Western Refining
GALLUP

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November 7, 2011

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

Re: Notice of Disapproval
Facility Wide Ground Water Monitoring Work Plan
Western Refining Company Southwest Inc., Gallup Refinery
EPA ID #NMD000333211 HWB-WRG-11-001

Dear Mr. Kieling:

On behalf of Western Refining Company, Southwest Inc., Gallup Refinery is submitting the following response to the Notice of Disapproval issued by the New Mexico Environment Department (NMED) regarding the above referenced matter. A redline version of the Work Plan has also been submitted electronically.

Comment 1

Figures submitted in the electronic version are sized to the document. Hard copy submittal contains the full scale size of maps along with an 8.5 x 11 inch copy. In the future scanned copies of maps will be full scale where applicable when submitting as an electronic copy. Figures 3, has been revised to reflect MW-4 which was missing from original map. Figure 5 has been updated with the 2010 version. (copies attached)

Comment 2

MW-2 was added to Section 5.2.1 (Sampling Locations) as well as revisions to the listing of EP-1 Inlet. (Page 25)

Comment 3

Appendix C – Well Data 2010 Summary Table is currently being revised as per the NOD, Requirement to Resurvey Ground Water Monitoring Wells issued on August 22, 2011.

I-40 Exit 39, Jamestown, New Mexico 87347 • 505 722-3833 • www.wnr.com
Mail: Route 3 Box 7, Gallup, New Mexico 87301

Response to this NOD will be on or before December 30, 2011. A copy of MW-2 Well log is attached which indicates the screened interval depth to be between 112 to 126 feet. Stratigraphic units of all the wells have been re-checked and will be corrected on the Well Data 2010 Summary Table to be submitted on or before December 30, 2011.

Comment 4

Section 2.1 concerning the underground diesel pipeline has been updated with current events. (Page 9, paragraph 3)

Comment 5

Section 2.4 Summary of containment releases that could contribute to possible ground water contamination has been updated. (Page 14, paragraph 1, 2 and 3)

Comment 6

Section 4.2.1 has been modified. (Page 18)

Comment 7

Field water quality parameters have been added to this section. (Page 31, paragraph 3)

Comment 8

MW-2 has been added to Appendix D, Table 1. (Page 54)

If you have any questions regarding Western's responses to the NOD please contact Cheryl Johnson of my staff at 505 722 – 0231.

Sincerely,

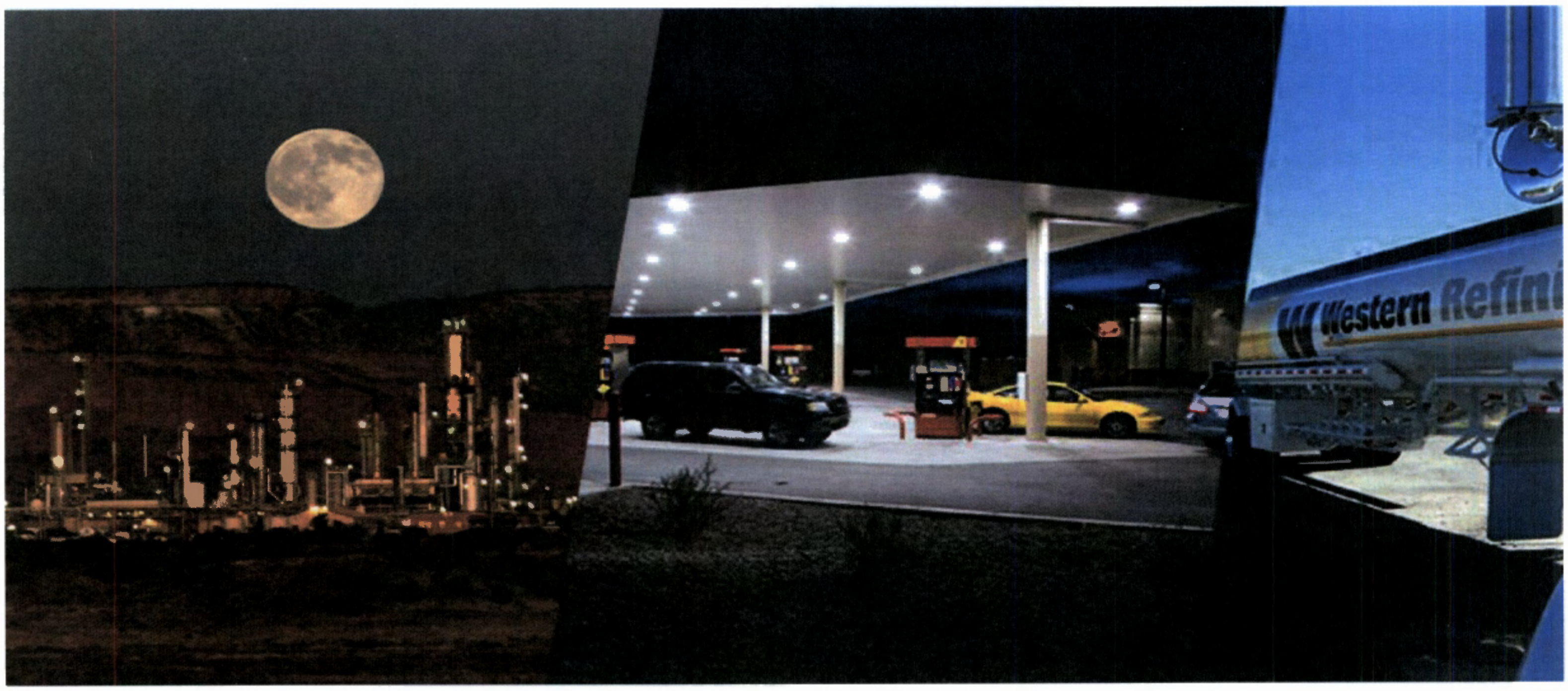
Ed Riege
Environmental Manager

Attachments
cc: K. Van Horn, NMED HWB
C. Chavez, OCD
C. Johnson, WNR

Facility-wide Ground Water Monitoring Work Plan – Revision 1

Gallup Refinery - 2010 Updates

Submitted: November 7, 2011



Submitted by: Western Refining Company
Route 3 Box 7
Gallup, New Mexico 87301

Facility-Wide Ground Water Monitoring Work Plan – Revision 1
Gallup Refinery – 2010 Updates

Western Refining
Gallup, New Mexico

November 7, 2011

Prepared by:

Cheryl Johnson
Environmental Specialist

Reviewed by:

Ed Riege, M.P.H.
Environmental Manager

Executive Summary

This Site-Wide Ground Water Monitoring Work Plan (Plan) has been prepared and revised in response to requirements stated in a letter from the New Mexico Environment Department's Hazardous Waste Bureau dated February 9, 2009 (see Appendix A.)

This Plan has been prepared to collect data that will be used to characterize the nature and extent of potential impacts to ground water at the Gallup Refinery owned by Western Refining ("Gallup Refinery" or "Facility"). The monitoring work plan is also designed to make the Facility quickly aware of any levels of contaminants that exceed compliance standards.

This Plan divides the Facility into two areas for periodic monitoring: the East Side and the West Side. The East Side includes the Refinery Complex, recovery wells from which free products have been principally removed, but continue to be recovered in small quantities, and the northeast set of observation wells and monitoring wells. The West Side includes a cluster of wells in and around the waste water treatment system, boundary wells, shallow monitoring wells in and around land treatment areas, and produced/production water wells. This plan also includes sampling requirements for aeration lagoons, influents, and evaporation ponds located in the West Side. Designated wells and sample points in these two areas will be monitored on an annual, semi-annual, quarterly, monthly, and weekly basis following the procedures presented in this Plan.

Gallup Refinery will periodically review facility-wide monitoring data, and assess the monitoring program presented in this Plan. Revisions to the Plan, as necessary, will then be presented annually for agency review and approval. These revisions may include, but not be limited to, a reduction or change in monitoring locations, monitoring frequency, and/or target chemicals to be analyzed.

We have created a monitoring work plan with quality assurance practices and controls as well as standard procedures for sampling, and a schedule of activities to monitor ground water at select locations of the Gallup Refinery. The persons responsible for the implementation and oversight of this plan are:

Refinery Manager

- Mark B. Turri

Environmental Manager

- Ed Riege

Environmental Specialist

- Cheryl Johnson
- Alvin Dorsey

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APPENDIX

LIST OF FIGURES

LIST OF ACRONYMS

BMP	Best Management Practices
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
EPA	Environmental Protection Agency
GPM	Gallons per minute
HWB	Hazardous Waste Bureau
MTBE	Methyl Tert Butyl Ether
NAPIS	New American Petroleum Institute Separator
NMED	New Mexico Environment Department
OCD	Oil Conservation Division
PPE	Personal protective equipment
VOC	Volatile Organic Compounds
SVOC	Semi-volatile Organic Compounds
SWMU	Solid Waste Management Unit
SWPP	Storm Water Pollution Prevention program
WWTP	Waste water treatment plant

1.0 Introduction

This Facility-Wide Ground Water Monitoring Work Plan (Plan) has been prepared for the implementation of a ground water monitoring program at the Gallup Refinery owned by Western Refining ("Gallup Refinery" or "Facility"). The Plan follows the requirements of the February 9, 2009 letter issued by the New Mexico Environment Department's Hazardous Waste Bureau (NMED/HWB) (a copy of this letter is provided in Appendix A).

1.1 Scope of Activities

This Plan has been prepared to collect data that will be used to characterize the nature and extent of potential impacts to ground water at the Gallup Refinery. The monitoring plan is also designed to make the facility quickly aware of any levels of contaminants that exceed compliance standards.

This Plan divides the Facility into two areas for periodic monitoring: the East Side and the West Side. The East Side includes the Refinery Complex, recovery wells from which small quantities of free products have been continually removed, and the northeast set of observation wells and monitoring wells. The West Side includes a cluster of wells in and around the waste water treatment system, boundary wells, shallow monitoring wells in and around land treatment areas, and produced/production water wells. This plan also includes sampling requirements for aeration lagoons, influents, and evaporation ponds located in the West Side. Designated wells and sample points in these two areas will be monitored on an annual, semi-annual, quarterly, monthly, and weekly basis following the procedures presented in this Plan.

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1.2 Facility Ownership and Operation

This Plan pertains to the Western Refining Southwest Inc. Gallup Refinery located at Exit 39 on Interstate I-40. This refinery is known as the Gallup Refinery and is located at Jamestown New Mexico, approximately 17 miles east of Gallup. Figure 1 shows the regional location of the Gallup Refinery.

The owner is:

Western Refining (Parent Corporation)
123 W. Mills Avenue
El Paso, TX 79901

Operator:	Western Refining Southwest Inc Route 3, Box 7 Gallup, New Mexico 87301	(postal address)
	Western Refining Southwest Inc I-40, Exit 39 Jamestown, New Mexico 87347	(physical address)

SIC code 2911 (petroleum refining) applies to the Gallup Refinery.

The following regulatory identification and permit governs the Gallup Refinery:

U.S. EPA ID Number NMD000333211
OCD Discharge Permit No. GW-032

The facility status is corrective action/compliance. Annual and quarterly ground water sampling is conducted at the facility to evaluate present contamination.

The refinery is situated on an 810 acre irregular shaped tract of land that is substantially located within the lower one quarter of Section 28 and throughout Section 33 of Township 15 North, Range 15 West of the New Mexico Prime Meridian. A small component of the property lies within the northeastern one quarter of Section 4 of Township 14 North, Range 15 West. Figure 2 is a topographic map showing the general layout of the refinery in comparison to the local topography.

2.0 Background Information

2.1 Historical and current site uses

Built in the 1950's, the Gallup Refinery is located within a rural and sparsely populated section of McKinley County in Jamestown New Mexico, 17 miles east of Gallup, New Mexico. The setting is a high desert plain on the western slope of the continental divide. The nearest population centers are the Pilot (formerly Giant) Travel Center refueling plaza, the Interstate 40 highway corridor, and a small cluster of residential homes located on the south side of Interstate 40 approximately 2 miles southwest of the refinery (Jamestown). The surrounding land is comprised primarily of public lands and is used for cattle and sheep grazing at a density of less than six cattle or 30 sheep per section.

The refinery primarily receives crude oil via two 6 inch diameter pipelines; two pipelines from the Four Corners Area enter the refinery property from the north. . In addition, the refinery also receives natural gasoline feed stocks via a 4-inch diameter pipeline that comes in from the west along the Interstate 40 corridor from the Conoco gas plant. Crude oil and other products also arrive at the site via railroad cars. These feed stocks are then stored in tanks until refined into products.

The Gallup Refinery is a crude oil refining and petroleum products manufacturing facility. The Standard Industrial Classification (SIC) code is 2911 and the NAIC is 32411. There are no organic chemicals, plastics, or synthetic fibers manufactured that contribute to our process flow of waste water. We do not manufacture lubricating oils.

The Refinery incorporates various processing units that convert crude oil and natural gasoline into finished products. These units are briefly described as follows.

- The crude distillation unit separates crude oil into various fractions; including gas, naphtha, light oil, heavy oil, and residuum.

- The fluidized catalytic cracking unit (FCCU) dissociates_ long-chain hydrocarbon molecules into smaller molecules, and essentially converts heavier oils into naphtha and lighter oils.

- The alkylation unit combines specific types of hydrocarbon molecules into a high octane gasoline blending component.

- The reforming unit breaks up and reforms low octane naphtha molecules to form high octane naphtha.

- The hydro-treating unit removes undesirable sulfur and nitrogen compounds from intermediate feed stocks, and also saturates these feed stocks with hydrogen to make diesel fuel.

- The isomerization unit converts low octane hydrocarbon molecules into high octane molecules.

- The treater units remove impurities from various intermediate and blending feed stocks to produce finished products that comply with sales specifications.

- The ammonium thiosulfate unit accepts high H2S and ammonia containing gas streams from the Amine and the Sour Water Stripper units, and converts these into a useful fertilizer product, ammonium thiosulfate.

- The sulfur recovery unit converts and recovers various sulfur compounds from the gases and liquids produced in other processing units to create a solid elemental sulfur byproduct. This unit only operates when the ammonium thiosulfate unit is inoperable or cannot handle incoming loads.

As a result of these processing steps, the Refinery produces a wide range of petroleum products including propane, butane, unleaded gasoline, diesel, and residual fuel. In addition to the aforementioned processing units, various other equipment and systems support the operation of the refinery and are briefly described as follows.

Storage tanks are used throughout the refinery to hold and store crude oil, natural gasoline, intermediate feed stocks, finished products, chemicals, and water. These tanks are all located above ground and range in size from 80,000 barrels to less than 1,000 barrels.

Pumps, valves, and piping systems are used throughout the refinery to transfer various liquids among storage tanks and processing units. A railroad spur track and a railcar loading rack are used to transfer feed stocks and products from refinery storage tanks into and out of railcars. Several tank truck loading racks are used at the refinery to load out finished products and also may receive crude oil, other feed stocks, additives, and chemicals.

Gasoline and diesel is delivered to the Pilot Travel Center via tanker truck. An underground diesel pipeline exists between the refinery and the Pilot Travel Center. As the result of an off-refinery release, the pipeline was purged of product, filled with nitrogen and temporarily placed out of service. Western is working with OCD and PSTB to place this line back into service.

A firefighting training facility is used to conduct employee firefighting training. Waste water from the facility, when training is conducted, is pumped into a tank which is then pumped out by a vacuum truck. The vacuum truck pumps the oily water into a process sewer leading to the New API Separator (NAPIS).

The process wastewater system is a network of curbing, paving, catch basins, and underground piping that collects waste water effluent from various processing areas within the refinery and then conveys this wastewater to Tank 35 (T-35) and then to the NAPIS.

T-35 is an equalization tank which handles large process and storm water flows allowing the flow to the NAPIS to be controlled during process and storm water events. The equalization tank is also used to store the waste water for a couple of days if problems are encountered with the downstream equipment, i.e., NAPIS and the benzene strippers and in the future the new DAF and MPPE units. The NAPIS is a two compartment oil water separator. Oil is separated from water based on the principle that, given a quiet surface, oil will float to the water surface where it can be skimmed off. The skimmed slop oil is passed to a collection chamber where it is pumped back into the refinery process. The clarified water is piped to three benzene strippers where benzene is removed. The stripped water flows into the first aeration lagoon. Sludge sinks to the bottom of the NAPIS which is periodically vacuumed out by a vacuum truck and disposed as hazardous waste at an approved landfill or recycled and reused in refineries that have this allowable exemption under RCRA.

At the benzene strippers, ambient air is blown upwards through the falling cascade of clarified waste water as it passes through distillation column packing. Countercurrent desorption of benzene from the water occurs due to the high volume of air passing over the relatively large surface area provided by the packing. The desorbed benzene is absorbed into the air stream and vented to the atmosphere. Effluent from the stripper columns gravity flows through piping into the first aeration lagoon.

At the aeration basins, the treated waste water is mixed with air in order to oxidize any remaining organic constituents and increase the dissolved oxygen concentration available in the water for growth of bacteria and other microbial organisms. The microbes degrade hydrocarbons into carbon dioxide and water. Three 15-hp mechanical aerators provide aeration in the first aeration lagoon with two 15-hp aerators providing aeration in the second lagoon. Effluent from the second aeration lagoon flows onward into the first of several evaporation ponds of various sizes.

At the evaporation ponds, waste water is converted into vapor via solar and mechanical wind-effect evaporation. No waste water is discharged from the refinery to surface waters of the state because all of the waste water evaporates. .

The storm water system is a network of valves, gates, berms, embankments, culverts, trenches, ditches, natural arroyos, and retention ponds that collect, convey, control, treat, and release storm water that falls within or passes through refinery property. Storm water that falls within the processing areas is considered equivalent to process waste water and is sent to T-35, T-27 and T-28 when needed before it reaches the NAPIS, benzene strippers and waste water treatment system for retention in evaporation ponds. Storm water discharge from the refinery is very infrequent due to the arid desert-like nature of the surrounding geographical area.

The Gallup Refinery currently operates under the Multi-Sector Permit 2008 (MSGP-2008). Gallup Refinery submitted a new NOI for coverage under the new MSGP. The refinery maintains a Storm Water Pollution Prevention Plan (SWPPP) that includes Best Management Practices (BMPs) for effective storm water pollution prevention. The refinery has constructed several new berms in various areas and improved outfalls (installed barrier dams equipped with gate valves) to minimize the possibility of potentially impacted runoff leaving the refinery property.

2.2 Potential receptors

Potential receptors at the facility also include those that may arise from future land uses. Currently, these include on-site workers, nearby residents, wildlife, and livestock.[1] The major route to exposure of humans would be from contaminants reaching a drinking water well. Other routes could be from showering, cooking, etc. with contaminated ground water, raising crops and vegetables with contaminated ground water, or getting exposed to or fishing in surface water that has commingled with shallow ground water. Exposure can also occur through contact with soils and/or plants that have become contaminated themselves through contact with contaminated ground water. However, drinking water wells remain the primary route of possible exposure.

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[1] Note: There is extensive and regular patrolling by security personnel of the facility which operates 24-hours – therefore, we can discount the possibility of an inadvertent or deliberate intruder becoming exposed to contamination in groundwater that has reached the surface in some form.

At this time, the nearest drinking water wells are located on-site at the southwest areas of the facility, at depths of approximately 3000 feet. These wells are designated PW-2, PW-3 and PW-4. Figure 3 shows the locations of these wells. These wells are operated by the facility to provide the refinery's process water, drinking water to nearby refinery-owned houses, to the refinery itself, and to the Pilot Travel Center. These wells are monitored and no contaminants have been detected in the deep aquifer that these wells are screened within.

Other than the on-site wells, there are no known drinking water wells located within a 4-mile radius of the site. The nearest drinking water wells that could be used by off-site residents are located to the northwest of the site at a distance slightly greater than 4-miles located within the Navajo community of Iyanbito (shown on the USGS Topographical Map - Gallup Quadrangle (Revised 1980).) These wells are northwest of the South Fork of the Puerco River which heads towards the southwest from immediately north of the facility. As the shallowest ground water will generally flow in the direction of surface water flow, any possible shallow ground water contamination that left the facility either now or in the future would flow towards the southwest after leaving the facility and away from the community of Iyanbito. The Cibola National Forest lies in the south-east direction and there are no wells or residents in this protected area. Boundary monitoring wells along the southwest to northwest perimeter of the facility have not shown any evidence of contaminants having left the facility in shallow ground water.

Artesian conditions at some locations of the site lead to the possibility of ground water emerging onto the surface and thus being able to affect wildlife. No surface water on the site is used for human consumption or primary contact, such as immersion, or secondary contact, such as recreation. The man-made ponds on the site are routinely monitored and are a part of this Plan. Therefore, if they are in contact with shallow ground water that has exhibited elevated levels of contaminants, the Plan will detect any commingling of ground water and surface waters.

Fluctuating ground water elevations can smear contaminants into subsurface soil and rocks, and there is a possibility that plant roots could reach such contaminated soils and bio-concentrate contaminants creating another route of exposure to potential receptors, such as birds and animals that eat the plants. No food crops are currently grown on the site.

2.3 Type and characteristics of the waste and contaminants and any known and possible sources

The types of waste likely include – volatile and semi-volatile organic compounds, primarily hydrocarbons, but could include various other industrial chemicals such as solvents; acids; spent caustic solutions; and heavy metals present in spent chemicals and waste water. These wastes could be in the form of waste water, spent chemicals destined for off-site shipping and disposal packed in drums, sludge, and dry solids. Dry wastes could stem from wind-blown metallic powders used as catalysts, and regular municipal solid wastes stored in covered containers destined for municipal landfills.

Most of the wastes and contaminants that could possibly reach ground water have the characteristic that they would biodegrade and naturally attenuate. However, any heavy metals present in dirt and sludge could possibly leach into ground water and would not attenuate. There is a possibility also that certain long-lived chemicals would not biodegrade, or, if they did, it would be at a very slow pace.

Possible sources include leaks from buried pipes, tanks, surface spills, and historical dumping of wastes in remote areas of the site.

All above-ground large tanks have leak detection or equivalent systems, such as radar gauges. Pumps that could leak hydrocarbons are within containment areas, and all tanks are also within berms to contain spills. The NAPIS has double walls and a leak detection system. This situation did not exist in the past. So, past spills and leaks could be a source of ground water contamination.

Similarly, surface impoundments can serve as a source of possible ground water contamination. In the past, liquids from the railroad rack lagoon in the northeast end of the Facility discharged into a field and drain onto the ground and evaporate – this led to subsurface soil contamination and has recently been cleaned up for a corrective action complete with controls status. Disposal of waste water into open fields is not practiced at the Gallup Refinery.

There are fourteen Sold Waste Management Units (SWMU) identified at the Gallup Refinery, and one closed Land Treatment Area.

<u>RCRA Regulated Units</u>

- Land Treatment Unit

<u>SWMUs</u>

- SWMU 1 – Aeration Basin
- SWMU 2 – Evaporation Ponds
- SWMU 3 – Empty Container Storage Area
- SWMU 4 – Old Burn Pit
- SWMU 5 – Landfill Areas
- SWMU 6 – Tank Farm
- SWMU 7 – Fire Training Area
- SWMU 8 – Railroad Rack Lagoon
- SWMU 9 – Drainage Ditch and the Inactive Landfarm
- SWMU 10 – Sludge Pits
- SWMU 11 – Secondary Oil Skimmer
- SWMU 12 – Contact Wastewater Collection System

- SWMU 13 – Drainage Ditch between North and South Evaporation Ponds
- SWMU 14 – API Separator

Existing ground water monitoring wells effectively surround all these SWMUs.

2.4 Summary of contaminant releases that could contribute to possible ground water contamination

Spills and leaks are known to have occurred on the site in various locations. Although most hydrocarbons are rapidly picked up for recovery, some of the liquids present in a spill enter the subsurface. With precipitation, there is a possibility that some of the contaminants could leach out and reach ground water.

Separate Phase Hydrocarbons (SPH) floating on shallow ground water has been found at the northeast end of the facility. A system of recovery wells has been created and SPH has been pumped out for several years. Recovery through hand-bailing continues on a quarterly basis with the volumes recovered, dropping substantially every year. Trace levels of Benzene have also been found in wells in this area possibly linked to this spilled material.

<u>Recovery Wells</u>

- RW-1
- RW-2
- RW-5
- RW-6

A small tank that held Methyl Tert Butyl Ether (MTBE) has leaked and created a plume of MTBE in the shallow ground water at the northeast end of the refinery. This tank is no longer in service and has been removed. MTBE has not been used at the refinery since April 2006.

A series of monitoring wells at various depths are in place to monitor contaminant plumes from this northeast area that has SPH and MTBE releases. These monitoring wells are designated as follows.

<u>Monitoring Wells</u>

- OW-29
- OW-30
- OW-13
- OW-14
- OW-50
- OW-52

A unit at the southwest end of the Facility that is used to recover oil and recycle this oil back into the process has also – through leakage and spills – caused some MTBE and hydrocarbon contamination in shallow ground water. This unit is known as the New American Petroleum Institute Separator (NAPIS) which was put into service in October 2004. The NAPIS has one up-gradient well – NAPIS-1 and three down-gradient shallow monitoring wells, NAPIS-2, NAPIS-3 and KA-3.

There has always been the possibility that the waste water treatment system of the Facility based at the aeration lagoons (AL-1 and AL-2) and evaporation pond 1 (EP-1) may have leaked contaminants into shallow ground water. The first aeration lagoon, known as AL-1, has received waste water with benzene at levels greater than 0.5 ppm – either through ineffective treatment farther upstream in the process, or through overflows – making these liquids a hazardous waste; however the aeration process and biological action within this lagoon has brought the benzene levels to well below 0.5 ppm and of the order of 0.1 ppm and less.

Monitoring well GWM-1 was installed in July 2004 down gradient of the aeration basins in order to detect potential leakage from the aeration basins, however analyses of ground water samples collected at GWM-1 have indicated only very low concentrations of constituents such as BTEX and methyl tertiary butyl ether (MTBE) that would indicate a potential for historical releases in the area. GWM-1 has shown benzene levels ranging from 0.012 ppm in 2006 to 0.0069 ppm in 2010. Ethyl benzene was detected in July 2008 at 0.0039 ppm to 0.0035 ppm in November of 2010. MTBE was also detected in 2006 at 0.16 ppm with a slight decrease in November of 2010 at 0.062 ppm. The location of this well was determined in the field after mutual consultation by representatives of the refinery, OCD and the drilling contractor.

Two new shallow ground water monitoring wells were installed in the early fall of 2005 near GWM-1 which is located at the southwest corner of EP-1. GWM-2 was placed at the NW corner of EP-2 and GWM-3 was placed at the NW corner of EP-1. GWM-1, 2 and 3 were placed to determine whether any leakage from the lagoons and or evaporation pond is occurring. GWM-2 and GWM-3 are considered dry wells since its installation in 2005. Water was detected in the first quarter of 2008 in GWM-2. Notification was given to NMED and OCD respectively. In 2010 during the second quarter inspections, GWM-2 and GWM-3 were found to have a water level of 1.5 feet in GWM-2 and 0.88 feet in GWM-3. Weekly inspections were done to monitor recharge rate. GWM-2 and GWM-3 have shown non-detectable (<0.001 ppm) levels of constituents such as BTEX and MTBE detected below the EPA RSL standard of 0.012 ppm. GWM-2 and GWM-3 have also shown high levels of fluoride, chloride and sulfate which are above the WQCC and EPA MCL standards. The continued presence of water in GWM-2 and GWM-3 may be attributed to the fluctuation of ground water levels due to the increase in moisture this year. Figure 3 shows the location of all of the active monitoring wells on the Facility.

3.0 Site Conditions

The Gallup Refinery is located within a rural and sparsely populated section of McKinley County. It is situated in the high desert plain on the western flank of the continental divide approximately 17 miles east of Gallup. The surrounding land is comprised primarily of public lands and is used for cattle and sheep grazing at low densities[2].

3.1 Current site topography and location of natural and manmade structures

Local topography consists of a gradually inclined down-slope from high ground in the southeast to a lowland fluvial plain in the northwest. The highest point on refinery property is located at the southeast corner boundary (elevation approximately 7,040 feet) and the lowest point is located at the northwest corner boundary (elevation approximately 6,860 feet). The refinery processing facility is located on a flat man-made terrace at an elevation of approximately 6,950 feet.

3.2 Drainages

Surface water in this region consists of the man-made evaporation ponds and aeration basins located within the refinery, a livestock watering pond (Jon Myer's Pond) located east of the refinery, two small unnamed spring fed ponds located south of the refinery, and the South Fork of the Puerco River and its tributary arroyos. The various ponds and basins typically contain water consistently throughout the year. The South Fork of the Puerco River and its tributaries are intermittent and generally contain water only during, and immediately after, the occurrence of precipitation.

3.3 Vegetation types

Surface vegetation consists of native xerophytic vegetation including grasses, shrubs, small junipers, and some prickly pear cacti. Average rainfall at the refinery is less than 7 inches per year, although it can vary to slightly higher levels elsewhere in the county depending on elevation.

On alluvial fans on valley sides and drainage ways, the existing vegetation is usually alkali sacaton, western wheatgrass, Indian ricegrass, blue grama, bottlebrush squirreltail, broom snakeweed, fourwing saltbush, threeawn, winterfat, mat muhly and spike muhly. On fan remnants on valley sides we usually find blue grama, western wheatgrass, Indian ricegrass, big sagebrush, galleta, bottlebrush squirreltail, fourwing saltbrush, needleandthread, oneseed juniper, sand dropseed, spineless horsebrush, rabbitbrush, and twoneedle pinyon.

3.4 Erosion features

The impacts of historic overgrazing are visible at the north-side of the facility, in the form of arroyos that formed when surface run-off cut through the ground and washed away soils that were not able to hold water with their ground cover lost to overgrazing. Now that the facility is fenced and no livestock grazing occurs on the site, vegetation has

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[2] See, for example, the web site of McKinley County at http://www.co.mckinley.nm.us/

recovered in these areas. With the facility helping to bring back vegetation in its undeveloped areas the formation and deepening of erosion features on its land has decreased.

3.5 Subsurface conditions

3.5.1 Soil types and associations

Most of the soils found at the surface in the locations where wells are located consist of the Mentmore-Gish complex.[3] These soils occur in alluvial fans on valley sides and fan remnants on valley sides. The parent material for these soils is slope and fan alluvium derived from sandstone and shale. These are well drained soils with moderately slow (0.2 in/hr) to slow permeability (0.06 in/hr). In this association, the Gish and similar soils make up about 45 percent, the Mentmore and similar soils 35 percent, and minor components 20 percent. These minor components are - Berryhill and similar soils 10 percent, and Anodize and similar soils 10 percent. The typical profile for these soils is – 0 to 2 inches fine sandy loam, 2-72 inches various kinds of clay loam.

Drill logs for various wells have been provided electronically to the NMED/HWB. From these well logs we can infer that the soils in the subsurface are generally composed of clays starting at the immediate subsurface, interbedded with narrow sand and silt layers. At about 100 to 150 feet, layers of mudstone, sandstone (from the Chinle formation, Petrified Forest group) and siltstone start to appear. Figure 4 shows a generalized relationship of soils in and around the Gallup Refinery.

3.5.2 Stratigraphy

The 810 acre refinery property site is located on a layered geologic formation. Surface soils generally consist of fluvial and alluvial deposits; primarily clay and silt with minor inter-bedded sand layers. Below this surface layer is the Chinle Formation, which consists of low permeability clay stones and siltstones that comprise the shale of this formation. As such, the Chinle Formation effectively serves as an aquiclude. Inter-bedded within the Chinle Formation is the Sonsela Sandstone bed, which represents the uppermost potential aquifer in the region.

The Sonsela Sandstone bed lies within and parallels the dip of the Chinle Formation. As such, its high point is located southeast of the refinery and it slopes downward to the northwest as it passes under the refinery. Due to the confinement of the Chinle Formation aquiclude, the Sonsela Sandstone bed acts as a water-bearing reservoir and is artesian at its lower extremis. Artesian conditions exist through much of the central and western portions of the refinery property.

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[3] Soil Survey of McKinley County Area, New Mexico, McKinley County and Parts of Cibola and San Juan Counties, Natural Resources Conservation Service (NRCS), US Department of Agriculture, available at - http://soildatamart.nrcs.usda.gov/Manuscripts/NM692/0/McKinley.Area%20NM.pdf

3.5.3 Presence and flow direction of ground water

Ground water flow within the Chinle Formation is extremely slow and typically averages less than 10^{-10} centimeters per second (less than 0.01 feet per year). Ground water flow within the surface soil layer above the Chinle Formation is highly variable due to the presence of complex and irregular stratigraphy; including sand stringers, cobble beds, and dense clay layers. As such, hydraulic conductivity may range from less than 10^{-2} centimeters per second in the gravelly sands immediately overlying the Chinle Formation up to 10^{-8} centimeters per second in the clay soil layers located near the surface.

Shallow ground water located under refinery property generally flows along the upper contact of the Chinle Formation. The prevailing flow direction is from the southeast and toward the northwest. In the past, a subsurface ridge has been identified that was thought to deflect some flow in a northeasterly direction in the vicinity of the refinery tank farm. This is not clear from the present data.

4.0 Investigation Methods

The purpose of this section is to describe the types of activities that will be conducted and the methods that will be used as part of this Plan. Appendix B provides more detailed information on actual sampling procedures that will be used.

4.1 Ground water Sampling Methodology

All monitoring wells scheduled for sampling during a ground water sampling event will be sampled within 15 working days of the start of the monitoring and sampling event.

Appendix C provides details of the wells to be sampled – including their date of establishment, ground elevation, top of casing elevation, well casing stick-up length, well depth, well casing diameter, screened interval, screen length, and stratigraphic units.

4.1.1 Well Gauging

At the beginning of each quarterly, semi-annual, or annual sampling event, all monitoring and recovery wells listed in Appendix A - Table 1 Ground Water Monitoring Schedule, will be gauged to record the depth to SPH (if present), the depth to water, and the total depth of the well. The gauging will be performed using an oil/water interface probe attached to a measuring tape capable of recording measurements to the nearest 0.01 foot. All measurements will be made relative to the same datum for all wells.

Gauging measurements will be recorded on a field gauging form. Data obtained from the gauging will be reported in the annual ground water monitoring report. The data will be used to develop groundwater contour maps and SPH thickness isopleths which will also be included in the annual report.

4.1.2 Well Purging

Each monitoring well will be purged by removing ground water prior to sampling in order to ensure that formation water is being sampled. Generally, at least three well volumes (or a minimum of two if the well has low recharge) will be purged from each well prior to sampling. Field water quality measurements must stabilize for a minimum of three consecutive readings before purging will be discontinued. Field water quality measurements will include pH, electrical conductivity, temperature, and dissolved oxygen (%). Field water quality measurement stability will be determined when field parameter readings stabilize to within ten percent between readings for three consecutive measurements. Once the readings are within ten percent, purging will stop and the well is ready for sample collection. The volume of ground water purged, the instruments used, and the readings obtained at each interval will be recorded on the field-monitoring log. Well purging and sampling will be performed using disposable bailers and/or appropriately decontaminated sampling pumps.

4.2 Ground water Sample Collection

Ground water samples will be obtained from each well within 24 hours of the completion of well purging. 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 are described in more detail in Appendix B. Decontamination procedures for reusable water sampling equipment are described in Appendix B.

All purged ground water and decontamination water from monitoring wells will be disposed of in the refinery waste water treatment system upstream of the API Separator. The procedures for disposing materials are described in Appendix B.

Ground water samples intended for metals analysis will be submitted to the laboratory as total metals samples. Ground water samples obtained for dissolved metals analysis will be filtered using disposable filters with a 0.45 micrometers mesh size.

4.2.1 Sample Handling

All sample containers are supplied by the contracted analytical laboratory and shipped to Western in sealed coolers. Chemical preservation is also provided by the laboratory through pre-preserved bottleware. Collection of containerized ground water samples are in the order of most volatile to least volatile, such as: VOCs, SVOCs, Metals, phenols, cyanide, sulfate, chloride, and nitrates. 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 in Appendix B of this Plan, will be followed for all samples collected. All samples will be submitted to the laboratory as soon as possible to allow the laboratory to conduct the analyses within the method holding times. Details of the general sample handling procedures are provided in Appendix B.

The following shipping procedures will be performed during each sampling event:

- 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.
- Each cooler or other container will be delivered directly to the analytical laboratory.
- Glass bottles will be separated in the shipping container by cushioning material to prevent breakage.
- Plastic containers will be protected from possible puncture during shipping using cushioning material.
- The chain-of-custody form and sample request form will be shipped inside the sealed storage container to be delivered to the laboratory.
- Signed and dated chain-of-custody seals will be applied to each cooler prior to transport of samples from the site.

4.3 Analytical Methods

Ground water and surface water samples collected during the monitoring events will be analyzed for the constituents listed in Appendix D, Table 1. In addition, for various locations the list of metals is modified to either be the Skinner list of the NM Water Quality Control Commission list. Appendix D, Table 1 provides a summary of target analytes for each EPA analytical method.

4.4 Quality Assurance Procedures

Contract analytical laboratories will maintain internal quality assurance programs in accordance with EPA and industry accepted practices and procedures. At a minimum, the laboratories will use a combination of standards, blanks, surrogates, duplicates, matrix spike/matrix spike duplicates (MS/MSD), blank spike/blank spike duplicates (BS/BSD), and laboratory control samples to demonstrate analytical QA/QC. The laboratories will establish control limits for individual chemicals or groups of chemicals based on the long-term performance of the test methods. In addition, the laboratories will establish internal QA/QC that meets EPA's laboratory certification requirements. The specific procedures to be completed are identified in the following sections.

4.4.1 Equipment Calibration Procedures and Frequency

The laboratory's equipment calibration procedures, calibration frequency, and calibration standards will be in accordance with the EPA test methodology requirements and documented in the laboratory's quality assurance and SOP manuals. All instruments and equipment used by the laboratory will be operated, calibrated, and maintained according to the manufacturers' guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance will be kept on file at the laboratory.

4.4.2 Field QA/QC Samples

Field duplicates and trip blanks may be obtained for quality assurance during sampling activities. The samples will be handled as described in Section 4.4.3.

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 de-ionized water placed in an appropriate sample container. Trip blanks will be analyzed at a frequency of one for each shipping event involving twenty or more samples. Generally, a trip blank will only be placed in one of the containers, if more than one container is used to ship the set of samples.

4.4.3 Laboratory QA/QC Samples

Analytical procedures will be evaluated by analyzing reagent or method blanks, surrogates, matrix spike/matrix spike duplicates (MS/MSDs), blank spike/blank spike duplicates (BS/BSDs) and/or laboratory duplicates, as appropriate for each method. The laboratory QA/QC samples and frequency of analysis to be completed will be documented in the cited EPA or other test methodologies. At a minimum, the laboratory will analyze laboratory blanks, MS/MSDs, BS/BSDs and laboratory duplicates at a frequency of one in twenty for all batch runs requiring EPA test methods and a frequency of one in ten for non-EPA test methods. Laboratory batch QA/QC samples will be project specific.

4.4.4 Laboratory Deliverables

The analytical data package will be prepared in accordance with EPA-established Level II analytical support protocol which will include:

- Transmittal letter, including information about the receipt of samples, the testing methodology performed, any deviations from the required procedures, any problems encountered in the analysis of the samples, any data quality exceptions, and any corrective actions taken by the laboratory relative to the quality of the data contained in the report;
- Sample analytical results, including sampling date; date of sample extraction or preparation; date of sample analysis; dilution factors and test method identification; water sample results in consistent units (milligrams per liter or micrograms per liter (µg/L)); and detection limits for undetected analytes. Results will be reported for all field samples, including field duplicates and blanks, submitted for analysis;
- Method blank results, including reporting limits for undetected analytes;
- Surrogate recovery results and corresponding control limits for samples and method blanks (organic analyses only);

- Laboratory duplicate results for inorganic analyses, including relative percent differences and corresponding control limits;
- Sample chain-of-custody documentation;
- Holding times and conditions;
- Conformance with required analytical protocol(s);
- Instrument calibration;
- Blanks;
- Detection/quantitative limits;
- Recoveries of surrogates and/or matrix spikes (MS/MSDs);
- Variability for duplicate analyses;
- Completeness;
- Data report formats;

Data deliverables provided by the laboratory that include analysis of organic compounds will also include the following:

- A cover letter referencing the procedure used and discussing any analytical problems, deviations, and modifications, including signature from authority representative certifying to the quality and authenticity of data as reported;
- A report of sample collection, extraction, and analysis dates, including sample holding conditions,
- Tabulated results for samples in units as specified, including data qualification in conformance with EPA protocol, and definition of data descriptor codes;
- Final extract volumes (and dilutions required), sample size, wet-to-dry weight ratios, and instrument practical detection/quantitative limit for each analyte,
- Analyte concentrations with reporting units identified, including data qualification and a description of the qualifiers,
- Quantification of analytes in all blank analyses, as well as identification of method blank associated with each sample,
- Recovery assessments and a replicate sample summary, including all surrogate spike recovery data with spike levels/concentrations for each sample and all MS/MSD results (recoveries and spike amounts), and

4.4.5 Review of Field and Laboratory QA/QC Data

The sample data, field, and laboratory QA/QC results will be evaluated for acceptability with respect to the data quality objectives (DQOs). Each group of samples will be compared with the DQOs and evaluated using data validation guidelines contained in EPA guidance documents: Guidance Document for the Assessment of RCRA Environmental Data Quality, National Functional Guidelines for Organic Data Review, and Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, and the most recent version of SW-846, and industry-accepted QA/QC methods and procedures.

The laboratory will notify the Gallup Refinery Project Manager of data quality exceptions within one business day of identifying the data quality exception in order to allow for sample re-analysis, if possible. The Gallup Refinery Project Manager will contact NMED within one business day of receipt of laboratory notification of data quality exceptions in order to discuss the implementations and determine whether the data will still be considered acceptable, or if sample re-analysis or re-sampling is necessary.

4.4.6 Blanks, Field Duplicates, Reporting Limits and Holding Times

4.4.6.1 Blanks

The analytical results of field blanks and field rinsate blanks will be reviewed to evaluate the adequacy of the equipment decontamination procedures and the possibility of cross-contamination caused by decontamination of sampling equipment. The analytical results of trip blanks will be reviewed to evaluate the possibility for contamination resulting from the laboratory-prepared sample containers or the sample transport containers. The analytical results of laboratory blanks will be reviewed to evaluate the possibility of contamination caused by the analytical procedures. If contaminants are detected in field or laboratory blanks, the sample data will be qualified, as appropriate.

4.4.6.2 Field Duplicates

Field duplicates will consist of two samples either split from the same sample device or collected sequentially. Field duplicates will not be collected on a routine basis, as there is sufficient data to establish outliers or suspect results through a trends analysis. Field duplicate samples may be collected for confirmation if a sample establishes the presence of a contaminant in an unexpected location, such as a deep aquifer, or at unexpected levels.

4.4.6.3 Method Reporting Limits

Method reporting limits for sample analyses will be established at the lowest level practicable for the method and analyte concentrations and will not exceed ground water or surface water cleanup standards and screening levels. Detection limits that exceed established standards or screening levels and are reported as "not detected" will be considered data quality exceptions and an explanation for its acceptability for use will be provided.

4.4.6.4 Holding Times

Per EPA protocol the sampling, extraction, and analysis dates will be reviewed to confirm that extraction and analyses were completed within the recommended holding times. Appropriate data qualifiers will be noted if holding times are exceeded.

4.4.7 Representativeness and Comparability

4.4.7.1 Representativeness

Representativeness is a qualitative parameter related to the degree to which the sample data represent the relevant specific characteristics of the media sampled. Procedures will be implemented to assure representative samples are collected and analyzed, such as repeated measurements of the same parameter at the same location over several distinct sampling events. Any procedures or variations that may affect the collection or analysis of representative samples will be noted and the data will be qualified.

4.4.7.2 Comparability

Comparability is a qualitative parameter related to whether similar sample data can be compared. To assure comparability, analytical results will be reported in appropriate units for comparison with other data (past studies, comparable sites, screening levels, and cleanup standards), and standard collection and analytical procedures will be implemented. Any procedure or variation that may affect comparability will be noted and the data will be qualified.

4.4.8 Laboratory Reporting, Documentation, Data Reduction, and Corrective Action

Upon receipt of each laboratory data package, data will be evaluated against the criteria outlined in the previous sections. Any deviation from the established criteria will be noted and the data will be qualified. A full review and discussion of analytical data QA/QC and all data qualifiers will be submitted as appendices or attachments to the ground water monitoring reports. Data validation procedures for all samples will include checking the following, when appropriate:

- Holding times
- Detection limits
- Field equipment rinsate blanks
- Field blanks
- Field Duplicates
- Trip blanks
- Reagent blanks
- Laboratory duplicates
- Laboratory blanks
- Laboratory matrix spikes
- Laboratory matrix spike duplicates
- Laboratory blank spikes
- Laboratory blank spike duplicates
- Surrogate recoveries

If significant quality assurance problems are encountered, appropriate corrective action will be implemented. All corrective action will be reported and the corrected data will be qualified.

5.0 Monitoring and Sampling Program

The primary objective of ground water monitoring is to provide data which will be used to assess ground water quality at and near the Facility. Ground water elevation data will also be collected to evaluate ground water flow conditions. The ground water monitoring program for the Facility will consist of sample collection and analysis from a series of monitoring wells, recovery wells, outfalls, and evaporation pond locations.

The monitoring network is divided into two investigation areas (East Side and West Side). The sampling frequency, analyses and target analytes will vary for each investigation area and well/outfall/evaporation pond location. The combined data from these investigation areas will be used to assess ground water quality beneath and immediately down-gradient of the Facility, and evaluate local ground water flow conditions.

Samples will not be collected from monitoring wells that have measurable SPH. For wells that are purged dry, samples will be collected if recharge volume is sufficient for sample collection within 24 hours. Wells not sampled due to insufficient recharge will be documented in the field log.

The following sections outline the monitoring program for each investigation area.

5.1 East Side

5.1.1 Sampling Locations

The location of the East Side monitoring and recovery wells are shown in Figure 3. The following wells will be sampled (as described in Appendix D, Table 1) within the East Side area:

Recovery wells

- RW-1
- RW-2
- RW-5
- RW-6

Monitoring wells

- OW-29
- OW-30
- OW-13
- OW-14
- OW-50
- OW-52

5.2 West Side

5.2.1 Sampling Locations

The locations of wells on the West Side are shown in Figure 3.

The following wells, outfalls, and ponds will be sampled (as described in Appendix D, Table 1) within the West Side area:

(Note: these outfalls are from one section of the waste water treatment system to another – they do not discharge to any location outside the facility.)

Monitoring wells

- NAPIS 1
- NAPIS 2
- NAPIS 3
- KA-3
- GWM-1
- GWM-2
- GWM-3
- SMW-2
- SMW-4
- MW-1
- MW-2
- MW-4
- MW-5
- OW-1
- OW-10
- OW-11
- OW-12
- BW-1A
- BW-1B
- BW-1C
- BW-2A
- BW-2B
- BW-2C
- BW-3A
- BW-3B
- BW-3C
- PW-2
- PW-3
- PW-4

Outfalls

- Influent to AL-1
- Influent to AL-2

- Influent to EP-2
- AL2 to EP-1
- Pilot Effluent (Travel Center)
- NAPIS Effluent
- Boiler Water Inlet to EP-2

Ponds

- EP-1
- EP-2
- EP-3
- EP-4
- EP-5
- EP-6
- EP-7
- EP-8
- EP-9
- EP-11
- EP-12A
- EP-12B
- Any temporary pond containing liquid

Containment

- NAPIS secondary containment (Leak Detection Units -LDU)
    - East LDU
    - West LDU
    - Oil Sump LDU

5.3 Monitoring Program Revisions

Upon review of the analytical results from the monitoring events under this Plan, historic facility-wide monitoring data, available soil boring data, and other related information Western Refining will assess the monitoring program presented in this Plan. Revisions to the Plan, as necessary, will then be presented for agency review and approval on an annual basis. These revisions may include, but not be limited to, a reduction or change in monitoring locations, monitoring frequency, and/or target analytes.

Appendix A: Letter from NMED/HWB February 9

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

BILL RICHARDSON
Governor

DIANE DENISH
Lieutenant Governor

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us

RON CURRY
Secretary

JON GOLDSTEIN
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

February 9, 2009

Mr. Ed Riege
Environmental Superintendent
Western Refining, Southwest Inc., Gallup Refinery
Route 3, Box 7
Gallup, New Mexico 87301

RE: FACILITY WIDE GROUNDWATER MONITORING WORK PLAN
WESTERN REFINING COMPANY, SOUTHWEST, INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-GRCC-09-001

Dear Mr. Riege:

The New Mexico Environment Department (NMED) requires Western Refining Company, Southwest Inc., Gallup Refinery (Permittee) to submit a Facility Wide Groundwater Monitoring Plan (Monitoring Plan). The purpose of this Monitoring Plan is to characterize the nature and extent of groundwater contamination at, and migrating from the facility and provide one plan that contains all groundwater monitoring activities that will satisfy both NMED and the New Mexico Energy Minerals and Natural Resource Department Oil Conservation Division (OCD) requirements. The Monitoring Plan must be revised on an annual basis to accommodate monitoring changes at the facility and to alleviate the need to update NMED and OCD permits.

Currently, the groundwater monitoring requirements are established in the OCD Discharge Plan dated August 23, 2007, specifically items 16 (the Sampling Schedule Resulting from historical New API Separator Spills), 19, 20 (A & B), and 25.

The Permittee must use Attachment 1 of this letter as a general guide for preparing the Monitoring Plan. The Monitoring Plan must include, but is not limited to the following:

a. A general description of the hydrogeologic system beneath the facility

b. A section or table to include, but not limited to, a description of all existing monitoring wells, recovery wells, and any other required sampling locations specifying their exact location, date the wells were installed including ground elevation, top of casing elevation, well casing stick up length, well depth, well casing diameter, screened interval, screen length, and stratigraphic unit(s) intersected by the well screen.

c. The initial submittal must include a section or appendix that includes all well construction diagrams.

d. A facility map showing all monitoring well locations. This map must be revised as necessary to reflect any well additions and well abandonments that occur during the year.

e. The current groundwater monitoring/sampling requirements found in the OCD Discharge Plan (items 16 (the Sampling Schedule Resulting from historical New API Separator Spills), 19, 20 (A & B), and 25)

f. The sampling requirements must include the proposed frequency of sampling, sampling methodology, field water quality parameters to be measured, and chemical analytical methods.

g. A description of all sampling methods and procedures that will be applied during each monitoring event.

h. Identification of all field instruments proposed for use as well as calibration procedures.

The Permittee must continue to submit their Annual Groundwater Monitoring Report to NMED and the OCD by September 1 of each subsequent year to include the specified items found in the OCD Discharge Permit and describe all groundwater monitoring activities. The annual updates to this Monitoring Plan must be submitted by April 1 of each year beginning in 2010, so that any changes will be implemented prior to the groundwater monitoring summaries provided in the Annual Groundwater Monitoring Report.

Once this Monitoring Plan is approved, this plan will include and replace the requirements of the OCD Discharge Plan. The information gathered per the Monitoring Plan will then be included in the Annual Groundwater Monitoring Report. The Annual Groundwater Monitoring Report is considered a Periodic Monitoring Report for the purpose of compliance with NMED requirements and the OCD Discharge Plan items 20 (A and B) and 25. Attachment 2 provides general guidance for the preparation of Periodic Monitoring Reports.

The Permittee must submit the Monitoring Plan to NMED and the OCD on or before May 11, 2009. If you have questions regarding this letter please contact Hope Monzeglio of my staff at 505-476-6045.

Sincerely,

John E. Kieling
Program Manager
Permits Management Program
Hazardous Waste Bureau

cc: D. Cobrain NMED HWB
H. Monzeglio, NMED HWB
W. Price, OCD
B. Jones, OCD
G. Rajen, Gallup
File: Reading File and GRCC 2009 File
HWB-GRCC-09-001

ATTACHMENT 1
GENERAL GUIDE FOR COMPOSING THE MONITORING PLAN

- An Executive Summary (Abstract) must be included to provide a brief summary of the purpose and scope of the Monitoring Plan. This section must include the facility name and portions of the facility including any areas of concern (AOCs), Solid Waste Management Units (SWMUs) or other locations that the Monitoring Plan will be addressing.

- A Table of Contents must be included that lists all text sections, subsections, tables, figures, and appendices or attachments included in the Monitoring Plan.

- An Introduction must be included in the Monitoring Plan to include general information on the current facility and a brief description of the purpose of the proposed groundwater monitoring and the types of activities that will be conducted.

- A Background section must be added that briefly describes relevant general background information, including historical site uses, potential receptors, the type and characteristics of the waste or contaminants and any known and possible source(s), and a summary of the history of contaminant releases which could be contributing to groundwater contamination.

- The Permittee must include a Site Conditions section to provide a detailed description of current site topography and locations of natural features and manmade structures. This section must include a description of drainages, vegetation types, erosional features, and current site uses, in addition to, descriptions of features located in surrounding sites (i.e. SWMUs, AOCs) that may have an impact on the subject site regarding recharge sediment transport, surface water runoff, or contaminant fate and transport. A description of subsurface conditions must also be included that provides a discussion of the conditions observed during previous subsurface investigations, including but not limited to soil types and associations, stratigraphy, and the presence and flow direction of groundwater.

- A Scope of Activities section must include a list of all anticipated activities to be performed during the facility-wide groundwater monitoring sampling events.

- A section must be included that provides a description of all anticipated locations to be sampled and methods for conducting the activities during the facility wide groundwater monitoring events. This section must include, but is not limited to, descriptions of sampling methods, sample handling procedures, procedures for collecting field water quality measurements, any field equipment and calibration procedures, water level measurement, purging activities, and decontamination procedures. This section must also address Investigation Derived Waste (IDW).

- The Permittee must include a Schedule section that proposes a schedule for the groundwater monitoring.

- Tables, Figures, and Appendices must be included.

Appendix B: Gallup Field Sampling Collection and Handling Standard Procedures

Field Data Collection: Elevation and Purging

All facility monitoring wells and recovery wells are gauged as required through the year. Gallup does not have any recovery well pumps that need to be shut off and removed prior to water elevation measurements.

All water/product levels are measured to an accuracy of the nearest 0.01 foot using an electrical conductivity based meter, the Heron Instruments 100 ft. DipperT electric water depth tape complying with US GGG-T-106E, EEC Class II. After determining water levels, well volumes are calculated using the appropriate conversion factors for a given well based on its internal diameter. Volume is equal to the height of the liquid column times the internal cross-sectional area of the well.

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Generally, at least three well volumes (or a minimum of two if the well has low recharge) are purged from each well prior to sampling. Field water quality parameters measured during purging (pH, electrical conductivity, temperature, and dissolved oxygen), must stabilize to within 10% for a minimum of three consecutive measurements before collection of ground water samples from each well.

Before sample collection can begin, the water collected from each monitoring well must be fresh aquifer water. Well evacuation replaces stagnant well water with fresh aquifer water. The water level in the well, total depth of well and thickness of floating product (if any) will be measured using the DipperT electric water depth tape. If product is present, a ground water sample is typically not obtained.

If a well is pumped or bailed dry before two or three well volumes can be evacuated, it requires only that sufficient time elapse for an adequate volume of water to accumulate for the sampling event. The first sample will be tested for pH, temperature, specific conductivity and dissolved oxygen (%). The well will be retested for pH, temperature, specific conductivity and dissolved oxygen (%) after sampling as a measure of purging efficiency and as a check on the stability of the water samples over time. All well evacuation information will be recorded in a log book.

Wells MW-1, MW-2, MW-4, MW-5, BW-1C, BW-2A, BW-2B, BW-3B, SMW-4, OW13, OW14, OW29 and OW30 are each equipped with a dedicated electrical pump. The remaining wells are purged using a portable Grundfos pump. Recovery wells and NAPIS-1, NAPIS-2, NAPIS-3 and KA-3 are hand-bailed as well as GWM1 and GWM2 and GWM3 are hand-bailed if the presence of water is detected.

Purged well water from wells is collected in fifty five gallon drums and disposed of upstream of the NAPIS. The water is treated in the refinery's waste water treatment system.

Sampling Equipment at Gallup

The following sampling equipment is maintained at Gallup and used by the sampling personnel:

- Heron Instruments 100 ft. DipperT electric water depth tape complying with US GGG-T-106E, EEC Class II.

- Pall Corporation Acro 50A 0.45 micron disposable filter used with 60 ml. disposable syringe for filtering water in the field.

- YSI pH/Conductivity meter Model 63, calibrated with a one-point, two-point, or three-point calibration procedure using pH standards of 7, 4 and 10.

- IQ Scientific Instruments, pH/Temperature/Conductivity/ Dissolved Oxygen meter, Model IQ1806LP.

- Grundfos 2-inch pumps with Grundfos 115-volt AC–to-Dc converter.

Calibration and maintenance procedures will be performed according to the manufacturer's specifications.

Order of Collection

Samples will be collected in the order listed below:

Parameter	Bottle Type
VOC, SVOC	40 ml VOA vials, (H2SO4)
TOC	1 liter glass jar, H2SO4
Extractable Organics	1 liter glass jar with Teflon™ cap
Metals* Total and Dissolved	500 ml, 125 ml plastic, HNO3
Phenols, Cyanide	1 liter glass jar
Chloride, Sulfate, Nitrates	1 liter plastic, no preservative

* Prefiltration bottle for dissolved metals which is subsequently filtered and transferred to a pint plastic bottle with HNO3.

Filtration

Ground water samples are filtered prior to *dissolve metals* analysis. For dissolved metals, sample water is poured into a jar and then extracted with a syringe. The syringe is then used to force the sample water through a 0.45 micron pore filter paper filter into the proper sample bottle to collect dissolved metals samples. Filtration must be performed within two hours of sample collection. Pour the filtrate into a sample bottle containing HNO3 preservative.

For samples destined for *total metals* analysis, do not filter the sample, and preserve with HNO_3 to pH <2 in the field.

Gallup sampling personnel carry a cell phone when gathering ground water and other water samples. While sampling procedures are generally well known and the appropriate sample bottles are ordered to match each sampling event, occasional questions do arise from unforeseen circumstances which may develop during sampling. At such times, sampling personnel contact Hall Environmental Analytical Laboratory to verify that sampling is correctly performed.

Sample Handling Procedures

At a minimum, the following procedures will be used when collecting samples:

- Neoprene, nitrile, or other protective gloves will be worn when collecting samples. New disposable gloves will be used to collect each sample.
- All samples collected for chemical analysis will be transferred into clean sample containers supplied by the analytical laboratory. The sample container will be clearly marked. 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.
- Sample labels and documentation will be completed for each sample.

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 in Section 4.2.1 of this Plan, will be followed for all samples collected. All samples will be submitted to the laboratory to allow the laboratory to conduct the analyses within the method holding times.

General Well Sampling Procedures

For safety protection and sampling purity, rubber gloves are worn and changed between each activity.

Prepare for sampling event by making out sample bottle labels and have bottles separated into plastic bags for each well to be sampled and placed in an ice chest ready to take into the field. Bring along a note book and sample log. Document weather conditions, sample date and time. Fill in label with location, date, time, analysis, preservative, and your name. Start sampling by adjusting converter speed for each well. Affix sample label and fill bottle according to lab instructions. For samples intended for VOC analysis, use bottles with septa lids, fill bottle to neck and add final amount of water with cap to form meniscus. Turn bottles upside down to examine for bubbles, if bubbles are detected in the vial, repeat collection procedure.. If no bubbles show, secure lids and pack in bubble wrap and place in cooler until sampling is completed.

Decontaminate equipment that is not dedicated for use in a particular well.

Refrigerate completed samples until shipping to lab. Be sure to check holding times and arrange for appropriate shipping method.

Be sure that the field effort is adequately staffed and equipped. Check QC requirements before departing—QC samples require additional equipment and supplies.

Surface Water Sample Collection

At the evaporation ponds, samples will be collected as a grab sample at the pond edge near the inlets. This location will be noted in the field notebooks. The sampler will avoid disturbing sediment and gently allow the sample container to fill making sure that undue disturbance does not allow volatile contaminants to be lost. The sample bottle will be used for the sample collection in a shallow location near the bank. If a separate bottle/ bailer is used to refill the sample container, this will be duly noted in the field log books. The decision to use a separate bottle/bailer will be made, if at all, by the sampler and the reasons for doing so will be noted in the field log book.

Upon arrival at the field site, the sampler will set out safety equipment such as traffic cones and signs (if required). The vehicle will be parked a sufficient distance away so as to prevent sample contamination from emissions. Appropriate sample containers and gloves must be used for the type of analyses to be performed.

Decontamination Procedures

The objective of the decontamination procedures is to minimize the potential for cross-contamination

The majority of field equipment used for ground water sampling will be disposable and, therefore, not require decontamination. In order to prevent cross-contamination, field equipment that comes into contact with water or soil will be decontaminated between each sampling location. The decontamination procedure will consist of washing the equipment with a non-phosphate detergent solution (examples include Fantastik™, Liqui-Nox®), followed by two rinses of distilled water and air dried.

Decontamination water and rinsate will be contained and disposed of the same way as purge water, as described in Section 4.2. Decontamination procedures and the cleaning agents used will be documented in the daily field log.

Field Equipment Calibration Procedures

Field equipment requiring calibration will be calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures. Calibration checks will be conducted daily and the instruments will be recalibrated if necessary. Calibration measurements will be recorded in the daily field logs.

If field equipment becomes inoperable, its use will be discontinued until the necessary repairs are made. A properly calibrated replacement instrument will be used in the interim. Instrumentation used during sampling events will be recorded in the daily field logs.

Collection and Management of Investigation Derived Waste

Investigation derived waste (IDW) generated during each groundwater sampling event may include purge water, decontamination water, excess sample material, and disposable sampling equipment. All water from all wells generated during sampling and decontamination activities will be temporarily stored in labeled 55-gallon drums until disposed in the refinery wastewater treatment system upstream of the API separator. All other solid waste generated during sampling activities (including sampling gloves, tubing, etc) will be disposed of with the Refinery's general municipal waste.

Documentation of Field Activities

Daily field activities, including observations and field procedures, will be recorded using indelible ink on field sampling forms. The original field forms will be maintained at Gallup Refinery. Completed forms will be maintained in a bound and sequentially numbered field file for reference during field activities. The daily record of field activities will include the following information:

- Well ID/ Evaporation pond location/ Outfall
- Date
- Start and finish sampling time
- Field team members, including visitors
- Weather conditions
- Daily activities and times conducted
- Observations
- Record of samples collected with sample designations
- Photo log (if needed)
- Field monitoring data, including health and safety monitoring (if needed)
- Equipment used and calibration records, if appropriate
- List of additional data sheets and maps completed
- An inventory of the waste generated and the method of storage or disposal
- Signature of personnel completing the field record

Sample Custody

All samples collected for analysis will be recorded in the field report or data sheets. Chain-of-custody forms will be completed at the end of each sampling day, prior to the transfer of samples off site, and will accompany the samples during shipment to the laboratory. A signed and dated custody seal will be affixed to the lid of the shipping container. 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. Gallup Refinery will maintain copies of all chain –of-custody forms generated as part of sampling activities. Copies of the chain-of-custody records will be included with all draft and final laboratory reports submitted to NMED and OCD.

Appendix C – A revised Well Data Summary Table was submitted to NMED-HWB and was issued a Notice of Disapproval on August 22, 2011. A work plan as requested by NMED-HWB addressing comments listed in the NOD will be submitted on or before December 30, 2011.

WELL DATA 2010 SUMMARY TABLE
2010 ANNUAL GROUNDWATER DISCHARGE REPORT

Date of Installation	Well ID Number	Measure-ment Date	Casing Dia-meter (Inch)	A Ground Level Elevation (ft)****	Well Casing Rim Elevation (ft)**	Stick-up length (in)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thick-ness (ft)	C Depth to Water	D = A-C Ground-water Elevation (ft)	= 0.8 B + D Corrected Water Table Elevation (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists	Purge Volume = 3 Well [illegible] (gal)
11/10/2003	BW-1A	7/14/2010	2.00	6,876.73	6,876.73	52.50	6,836.73	40*	DRY	NA	DRY	DRY	NA	30 - 35	Chinle/alluvium	NA
10/28/2003	BW-1B	7/14/2010	2.00	6,876.91	6,876.91	28.63	6,811.71	67.55**	DRY	NA	DRY	DRY	NA	54.6 - 64.6	Chinle/alluvium	NA
11/10/2003	BW-1C	7/14/2010	2.00	6,876.75	6,876.75	54.25	6,719.75	157.0	0.00	0.00	7.19	6,869.56	NA	125 -135	Sonsela sandstone	73
11/10/2003	BW-2A	7/14/2010	2.00	6,874.72	6,874.72	51.25	6,809.22	65.50	0.00	0.00	32.17	6,842.55	NA	55 - 65	Chinle/alluvium	16
10/28/2003	BW-2B	7/14/2010	2.00	6,874.58	6,874.58	54.00	6,784.08	90.50	0.00	0.00	28.13	6,846.45	NA	80 - 90	Sonsela sandstone	30
10/28/2003	BW-2C	7/14/2010	2.00	6,875.40	6,875.40	35.50	6,724.40	151.0	0.00	0.00	20.80	6,854.60	NA	139.5 - 149.5	Sonsela sandstone	64
6/15/2004	BW-3A	7/14/2010	2.00	6,878.22	6,878.22	36.00	6,828.22	52.60	DRY	NA	DRY	DRY	NA	39.5 - 49.5	Chinle/alluvium	DRY
10/15/2003	BW-3B	7/14/2010	2.00	6,878.79	6,878.79	37.75	6,803.79	75.00	0.00	0.00	32.98	6,845.81	NA	63 - 73	Chinle/alluvium	21
7/20/2004	BW-3C	7/14/2010	2.00	6,878.08	6,878.08	32.25	6,723.08	155.0	0.00	0.00	8.18	6,869.90	NA	144.5 - 154.5	Sonsela sandstone	72
1/5/1981	OW-1	3/3/2010	4.00	6,866.00	6,868.45	23.00	6,773.96	94.04	0.00	0.00	1.74	6,864.26	NA	89.3 - 99.3	Sonsela sandstone	NA
	OW-1	6/3/2010	4.00	6,866.00	6,868.45	23.00	6,773.96	94.04	0.00	0.00	1.63	6,864.37	NA	89.3 - 99.3	Sonsela sandstone	NA
	OW-1	9/21/2010	4.00	6,866.00	6,868.45	23.00	6,773.96	94.04	0.00	0.00	1.22	6,864.78	NA	89.3 - 99.3	Sonsela sandstone	206
	OW-1	11/10/2010	4.00	6,866.00	6,868.45	23.00	6,773.96	94.04	0.00	0.00	1.89	6,864.11	NA	89.3 - 99.3	Sonsela sandstone	[illegible]
11/25/1980	OW-10	3/3/2010	4.00	6,873.20	6,875.12	19.13	6,804.00	68.00	0.00	0.00	1.48	6,871.72	NA	40 - 60	Chinle/alluvium	NA
	OW-10	6/3/2010	4.00	6,873.20	6,875.12	19.13	6,804.00	68.00	0.00	0.00	1.72	6,871.48	NA	40 - 60	Chinle/alluvium	NA
	OW-10	9/21/2010	4.00	6,873.20	6,875.12	19.13	6,804.00	68.00	0.00	0.00	1.21	6,871.99	NA	40 - 60	Chinle/alluvium	148
	OW-10	11/10/2010	4.00	6,873.20	6,875.12	19.13	6,804.00	68.00	0.00	0.00	8.91	6,864.29	NA	40 - 60	Chinle/alluvium	131
9/25/1981	OW-11	7/28/2010	4.00	6,922.00	6,923.51	25.00	6,857.27	66.62	0.00	0.00	21.29	6,900.71	NA	43 - 65	Chinle/alluvium	101
12/15/1980	OW-12	7/22/2010	4.00	6,938.00	6,940.43	22.50	6,795.43	145***	0.00	0.00	48.86	6,889.14	NA	117.8 - 137.8	Sonsela sandstone	213

Well Data 2010 Summary Table – continued

Date of Installation	Well ID Number	Measure-ment Date	Casing Dia-meter (Inch)	A Ground Level Elevation (ft)****	Well Casing Rim Elevation (ft)**	Stick-up length (in)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thick-ness (ft)	C Depth to Water	D = A-C Ground-water Elevation (ft)	= 0.8 B + D Corrected Water Table Elevation (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists	Purge Volume = 3 Well Vol (gal)
12/10/1980	OW-13	3/25/2010	4.00	6,918.60	6,920.12	57.50	6,820.12	100.0	0.00	0.00	23.79	6,894.81	NA	78.2 - 98.2	Sonsela sandstone	169
		6/2/2010	4.00	6,918.60	6,920.12	57.50	6,820.12	100.0	0.00	0.00	23.81	6,894.79	NA	78.2 - 98.2	Sonsela sandstone	169
		9/22/2010	4.00	6,918.60	6,920.12	57.50	6,820.12	100.0	0.00	0.00	23.78	6,894.82	NA	78.2 - 98.2	Sonsela sandstone	1[illegible]
		11/8/2010	4.00	6,918.60	6,920.12	57.50	6,820.12	100.0	0.00	0.00	23.41	6,895.19	NA	78.2 - 98.2	Sonsela sandstone	170
12/17/1980	OW-14	3/24/2010	4.00	6,924.10	6,926.64	27.00	6,881.64	45.00	0.00	0.00	26.34	6,897.76	NA	35 - 45	Chinle/alluvium	41
		6/6/2010	4.00	6,924.10	6,926.64	27.00	6,881.64	45.00	0.00	0.00	26.34	6,897.76	NA	35 - 45	Chinle/alluvium	41
		9/22/2010	4.00	6,924.10	6,926.64	27.00	6,881.64	45.00	0.00	0.00	26.17	6,897.93	NA	35 - 45	Chinle/alluvium	42
		11/8/2010	4.00	6,924.10	6,926.64	27.00	6,881.64	45.00	0.00	0.00	25.93	6,898.17	NA	35 - 45	Chinle/alluvium	42
8/23/1996	OW-29	3/25/2010	4.00	6,913.50	6,913.50	46.50	6,864.50	49.00	0.00	0.00	21.03	6,892.47	NA	37.5 - 47.5	Chinle/alluvium	69
		6/7/2010	4.00	6,913.50	6,913.50	46.50	6,864.50	49.00	0.00	0.00	21.07	6,892.43	NA	37.5 - 47.5	Chinle/alluvium	69
		9/22/2010	4.00	6,913.50	6,913.50	46.50	6,864.50	49.00	0.00	0.00	21.42	6,892.08	NA	37.5 - 47.5	Chinle/alluvium	61
		11/9/2010	4.00	6,913.50	6,913.50	46.50	6,864.50	49.00	0.00	0.00	20.83	6,892.67	NA	37.5 - 47.5	Chinle/alluvium	63
8/28/1996	OW-30	3/24/2010	4.00	6,921.60	6,921.60	58.25	6,873.20	48.40	0.00	0.00	25.48	6,896.12	NA	37.9 - 47.9	Chinle/alluvium	50
		6/4/2010	4.00	6,921.60	6,921.60	58.25	6,873.20	48.40	0.00	0.00	25.52	6,896.08	NA	37.9 - 47.9	Chinle/alluvium	49
		9/27/2010	4.00	6,921.60	6,921.60	58.25	6,873.20	48.40	0.00	0.00	25.45	6,896.15	NA	37.9 - 47.9	Chinle/alluvium	51
		11/8/2010	4.00	6,921.60	6,921.60	58.25	6,873.20	48.40	0.00	0.00	25.24	6,896.36	NA	37.9 - 47.9	Chinle/alluvium	51
10/6/2009	OW-50	3/16/2010	2.00	6,823.00	6,823.00	32.50	6,744.00	63.00	0.00	0.00	18.10	6,804.90	NA	48 - 63	Chinle/alluvium	[illegible]
	OW-50	6/1/2010	2.00	6,823.00	6,823.00	32.50	6,744.00	63.00	0.00	0.00	21.40	6,801.60	NA	48 - 63	Chinle/alluvium	20
	OW-50	9/27/2010	2.00	6,823.00	6,823.00	32.50	6,744.00	63.00	0.00	0.00	18.04	6,804.96	NA	48 - 63	Chinle/alluvium	22
	OW-50	11/9/2010	2.00	6,823.00	6,823.00	32.50	6,744.00	63.00	0.00	0.00	18.60	6,804.40	NA	48 - 63	Chinle/alluvium	22
10/6/2009	OW-52	3/16/2010	2.00	6,929.00	6,929.00	26.50	6,850.00	79.00	0.00	0.00	16.66	6,912.34	NA	64 - 79	Chinle/alluvium	31
	OW-52	6/1/2010	2.00	6,929.00	6,929.00	26.50	6,850.00	79.00	0.00	0.00	16.68	6,912.32	NA	64 - 79	Chinle/alluvium	30
	OW-52	9/27/2010	2.00	6,929.00	6,929.00	26.50	6,850.00	79.00	0.00	0.00	16.54	6,912.46	NA	64 - 79	Chinle/alluvium	31
	OW-52	11/9/2010	2.00	6,929.00	6,929.00	26.50	6,850.00	79.00	0.00	0.00	16.42	6,912.58	NA	64 - 79	Chinle/alluvium	31

Well Data 2010 Summary Table – continued

Date of Installation	Well ID Number	Measure-ment Date	Casing Dia-meter (Inch)	A Ground Level Elevation (ft)****	Well Casing Rim Elevation (ft)**	Stick-up length (in)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thick-ness (ft)	C Depth to Water	D = A-C Ground-water Elevation (ft)	= 0.8 B + D Corrected Water Table Elevation (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists	Purge Volume = 3 Well Vol (gal)
10/14/1981	MW-1	3/1/2010	5.00	6,876.60	6,878.15	26.50	6,746.50	132.02	0.00	NA	6.97	6,869.63	NA	117.72 - 127.72	Chinle/alluvium	383
		7/16/2010	5.00	6,876.60	6,878.15	26.50	6,746.50	132.02	0.00	NA	7.42	6,869.18	NA	117.72 - 127.72	Chinle/alluvium	381
	MW-2	3/1/2010	5.00	6,878.40	6,880.21	22.50	6,740.60	140.24	0.00	NA	16.77	6,861.63	NA	32.94 - 132.94	Chinle/alluvium	[illegible]
		7/16/2009	5.00	6,878.40	6,880.21	22.50	6,740.60	140.24	0.00	NA	16.36	6,862.04	NA	32.94 - 132.94	Chinle/alluvium	379
10/16/1981	MW-4	7/19/2010	5.00	6,880.33	6,882.20	27.75	6,760.40	122.14	0.00	NA	7.11	6,873.22	NA	101 - 121	Sonsela sandstone	352
7/21/1986	MW-5	3/1/2010	5.00	6,882.90	6,882.93	24.25	6,750.30	133.02	0.00	NA	15.13	6,867.77	NA	115 - 125	Sonsela sandstone	262
		7/19/2010	4.00	6,882.90	6,882.93	24.25	6,750.30	133.02	0.00	NA	12.04	6,870.86	NA	115 - 125	Sonsela sandstone	269
3/28/1995	RW-1	3/3/2010	4.00	6,943.50	6,943.50	53.00	6,900.50	43.00	30.89	0.16	31.05	6,912.45	6912.578	25 - 40	Chinle/alluvium	NA
	(OW-27)	6/3/2010	4.00	6,943.50	6,943.50	53.00	6,900.50	43.00	30.99	0.10	31.09	6,912.41	6912.49	25 - 40	Chinle/alluvium	NA
		9/20/2010	4.00	6,943.50	6,943.50	53.00	6,900.50	43.00	29.91	0.15	30.06	6,913.44	6913.56	25 - 40	Chinle/alluvium	NA
		11/3/2010	4.00	6,943.50	6,943.50	53.00	6,900.50	43.00	30.02	0.99	31.01	6,912.49	6913.282	25 - 40	Chinle/alluvium	NA
3/29/1995	RW-2	3/3/2010	4.00	6,927.20	6,927.20	43.00	6,889.20	38.00	0.00	0.00	26.52	6,900.68	NA	26.1 - 36.1	Chinle/alluvium	NA
	(OW-28)	6/3/2010	4.00	6,927.20	6,927.20	43.00	6,889.20	38.00	0.00	0.00	26.42	6,900.78	NA	26.1 - 36.1	Chinle/alluvium	NA
		9/20/2010	4.00	6,927.20	6,927.20	43.00	6,889.20	38.00	0.00	0.00	26.87	6,900.33	NA	26.1 - 36.1	Chinle/alluvium	NA
		11/3/2010	4.00	6,927.20	6,927.20	43.00	6,889.20	38.00	0.00	0.00	26.64	6,900.56	NA	26.1 - 36.1	Chinle/alluvium	NA
8/27/1997	RW-5	3/3/2010	4.00	6,942.50	6,942.60	35.00	6,902.50	40.00	0.00	0.00	31.63	6,910.87	NA	29.5 - 39.5	Chinle/alluvium	[illegible]
		6/3/2010	4.00	6,942.50	6,942.60	35.00	6,902.50	40.00	0.00	0.00	31.37	6,911.13	NA	29.5 - 39.5	Chinle/alluvium	NA
		9/20/2010	4.00	6,942.50	6,942.60	35.00	6,902.50	40.00	31.94	0.68	32.62	6,909.88	6910.424	29.5 - 39.5	Chinle/alluvium	NA
		11/3/2010	4.00	6,942.50	6,942.60	35.00	6,902.50	40.00	31.05	0.89	31.94	6,910.56	6911.272	29.5 - 39.5	Chinle/alluvium	NA
8/27/1997	RW-6	3/3/2010	4.00	6,972.60	6,972.60	31.00	6,933.80	38.80	31.78	0.23	32.01	6,940.59	6940.774	28.5 - 38.5	Chinle/alluvium	NA
		6/3/2010	4.00	6,972.60	6,972.60	31.00	6,933.80	38.80	31.61	0.09	31.70	6,940.90	6940.972	28.5 - 38.5	Chinle/alluvium	NA
		9/20/2010	4.00	6,972.60	6,972.60	31.00	6,933.80	38.80	32.04	0.24	32.28	6,940.32	6940.512	28.5 - 38.5	Chinle/alluvium	NA
		11/3/2010	4.00	6,972.60	6,972.60	31.00	6,933.80	38.80	32.10	0.36	32.46	6,940.14	6940.428	28.5 - 38.5	Chinle/alluvium	NA

Well Data 2010 Summary Table - continued

Date of Installation	Well ID Number	Measure-ment Date	Casing Dia-meter (Inch)	A Ground Level Elevation (ft)****	Well Casing Rim Elevation (ft)**	Stick-up length (in)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thick-ness (ft)	C Depth to Water	D = A-C Ground-water Elevation (ft)	= 0.8 B + D Corrected Water Table Elevation (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists	Purge Volume = 3 Well Vol (gal)
9/26/1985	SMW-2	7/16/2010	2.00	6,881.30	6,884.11	54.50	6,827.10	57.34	0.00	0.00	25.98	6,855.32	NA	34.31 - 54.31	Chinle/alluvium	15
9/25/1985	SMW-4	3/1/2010	2.00	6,777.40	6,882.73	46.00	6,807.80	72.20	0.00	0.00	29.36	6,748.04	NA	51.7 - 71.7	Chinle/alluvium	21
		7/16/2010	2.00	6,777.40	6,882.73	46.00	6,807.80	72.20	0.00	0.00	29.46	6,747.94	NA	51.7 - 71.7	Chinle/alluvium	[illegible]
7/8/2004	GWM-1	3/3/2010	2.00	6,912.65	6,912.65	46.50	6,888.95	23.70	0.00	0.00	19.81	6,892.84	NA	17.5 - 23.5	Chinle/alluvium	NA
		6/3/2010	2.00	6,912.65	6,912.65	46.50	6,888.95	23.70	0.00	0.00	18.14	6,894.51	NA	17.5 - 23.5	Chinle/alluvium	NA
		9/16/2010	2.00	6,912.65	6,912.65	46.50	6,888.95	23.70	0.00	0.00	17.90	6,894.75	NA	17.5 - 23.5	Chinle/alluvium	NA
		11/2/2010	2.00	6,912.65	6,912.65	46.50	6,888.95	23.70	0.00	0.00	18.41	6,894.24	NA	17.5 - 23.5	Chinle/alluvium	NA
9/25/2005	GWM-2	3/3/2010	2.00	6,913.17	6,913.17	57.00	6,896.97	18.97	DRY	NA	DRY	DRY	NA	3.2 - 16.2	Chinle/alluvium	NA
		6/3/2010	2.00	6,913.17	6,913.17	57.00	6,896.97	18.97	0.00	0.00	17.57	6,895.60	NA	3.2 - 16.2	Chinle/alluvium	NA
		9/16/2010	2.00	6,913.17	6,913.17	57.00	6,896.97	18.97	0.00	0.00	17.30	6,895.87	NA	3.2 - 16.2	Chinle/alluvium	NA
		11/2/2010	2.00	6,913.17	6,913.17	57.00	6,896.97	18.97	0.00	0.00	18.87	6,894.30	NA	3.2 - 16.2	Chinle/alluvium	NA
9/25/2008	GWM-3	3/3/2010	2.00	6,912.65	6,912.65	58.25	6,896.15	17.94	DRY	NA	DRY	DRY	NA	3 - 15	Chinle/alluvium	NA
		6/3/2010	2.00	6,912.65	6,912.65	58.25	6,896.15	17.94	0.00	0.00	17.17	6,895.48	NA	3 - 15	Chinle/alluvium	NA
		9/16/2010	2.00	6,912.65	6,912.65	58.25	6,896.15	17.94	0.00	0.00	16.92	6,895.73	NA	3 - 15	Chinle/alluvium	NA
		11/2/2010	2.00	6,912.65	6,912.65	58.25	6,896.15	17.94	0.00	0.00	17.83	6,894.82	NA	3 - 15	Chinle/alluvium	NA
3/14/2008	NAPIS 1	3/8/2010	2.00	6,918.43	6,918.43	3.50	6,904.40	14.00	0.00	0.00	8.69	6,909.74	NA	3.7 - 13.7	Chinle/alluvium	3
	(KA-2R)	6/8/2010	2.00	6,918.43	6,918.43	3.50	6,904.40	14.00	0.00	0.00	8.37	6,910.06	NA	3.7 - 13.7	Chinle/alluvium	3
		9/15/2010	2.00	6,918.43	6,918.43	3.50	6,904.40	14.00	0.00	0.00	7.77	6,910.66	NA	3.7 - 13.7	Chinle/alluvium	[illegible]
		11/2/2010	2.00	6,918.43	6,918.43	3.50	6,904.40	14.00	0.00	0.00	7.62	6,910.81	NA	3.7 - 13.7	Chinle/alluvium	3
3/14/2008	NAPIS 2	3/8/2010	2.00	6,917.27	6,917.27	1.25	6,902.80	14.50	0.00	0.00	9.19	6,908.08	NA	4.2 - 14.2	Chinle/alluvium	3
	(KA-2R)	6/8/2010	2.00	6,917.27	6,917.27	1.25	6,902.80	14.50	0.00	0.00	8.93	6,908.34	NA	4.2 - 14.2	Chinle/alluvium	3
		9/15/2010	2.00	6,917.27	6,917.27	1.25	6,902.80	14.50	0.00	0.00	8.57	6,908.70	NA	4.2 - 14.2	Chinle/alluvium	3
		11/2/2010	2.00	6,917.27	6,917.27	1.25	6,902.80	14.50	0.00	0.00	8.55	6,908.72	NA	4.2 - 14.2	Chinle/alluvium	3
3/14/2008	NAPIS 3	3/8/2010	2.00	6,917.31	6,917.31	3.50	6,886.60	30.70	0.00	0.00	9.24	6,908.07	NA	25.4 - 30-4	Chinle/alluvium	11
	(KA-3R)	6/10/2010	2.00	6,917.31	6,917.31	3.50	6,886.60	30.70	0.00	0.00	8.87	6,908.44	NA	25.4 - 30-4	Chinle/alluvium	11

Well Data 2010 Summary Table – Continued

Date of Installation	Well ID Number	Measure-ment Date	Casing Dia-meter (Inch)	A Ground Level Elevation (ft)****	Well Casing Rim Elevation (ft)**	Stick-up length (in)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	B SPH Thick-ness (ft)	C Depth to Water	D = A-C Ground-water Elevation (ft)	= 0.8 B + D Corrected Water Table Elevation (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists	Purge Volume = 3 Well Vol (gal)
		9/15/2010	2.00	6,917.31	6,917.31	3.50	6,886.60	30.70	0.00	0.00	7.31	6,910.00	NA	25.4 - 30-4	Chinle/alluvium	11
		11/2/2010	2.00	6,917.31	6,917.31	3.50	6,886.60	30.70	0.00	0.00	8.65	6,908.66	NA	25.4 - 30-4	Chinle/alluvium	11
6/11/2007	KA-3	3/8/2010	2.00	6,917.17	6,917.17	2.00	6,892.40	25.00	0.00	0.00	8.74	6,908.43	NA	15 - 25	Chinle/alluvium	8
		6/10/2010	2.00	6,917.17	6,917.17	2.00	6,892.40	25.00	0.00	0.00	8.39	6,908.78	NA	15 - 25	Chinle/alluvium	8
		9/15/2010	2.00	6,917.17	6,917.17	2.00	6,892.40	25.00	0.00	0.00	8.69	6,908.48	NA	15 - 25	Chinle/alluvium	8
		11/2/2010	2.00	6,917.17	6,917.17	2.00	6,892.40	25.00	0.00	0.00	8.52	6,908.65	NA	15 - 25	Chinle/alluvium	8

NOTES:

NAPIS 1(KA-1R), NAPIS 2 (KA-2R), NAPIS 3 (KA-3R): NAPIS wells installed on 3/15/08. Quarterly monitoring began third quarter of 2008.

KA-3: Began sampling 4th Quarter 2008.

SPH = Separate Phase Hydrocarbons

NA = If no SPH was detected then this is shown on the table as NA (not applicable)

Corrected water table elevations are only provided if SPH was detected.

***OW-12: Annual inspection revealed well depth measurement to be 126 feet instead of 145 feet as listed.

**** Note2: Western has determined that in the past, these ground level elevations have been incorrectly marked as well casing rim elevations. However, from a review of the well logs, we have determined that the elevation levels were listed in the table as rim casing levels when they should have been listed as ground surface elevations.

Appendix D

Table 1: Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation DTW, DTP	Water Quality Parameters	Analytical Suite
Pilot Effluent	Quarterly (Q)			VOC/ DRO extended/GRO/BOB/COD/WQCC Metals
NAPIS Effluent	Q			Gen Chem/VOC/SVOC(phenol)/DRO extended//GRO/WQCC Metals
AL2 to EP-1	Q			Major cations/major anions/VOC/SVOC (phenol)/DRO extended/GRO/WQCC Metals
Influent to AL-1	Q			VOC/BOD/COD/chlorides/DRO extended/GRO/pH/phenol
Influent to AL-2	Q			VOC/BOD/COD/chlorides/DRO extended/GRO/pH/phenol
Influent to Evaporation Pond 1	Q			Major cations/ major anions/pH/BOD/COD/chlorides/VOC/SVOC (phenol)/DRO extended/GRO/WQCC metals
NAPI 2ndary Containment	Q			BTEX/DRO extended/GRO/WQCC Metals or check for fluids
RW-1	Q	X		Measure DTW,DTP
RW-2	Q	X		Measure DTW,DTP
RW-5	Q	X		Measure DTW,DTP
RW-6	Q	X		Measure DTW,DTP

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.

Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
OW-1	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Visual check for artesian flow conditions; Major cations/major anions/ VOC/DRO extended / WQCC Metals
OW-10	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Water level measurement of the Sonsela Aquifer water table Major cations /major anions/ VOC/DRO extended/ WQCC Metals
OW-13	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
OW-14	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
OW-29	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
OW-30	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
OW-50	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC, SVOC, WQCC metals (total and dissolved), GRO, DRO, Gen. Chem.
OW-52	Q	X	pH , E.C., D.O, ORP, Temp, TDS	VOC, SVOC, WQCC metals (total and dissolved), GRO, DRO, Gen. Chem.

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
GWM-2	Q	X		Check for water – if water is detected report to OCD & NMED within 24 hours; sample for BTEX + MTBE/GRO/DRO extended/major cations/ Major anions.
GWM-3	Q	X		Check for water – if water is detected report to OCD & NMED within 24 hours; sample for BTEX + MTBE/GRO/DRO extended/major cations/ Major anions.
GWM-1	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC Metals
NAPIS-1(**a**)	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/ BTEX + MTBE/SVOCs/DRO/GRO WQCC Metals
NAPIS-2 (**a**)	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/ BTEX + MTBE/SVOCs/DRO/GRO WQCC Metals
NAPIS-3(**a**)	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/ BTEX + MTBE/SVOCs/DRO/GRO WQCC Metals

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
KA- 3 (a)	Q	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/ BTEX + MTBE/ SVOCs /DRO/GRO WQCC Metals
Boiler Water & Cooling Tower Blowdown inlet To EP-2	Semi Annual (SA)		pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions
Evaporation Pond 1 (b)	Semi Annual		pH , E.C., D.O, ORP, Temp, TDS	General Chemistry / VOC/SVOC/WQCC 20.6.2.3103 constituents/BOD/COD/E-coli Bacteria/RCRA 8 Metals
Evaporation Pond 2 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 3 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 4 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.

Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
Evaporation Pond 5 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 6 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 7 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 8 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 9A (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 11 (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
Evaporation Pond 12A (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Evaporation Pond 12B (b)	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
Any temporary Pond containing Fluid	SA		pH , E.C., D.O, ORP, Temp, TDS	Same as Evaporation Pond 1
BW-1-A	Annual (A)	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
Evaporation Pond 9A (b)	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
Evaporation Pond 11 (b)	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
BW-2-A	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-2-B	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-2-C	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-3-A	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-3-B	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
BW-3-C	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
Pond 2 Inlet	A			VOC/DRO extended/GRO/BOD/COD/TDS

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
MW-1	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals
MW-2	A	X	pH, E.C., D.O. ORP, Temp, TDS	Major cation/major anions/VOC/DRO extended/GRO/WQCC metals
MW-4	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals
MW-5	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals
OW-11	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/SVOC/WQCC metals
OW-12	A	X	pH , E.C., D.O, ORP, Temp, TDS	VOC
SWM-2	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
SWM-4	A	X	pH , E.C., D.O, ORP, Temp, TDS	Major cations/major anions/VOC/DRO extended/GRO/WQCC metals
PW-2	Every 3 yrs Starting in 2008			VOC/SVOC/ WQCC metals/cyanide/nitrates
PW-3	Every 3 yrs Starting in 2008			VOC/SVOC/ WQCC metals/cyanide/nitrates
PW-4	Every 3 yrs Starting in 2007			VOC/SVOC/ WQCC metals/cyanide/nitrates
Effluent from Old API (storm Water separator Effluent	Monthly flow rate Measurements To New API Separator			Collect monthly flow rate readings from the Old API to the New API Separator. If effluent is re-routed to any other location than the New API Separator, NMED/OCD must be contacted to determine whether additional sampling and analysis is required.

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.

Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table 1 (continued): Gallup Refinery - Groundwater Monitoring Schedule

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
All Wells Including the Recovery wells Containing Separate phase hydrocarbons	Annual Sampling Event			Major cations/major anions/VOC/SVOC/WQCC 20.6.2.3103

The Analyte list for EPA Method 8260 must include MTBE

(a) NAPIS 1, NAPIS-2, NAPIS 3: detection of product during quarterly monitoring must comply Section II.F.2(Twenty-Four Hour Reporting) of NMED Post – Closure Care Permit.

(b) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006(use methods:9221-E and 9221-F, until EPA approves 40 CFR 136 methods (Colilert,Colilert -18-, m ColiBlue 24,membrane filter method)). Parameters are subject to change.

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved.
Evaporation Pond samples must be collected at the inlet where wastewater flows into the evaporation pond.

Table Notes

Pilot Effluent - Effluent from the Pilot Gas Station to the Aeration Lagoon

Pond 2 Inlet- Sample collected at the inlet to Evaporation Pond 2 from Evaporation Pond 1

NAPIS Effluent – Effluent leaving the New API Separator

AL-2 to EP-1- sample collection at the inlet from Aeration Lagoon 2 to Evaporation Pond 1 (influent location into EP 1)

NAPIS 1= (KA-1R); NAPIS-2 = (KA-2R), NAPIS 3= (KA-3R) – monitor wells positioned around NAPIS to detect leakage

DO- dissolved oxygen; ORP- oxygen reduction potential temp-temperature E.C. – electrical or specific conductivity

TDS- total dissolved solids VOCs- volatile organic compounds – EPA Method 8260, must include MTBE

SVOCs- semi volatile organic compounds- EPA Method 8720, must include phenol

DRO – diesel range organics – EPA Method 8015B (or as modified)

GRO – gasoline range organics – EPA Method 8015B (or as modified)

BTEX – benzene, toluene, ethylbenzene, xylene, plus Methyl Tertiary-Butyl Ether (MTBE) – EPA Method 8021 + MTBE

DTW- Depth to water DTP-depth to product EP- Evaporation Pond

BW wells – boundary wells GWM wells – are located around the aeration lagoons to detect leakage

MW – Monitor Well OW- observation well RW- recovery well PW- raw water production well

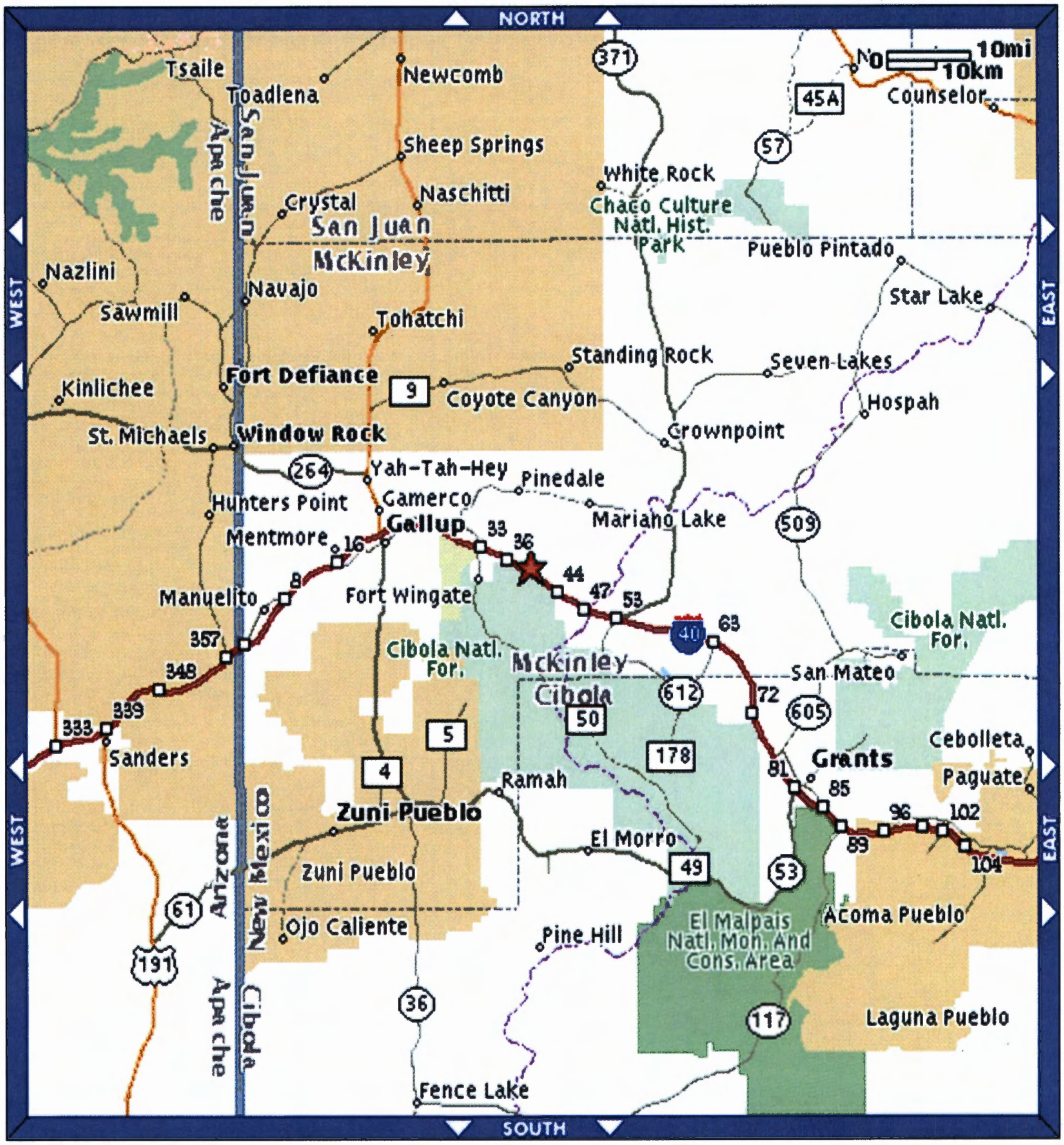

Figure 1: Regional map showing the location of the Gallup Refinery (red star along Interstate-40, 20 miles east of the City of Gallup).

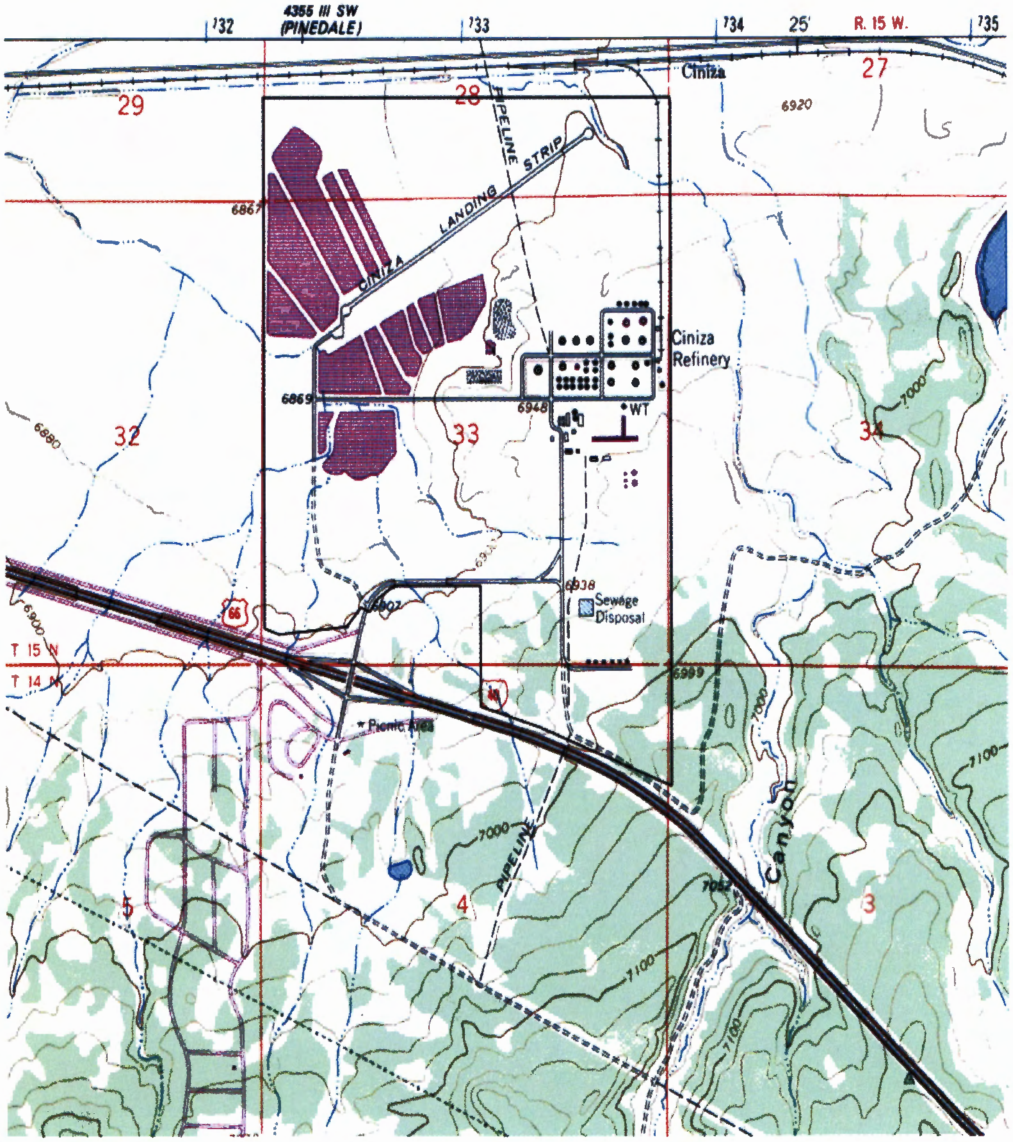

Figure 2: Topographic Map of the Gallup Refinery Site - USGS Topographical Map - Gallup Quadrangle (Revised 1980)

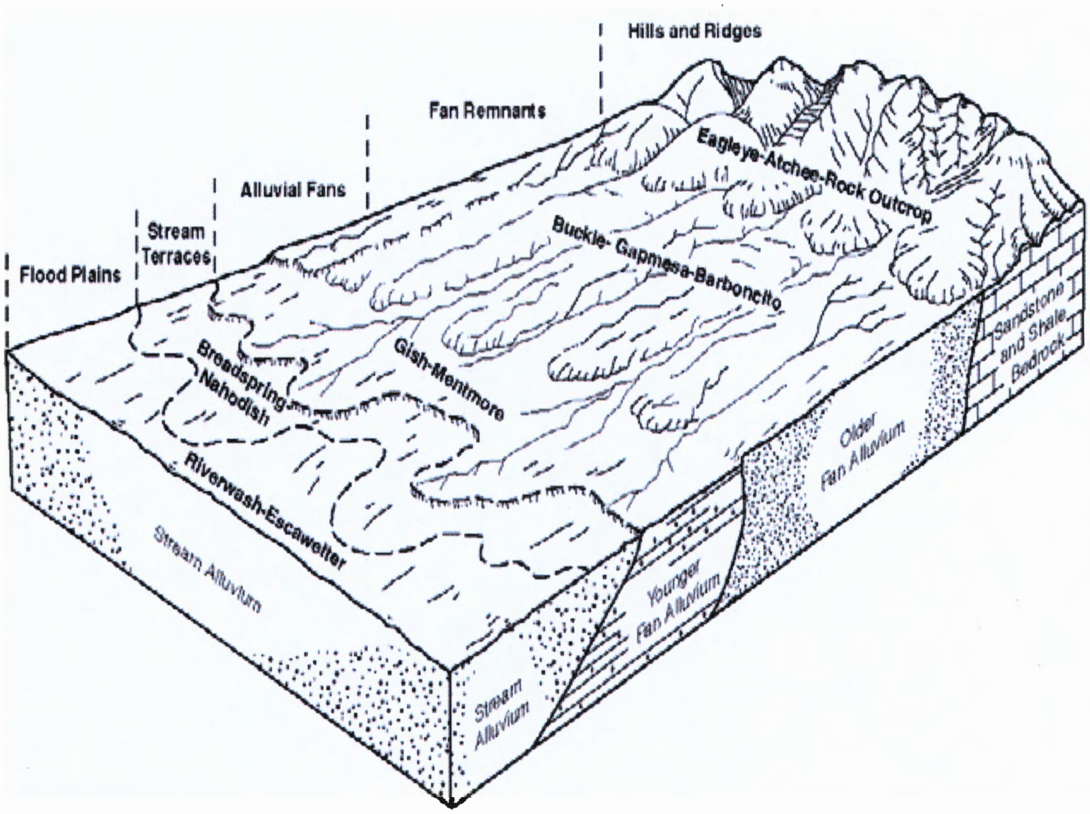

Figure 4: Generalized relationship of soils in the Gallup Refinery area: from NRCS/USDA Soil Survey of McKinley County.

TO VIEW THE MAP AND/OR MAPS WITH THIS DOCUMENT, PLEASE CALL THE HAZARDOUS WASTE BUREAU AT 505-476-6000 TO MAKE AN APPOINTMENT