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**CERTIFIED MAIL – RETURN RECEIPT REQUESTED**

May 11, 2015

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

**RE: DISAPPROVAL  
REVISED INVESTIGATION REPORT  
SOLID WASTE MANAGEMENT UNIT (SWMU) NO. 1  
AERATION BASIN AND SWMU NO. 14 OLD API SEPARATOR  
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY  
EPA ID # NMD000333211  
HWB-WRG-13-001**

Dear Mr. Riege:

The New Mexico Environment Department (NMED) has reviewed the revised *Investigation Report Solid Waste Management Unit (SWMU) No. 1 Aeration Basin and SWMU No. 14 Old API Separator* (Report), dated June 2014, submitted on behalf of Western Refining Southwest Inc., Gallup Refinery (Permittee) and hereby issues this Disapproval with the following comments.

NMED's responses to several of the Permittee's comments regarding NMED's Disapproval letter (dated April 1, 2013) are below. The comments below only address comments which required responses from NMED. Following the response to comments are NMED's general comments on the revised Report.

**Response to Comments, Comment 1**

- a) The Permittee raises concerns regarding NMED's inconsistent review between Bloomfield Terminal and Gallup Refinery documents. NMED required Bloomfield to be more consistent in presenting data and required Gallup to present additional information and present that information more clearly. These two requirements do not constitute inconsistency. More specifically, in the response to NMED's Disapproval Comment 1, the Permittee presents an example of a comment regarding the Bloomfield's Group 2 Investigation Report and states that, "[b]ased on NMED's most recent comment, Western will eliminate the redundant soil information from Section 4.4 in this and all subsequent site investigation reports." NMED's Disapproval Comment 1 required the Permittee to remove redundant information regarding the soil investigation in the groundwater section of the Report because the Permittee simply copied Section 4.3 (Exploratory Drilling Investigations, Soil Sampling and Boring Abandonment) verbatim into Section 4.4 (Monitoring Well Construction and Groundwater Sampling). Relevant soil data information such as descriptions of the interval of saturation, the presence of potential contamination and its correlation to saturated intervals, and how that information relates to the locations of the monitoring wells and where formation water was sampled are relevant to the groundwater section. The Permittee is required to include all relevant information that may be helpful to the reviewer; the Permittee must continue to include relevant and useful details regarding soil in the monitoring well construction and groundwater sampling sections. However, it must be information that supplements the soil investigation section.
- b) NMED's Disapproval Comment 1 also required the Permittee to "[i]nclude descriptions of the volume of water purged, field parameters measured and the results, identify the unit from which water was sampled, and discuss any other details which may aid in understanding the groundwater at the site." The Permittee references Appendix B (Field Methods) in Section 4.4; however, the Field Methods seem to relate only to the development of permanent well OAPIS-1. It is not clear whether or not the Permittee followed the same procedures to collect groundwater from soil borings where monitoring wells were not completed. Please include a description of the methods and procedures used to collect groundwater samples from soil borings either in Section 4.4 or in Appendix B. Also, please discuss the recharge rate in OAPIS-1.

**Response to Comments, Comment 2**

- a) The Permittee's response to NMED's Disapproval Comment 2 states, "NMED provided a general reference to the NM SSLs (or EPA Regional Screening Levels as appropriate) as outlined in NMED's Risk Assessment Guidance and states, "[b]ecause groundwater in the area is affected by contamination, it is inappropriate to calculate a DAF for the site." Western requests clarification on this statement. Is it NMED's position/policy that for any SWMU and/or AOC that has groundwater in the area affected by contamination that no site-specific DAF may be calculated to determine appropriate soil remediation levels? Is NMED

requiring all sites in New Mexico to use DAF equal to 1.0 if there is groundwater contamination on the site, which is “in the area” of the subject soils?” A dilution attenuation factor (DAF) is used to calculate the potential risk of the soil contamination reaching groundwater. Specifically, it is utilized at a site when there is soil contamination, but groundwater contamination does not exceed the established cleanup levels. A DAF may also be used to demonstrate that soil is no longer a source or is a continuing source of contamination for groundwater (for example, if there has been soil remediation conducted, but a source of contamination remains in the soil). In general, NMED recommends using a conservative value of DAF 20 for most sites. A DAF 1 is used when contaminated soil is in direct contact with groundwater and is often overly conservative, depending on site conditions.

- b) At the Aeration Lagoons, hazardous waste has been in direct contact with the groundwater. According to the Trihydro Report included with the subject Report, sediment measurements in AL-1 and AL-2 were 8-10 feet deep and groundwater ranges from 6-20 feet below the ground surface in the area of the lagoons. Additionally, groundwater at the OAPIS is shallow (around 11 feet below ground surface) and the soil contamination is present relatively deep below the ground surface, meaning that contamination is likely in contact with groundwater. Furthermore, in Section 7.1.1 (Aeration Basin) the Permittee states, “[t]he vertical impacts to soil were found to extend to the uppermost groundwater-bearing horizons in some borings around the Aeration Basin as discussed below” and then, in Section 7.1.2 (Old API Separator) the Permittee states, “[t]he vertical impacts to soil were found to extend to the uppermost groundwater-bearing horizons in borings SWMU 14-2 and SWMU 14-3.” However, the screening described in the Report was based on the overall maximum concentration measured for each contaminant that exceeded its associated soil screening level(s). In a majority of analytical results, the overall maximum concentrations did not occur at depths that could contact groundwater. In addition, many sampling locations that included depths that could contact groundwater exhibited intermittent detections indicating that contamination was likely not continuous from the surface to the water table. Therefore, upon further examination, a DAF of 20 (or the calculated DAF of 461) is appropriate for screening the majority of the contaminants addressed in the Report and the Permittee shall therefore remove all references to DAF 1 from the Report.
- c) The results obtained from the screening analysis (risks for soil under a residential scenario at  $1 \times 10^{-3}$  exceed NMED target risk of  $1 \times 10^{-5}$  using DAF=461 while the hazard index is 1.5; for groundwater, the risk is again above  $1 \times 10^{-3}$  and the hazard index is 910) indicate the SWMUs must be further evaluated (potentially, with a more detailed, site-specific risk assessment) and/or that remediation of soil and groundwater is necessary. The Permittee may calculate separate DAFs for each SWMU to aid in the assessment of soil contamination. In addition to calculating separate, site-specific DAFs, the Permittee may want to perform a screening

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analysis of the sediments in the Aeration Basin. These actions may be used to support final remedies at the sites. See also Response to Comments, Comment 8.

#### **Response to Comments, Comment 5**

NMED's Disapproval Comment 5 required the Permittee to provide, "a description of the design and composition of the berms, if available." The Permittee states that "[t]he design of the Aeration Basin, including the berms, has previously been submitted to the NMED and Western does not believe it would be beneficial to incorporate this design document into the site investigation report." For clarification, NMED does not require a design document; simply a description of how the berms were constructed, the content of the berms, and an estimate of how thick the layer of gravel is on top of the berms. Since the hand auger borings installed along the berms hit refusal at 6 inches, a description of whether or not there are multiple layers of gravel and how often gravel is added to the berms is critical. Additionally, the Permittee must provide a description of the type of vehicles driven onto the berms and whether or not that affects the integrity of the berms.

Finally, the Permittee states that "[w]here gravel is present beneath the upper 0.5' to 1.0', it occurs in a silty clay matrix and the percentage of gravel is not sufficient to facilitate seepage through the dikes." NMED was unable to confirm this statement through the documentation provided. Please provide information regarding the percent of gravel present in the berms and how deep below the berm surface gravel is present.

#### **Response to Comments, Comment 7**

- a) NMED's Disapproval Comment 7 required the Permittee to use "unknown oil" for comparison, because unknown oil covers the full hydrocarbon range and is the most conservative standard. The Permittee presents their case for using the motor oil standard for comparison as well as the unknown oil standard. NMED agrees that it is important to analyze for the full range of total petroleum hydrocarbons (TPH) (gasoline range organics (GRO), motor oil range organics (MRO), and diesel range organics (DRO)). However, because there is no way to know the types of material that have entered the environment over time, the unknown oil standard is the most conservative standard and the most appropriate one to use for comparison. The Permittee may perform fingerprint analysis to determine the type of oil present in the soil and then use the appropriate standard once the oil type is confirmed.
- b) The Permittee states, "[t]he analysis for motor oil range organics only analyzes for >C-28 – C35 hydrocarbons. There is not overlap between this range of petroleum constituents and those used to represent unknown oil (i.e., C11-C22). In other words, the petroleum hydrocarbons reported by the motor oil range organics cannot and does not include the C11-C22 hydrocarbons used to represent unknown oil. Therefore, an analysis for motor oil range organics should not be evaluated for environmental impacts by using toxicity for a totally

unrelated carbon range.” The ranges may not overlap, but the difference in the numbers is not very large. The Permittee also states, “[a] review of NMED’s Table 6-1 reveals there is only one product type that does not include significant percentages of carbon ranges that cannot be present in the motor oil range analysis and this [is] “waste oil.” The motor oil range analysis covers >C28 to C35 and waste oil composition is based on C19-C36 aliphatics, therefore, it is possible for the motor oil range analysis to detect the presence of hydrocarbons represented by the waste oil product type. Based on these facts, Western compares the analytical results from the motor oil range analyses to the screening levels for waste oil. Western requests that NMED reconsider their comment; no changes have been made to the data tables.” The Report indicates that a large proportion of the detected contamination falls within the diesel range, which generally corresponds to the range of “unknown oil” in NMED guidance; therefore, the most conservative screening level is the most appropriate screening level to use. The Permittee must analyze for the full range of TPH (MRO, DRO, and GRO) and must use the “unknown oil” standard for comparison and revise the tables as necessary.

- c) The laboratory data from MRO analysis contains variable detection limits and some detection limits that exceed the 3000 mg/kg screening level for waste oil; the Permittee must review the laboratory case narrative and demonstrate that this data is useable.
- d) In many cases, the Permittee sampled from 0-0.5’ and then 1.5-2’ below ground surface and analytical data indicate that there is an increase in contamination with depth. NMED understands that the Permittee plans to propose conducting additional sampling to further define the vertical extent of contamination. NMED concurs with this approach.
- e) Table 9 (Aeration Basin Groundwater Analytical Results Summary) does not report screening levels for DRO, GRO, or MRO. In addition, the Permittee does not depict the exceedance values in bold which is defined in the footnotes as values exceeding the screening level. Revise Table 9 and Table 10 to include the screening levels, define the units for all analytes in the table, and highlight soil screening exceedances.

**Response to Comments, Comment 8**

- a) NMED’s Disapproval Comment 8 stated that it “makes more sense to separate the Aeration Basin and the OAPIS for cumulative risk calculations.” The Permittee’s response states, “Western included both SWMUs in the same cumulative risk evaluation based on previous NMED comments, which Western understood to request that cumulative evaluations should, at least in some situations, include more than only a single SWMU or area of concern.” The Permittee goes on to give an example from the Bloomfield Terminal. It is not appropriate to implement a universal approach that does not take into account differences between the two facilities. At Bloomfield, the SWMUs are typically small and essentially co-located. It is difficult to discern which SWMU contributed to the overall contamination in the area;

therefore, it made sense to combine them. In some cases, it is not best to combine SWMUs, because contamination present at one SWMU could result in the failure of both SWMUs to pass a risk screening evaluation. The decision to combine or separate SWMUs includes the sizes and locations of the SWMUs, contaminant history and whether there is potential for coalescing contamination or contamination that cannot definitively be attributed to one SWMU or the other. The end goal of calculating risk is to be protective of human health and the environment which often requires using a more conservative approach. The Permittee and NMED can work together to assess which approach makes the most sense on a case-by-case basis.

- b) Analytical results demonstrate that contaminants likely migrated from SWMU 14 to SWMU 1 over time. Groundwater contamination associated with both SWMUs features eight constituents (seven organic compounds and DRO) that exceed screening levels. Six of the same organic constituents (five specific constituents and DRO) are found at both SWMUs. Eleven metals exceed screening levels at SWMU 1 compared to SWMU 14. SWMU 1 metals concentrations are generally higher while SWMU 14 organic constituents are higher. Soils appear to contain higher organic contaminant concentrations at SWMU 14 and a higher number of contaminants were detected at concentrations greater than their associated screening levels. It may make more sense to evaluate the SWMUs separately based on this information.

The Permittee estimated cumulative risk and hazard using the maximum detected concentration over both SWMUs. Thus, soil risk and hazard estimates are biased towards SWMU 14 contamination. Groundwater contamination due to metals is primarily attributable to SWMU 1 while organics associated with SWMU 14 appears to be the main source of groundwater contamination. In this case it is possible to delineate sources of contamination, warranting separation of SWMUs 1 and 14.

- c) The data indicates the most contaminated sample from SWMU 1 is from soil boring SWMU 1-1 (2-4'), which is near the OAPIS and may be more representative of contamination at the OAPIS than the Aeration Lagoon. However, analytical data from boring SWMU 1-1 (2-4') must be included with both the OAPIS and Aeration Basin risk calculations as it may be representative of both sites. The Permittee must provide a description of the conveyance equipment connecting the OAPIS to the Aeration Lagoons and the discharge from the truck stop. Section 4.2 (Subsurface Conditions) mentions that there are two pipes buried at shallow depth near the OAPIS, but Figure 3 does not depict the location of soil boring SWMU 1-1 and Figure 2 does not include the location of the pipes. Provide a figure depicting both SWMUs 1 and 14, physical features such as pipe locations, former ancillary equipment and structures (including the benzene air strippers), roads, and boring locations. See also General Comment 2.

- d) Given the high risk estimates, a more detailed screening analysis that focuses on the potential risks and hazards posed by each SWMU is warranted. Further evaluation will be necessary. A more detailed risk assessment and possible remediation may also be necessary. Addressing the SWMUs as separate exposure units will facilitate more informed and resource-effective risk management decisions related to corrective action and remedy selection.

**Response to Comments, Comment 9**

The Permittee states, "Western notes that in preparation of a similar site investigation report at its Bloomfield Terminal (former Bloomfield Refinery), it was directed to use the most conservative of the two NMED non-residential (i.e., industrial worker and construction worker) SSLs." This is true; the Permittee must use the most conservative cleanup level. For the initial screening the Permittee must start by comparing all three (residential, construction, industrial) screening levels and then use the more conservative of the construction worker and industrial screening levels (if the analytical results are below the residential screening level, the most conservative of all of the levels) then the site does not require further risk evaluation). The Permittee used the proper method for the Bloomfield Terminal site and should continue to use that approach.

**Response to Comments, Comment 12**

NMED concurs that all of the standards should be included in Table 6 (Groundwater Screening Level Table).

**Response to Comments, Comment 13**

As discussed in Response to Comments, Comment 9 above, the Permittee must continue to use the most conservative of the non-residential SSLs for comparison whether it is industrial or construction worker.

**General Comments**

**Comment 1**

The Permittee did not include an electronic copy on a disc with the revised submittal, although a disc was provided when requested by NMED. The Permittee is required to submit two paper copies and one electronic copy of submittals according to Permit Section II.C.7 (Submissions to the Environment Department). The items on the disc should include the document and any related tables, figures, laboratory reports and any other relevant documents. All revised submittals must be accompanied by an electronic version in red-line strikeout showing where all changes have been made. Providing the electronic copy of the document, figures, tables, appendices, and red-line strikeout will facilitate timely review of the document.

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**Comment 2**

If possible, provide a plate-sized (e.g., 24x36-inch) figure depicting the locations of all of the borings advanced during both the Aeration Basin and the OAPIS investigations.

**Comment 3**

In Table 2 (Groundwater Level Measurements) the “Groundwater Elevation (ft)” column lists different groundwater elevations than those reported in the latest Facility-Wide Groundwater Monitoring Report. Please revise the table to present the correct information.

**Comment 4**

The data tables include values with too many significant digits and do not define the units in several instances. The Permittee must revise the tables to include accurate values with the proper number of significant digits and report the proper units which reflect the number of significant digits as reported in the data. Additionally, some of the detection limits are higher than the screening level. For example, arsenic is listed, for some samples, as having a detection limit of <12.5 mg/kg. The laboratory must use methods that allow for detection limits equivalent to or less than the screening levels, otherwise the data is not useable (see Permit Section IV.J.3). The Permittee must explain the highly variable laboratory detection limits reported in the data tables and discuss the reasons why the detection limits vary by such a wide range. See also Response to Comments, Comment 7.

**Comment 5**

Hand auger borings around the Aeration Lagoons generally encountered a silty clay/gravel layer from 0-0.5 ft bgs and often hit refusal at 0.5 ft bgs, because of the presence of gravel. The gravel fill in these borings is most likely gravel placed over spill areas and therefore, would likely be clean. The borings did not encounter berm material other than the gravel/clay mixture at the top of the berms. The purpose of sampling around the berms was to determine whether or not the berm material contained potentially permeable layers that may have allowed seepage to occur. The data from these borings must not be used to determine whether the soil in the berm is contaminated or not and cannot be used for risk calculations, because it could skew the data. If the Permittee believes that the berm soil samples from 0'-0.5' feet are representative of site conditions, then the Permittee must provide the rationale to support this assertion.

**Comment 6**

In Section 5 (Regulatory Criteria), page 49, the Permittee states, “[i]t should also be noted that the soil sample results for chromium are compared to the screening levels for both chromium III and VI, as speciation has not been conducted to determine if the detected chromium is chromium III or chromium VI.” Chromium VI is the more conservative of the soil screening levels and some of the reported concentrations of chromium are greater than the chromium VI soil screening level. The Permittee must discuss whether or not chromium VI was ever used at the

refinery. Based on this information, the Permittee may need to speculate for chromium to determine whether or not chromium VI is present at the facility.

**Comment 7**

In Section 7.1.2 (Old API Separator), under the heading “Groundwater”, page 67, the Permittee states, “[t]he lateral extent of potential impacts to groundwater was defined by a series of dry soil borings drilled to the west, south and east of the OAPIS. SWMU 14-1, the western most soil boring near the OAPIS was drilled to a depth of 50 feet and never did encounter bedrock. There was no indication of saturation in SWMU 14-1 and the boring failed to produce any water. Two borings (SWMU 14-21 and SWMU 14-22) were drilled south of the OAPIS and no elevated PID readings or indication of saturation was logged in either boring. Soil boring SWMU 14-23 was drilled east of the OAPIS and did encounter a sandy clay zone at 16 feet bgs that was wet, but a temporary well completion in the boring failed to produce any water.” Soil borings SWMU 14-21 and SWMU 14-22 were drilled to 10 feet whereas groundwater was encountered in soil borings SWMU 14-2/OAPIS-1 and SWMU 14-3 at 18 and 14 feet bgs, respectively. Borings SWMU 14-21 and 14-22 would likely not encounter groundwater, because they were not drilled deep enough. Soil boring SWMU 14-3 encountered a stratigraphic layer with “gravel at top” and “odor” at 14 feet, which is also where groundwater was encountered. The soil boring log for soil boring SWMU 14-23 indicates the presence of groundwater at 16 feet bgs and no recovery after 16 feet, so it seems that the boring failed to produce water in the temporary well, because there may have been sloughing, even though groundwater was present. Boring SWMU 14-1 encountered a layer with “trace gravel – pebbles” from 12 to 18 feet bgs, which corresponds to the gravelly layer in boring SWMU 14-3, although groundwater was not encountered. Generally, it is known that the alluvium above the Chinle formation contains irregular sand stringers and groundwater flow is highly variable, because of the complex and irregular stratigraphy. NMED understands that it will be difficult to pinpoint the lateral extent of groundwater at this location. However, it does not appear that the Permittee fully defined the lateral extent of potential groundwater impacts and additional investigation may be required. The Permittee has submitted an additional work plan proposing to conduct additional investigations at the SWMUs to define the extent of contamination, once NMED reviews the revised Report, NMED will review the work plan submittal.

**Comment 8**

In Section 7.1.1 (Aeration Basin), under the “Groundwater” heading, page 65, the Permittee states, “soil boring SWMU 1-8 was completed on the east side of the Aeration Basin near the New API Separator. Bedrock was encountered at a depth of 19 feet bgs and there was one relatively thick saturated interval of clayey sand found on top of the bedrock from a depth of approximately 13 feet to 19 feet bgs. 1-Methylnaphthalene, MTBE and naphthalene were found in the groundwater sample collected from this boring at concentrations above their screening levels; however, there are additional monitoring wells in this area (e.g., NAPIS-1 located east of the new API Separator) that can be used to provide delineation to the east.” The monitoring

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wells located to the east are contaminated as well; therefore, they do not provide delineation and cannot be used to show that there is no contamination east of soil boring SWMU 1-8. It may not be possible to delineate the vertical extent of groundwater contamination at the Aeration Basin, because of comingling of contamination from other units. The Permittee may have to address groundwater contamination separately from the soil at these SWMUs and approach groundwater monitoring and cleanup in a holistic manner for the entire Facility.

#### **Comment 9**

In Section 7.2 (Recommendations) the Permittee states, “[t]he area between the OAPIS and the Aeration Basin is relatively small and does not warrant additional investigation to determine if there is possible separation of impacts sourced from the two different SWMUs.” Further characterization may not be needed at this time; however, this area is the location where the highest concentrations of contaminants in soil and groundwater were observed. The Permittee must address this issue when these units are more accessible.

#### **Comment 10**

In Table 10 (Old API Separator Groundwater Analytical Results Summary) the groundwater sample collected from boring SWMU 14-3 has a reported DRO concentration of 83 (no units provided, NMED assumes mg/L), which indicates the presence of light non-aqueous-phase liquids (LNAPL). The Permittee must determine whether or not there is LNAPL on the groundwater. Additional investigation may be required.

#### **Comment 11**

Review and revise Table 13 (SWMU No. 14 Cumulative Risk and Hazard Index Evaluation) and Table 14 (SWMU No. 1 Groundwater Cumulative Risk Evaluation) to address typographical errors in the maximum concentrations listed in both tables for contaminants that exceed screening levels. Additionally, many of the concentrations reported in Table 14 for contaminants detected in groundwater (but not exceeding screening levels) are not listed in Table 9 (Aeration Basin Groundwater Analytical Results Summary) and Table 10 (Old API Separator Groundwater Analytical Results Summary). The Permittee must ensure that data is entered correctly and that tables correspond to the text as necessary. In the response to comments discuss whether or not the typographical errors impacted the calculations.

The Permittee indicated during a meeting on October 6, 2014 that they would like to discuss plans for the disposition of the Aeration Basin and contiguous sites. NMED believes this discussion may aid in the revision of the additional soil investigation work plan and responses to these comments.

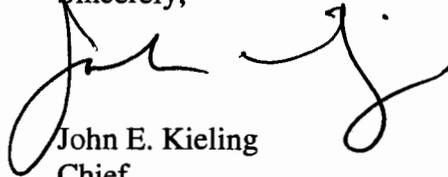
The Permittee must address all comments in this Disapproval and submit a revised Report on or before **August 21, 2015**. The revised Report must be accompanied by a response letter that details where all revisions have been made, cross-referencing NMED’s numbered comments. In

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addition, the Permittee must submit a redline-strikeout version that identifies all changes and edits to the Report (the red-line strikeout may be an electronic copy) with the response.

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

Sincerely,



John E. Kieling  
Chief  
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB  
N. Dhawan, NMED HWB  
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File: Reading File and WRG 2015 File  
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