



MICHELLE LUJAN GRISHAM
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Certified Mail - Return Receipt Requested

November 8, 2022

Colonel Jason F. Vattioni
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117

Ms. Melissa Clark
Civil Engineer Office
377 Civil Engineer Division
2050 Wyoming Blvd SE, Suite 116
Kirtland AFB, NM 87117

**RE: NOTICE OF DISAPPROVAL
WORK PLAN FOR GROUNDWATER MONITORING
BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID# NM6213820974
HWB-KAFB-21-003**

Dear Colonel Vattioni and Ms. Clark:

The New Mexico Environment Department (NMED) is in receipt of the Kirtland Air Force Base (Permittee) *Work Plan for Groundwater Monitoring* (Work Plan), dated April 2021. NMED has reviewed the Work Plan and hereby issues this Disapproval with the following comments.

GENERAL COMMENTS

1. Groundwater Monitoring Work Plan Updates

NMED Comment: The Work Plan must be updated annually for NMED review and approval on April 1st of each year. The updates must include any changes to the program. This may include the addition of wells to the monitoring network or any proposed changes to the monitoring protocol. If no changes to the plan are proposed, the Permittee must submit a letter, specific to the plan, by **April 1st** of the corresponding year stating that no changes to the monitoring program are proposed. Revise the Work Plan to include this provision.

2. Data Comparability

NMED Comment: Data sets from 3 sampling events were presented by KAFB to NMED as justification for use of the passive sampling devices. NMED performed an analysis of the

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data, which is provided in the attachment to this letter. NMED's analysis indicates an overall lack of correlation between the active and passive monitoring data sets with a high percentage of the sample pairs failing KAFB's quality control criteria. Based on NMED's assessment, the passive sampling devices are not producing accurate, precise, and representative data as required by the KAFB Permit Section 6.5. Therefore, data collected from the passive sampling devices cannot be used for compliance or decision-making purposes. See attachment. The Permittee must submit a separate work plan proposing to replace all passive sampling devices with active sampling methods to NMED no later than **March 1, 2023**.

3. Contaminants of Concern

NMED Comment: The current analytical suite for contaminants of concern (COCs) for groundwater sampling will not identify heavier fractions of fuels, such as components of the jet propellants (JP) JP-4 and JP-8, and also aviation gasoline components, that were historically used at the site. The Permittee must add total petroleum hydrocarbons (TPH) gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to the groundwater analytical suite using modified Environmental Protection Agency (EPA) method SW 8015. Revise the Work Plan to include TPH-GRO and TPH-DRO in the analytical suite.

4. Comprehensive Sampling Events

NMED Comment: Several iterations of groundwater sampling optimizations have been conducted over the past decade, and during that time, significant hydrologic changes have occurred, resulting in changing water levels at the site. A comprehensive sampling event has not been performed since optimizations were implemented in order to confirm that the optimizations have not resulted in information omissions regarding the nature and extent of groundwater contamination at the site. The Permittee must propose to perform two semi-annual groundwater sampling events (i.e., second and fourth quarters) to determine current conditions:

- a. The Permittee must sample all groundwater monitoring wells utilizing standard active sampling techniques approved by NMED in order to obtain RCRA-compliant groundwater monitoring results that are representative and defensible in accordance with Permit Section 6.5.17. The see the attachment to this letter;
- b. The Permittee must add TPH-GRO and TPH-DRO via EPA Method SW 8015 to the analytical suite for groundwater samples collected from all wells at the site; and
- c. The sampling frequency of particular wells may be adjusted in the future based on the results of these sampling events. Data must be valid and defensible to be used for decision making purposes at the site as specified by Permit Section 6.5.18.

After the two comprehensive sampling events, the Permittee may propose changes to the monitoring program if such changes can be adequately justified. Should the Permittee wish to utilize alternative sampling protocols, they must submit a petition for alternate sampling methods to NMED in accordance with Permit Section 6.5.17.3, including a demonstration by comparison with results from the standard procedure that indicates the data quality is suitable for the project's purpose. The Work Plan must comply with NMED's 2020 General Reporting Guidelines for Corrective Action (Reporting Guidelines), which can be found on NMED's website at: <https://www.env.nm.gov/hazardous-waste/guidance-documents/>. Revise the Work Plan to propose two comprehensive sampling events in accordance with the direction provided in this disapproval letter.

5. Data Reporting

NMED Comment: Laboratory data in quarterly monitoring reports indicate that samples with high concentrations of COCs are frequently diluted in the laboratory to protect laboratory equipment. This often results in limits of detection (LOD) for analytes which are higher than the screening level (SL) for a chemical of concern (COC). If a COC is not detected at a LOD that is greater than the screening level, the Permittee reports groundwater analytical data as non-detect (ND). These results are data quality exceptions that must be identified as such everywhere they are reported, including all text, tables, and figures. Analytical data whose LOD exceeds the applicable SL cannot be used for compliance or decision-making purposes as specified by Permit Section 6.5.18.

For example, in the *KAFB Periodic Monitoring Report – October–December 2020 and Annual Report For 2020, Bulk Fuels Facility, Solid Waste Management Units St-106/SS-111*, the October 30, 2020 groundwater sample from well KAFB-106076 was diluted by a factor of 5 for the EDB analysis. As a result of the dilution, the LOD was 0.096 µg/L, which exceeded the screening level of 0.05 µg/L for EDB. This well data is presented as ND on Table 4-9, Historical EDB Concentrations. This well data is also presented as ND on Figure 4-7, EDB Concentrations in Groundwater Reference Elevation Interval 4857, Q4 2020, which is misleading because this sample result is presented as part of the determination of the southern border of the EDB plume.

In all future instances where the laboratory dilution of samples, or any other factor, results in a LOD that is higher than the SL for any analyte, the Permittee must identify the data as a data quality exception and report it as less than laboratory LOD. The presentation of such data as ND is not only misleading, it is a violation of the requirements of the Permit. Going forward, all text, tables, and figures in any document submitted to NMED must identify the data that meets the criteria above as data quality exceptions. These data are not to be reported as "ND", but as "<[numerical LOD]" (i.e., <0.096 µg/L in the case of the example above). The Permittee must follow the requirements of Permit Section 6.5.18 and NMED's

Reporting Guidelines. The Permittee has been provided similar direction in previous NMED correspondence. Failure to follow NMED direction constitutes noncompliance and may result in an enforcement action. Revise the Work Plan to state that all laboratory data shall be reported accordingly.

6. Data Validation Documentation

NMED Comment: Data validation documentation including data validation qualifiers, edits to data resulting from data validation, and all other changes to the data must be discussed in the data validation section of the groundwater monitoring reports. The laboratory data qualifiers provided in the laboratory reports must also be included in a separate column on all data tables in the quarterly, annual report tables, and historical data tables. See Comment 8 of the NMED's September 2, 2020 *Reporting Requirements for All Document Submittals* (Reporting Requirements Letter) letter with attachment, Permit Sections 6.2.4 and 6.5.18.2, and relevant NMED Guidance documents found on the NMED Hazardous Waste Bureau (HWB) website: <https://www.env.nm.gov/hazardous-waste/guidance-documents/>. Revise the Work Plan to include these requirements.

7. Tables

NMED Comment: According to the March 2021 *Final Ethylene Dibromide In Situ Biodegradation Pilot Test Report, Revision 1, Bulk Fuels Facility, Solid Waste Management Units St-106 And SS-111*, during 2020, light non-aqueous phase liquids (LNAPL) was detected in wells KAFB-106EX1 and KAFB-106EX2 associated with the pilot test at thicknesses of 0.65 feet and 11.2 feet, respectively. These data were not included in quarterly or annual report tables for 2020. The Permittee must include all groundwater and LNAPL gauging data associated with ancillary pilot tests in the quarterly, annual, and historic data tables and figures that are included with the groundwater monitoring reports. At the conclusion of the pilot tests, all pilot testing wells that have exhibited COC detections and/or LNAPL must be added to the quarterly groundwater monitoring program in the next annual update to the groundwater monitoring plan. Comprehensive and accurate groundwater and LNAPL reporting is necessary to characterize the site fully and accurately. Due to the presence of LNAPL, the revised Work Plan must add wells KAFB-106EX1 and KAFB-106EX2 to the list of wells for quarterly gauging of depth to groundwater and LNAPL thickness and to the list of wells for quarterly sampling if LNAPL is not present in these wells. Revise the Work Plan to include these wells to the gauging and sampling program.

8. Figures

NMED Comment: Revise the Work Plan to incorporate the requirements listed below. For figures presented in quarterly monitoring reports, the Permittee must:

- a. Distinguish which wells are used in creating contours and which wells are not used on figures for clarity;
- b. Include one approximate D-size plate containing all of the wells at the site in each hard copy of each report;
- c. Develop concentration contour maps only using data collected from the same approximate depth interval. Data collected from multiple depths must not be contoured as one single depth contour. This method is not a valid representation of the contaminant plume; and
- d. Increase the scale of the base map so that only the relevant area of interest is depicted to increase the readability of figures.

9. Required Work Plan Information

NMED Comment: Information relevant to groundwater monitoring at the site is currently scattered among several Quality Assurance Project Plans (QAPjP's) associated with old work plans and many phases of work for the site. The Permittee must include all information relevant to groundwater monitoring in the revised Work Plan in accordance with Permit Sections 6.2.4.2 and 6.5.18. This information must include, but is not limited to, a description of data generation and acquisition, sampling and analysis activities, quality assurance/quality control (QA/QC) for field and laboratory samples, laboratory analytical methods and reporting requirements, relevant laboratory reporting limits, and data management processes, including data validation and acceptability for use. This information must be updated annually in the Groundwater Monitoring Plan to include any changes. Revise the Work Plan to include the information noted above.

SPECIFIC COMMENTS

10. Section 2.1, Site Description, page 2-1

Permittee Statement: "The off-Base migration included dissolved-phase EDB extending north of Ridgecrest Drive SE."

NMED Comment: The Site Description section of the revised Work Plan must discuss all contaminants of concern that have migrated off-base, including benzene and TPH. Revise the Work Plan to include a discussion of all relevant COC's including TPH.

11. Section 2.2.1, Operational History, page 2-1

Permittee Statement: “The BFF at Kirtland AFB became operational in 1953, and has been used over time for the storage of aviation gasoline, jet propellant (JP)-4, JP-8, and smaller amounts of diesel fuel and unleaded gasoline.”

NMED Comment: Groundwater samples collected from the site have not been analyzed for TPH concentrations in many years. As such, the current groundwater analytical suite does not identify the heavier fractions of fuel constituents historically used at the site, thereby providing an incomplete conceptual site model (CSM) for the site. Proposed analyses for future groundwater sampling shown in Table 1-2, Groundwater Monitoring Program, indicates that the only wells proposed to be sampled for TPH are the most recently installed wells KAFB-10648 through KAFB-10652 and KAFB-106S10, which NMED specified must be sampled for TPH. See Comments 3 and 4.b above. The Permittee must revise the Work Plan to add TPH-GRO & TPH-DRO via modified EPA method 8015 to the analytical suite for all groundwater monitoring samples collected at the site to determine the nature and extent of TPH contamination.

12. Section 2.2.2 Investigation History, page 2-2

Permittee Statement: “Analytical data for EDB and BTEX in 2020 are provided in Tables 2-2 and 2-3, respectively.”

NMED Comment: The Permittee must identify all data quality exceptions in all presentations of the data. Data whose LOD exceeds the appropriate SL are data quality exceptions and must be identified on the tables. See Comment 5 above. Revise the Work Plan to identify all data quality exceptions and to report the data not as “ND”, but as “<[numerical LOD].” (i.e., <0.096 µg/L in the case of the example in Comment 5 above).

13. Section 3.0, Site Conditions, page 3-1

Permittee Statement: “A complete discussion of site conditions, including surface conditions that are not relevant to the activities discussed in this Work Plan, was provided in the Phase I RFI Report.”

NMED Comment: The Phase I RFI does not include a comprehensive discussion of site conditions. Additionally, the Phase I RFI only includes data up to the end of 2016 and a significant portion of that data were identified as not being acceptable for use. The revised Work Plan must include a description of current site conditions relevant to the task of groundwater monitoring; references to other documents are not sufficient. Revise the Work Plan to include a complete discussion of relevant site conditions.

14. Section 3.1.3.2, Source Area Plume, page 3-3

Permittee Statement: “In the Source Area Plume, GWM is focused on continued observation of the nature and extent of groundwater contamination.”

NMED Comment: The scope of work outlined in this Work Plan does not focus on accurate observation and reporting on the nature and extent of groundwater contamination, particularly in the source area where samples are collected with passive sampling devices. As discussed in Comments 2 and 4.a above, passive sampling has not produced representative data based on comparative analysis of the data provided to NMED and, therefore, the data cannot be used for site evaluation or decision-making purposes. See the attachment to this letter. The Permittee must correct this statement in the revised Work Plan.

15. Section 3.1.3.2, Source Area Plume, page 3-3

Permittee Statement: “As of Q4 2020, LNAPL was measured in only four wells located on-Base within the Source Area Plume at thicknesses ranging from 0.01 to 0.04 ft. There were 14 wells with unsubmerged screens surrounding these wells that did not indicate the presence of LNAPL in Q4 2020. These data indicate that the extent of LNAPL was bounded during Q4 2020.”

NMED Comment: It is speculative for the Permittee to assert that “...the extent of LNAPL was bounded during Q4 2020”. The Permittee did not address the fact that the absence of LNAPL in the submerged source area wells is not an indication that there is no longer LNAPL in the source area. Wells with screened intervals that do not cross the groundwater table are not appropriate for assessing the presence of LNAPL. In addition, LNAPL submerged under the rising groundwater table remains trapped in the interstitial spaces of the soil column below the groundwater surface.

Furthermore, LNAPL thicknesses of 0.65 feet and 11.2 feet were documented at the site in the first and second quarters of 2020, as was reported in the March 2021 *Final Ethylene Dibromide In Situ Biodegradation Pilot Test Report, Revision 1, Bulk Fuels Facility, Solid Waste Management Units St-106 And SS-111*. This information has not been incorporated into the quarterly groundwater monitoring reports and it is unlikely that LNAPL is bounded at the site. See Comment 7 above. Remove these statements from the revised Work Plan.

16. Section 5.0, Investigation Methods, page 5-1

Permittee Statement: “The initial investigation of groundwater at SWMUs ST-106/SS-111 was completed under multiple work plans beginning in November 1999. The initial investigation included multiple phases of GWM well installation, soil sampling, borehole logging, groundwater contamination characterization, aquifer testing, and LNAPL

characterization. Investigations from November 11, 1999 through December 31, 2015 were discussed in detail in the Phase I RFI Report (Kirtland AFB, 2018). Investigations beginning in 2016 were conducted under the Work Plans listed in Table 1-1.”

NMED Comment: The Permittee is reminded that the majority of data gathered from previous investigation activities and summarized in the Phase I RFI Report was deemed to be unacceptable for use and decision making purposes by NMED, as detailed in the *Approval with Modifications Letter for the Phase I RCRA Facility Investigation Report*, dated September 25, 2020. When reviewing and/or considering previous investigations at the site, the Permittee must refer to the *Approval with Modifications Letter for the Phase I RCRA Facility Investigation Report* to identify excluded data. Revise the Work Plan to remove the reference to the Phase I RFI Report.

17. Section 6.1, Documentation of Field Activities, page 6-1

Permittee Statement: “Daily field activities will be recorded on the appropriate forms, which will be maintained by Kirtland AFB and provided upon request. Appendix B includes example field forms.”

NMED Comment: Copies of all field forms including those shown in Appendix B, as well as field logbooks and daily activity sheet equivalents regarding groundwater monitoring activities, must be included as an appendix in the groundwater monitoring reports. Revise the Work Plan to propose to include this provision.

18. Section 6.1, Documentation of Field Activities, page 6-1

Permittee Statement: “[U]ploading the database with data validation qualifiers, edits resulting from data validation...”

NMED Comment: The revised Work Plan must state that the original laboratory qualifiers will be included in a column on all data tables. See Comment 6 and Comment 12 above. Revise the Work Plan to state that the original laboratory qualifiers will be included on all tables which present laboratory analytical data as well as noting the sampling method used for wells sampled (e.g., low flow). See the attachment to this letter.

19. Section 6.1, Documentation of Field Activities, pages 6-1 and 6-2

Permittee Statement: “Project data will be documented and recorded using various methods, as applicable. The following field documentation and records may be generated during GWM activities:”

NMED Comment: This statement is followed by a bulleted list of 16 items. All of the items in

the bulleted list must be included in the groundwater monitoring reports with the exception of internal records such as communication logs/e-mails and Global Positioning System files, although these must be made available to NMED upon request. Revise the Work Plan to clarify what information will be provided in the reports.

20. Section 6.2, Decontamination Procedures, page 6-2

Permittee Statement: "Equipment will be decontaminated using the following procedures:"

NMED Comment: The Permittee must describe the process of decontamination for non-dedicated equipment used to sample groundwater monitoring wells in the revised Work Plan. The field notes and the associated report must also describe the procedures that are actually used at each well during sampling activities in accordance with Permit Sections 6.5.2 and 6.5.3 and Comment 6 of the General Reporting Requirements Letter. Revise the Work Plan accordingly.

21. Section 6.4, Gauging and Sampling Schedule, page 6-3

Permittee Statement: "When a well is added to the GWM network, it will be sampled for eight consecutive quarters using low flow sampling methods to establish baseline concentrations. If the well does not contain LNAPL or is not adjacent to a well that contains LNAPL after eight quarters of low-flow sampling, passive sampling methods will be implemented."

NMED Comment: Passive sampling methods have proven to be unreliable at KAFB and are not approved for further sample collection. For example, in monitoring well KAFB-106059, utilizing the passive sampling method obtained an analytical result of 3,700 ug/L for benzene whereas utilizing an active sampling method (i.e., low-flow pumping) obtained an analytical result of 15,000 ug/L for benzene with the duplicate samples for the same well yielding similar results (3,600 ug/L and 16,000 ug/L, respectively). Groundwater monitoring data collected using passive sampling techniques cannot be used for site evaluation or decision-making purposes. See Comment 2 above and the attachment to this letter. The Permittee must propose to collect groundwater samples utilizing active sampling methods in the revised Work Plan.

22. Section 6.5, Groundwater and Light Non-Aqueous Phase Liquid Gauging, page 6-4

Permittee Statement: "If concentrations greater than 5 parts per million are detected, take appropriate protective measures, including ventilating the well vault."

NMED Comment: The Permittee must describe all of the "appropriate protective measures" which will be taken in the revised Work Plan.

23. Section 6.6, Groundwater Sampling, page 6-5

Permittee Statement: “Groundwater samples will be collected using either a passive sampling device or low flow techniques...”

NMED Comment: In the revised Work Plan, the Permittee must propose to collect groundwater samples utilizing an active sampling method approved by NMED. See Comments 2, 4.a, and 21 above, and the attachment to this letter below. Revise the Work Plan accordingly.

24. Section 6.6.1, Groundwater Sample Collection Using Passive Sampling Techniques, page 6-5

Permittee Statement: “GWM wells located north of Ridgecrest Drive SE are approved by NMED to utilize passive sampling technologies...following sampling evaluations that showed comparable analytical results in samples collected using passive and low-flow technologies.”

NMED Comment: Sampling evaluations did not show comparable analytical results; therefore, the approval is hereby rescinded. Furthermore, the groundwater monitoring wells located north of Ridgecrest Drive SE have not been sampled with active low-flow technologies for several years. See Comment 2 and Comment 21 above, and the attachment to this letter below. In the revised Work Plan, the Permittee must propose to sample all groundwater monitoring wells utilizing active sampling methods, including the wells located north of Ridgecrest Drive SE.

25. Section 6.6.1, Groundwater Sample Collection Using Passive Sampling Techniques, page 6-5

Permittee Statement: “In addition, regardless of location, wells that are less than 4 inches diameter are sampled using passive technologies as the diameter is too small to accept a low-flow pump.”

NMED Comment: The Permittee must sample all wells using active sampling methods based on the lack of correlation between active and passive sampling methods. Industry standard pumps are readily available which are capable of pumping wells as narrow as 2-inch in diameter to depths of 1,000 feet below the ground surface. Revise the Work Plan accordingly.

26. Section 6.6.1, Groundwater Sample Collection Using Passive Sampling Techniques, page 6-5

Permittee Statement: “The approval of passive sampling (NMED, 2017) meets the requirement in Part 6.5.17.4 of the RCRA Permit (NMED, 2010) that states, “The Permittee may submit to the department for approval, a written request for a variance from the

described method of well purging for individual wells no later than 90 days prior to scheduled sampling activities.”

NMED Comment: The approval of a work plan containing a variance does not meet the requirements of Permit Section 6.5.17.3 which requires “requests for variances from the approved groundwater sampling plan or schedule shall be submitted to the Department in writing 90 days prior to the start of scheduled monitoring and sampling events.” The Permittee must sample using active sampling methods due to the lack of correlation between the methods and in accordance with EPA guidance in *Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers*, EPA 542-S-02-001, May 2002. See Comments 2, 21, and 24 above. Revise the Work Plan Accordingly.

27. Section 6.6.1, Groundwater Sample Collection Using Passive Sampling Techniques, page 6-5

Permittee Statement: “In addition, regardless of location, wells that are less than 4 inches in diameter are sampled using passive technologies as the diameter is too small to accept a low-flow pump.”

NMED Comment: Wells located in areas of contamination or containing LNAPL, such as the source area wells, must be sampled using active sampling methods per EPA guidance cited in Comment 26 above. See Comment 2 and Comments 21 and 25 above. Propose appropriate methods for sample collection in the revised Work Plan.

28. Section 6.6.1, Groundwater Sample Collection Using Passive Sampling Techniques, page 6-5

Permittee Statement: “Because passive sampling is not discussed in the RCRA Permit (NMED, 2010), it will be performed in accordance with the methods described in the Work Plan for the BFF Expansion of the Dissolved-Phase Plume GWTS Design...”

NMED Comment: There is no clear approval for the cited work plan in NMED’s administrative record. The revised groundwater monitoring plan must include all information in single, stand-alone document; reference to other documents is not acceptable. Furthermore, the Permittee must discontinue the use of passive sampling techniques at the site, as they have been proven to be unreliable. See Comments 2, 21, and 24 above, and the attachment to this letter below. Revise the Work Plan to propose the active sampling techniques for all wells to be sampled.

Direction on document requirements has been provided multiple times to the Permittee. Failure to follow NMED direction constitutes noncompliance and may result in an enforcement action.

29. Section 6.6.2.1, Well Purging, page 6-6

Permittee Statement: “Groundwater will be purged continuously at a flow rate between 0.5 and 1 liter per minute, while field parameters (turbidity, temperature, dissolved oxygen, specific conductivity, pH, and oxidation reduction potential) will be measured and recorded every 5 minutes.”

NMED Comment: Groundwater quality field parameter collection is required by Permit Section 6.5.17.4; however, these parameters have not been collected in the monitoring wells sampled with passive sampling techniques for several years. The Permittee must propose to collect groundwater quality field parameters from all wells in the revised Work Plan.

30. Section 6.6.2.1, Well Purging, pages 6-6 to 6-7

Permittee Statement: “This is a variance from the RCRA Permit, which stipulates that three quarters of a well volume be purged from the well prior to sampling.”

NMED Comment: Preferential pathways have likely formed in the zones sampled via low flow sampling techniques. Due to the dynamic nature of the rising water table at the site, the Permittee must biennially collect groundwater samples by purging 3 well volumes prior to sample collection to demonstrate that low flow sampling techniques are effective. Revise the Work Plan accordingly.

31. Section 6.6.2.1, Well Purging, page 6-7

Permittee Statement: “This variance was presented in the Work Plan for the BFF Expansion of the Dissolved-Phase Plume GWTS Design (Kirtland AFB, 2017), which was approved by NMED on May 31, 2017 (NMED, 2017). The approval meets the requirement in Part 6.5.17.4 of the RCRA Permit (NMED, 2010) that states, “The Permittee may submit to the department for approval, a written request for a variance from the described method of well purging for individual wells no later than 90 days prior to scheduled sampling activities.” Purge information and field parameters will be recorded on the field forms (Appendix B).”

NMED Comment: There is no clear approval for the cited work plan in the NMED Hazardous Waste Bureau administrative record. The revised groundwater monitoring Work Plan must include all information required to be a stand-alone document; reference to other documents is not acceptable. The approval of a scope of work in a previous work plan does not constitute approval for the scope of work in other work plans. See Comment 28 above. Revise the plan to include all information required by this disapproval letter, the Permit, and the NMED Reporting Requirements Letter.

32. Section 6.7 Groundwater Monitoring Network Maintenance

Permittee Statement: “Annually, the total depth of wells without a dedicated pump will be measured with a weighted measuring line to assess sediment build-up in the sump of each well. If a well is found to contain 2 ft of sediment in the well screen, the well will be redeveloped. Total depth information will be reported in the Q4 Periodic Monitoring Report.”

NMED Comment: In the revised Work Plan, state within which table(s) the total depth information will be reported.

33. Figure 3-5, Groundwater Monitoring Wells with Measurable LNAPL

NMED Comment: This figure indicates that LNAPL has not been detected in the area of the EDB ISB Pilot Test in “5-10 years”. According to the March 2021 *Final Ethylene Dibromide In Situ Biodegradation Pilot Test Report, Revision 1, Bulk Fuels Facility, Solid Waste Management Units St-106 And SS-111*, in 2020, LNAPL was detected in wells KAFB-106EX1 and KAFB-106EX2 at thicknesses of 0.65 feet and 11.2 feet, respectively. See Comments 7 and 15 above. Revise Figure 3-5 to accurately present historical LNAPL information.

34. Appendix C, Section C-1.1 Non-Hazardous Water, page C-2, first bullet

Permittee Statement: “Review of quarterly analytical data is not required. This waste is characterized based on acceptable knowledge per Part 2.6.2 of the RCRA Permit (NMED, 2010).”

NMED Comment: A periodic review of the quarterly analytical data is required. The Permittee must re-evaluate the characterization of waste at least annually in accordance with Section 2.6.4 of the Permit. This evaluation must be included in the corresponding reports to NMED in accordance with the NMED Reporting Requirements Letter. Revise the Work Plan accordingly.

35. Appendix C, Section C-1.1.1 Non-Hazardous Water with Dissolved Metals Exceeding Groundwater Treatment System Effluent Discharge Limits, page C-2 and Section C-1.2 Hazardous/Potentially Hazardous Water, page C-3;

Permittee Statement: “The quantity of water purged from each well will be recorded.”

NMED Comment: State where this information will be recorded in the revised Work Plan.

36. Appendix C, Section C-1.1.2 Non-Hazardous Water with Dissolved Metals Less than the Groundwater Treatment System Effluent Discharge Limits, page C-2;

Permittee Statement: “The quantity of water purged from each well and the total quantity of water transferred to the GWTS will be recorded.”

NMED Comment: State where this information will be recorded in the revised Work Plan.

37. Appendix C, Section C-1.2 Hazardous/Potentially Hazardous Water, page C-3

Permittee Statement: “Purge water that is confirmed to meet hazardous waste criteria will be properly manifested and transported to a permitted treatment, storage, and disposal facility for disposal. Kirtland AFB personnel will approve all offsite waste shipments and only Kirtland AFB personnel can sign waste manifests for offsite disposal.”

NMED Comment: Copies of all waste manifests for offsite disposal must be included in a separate appendix to the corresponding groundwater monitoring report. Manifests must be presented in a sequential organized fashion (e.g., by well identification number or date of disposal) and in accordance with the NMED Reporting Requirements Letter. Revise the Work Plan accordingly.

The Permittee must submit a revised Work Plan that addresses all comments contained in this letter. Two hard copies and an electronic version of the revised Report must be submitted to NMED. The Permittee must also include a redline-strikeout version in electronic format showing where all revisions to the Report have been made. The revised Report must be accompanied by a response letter that details where all revisions have been made, cross-referencing NMED’s numbered comments. The Revised Work Plan must be submitted to NMED no later than **January 18, 2023**. The work plan to replace the passive sampling systems with active sampling systems must be submitted no later than **March 1, 2023**.

Should you have any questions, please contact Lane Address of my staff at (505) 690-5826.

Sincerely,

Rick Shean, Bureau
Chief
Hazardous Waste Bureau

Attachment: KAFB BFFS Passive Sampling Data Evaluation

cc:

D. Cobrain, NMED HWB

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B. Wear, NMED HWB

L. Andress, NMED HWB

L. King, EPA Region 6 (6LCRRC)

L. McKinney, EPA Region 6 (6LCRRC)

S. Kottkamp, KAFB

R. Wortman, KAFB

K. Bronson, ABCWUA

A. Tafoya, VA

File: KAFB 2021 Bulk Fuels Facility Spill and Reading

Attachment:
**Evaluation of KAFB BFFS Comparative Study Data for
Correlation between Active Groundwater Sampling Methods
and Passive Groundwater Sampling Methods**

Evaluation of KAFB BFFF Comparative Study Data for Correlation between Active Groundwater Sampling Methods and Passive Groundwater Sampling Methods

Correlation of data is required for use of alternative sampling methods. In order to utilize alternative sampling methods, a facility must demonstrate that the proposed alternative method correlates well with the standard method. KAFB attempted to provide this demonstration through a comparative data study.

During the second and third quarter sampling events in 2016 and the fourth quarter sampling event in 2017, KAFB co-collected groundwater samples by both the standard active sampling technique and by the passive sampling technique. For these studies, the data quality objective (DQO) for the relative percent difference (RPD) between the concentration results was established by KAFB as 35%.

RPDs were calculated for all concentration data with values greater than the detection limit. Tables 1, 2, and 3 below present the EDB concentration data for samples collected during the 2nd Quarter 2016, 3rd Quarter 2016, and 4th Quarter 2017 sampling events, respectively.

Table 1: 2nd Q 2016 EDB sample concentrations with a value above the detection limit

Sample Date	Well	Active Sample Concentration, µg/l	Passive Sample Concentration, µg/l	RPD, %
5/5/2016	106009	0.019	0.064	108.4
5/11/2016	106059	2.3	4.8	70.4
5/3/2016	106082	0.045	0.033	30.8
5/4/2016	106083	0.099	0.02	132.8
5/2/2016	106105	0.019	0.022	14.6

Red indicates that the sample pair failed the DQO of 35% for RPD.

Table 2: 3rd Q 2016 EDB sample concentrations with a value above the detection limit

Sample Date	Well	Active Sample Concentration, µg/l	Passive Sample Concentration, µg/l	RPD, %
7/21/2016	106009	0.019	0.015	23.5
8/4/2016	106059	4.3	4.3	0.0
8/9/2016	106082	0.039	0.015	88.9
7/28/2016	106083	0.087	0.047	59.7
7/27/2016	106105	0.021	0.016	27.0

Red indicates that the sample pair failed the DQO of 35% for RPD.

Table 3: 4th Q 2017 EDB sample concentrations with a value above the detection limit

Sample Date	Well	Active Sample Concentration, µg/l	Passive Sample Concentration, µg/l	RPD, %
10/23/2017	106005	0.32	0.29	9.8
10/20/2017	106014	0.85	4.2	132.7
10/19/2017	106059-174	5.9	1	142.0
10/19/2017	106059-574	6.4	1	145.9
10/20/2017	106008	4.1	2.5	48.5
10/19/2017	106006	0.014	0.21	175.0

Red indicates that the sample pair failed the DQO of 35% for RPD.

In summary, for EDB:

- 2nd Q 2016 - 3 of 5 sample pairs failed the data quality criteria
- 3rd Q 2016 - 2 of 5 sample pairs failed the data quality criteria
- 4th Q 2017 - 5 of 6 sample pairs failed the data quality criteria

It is clear, solely based on the fact that 10 out of 16, over 60%, of the sample pairs failed the criteria for %RPD, that the passive sampling data does not correlate well with the active sampling data for EDB.

Tables 4, 5, and 6 below present the benzene concentration data for samples collected during the 2nd Quarter 2016, 3rd Quarter 2016, and 4th Quarter 2017 sampling events, respectively.

Table 4: 2nd Q 2016 benzene sample concentrations with a value above the detection limit

Sample Date	Well	Active Sample Concentration, µg/l	Passive Sample Concentration, µg/l	RPD, %
5/5/2016	106009	2	1	66.7
5/11/2016	106059	16000	19000	17.1

Red indicates that the sample pair failed the DQO of 35% for RPD.

Table 5: 3rd Q 2016 benzene sample concentrations with a value above the detection limit

Sample Date	Well	Active Sample Concentration, µg/l	Passive Sample Concentration, µg/l	RPD, %
7/21/2016	106009	0.7	1	35.3
8/4/2016	106059	14000	8700	46.7

Red indicates that the sample pair failed the DQO of 35% for RPD.

Table 6: 4th Q 2017 benzene sample concentrations with a value above the detection limit

Sample Date	Well	Active Sample Concentration, µg/l	Passive Sample Concentration, µg/l	RPD, %
10/23/2017	106005	230	300	26.4
10/20/2017	106014	160	310	63.8
10/19/2017	106059-174	15000	3700	120.9
10/19/2017	106059-574	16000	3600	126.5
10/20/2017	106008	2300	2300	0.0
10/19/2017	106006	37	27	31.3

Red indicates that the sample pair failed the DQO of 35% for RPD.

In summary, for benzene:

- 2nd Q 2016 - 1 of 2 sample pairs failed the data quality criteria
- 3rd Q 2016 - 2 of 2 sample pairs failed the data quality criteria
- 4th Q 2017 - 4 of 6 sample pairs failed the data quality criteria

It is clear, solely based on the fact that 7 out of 10, or 70%, of the sample pairs failed the criteria for %RPD, that the passive sampling data does not correlate well with the active sampling data for benzene, either.

To illustrate the point further, the critical range for accuracy and precision in data collected for compliance determination is near the screening level for the particular pollutant. For EDB, the groundwater screening level is 0.05 µg/L. Figure 1 is a linear regression graph of all EDB data pairs that are greater than the detection limit and less than 0.1 µg/L. A trendline was added in order to determine the correlation coefficient, or R^2 value. Industry standard for establishing correlation is an R^2 value of 0.9 or greater. The R^2 value for KAFB's comparative study EDB concentration data in close range to the screening level is 0.0055. This illustrates that there is very little correlation at all in this critical concentration range.

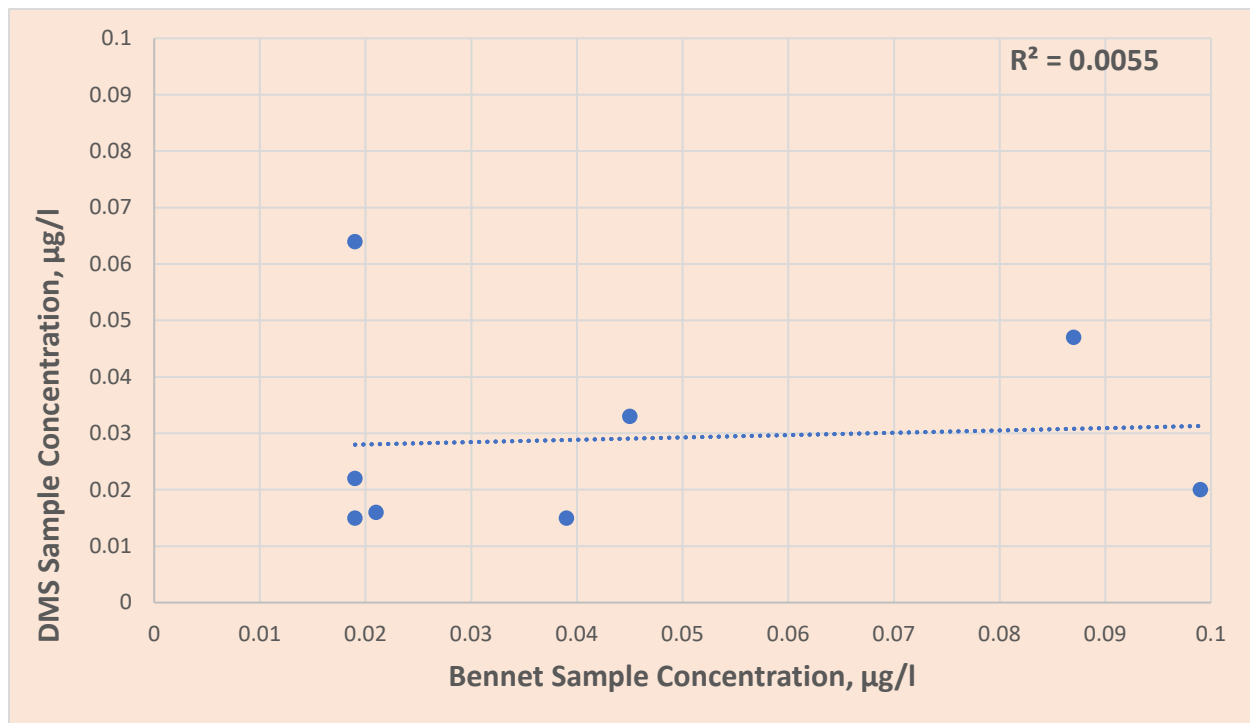


Figure 1: 2016/2017 EDB Active vs Passive linear regression for all data pairs within the relative range of the Screening Level, or with a value greater than the detection limit and less than 0.1 µg/L, or double the SL.

Figure 2 provides the same linear regression graph for all EDB data pairs that are greater than the detection limit. For this dataset, the R^2 value was 0.2, again indicating very little correlation between the data pairs.

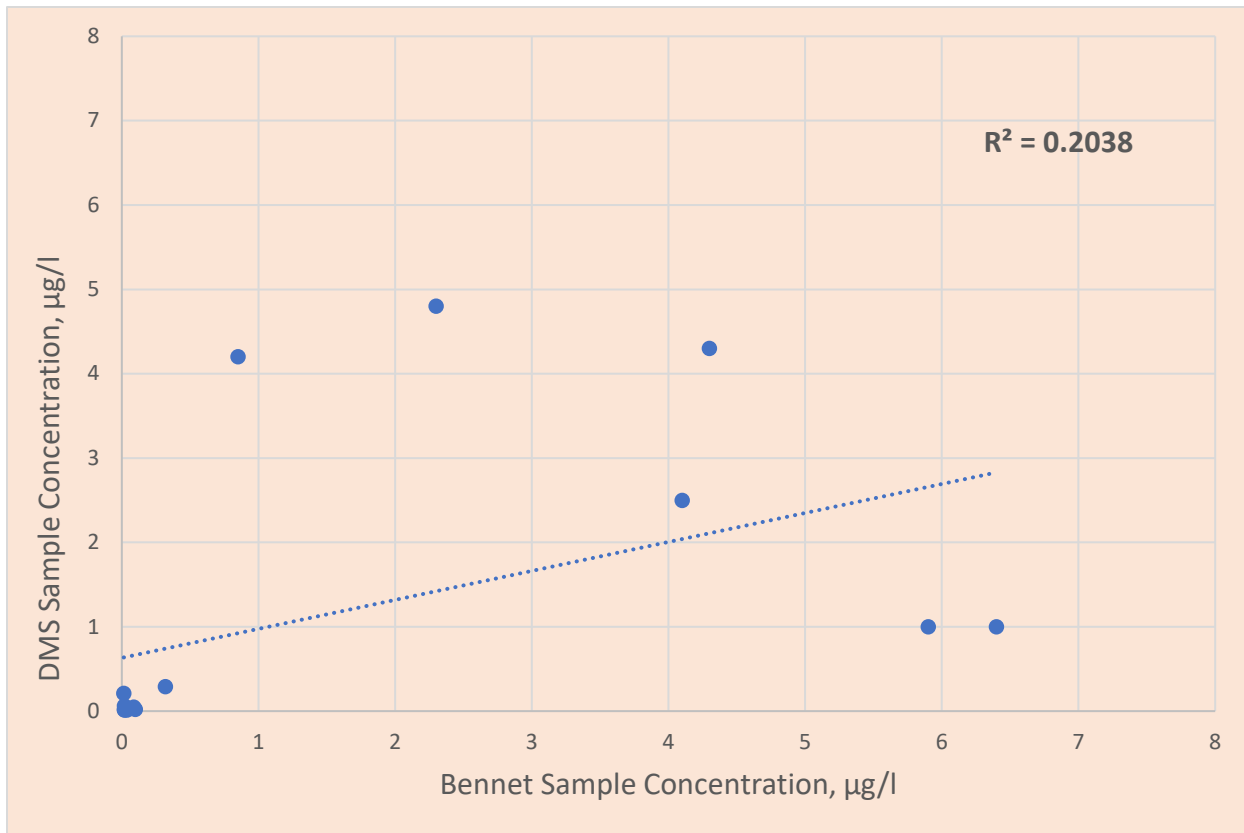


Figure 2: 2016/2017 EDB Active vs Passive linear regression for all data pairs with a value above the detection limit

The information above clearly demonstrates that the passive sampling method employed by KAFB is neither accurate nor precise; the method does not produce representative samples. Over 60% of the EDB sample method pairs and over 70% of the benzene sample method pairs with a value above the detection limit failed the KAFB %RPD criterium of 35%.

Some paired data points for EDB are over an order of magnitude apart. The passive sampling data is not reliable and, had it been relied upon, would have resulted in three of the 22 samples being mischaracterized regarding compliance with the screening level. Based on this evaluation and the clear indication that the passive sampling method is not providing accurate, precise, or representative data, all passively sampled data collected at KAFB is suspect, considered qualitative, and cannot be used for site evaluation or decision-making purposes.

Analysis of passive sampling data for future consideration for acceptability :

1. KAFB must eliminate all passive sampling at the BFF and replace it with active sampling methods that can provide representative data. The replacement needs to be implemented as soon as possible after approval of the work plan to replace passive

sampling devices required by the letter that is part of this correspondence. See Comments 2, 4, 14, 21, 23, 24, and 28 in the letter above.

2. If KAFB wishes to salvage some of the passive sampling data, they must conduct contaminant specific analysis to demonstrate passive sampling data is valid for a constituent/constituents based on appropriate %RPD and linear regression analysis (portions of the general chemistry data and metals data may be useable). See Comment 4 in the letter above.
3. Segregate all passive sampling data that has not been demonstrated (by #2 above) to be accurate and precise for the specific contaminant. Mixing inaccurate, imprecise data into the site data set produces inconsistencies that are not readily identifiable when reviewing data tables and figures. All data that has not been demonstrated to be accurate and precise must be removed from the site data. See Comment 18 in the letter above.
4. KAFB must include appropriate information on the inaccurate and imprecise nature of the passive sampling data any time it is presented. This includes providing footnotes on tables stating that the data is not accurate or representative and cannot be used for decision-making purposes and error bars on charts and graphs indicating the potential range for each data point. Passive sampling data for a specified contaminant that has not been demonstrated to be accurate and precise (by #2 above) is not acceptable for use. See Comment 18 in the letter above.

Should the Permittee be able to demonstrate that passive sampling methods provides acceptable data for detection monitoring in wells where contaminants are no longer present for a period of at least two years, the Permittee may propose the use of passive samplers in those wells in the subsequent Groundwater Monitoring Plan updates.