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CERTIFIED MAIL – RETURN RECEIPT REQUESTED

August 22, 2016

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

RE: DISAPPROVAL
LETTER REPORT EVAPORATION POND 7 DIKE BREACH AND
SUMMARY REPORT EVAPORATION POND REPAIRS
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-15-006

Dear Mr. Riege:

In March and April of 2015 the New Mexico Environment Department (NMED) and the Oil Conservation Division (OCD) contacted Western Refining Southwest, Inc. Gallup Refinery (the Permittee) regarding requirements related to the repair of evaporation pond berms. The Permittee subsequently submitted a report discussing the breach and repair of the Evaporation Pond 7 berm as well as improvements to several other evaporation pond berms. NMED has completed its review of the Permittee's *Letter Report Evaporation Pond 7 Dike Breach and Summary Report Evaporation Pond Repairs* (Report), dated December 2015 and hereby issues this Disapproval with the following comments.

Comment 1
In Section III (Miscellaneous), Part B (Pond Integrity), the Permittee states, "NMED's April 8, 2015 letter states 'seepage is likely occurring' and 'there is evidence that the berms are still in need of repair.' NMED notes that the basis for this observation is information from an August 2014 U.S. Environmental Protection Agency (EPA) RCRA compliance inspection. EPA' s

Inspection Report indicated that EPA had observed what it believed was moisture at a pond dike, and included several photographs, all of Pond 6. Western received EPA's Inspection Report in Fall 2014 and completed significant berm improvements on Pond 6 in March 2015, prior to receiving NMED's April 8th letter. Western also completed improvements to other pond dikes during this same time period." Section 2.4.3 (Pond 7/8 West Berm Soil Borings) describes the soils as "[t]he berm fill soil was characterized as a red, silt to clay moist soil, until the native material was encountered around 12 feet deep. Native material was characterized as gray fine sand overlaying a stiff wet red clay." Soil boring logs presented in Appendix D (Soil Boring Logs) indicate that there are "wet" layers in the soils within the evaporation pond berms along Ponds 7 and 8. Sand layers are also identified in the berm boring logs. The boring logs provided in Appendix C indicate water was present when those borings were installed in 2000. For example Boring 8 (Southwest Corner of Pond 9A) indicates that the depth to water is 18 feet with a note "water bearing at 18', water rises to 6'2" after 24-hours and stabilizes." From 10 feet below the berm surface and down, the soil descriptions are "slightly sandy" at 10 feet, "very sandy" at 15 feet, and "sandy" at 20 feet. This is evidence that the evaporation pond berms allow water to seep through in spite of the calculated 1.9×10^{-7} cm/sec permeability. In the revised Report, discuss the permeability of the berms, the sand layers, and whether or not the water observed in the borings presents a risk for berm failure. See also Comment 4.

Comment 2
In Section III (Miscellaneous) point B, bullet 1 the Permittee discusses the placement of additional evaporation blowers to help in lowering the amount of water in the evaporation ponds. In the revised Report discuss the frequency (e.g., continuous, as needed) the blowers will be used.

Comment 3
In Section III (Miscellaneous) point B, bullet 3 the Permittee discusses new staff gauges that were installed to measure current storage, remaining storage volume, and freeboard in the evaporation ponds. The Permittee must keep track of these measurements and report the data in table format in the annual Facility-wide Groundwater Monitoring Report. Additionally, the Permittee must also report on evaporation pond inspections, maintenance, and/or repairs to the evaporation pond berms in the annual Facility Wide Groundwater Monitoring Report.

Comment 4
In Section 2.4.4 the Permittee states, "[w]ater levels (if present) have been measured in the drive-point piezometers three times since installation (as of November 11, 2015) and that data is contained in the piezometer logs in Appendix E. Due to the low permeability clay soil in the berms, as of December 2015, the water levels in the piezometers have not yet completely stabilized. Western will continue to monitor the water levels in the piezometers as needed. The drive-point piezometer logs also visually illustrate the location of the phreatic surface." The piezometer logs indicate that surface water is entering the casing at the ground surface in a few

of the piezometers (e.g., Pond 6, Piezometer E), ensure that the casing is constructed so that surface water cannot infiltrate the casing. Additionally, in the revised Report discuss how often water levels in the piezometer will be monitored and reference that the information will be reported in an annual status report (See Comment 3). Also, discuss whether or not the piezometric surface is below the potential or existing sliding surface or below the stability threshold for the berm slopes and discuss what measures will be taken if the water levels in the piezometers increase to the point where slope failure is possible.

Specific Geotechnical Comments

Comment 5

The stability of the embankment slopes was evaluated using total stress rather than effective stress analysis methods. Total stress analyses involve less sophisticated (and less costly) laboratory strength test methods than effective stress analyses and were in common usage thirty or more years ago. It has since become clear to the engineering profession that the strength behavior of soil is best characterized in terms of effective stresses, where the pressure of the water within the pores of the soil is explicitly accounted for. In total stress analyses, by comparison, pore water pressures are simply lumped into the soil strength value without quantification. The total stress method, because of the soil testing methodology employed, can potentially involve computations that involve artificially high values of soil cohesion, which, in turn, may lead to falsely high computed factors of safety (FS). Although the stability of the embankment slopes may indeed be satisfactory, that conclusion cannot reasonably be drawn from the data presented.

In order to assess whether the stability of each embankment lies within an acceptable range (for example, the FS = 1.5 for long term stability of the downstream face), all stability analyses must be repeated using the effective stress method in the context of the Bishop Method or the Morgenstern Price method. This requires retesting the soils to determine their effective stress shear strength parameters (φ and c) using, for example, the direct shear method (a drained test) or the triaxial test (a drained test or, alternatively, an undrained test with pore pressure measurement). Provide a work plan proposing to collect additional soil data from the evaporation pond berms.

Comment 6

The slope stability analyses did not include an assessment of potential seismic loading conditions. A pseudo-seismic analysis must be performed for this purpose. As required by 40 CFR § 257.74(3)(e)(iv) and discussed in Seed, H.B. 1979. Geotechnique Vol. 29, No. 3. An appropriate peak ground acceleration (PGA) should be applied to determine if the proposed slopes are stable under a seismic load. It is recommended that a PGA (2% over 50 years) of 0.081g based on current mapping be applied. The liquefaction potential of the berm material must also be evaluated.

Comment 7
It is not clear how the water level was determined for the Pond 9 north rebuild section. It does not appear that piezometers were installed in the embankment. In addition, boring logs in the area seem to present conflicting information. Provide information regarding how the groundwater levels were determined for this section and to discuss the method used to measure the water level.

Comment 8
The Report does not provide information on how the strengths and unit weights for each soil type were determined, nor does it provide information as to how the delineations of soil materials were determined. Boring logs from 2002 do not contain elevations and no geotechnical lab data were provided concerning the soil material used to complete repairs in 2013 and 2015. The analysis must include this information so that slope stability analyses are accurate and also so that a technical evaluation of the soils geotechnical information may be completed. If historic boring logs do not include elevations and geotechnical laboratory data, then the Permittee must provide a schedule to submit a work plan proposing to collect additional soil boring data.

Comment 9
The Report does not specify whether rapid drawdown will be employed during site operations. If rapid drawdown is expected to occur, then a rapid drawdown analysis must be conducted to investigate the stability of interior slope faces of any pond embankment that is potentially subject to instances of abrupt lowering of the water level in the pond. Under such circumstances, the rate of dissipation of pore water pressures in the embankment soils, which have developed under long term steady state conditions, cannot keep pace with the lowering of the pond level. This results in excess pore pressures in the embankment that are likely to reduce embankment stability below that of long term steady state conditions. If the Permittee expects rapid drawdown at the evaporation ponds, then this analysis must be conducted. Please revise the Report accordingly.

Comment 10
The Report does not specify whether loading to the berms is anticipated. The analyses were run assuming there would be no loadings on the berms (that is, no vehicular axle loadings and no dead loads). Traffic or high loadings on the berms must be included in the analysis if, in fact, such loadings are present or may occur.

Comment 11
The graphical output profile of the Slope/W runs is confusing. Although the output file appears to provide a detailed summary of the specific run, the delineation of materials and zones is unclear. Also, in some runs, the critical failure plane is cut off and not within the limits of the profile. The graphical output must be portrayed at a scale that shows the full profile and is clear and understandable so that the stability of the slope can be confidently evaluated. Revise the Report accordingly.

Comment 12

In the revised Report, the following design scenarios must be evaluated in order to determine whether their inclusion would significantly impact embankment stability:

1. Utilize a more conservative estimate of the groundwater elevation through the embankment for Pond 6 (west to east) and Pond 8 (south to north), using the November 11, 2015 readings from Piezometers A and E.

2. In the Slope/W runs, larger entry/exit ranges with more convergence/slip surfaces for each point must be utilized to increase confidence that the critical failure surface (that is, the surface with the lowest factor of safety) had, in fact, been identified.

3. The Report does not explicitly state why the sections were cut where they were. Revise the Report to discuss the decision process. Additionally:

   a) move Section 6 to the southwest and extending Section 6 into the bottom of Pond 7 to enable a stability analysis of the interior slopes of Ponds 6 and 7, including a surcharge loading (as appropriate). [See Annotated Drawing 6a, note 5];

   b) move Section 8 slightly to the west to capture the low point of the pond, corresponding to what appears to be the tallest and most appropriate embankment section for the analysis of stability. [See Annotated Drawing 6a, note 6]; and

   c) extend Section 9A directly north into the Pond 6 bottom, so the stability analysis is performed of the interior slopes of Ponds 6 and 9, with the inclusion of surcharge loads, as appropriate. [See Annotated Drawing 6a, note 7]

The Permittee must submit a revised Report. The submittal must be in the form of two bound paper copies and also an electronic copy that includes a redline-strikeout version of the Report that shows where all changes have been made to the Report. The revised Report must be submitted on or before **February 21, 2017**. Please ensure that NMED and OCD are both copied on all correspondence and submittals regarding this issue.

If you have questions regarding this Requirement, 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
K. Van Horn, NMED HWB
A. Hains, WRG
C. Chavez, EMNRD OCD
S. Holcomb, NMED SWQB
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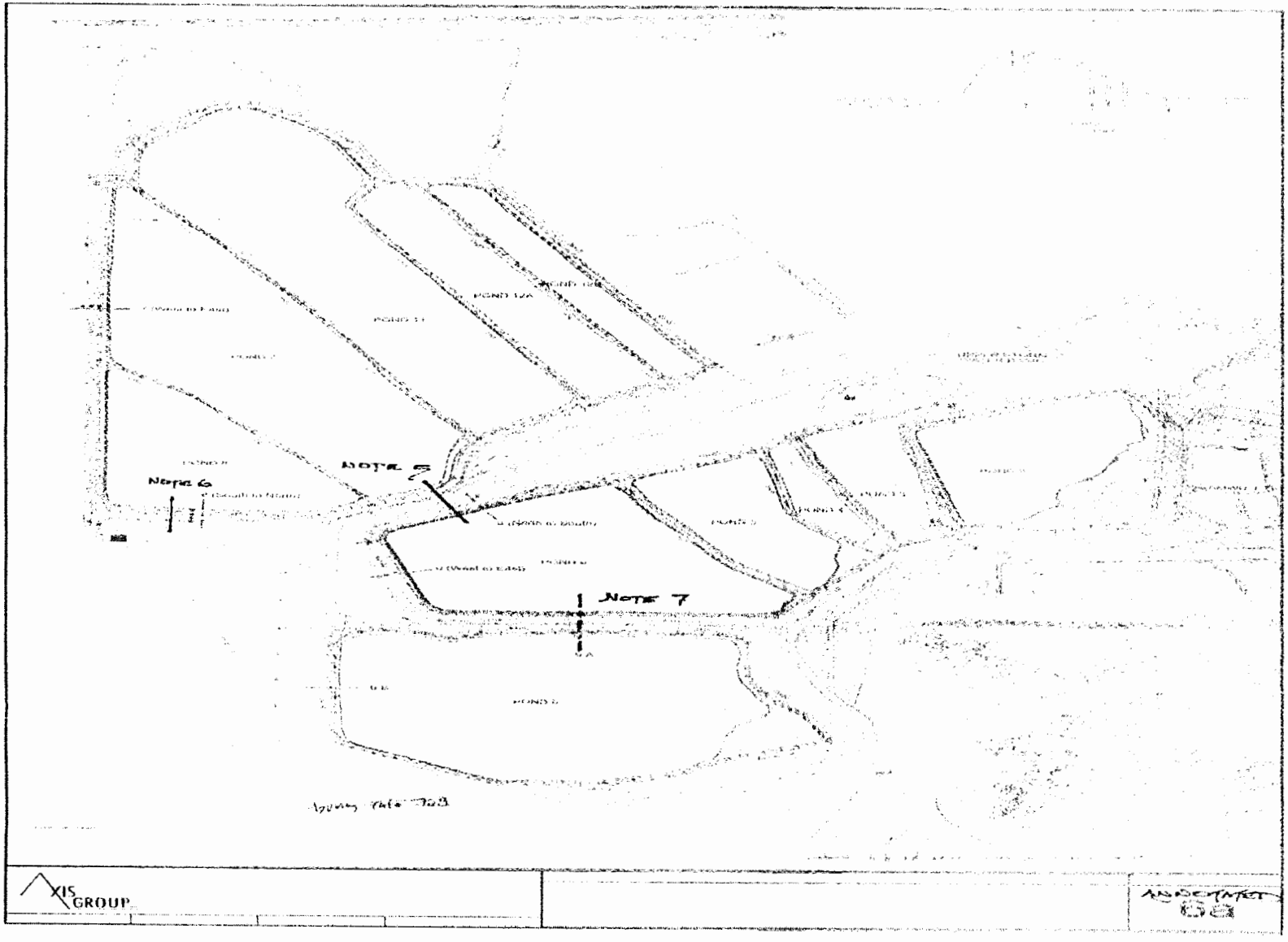
File: Reading File and WRG 2016 File
WRG-15-006


Note 6
Note 5
Note 7
AXIS GROUP