AP-111

Aeration Basin

2017

NEW MEXICO
ENVIRONMENT DEPARTMENT

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CERTIFIED MAIL – RETURN RECEIPT REQUESTED

February 6, 2017

Mr. Ed Riege
Remediation Manager
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: NOTIFICATION OF DETERMINATION
HAZARDOUS WASTE MANAGEMENT UNIT
AERATION BASIN
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-17-MISC

Dear Mr. Riege:

The purpose of this letter is to notify Western Refining Southwest, Inc. Gallup Refinery (the "Facility" or "Permittee") that the New Mexico Environment Department (NMED) has determined based on historic use that the Aeration Basin, designated as Solid Waste Management Unit (SWMU) 1 in the RCRA Post-Closure Permit (Permit), is in fact a Hazardous Waste Management Unit (HWMU) and must be closed under interim status in accordance with 40 CFR § 265 Subpart G.

Currently, the Aeration Basin (which consists of three ponds: aeration lagoon AL-1 and AL-2 and evaporation pond EP-1) is listed in Permit Table G-1 (Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) requiring corrective action). Part IV of the Permit requires the Permittee to conduct corrective action for all releases of hazardous waste and hazardous constituents at the Facility. Previously, the Permittee submitted a *Corrective Measures Implementation Work Plan* (dated July 2009 and revised October 2010) and a *Corrective Measures Evaluation Report* (dated October 2010 and revised April 2011) to address

closing the Aeration Basin. The Aeration Basin is also attached to the U.S. Environmental Protection Agency (EPA)'s *Complaint and Consent Agreement and Final Order* (CAFO) filed August 26, 2009 and modified September 10, 2010 that, in part, requires the Permittee to provide documentation demonstrating completion of the selected remedy at the Aeration Basin. NMED required the Permittee to conduct additional investigations at the Aeration Basin, most recently reported in the *Investigation Report SWMU 1 Aeration Basin and SWMU 14 Old API Separator*, final, revised report submitted April 26, 2016.

The Aeration Basin is located adjacent to the New API Separator (NAPIS). The Aeration Basin is a surface impoundment, defined in Permit Section I.I (Definitions) as a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials used hold an accumulation of liquid wastes or wastes containing free liquids. The Aeration Basin was a component of the refinery wastewater treatment system. There are three man-made earthen berms connected in series: the first two ponds (AL-1 and AL-2) were equipped with aeration pumps to inject air into wastewater and the last pond, EP-1, served as a holding pond downstream of the aeration lagoons. AL-1 and AL-2 cover an area approximately 275 feet by 150 feet and have an estimated holding capacity of 1 million gallons. The aerial extent of EP-1 is approximately 225 feet by 250 feet and has an estimated holding capacity of 3 million gallons. The depth of the Aeration Basin is approximately 10-14 feet deep; however, the exact depth appears to be unknown.

As part of the Facility's wastewater treatment system, effluent from the API Separator was discharged into the Aeration Basin in several ways over its operational life: directly as untreated influent, after treatment through air strippers, and after treatment by a Macro Porous Polymer Extraction (MPPE) system or Granulated Active Carbon Canisters (GAC) until May 8, 2012 when new effluent pond STP-1 began receiving refinery wastewater. The Aeration Basin also received sanitary wastewater from the off-site Pilot Truck Stop until June 2013, when all wastewater flows were directed to new pond STP-1.

Groundwater in the vicinity of the Aeration Basin is monitored by a series of monitoring wells: NAPIS-1, NAPIS-2, NAPIS-3, KA-3, GW-1, GW-2, GW-3, and OAPIS-1. The average depth to groundwater in the area of the Aeration Basin is between 7 and 20 feet below the ground surface.

Facility Wastewater Treatment System

The wastewater treatment system at the refinery originally consisted of a process sewer system that entered an API Separator (oil-water separator) that then discharged effluent to a series of surface impoundments. Prior to the creation of the Aeration Basin, after wastewater flowed through the API separator the wastewater flowed directly into an impoundment called Pond No. 1. In 1985, in order to comply with new RCRA regulations, the Facility upgraded the wastewater treatment system to provide aeration of wastewaters. As part of the upgrade, AL-1, AL-2, and EP-1 were constructed in 1987 within the footprint of original Pond No. 1.

The Toxicity Characteristic rule, adopted March 29, 1990, required treatment of the API Separator effluent and as a result, the Facility installed an air stripper between the API Separator and the discharge point to AL-1 to remove benzene. A second air stripper was subsequently added to enhance benzene removal. A third air stripper was added to the system in the late 2000s. The benzene air strippers were intended to treat the wastewater to remove benzene and prevent characteristically hazardous waste from being discharged to the Aeration Basin; however, they were not entirely effective. Monitoring data of the effluent from the benzene air strippers indicated that concentrations of benzene above the toxicity characteristic (TC) regulatory threshold of 0.5 milligrams per liter (mg/L) was discharged to the lagoons. The strippers were removed from service November 9, 2012 as part of a requirement in the CAFO.

Prior to removal of the air strippers, the facility designed and built a new wastewater treatment system, as required by the CAFO. The upgraded treatment system includes a series of filters and the MPPE system is located upstream of the API Separator and the Aeration Basin. The MPPE system began full operation May 8, 2012. The use of the Aeration Basin ended in June 2013. The MPPE system was not entirely effective which caused the Facility to discontinue its use and the Facility now relies on two GAC canisters to filter the wastewater prior to discharge to pond STP-1.

Aeration Basin Design

A geotechnical report (Geotechnical Investigation Three Cell Sludge Pond, dated July 22, 1986) was prepared prior to construction of the Aeration Basin. The geotechnical report indicates that the plans for the aeration lagoons included additional embankments created from materials from the bottom of the original Pond No. 1 and from adjacent hillsides to the north and east of the site. The plan presented compaction requirements for both the berms and the bottom of the lagoons. A "testhole" was drilled adjacent to the natural seep on east side of Pond No. 1 (between where AL-2 and EP-1 were constructed) and water was encountered at 3.5 feet bgs. The water was described as perched on top of a weathered shale layer which was encountered at 12 ft bgs. The plan recommended installing drain pipe to divert the seep. The plan also recommended removing all sludge from the existing Pond No. 1. The geotechnical report included a description, "[t]he crest of the pond embankment will be at a local elevation of ninety-six (96) feet and will be ten (10) feet wide. The base of the embankment will be from seventy (70) to eighty (80) feet wide. The bottom of the pond will be cut into the natural soils at a local elevation of eight-two (82) feet. The maximum effluent level will be at local elevation of ninety four (94) feet giving a maximum effluent depth of twelve (12) feet and minimum freeboard of two (2) feet." However, it is not clear from available documents in NMED and Oil Conservation Division (OCD) records if the recommendations in the geotechnical report were implemented as proposed when the Aeration Basin was constructed in 1987. A letter dated August 20, 1986 regarding Pond No. 1 sampling stated that sampling results indicated that there had been no significant migration of hazardous constituents from Pond No. 1 and that further excavation or treatment of soil under the pond prior to lagoon construction was not necessary. A letter to OCD dated March 2, 1979 from the Shell Oil Company indicates that the approximate depth of Pond No. 1 was three feet; therefore, assuming that some sedimentation occurred over 28 years of use, excavation was conducted to depths below three feet to reach the current estimated depth of the ponds. Sediment

sampling conducted by TriHydro in April 2008 describes a layer of gray clay that was encountered between 3 and 10 feet below the top of the sludge. This clay may be the base of the lagoons. Based on the TriHydro observations, it appears that the bottom of the Aeration Basin is anywhere from 3 to 10 feet below the top of the sludge. It is not clear at what depth the sludge was encountered in the Aeration Basin relative to the descriptions of the bottom and "local ground elevation" provided in the geotechnical report.

Groundwater Monitoring Wells

There are three groundwater monitoring wells located adjacent to the western side of the Aeration Basin (wells GWM-1, GWM-2, and GWM-3). The wells are screened in the Chinle/Alluvium Interface stratigraphic unit. GWM-1 and GWM-2 are located on the west side of the Aeration Basin straddling the dike that separates AL-2 and EP-1. Downgradient (north) of GWM-1 and GWM-2 is GWM-3 located on the northwest corner of EP-1. GWM-2 and GWM-3 were installed in 2006 as dry wells to detect potential leakage from the Aeration Basin and were dry until 2008 when water was first observed in GWM-2. By the second quarter inspection of 2010 both wells contained water. In March 2013, GWM-3 was found to be dry and water has not been present in the well during subsequent quarterly monitoring events. Water was observed in GWM-2 until the first quarter sampling event in 2014. The absence of water in the wells generally corresponds to the decrease in water levels in the aeration lagoons and EP-1. The most recently recorded groundwater levels are as follows: GWM-1 at 21.47 ft bgs; GWM-2 DRY (the last depth to water was measured 18.39 ft bgs); GWM-3 DRY (the last depth to water was measured 13.6 ft bgs). Groundwater samples from GWM-1 contain benzene, ethylbenzene, MTBE, naphthalene, 1-methylnapthalene, chloride, and DRO at concentrations above screening levels on a consistent basis. Analytical results for GWM-2 and GWM-3 demonstrated that nitrate and nitrite, sulfate, chloride, and DRO (only in GWM-3) were present at concentrations above standards. An October 28, 2015 NMED letter contained a requirement to remove SPH from GWM-1 after the Permittee reported free product in the well. In a response dated December 10, 2015 the Facility stated that the likely source of the SPH in GWM-1 was the Aeration Lagoon. A chromatograph indicated that the hydrocarbons were predominantly DRO in a sample collected from GWM-1.

The NAPIS groundwater monitoring wells are located east of AL-1. NAPIS-1 is an upgradient well located on the southeast side of the NAPIS. The NAPIS-2 monitoring well is located in the southwest corner of the bay to the NAPIS, and NAPIS-3 is located in the northwest corner. Well KA-3 is located between NAPIS-2 and NAPIS-3 on the west side of the NAPIS. These wells are screened in the Chinle/Alluvium stratigraphic unit. The most recent recorded depths to groundwater levels are as follows: NAPIS-1 at 7.20 ft bgs; NAPIS-2 at 8.32 ft bgs; NAPIS-3 at 9.22 ft bgs; and KA-3 at 8.24 ft bgs. Because the NAPIS wells are upgradient from the Aeration Basin, any contaminants present in the groundwater are likely from other sources than the Aeration Basin. However, it is noted that the recorded groundwater levels are within the depth range of the bottom of the Aeration Basin.

A new monitoring well, OAPIS-1, was installed on the southeast edge of AL-2 upgradient from the Aeration Basin in July 2012. Well OAPIS–1 is screened in the Chinle/Alluvium Interface

stratigraphic unit. The most recently recorded groundwater level for OAPIS-1 is 11.02 ft bgs. The recorded groundwater level is within the depth range of the bottom of the Aeration Basin.

Wastewater appears to have migrated out of the Aeration Basin and groundwater currently appears to be seeping into the Aeration Basin. The water levels measured around the Aeration Basin range from approximately 7 to 21 feet bgs and the approximate depth of the Aeration Basin is 10-14 feet. There was an observed drop in groundwater levels when use of the Aeration Basin ceased, indicating that there is a connection between the Aeration Basin and groundwater and that the clay layers in the bottom of the ponds and the berms were more permeable than anticipated.

Spills and Discharges Affecting Aeration Basin

The Facility has experienced discharges of oil and oily water into the Aeration Basin. Relatively recent examples are described below:

- A release of oily water from the old API separator and its inlet box occurred on August 3, 2005 with approximately 17 cubic yards of impacted soils excavated from AL-1 and AL-2;
- Approximately 13 cubic yards of impacted soils were excavated from AL-1 and AL-2 after a release of oily water from the old API separator occurred on August 15, 2005;
- On June 15, 2006, Western submitted a letter to NMED requesting a "contained-in" determination regarding soil excavated from AL-1, AL-2 and EP-1 to remediate releases of oily water that generated F037/F038 listed waste, which occurred in the fall of 2005;
- A release of approximately 700-800 gallons of oil from the new API separator (NAPIS) occurred on March 3, 2007 to AL-1, AL-2, and EP-1, which resulted in the collection of additional effluent samples at AL-1, AL-2 and EP-1. In July 2007, the impacted bank soils were removed from the aeration lagoons (AL-1 and AL-2), EP-1 and evaporation pond EP-2. NMED stated in their letter of August 15, 2007, that the oily wastewater contained benzene (D018) and F037/F038-listed waste; however, the excavated soils were granted no-longer-contained-in status and the excavated materials were appropriately disposed off-site pursuant to NMED's direction;
- On June 23, 2007 and July 19, 2007, oily wastewater reported to contain benzene (D018) and F037/F038-listed waste was released from the weir box at the NAPIS. Impacted soils were removed;
- On August 3, 2008, 756 gallons of oily wastewater was discharged from the NAPIS to the Aeration Basin. Impacted soils were removed and disposed off-site pursuant to NMED's approval; and

- On September 23, 2012 the benzene strippers overflowed. The spill went over into the concrete pad and overflowed onto the ground on all four sides of the containment berm and into AL-1.

In addition to the spills and discharges to the Aeration Basin, the sludges in the Aeration Basin contain F037 and F038 listings due to malfunctioning aerators. The regulations in 40 CFR 261.31(b)(3)(i) and (ii) for F037 and F038 wastes states "[s]ludges are considered to be generated at the moment of deposition in the unit, where deposition is defined as at least a temporary cessation of lateral particle movement." Therefore, F037/F038 wastes were generated in the lagoons during these events:

- In April and May 2006, there was a period when two aerators in AL 2 were not operating due to pump failure, which would result in the generation of F037/F038 waste.

- In 2008, the aerators in AL-1 and AL-2 were shut down for a period time to conduct sediment sampling. During this time F037/F038 listed wastes were generated.

The EPA conducted a RCRA Compliance Evaluation inspection from September 11-13, 2007. During the inspection, the Facility provided analytical data showing that the concentration of benzene in water discharged to AL-1 was 4.4 mg/L. The EPA also observed a separate pipe conveying wastewater from the API separator directly into AL-1. This "Overflow Pipe" from the NAPIS was used when wastewater flow to the NAPIS exceeded unit's ability to process the volume of wastewater and the overflow was directly discharged to AL-1. This overflow pipe was removed from service January 5, 2009. Data indicates benzene concentrations in wastewater discharged from the overflow pipe to be between 11.0 and 16.0 mg/L. This is considered discharge of hazardous waste that is characteristic (D018) and violated Land Disposal Restrictions. EPA inspection report labels AL-1 as a surface impoundment and a hazardous waste management unit; and cited the Facility with a violation of failing to have RCRA Permit to operate surface impoundment for hazardous waste management. The inspection resulted in the EPA issuing the CAFO requiring a new wastewater treatment system and required closure of the Aeration Basin. The Aeration Basin functioned as a hazardous waste treatment unit when influent containing benzene at concentrations greater than 0.5 mg/L was discharged to the lagoons. The Aeration Basin also functioned as a hazardous waste disposal unit when wastewater was discharged directly from the API Separator to the lagoons and when the aeration units were not functioning.

Investigation History

Soil sampling was conducted near the Aeration Basin during a RFI conducted in the early 1990s (Giant Refining Company, 1991). Based on the analytical results from the samples, in a letter dated January 7, 1994 the EPA determined that no significant impact had occurred and no further action was required for Aeration Basin. However, the EPA required that on-going soil sampling be conducted at the lagoons every two years, which was later reduced to a frequency of five years. The first "monitoring" event was completed in October, 1996 (Giant Refining Company, 1996). Soil samples were collected from depths of four feet to 20 feet below ground surface with

some borings angled to allow collection of samples beneath the lagoons. Neither volatile nor semi-volatile organics were detected in 25 of the samples. Two samples collected near the side wall of the inlet aeration lagoon at a depth of four feet contained concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX). The highest concentration was 2.2 mg/kg of xylenes.

The Facility hired an engineer in 1998 to conduct a visual site assessment (VSA) of the refinery including the Aeration Basin. The VSA concluded that the lagoons were in active service, functioning normally, oxygenating wastewater, and stimulating biological activity (Practical Environmental Services, Inc., 1998). The engineer determined that the lagoons had been placed in an appropriate geologic setting in which the underlying soils exhibited a very low hydraulic conductivity of 10^{-7} cm/sec, effectively serving as an aquitard. The report noted concentrations of BTEX near the inlet were considered common and predictable for the service.

An investigation of the Aeration Basin was conducted in April 2008 by TriHydro to characterize the volume and nature of sediments in each lagoon. Based on this investigation, there appears to be two layers of sludge/sediment in the aeration lagoons. The upper layer ("soft sediment") is described as a soft, loose, and unconsolidated, as opposed to the lower layer ("hard pack sediment") that is more compact and dense. In some areas, the distinction between the two layers is indiscernible (Trihydro Corporation, 2008). Laboratory sampling analyses of sludge samples included diesel range organics (DRO)/gasoline range organics (GRO), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), RCRA metals, and mercury. Analytical results for mercury (results ranging from 2.1 to 19 mg/kg) and lead (results ranging from 9.7 to 220 mg/kg) were above the EPA Toxicity Characteristic levels, DRO levels ranged from 7,200 to 370,000 mg/kg, and several VOCs and SVOCs were detected at elevated concentrations.

In 2012 the Facility conducted an investigation around the Aeration Basin berms and collected groundwater samples and reported results in the *Investigation Report SWMU 1 Aeration Basin and SWMU 14 Old API Separator* [OAPIS], submitted April 26, 2016. Soil samples contained concentrations of contaminants greater than the applicable SSLs and the groundwater samples indicated the presence of metals, VOCs (e.g., benzene, 1-Methylnapthalene, Methyl tert-butyl ether (MTBE), and naphthalene), and DRO in temporary wells. The soil sampling results from the OAPIS (SWMU 14) investigation also indicate releases from SWMU 14 occurred. Releases from the OAPIS would have also contained K049, K050, K051, F037/F038 and D018 listed wastes and potentially other F-listed wastes.

Basis for HWMU Determination

The Aeration Basin is a surface impoundment that received hazardous waste after July 26, 1982. 40 CFR § 270.1 (c) requires that all surface impoundments that receive hazardous waste after July 26, 1982 obtain a permit to operate the surface impoundment, or, alternately, clean close the unit or close the unit and obtain a post-closure care permit. Units that receive hazardous waste after July 26, 1982 are considered "regulated units". Since the Aeration Basin received listed hazardous waste including F037, F038, K049, K050 and K051 as well as has experienced

discharges of D018 (benzene) above the toxicity characteristic (40 CFR § 262.24 Table 1) after July 26, 1982, the Aeration Basin meets the definition of a HWMU or a regulated unit. The Aeration Basin does not meet the exemption requirements listed in § 264.90(b); therefore, the surface impoundments must be closed as an interim status HWMU under 40 CFR § 265. If the Permittee is unable to achieve clean closure, the Permittee must conduct post-closure care of the unit as required by 40 CFR§§ 264.117-120.

The sludges and some affected soils in and beneath the Aeration Basin may not meet Land Disposal Restrictions (LDR) for treatment standards listed in 40 CFR § 268.40 once the sludges and soils are removed from the unit; therefore, any closure action must include analytical testing of the materials in order to determine compliance with LDRs.

In July 2016 the Permittee presented a proposed interim measure for the Aeration Basin to NMED. However, after discussion and research regarding the proposed interim measure and in light of the fact that the unit is a HWMU rather than a SWMU, NMED has determined that the proposed interim measure is not appropriate, because it will not be meet the standards for closure and is not protective of human health and the environment. The proposed in-situ treatment and capping of waste does not meet RCRA regulatory requirements. If the Permittee was to proceed with the proposed plan, waste would be left in place in a unit that was not designed to meet the requirements for a landfill. In addition, the unit is in contact with groundwater further complicating the situation.

Based on RCRA regulations and EPA guidance, there are several options to consider to close the Aeration Basin. The options for closure include:

1) Remove the waste and affected soils from the unit and send the excavated material off-site for treatment and disposal.

2) Apply for a treatment permit, remove the waste and affected soils from the unit for on-site treatment and then either:

    a. Send the treated waste off-site for disposal at a RCRA-permitted disposal facility; or;

    b. Permit and construct a CAMU that meets the requirements of 40 CFR §264.552(e) for on-site disposal; or

    c. Permit and construct a hazardous waste landfill at the Facility that meets the requirements of 40 CFR § 264 subpart N for on-site disposal.

NMED will assist the Permittee in determining the most cost effective closure process that also meets the regulatory requirements and is protective of human health and the environment. As part of closure, the Permittee must submit a Closure Plan to close the Aeration Basin as an interim status unit after the appropriate data is collected. The Closure Plan is a permit

modification that requires a public notice and a public comment period in accordance with 40 CFR §265.112.

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

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
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