



Mr. Pike
2014

NEW MEXICO
ENVIRONMENT DEPARTMENT

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

February XX, 2015

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**RE: QUARTERLY PRE-REMEDY MONITORING AND SITE-INVESTIGATION
REPORT FOR OCTOBER-DECEMBER 2011, BULK FUELS FACILITY SPILL,
SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111, APRIL 2012
KIRTLAND AIR FORCE BASE
EPA ID# NM9570024423, HWB-KAFB-12-006**

Dear Colonel Miller and Mr. Pike:

The New Mexico Environment Department (NMED) has reviewed the document Quarterly Pre-Remedy Monitoring and Site Investigation Report for October-December 2011, Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111, dated April 2012 (hereinafter referred to as the Quarterly Report). The Permittee does not have to resubmit the Quarterly Report however, the deficiencies noted in this letter need to be corrected in future quarterly reports or responded to by letter, as appropriate.

Executive Summary

1. The Executive Summary, first bullet states "*Based on the three-dimensional (3D) distribution of soil and vapor concentrations from wells installed and sampled to date, it appears that the majority of the vadose zone contaminant mass is located within 100 feet (ft) above the water table at depths of approximately 400 to 500 ft below ground surface (bgs).*" In contrast to this statement, Figures 2-2 through 2-4 of the Stage 2 Abatement Work Plan for the Soil Vapor Pilot Test at the Bulk Fuels Facility (ST-106), December 11, 2002, show considerable contamination in the upper 300 ft of the vadose zone, especially beneath the location of the Former Fuel Offloading Rack. Given that the last known leak was repaired in 1999, it seems likely that the upper portion of the vadose zone would still contain considerable fuel

KAFB4889



contamination. The Permittee should describe how the contaminant mass is distributed throughout the vadose zone, including the upper 350 ft, and especially in the vicinity of the Former Fuel Offloading Rack (see also Comment 24).

2. The table in the Executive Summary on Page ES-3 lists a minimum value of 900 feet for a 50-Year Downgradient Migration Distance. This implies a 100 year time period to go 1800 feet. Since it is known that the plume is less than 100 years old and has travelled more than 1800 feet, explain the veracity of the 900 feet value.
3. The sixth bullet on page ES-3 of the executive summary discusses the EDB plume. The observed EDB plume length from the likely source area (near beneath the former fuel offloading rack) is already greater than 4500 feet, with the full length unknown. Explain the point of this bullet and the importance of the 2500 feet downgradient of the NAPL area.

Section 2. SVE REMEDIATION SYSTEM PERFORMANCE

4. Section 2.5 SVE Treatment System Operational Summary – In a December 10, 2010, letter, NMED instructed the Permittee to, among other things, prepare an Optimization Plan for the SVE system. The Quarterly Report should describe in detail what optimization was conducted for the SVE system during the reporting period.
5. Figure 2-2. SVE Accumulated Mass Recovery Over Time -- To make Figure 2-2 more meaningful, total hours of units operation by period should be added, so that for example, turning off the units for ROI testing and mechanical breakdown/maintenance are not interpreted as a decrease in mass recovery efficiency. Also, propane recovery ratio and propane used should be graphed against time.

Section 3. SITE INVESTIGATION

6. Section 3.2.1 Geophysical Logging -- Although the Permittee stated in Appendix I-3, First RTC, No. 3, that geophysical logs would be provided in future reports, no paper copies or stand-alone digital copies were included in this quarterly report. Instead, dimensionless, poorly-scaled logs are included with the geologic cross sections which, are of limited use because the logs are not calibrated as NMED detailed in the September 28, 2011, and February 17, 2012, letters concerning the quality of the Permittee's geophysical logs.
7. Section 3.2.1 Geophysical Logging, 1st paragraph, states "*the goal of the geophysical investigation was to refine the conceptual site model in order to optimize the placement of SVE well, groundwater extraction wells, and future monitoring wells.*" NMED did not find any discussions on how these goals were met. Also, there is no discussion of the results of the geophysical logging. The Permittee must discuss the results of the three types of logs and provide the information requested in NMED's September 28, 2011, and February 17, 2012, letters.
8. Section 3.2.1.4 Requirements for Quantitative Log Analysis, 2nd paragraph, states "*Even though the data from the different contractors is presented in the same standard units, there are differences in the actual measurement values...the most notable of which are from the neutron and induction probes.*" Induction logs that differentiate between clays/silts and sands/gravels by only a few ohm meters are not correctly calibrated. Other induction logs in the area show an order of magnitude difference in resistivity between the finer and coarser units. In a September 28, 2011, letter, NMED has stated that geophysical data collected by

CoLog and Jet West was from un-calibrated tools which allows only for qualitative comparison within a given borehole and between nearby boreholes, but does not allow for quantitative comparisons across the site, the latter being the goal of a calibrated logging program. Un-calibrated geophysical logs cannot be used reliably to interpolate or extrapolate physical properties, such as hydraulic conductivity.

9. Section 3.2.2.3 PneuLog Wells, does not indicate if the PneuLog wells were geophysically logged, they are not listed as having been logged in Table 3-1 and NMED has not received any logs generated for these PneuLog wells, even though the March 31, 2011, Interim Investigation Work Plan, Section 4.6.2.1, states that these wells are to be logged.
10. Section 3.2.2.3 PneuLog Wells -- PneuLog wells (KAFB-106148, KAFB-106149, KAFB-106150, and KAFB-106151) were installed during the third quarter of 2011. Indicate whether the PneuLog wells have been geophysically logged, and if so, submit the logs to the NMED, or if geophysical logging has not yet been conducted, indicate when they are scheduled to be logged.
11. Additionally, submit all outstanding geophysical logs to the NMED as directed by the NMED's letter of June 4, 2010, for quarterly report submittals. NMED has only received geophysical logs for the first three logging mobilizations.
12. Geophysical and geologic data are not being fully integrated into the conceptual geologic model or cross-sections. Include data from other KAFB wells, the Veteran's Administration well and the Water Utility Authority (WUA) wells on cross-sections, wherever possible, to provide additional information for preparation of the geologic cross-sections. Because the production wells in the area are deeper than the monitoring wells, these wells may be the only source for geologic information for deeper parts of the aquifer (geophysical logs are available for many of these wells). Cross-section locations, which should generally be oriented parallel and perpendicular to the contaminant plumes under investigation, must be chosen by the Permittee based on current well locations and data. Cross-section density should be increased in the source area.

Section 4. VADOSE ZONE SAMPLING AND MONITORING

13. Section 4 presents contoured cross-sections of various vapor constituents. These color contours show computer-program-generated output without human synthesis. For example, in past reports, the data related to specific sampling values do not always match the color coded contour values. In this report, in Figures 4-10 and 4-15, for example, higher-concentration color contours are abruptly truncated in the vadose zone. Some contours are drawn around wells for which no data points are supplied; for example, Wells KAFB-106002, KAFB-106012, KAFB-106079, etc., in Figure 4-5. Many other such examples exist in the Section 4 contoured cross-section figures. Explain these discrepancies and/or correct the contoured profiles.
14. There is no location map showing the locations of the cross sections and wells used as data points for Figures 4-5 through 4-10. This cross-section location map should be provided.
15. Figure 4-12, Lithology and TPH Soil, East-West Cross-Section G-G' provides no soil analytical data from beneath the former fuel offloading rack (FFOR) and indicates the soil at the rack exhibit little TPH contamination. Previous reports submitted by the Permittee

showed much higher levels of TPH in the soil beneath the FFOR (see for example Figure 2-2 of the Stage 2 Abatement Work Plan for the Soil Vapor Extraction Pilot Test at the Bulk Fuels Facility (ST-106), December 11, 2002). The Permittee must explain this difference and use all available data for site characterization that isn't rejected for quality control purposes.

16. Graphs showing trends of major contaminant concentrations versus time for groundwater or soil vapor need to be prepared. For groundwater, at a minimum, the major contaminants are EBD, benzene, toluene, xylene (total), naphthalene, 1-methyl naphthalene, 2-methylnaphthalene, DRO, GRO, and lead. For soil vapor, at a minimum, the major contaminants are EDB, EDC, benzene, toluene, ethylbenzene, xylenes, acetone, GRO, 1,3,5-trimethylbenzene, and 1,2,4-trimethylbenzene.
17. There is not a complete and updated listing of survey data (horizontal and vertical coordinates) for all groundwater and soil-vapor monitoring wells, and soil borings. Include such a table or tables in future quarterly reports and in MS Excel™ format on a CD or DVD.
18. Although geophysical logs were included in the geologic cross-sections (Figures 7-2 through 7-7-6) in the quarterly report, the logs are not calibrated and are not useful.
19. The Quarterly Report does not provide adequate information to evaluate the effectiveness of the SVE units. While NMED can discern how much contaminant mass is being removed from the vadose zone during the reporting period and how much mass has been removed cumulatively since initiation of SVE, NMED cannot easily evaluate possible trends or determine if the SVE system is pulling increasing or decreasing amounts of contaminants with time, or monitor if system maintenance or optimization is successful. NMED also cannot determine how much propane is being consumed, or monitor the ratio of propane use versus contaminant extraction. To correct this problem, data tables and graphical representations of the data must be prepared showing by each quarterly period and cumulatively since SVE has commenced for a given area, hours of operation (by engine and by unit), propane used, and mass of contaminants extracted (separate from biodegradation) and treated.
20. The Quarterly Report does not describe in detail what optimization was conducted for the SVE system during the reporting period.

Section 5. GROUNDWATER MONITORING

21. To better understand the general hydrochemistry of the groundwater, Piper and stiff diagrams should be prepared for shallow, intermediate, and deep depths within the saturated zone. The stiff diagrams for a given depth should be posted on a map at the sample locations (wells) the diagrams represent.
22. The groundwater potentiometric surface maps do not provide adequate coverage of the area. The maps should show all wells in the area, including at a minimum the VA Hospital, KAFB and Water Utility Authority (Ridgecrest and Burton Fields) production wells and KAFB groundwater monitoring wells located nearest to the Bulk Fuels Facility, i.e., KAFB-510 (see Comment 28), KAFB-0519, KAFB-0118, KAFB-0119, KAFB-0121, KAFD-015, KAFB-016, and KAFB-003.

23. Graphs showing water levels versus time for multiple wells in the same geographic area should be prepared and included in each quarterly report so that changes in water-level for a given well can be assessed relative to that of the overall water level change for the group of wells shown on the same plot. These hydrographs should have the same vertical and horizontal scale for ease of comparison.

Section 7. CONCEPTUAL SITE MODEL

24. It seems that the Regional Geology section, and the Site-Specific Geology section, Sections 7.1 and 7.2, respectively, should be longer than 1 to 1 ½ double spaced pages each. NMED is concerned that geophysical and geologic data are not being fully integrated in the cross-sections to produce the best possible geologic model. Furthermore, explain how each of the lithologic units shown on the cross-sections are differentiated from each other, and what major type of depositional environment(s) are represented by each of the units. Use and show on cross-sections data from other KAFB wells and from the Water Utility Authority (WUA) wells wherever possible to provide additional information for preparation of the geologic cross-sections. Because the production wells in the area are deeper than the monitoring wells, these wells may be the only source for geologic information for deeper parts of the aquifer.
25. NMED is concerned that geophysical and geologic data are not being fully integrated in the cross-sections to produce the best possible geologic model. Furthermore, explain how each of the lithologic units shown on the cross-sections are differentiated from each other, and what major type of depositional environment(s) are represented by each of the units. Use and show on cross-sections data from other KAFB wells and from the Water Utility Authority (WUA) wells wherever possible to provide additional information for preparation of the geologic cross-sections. Because the production wells in the area are deeper than the monitoring wells, these wells may be the only source for geologic information for deeper parts of the aquifer.

Figures

26. Many figures have unrealistic or erroneous contours such as greater than 50-ft vertical walls as sides or edges of plumes, for example, Figure 4-67, which, in reality, probably have a more lens-like geometry. Also, cross-sectional figures do not show where the other cross sections intersect; for example Figure 4-67 – showing Lithology Cross Section K-K’ – does not indicate the intersections of cross sections F-F’, G-G’ and H-H’. Correct the figures as appropriate.

Another example of unrealistic contours, for example, would be Figure 7-9, which shows a wider EDB groundwater plume at about 60’ foot depth than at the water table (which may imply interesting hydrologic conditions). Other figures show greater- than 50-foot vertical walls as sides or edges of plumes, which, in reality, probably feather out.

Computer contouring is certainly an acceptable step in producing contours, but the final figure/cross-section/map should be tempered by a person to be closer to reality.

Appendix E. HISTORICAL DATA SUMMARIES

27. The continued submittal of the databases (Appendices E-1 and E-2) is the mechanism to correct earlier mistakes in data. Mistakes have previously been pointed out to the Permittee

(see for example comment 30 in the August 17, 2011, letter from NMED). Each quarterly report should contain a table listing or text describing what data have been corrected, if any.

28. There is confusion about well KAFB-510. The well construction database in Appendix E-1 lists a well named KAFB-510 at 1545110.84E, 1472791.28N, elevation 5357 and no baseline elevation measuring point, as well as a well named KAFB-510MW at 1545235.84E, 1472788.95N, elevation 5262.18 and baseline elevation measuring point of 5262.18 feet above mean sea level. These 2 points are about 120 feet apart horizontally and about 105 feet apart vertically. NMED is aware of only one well in that immediate area. This discrepancy was pointed out to the Permittee by email on 3/9/2012. The Permittee responded by email on 3/12/2012 saying they would resurvey the location, but NMED has not received any new coordinates for the well.

Additionally, NMED notes that KAFB-0510 was listed as being at 404990.22N and 1472725.67, elevation 5262.18 and measuring point elevation 5364.43 in the February 2002 Kirtland AFB Biannual Groundwater Monitoring Report, page 2-8, Table 2-5. The horizontal location, when converted from NAD 27 to NAD 83, corresponds to the horizontal location listed for the well named KAFB-510MW and the elevation is the same (if you assume there is a typo in the 2002 report) but the measuring point is different. The apparent typo shows why NMED typically asks for copies of the original survey plat and not transcribed tables.

The Permittee must clarify the information, including the name(s) for this well or wells, and supply the accurate horizontal and vertical coordinates for the well, as well as the groundwater elevation. Additionally, the Permittee must explain why water elevation data from this well is not used in generating water level maps for the BFF Spill and the Permittee must also present accurate data to NMED for their nitrate abatement program that uses well KAFB-510.

29. Appendix E-1 lists many soil samples as collected from a 50-ft interval (example, benzene form KAFB-106130 at 351-ft start depth and 400-ft end depth). State if the sample is a composite of 50 ft length, or be more specific at what depth the sample was collected.
30. Appendix E1 – Excel spreadsheet KAFB-011-0061c shows the top of screen elevation for KAFB-1065 as 4852.3 feet while Table 5-1 shows the sampling depth for KAFB-1065 as 479-506 feet which, suggests 27 feet of screen. Provide the correct information in future reports.
31. NMED is aware that pumping test data and geophysical logs have been generated for at least some Kirtland production wells, and all of the production wells likely have construction logs. Submit all such available data for production wells KAFB-1 KAFB-2 KAFB-3, KAFB-7, KAFB-14, KAFB-15, KAFB-16, and KAFB-20.

Appendix G. FIELD SAMPLING DATA AND RECORDS, JULY – SEPTEMBER 2011

32. Appendix G-6. Field Work Variances: Appendix I-1, Field work variances, contains four variances, FWV-1, 2, 3, 4, 5 and 7. FWV-4 exhibits a number of problems including lack of appropriate signatures, omissions and what appear to be typographical mistakes. For example in FWV-4, the first sentence of the Recommended Solution on page 2 of 2 is “The Shaw technical team recommends collecting a minimum of one quarter of monitoring data

from the 5 closest groundwater monitoring well clusters: GWM-8, GWM-8, GWM-10, and GWM-28.” Clarify whether there are 3, 4, or 5 well clusters being recommended.

33. Additionally, in FWV-4, there is a section on page 1 called “recommended solution” which has one solution and a section on page 2 called “recommended solution” which lists two possible solutions: a recommended solution and an “altetal” (alternative?) proposed solution. The recommended solution on page 1 is the “altetal” solution on page 2. QA/QC Field Work Variance Forms should be free of errors, present final decisions, and have appropriate signatures.
34. FWV 5 exhibits similar signature problems as FWV-4; it also appears to be a “draft” as the date at the bottom of the variance pages is crossed out and the date changed.
35. FWV-7 also has signature issues similar to FWV-4. The Permittee should fix these issues and in the future insure that all documents are completed, signed and dated properly.
36. The Permittee must explain why Variance 6 was removed from Appendix G of the December 27, 2011, KAFB Quarterly Pre-Remedy Monitoring and Site Investigation Report for July - September 2011.

Appendix J. ADDITIONAL CROSS SECTIONS

37. Appendix J-1, Plate J-10, TPH Soil Concentration for Geologic Cross –Section A-A’ and Plate J-11, TPH Soil Concentration for Geologic Cross –Section D-D’, indicate the presence of soil contamination about 150 ft deep in groundwater beneath KAFB-106081. The Permittee must explain the occurrence of the soil contamination at that depth below the water table.

Appendix K. NAPL AND HYDRAULIC PROPERTY LAB REPORTS

38. Appendix K1, PTS Lab Soil and NAPL Analysis Results, Hyd_Cond_Porosity_GrainSize_foc, Sieve Analysis, 41516_2, first page, lists the classification of the grain-size analysis sample for KAFB-106030 at 475ft depth as gravel. Because more than 50% of the sample is sand, the USCS/ASTM classification would not be gravel. Other such examples exist. Describe the soil classification system used by the laboratory.

Should you have any questions or would like to meet to discuss the deficiencies addressed in this letter, please contact Mr. William Moats of my staff at (505) 222-9551.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: K. Roberts, NMED EHD

Col. Miller and Mr. Pike

November XX, 2014

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File: KAFB 2013 Bulk Fuels Facility Spill and Reading