29, MKTF-30, MKTF-31, MKTF-40, and OAPIS-1) will be analyzed for nitrite, nitrate, COD, BOD, total coliform, and E. coli bacteria.

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

4.1.10 Data Quality Objectives

The Data Quality Objectives (DQOs) were developed to ensure that newly collected data are of sufficient quality and quantity to address the project goals, including Quality Assurance/Quality Control (QA/QC) issues (EPA, 2006). The project goals are established to determine and evaluate the presence, nature, and extent of releases of contaminants at the lagoon. The type of data required to meet the project goals includes chemical analyses of soil and groundwater to determine if there has been a release of contaminants at the lagoon.

The quantity of data is specific to the lagoon and is based on the historical operations at lagoon. Method detection limits should be 20% or less of the applicable background levels, cleanup standards and screening levels.

Additional DQOs include precision, accuracy, representativeness, completeness, and comparability. Precision is a measurement of the reproducibility of measurements under a given set of circumstances and is commonly stated in terms of standard deviation or coefficient of variation (EPA, 1987). Precision is also specific to sampling activities and analytical performance. Sampling precision will be evaluated through the analyses of duplicate field samples and laboratory replicates will be utilized to assess laboratory precision.

Accuracy is a measurement in the bias of a measurement system and may include many sources of potential error, including the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques (EPA, 1987). An evaluation of the accuracy will be performed by reviewing the results of field/trip blanks, matrix spikes, and laboratory QC samples.

Representativeness is an expression of the degree to which the data accurately and precisely represent the true environmental conditions. Sample locations and the number of samples have been selected to ensure the data is representative of actual environmental conditions. Based on SWMU specific conditions, this may include either biased (i.e., judgmental) locations/depths or unbiased (systematic grid samples) locations. In addition, sample collection techniques (e.g., field monitoring and decontamination of sampling equipment) will be utilized to help ensure representative results.

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

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

Section 5
References

EPA, 1987, Data Quality Objectives for Remedial Response Activities; United States Environmental Protection Agency, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, OSWER Directive 9355.0-7B, 85p

EPA, 1989, Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A), EPA/540/1-89/002, December, 1989, p. 247.

EPA, 2006, Guidance on Systematic Planning Using the Data Quality Objectives Process, United States Environmental Protection Agency, Office of Environmental Information; EPA/240/B-06/001, p. 111.

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.

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

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