

September 1, 2009

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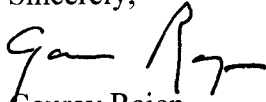
Dear Hope and Carl:

It is a pleasure to submit our 2008 Annual Groundwater Monitoring Report for the Gallup Refinery.

There are three binders in all.

We look forward to your review,

Sincerely,



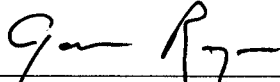
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**Binder 1**  
**Annual Groundwater Monitoring Report:**  
**Gallup Refinery - 2008**

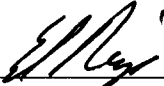
**Western Refining**  
**Gallup, New Mexico**

**August 2009**

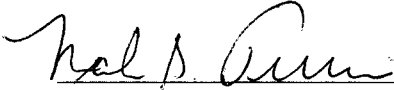
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## Executive Summary

This Annual Groundwater Monitoring Report for 2008 (report) has been prepared in response to requirements stated in Groundwater Discharge Permit, GW-032, issued by the Oil Conservation Division (OCD) of the New Mexico Energy Minerals and Natural Resources Department to the Gallup Refinery owned by Western Refining (“refinery” or “facility”).

This report describes monitoring and remediation activities undertaken throughout 2008, and includes conclusions and recommendations. In this Executive Summary, we provide a broad overview of groundwater impacts – all of our interpretations, conclusions, and recommendations are supported by data tables, graphs and maps in the main body of the report.

The monitoring activities have collected data that are used to characterize the nature and extent of impacts to groundwater at the refinery, and to recognize any levels of contaminants that exceed applicable standards. These standards are the New Mexico Water Quality Standards (NMWQS) set by the New Mexico Water Quality Control Commission (WQCC), and the U.S. Environmental Protection Agency’s (EPA’s) Maximum Contaminant Levels (MCLs). If NMWQS standards or MCLs do not exist for a contaminant, we compare levels against the EPA Regional Screening Levels set for Residential Risk-Based Screening Levels for Tap Water (RRSLs). As stated by the EPA, exceeding a RRSL does not “automatically designate a site as “dirty” or trigger a response action; however, exceeding a [RRSL] suggests that further evaluation of the potential risks by site contaminants is appropriate.”<sup>1</sup> The EPA recommends that for a specific site, the screening levels be recalculated using site-specific data.

Essentially, there are two major sections of the Refinery which we have defined as the East and the West side. Shallow groundwater enters the refinery from the northern, southern, and eastern portions of the site and flows out along the western portions. Detailed discussions of monitoring and remediation activities in the East and the West sides, the data generated, and other issues are provided in chapters 2, 3 and 4 of the report. Chapter 5 provides detailed sets of conclusions and recommendations.

On the East side, in the north-east corner of the active refinery perimeter (but not the refinery property as a whole) a plume of Methyl-Tert Butyl Ether (MTBE) is known to exist in shallow groundwater within refinery property. This groundwater enters the refinery from the east, and then moves slowly north-west into the Facility property. In three wells, OW-14, OW-29, and OW-30, the MTBE is in the range of 0.05 to 1.3 ppm and at levels that exceed the RRSL (0.012 ppm). In this area volatile hydrocarbons have also been detected in shallow groundwater and benzene (in OW-14 at a level of 0.074 ppm) is at a level that exceeds NMWQS for drinking water (0.005 ppm). There are downgradient wells that have not yet shown more than trace levels of benzene, that is, close to the levels of detection of analytical methods. These wells are within a few hundred feet of OW-14, the well at which benzene has been detected at levels above

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<sup>1</sup> [http://www.epa.gov/reg3hscd/risk/human/rb-concentration\\_table/faq.htm#FAQ1](http://www.epa.gov/reg3hscd/risk/human/rb-concentration_table/faq.htm#FAQ1)

NMWQS. Therefore, benzene in the groundwater in this region is expected to move approximately 10 feet per year – this is apparent from noting the time it has taken for trace levels to be detected downgradient. The nearest drinking water well in the direction of contaminant movement is probably more than 10,000 feet away and more than 3000 feet deep – while contamination is at shallow depths of 30-50 feet. Within the perimeter of the active refinery in this north-east section, there are also several shallow recovery wells from which separate-phase hydrocarbons have been recovered and still continue to be recovered, of the order of 4 gallons total in 2008.

On the West side, there are shallow groundwater issues likely stemming from the wastewater treatment system of the refinery that consists of aeration lagoons and a series of large evaporation ponds. Immediately downgradient (within 10 feet) of the refinery's oil/water separator, a sample from a shallow groundwater monitoring well (NAPIS-2) had MTBE at a level (0.32 ppm) greater than the RRS� (0.012 ppm), a few hydrocarbons above detection levels, and benzene above the NMWQS (0.91 ppm > 0.005 ppm). Downgradient of the two aeration lagoons, a shallow monitoring well, GWM-1, has also detected benzene above NMWQS, and other hydrocarbons at detectable levels. Some of these include several polycyclic aromatic hydrocarbons (PAHs), which though below any regulatory standards, are of concern as they are long-lived and could possibly impact deeper aquifers. Some of these wells have also shown levels of chlorides and sulfates above NMWQS and/or MCL. Elevated levels of arsenic and manganese have also been detected in GWM-1 above the NMWQS.

In this report, we also present data on our aeration lagoons, ponds and outfalls between the lagoons and ponds. We collect these data as a part of our permit GW-032. Groundwater standards do not apply to these surface water bodies. However, these data are of great value in determining compliance with various provisions of the State of New Mexico as well as the EPA regarding hazardous waste treatment. None of the aeration lagoons or ponds has benzene levels greater than 0.5 ppm. (In a RCRA-driven sampling activity that studied benzene levels entering Aeration Lagoon 1, benzene levels greater than 0.5 ppm were found. However, these levels had fallen to well below 0.5 ppm, before the wastewater left Aeration Lagoon 1, as can be seen by our sampling data.) These data on our surface water treatment ponds also help us understand if the ponds are affecting groundwater. It should be noted that the aeration lagoons and ponds do contain volatile and semi-volatile organic compounds, some of which are also found in shallow wells (GWM-1, and SWM-2).

Finally, there are a series of boundary (BW), observation (OW), monitoring (MW) and shallow monitoring (SWM) wells in the western portions of the facility that are meant to detect any off-site movement of contaminants and also releases to groundwater. One of the OW wells has shown detectable levels of uranium, in one case above NMWQS. Uranium is ubiquitous in groundwater of New Mexico, and the location of this one well (OW-11) makes it unlikely that the uranium should be linked to refinery activity – OW-11 is located so that it is mainly affected by off-refinery groundwater, and also groundwater that is linked to movement through rock. Among the wells on the far west side are three deep drinking water wells, PW-3, PW-2, and PW-4 – none of these has

ever been known to have any contamination at any detectable level. In one event in 2007, we found a semi-volatile hydrocarbon in PW-3, sampled again and found that it was non-detectable – we will continue to monitor this well, and believe the one anomalous reading was a laboratory artifact. Among MW and SWM monitoring wells in the west side, a few have shown traces of hydrocarbons. SMW-2 has shown a level of 1,4-Dioxane at 0.0136 ppm which is greater than the RRS� of 0.0061 ppm. All of the BW wells have shown that no organic contaminants are leaving the refinery’s property, although some of these wells have high levels of sulfates (above drinking water standards).

#### Recommendations

- 1) Continue monitoring as specified in the current Facility-wide Groundwater Monitoring Plan
- 2) Develop a subsurface hydrogeological map of the refinery
- 3) Collect samples of incoming shallow groundwater at the northern edges of the refinery and sample for metals – this may help establish what metals, if any, are possibly linked to the refinery
- 4) Recognizing that the MTBE and benzene plume in the north-east region is moving towards the north-west, and may have passed by existing wells, establish two new monitoring wells north and west of OW-29 at the Chinle/alluvium interface.

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## Binder 3

Appendix I	Laboratory Analytical Reports
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## LIST OF ACRONYMS

<b>AL</b>	Aeration lagoons
<b>BOD</b>	Biochemical Oxygen Demand
<b>BTEX</b>	Benzene, Toluene, Ethylbenzene, Xylene
<b>COD</b>	Chemical Oxygen Demand
<b>DRO</b>	Diesel Range Organics
<b>EP</b>	Evaporation ponds
<b>EPA</b>	Environmental Protection Agency
<b>GPM</b>	Gallons per minute
<b>GRO</b>	Gasoline Range Organics
<b>HWB</b>	Hazardous Waste Bureau
<b>MTBE</b>	Methyl Tert Butyl Ether
<b>MG/L</b>	Milligrams/liter
<b>NAPIS</b>	New American Petroleum Institute Separator
<b>NMED</b>	New Mexico Environment Department
<b>OCD</b>	Oil Conservation Division
<b>PPM</b>	Parts per million
<b>VOC</b>	Volatile Organic Compounds
<b>SVOC</b>	Semi-volatile Organic Compounds
<b>WWTP</b>	Wastewater treatment plant

## 1.0 Introduction

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### 1.1. Facility ownership, operation and location

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 (postal address)  
Route 3, Box 7

Gallup, New Mexico 87301  
Western Refining Southwest Inc (physical address)  
I-40, Exit 39  
Jamestown, New Mexico 87347

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 groundwater 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