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CERTIFIED MAIL – RETURN RECEIPT REQUESTED

February 1, 2018

Mr. William Bailey
Environmental Supervisor
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: DISAPPROVAL
INTERIM MEASURES REPORT
HYDROCARBON SEEP AREA
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-15-002

Dear Mr. Bailey:

The New Mexico Environment Department (NMED) has reviewed the *Revised Interim Measures Report Hydrocarbon Seep Area* (Report), submitted on July 8, 2016, on behalf of Western Refining Southwest Inc., Gallup Refinery (Permittee) and hereby issues this Disapproval with the following comments.

NMED Comment 1

The Permittee must include additional details in the revised Report to provide context and to eliminate misunderstanding by readers unfamiliar with the site. Revise the Report to include the following:

1. Include a figure(s) showing the location of areas and structures mentioned in the Report. To aid in understanding the objectives of the field activities, the figure must include: the heat exchanger bundle cleaning pad; tank T-231; tank TK-568; I/E shop; lab sinks;

sanitary lagoon; fresh water storage tank; tank water draw sewer cups; above-ground piping rack and other relevant buildings/structures/areas. The Permittee must not assume readers are familiar with the designations at the facility.

2. Additional description (e.g., composition, volume and concentration) regarding each dye test conducted in 2013 must be included in the revised Report. The Report describes the release locations of each test in Section 2.1; however, these locations are not clearly identified relative to the piping of the sewer line. Provide a diagram that shows the sewer line piping in relation to the dye release points and water/separate phase hydrocarbon (SPH) drains. Also, indicate the timing of breakthrough for each dye at the observed locations and address any concerns related to mixing them simultaneously during the 2013 test. Each dye was presumably introduced into the sewer system within a short time frame and observed in close proximity. The observation of dye was briefly documented in Table 1, and the orange and dark color solutions were detected in several wells. It is possible to create an orange or dark color solution if red and yellow/green dyes are mixed simultaneously. Also, if it is possible for higher concentrations of one dye to shade the color of another dye, the interpretation of the test will need to be reevaluated. Revise the Report to include a more thorough discussion of the dye tracer test.

3. Provide more specific information regarding the description of laboratory reports identified by # 1306C03, 1307524, and 1309D69 on page 2-6. These reports were identically described as "waste characterization soil sample of material excavated for sump installation west of Tank 101 and 102" although each sample was designated differently in the laboratory report. Revise the Report to distinguish the samples from each other and provide descriptions of where the samples were collected.

4. Provide additional details and discussion of the three dye tests conducted in 2016 as similarly required by NMED Comment 1.2 above in relation to the 2013 dye tests.

NMED Comment 2

The organization and accuracy of the Report makes it difficult for the reader to follow. Revise the Report to address the following:

1. Table 2 (Groundwater Analytical Results) contains groundwater analytical results for all analytical suites without appropriate subsections and subtitles. The table contains five categories of analytical results (1. BTEX/MTBE, 2. DRO/GRO/MRO/anions, 3. metals, 4. SVOCs, and 5. VOCs). No division or description was provided for each data set except for the VOCs set. Separate them into subsections (e.g., Table 2.1) and add subtitles (e.g., BTEX/MTBE) for better organization.

2. Table 2 (Groundwater Analytical Results) contains two separate analytical results for metals without clear distinction. Indicate whether the results are for dissolved or total metals concentrations. Also, modify the table to distinguish analytical method 200.7 from 200.8 for each analyte.

3. VOC results are not legible due to the small font size in Table 2. Use a legible font size and present the table on 11 x 17 paper.
4. Section 2.1 in the Report discusses six different actions taken for source identification without breaking the discussions into separate sections. Create subsections and add subtitles (e.g., Section 2.1.1 Completion of 14 Soil Excavations with a Backhoe) to provide more structure to the section so that the actions are more easily distinguished.
5. Multiple soil laboratory analytical reports are included in Appendix D; however, tables of the results comparing them to screening values are not provided. Provide a summary table(s) showing these results in the revised Report.
6. Typographical errors were found in the last paragraph of page 2-4, and the second paragraph of page 2-12 in the Report. Make the appropriate corrections in the revised Report.

NMED Comment 3

As stated in NMED's correspondence dated April 26, 2016 (Comment 10), NMED questions the quality of in-house laboratory results. On page 8 of the Permittee's correspondence dated July 28, 2016, the Permittee acknowledged the issue; however, continued to use the results of the distillation analysis in the revised Report. Discuss the data based on the results obtained from an independent third party laboratory (e.g., the result in laboratory report # 1307269-001), and remove the discussion related to the in-house distillation analyses from the Report.

NMED Comment 4

A chronological list of some events related to the hydrocarbon seep beginning on June 26, 2013 is provided below followed by NMED comments regarding the timing of activities:

- June 26, 2013 – A hydrocarbon seep was discovered west of crude oil storage tank T-102.
- August 14, 2013 – A breakthrough of dye was observed in wells MKTF-3 and MKTF-10. The investigation concluded there were leak(s) in the sewer piping system and a hydraulic connection between the area of seep and the sewer piping system.
- August 19, 2013 – An SPH release was discovered near tank T-3. The recovered SPH (1.5 barrels) was pumped into the sewer.
- August 27 and 28, 2013 – One of the sewer leaks was identified near the heat exchanger bundle cleaning pad through a camera survey.
- September 26, 2013 – A breakthrough of dye was observed in nine soil boring locations. The Report suggested the possibility of two separate release points from the sewer lines.
- October 23, 2013 – The leak near the bundle cleaning pad was repaired.
- May 27, 2016 – A breakthrough of dye was observed in the seep recovery standpipes.

Based on the cited chronology:

a. Approximately one and a half barrels of the recovered hydrocarbon was placed into the sewer system after it was discovered the system was leaking on August 19, 2013. Provide a justification for placing the recovered hydrocarbon into the leaking sewer line.

b. The sewer leak that was detected on August 27 and 28, 2013 was not repaired until October 23, 2013. Provide information regarding any interim measures (immediate corrective actions) taken by the Permittee between August and October (e.g., effort to bypass wastewater from the leaking piping) related to this leak. Also, provide the reason(s) it was not repaired until October 23, 2013.

c. Although one of the sewer leaks was repaired in October 23, 2013, the Permittee has been aware of other on-going leaks since September 26, 2013. Provide information related to the interim measures (immediate corrective actions) taken by the Permittee to address on-going leaks releasing untreated wastewater to the subsurface.

d. The unidentified sewer leaks may be contributing to the fluctuation of the water levels in MKTF wells as discussed in NMED's correspondence dated April 26, 2016 (Comment 16). Provide a discussion of the fluctuating water levels in MKTF wells in relation to wastewater flowrates.

e. Since the SPH release took place approximately 60 feet west (downgradient) of the sewer line near the heat exchanger bundle cleaning pad, wastewater previously released from the leak location may have "pushed" SPH already present in the ground toward the area of seep. Provide additional details on any known intermittent hydrocarbon releases that took place prior to June 26, 2013. Additionally, provide a chronological table for all releases from the marketing and crude oil tanks located downgradient of the heat exchanger bundle cleaning pad prior to June 26, 2013.

NMED Comment 5

NMED concurs that the sewer release point near the heat exchanger bundle cleaning pad is hydraulically connected to the area of seep. However, the release purportedly consisted of wastewater, not SPH itself, and it is not clear why the process wastewater contains such a large amount of SPH.

1. The Permittee must discuss how SPH enters the wastewater stream. Measure the SPH thickness in tanks T-27, T-28, and T-35, where the streams merge to evaluate the fractional content of SPH in the wastewater. Revise the Report to include a discussion of SPH in the tanks.

2. Provide an explanation for the presence of SPH in wastewater streams and whether the wastewater contains a large amount of SPH continuously or intermittently in the revised Report.

3. The recovered contaminated groundwater generated from environmental investigation activities appears to be released into the sewer at several drains. It appears that there are

still on-going unidentified leaks in the sewer piping. Presumably, some sewer drains (e.g., laboratory) are located upstream of the suspected leak locations. Ensure that the discharges are not creating further releases of contamination. Release all potentially contaminated fluids downstream of suspected leak locations unless repairs have adequately addressed the problem.

NMED Comment 6

Several soil samples were analyzed for characterization and disposal, as explained in Section 2.2 in the Report; however, the variance in the analytical parameters between samples was not explained. **Table A** shows the variance:

Table A: Variance in Soil Analytical Parameters

Lab Report #	GRO DRO MRO	Metals	VOCs	SVOCs	TCLP VOCs	TCLP SVOCs	TCLP Metals	RCI
1310486	x	x			x			x
1306C03	x				x	x	x	x
1307524	x				x	x	x	x
1309D69	x				x		x	x
1311343	x	x	x	x				
1311380	x				x		x	x
1406C66					x		x	
1605646		x	x	x	x	x		

Explain the reasons for the variance in analytical parameters among the sample sets in the revised Report.

NMED Comment 7

On page 2-4, the Permittee states, "[f]igure 11 in the July 2015 Interim Measures report shows the distribution of 1,1-dichloroethane (one of the most widely distributed chlorinated solvents) and it clearly appears to be sourced from a location near the leaking wastewater line. In addition, low concentrations of 1,1-dichloroethane and other solvents (e.g., trichloroethylene) were detected further to the southeast in well MKTF-37. Chlorinated solvents were historically used at the refinery in the maintenance shops and there may be additional sources in these areas." No groundwater samples were collected for VOC analyses from wells MKTF-5, 6, 7, 8, 12, 13, and 15 due to the presence of SPH although these wells are placed in the critical location for defining the contaminant plume. Thus, the identification of the source location of 1,1-dichloroethane appears to be inconclusive because the contaminant plume has not been fully defined. Moreover, there are still on-going unidentified leaks in the sewer piping and discharge entering the sanitary lagoon. See NMED comment 11. The highest 1,1-dichloroethane concentration was observed in the groundwater sample collected from well MKTF-25 located near the sanitary lagoon during the March 2015 sampling event. Revise the description of the source location from the revised Report and note that there may be additional sources.

NMED Comment 8

On page 2-7, the Permittee states, "[w]ater that has accumulated in the excavation along the seep area is being pumped out on a routine basis using a vacuum truck. The volumes of recovered groundwater and product (total) are provided in Table 5."

1. The title of Table 5 is "Hydrocarbon Seep Retention Ditch Recovery Volumes". Provide additional information pertaining to the hydrocarbon seep retention ditch (i.e., figures showing the location, construction date, and as built diagrams) in the revised Report.

2. It is not clear how the excavated soils were handled (e.g., storage or disposal). The analytical data for characterization and disposal were not included in the Report. Revise the Report to include this information.

3. Table 5 includes the recovery data from April 1, 2016 to June 29, 2016. A significant variability in the recovery rate is shown in Table 5. For instance, it took 26 days to recover 5,460 gallons between April 1 and April 27, 2016 but it took one day to recover 5,460 gallons on the following day April 28, 2016. There may be a correlation between the rate of sanitary lagoon discharge and recovery rate in the ditch. Evaluate for a correlation and discuss the findings in the revised Report.

NMED Comment 9

On page 2-7, the Permittee states, "[s]oil samples were not collected as the purpose of the wells was to define the impacts to groundwater."

1. NMED acknowledges the Permittee's intention of focusing on identification of primary sources and associated groundwater impacts; however, the Permittee must approach each corrective measure more holistically. Observations pertaining to hydrocarbon odor and PID readings are useful for site delineation. But they are insufficient and incomplete unless associated soil samples are also collected for laboratory analysis. Include soil sampling for laboratory analyses for every future soil boring or test pit installation in the area of the seep.

2. It is not clear how the drill cuttings were managed for storage or disposal. The analytical data for the characterization and disposal were not included in the Report. Revise the Report to include this information.

NMED Comment 10

On page 2-12, the Permittee states, "[f]igure 10 shows the distribution of benzene with two apparent source areas. The highest concentrations appear to originate in the area where the leak was identified in the wastewater line near the Bundle Cleaning Pad and a second area of high concentrations is located near the trucking loading rack." The benzene concentration in the groundwater sample collected from well MKTF-16, located approximately 30 feet west of the replaced sewer line, has been steadily increasing since October 2013. Table 2 indicates that the benzene concentration in the groundwater sample collected from well MKTF-16 was 9.9 mg/L in November 2013 and 28 mg/L in November 2015. The increasing trend of benzene concentrations in the groundwater samples obtained from well MKTF-16 suggests a possibility of another release near the replaced sewer. Submit a work plan to investigate and address increasing benzene concentrations in the vicinity of the replaced sewer.

NMED Comment 11

On page 11 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 15 states, "[t]he sanitary lagoon (identified as Sanitary Lagoon #2 in earlier site documentation) located west of the crude oil storage tanks receives a small flow of sanitary wastewater from the warehouses, lab building and firehouse." Revise the Report to clarify the location of the sanitary lagoon and discharge piping from the refinery in a figure or drawing (See NMED Comment 1.1) and describe the nature of discharge (e.g., daily discharge volume, sources of the discharge, chemical analysis of the discharged wastewater) to the lagoon. Additionally, describe the construction details (size, presence/absence of the bottom liner, dike, etc.) of the sanitary lagoon. Also, explain why this wastewater flow is diverted from the main refinery wastewater system.

NMED Comment 12

On pages 2-12 and 2-13, the Permittee states, "[t]he elevated iron concentrations may be the result of the reduction of ferrous iron that occurs when iron acts an electron acceptor during biodegradation of either petroleum hydrocarbons or chlorinated solvents. Iron would serve as an electron acceptor after depletion of more active electron acceptors (e.g., oxygen, nitrate, and manganese)."

1. Clarify the Permittee's purpose for choosing "ferrous" rather than "ferric" in the statement. Make a correction in the revised Report if necessary. Ferrous ion is the reduced form of ferric ion. Elemental iron is the reduced form of ferrous ion.

2. The field analytical parameters such as dissolved oxygen concentration and oxidation-reduction potential (ORP) must be evaluated and presented to support the argument that reducing conditions and anaerobic degradation are occurring. Also, the ratio of total and dissolved iron concentrations must be examined to support the argument. Revise the Report as necessary.

3. Most chlorinated compounds at the facility are not subject to the degradation pathway stated by the Permittee. If the reduction of iron is proven to be taking place at the site, the Permittee must also investigate the anaerobic dechlorination pathway. Revise the Report to propose the submittal of a work plan to investigate the occurrence of anaerobic dechlorination.

4. The accumulation of vinyl chloride may be occurring based on the site's groundwater conditions. In the plan referenced in Item 3 above, propose to monitor and evaluate the groundwater for analytical parameters pertinent to the accumulation or degradation of vinyl chloride (e.g., concentrations of daughter products, dissolved oxygen, chloride, redox potential, and pH). Include all previously acquired data and interpretation of the existing data in the revised Report.

5. The Permittee must evaluate for the occurrence of hydrocarbon and MTBE degradation (e.g. concentrations of the electron acceptors, degradation byproducts, redox potential, and pH). Include all findings and interpretation of the existing data in the revised Report.

NMED Comment 13
On page 6 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 7 states, "[N]MED states that the release was not reported to them or to [New Mexico Energy Minerals and Natural Resources Department (EMNRD) Oil Conservation Division] OCD. This is not correct; the release was previously reported to both agencies." Provide a copy of any documentation related to the reporting of the August 2013 incident to NMED and OCD. All releases greater than one barrels (42 gallons) must be reported to the NMED in accordance with Permit Section II.C. In addition, all releases of hazardous waste greater than one gallon must be reported to NMED.

NMED Comment 14
On page 9 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 11 states, "[t]he total volume sent off-site was 830 cubic yards and Section 2.2 has been revised to reflect the final disposal volume."

Based on the data provided in the Report, the volume of excavated soil is estimated as follows: $(180 \times 20 \times 12 - \{[(8/12)/2]^2\pi \times 180\}) \times (1 \text{ cubic yard} / 27 \text{ cubic feet}) = 1{,}598$ cubic yards

If the estimated volume of excavated soil was 1,598 cubic yards, and the disposed volume was 830 cubic yards, then the remaining excavated soil (768 cubic yards) is unaccounted for. Revise the Report to describe how the remaining soil was managed.

NMED Comment 15
On page 10 of the correspondence dated July 28, 2016, the the Permittee's response to the NMED Comment 13 states, "[t]he possible sources of the chlorinated solvents are discussed in Section 2.1." The only discussion related to the potential sources of chlorinated solvents in Section 2.1 is found on page 2-4 stating, "[c]hlorinated solvents were historically used at the refinery in the maintenance shops and there may be additional sources in these areas." Provide more details regarding the "additional sources" and explain the nature of chlorinated solvent use at the facility. If chlorinated solvents are currently used or stored in certain location(s) at the Facility, identify them in the revised Report.

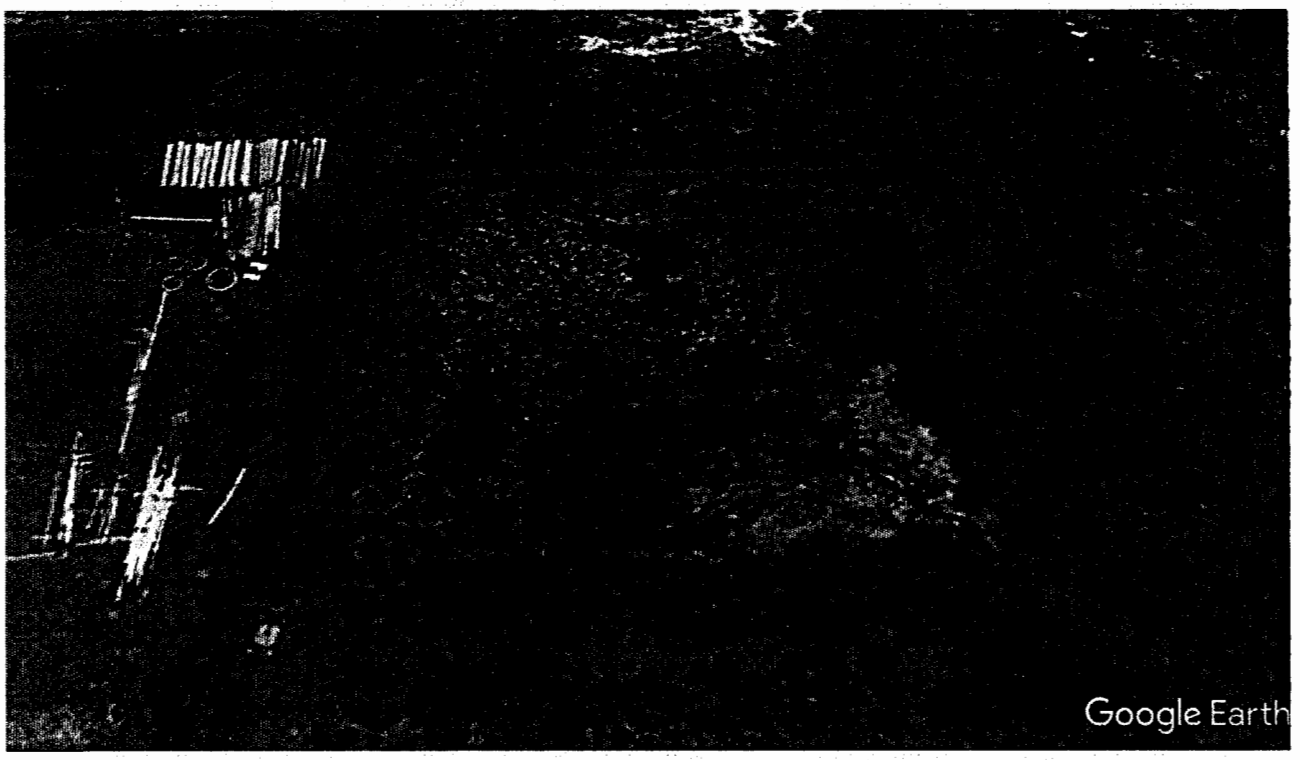
NMED Comment 16
On page 10 of the correspondence dated July 28, 2016, the Permittee's response to the NMED Comment 13 states, "[t]here is no reason to believe there is a connection between the presence of 2-methylnaphthalene in the shallow groundwater and the production interval of PW-3." Even if there is no hydraulic connection between shallow and deep aquifers, the contaminant could migrate into the deep aquifer through faulty construction of the well. Provide all available construction details for PW-3 (e.g., screen interval, depth of sand pack, or open borehole).

NMED Comment 17
On page 11 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 14 states, "[a]ctually, many of the soil samples collected for confirmation and waste disposal did include SVOCs." **Table A** indicates the samples listed in laboratory report # 1310486, 1311380, and 1406C66 were not analyzed for SVOCs. All soil samples collected for

confirmation and waste disposal must be analyzed for SVOCs and other applicable parameters in the future.

NMED Comment 18

On page 2-10, the Permittee states, "[b]ased on well development and sampling efforts, many of the wells do not produce significant volumes of water with the exception of wells located near the sanitary lagoon, which is located approximately 400 feet directly west of the crude oil storage tanks". Also, on page 11 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 15 states, "[t]he "sanitary lagoon (identified as Sanitary Lagoon #2 in earlier site documentation) located west of the crude oil storage tanks receives a small flow of sanitary wastewater from the warehouse, lab building and firehouse." A photograph of the "sanitary lagoon" located approximately 400 feet directly west of the crude oil storage tanks, taken on March 18, 2016 (Google Earth), is shown below:



1. A small stream from the southeastern corner of the "sanitary lagoon" is observed from the photograph. The discharge must be reported to OCD and the NMED Surface Water Quality Bureau.

2. The discharge may be a source of groundwater recharge allowing sufficient water production for well development and sampling in some wells. Examine this potential pathway and include a discussion in the revised Report.

NMED Comment 19
On page 11 of the correspondence dated July 28, 2016, the Permittee's response to the NMED Comment 15 is incomplete. NMED's concern was related to the new Sanitation Treatment Pond (STP)-1. Revise the Report to include an analysis on the relationship between water levels in the STP wells and the wastewater flowrate. Also, provide the boring logs and well construction details for STP1-NW and STP1-SW in the revised Report.

NMED Comment 20
On page 12 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 16 states, "[a]lso, as SPH enters a well the measured "water level" will lower, thus recording a change in the "depth to groundwater" that is not reflected to the same extent in the corrected groundwater elevation."

1. The sentence must be revised for clarification. It is an incomplete sentence.

2. A formula for the corrected water level with a presence of SPH must be provided as a footnote in Table 1. Revise the Report to add the footnote.

NMED Comment 21
On pages 12 and 13 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 17 states, "[i]t is not clear if the delayed entrance of SPH into the well screen at MKTF-15 is an indication of a change in SPH composition or thickness in the screened formation, or if it was just slow to enter the well due to location-specific conditions (e.g. relative viscosity of the SPH, formation physical properties, etc.)." MKTF-15 is the well closest to the crude oil tank. The lighter and more soluble fraction of crude oil (e.g., GRO and DRO) can migrate faster compared to the heavier and more insoluble fraction of crude oil (e.g., MRO). Collect a sample of SPH from MKTF-15 for an off-site fuel fingerprint analysis and compare it with an off-site laboratory fuel fingerprint analysis of a SPH sample collected from Seep Hole #6. Revise the Report to include the comparison. The analysis must be conducted by an independent analytical laboratory, which has been certified by the National Environmental Laboratory Accreditation Conference (NELAC).

NMED Comment 22
On page 13 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 18 states, "[t]he water levels in wells MKTF-28 and MKTF-43 fluctuate near the top of the screen intervals, while the water level in MKTF-44 has recovered to the top of the well screen." When a well screen interval is submerged under the water table, SPH will likely not be detected since SPH accumulates on the interface. Also, a well having a submerged screened interval will not provide accurate information regarding the vertical extent of the product smear zone. Revise Table 1 to include additional columns for depth to groundwater relative to ground elevation, and well screened intervals. Identify the MKTF wells where the screened intervals are below the water table in a manner similar to that presented on the table in the Permittee's response to comments.

NMED Comment 23
On page 15 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 21 states, "[t]he survey information for wells MKTF-35 through MKTF-45 was included as the last page of Appendix C." The information was provided as the last page of Appendix E rather than Appendix C. Revise the Report to correct the reference.

NMED Comment 24
On page 15 of the correspondence dated July 28, 2016, the Permittee's response to NMED Comment 22 states, "[t]he groundwater plume has been delineated with the exception to the north in the vicinity of Tank 102 and efforts to identify primary sources are on-going." Based upon the data, this statement is not accurate; it is inconclusive how far benzene, dissolved iron, naphthalene, and 1, 2, 4-trimethylbenzene plumes extend to the south from MKTF-35 and to the east from MKTF-37 and MKTF-39 on Figure 10, 12, 14, and 15, respectively. Also, the screened intervals in many MKTF wells are submerged below the water table; therefore, they are inappropriate for SPH plume delineation. Submit a work plan to propose to install three additional monitoring wells; one to the south of MKTF-35, and two to the east of MKTF-37 and MKTF-39, respectively, and propose to investigate the subsurface and groundwater north of Tank 102.

The Permittee must address all comments in this Disapproval and submit a revised Report to NMED. The Report must be submitted as two bound hard copies and an electronic version. Include a red-line strikeout version in electronic format showing where all revisions have been made. The revised Report must be accompanied with a response letter that details where all revisions have been made, and cross-referencing NMED's numbered comments. The revised Report must be submitted to NMED no later than **October 1, 2018**. In addition, submit a work plan to address Comments 10 and 24 for NMED review no later than **September 1, 2018**.

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
New Mexico Environment Department

cc: K. Van Horn NMED HWB
M. Suzuki NMED HWB
C. Chavez OCD
A. Hains WRG
L. King EPA Region 6

File: Reading File and WRG 2018 File
HWB-WRG-15-002