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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 14, 2020

Colonel David S. Miller
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117

Lt. Colonel Wayne J. Acosta
Civil Engineer Office
377 Civil engineer Division
2050 Wyoming Blvd SE, Suite 116
Kirtland AFB, NM 87117

**RE: APPROVAL WITH MODIFICATIONS
WORK PLAN FOR DATA GAP MONITORING WELL INSTALLATION
KAFB-106248 to KAFB-106252
BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID# NM6213820974
HWB-KAFB-19-015**

Dear Colonel Miller and Lt. Colonel Acosta:

The New Mexico Environment Department (NMED) is in receipt of the Kirtland Air Force Base (Permittee or KAFB) *Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252* (Work Plan), dated December 2019. NMED has reviewed the Work Plan and hereby issues this Approval with Modifications.

The attached comments include direction to expedite the characterization of the source area contaminant migration pathway, correct deficiencies in the Work Plan, and provide specific information regarding the sampling of newly installed groundwater monitoring wells. NMED comments are presented in Attachments I and II. NMED and KAFB staff met on May 28, 2020 to discuss relocating one or two of the wells closer to the source area, the associated changes to

Col. Miller and Lt. Col. Acosta

July 14, 2020

Page 2 of 2

the scope of the project, and additional NMED comments and questions. NMED sent a list to KAFB describing the changes in scope of work via electronic mail on June 1, 2020.

Please submit replacement pages and proposed borehole locations to NMED no later than **September 15, 2020**. The Permittee shall ensure that all copies of the Work Plan are updated with the NMED-approved replacement pages and that contractors are issued copies of the updated Work Plan so that investigation activities are conducted according to the modified scope provided in this Approval with Modifications letter. The Permittee is advised that if field work is not performed appropriately due to incorrect direction given to field staff, it may result in the Permittee being required to repeat or conduct additional work.

Please submit an investigation report summarizing the results of the implementation of this Work Plan no later than **June 15, 2021**. The report must address all of the comments included in this Approval with Modifications. The report must be submitted to NMED in the form of two hard copies and one electronic copy.

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.

Should you have any questions or wish to meet with us to discuss these comments, please contact me at (505) 476-6035.

Sincerely,



Kevin M. Pierard, Chief
Hazardous Waste Bureau

Attachments I and II

cc: S. Stringer, Director NMED RPD
D. Cobrain, NMED HWB
B. Wear, NMED HWB
R. Murphy, NMED HWB
L. King EPA Region 6 (6LCRRC)
S. Kottkamp, KAFB
K. Lynnes, KAFB

File: KAFB 2020 Bulk Fuels Facility Spill and Reading

Attachment I

APPROVAL WITH MODIFICATIONS COMMENTS:

1. Address contaminant migration pathway data gaps beneath the source area.

NMED Comment: Data gaps remain from the source zone characterization previously performed under the Permittee's *Work Plan for Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling Bulk Fuels Facility, Solid Waste Management Unit (SWMU) ST-106/SS-111, Kirtland Air Force Base, New Mexico, Revision R1*, dated December 2017 and approved with conditions by NMED on February 23, 2018. The results of the investigation were presented in the *Source Zone Characterization Report for the Bulk Fuels Facility Solid Waste Management Unit ST-106/SS-111*, received by NMED on October 30, 2019. This Report is currently under NMED review. The review in progress indicates that the migration pathway has not been adequately characterized beneath the source area.

In order to understand the migration of contaminants through the vadose zone beneath the former fuel offloading rack (FFOR), an understanding of the stratigraphy approximately 250-300 feet below ground surface (ft bgs) is essential. The source area contaminants descend essentially vertically from the surface to a depth of approximately 250-350 ft bgs where a distinct clay layer is present. The clay layer is easily identified in drill cores and on geophysical logs. The thickness, lateral continuity, and geometry of this clay layer changes across the site. Directly below the FFOR the clay occurs as a single layer at approximately 275-300 ft bgs (lower clay). East-southeast of the FFOR the clay occurs as a single layer at approximately 250 ft bgs (upper clay). A vertical offset can be identified in the clay layer directly below the FFOR that likely creates a preferential pathway to vertical migration of contaminants. Once contaminants reach the 250-300 foot depth range they appear to migrate predominantly downdip (to the east-southeast) on the lower clay layer and then generally vertically to the water table. Three other data sets support this interpretation of the contaminant migration pathway: the observed lateral offset of elevated volatile organic compound (VOC) concentrations with depth; soil vapor extraction system rebound data; and PneuLog total volatile petroleum hydrocarbons (TVPH) soil gas data. All three data sets show contaminant migration to be predominantly vertical beneath the FFOR to a depth in the 250-300 foot range with a shift in the pathway to the east-southeast before continuing on a vertical downward path to the water table.

As stated in NMED's November 4, 2019 letter, "NMED met with the Permittee on September 26, 2019 to discuss the potential to utilize some of the proposed wells for multiple purposes to address other data gaps, the most important being the further characterization of the source area migration pathway through the vadose zone east of the former location of the bulk fuels loading racks. The Permittee agreed to evaluate the potential..." Therefore, the Permittee is instructed to relocate one or two of the proposed monitoring wells (KAFB-106250 and KAFB-106251) nearer to source area, as shown in Attachment II.

In order to reduce cost and accelerate work, borehole(s) may be drilled with air rotary casing hammer techniques (ARCH) to a depth of approximately 230 ft bgs, just above the top of the clay described above. The boreholes must then be continuously cored to the total depth of the borehole and sampled for total petroleum hydrocarbons (TPH) gasoline range organics (GRO) and diesel range organics (DRO) Extended using United States Environmental Protection Agency (EPA) Method 8015 (modified). The total depth must be 10 feet below any field screening evidence of contamination (e.g., photoionization detector (PID) readings greater than 10 parts per million volume (ppmv)) to obtain a consistent detailed vertical profile of the migration pathway and to determine the vertical extent of contamination in the source area. A sample for TPH GRO and DRO Extended must be collected at the total depth of the borehole(s). The borehole(s) must also be geophysically logged. See Attachment II for NMED's proposed location for source area migration pathway boreholes.

The Permittee must provide NMED email notification at certain stages of the drilling process. These stages include but may not be limited to:

- a) initiation and cessation of ARCH drilling,
- b) initiation of sonic drilling,
- c) upon reaching a depth of 300 ft bgs,
- d) upon reaching the water table, and
- e) upon reaching total well depth.

The Permittee's notification to NMED that the driller has reached a depth of 300 ft bgs must include the actual depth bgs and thickness of the clay layer, if it is encountered. If the clay layer is not encountered then the objective of the well will have been achieved, that is, to identify the possible gap in the clay layer located 250 and 300 ft bgs as described above.

If the clay layer is encountered, the Permittee, in consultation with NMED, must make a determination about whether it is the lower or upper clay. If it is determined that the driller has encountered the lower clay, the driller should stop at 300 ft bgs or just below the bottom of the clay and the Permittee must partially backfill the borehole with a bentonite seal and sand. The bentonite must be emplaced with a tremie pipe to approximately 2 ft below the top of the clay followed by one foot of sand to prevent bentonite from entering the well screen. The borehole must then be completed as a soil vapor monitoring well (SVMW) with the lower end of the screen located across the top of the clay layer. The SVMW must be constructed with a 1 foot sump and a 2 foot screen of an appropriate slot size. A SVMW design must be submitted to NMED for review with the Work Plan replacement pages.

If it is determined that the driller has encountered the upper clay only, the driller should advance the borehole to total depth below the water table and the Permittee must complete the well as a dual screen ground water monitoring well as proposed in the Work Plan.

If the first borehole is not successful in locating the contamination migration pathway (i.e., lower clay has been encountered) then a second borehole location should be selected based on the findings of the first borehole. The proposed second borehole location must be submitted by the Permittee to NMED for approval via electronic mail and approved prior to initiation of drilling.

If the first borehole is successful in locating the contamination migration pathway then the Permittee, in consultation with NMED, must make a determination if a second borehole location should be selected to refine the migration pathway or if the borehole should be used to meet the objectives outlined in the Work Plan. See comments below for further detail.

Upon completion of drilling the first borehole in the source area, the Permittee must provide NMED a copy of the lithologic log(s) by email. After reviewing the lithologic logs, NMED will provide direction for well installation at that location and direction on drilling a second borehole in the source area.

NMED may require the installation of additional groundwater monitoring wells, if the five wells installed pursuant to this Work Plan do not sufficiently address the data gaps.

2. Section 6.0 Monitoring and Sampling, page 6-1, line 28

Permittee Statement: “Beginning in 2016 passive sampling techniques were implemented at select GWM [ground water monitoring] well locations. The transition to passive sampling for select GWM well locations was formally approved by NMED on May 31, 2017 (NMED, 2017. A further passive sampling evaluation was performed in Q4 2017 (Section 3.7.7 of KAFB, 2018b). This evaluation demonstrated that analytical results from passive sampling techniques and analytical results from low-flow sampling techniques are generally comparable between the two sampling methods, with no consistent bias identified (i.e., neither method has consistently resulted in higher or lower concentrations).”

NMED Comment: NMED’s May 31, 2017 approval letter approved the change to the use of passive diffusion bags and dual membrane samplers for certain groundwater monitoring wells located north of Ridgecrest Drive in residential areas. NMED did not approve the use of passive sampling south of Ridgecrest Drive, particularly in areas with elevated petroleum hydrocarbon contamination. The passive sampling demonstration evaluation performed in Q4 [fourth quarter] 2017 and presented in the *Quarterly Monitoring Report October-December 2017 and Annual Report for 2017*, dated March 2018, was not reviewed or approved by NMED Hazardous Waste Bureau (HWB).

The *Quarterly Monitoring Report-October-December 2018 and Annual Report for 2018*, dated March 2019, states “Field parameters [i.e., turbidity, temperature, dissolved oxygen,

specific conductivity, pH, and oxidation reduction potential] were not collected from wells that were sampled using passive sampling methods due to the unreliable field parameter data associated with this technology.”

Additionally, an email to NMED from KAFB, dated February 28, 2020, provided data from this evaluation. The data indicates that source area monitoring well KAFB-106053 does not produce “high quality and representative sampling that was highly comparable to low-flow sampling,” as indicated in the text of the email. Low-flow sampling results indicated a benzene concentration of 15,000 µg/L with duplicate results of 16,000 µg/L, while the passive sampling results for this same well indicated a benzene concentration of 3,700 µg/L with duplicate results of 3,600 µg/L. This demonstrates an order of magnitude difference between the sampling methods for this well located in the source area.

3. Section 4.0, Scope of Activities, page 4-1

NMED Comment: The Permittee must revise Section 4.0 of the Work Plan along with corresponding Figures and Tables to incorporate the modifications required by NMED to characterize the source area migration pathway. See individual comments on Section 4.0 revisions below. The Permittee must submit the revised Section 4.0 and corresponding Figures and Tables as replacement pages.

4. Section 4.0, Scope of Activities, page 4-1, line 6

Permittee Statement: “...well locations proposed in this Work Plan are shown on Figure 2-1 and Figure 2-2.”

NMED Comment: The Permittee must relocate one or two of the proposed monitoring wells (KAFB-106250 and KAFB-106251) to locations in the source area to determine the source area migration pathway. Propose two new locations within the area identified in Attachment 2. Include a primary location to be drilled first and a secondary location to be drilled should the first borehole not successfully locate the migration pathway.

5. Section 4.0, Scope of Activities, page 4-1, line 9 and Figure 4-1, Proposed Construction Diagram for Groundwater Monitoring Well with Contingency Well and Figure 4-2, Proposed Construction Diagram for Groundwater Monitoring Well KAFB-10624

Permittee Statement: “Four of the five proposed GWM wells (KAFB-106249 through KAFB-106252) will be constructed with the same design employed by the Work Plan for Data Gap Monitoring Well Installation (Section 3.1.1 of [Work Plan for Data Gap Well Installation, 2017]) as shown on the construction diagram (Figure 4-1).”

NMED Comment: All groundwater monitoring wells must be constructed utilizing an appropriate well casing diameter (e.g., four-inch inside diameter) to accommodate

equipment, such as low-flow pumps, which can effectively purge wells for active sampling.

6. Section 4.0, Scope of Activities, page 4-2, lines 1 through 16

Permittee Statement: "KAFB-106250 is proposed to be installed in the parking lot of the Air National Guard (ANG) adjacent to the existing well KAFB-106046. This location will help to bound both the EDB [ethylene dibromide] and benzene plumes in this area...KAFB-106251 is also proposed for installation on ANG property, adjacent to the boundary with the BFF [Bulk Fuels Facility]... However, water table wells are needed closer to the source area to more accurately delineate the EDB and benzene plumes in this area."

NMED Comment: According to Figures 2-1, Proposed Monitoring Well Locations and Q2 [second quarter] 2019 EDB Plume Map, and Figure 2-2, Proposed Monitoring Well Locations and Q2 2019 Benzene Plume Map, wells KAFB-106245 and KAFB-106247 do not have submerged well screens and neither EDB nor benzene were detected in the second quarter of 2019 (Q2 2019). These wells provide delineation of the plumes to the east and east-southeast of the source area; therefore, proposed wells KAFB-106250 and KAFB-106251 are good candidates to be moved to characterize the source area migration pathway.

7. Section 5.0, Scope of Activities, page 4-1

NMED Comment: Please revise Section 5.0 of the Work Plan along with corresponding Figures and Tables to incorporate the modifications required by NMED to characterize the source area migration pathway. See individual comments on Section 5.0 revisions below. The Permittee must submit the revised Section 5.0 and corresponding Figures and Tables as replacement pages.

8. Section 5.0, Scope of Activities, page 4-1

NMED Comment: The Permittee must incorporate / reference the relevant scopes of work from the *Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling Bulk Fuels Facility, Solid Waste Management Unit (SWMU) ST-106/SS-111, Kirtland Air Force Base, New Mexico, Revision R1*, dated December 2017, and approved with conditions by NMED on February 23, 2018 (VZ Work Plan), including, but not limited to, the following:

- a) Drilling Approach and Methodology as outlined in Section 3.1.1.1, page 3-2 of the VZ Work Plan: "...borings can be cored continuously from ground surface to total depth, these borings will be over-reamed via air rotary casing hammer (ARCH) technique to the nominal 10-inch diameter OR borings can be accomplished using a combination of ARCH drilling to the designated coring depth, followed by sonic drilling [or other continuous core methodology] to obtain undisturbed cores from the designated coring intervals. Upon achieving the top of the designated coring interval depth, the ARCH rig will be moved off each location while leaving the casing downhole, and the sonic [or other

continuous core] rigs will be positioned at the cased holes to core the prescribed designated coring intervals and then subsequently reamed with a sufficient size bit with the ARCH drilling rig to provide a large enough borehole for well construction.”

- b) Core temperatures must be monitored as outlined on page 3-2 in Section 3.1.1.1, page 3-2 of the VZ Work Plan: “Heating during continuous core collection can impact contaminant, geochemical and microbial properties and adversely affect sample representativeness. In addition to advancing the borehole to the designated coring depth with the ARCH rig, to minimize the heating potential, heating of the sonic drilling core barrels in the unsaturated zone can be controlled by any one or combination of the following:
- i. Advancing shorter sampling runs (5-10 feet versus 20 feet)
 - ii. Allowing the core barrel to cool (or pre-cooling the core barrel) before tripping back into the borehole
 - iii. Changing the vibration level and rotation speed
 - iv. Injecting small quantities of potable water between the override casing and the core barrel without compromising sample integrity as described in ASTM International D6914/D6914M-16.
 - v. Temperature inside the core will be monitored when returned to the surface to ensure that heating of the core barrel is not impacting sample selection or integrity. Background soil vapor temperatures in the vadose zone have historically averaged from 20 to 22 degrees Celsius (°C). Average groundwater temperatures at the site are 19°C. Any core heating over 20°C will require mitigation steps as outlined above. If water is injected, the bottom few inches of the core intervals that are possibly in contact with water accumulating in the bottom of borehole will be discarded prior to collection of samples. Sonic core barrels in the saturated zone are naturally cooled by the presence of formation water; however, similar steps will be implemented as described above to ensure sample representativeness.”
- c) Field Screening for hydrocarbons must be conducted as outlined in Section 3.1.1.3, page 3-3 of the VZ WP, with depths modified as follows: When advancing the borehole to the designated coring interval with ARCH, all cuttings must be logged and PID measurements collected at a minimum of every 10 feet as described in Section 3.2.10 of the VZ WP. Within the designated coring interval, PID readings must be collected every 5 ft. Additional measurements will be collected if qualitative data (e.g., staining, odor, etc.) indicate possible LNAPL. All PID readings shall be recorded on borehole logs.
- d) Laboratory Analyses for Selected Core Samples as outlined in Section 3.1.1.4, page 3-4 of the VZ WP, and modified as follows: Samples for laboratory analyses shall be

collected every 10 ft, additional samples shall be selected based on elevated PID measurements (augmented by lithologic and qualitative data) and sampled for TPH GRO/DRO Extended by EPA Method 8015 (modified) from 230 ft bgs to the total depth of the boring(s), to obtain a consistent detailed vertical profile of the migration pathway.

9. Section 5.1.2 Drilling of Groundwater Monitoring Wells, page 5-2, line 2

Permittee Statement: "All five new monitoring nested wells will be installed via air rotary casing hammer technology with casing advancement."

NMED Comment: The two designated boreholes to be used for the investigation of the source area migration pathway must be continuously cored from 230 ft bgs to total depth. This will provide undisturbed cores for more accurate lithologic logging, field screening, and soil sampling. This can be accomplished using a combination of ARCH drilling to the designated coring depth, followed by sonic or other continuous core drilling method to obtain undisturbed cores from the designated coring intervals.

10. Section 5.1.2.2 Photoionization Detector [PID] and Headspace Screening, page 5-2, line 32

Permittee Statement: "PIDs will be used for breathing zone monitoring during drilling and sampling activities, as well as for field screening of hydrocarbons in soil cuttings during drilling. This instrument monitors volatile organic compounds using a PID with a 9.8-electronvolt (eV), 10.6-eV, or 11.7-eV UV lamp."

NMED Comment: The Permittee must use either a 9.5 eV or 9.8 eV UV lamp for field screening samples to avoid fouling of the lamp due to dust, moisture, or high concentrations of petroleum vapors. If evidence of lamp fouling is observed during use of a PID with a 9.8 eV lamp, the Permittee must switch to a 9.5 eV UV lamp to obtain the most accurate PID readings possible. The Permittee must have an additional PID with the lower lamp strength readily available. Reliable PID readings will result in a consistent detailed vertical profile of the migration pathway. Failure to obtain reliable readings in the potential migration pathway may result in having to drill another boring to obtain accurate readings.

11. Section 5.1.2.2 Photoionization Detector and Headspace Screening, page 5-2, line 37

Permittee Statement: "Record PID measurements at a minimum of every 25 ft of drill cuttings down to 450-ft depth, and then every 10 ft of drill cuttings to total depth following the process below..."

NMED Comment: For boreholes that will be continuously cored, the Permittee must record PID sample measurement, at a minimum, every 10 ft from ground surface to the start of

coring and every 5 ft from the start of coring to the total depth of the borehole to obtain a detailed vertical profile of the migration pathway.

12. Section 5.1.3 Construction of Groundwater Monitoring Wells, page 5-3, line 21

Permittee Statement: "The GWM nested wells will each be constructed using 3-inch diameter Schedule 80 polyvinyl chloride (PVC) casing..."

NMED Comment: The Permittee must construct all wells with well casing of sufficient diameter such that they can be sampled via active sampling techniques (e.g.: four-inch inside diameter well casing to accommodate pumps). See also Comment 5.

13. Geophysical logging of source area boreholes

NMED Comment: The Permittee must add a section to the Work Plan proposing to geophysically log all source area migration pathway investigation bore holes with a dual induction geophysical logging tool. The Permittee must specify approximate depths of interrogation for the tool they propose to use. The tool must be calibrated and operated according to American Society for Testing and Materials (ASTM) standards for geophysical logging and the operation manual for the specific model of logging tool. In the report summarizing the results of the investigation the Permittee must provide shop calibration and daily field calibration data. An electronic copy of raw and processed data must be provided in Excel table format. A visual presentation of the log curve must be presented on a single page in a continuous format rather than as several separate pages. The geophysical log(s) for each well must be displayed with the lithologic log for comparison purposes and a discussion of the results must be included in the main body of the investigation report. Wells that are to be or will be geophysically logged must be designed with PVC centralizers rather than steel centralizers.

14. Section 5.1.3.2 Well Development, page 5-4

NMED Comment:

The Permittee must measure and record the parameters for pH, temperature, conductivity, and turbidity, as shown on the field form presented in Appendix B, Field Forms.

The Permittee must collect groundwater samples within 10 days after well development in accordance with Section 6.5.17.3 of the Permit. Samples must be analyzed in accordance with Table 6-1, Groundwater Monitoring Requirements for Data Gap Wells.

15. Section 5.1.3.2 Well Development, page 5-4, line 34

Permittee Statement: “The new wells (KAFB-106248 through KAFB-106252) were designed for passive sampling (Section 6), and the 0.010-inch slot size should minimize formation fines in these wells.”

NMED Comment: The new wells must be designed for active sampling techniques. The new wells must be sampled using active sampling (e.g., low-flow sampling) for a minimum of eight consecutive quarters to establish baseline concentrations in order to establish the precision criteria for passive sampling methods for the newly installed wells. While the approved work plans for data gap well installation and vadose zone coring included passive sampling of newly installed wells, the NMED administrative record does not contain documentation that the use of passive sampling south of Ridgecrest Drive, particularly in areas of elevated contaminant concentrations, has been evaluated or approved by NMED.

16. Section 6.0 Monitoring and Sampling, page 6-1

NMED Comment: The Permittee must revise Section 6.0 of the Work Plan along with corresponding figures and tables to incorporate the modifications required by NMED to characterize the source area migration pathway. See individual comments on Section 6.0 revisions below. The Permittee must submit the revised Section 6.0 and corresponding figures and tables as replacement pages.

17. Section 6.0 Monitoring and Sampling, page 6-1, line 11

Permittee Statement: “All newly installed wells will be sampled for four consecutive quarters to establish baseline concentrations for the parameters listed in Table 6-1.”

NMED Comment: The Permittee must collect groundwater samples from all newly installed wells within 10 days after well development in accordance with Section 6.5.17.3 of the Permit, at the next quarterly sampling event, and quarterly thereafter for eight consecutive quarters via active sampling methods (e.g., low-flow) to establish baseline concentrations. These data will be used to establish precision criteria for passive sampling methods for the newly installed wells. Groundwater samples must be analyzed for analytes presented in Table 6-1, Groundwater Monitoring Sampling Requirements for Data Gap Wells, of the Work Plan.

18. Section 6.0 Monitoring and Sampling, page 6-1, line 35

Permittee Statement: “Groundwater sampling will be performed via passive sampling techniques for all new GWM wells covered in this Work Plan, barring any environmental

factors that would preclude the ability to sample with this technology (e.g., significant and continuous LNAPL thickness in the well).”

NMED Comment: Given the concerns stated above, the Permittee must not use passive sampling in areas with elevated petroleum hydrocarbon contamination (i.e., in the vicinity of the source area).

19. Section 6.2 Preparation for Groundwater Well Sampling, page 6-3, line 2

Permittee Statement: “All wells covered in this Work Plan will be sampled via passive sampling technology and, therefore, well purging will not be required in association with sampling”

NMED Comment: The Permittee must add active sampling (e.g., low-flow) to relevant portions of Section 6.0. See the preceding comments regarding passive sampling.

20. Section 6.2.1 Collection of Groundwater Samples from Monitoring Wells Using Passive Sampling Techniques, page 6-3, line 19

Permittee Statement: “The procedures below will be followed for passive sampling.”

NMED Comment: As stated previously, active sampling techniques are required. Please include a section describing the procedures for active sampling in the modified Section 6.0 replacement pages and remove the description for passive sampling.

21. Section 6.3 Analytical Requirements and Quality Control, page 6-4, line 31

NMED Comment: The Permittee must revise Section 6.3 of the Work Plan along with the relevant figures and tables to include the additional sampling required for the modified scopes of work in the modified Section 6.0 replacement pages.

22. Section 6.3 Analytical Requirements and Quality Control, page 6-4, line 31

NMED Comment: The Permittee must include a data validation section of the Report which describes the data validation process outlined in this Section 6.3 of the Work Plan. Data validation shall be conducted in accordance with Permit Section 6.5.18.

23. Section 6.5.2 Hazardous Water Investigation-Derived Waste, page 6-6, line 30

Permittee Statement: “No hazardous/potentially hazardous [investigation-derived waste] IDW is anticipated to be generated from the activities outlined in this Work Plan.”

NMED Comment: This statement must be revised in the modified Section 6.0 replacement pages. The modified scope of work requires drilling and well development activities in the source area which may generate potentially hazardous IDW. Provide a description of the proposed management of hazardous IDW. Alternately, propose to dispose of purge / development water in the on-site groundwater treatment system that treats groundwater removed from recovery wells located north of Ridgecrest Drive.

24. Section 7 Project Schedule, page 7-1, line 1

NMED Comment: The Permittee must revise Section 7.0 of the Work Plan along with corresponding figures and tables to incorporate the modifications required by NMED to characterize the source area migration pathway. See individual comments on Section 7.0 revisions below. The Permittee must submit the revised Section 7.0 section as replacement pages.

25. Table 6-1, Groundwater Monitoring Sampling Requirements for Data Gap Wells

NMED Comment: Baseline sampling of newly installed wells must include quarterly sampling for GRO, DRO, and volatile organic compounds. The sampling frequency and analytical suite will be re-evaluated after the initial post-development sampling plus eight quarters of baseline sampling.

26. Table 6-3, Summary of Investigation-Derived Waste Sampling

NMED Comment: Under the portion of the table titled "Water Investigation-Derived Waste from Drilling", the Permittee indicates that post development water will be characterized by a sample taken from "the bailer at end of development". The Permittee is directed to take a composite sample of water from all containers of development water from each well. The contaminant concentrations in the development water may be higher or lower at the start of well development than at the end of development. A composite sample will provide a more accurate representation of contaminant concentrations in the IDW.

27. Appendix B, Field Forms

NMED Comment: The Borehole/Well Construction Log must include well details for all wells to be installed in a single borehole. The example field form shows only one well while the scope of work proposes two wells per borehole. The field form must include well details for installing two wells in each borehole.

28. Appendix C, Eurofins Lancaster Laboratories Environmental [Limited Liability Company] LLC Method Reporting Limits and Screening Criteria

NMED Comment: The Permittee must add a table which presents relevant Method Reporting Limits for soil analyses for the modified scope of work outlined in this Approval with Modifications letter.

29. Appendix C, Eurofins Lancaster Laboratories Environmental LLC Method Reporting Limits and Screening Criteria

NMED Comment: The Permittee must ensure that the limit of quantitation (LOQ) is less than the project screening levels. If this cannot be achieved by the laboratory due to the dilution of samples or other reason, the new LOQ, and all data qualifiers must be reported. Data tables in the investigation report must present the final limit of detection (LOD), LOQ, sample results, and all laboratory data qualifiers for the analytical results. No revision to Work Plan required.

SPECIFIC COMMENTS:

30. Section 2.1, Background Information, page 2-1, line 5

NMED Comment: The Permittee must include a more complete site history in the investigation report. The background information / site history must include a comprehensive summary of the subsurface field investigations that have contributed to the understanding of the site conceptual model and hydrogeology. The Report must also include a more detailed discussion of current water use and the influence of water supply wells on the hydrology and dissolved phase contaminant migration at the site. Discuss the impact these factors may have on projected future use of the water supply wells.

31. Section 2, Background Information, page 2-1, line 34

Permittee Statement: "Appendix A-1...illustrates groundwater elevations from 2011 through 2018 along two transects through the [ethylene dibromide] EDB plume. These time series graphs illustrate that the most pronounced increases in groundwater elevation are in the northern area of the site."

NMED Comment: Appendix A-1, Water Level Hydrographs, does not clearly illustrate this. It is difficult to ascertain trends with the bar graphs presented. Significant differences between the southern and northern portions of the site are not readily apparent. In future documents the Permittee must present data trends in an easy to interpret format. In addition, on Figure L-2-1, Groundwater Elevation Cross Section, three drinking water supply wells are shown on the figure but are not identified in the legend. Other figures had to be

consulted to identify these wells. In future documents the Permittee must include all pertinent symbols in the legends of figures. No revision is necessary.

32. Section 2, Background Information, page 2-1, line 45 and page 2-2, line 1

Permittee Statement: "Appendix A-1 includes compiled potentiometric surface maps, EDB plume maps, and benzene plume maps at the 4,857 reference elevation interval (REI)..."

NMED Comment: In the investigation report the Permittee must add a brief explanation of REI's at the site including the depth intervals they represent in both words and numbers (e.g., "the 4,857 REI represents wells screened in the shallow zone at depths ranging from approximately X ft bgs to X ft bgs.") and include a figure / table for visual clarification of this term.

33. Section 2.2, Initial Data Gap Groundwater Wells and Vadose Zone Coring Activities, page 2-2, line 38

Permittee Statement: "The Source Zone Characterization Report...describes the complete suite of analyses performed to characterize LNAPL in the soil cores. The report also describes the conclusions of the LNAPL analyses."

NMED Comment: The Source Zone Characterization Report is currently in review by NMED and has not yet been approved. In future documents the Permittee must refrain from referencing documents that have not been approved by NMED, as it could be misleading to stakeholders reviewing documents. If referencing such documents is necessary, the Permittee must add a statement stating the official status of the referenced document (e.g., "currently in review by NMED".)

34. Section 3.0, Site Conditions, page 3-1, line 14

Permittee Statement: "The groundwater elevation graphs shown in Appendix A-1, illustrate that the operation of the Ridgecrest wellfield has a significant influence on the groundwater gradient at SWMUs ST-106/SS-111. Measurements from 2010 to 2015 indicated a north-northeast-oriented hydraulic gradient toward the Ridgecrest wellfield (Section 7.6.1.2 of KAFB, 2018a). However, with changes in Water Authority and Kirtland AFB pumping practices, the hydraulic gradient no longer has a consistent orientation each quarter. As described in the Q2 2018 report (Section 5.4.4.1 of KAFB, 2018c), the observed rise in groundwater levels across the plume area has occurred at the same time as a continual decrease in groundwater extraction at the Ridgecrest wellfield."

NMED Comment: Appendix A-1 does not clearly depict this. See Comments 35 and 36.

35. Section 3.0, Site Conditions, page 3-1, line 41

Permittee Statement: “Currently, these exceedances of EDB and benzene cannot be accurately bounded because GWM wells with non-detect concentrations of EDB and benzene to the southeast have submerged well screens.”

NMED Comment: According to Figures 2-1, Proposed Monitoring Well Locations and Q2 2019 EDB Plume Map, and Figure 2-2, Proposed Monitoring Well Locations and Q2 2019 Benzene Plume Map, the southeast boundaries of both the benzene and EDB plumes are bounded by groundwater monitoring wells KAFB-106245 and KAFB-106247, neither of which have submerged well screens. According to these figures it appears that the southern and southwestern boundaries of these plumes are not bounded by any wells which do not have submerged well screens. Proposed groundwater monitoring well KAFB-106252 will close the southern data gap, however, additional wells may need to be installed in the future to delineate the southwestern edge of these plumes. No response required.

36. Section 6.4 Reporting, page 6-5, line 25

Permittee Statement: “Information and data collected during any quarter from drilling, installation, sampling, and gauging activities performed on the newly added monitoring wells will be submitted in SWMUs ST-106/SS-111 Quarterly Monitoring Reports.”

NMED Comment: In accordance with Section 6.2.2.1.2, Site Investigations, Investigation Reports, and Section 6.2.4.3, Reporting Requirements, Investigation Reports of the KAFB Resource Conservation and Recovery Act (RCRA) Permit the information and data collected from all investigation activities related to this Work Plan must be submitted to NMED as a separate stand-alone Investigation Report.

37. Section 8.0 References, page 8-2, line 1

Permittee Statement: The Permittee cites, “KAFB, 2019c. *Source Zone Characterization Report Bulk Fuels Facility, SWMUs ST-106/SS-111*. Prepared by EA Engineering, Science, and Technology, Inc., PBC for USACE Albuquerque District under USACE Contract No. W912DR-12-D-006. November.”

NMED Comment: The Permittee is reminded not to include references for documents that have not been approved by NMED.

38. Appendix A-2 HISTORICAL GROUNDWATER PLUME MAPS

NMED Comment: The Permittee is reminded that all appendices must have properly numbered pages, tables, and figures. For example, the figure numbers presented in Appendix A-2 include five Figure 3-3's, three Figure 3-6's, two Figure 3-7's, three Figure 3-9's, and two Figure 3-10's. There is no Figure 3-1, Figure 3-2, Figure 3-4, Figure 3-5, or Figure 3-8. In all future submittals all figures, tables, and pages must be renumbered sequentially for the specific appendices they are placed in and include cross-references to corresponding tables and figures in referenced documents.

Attachment II



Figure 1: Site map of KAFB Bulk Fuels Facility. The blue polygon represents the area proposed by NMED for relocating boreholes KAFB-106250 and KAFB-106251. Aerial imagery from Google Earth Pro, 2018.