

June 24, 2014

JUN 30 2014

**NMED
Hazardous Waste Bureau**

Mr. John E. Kieling, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, New Mexico 87505-6303

**RE: INVESTIGATION WORK PLAN - SOLID WASTE MANAGEMENT UNIT ("SWMU") NO. 4
OLD BURN PIT AND SWMU NO. 5 LANDFILL AREAS;
WESTERN REFINING SOUTHWEST, INC. ("WESTERN"), GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-11-002**

Dear Mr. Kieling:

Please find enclosed the subject Investigation Work Plan, which has been prepared pursuant to the recently issued RCRA Post-Closure Care Permit (effective date 12/2/2013) (the "Permit"). The Investigation Work Plan addresses SWMU No. 4, which is due June 30, 2014, and SWMU No. 5, which not due until September 30, 2014.

Please note that the Permit currently is under appeal including, without limitation, the Permit's identification of the AOCs in Attachment G. Accordingly, this timely submission under the Permit shall not be deemed as agreement by Western with the identification of the AOCs in Attachment G, or as a change in any position expressed by Western in its comments to NMED on the Permit, and Western reserves all applicable rights and defenses associated with the Permit appeal.

If there are any questions regarding the Investigation Work Plan, please contact Mr. Ed Riege at (505) 722-0217.

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,



Mr. William C. McClain Jr.
Refinery Manager
Western Refining Southwest, Inc. – Gallup Refinery

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**INVESTIGATION WORK PLAN
SWMU No. 4 Old Burn Pit and
SWMU No. 5 Landfill Areas**

**Gallup Refinery
Western Refining Southwest, Inc.
Gallup, New Mexico
EPA ID# NMD000333211**

June 2014

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List of Acronyms

areas of concern (AOCs)

below ground surface (bgs)

Code of Federal Regulations (CFR)

dilution attenuation factor (DAF)

Environmental Protection Agency (EPA)

Hazardous and Solid Waste Act (HSWA)

mean sea level (msl)

New Mexico Administrative Code (NMAC)

New Mexico Environment Department (NMED)

photoionization detector (PID)

Resource Conservation and Recovery Act (RCRA)

RCRA Facility Investigation (RFI)

semi-volatile organic compound (SVOC)

Solid Waste Management Units (SWMUs)

volatile organic constituent (VOC)

Executive Summary

The Gallup Refinery, which is located 17 miles east of Gallup, New Mexico, has been in operation since the 1950s. Past inspections by State [New Mexico Environment Department (NMED)] and federal environmental inspectors have identified locations where releases to the environment may have occurred. These locations are generally referred to as Solid Waste Management Units (SWMUs). Pursuant to the terms and conditions of the facility Resource Conservation and Recovery Act (RCRA) Post-Closure Care Permit and 20.4.1.500 New Mexico Administrative Code, this Investigation Work Plan has been prepared for the Old Burn Pit and the Landfill Areas. Attachment G of the facility's Post-Closure Care Permit provides a list of designated SWMUs and Areas of Concern (AOCs), and the Old Burn Pit and Landfill Areas are listed as SWMUs No. 4 and No. 5, respectively.

The Old Burn Pit occupied a small triangular shaped area of approximately 20 feet by 40 feet, which was located approximately 700 feet north of the refinery's main tank farm and a short distance west of the fire training area. The pit was used to burn acid soluble oils from the alkylation unit and was operated from 1958 through 1976. A RCRA Facility Investigation (RFI) was conducted in the area in early 1990s (three soil borings with depths of 4.5 feet in May 1992, which were extended to a depth of 10 feet in 1994) with the finding that the area did have relatively low concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals present in surface soils. Giant Refining Company recommended a soil cap be placed over the area of the burn pit and it was subsequently installed in 1997 pursuant to the United States Environmental Protection Agency's (EPA) approval of the Voluntary Corrective Action Plan. While EPA had authority over the project during the earlier investigation phase, NMED received authorization on January 2, 1996 to implement the Hazardous and Solid Waste Act Corrective Action Program in New Mexico and was afforded an opportunity to intercede prior to and during the remedial actions. There is no record of NMED expressing concerns about or opposition to the remedial actions that were completed at the Old Burn Pit or the Landfill Areas.

The Land Fill Areas were determined to include four small areas used to dispose of waste generated from refinery construction, maintenance, and operations. Three of the landfill areas were contiguous and were located northwest of the main refinery tank farm, approximately 500 feet northwest of tank 337. The fourth landfill area was located approximately 50 feet north of the other three landfills. The main landfill area is estimated to have been 100 feet wide by 350

feet long in a kidney shape. The separate landfill area to the north is estimated to have been 20 feet by 20 feet. The landfill areas were operated from 1958 through 1979. A RCRA Facility Investigation (RFI) was conducted in the area in early 1990s (twelve soil borings to a depth of 9.5 feet in May 1992, with seven of these borings drilled deeper to a depth of 20 feet in 1994). The soil samples were analyzed for priority pollutant volatile organics and metals, with the finding that the area did primarily have metals present at concentrations above background. Giant Refining Company recommended a soil cap be placed over the area of the landfills and it was subsequently installed in early 1998 pursuant to the EPA's approval of the Voluntary Corrective Action Plan.

There are no plans for additional investigation activities at either of the two above mentioned SWMUs. Giant Refining Company submitted documentation demonstrating proper closure of the Old Burn Pit and the Landfill Areas in 1998 (Practical Environmental Services, Inc., 1998a and b). The investigation and remediation (i.e., capping) of both SWMUs was overseen and approved by the US EPA. In 2001, Giant Refining again submitted information on the remediation of the Old Burn Pit and the Landfill Areas in the "Petition for *No Further Action*" (Giant Refining Company, 2001) NMED commented on the 2001 *No Further Action* petition and requested additional information for the Old Burn Pit and the Landfill Areas. All of the additional information requested by NMED for the Old Burn Pit and the Landfill Areas was submitted to NMED on October 2, 2002. Western Refining Southwest, Inc. submitted another request for NMED to respond to the previously submitted Petition for *No Further Action* on June 24, 2013. Western Refining Southwest, Inc. is confident that the previously approved and implemented remedial efforts have addressed any threats posed to the environment and/or human health that may have been present at the Old Burn Pit and the Landfill Areas prior to placement of the caps.

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 is located on 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 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.

On October 31, 2013, the NMED issued a RCRA Post-Closure Care Permit ("Permit") to Western. The Permit authorizes post-closure care at a hazardous waste land treatment unit and also includes corrective action provisions. Section IV.H.5.a.i requires the Permittee to prepare and submit RCRA Facility Investigation Work Plans to the NMED in accordance with the schedule set forth in Permit Attachment E. The investigation work plan for SWMU No. 4 (Old Burn Pit) is due June 30, 2014 and the investigation work plan for SWMU No. 5 (Landfill Areas) is due September 30, 2014.

The locations of SWMUs No. 4 and 5 are shown on Figure 2. Photographs of the SWMUs and the surrounding area are included in Appendix A.

The purpose of the site investigation that was conducted during the original RFI was to determine and evaluate the presence, nature, and extent of releases of contaminants in accordance with 20.4.1.500 New Mexico Administrative Code (NMAC) incorporating 40 Code of Federal Regulations (CFR) Section 264.101.

Section 2

Background

This section presents background information for SWMUs No. 4 and No. 5 including a review of historical waste management activities to identify the following:

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

2.1 Old Burn Pit (SWMU No. 4)

The Old Burn Pit was originally included as a SWMU in the 1988 Hazardous and Solid Waste Act (HSWA) permit and subsequently included for investigation in the 1990 RFI Work Plan. The Old Burn Pit was put into service in 1958 and was removed from service in 1976, when the pit area was apparently covered with a layer of soil. It covered an area of approximately 20 feet by 40 feet with a triangular shape and had a depth of 10 to 12 feet (Figure 3). Acid soluble oils from the alkylation unit were placed in the pit and burned. It is possible that spent silicon dioxide catalysts may have also been placed in the pit.

In 1992, during the Phase III RFI three soil borings (RFI0401V, RFI0402V, and RFI0403V) were completed to depths of 4.5 feet below ground surface (bgs) using a hand auger (Figure 3) (Giant Refining Company, 1992). Soil samples were collected from depths of 0.0 feet bgs, 3.0 feet bgs, and 4.5 feet bgs at each of the three soil borings. The soil samples were analyzed for metals (arsenic, barium, beryllium, cadmium, chromium, lead, nickel, mercury, and vanadium), VOCs, SVOCs, and pH and the results are presented in Table 1. For comparison the NMED soil screening levels (*Risk Assessment Guidance for Site Investigation and Remediation*, dated February 2012) and EPA Regional Screening Levels are also included in Table 1. Based on the detection of constituents in the samples collected in 1992, EPA directed that deeper samples be collected from the same three locations. As shown on Figure 4, three soil borings (RFI0404V, RFI0405V, and RFI0406V) were drilled using hollow-stem augers at the same locations in 1994 with soil samples collected at depths of 6.0 feet bgs and 10.0 feet bgs (Giant Refining Company, 1994). The soil samples were analyzed for VOCs, SVOCs, and metals and the results are summarized in Table 1.

One metal, three VOCs and one SVOC were detected at concentrations above the soil screening levels developed to protect groundwater assuming a dilution attenuation factor (DAF) of 1.0, but all reported concentrations were less than the residential soil screening level for direct contact. The soil samples were also screened in the field with a photo ionization detector (PID). Many of the PID readings were 0.0, but those with higher readings are as follows; RFI0402 V3.0 at 16 parts per million (ppm), RFI0402 V4.5 at 8.4 ppm, RFI0403 V3.0 at 3.2 ppm, and RFI0403 V4.5 at 12 ppm. The field data sheets are included in Appendix B.

Barium was detected in five soil samples (RFI0401 V0.0, RFI0401 V3.0, RFI0401 4.5, RFI0402 V0.0, and RFI0402 V3.0) at concentrations above the NMED soil screening for groundwater protection assuming a dilution attenuation factor (DAF) of 1.0. The concentrations of barium in these five samples ranged from 360 mg/kg to 1,300 mg/kg in comparison to the DAF = 1.0 screening level of 300 mg/kg (Table 1). The background value established in the 1992 Phase III RFI report for barium in soils less than five feet deep was 408.8 mg/kg (Giant Refining Company, 1992). There were three VOCs (chlorobenzene, ethylbenzene, and xylenes) detected at concentrations above their screening levels. Chlorobenzene was detected in one soil sample (RFI0403 V4.5) at 0.05 mg/kg, which slightly exceeded the DAF screening level of 0.049 mg/kg. Ethylbenzene was found at concentrations above the DAF 1.0 screening level of 0.013 mg/kg in three soil samples. These three soil samples were RFI0402 V3.0, RFI0403 V3.0, and RFI0403 V4.5 with concentrations of ethylbenzene of 1.0 mg/kg, 0.910 mg/kg, and 0.510 mg/kg, respectively. Xylenes (total) were also detected above the DAF 1.0 screening level (0.16 mg/kg) in the same three soil samples. Soil samples RFI0402 V3.0, RFI0403 V3.0, and RFI0403 V4.5 had concentrations of total xylenes of 2.1 mg/kg, 2.2 mg/kg, and 1.1 mg/kg, respectively. Naphthalene was the only SVOC to have a concentration in soil above the DAF 1.0 screening level of 0.0036 mg/kg. Naphthalene was detected at a concentration of 0.520 mg/kg.

Based on the detection of constituents in soils discovered during the Phase III RFI, Giant Refining Company recommended the placement of a soil cap over the area occupied by the burn pit. This activity was completed in 1997. During the week of March 23, 1998, an on-site inspection was conducted by Practical Environmental Services, Inc. in support of preparation of a RCRA Post-Closure Care Permit for the Gallup Refinery Land Treatment Unit. This inspection report, the applicable section of which is included in Appendix C, documents the remediation (i.e., construction of a low permeability soil cap) of the Old Burn Pit. The remediation was conducted under the review and authority of both EPA and NMED.

2.2 Landfill Areas (SWMU No. 5)

The Land Fill Areas were determined to include four areas used to dispose of waste generated from refinery construction, maintenance, and operations. The construction waste is reported to have included asphalt paving, concrete, and scrap metal. Some office, residential, and shop wastes were also identified. Wastes associated with operations may have included defluorinator bauxite and hydrotreating catalyst (cobalt, molybdenum, and nickel), and possibly outdated laboratory chemicals. Three of the landfill areas were contiguous and were located northwest of the main refinery tank farm, approximately 500 feet northwest of tank 337 (Figure 5). The fourth landfill area was located approximately 50 feet north of the other three landfills. The main landfill area is estimated to have been 100 feet wide by 350 feet long in a kidney shape. The separate landfill area to the north is estimated to have been 20 feet by 20 feet. The landfill areas were operated from 1958 through 1979.

A RCRA Facility Investigation (RFI) was conducted in the area in May 1992 with twelve soil borings (RFI0501 through RFI0512) completed with a hand auger to a depth of 9.5 feet bgs (Figure 5). The soil samples were collected from depths of 0.0 feet bgs, 3.0 feet bgs, 7.0 feet bgs, and 9.5 feet bgs and analyzed for VOCs, metals, and pH. Based on the presence of waste materials at depths of 9.5 feet bgs, seven additional soil borings were drilled deeper to a minimum depth of 20 feet bgs in 1994. The deeper borings (RFI0513 through RFI0519) were completed using hollow-stem augers and were completed at the same location of previous soil borings RFI0502, RFI0503, RFI0504, RFI0505, RFI 0506, RFI 0507, and RFI 0509 (Figure 6). Soil samples were collected from depths of 11.0 feet bgs, 16.0 feet bgs, and 20.0 feet bgs and analyzed for VOCs, SVOCs, and metals. The analytical results are presented in Table 2.

Five metals (arsenic, barium, lead, mercury, and nickel) and one SVOC (di-n-butyl phthalate) were detected at concentrations above the soil screening levels developed to protect groundwater assuming a dilution attenuation factor (DAF) of 1.0 and all but one constituent (arsenic) had reported concentrations less than the residential soil screening level for direct contact. The soil samples were also screened in the field with a PID. Many of the PID readings were 0.0, but those with higher readings are as follows; RFI0504 V3.0 at 0.01 ppm and RFI0504 V9.5 at 0.4 ppm. The field data sheets are included in Appendix B.

As shown in Table 2, all of the detected results for arsenic were above the DAF 1.0 screening level of 0.013 mg/kg. Many of the reported arsenic concentrations also exceeded the residential direct contact screening level of 3.9 mg/kg. Arsenic concentrations ranged from non-detect at 2.5

mg/kg to 35 mg/kg. For some perspective on the arsenic DAF 1.0 screening level of 0.013 mg/kg and the residential direct contact screening level of 3.9 mg/kg, the background level for arsenic established in the 1992 Phase III RFI report was 11.73 mg/kg for soil less than 5 feet deep and 10.98 mg/kg for soils greater than 5 feet. Thirty three of the 75 soil samples collected reported barium with concentrations above the DAF 1.0 screening level of 300 mg/kg, while none of the samples exceeded the residential direct contact screening level of 16,000 mg/kg. Barium concentrations ranged from 56 mg/kg to 1,600 mg/kg. Twelve soil samples had lead present in concentrations above the EPA groundwater protection screening level of 14.0 mg/kg, but none exceeded the residential direct contract screening level of 400 mg/kg. Lead concentrations ranged from <5 mg/kg to 21 mg/kg. One soil sample had a reported concentration of mercury (0.31 mg/kg) that exceeded the DAF 1.0 screening level of 0.033 mg/kg, but no samples had concentrations above the residential direct contact screening level of 16 mg/kg. All other samples were non-detect for mercury at a reporting limit of 0.25 mg/kg. One soil sample had a concentration of nickel (83 mg/kg) that exceeded the DAF 1.0 screening level of 48 mg/kg, but no samples had concentrations above the residential direct contact screening level of 1,600 mg/kg. Nickel concentrations ranged from 3.6 to 83 mg/kg. Di-n-butyl phthalate was detected at a concentration above of the DAF 1.0 screening level of 7.0 mg/kg in one sample at a concentration of 9.6 mg/kg, while all other samples were non-detect at a reporting limit of 0.005 mg/kg.

Based on the detection of constituents in soils discovered during the Phase III RFI, Giant Refining Company recommended the placement of a soil cap over the area occupied by the landfills. This activity was completed in early 1998. During the week of March 23, 1998, an on-site inspection was conducted by Practical Environmental Services, Inc. to document the closure of SWMU No. 5. A Landfill Closure Certification Report was prepared, which documents the remediation (i.e., construction of a low permeability soil cap) of the Landfill Areas (Appendix D). The remediation was conducted under the review and authority of both EPA and NMED, in accordance with the Voluntary Corrective Action Plan approved by EPA on January 5, 1994.

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 SWNUs No. 4 and 5 is at an approximate elevation of 6,940 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 SWMUs No. 4 and No. 5 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 ft²/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. Figure 7 presents a cross section location map showing cross section (A-A'), which is included as Figure 8.

Section 4

Scope of Activities

4.1 Anticipated Activities

No new sampling activities are proposed.

4.2 Background Information Research

Documents containing the results of previous investigations that explored the subsurface conditions at SWMUs 4 and 5 were reviewed to facilitate development of this work plan (Giant Refining Company, 1992; Giant Refining Company, 1994; Giant Refining Company, 2001; and Practical Environmental Services, Inc., 1998a & b).

Section 5

References

- Giant Refining Company, 1992, RCRA Facility Investigation, Phase III, Ciniza Refinery, Gallup New Mexico, p. 139.
- Giant Refining Company, 1994, Report on Additional RFI Sampling, Ciniza Refinery, Gallup New Mexico.
- Giant Refining Company, 2001, Ciniza Refinery No Further Action Report, August 2001.
- Practical Environmental Services, Inc., 1998a, SWMU #4 Summary Report, Old Burn Pit Area, Ciniza Refinery McKinley County, New Mexico, p. 5
- Practical Environmental Services, Inc., 1998b, SWMU #5 Closure Certification Report, Solid Waste Landfill Areas, Ciniza Refinery McKinley County, New Mexico, p. 5.
- 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.
- Western Refining, 2009, Annual Ground Water Monitoring Report Gallup Refinery – 2009.

Tables
