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NEW MEXICO  **ENTERED**  
ENVIRONMENT DEPARTMENT

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**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**



**James C. Kenney**  
Cabinet Secretary

**Jennifer J. Pruett**  
Deputy Secretary

**APR 03 2020**

John Moore  
Environmental Superintendent  
Western Refining, Southwest Inc., Gallup Refinery  
92 Giant Crossing Road  
Gallup, New Mexico 87301

**RE: APPROVAL WITH MODIFICATIONS  
GEOTECHNICAL ENGINEERING REPORT  
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY  
EPA ID # NMD000333211  
HWB-WRG-20-001**

Dear Mr. Moore:

The New Mexico Environment Department (NMED) has reviewed the *Geotechnical Engineering Report* (Report), dated January 7, 2020, submitted on behalf of Marathon Petroleum Company dba Western Refining Southwest Inc., Gallup Refinery (the Permittee). The Report is generally acceptable; however, several technical deficiencies are identified in the Report. NMED hereby issues this Approval with Modifications with the attached comments.

The Permittee must address all comments in the attachment and submit a response letter, and replacement pages no later than **August 17, 2020**.

This approval is based on the information presented in the document as it relates to the objectives of the work identified by NMED at the time of review. Approval of this document does not constitute agreement with all information or every statement presented in the document.

Mr. Moore  
Geotech Engineering Report  
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If you have questions regarding this Approval with Modifications, please contact Michiya Suzuki  
of my staff at 505-476-6046.

Sincerely,



Kevin Pierard  
Chief  
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB  
M. Suzuki, NMED HWB  
C. Chavez, OCD  
L. King, EPA Region 6 (6LCRRC)  
B. Moore, WRG

File: Reading File and WRG 2020 File  
HWB-WRG-20-001

Attachment

**Comment 1**

In the Project Description Section, page 1, the Permittee states, “[t]he ponds are apparently lined with a synthetic HDPE or compacted clay liner.” Previous information indicates that ponds are lined with compacted clay rather than HDPE. Explain which ponds are lined with a synthetic HDPE, if any, in a response letter.

**Comment 2**

In the Geotechnical Characterization Section, *Subsurface Profile*, page 4, the Permittee states, “[m]ost pertinent to the geotechnical engineering analyses discussed later in this report, are the results of the consolidated drained triaxial shear tests and unconfined compression strength tests conducted on relatively undisturbed samples obtained from the test borings.” The method used to determine the shear strength was not appropriate. Typically, three specimens of the same soil are tested over a range of normal or effective stresses which would be present along potential failure surfaces to define the strength envelope. To bracket this range for a 13-foot-high embankment, an additional confining stress greater than five pounds per square inch (psi) would be necessary. Although the Permittee used conservative strength properties relative to literature values for similar materials, if water levels vary or rise in the piezometers, then stability analyses will need to be rerun, and more accurate strength values will need to be determined. In this case, consolidated undrained triaxial tests with pore water pressure measurements must be run with three specimens of the same soil collected from the same cross-section. This would require the collection of new undisturbed samples. Acknowledge the provision in the response letter. No other action is required.

In addition, NMED does not agree with using unconfined (zero confining stress) compression strength tests to determine effective cohesion ( $c'$ ) because those tests are normally used to determine total stress cohesion – to be used in total stress (short term/end of construction) analyses with friction angle ( $\phi'$ ) equal zero. In the event that shear strength needs to be reevaluated,  $c'$  must be determined using the consolidated undrained triaxial test with pore water pressure measurements.

**Comment 3**

In the Geotechnical Characterization Section, *Subsurface Profile*, page 5, the Permittee states, “[u]sing the lowest unconfined compression strength test result, the combined Mohr envelope, and Table 5.1, the following Mohr-Coulomb strength parameters were conservatively developed for use in modeling the subsurface stratigraphy for the stability analyses.” The unit weight of 115 pounds per cubic foot (pcf) was used for the “fat clay” in the stability analysis. However, the unit weight must be calculated based on the soil moisture content and dry density in Appendix B, *Laboratory Testing*, Exhibits B-10 through B-23. The unit weight of the soil is averaged as 123 pcf. It is more appropriate to conduct the slop stability analysis using the results acquired from laboratory tests. Rerun the stability analysis using the soil unit weight as determined by the laboratory tests. Provide replacement pages, where applicable.

**Comment 4**

In the Stability Evaluation Section, *Stability Modeling*, page 7, the Permittee states, “[a]n assumed traffic live load of 150 psf was applied to the crest of each embankment and section to simulate maintenance truck traffic that may be encountered during the lifetime of the structures.” It is not clear how the live load value of 150 psf was used. Provide a reference for the value in the response letter.

**Comment 5**

In Appendix B, *Laboratory Testing*, Exhibits B-10 through B-23 are labeled as both Consolidated Drawing Triaxial Compression Tests and Unconfined Compression Strength. Clarify which test was performed on the samples in the response letter.

**Comment 6**

In Appendix C, *Piezometer Readings*, Exhibits C-2 and C-3 present water levels in piezometers installed along Ponds 6, 7, and 9. Piezometer readings in Pond 6 increased significantly between September 16, 2019 and December 11, 2019. Issues associated with the increase of the water level in Pond 6 must be addressed. The following sequence of corrective measures must be taken:

- a. Pond 6 piezometer reading must continue to be monitored. If piezometer readings continue to rise, it is likely that the minimum factor of safety will no longer be attainable. Therefore, Pond 6 piezometers must continue to be measured until piezometer readings stabilize.
- b. If piezometer readings rise, stability analyses must be rerun to determine whether a static factor of safety of 1.5 and a seismic factor of safety of 1.13 are still attained.
- c. If stability analyses are rerun and the static factor of safety is calculated to be less than 1.5 or a seismic factor of safety is less than 1.13, embankment soil strength must be evaluated using the method prescribed in Comment 2 above.

Collect piezometer readings quarterly and report them in future annual periodic groundwater reports. In addition, provide a discussion regarding the necessity of conducting the analyses in the reports.

**Comment 7**

In Appendix D, *Slope Stability Analyses*, Exhibit D-3 indicates that there is minimal freeboard at Pond 7; the pond water level is nearly at the crest elevation. Inadequate freeboard could result in overtopping during a storm event. Breaching and instability caused by erosion may result from overtopping, regardless of the acceptable stability analyses factors of safety. Evaluate whether current water levels provide adequate freeboard and provide a discussion in the response letter.

**Comment 8**

The Report does not discuss the situation where rapid drawdown is employed during site operations (e.g., pond cleanout). If rapid drawdown is expected to occur, a rapid drawdown analysis must be conducted to evaluate the stability of interior slopes. Under rapid drawdown conditions, 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. In the response letter, explain whether site operations that employ rapid drawdown are scheduled in near future. If such events are scheduled, rapid drawdown analysis must be conducted prior to executing the operations and the results submitted to NMED for review.