



**NEW MEXICO  
ENVIRONMENT DEPARTMENT**



**Hazardous Waste Bureau**

2905 Rodeo Park Drive East, Building 1  
Santa Fe, New Mexico 87505-6313  
Phone (505) 476-6000 Fax (505) 476-6030

[www.env.nm.gov](http://www.env.nm.gov)

**Michelle Lujan Grisham**  
Governor

**Howie C. Morales**  
Lt. Governor

**James C. Kenney**  
Cabinet Secretary

**Jennifer J. Pruett**  
Deputy Secretary

**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

September 25, 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  
PHASE I RCRA FACILITY INVESTIGATION REPORT  
BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111  
KIRTLAND AIR FORCE BASE, NEW MEXICO  
EPA ID# NM6213820974  
HWB-KAFB-18-009**

Dear Colonel Miller and Lt. Colonel Acosta:

The New Mexico Environment Department (NMED) is in receipt of the Kirtland Air Force Base (Permittee) *Phase I RCRA Facility Investigation Report, Bulk Fuels Facility, Solid Waste Management Unit ST-106 and SS-111, August 2018* (Report), received August 30, 2018. NMED has reviewed the Report and hereby issues this Approval with Modifications. NMED's comments are attached to this letter.

The Report is approved with modifications to allow the Permittee to focus resources on completing investigation activities at the Kirtland Airforce Base (KAFB) Bulk Fuels Facility Spill (BFFS) site in order to acquire sufficient data to select a final remedy for the BFFS site. However, NMED is aware that additional site investigations have been performed at the Site since 2016 which have provided additional information and that further site investigations are

currently in the planning stages which should lead to a more comprehensive conceptual site model (CSM). Therefore, the CSM presented in this Phase I RFI Report is not approved. A comprehensive CSM must be included in the Phase II RFI report to be submitted to NMED at the conclusion of investigation activities at the site.

This Approval with Modifications does not require any revisions to the Report. The attached comments discuss limitations regarding use of the information provided in the Report. General topics and several examples of NMED's comments were discussed during a NMED/KAFB conference call on August 27, 2020.

This Approval with Modifications 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.

The Permittee must submit a work plan for a Phase II RCRA Facility Investigation Report to NMED for review no later than **April 30, 2021**.

Should you have any questions please contact me at (505) 476-6035.

Sincerely,

Kevin Pierard, Chief  
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB  
B. Wear, NMED HWB  
L. Andress, NMED HWB  
L. King EPA Region 6 (GLCRRC)  
S. Kottkamp, KAFB  
K. Lynnes, KAFB  
C. Cash, KAFB

File: KAFB 2020 Bulk Fuels Facility Spill and Reading

Attachment



**Kirtland Air Force Base (KAFB) Bulk Fuels Facility**

**Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation Report History**

The history of this document involves draft documents and meetings; therefore, a brief background is presented below.

Correspondence History:

<b>Date</b>	<b>Action</b>	<b>Abbreviation</b>
1/20/17	KAFB Submitted Phase I RCRA Facility Investigation Report	2017 RFI
8/3/17	NMED sent preliminary review letter to KAFB	
11/16/17	NMED sent Notice of Disapproval (NOD)	2017 NOD
1/19/18	Draft Second NOD prepared by NMED	2018 NOD
1/31/18	Meeting between NMED and KAFB resulting in the submittal of KAFB's Response to Comments (RTC) matrix regarding 2018 Draft NOD	RTC
8/30/18	KAFB Submitted a revised Phase I RCRA Facility Investigation Report	2018 RFI

In summary, NMED issued a Draft Notice of Disapproval letter dated January 19, 2018 in response to the Permittees Resource Conservation and Recovery Act (RCRA) Phase I Facility Investigation (RFI) Report dated January 2017. The Permittee and NMED met on January 31, 2018 to discuss these NOD comments. The RTC generated as a result of this meeting states that the Permittee agreed to make specific revisions to the Phase I RFI, which was submitted to NMED as the Phase I RFI Report (Report) on August 2018. This Approval with Modifications pertains to the Report submitted to NMED on August 30, 2018.

The comments below are organized into three sections:

1. Comments made in NMEDs 2018 Draft second NOD including KAFB's 2018 RTC are indented, followed by the current NMED 2020 comment, which is not indented.
2. General Comments on the August 2018 Phase I RFI Report, comments are not indented.
3. Specific Comments on the August 2018 Phase I RFI Report, comments are not Indented.

**MODIFICATION COMMENTS:**

**2018 NOD COMMENTS**

1. **2018 NOD Comment 43:** Response required in the Phase II RFI Report.

**Permittee's Statement in 2017 RFI Report, p. 4-27, 5th paragraph:** "In 2014, based on exceedances of the 2012 NMED residential soil screening levels (SSLs) detected in samples from the former pipeline investigation, approximately 2,340 cy (3,648 tons) of

soil was removed and transported off-site for disposal at Valencia Regional Landfill in Los Lunas, NM...

**NMED 2018 Comment:** "The Permittee shall update the text to include soil concentrations."

**Permittee 2018 RTC Response:** "Concur."

**NMED 2020 Comment:** This comment was not fully addressed in the response to the 2018 NOD. The revised text includes a bulleted list of some soil concentrations and states "Appendix B includes all analytical data from the original source area investigation and excavation confirmation samples collected." Appendix B contains three tables, one of which is a 5,684-page PDF table in which data is not presented chronologically and cannot be sorted by date. The data for the 2012 and 2014 former pipeline investigation soil samples cannot be located in Appendix B. The Permittee must clearly present all analytical data from the former pipeline investigations in a searchable format in the Phase II RFI report to allow for these data to be evaluated for decision-making purposes.

**2. 2018 NOD Comments 45, 46, 47, and 48:** No response required.

**NMED 2018 Comment 45:** "The equation for calculating the mass of hydrocarbon (HC) extracted is not dimensionally correct as provided. The Permittee shall revise the text and calculations to use the correct equation and show the units for the conversion factor of 24.055."

**NMED 2018 Comment 46:** "The operating times are not provided in the RFI Report and the flowrate and hydrocarbon content are provided in a format that does not lend itself to being useful for checking the calculations. The Permittee must revise the RFI Report to include a summary table such as Table 3-5 in the April -July 2015 quarterly monitoring report. NMED is unable to verify the accuracy of the calculations in the report without the missing information."

**NMED 2018 Comment 47:** "The equation for calculating the mass of HC biodegraded is not dimensionally correct as provided. The Permittee must verify the equation being used and recomplete the calculations present. The Permittee must revise the text to define variable "D" and indicate the units. Additionally, the Permittee must include the value of  $C_{vbkgd}$  used in the calculation."

**NMED 2018 Comment 48:** "The Permittee points the reader to Appendix L for a summary of biodegradation calculations and the cover sheet for Appendix L-1 states that the calculations are provided. However, the appendix only contains the results and

not the actual calculations. Consequently, NMED cannot verify the accuracy of the calculations. The Permittee must revise the RFI Report to include the calculations so that NMED can verify the results presented.”

**Permittee 2018 RTC Response to Comments 45, 46, 47, and 48:** “Not all requested inputs are provided in the original reports. Some of the information is available, however the SVE operation goes back to 2003. Individual inputs for the soil vapor monitoring locations are not available.”

**NMED 2018 Response:** “Agrees that we are limited with what was provided by previous sub-contractors.”

**2018 Decision:** “Remove the sections talking about the calculations, but refer to the actual report, and state that the calculations cannot be reproduced, and state as such. Concur with solution.”

**NMED 2020 Comment:** Section 4.6.2.5 [soil vapor extraction] SVE HC Mass Removal, of the Report does not contain the requested information regarding the equations, defining variables, units, and inputs used to make these calculations, nor was the reason for omitting this information included in the Report. Furthermore, Appendix L-1 (Mass Extraction Calculations) from the 2017 Phase I RFI was removed from the 2018 Report rather than being updated to contain the information specified in NMED 2018 Draft NOD Comments 45, 46, 47, and 48. Therefore, hydrocarbon removal estimates prior to 2016 as a result of the CATOX operations or biodegradation cannot be used for decision-making purposes at the site unless the data is re-presented along with the necessary supporting information.

**3. 2018 NOD General Comment 3:** No response required.

**NMED 2018 Comment:** “The RFI Report discusses vapor testing in soil and on-base industrial buildings, including the issue of vapor intrusion into industrial buildings. The Permittee’s discussion of the potential for groundwater contaminant diffusion and vapor transport, as it pertains to the potential for vapor intrusion both on-base and off-base, is piecemeal and does not compare off-base soil vapor and groundwater data with NMED risk-based screening levels. The Permittee shall provide a rigorous analysis of the potential for soil vapor contamination to migrate into homes and buildings located off-base and the findings integrated into the Conceptual Site Model presented in the RFI Report”

**Permittee 2018 RTC Response:** “Any discussion related to vapor intrusion risk will be removed from the RFI Report. The report will point to the Risk Assessment, take out all reference to potential for vapor intrusion. Keep soil vapor data, tables, discussion “just stick to the data only.”

**NMED 2020 Comment:** Since the discussion of the soil vapor intrusion data was deleted from the Report, should the Permittee wish to use the pre-2016 soil vapor data for decision-making purposes, this data must be presented in the Phase II RFI report. All soil vapor data included in the Phase II RFI Report must be screened against the NMED vapor intrusion screening levels (VISLs) in effect at the conclusion of all related investigation activities at the site.

**4. 2018 NOD Comment 37:** Response required in the Phase II RFI.

**NMED 2018 Comment:** “Section 4.4.1: The Permittee does not discuss soil vapor detections off base and compare those detections to NMED VISLs, as outlined in the NMED screening guidance published March 2017. The Permittee shall revise the RFI Report to incorporate NMED VISLs.”

**Permittee 2018 RTC Response:** “VISLs are used in the Risk Assessment. Defer to Risk Assessment by stating just the data and then refer to the Risk Assessment.”

**NMED 2020 Comment:** The Permittee must discuss soil vapor intrusion detections off base and compare those detections to NMED VISLs in effect at the conclusion of investigation activities at the site in the Phase II RFI.

**5. 2018 NOD Comment 24:** No response required.

**NMED 2018 Comment:** “The Permittee shall add a bullet to state that additional information is required on locations of ethylene dibromide (EDB) partitioning out of the [light non-aqueous phase liquid] LNAPL and the rate(s) of partitioning under varying redox conditions. Additionally, a bullet is required to address the need for revising and updating the [compound specific isotope analysis] CSIA that was conducted at the site to obtain a more meaningful and robust analysis of residual and degraded fractions of EDB. The CSIA included in the RFI Report is not technically defensible due to coelution of benzene and other organic compounds with EDB, not using two-dimensional gas chromatography as the preferred analytical method, EDB concentrations at detection limits of analytical instruments, and lack of fresh LNAPL samples for carbon isotope analysis on EDB.”

**Permittee 2018 RTC Response:** “Include map of locations where benzene exceeds effective solubility...”

**NMED 2020 Comment:** Figure 5-1, Wells with Historical LNAPL Detections, depicts wells that have exceeded the effective solubility for benzene, but does not state when these wells were sampled. This figure does not clearly illustrate the exceedance of effective solubility



for benzene or EDB, nor does it illustrate the inference of submerged LNAPL. In addition, the CSIA used likely underestimated EDB concentrations, this is further discussed in Specific Comment 15 below.

**6. 2018 NOD Comment 28.d:** No response required.

**NMED 2018 Comment:** “Figure ES-9: The Permittee shall revise the figure to fix the typographical error and correct “Dissolve Magnesium” to “Dissolved Manganese.”

**Permittee 2018 RTC Response:** “Concur.”

**NMED 2020 Comment:** The figure was not corrected. The Permittee must ensure that all figure titles are correct in the Phase II RFI report.

**7. 2018 NOD Comment 38:** No response required.

**NMED 2018 Comment:** “The 2005 temporary [soil vapor monitoring] SVM results are not included in Appendix G. Additionally, the locations of and boring logs for SB-01 through SB-09 are not provided in the RFI Report. The Permittee must revise the RFI Report to include this missing data. If the data is not available to be included, the statement should be revised to clarify the data available and included in the report.”

**Permittee 2018 RTC Response:** “Concur.”

**NMED 2020 Comment:** The table of historical soil vapor analytical results provided as a PDF in Appendix G is 7,357 pages long and does not appear to include data from 2005. The Permittee must not rely on this data for future decision-making purposes.

**8. 2018 NOD Comment 49:** No response required.

**NMED 2018 Comment:** “Many of the figures in Section 4.0 rely on color to differentiate wells, borings, and sampling locations or data. Thus, these figures are essentially meaningless to the roughly 7 percent of the population who have color vision deficiency. NMED requests that the Permittee revise the figures to be able to be interpreted by all readers, including those with color vision deficiency.”

**Permittee 2018 RTC Response:** “Can alter a few specific maps, but will be concise moving forward with symbols. Mainly the section 4 figures...”

**NMED 2020 Comment:** No figures were revised in the Report. The Permittee must ensure that all figures in the Phase II RFI report are able to be interpreted by all readers, including those with color vision deficiency.

**9. 2018 NOD Comment 54:** No response required.

**NMED 2018 Comment:** “Asked for clarification regarding use of the term bioslurping regarding Permittee’s Statement on p. 5-2, 5th paragraph: “These systems did not have a small diameter drop pipe but were still able to volatilize LNAPL off of the water table as these SVE locations are screened in both the saturated and unsaturated zone, thus performing a bioslurping function.”

**Permittee 2018 RTC Response:** “Concur.”

**NMED 2020 Comment:** The language was changed slightly as “bioslurping function” was changed to “LNAPL recovery”, however both LNAPL and soil vapor are recovered in modified bioslurping activities. The Permittee must clarify whether water, LNAPL, and / or soil vapor were recovered with modified bioslurping methods when discussing this method.

**10. 2018 NOD Comment 87:** Response required in the Phase II RFI Report.

**NMED 2018 Comment:** “...floating LNAPL has been detected in a water table groundwater monitoring well at the In-Situ Bioremediation (ISB) Pilot Test, indicating that the Permittee’s assertion of no floating LNAPL inside monitoring wells is incorrect. The Permittee must revise this conclusion.”

**Permittee 2018 RTC Response:** “Concur – Will make correction.”

**NMED 2020 Comment:** While the main issue of this comment was addressed appropriately, the Permittee did not revise the text to include the presence of LNAPL in ISB wells. This is critical information for understanding the nature and extent of contamination at the site. This information must be included in the Phase II RFI report.

**11. 2018 NOD Comment 35:** Response required in the Phase II RFI Report.

**NMED 2018 Comment:** “During an evaluation of soil vapor monitoring points (“SVMPs”), sampling processes, and development of the soil vapor rebound and biorespiration testing, the Permittee noted that many SVMPs did not have air tight seals. The Permittee must revise the RFI Report to include a discussion on the lack of SVMP seals and potential impacts on soil vapor concentration data as well as on estimates of soil vapor contaminant degradation.”

**Permittee 2018 RTC Response:** “Concur.”

**NMED 2020 Comment:** The Permittee removed all text related to air tight seals from the

Report. For these data to be used for decision-making purposes at the site, a discussion regarding the lack of SVMP seals and the potential impacts on soil vapor concentration data and estimates of soil vapor contaminant degradation must be included in the Phase II RFI report.

**12. 2018 NOD Comment 92:** No response required.

**NMED 2018 Comment:** “Appendix L-1, [Mass Extraction Calculations]: The results are in units of volume (gallons) and not mass (pounds) as indicated by the sub-appendix title.”

**Permittee 2018 RTC Response:** “Concur.”

**NMED 2020 Comment:** The Permittee removed Appendix L-1 in its entirety; therefore, all data and conclusions related to information dependent upon mass extraction calculations may not be used for decision-making purposes at the site.

**13. 2018 NOD Comment 94:** No response required.

**NMED 2018 Comment:** “Appendix R, Quant-Array™-Chlor and Reduced Gases (Hydrogen/Methane/Ethene/Ethane) Study: Please see Attachment B for NMED’s technical memorandum on the errors, comments, and revisions required for Appendix Q.”

**Permittee 2018 RTC Response:** “Concur. [waiting for further comments from NMED, to see if will remove or not.]”

**NMED 2020 Comment:** The Permittee removed Appendix R in its entirety, therefore all data and conclusions related to the information contained in the Quant-Array™-Chlor and Reduced Gases (Hydrogen/Methane/Ethene/Ethane) Study may not be used for decision-making purposes at the site.

**14. 2018 NOD Comment 95:** No response required.

**NMED 2018 Comment:** “Appendix T, Trend Analysis of EDB and Benzene in Groundwater at Kirtland Air Force Base, [fourth quarter] Q4 2015: Please see Attachment C for NMED technical memorandum on errors, comments, and revisions required for Appendix T.”

**Permittee 2018 RTC Response:** “Concur. Will discuss further.”

**NMED 2020 Comment:** The Permittee removed Appendix T in its entirety; therefore, all data and conclusions related to trend analysis of EDB and benzene in groundwater at the

site prior to 2016 may not be used for decision-making purposes.

**SPECIFIC 2020 COMMENTS ON THE 2018 REPORT:**

**15. Section 6.2.1.2, Compound Specific Isotope and Microbial Analyses Sampling, page 6-6, line 28;** Response required in the Phase II RFI Report.

**Permittee Statement:** “CSIA and biological parameter samples were collected at 31 wells in [third quarter] Q3 2013. Quality issues were identified with these 2013 data in an EPA review (EPA, 2014). Consequently, the 2013 CSIA data were not used in this Report.”

**NMED Comment:** A discussion of the data quality issues regarding CSIA performed at the site (i.e., samples were not analyzed using two-dimensional gas chromatography), the potential of the underestimation of EDB concentrations, the affected data, and what was done to correct the issue must be included in the Phase II RFI report or the data cannot be used for decision-making purposes.

**16. Section 7.7, Current and Future Land Use, page 7-7, line 40;** Response required in the Phase II RFI Report.

**Permittee Statement:** “Kirtland [Air Force Base] AFB is an active military installation and is expected to remain active for the foreseeable future. Kirtland AFB is adjacent to the Albuquerque International Sunport and is bounded to the north and west by the city of Albuquerque (residential areas), to the south by the Pueblo of Isleta, and to the east by the Cibola National Forest.”

**NMED Comment:** The property to the north Kirtland AFB, and over the off-base EDB plume is a mixed-use area containing recreational (Bullhead Park), residential, and commercial properties. The Phase II RFI Report must discuss all land use over the groundwater contaminant plumes (i.e., recreational and commercial).

**17. Section 2.2, Initial Discovery of Leaked Fuel and Subsequent Investigations, page 2-4, line 2;** Response required in the Phase II RFI Report.

**Permittee Statement:** “Site specific measurements of LNAPL in the soil and soil vapor were entered into Rockworks and ArcGIS, and apparent LNAPL thicknesses in the saturated zone were entered into the software program OILVOL.”

and

“The software also used vadose zone soil and vapor concentrations interpolated across the affected vadose zone soil and pore space to estimate total LNAPL mass.”

**NMED Comment:** The software developers of OILVOL claim that the purpose of the model is to provide a volume of mobile LNAPL and it is not recommended for accurately estimating the volume of residual LNAPL in the saturated and unsaturated zone. Disclose that, according to the developer of OILVOL, there is significant uncertainty in using this software to estimate LNAPL mass and provide justification for using it to estimate total LNAPL mass at the site. The Permittee must also state the margin of error that exists in these calculations when using OILVOL.

**18. Section 2.2, Initial Discovery of Leaked Fuel and Subsequent Investigations, page 2-4, line 9;** No response required.

**Permittee Statement:** “The LNAPL mass in the vadose zone soils and vapors was converted to liquid equivalent according to jet fuel composition. The calculations estimated that approximately 48,000 gallons of LNAPL were present in soil vapor, approximately 630,000 gallons of LNAPL were present in soil pores in the vadose zone, and 5.2 million gallons of immiscible LNAPL was present for a total estimated volume of 5.9 million gallons in the subsurface.”

**NMED Comment:** Supporting information was not referenced in this statement and the Air Force does not know the volumes of the fuel types released over decades. Calculations and conversion factors were not presented in the text of the report or its appendices. The Permittee must not use these data for decision-making purposes.

**19. Section 6.3.3, Groundwater-Level Monitoring Results;** Response required in the Phase II RFI Report.

**Permittee Statement:** “The initial depth to water at production well KAFB-3 was 407 feet measured in 1949. This well is screened from a depth of 448 feet to 900 feet bgs. The greatest depth to water measured at this well was 550 feet in 2009. Water levels were collected when KAFB-3 was not pumping, which was during the original installation and subsequent pump repair events.”

**NMED Comment:** The Permittee’s statement indicates that KAFB-3 is a production well; however, the well is not mentioned elsewhere in the Report where the other drinking water supply wells are discussed. The Phase II RFI must provide additional detail for this well including the purpose of the water supplied from this well, whether it is currently in use, and, if not in use, KAFB’s future plans for this well. If the well is currently in use, the well must be included in the groundwater monitoring program at the site and the results included in the Phase II RFI report.

**20. Section 7.8, Current and Future Water Use; page 7-8, line 6;** Response required in the

Phase II RFI Report.

**Permittee Statement:** “Near the Site, the aquifer supplies drinking water to the city of Albuquerque, the Raymond G. Murphy VA Medical Center, and Kirtland AFB, along with supplying private irrigation wells.”

**NMED Comment:** The Permittee must provide tabulated data of the screened intervals for all private and production wells near the site. This information is important for the corrective measures evaluation as well as future risk management decisions.

**21. Section 4.6.2, SVE Systems, page 4-27, line 15; No response required.**

**Permittee Statement:** “Based on operational hours, flow rates, and influent soil vapor [oxygen] O<sub>2</sub> concentrations, it is estimated that approximately 209,000 gallons of fuel have biodegraded within the area influenced by SVE operation.”

**NMED Comment:** NMED required the Permittee to provide the calculations to support the estimate in the 2018 Draft Second NOD. Supporting information was not provided for verification of volume of fuel biodegraded that was presented in the Report.

**22. Section 6.3.2.6, Compound-Specific Isotope and Microbial Analysis Results, page 6-25, line 25; No response required.**

**Permittee Statement:** “The microbial and reduced gas analyses provided evidence that microbial mediated reductive debromination of EDB is occurring in situ in the BFF plume. Conditions throughout much of the EDB-impacted area were anaerobic and electron donors and acceptors facilitating reductive debromination were present.”

**NMED Comment:** Supporting material was not provided in the Report to verify the statement regarding biodegradation or its effectiveness in reducing EDB concentrations throughout the contaminant plume.

**23. Section 6.3.2.6, Compound-Specific Isotope and Microbial Analysis Results, page 6-25, lines 20 and 23; Response required in the Phase II RFI Report.**

**Permittee Statements:** “The lowest EDB  $\delta^{13}\text{C}$  ratios were in the benzene plume area (AOI 8), where EDB concentrations were the highest.  $\delta^{13}\text{C}$  values increased toward the downgradient portion of the EDB plume (Koster van Groos et al., 2016).”

and

“ $\delta^{13}C$  values and EDB concentrations in the downgradient area of the plume (AOI 9) are consistent with the breakdown of EDB by the abiotic process of hydrolysis (Koster van Groos et al., 2016).”

**NMED Comment:** The reference provided, Koster van Groos et al., 2016, was not an independent study. This study was performed at the site, and the author is affiliated with the Permittee’s contractor who was paid to perform the referenced study. In all future documents which cite this study, including the Phase II RFI report, the Permittee must clearly disclose that this study was associated with the BFFS site characterization.

**24. Section 3.2.2, Analyte Selection, page 3-2, line 35; No response required.**

**Permittee Statement:** “For all environmental media, the following classes of analytes are excluded because there is no evidence of any association between these analytes and the [fuel-related analyte] FRAs. There are multiple quarters of analytical data for many of these analytes indicating that they are non-detect in addition to being unrelated to Site FRAs.”

**NMED Comment:** The Permittee is reminded that if a hazardous constituent is detected above its background level it is considered a contaminant of concern (COC) whether it is a “FRA” or not, and must be retained as a COC at the site. See also the definitions of hazardous waste, hazardous constituent, and extent of contamination in Permit Sections 1.8, 6.0, 6.2.3, and 6.2.3.1 of the KAFB Hazardous Waste Treatment Facility Operating Permit for the Open Detonation Unit.

**25. Section 4.5.2, Indoor Air Sampling Results, page 4-17, line 10; Response required in the Phase II RFI Report.**

**Permittee Statement:** “However, potential human health impacts from soil vapor are evaluated in the Risk Assessment (USACE, 2017).”

**NMED Comment:** Site characterization has continued at the site since 2016 when Phase I RFI work was been completed. Therefore, the Risk Assessment must be updated include data from 2016 through when site characterization is complete. See Comment 4 above. Additional investigation is necessary to characterize soil vapor contamination at the site, including the nature and extent of the soil vapor plume and vapor intrusion risks. Additionally, the Phase II RFI report must also present the physical parameters that will be used for future vapor intrusion risk analysis (e.g., soil type, porosity, etc. Include the physical parameters in the Phase II RFI report.

**26. Section 6.3.4.3, Aquifer Testing Results, page 6-28, line 15; No response required.**

**Permittee Statement:** “The results of the analysis of the step-drawdown and constant-rate

aquifer tests were reported in the Aquifer Test Report for Groundwater Extraction Well KAFB-106228... The pumping and recovery data for KAFB-106228 were analyzed to determine aquifer characteristics.”

**NMED Comment:** According to the Report, aquifer testing was only performed on one well and the test was unsuccessful. Aquifer tests are necessary to determine site-specific hydrologic parameters such as transmissivity, specific yield (or storativity), and hydraulic conductivity in order to obtain defensible data necessary to support groundwater modeling efforts, remedy evaluation, and remedy selection for the site. A single well test is not sufficient to determine aquifer properties at the site. At least two aquifer tests, one in the source area and one north of the leading edge of the EDB plume (e.g. at the ABCWUA Trumbull well cluster location), must be conducted. The aquifer tests must consist of step-draw down and constant discharge tests. Appreciable drawdown in observation wells must be observed before the constant discharge tests can be considered successful and to ensure that reliable and high quality data for determining transmissivity and hydraulic conductivity are obtained.

**GENERAL 2020 COMMENTS on 2018 REPORT:**

**27. Appropriate Screening Levels;** Response required in the Phase II RFI Report.

**NMED Comment:** All acceptable data must be compared to the corresponding screening levels in effect when investigation activities at the site are complete. These data must be included in an updated conceptual site model (CSM) presented in the Phase II RFI report

**28. Risk Assessment Report;** Response required in the updated Risk Assessment Report.

**NMED Comment:** An updated Risk Assessment Report must be submitted to NMED for review when site investigation activities are complete. The Risk Assessment Report must use the appropriate screening levels in effect at the time when site investigation activities are complete. See Comment 25 above.

**29. The Nature and Extent of Soil Vapor Contaminant Concentrations and Vapor Intrusion;** Response required in the Phase II RFI Report.

**NMED Comment:** Soil vapor contamination at the site is mentioned on page 8-2, Line 4; the Permittee states: “The nature and extent of soil vapor contamination at the site has been characterized.” Soil vapor has not been adequately characterized at the site. The nature and extent of soil vapor contaminant concentrations and vapor intrusion must be addressed in the Phase II RFI report.



**30. Data Not Approved for Decision-Making Purposes;** Response required in the Phase II RFI Report.

**NMED Comment:** The following data are not approved. These data shall not be used for decision-making purposes at the site without presenting additional supporting information in the Phase II RFI report.

- a. Portions of Pneulog® permeability data: The Permittee has calculated permeability of the subsurface based on flow within long screened intervals (134 to 175 feet). Data collected in this manner will indicate a decrease in permeability with depth, as flow rates are dependent on pressure. The Permittee has not discussed these issues or limitations within the Report. In the Phase II RFI report, the Permittee must discuss these limitations and remove all reference to specific permeability values or inferences thereof made from Pneulog® test results.
- b. Geophysical Logs: A large portion of the geophysical logging conducted for the site is unreliable due to inaccurate calibration of the instrumentation resulting in inaccurate induction logs. These logs cannot be used to distinguish between coarser grained units, which are the predominant lithologies present throughout the site. However, the induction logs can be used qualitatively to identify clay layers and provide a means of correlating surfaces and some stratigraphic intervals across the site. The Permittee must ensure that instrumentation is properly calibrated when conducting future geophysical logging.

**31. Information Presented in Cross Sections;** Response required in the Phase II RFI Report.

**NMED Comment:** Multiple comprehensive cross sections are required in the Phase II RFI report. Cross sections must be prepared to portray a variety of critical information including, but not limited to:

- a. Geologic units;
  - b. Top of the water table obtained from well gauging data;
  - c. Top of free phase LNAPL obtained from well gauging data;
  - d. Screened intervals of the wells used to construct the cross sections;
  - e. Photoionization detector (PID) data;
  - f. Concentrations of contaminants depicted at the sample location that the data represent;
  - g. Contours of contaminant concentrations to include laboratory data for soil contaminant plumes, laboratory data for vapor contaminant plumes, and laboratory data for groundwater contaminant plumes, as appropriate;
  - h. Indication of where cross sections intersect one another;
  - i. Pertinent above ground features such as roads, buildings, etc... for orientation;
- and

- j. Vertical scales in both elevation above mean sea level and feet below ground surface.

**32. Description of Regional, Sub-Regional, Local, and Site Hydrogeology;** Response required a Phase II RFI Report.

**NMED Comment:** A more detailed description of the regional, sub-regional, local, and site-specific hydrogeology is required in the Phase II RFI report. The Permittee must better define the hydrogeology of each area to more accurately describe the extent of geologic units and explain how they affect contaminant migration at the site. This information will facilitate the understanding of the site's anisotropic conditions and how they affect contaminant migration. These descriptions will be useful when designing corrective measures for the site.

**33. Changes in Groundwater Elevations and Gradient Over Time;** Response required a Phase II RFI Report.

**NMED Comment:** The Phase II RFI Report must include a discussion of changes in the groundwater elevations and gradient over time and the causes of those changes (e.g., pumping stresses), describe current conditions at the site, and address potential impacts of possible future changes in the groundwater gradient on the dissolved phase contamination at the site (e.g., resuming, increasing, or discontinuing the use of various municipal wells in accordance with Albuquerque Bernalillo County Water Utility Authority (ABCWUA) projected plans, and seasonal use variations, at the time the report is written). Given the anticipated continual rise in groundwater levels, the Phase II RFI should discuss how recovery well pumping rates may need to change in order to account for changes in groundwater gradients toward the Ridgecrest well field.

Further, the locations where production wells exist today may remain the same over time because of well replacement and water resource management strategy needs (although pumping from Ridgecrest well field is still a worst-case scenario). Increased conservation and San Juan-Chama water dependence could shift the pumping center from its current location to another location in the basin. These factors must be discussed in the Phase II RFI as they will need to be considered when determining final corrective measures.

**34. Updated Conceptual Site Model;** Response required a Phase II RFI Report.

**NMED Comment:** The Phase II RFI report must contain an updated conceptual site model which incorporates all data collected at the site at the conclusion of investigation activities to provide an understanding of the physical, chemical, and biological processes that influence contaminant fate and transport to human and environmental receptors. Understanding these processes is critical for adequately conducting a corrective measures

evaluation for final remedy selection.

**35. Reporting Requirements;** Response required in the Phase II RFI Report.

**NMED Comment:** No revisions to the Phase I RFI Report are required. However, to facilitate shorter and more efficient NMED review times, the Phase II RFI must follow reporting requirements outlined below. These comments have also been sent to the Permittee, in a separate letter, titled "Reporting Requirements For All Document Submittals" dated September 2, 2020:

- a. A complete and accurate electronic red-line strike out (RLSO) version must be included in all future revised documents. The RLSO included with this Report did not include all changes that were made. This defeats the purpose of a RLSO version and results in longer NMED review times.
- b. All appendices must appropriately paginated and include tables of contents, if necessary. In addition, all tables, figures, and included pages from previous reports must be appropriately numbered, including new and correct footers, headers, and titles, relevant to the appendix where they are presented.
- c. All data tables must be of a manageable size, separated into logical sections or separate tables (e.g., chronologically or by investigation) to facilitate locating information. Portable document format (PDF) tables that are several thousand pages long that are not in chronological order and/or contain no subdivisions for different investigations are not acceptable.
- d. Searchable, electronic versions of all data tables (i.e., Microsoft Excel format) must also be included on compact disk with the report in accordance with Section 6.5.18, Laboratory Analyses Requirements for all Environmental Media, of the Permit. This requirement was discussed with KAFB during a May 4, 2020 conference call with NMED; KAFB indicated that they would comply.
- e. Lithologic logs must not be distributed among several appendices. Appendices A, B, C, and D each contain different sets of lithologic logs. In the Phase II RFI report and future reports, all relevant lithologic logs must be compiled into one appendix. All borings for which there are lithologic logs included in an appendix must be listed in a table of contents for that appendix.
- f. Well installation and development records must not be presented in one appendix. In the Phase II RFI report and future reports, well installation and development records must be included in one appendix. Each well for which well installation and development records are included must be listed in a table of contents for that appendix.
- g. All geophysical logging activities must ensure that the geophysical logging equipment is properly calibrated, and calibration records must be included in all relevant reports for investigation activities performed at the site after 2015.