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**CONTAMINANT MIGRATION  
INVESTIGATION  
REPORT**

**2015**



SUSANA MARTINEZ  
Governor

JOHN A. SANCHEZ  
Lt. Governor

NEW MEXICO  
ENVIRONMENT DEPARTMENT

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BUTCH TONGATE  
Cabinet Secretary - Designate

J. C. BORREGO  
Deputy Secretary

**CERTIFIED MAIL – RETURN RECEIPT REQUESTED**

December 16, 2016

Mr. Scott M. Denton  
Environmental Manager  
HollyFrontier Navajo Refining LLC  
P.O. Box 159  
Artesia, New Mexico 88211-0159

**RE: APPROVAL FOR EXTENSION REQUEST FOR SUBMITTAL OF  
THE REVISED CONTAMINANT MIGRATION EVALUATION REPORT  
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY  
EPA ID NO. NMD048918817  
HWB-NRC-15-005**

Dear Mr. Denton:

The New Mexico Environment Department (NMED) has received HollyFrontier Navajo Refining LLC's, Artesia Refinery's (the Permittee) *Request for Extension for Submittal of the Contaminant Migration Evaluation Report* dated November 21, 2016. The reason for the extension request is that "the degree of the modifications to the report, and the ties to the Ground Water Recovery System Pump Test work plan, all requested by [NMED] Hazardous Waste Bureau personnel will need additional time to prepare." The Permittee requires additional time because "the entire scope of changes cannot be completed in time to meet the submittal deadline." The Permittee requests to extend the submittal deadline to **April 1, 2017**. NMED hereby approves the extension for submittal of the revised Contaminant Migration Evaluation Investigation Report (CME IR) with the following comments.

**Comment 1**

In paragraph 2, the Permittee states that "[t]he Ground Water Recovery System Pump Test draft report was submitted to NMED on November 10, 2016. Navajo believes that many of the

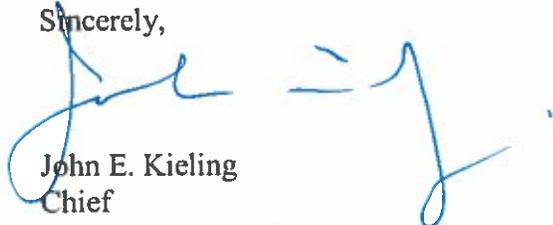
concerns expressed by NMED will be addressed in the agency's review of that report." After completing a preliminary review, NMED is uncertain that the Ground Water Recovery System Pump Test draft report will address NMED's concerns in the revised CME IR. Also, since the Pump Test Report has been submitted in draft form, the Permittee must directly address the comments from the September 21, 2016 Disapproval letter with the information from the CME investigation.

**Comment 2**

In paragraph 3, the Permittee requests an extension for approval by the landowner to install the proposed well(s) in Comment 7 of NMED's September 21, 2016 Disapproval letter. NMED requested that a work plan for the installation of additional monitoring wells be submitted no later than December 2, 2016. NMED hereby approves the extension and the Permittee must provide the work plan no later than **April 1, 2017**.

If you have any questions regarding this letter, please contact Leona Tsinnajinnie of my staff at (505) 476-6057.

Sincerely,



John E. Kieling  
Chief  
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB  
K. Van Horn, NMED HWB  
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File: Reading File and NRC 2016  
HWB-NRC-15-005



SUSANA MARTINEZ  
Governor

JOHN A. SANCHEZ  
Lieutenant Governor

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BUTCH TONGATE  
Cabinet Secretary  
J. C. BORREGO  
Acting Deputy Secretary

**CERTIFIED MAIL – RETURN RECEIPT REQUESTED**

September 21, 2016

Mr. Scott M. Denton  
Environmental Manager  
HollyFrontier Navajo Refining LLC  
P.O. Box 159  
Artesia, New Mexico 88211-0159

**RE: DISAPPROVAL  
CONTAMINANT MIGRATION EVALUATION  
INVESTIGATION REPORT, FEBRUARY 2015  
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY  
EPA ID NO. NMD048918817  
HWB-NRC-15-005**

Dear Mr. Denton:

The New Mexico Environment Department (NMED) has reviewed the HollyFrontier Navajo Refining LLC - Artesia Refinery's (the Permittee) *Contaminant Migration Evaluation Investigation Report* (Report), received March 2, 2015. NMED hereby issues this Disapproval with the following comments.

**Comment 1**

In Section 2.2.5 (Phase-Separated Hydrocarbons Recovery System), page 7, the Permittee discusses upgrades to the phase separated hydrocarbons (PSH) system and identifies the active recovery wells; however, the Permittee does not present PSH recovery data for individual recovery wells. Provide a table that summarizes the combined and individual removal rates of each of the recovery wells, including current removal rate and maximum removal rate in the revised Report.

### **Comment 2**

In Section 4.5.1.2 (Resistivity Data Presentation), page 29, paragraph 1, the Permittee states that “[t]he scale varies between cross sections and thus the red and blue colors do not necessarily indicate the same resistivity response on each cross section (i.e., red correlates to 50 [Ohm-meters ( $\Omega$ -m)] on line B-B’ and 25  $\Omega$ -m on line F-F’).” There are several issues with the way the Permittee presented this data. It is not clear how the scale is different for the cross sections which are shaded to represent the resistivity data because each scale for the separate cross sections ranges from 5 to 100  $\Omega$ -m. In addition, there appear to be inconsistencies with the interpretations of the resistivity data with regard to determining the lithology in the cross sections. For example, in Figure 20 (Cross Section 6-6’), there are high resistivity readings below boring B85, which is located in a clay layer. However, in Figure 18 (Cross Section 4-4’), there appears to be a reading similar to B85 between monitoring wells MW-128 and MW-129 in silty clay/clay layers that the Permittee interpreted to be a gravelly clay rather than clay. In the revised Report, provide additional explanation about how the resistivity responses presented in the figures were different if the scale is presented with the same range for each figure. In addition, explain how the resistivity data was interpreted to determine the lithology from the data results. If the reported resistivity data was determined by generating a table and assigning specific ranges for each lithology on the figures based on the investigation data, provide the table in the revised Report.

### **Comment 3**

In Section 4.5.1.2 (Resistivity Data Presentation), page 29, paragraph 2, the Permittee states that “[t]he depth of penetration for all survey lines varies, but the data sets were trimmed to approximately 100 feet [below ground surface (bgs)] to highlight the depth of interest and minimize data artifacts at a depth typically associated with the lower data density in the model. In the survey array, the distance between the current and voltage electrode pairs dictates the depth of the measurement.” In the revised Report, explain why the depth of penetration varied for the surveyed lines and clarify if the variation was along the same survey line or separate survey lines. In addition, discuss the distance between the current and voltage electrode pairs and state whether the distance between them was consistent for each survey line or if it varied. If the distance between the current and electrode pairs varied, explain the factors contributing to the variation and how it affected the depth of penetration for the survey lines.

### **Comment 4**

In Section 4.5.2.3 (Cross-Section 3-3’), the Permittee does not describe the significant induced polarization (IP) responses depicted in Figure 30 (Interpreted Sand/Gravel Channels and Interpreted Preferential Pathways with the Shallow Saturated Zone). In addition, it is not clear how the inverted IP data was interpreted to generate the IP responses on Figure 30. In Figure 17 (Cross-Section 3-3’), there appear to be small responses near boring #7 and MW-125; however,

the size of the response depicted on Figure 17 does not correlate to the line on Figure 30. Clarify how the significant IP responses were interpreted in the revised Report and explain why Figure 17 does not support the information depicted in Figure 30.

#### **Comment 5**

In Section 4.5.2.4 (Cross-Section 4-4'), the Permittee states that "the inverted resistivity section allows for an expanded geologic interpretation regarding the two more highly resistive anomalies (shown in red and yellow) that occur between soil boring #8 and MW-128 and between MW-128 and MW-129, respectively. These more highly resistive anomalies are interpreted as more permeable clayey gravel units." NMED was not provided with the resistivity data and cannot verify the information presented in the inverted resistivity and IP section figures because of the discrepancy of the scales presented in Section 4.5.1.2 (Resistivity Data Presentation). (*see also* Comment 2) Provide additional information and discussion to this section to support the interpretation of the resistivity data in the revised Report.

#### **Comment 6**

In Section 5.1 (New Mexico Soil Screening Levels), page 42, paragraph 2, the Permittee discusses the use of the Environmental Protection Agency's (EPA) January 2015 regional screening level (RSL) of 6.7 milligrams per kilogram (mg/kg) for arsenic. The Permittee's reason for screening with EPA's RSL is the application of a relative bioavailability factor to calculate the RSL. However, Section 4.1.1.b (Soil Cleanup Levels) item 1 from the December 2010 Post-Closure Care Permit states that "[f]or all individual contaminants for which NMED has specified a soil screening level in NMED's *Technical Background Document for Development of Soil Screening Levels*, the residential or industrial land use scenario cleanup level shall be the screening level specified in the most recent version of that document." Section 4.1.1.b.4 from the December 2010 Permit also states that the Permittee can propose a cleanup level "[i]f a NMED soil screening level has not been established for a hazardous waste or hazardous constituent." NMED has established a soil screening level (SSL) for arsenic. The residential SSL for arsenic is 4.25 mg/kg in Table A-1 (NMED Soil Screening Levels) and has been corrected for bioavailability. No correction is required for the revised Report because the focus of the investigation is not on naturally occurring metals. However, the Permittee must evaluate future investigation results with the established cleanup levels in the most current NMED guidance document. Note that NMED is currently updating their screening levels for 2017. No response required.

#### **Comment 7**

In Section 8 (Recommendations), bullet item 2, the Permittee proposes to "[i]nstall two additional downgradient monitoring wells along the eastern boundary of the pecan orchard located adjacent to Highway 82 and Bolton Road." Using the scale provided on Figure 39

(Extent of PSH in Shallow Saturated Zone), NMED plotted the proposed locations and determined that these locations will not provide useful information about the movement of the dissolved phase and PSH plumes. In addition, the Permittee states that “[t]hese wells will only be installed if the landowner grants access to the desired locations.” It would be more beneficial to install these additional downgradient wells in locations that are accessible and not as close to the locations of the nearby monitoring wells. Propose to install the additional monitoring wells downgradient and outside the boundary of the pecan orchard. Provide a work plan to propose locations and installation details for the additional downgradient monitoring wells.

### Comment 8

In Section 8 (Recommendations), bullet item 3, the Permittee proposes to “[i]nstall three additional PSH recovery wells within the gravel channels east of the Refinery to increase the recovery of PSH from the portion of the plume between the Refinery fence and Bolton Road.” NMED agrees that additional PSH recovery wells must be installed; however, it would be more effective if the recovery wells were installed close to the Refinery fence boundary to restrict off-site migration of contaminants. The dissolved phase and PSH plume must be captured, retained and treated closer to the source. Pumping and treating closer to the Refinery will focus on containing the plume at the source, and will reduce contaminant concentrations between the Refinery towards the pecan orchard. The Permittee recently submitted a *Shallow Saturated Zone Groundwater Pump Test Work Plan* (Work Plan) received by NMED on August 16, 2016. In this Work Plan the Permittee proposed to conduct a constant discharge pump test using six existing recovery wells (RW-2R, RW-6R, RW-7R, RW-14R, RW-18D, and RW-19) and collecting groundwater samples from RW-6R and RW-13R. The purpose of the pump test is to provide the Permittee with additional information to complete the design of a reinjection system, update the groundwater model developed from the Report and determine design parameters for a groundwater treatment system. NMED was not provided prior notification of the startup of the pilot test, but was informed during a call with the Permittee, to discuss clarifications regarding the Work Plan, that the pump test had commenced the week of August 22, 2016. During the call, NMED requested that MW-99 be included in the pump test if timing and budget allowed. Because the Permittee did not provide NMED with sufficient notification prior to starting the pump test, NMED was not able to review the Work Plan and provide technical feedback. As a result, the Permittee must propose to conduct an additional pump test by installing one recovery well near the eastern Refinery fence boundary to run a pilot study to determine the radius of influence in this area and to determine the appropriate depth of extraction and drawdown for contaminant removal. In addition, monitoring wells MW-66, MW-99, MW-107 and recovery well RW-19 must be included during the pilot study as required by Comment 6 of NMED’s response to the Permittee’s Work Plan. A step test must be conducted in this study to determine the optimum pumping rate prior to beginning the pilot study. Additional monitoring wells may need to be installed depending on the approved location unless there are surrounding monitoring wells in close proximity to the extraction points. This pilot test will also determine the appropriate spacing for additional recovery wells along the Refinery fence boundary. Provide a

work plan for this pilot study and propose a location for the recovery well based on the information in this Report.

#### **Comment 9**

Table 9 (Groundwater Analytical Data), pages 1 through 9, summarized the groundwater analytical data for the monitoring wells investigated for the Contaminant Migration Evaluation (CME). The column labeled "Area of Concern" is missing from pages 3 through 9. It is helpful for the review to provide this information in the tables. In future reports ensure the "Area of Concern" column is included on the appropriate spreadsheets and provide a replacement Table 9 in the revised Report.

#### **Comment 10**

Figures 15 (CROSS-SECTION 1-1') through 29 (CROSS-SECTION 15-15') depict cross sections using monitoring wells and borings as illustrated in Figure 14 (Locations of Lithologic Cross-Sections) that report groundwater and product levels, results of the nonaqueous phase liquid (NAPL) shake test for newly installed monitoring wells, the lithology of the cross section created from the boring logs and in some cases the inverted resistivity and inverted IP section figures. NMED has the following comments for these figures:

- a. In Figure 16 (Cross Section 2-2'), there is a typographical error in the title where *EVALUATION* is misspelled as *EVALUSTION*. Provide a replacement Figure 16 in the revised Report.
- b. On Figure 19 (Cross-Section 5-5'), the horizontal and vertical scales for the cross section and the inverted resistivity and IP section figures are not consistent. For example, the elevation scale for the cross section is approximately 0.99 inches equals 20 feet. For the inverted resistivity and IP section figures, the scale is approximately 1.05 inches equals 20 feet. Review all other figures to determine if the horizontal and vertical scales are the same for the cross section and the inverted resistivity and IP section figures. Provide replacement figures for those figures that have inconsistent scales. In future reports and submittals ensure all scales match up on all corresponding figures.
- c. In Figures 20 (Cross-Section 6-6') and 21 (Cross-Section 7-7') near KWB-6 and between RW-14R and RW-13R the Permittee depicts an inverted IP response in the parking area and the surface but does not discuss it in Section 4.5.2. Provide an explanation for these IP responses in the appropriate section(s) of the revised Report.
- d. In Figure 30, the Permittee depicts a significant IP response approximately 270 ft long starting north of boring 97-03 and extending south towards boring 97-02. Explain how the significant IP response in Figure 30 was determined if Figure 23 (Cross-Section 9-9')

does not depict a similar IP response in the inverted IP section figure. There are areas of low IP density presented in Figure 23 but the Permittee did not discuss how that data is utilized or if there is a numeric threshold from the IP data that is utilized to determine which IP data are significant enough to map in Figure 30. In addition, there are several other cross-sections (3-3', 4-4', 5-5', 6-6', 7-7', 8-8', and 14-14'), that present information where it is not clear how the significant IP response and its span across the sand/gravel channel was determined. Provide additional explanation about the evaluation of IP data to generate the significant IP response in Figure 30 in the appropriate section(s) of the revised Report.

- e. There is a typographical error in reporting the groundwater elevation for MW-66 on Figure 26 (Cross-Section 12-12'). The 2013 groundwater elevation is 3346.03 ft and the 2014 groundwater elevation is 3345.01 ft. The groundwater elevation reported on Figure 26 is approximately 3358.46 ft (5 ft bgs). Correct the information in a replacement Figure 26 in the revised Report.
- f. In Figure 27 (Cross-Section 13-13'), the Permittee did not include RW-19 in the cross section and the monitoring well location is approximately 30 ft east of KWB-4. In addition, the lithology of RW-19 does not match up with what is depicted on Figure 27. From 18 ft to 24 ft in the RW-19 boring log, cobbles are reported. In the KWB-4 boring log, the Permittee reported "increasing rock content from 18-25 [ft]"; however, this information was not reported on Figure 27. In the revised Report, explain why some monitoring wells were not included on the figures and why some information from the boring logs was not included in the cross sections.
- g. In Figure 28 (Cross-Section 14-14') the Permittee provides a depiction of MW-58 which is projected from approximately 150 ft south of the lithologic cross section line. The cross section generated in Figure 28 does not correlate with the MW-58 boring log. Figure 28 depicts the MW-58 monitoring well lithology as approximately 0-9 ft of sandy clay, underlain from 9-13 ft below ground surface (bgs) consists of silt, then from 13-18 ft bgs as sandy clay, and from 18-30 ft bgs is described as gravelly clay. The MW-58 boring log depicts the top 0-3 ft as fill material, then from 3-13 ft bgs there is clayey silt/silty clay, 13-18 ft bgs is clay, 18-20 ft bgs is clayey gravel, and then 20-30 ft bgs is clay. In addition, the Permittee did not discuss the inverted resistivity and corresponding inverted IP response west of KWB-6. In the revised Report, explain the reason the inverted resistivity section depicts resistive material near the surface and why the corresponding inverted IP response is considered an area of low IP data density in the appropriate section(s).
- h. In Figure 29 (Cross-Section 15-15'), the Permittee depicts an IP response west of CME-BH02; however, Figure 30 does not indicate a significant IP response near CME-BH02. Explain how the Permittee determined which IP responses were considered significant

and if a scale or other determination was utilized to evaluate the data, discuss how IP responses were determined to be significant in the appropriate section(s) of the revised Report and provide supporting tables with the response letter. (*see also* Comment 2)

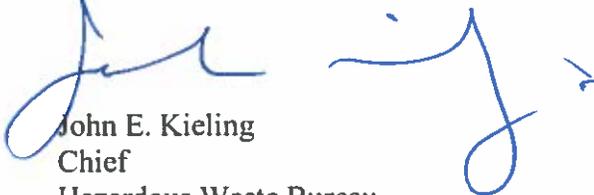
- i. On Figure 30 there is a significant IP response located south of Highway 82, extending approximately 90 feet west of KWB-2R and approximately 330 feet east of MW-58. These monitoring wells are located along Line M-M' from the Phase 2 study completed in March 2013; however, the Permittee did not include a cross section or a discussion in Section 4.5.2 (Cross-Sections) for Line M-M'. Considering there was a significant IP response at Line M-M', explain why this information was not discussed or provide a discussion in the revised Report.

S. M. Denton  
September 21, 2016  
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The Permittees must address all comments and submit a revised Report by **December 1, 2016**. As part of the response letter that accompanies the revised Report, the Permittees must include a table that details where all revisions have been made to the Report and that cross-references NMED's numbered comments. All submittals (including maps and tables) must be in the form of two paper copies and one electronic copy. In addition, the Permittees must submit a redline-strikeout version that includes all changes and edits to the Report (electronic copy) with the response to this Disapproval. In addition, the work plan for the additional monitoring well installation referenced in Comment 7 must be submitted to NMED no later than **December 2, 2016**. The pilot test work plan referenced in Comment 8 must be submitted to NMED no later than **December 31, 2016**.

If you have any questions regarding this letter, please contact Leona Tsinnajinnie at (505) 476-6057.

Sincerely,



John E. Kieling  
Chief  
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB  
N. Dhawan, NMED HWB  
K. Van Horn, NMED HWB  
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File: Reading File and NRC 2016  
HWB-NRC-15-005