ENTERED

NEW MEXICO ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

January XX, 2015

Colonel Tom D. Miller
Base Commander
377 ABW/CC
2000Wyoming Blvd. SE
Kirtland AFB, NM 87117-5606

John Pike
Director, Environmental Management Services
377 MSG
2050 Wyoming Blvd. SE, Suite 116
Kirtland AFB, NM 87117-5270

RE: NOTICE OF DISAPPROVAL: QUARTERLY PRE- REMEDY MONITORING AND SITE INVESTIGATION REPORT FOR JULY-SEPTEMBER 2011, BULK FUELS FACILITY SPILL, SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111, DECEMBER 2011
KIRTLAND AIR FORCE BASE
EPA ID# NM9570024423, HWB-KAFB-11-019

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 July-September 2011, Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111,* dated December 2011 (hereinafter referred to as the Quarterly Report). The deficiencies noted in this letter need to be corrected in future quarterly reports.

Executive Summary

1. The Executive Summary, first bullet states "*Based on the three-dimensional (3D) distribution of vadose zone soil and vapor concentrations for wells installed and sampled to date, it appears that the majority of the vadose zone contaminant mass is located within*

KAFB4888

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 contamination. The Permittee must describe how the contaminant mass is distributed throughout the vadose zone, including the upper 400 ft, and especially in the vicinity of the Former Fuel Offloading Rack as represented, for example, in Figures 2-2 and 2-3 of the Stage 2 Abatement Work Plan for the Soil Vapor Pilot Test at the Bulk Fuels Facility (ST-106), December 11, 2002, and the continuing pathway down to the 400-500 foot level. (See also Comment 20).

2. The table in the Executive Summary on Pages ES-2 and 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 fifth 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-1, 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.

Section 4. VADOSE ZONE SAMPLING AND MONITORING

12.

13. Section 4 presents contoured cross-sections of various vapor constituents. In many locations, the data related to specific sampling values do not appear to match the color coded contour values. For example, in Figure 4-63 all of the values for TPH but one in KAFB-106112 are less than 100 ppmv, but fall in the 100-1,000 ppm (green) zone. Many other such examples exist in the Section 4 contoured cross-section figures. Explain these discrepancies and/or correct the contoured profiles.

14. 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.

Section 5. GROUNDWATER MONITORING

15. Section 5.2.1 Groundwater Levels -- The water level 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. Add KAFB-510 (see Comment X), KAFB-0519, KAFB-0118, KAFB-0119, KAFB-0121, KAFD-015, KAFB-016, KAFB-003, the VA Hospital, Ridgecrest 3, and Ridgecrest 5 wells to the map. The groundwater elevations from the water supply wells (and KAFB-0519) do not necessarily have to be used for the contouring, but the elevation data must be printed on the map.

16. Section 5.3.3 Piper and Stiff Diagram Inorganic Chemistry Evaluation -- To better understand the general hydrochemistry of the groundwater, the stiff diagrams for a given depth (Figures 5-60 through 5-62) should be posted on a map at the sample locations (wells) the diagrams represent.

17. Section 5.6.1 Groundwater Levels -- 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 hydro graphs should have the same vertical and horizontal scale for ease of comparison.

Section 7. CONCEPTUAL SITE MODEL

18. 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.

19. There are several instances of cross sections in Section 7 that depict contaminant concentrations that do not agree with contamination maps shown in Section 5. For example, Figure 7-8 shows EDB contamination greater than 0.10 µg/L at well KAFB-10621 that extends from the water table to below 4,800 ft elevation, but Figure 5-21 shows contamination at the water table at KAFB-10621 to be 0.032 µg/L. Figure 7-8 also shows, at well cluster KAFB 106085-86-87, EDB contamination starting at 0.5 ug/L at the water table, increasing to 0.10 ug/L, or greater, to below 4,800 ft elevation, but Figure 5-22 shows intermediate groundwater contamination of 0.75 µg/L EDB at this cluster. The Permittee must resolve these discrepancies between the maps and the cross sections.

20. Figure 7-10 (Cross Section D-D') shows an EDB groundwater plume thickness greater than 140 feet. The Permittee must supply a map showing the interpreted area of EDB groundwater contamination greater than 100 feet thick.

21. Explain why Figure 7-10 shows a distinct area where the EDB groundwater plume is 140+ feet thick beneath D-D' yet Figure 5-23 shows no detects in any deep monitoring well along the section or nearby. Explain if more deep wells are necessary to outline the deeper portions of the EDB plume or if there is a preferential downward flow path.

Figures

22. 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.

23. 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

22. 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.

23. 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.

24. 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.

25. 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 top of screen for KAFB-1065 as 4864.995 feet. Provide the correct information in future reports.

26. 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 F. TIME-SERIES PLOTS

27. Appendix F-1. Water-Level Hydrographs, page F1-3: Explain the apparent 30 ft shift in groundwater levels at KAFB-016, Appendix F-1, page F1-3 (about January 2007).

28. Appendix F-1: The number of graphs in Appendix F-1 may be reduced. Instead of individual plots for each well, graphs showing water level versus time for wells in the same geographic area can be prepared so that changes in water-level for a given well can be assessed relative to that of the other wells shown on the same plot.

29. Appendix F-1: In the future, hydrographs should have the same vertical and horizontal scale for ease of comparison. 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.

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

30. Appendix G-6. Field Work Variances contains eight variances, FWV-1, 2, 3, 4, 5, 7 and 8. 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.

    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 "altemal" (alternative?) proposed solution. The recommended solution on page 1 is the "altemal" solution on page 2. QA/QC Field Work Variance Forms should be free of errors, present final decisions, and have appropriate signatures.

    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.

    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.

31. 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

32. 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

33. 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.

The Permittee must respond in writing to this letter and correct the deficiencies noted herein by **September 30, 2015**. Should you have any questions, please contact Mr. Dave Cobrain of my staff at (505) 476-6055.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: K. Roberts, NMED EHD
D. Cobrain, NMED HWB
W. Moats, NMED HWB
W. McDonald, NMED HWB
J. Schoeppner, NMED GWQB
S. Reuter, NMED PSTB
B. Gallegos, AEHD
F. Shean, ABCWUA
L. King, EPA-Region 6 (6PD-N)
File: KAFB 2015 Bulk Fuels Facility Spill and Reading