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**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

February 1, 2013

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**RE: DISAPPROVAL  
ADDITIONAL DATA REQUEST AND QUARTERLY PRE-REMEDY  
MONITORING AND SITE INVESTIGATION REPORT FOR APRIL - JUNE  
2012, BULK FUELS FACILITY SPILL, SOLID WASTE MANAGEMENT UNITS  
ST-106 AND SS-111, OCTOBER 2012  
KIRTLAND AIR FORCE BASE  
EPA ID# NM9570024423  
HWB-KAFB-12-023**

Dear Colonel Kubinec and Mr. Pike:

The New Mexico Environment Department (NMED) has reviewed the document *Quarterly Pre-Remedy Monitoring and Site Investigation Report for April – June 2012, Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111*, dated October 2012 (hereinafter referred to as the Quarterly Report). By letter on June 4, 2010, NMED required quarterly reports to be submitted for the investigation and remediation of the Bulk Fuels Facility (BFF) Spill. The pertinent part of that letter states:

*Each quarterly report shall provide detailed information on all characterization and remediation activities that took place during the period covered by the report, including, but not limited to, as applicable for the reporting period, field and laboratory analytical results for groundwater, soil, and soil gas; graphs showing trends of major contaminants*

KAFB4036



*versus time, a table of surveyed well locations; descriptions of the installation of groundwater and soil-gas monitoring wells; measurements of light non-aqueous phase liquid (LNAPL); table of water levels; water-level map; plume contaminant maps and cross-sections; and geologic and geophysical logs of wells and boreholes. Each quarterly report shall also describe the operation, maintenance, and performance of the four soil-vapor extraction (SVE) systems. Each quarterly report shall also include all field and laboratory quality control data for the reporting period and a discussion of data quality as it relates to accuracy, precision, representativeness, and completeness for each analytical parameter that is to be reported.*

NMED is dissatisfied with the contents of the Quarterly Report. Existing data are not being utilized to maximum benefit. Also, as with earlier reports, the Quarterly Report does not adequately convey the information that is necessary to facilitate a detailed understanding of the geologic, hydrologic, and contaminated conditions of the vadose zone and groundwater, and the degree of success of the soil-vapor extraction (SVE) units in removing contamination from the vadose zone. In particular, an adequate geologic conceptual site model for such a complex investigation has not been prepared based on the figures provided in the Quarterly Report, especially for the source area of the contamination where geologic conditions significantly influence the migration of fuel to the water table.

The following comments are intended to convey deficiencies in the Quarterly Report that have been identified by the NMED. In addition, at the end of this letter, data are requested concerning production wells located in the BFF area.

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 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 (see also Comment 18).
2. There is confusion about well KAFB-510 (KAFB-510MW, KAFB0510MW, KAFB-0510-MW). In the quarterly report for January – March 2012 (dated June 2012), the Well Construction Database in Appendix E-1 lists a well designated KAFB-510 at 1545110.841 E, 1472791.276 N, elevation 5,357 ft (with no measuring point), and another well named KAFB-510MW at 1545235.841 E, 1472788.945 N, elevation 5,262.18 ft (with a measuring point elevation of 5,262.18 ft). These two locations are separated by about 120 ft horizontally and 105 ft apart vertically. NMED is aware of only one well in that immediate area and the topography is essentially flat. This discrepancy was pointed out to the Permittee by email on March 9, 2012. The Permittee responded by email on March 12, 2012 stating

that they would resurvey the location. NMED has not received the actual coordinates for the well.

Additionally, NMED notes that KAFB-0510 was listed as being at 404990.22 N and 1472725.67 E, elevation 5262.18 ft (with a measuring point elevation of 5,364.43 ft) 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 location listed for the well named KAFB-510MW and the same elevation (if you assume there is a typographical error for the elevation in the 2002 report), but the measuring point is different. The hydrograph submitted in Appendix F-1, Water Level Hydrographs, page F1-4, Well ID KAFB0510MW shows the water level at about 4856.5 ft elevation for January 2012. Appendix G-6, Water Level Measurement Field Forms, the Quarterly Water Level Field Measurements, 1<sup>st</sup> Quarter 2012 form, page 18 of 20, shows a depth to water of 513.41 ft on 1/5/12 at KAFB-0510-MW. This would imply a measuring point of approximately 5,370 ft, about 4.5 ft higher than the surveyed measuring point listed in the 2002 Report or the measuring point listed in Appendix E-1.

In this quarterly report, well KAFB-0510MW is listed as having a groundwater elevation of 4750.88 ft in Appendix E-2 for the second quarter 2012, which would plot about 100 ft below the hydrograph of the well presented in Appendix F-1. The measuring point listed in Appendix E2 is listed as 5262.18 ft, which is appreciably below actual ground elevation.

The Permittee must clarify the information, including the name(s) for this well or wells, and supply accurate horizontal and vertical coordinates, provide an accurate elevation of measuring point and the groundwater potentiometric surface. Additionally, the Permittee must explain why water elevation data from this well is not used in generating water level maps for the BFF Spill.

3. Section 4 presents contoured cross-sections showing concentrations for various vapor constituents. At multiple locations, the data related to specific concentration values do not appear to match the color coded ranges. For example, in Figure 4-6 the value of 13,000 ppmv at KAFB-106112 at the bottom of the monitoring well appears within the yellow background of 1,000 to 10,000 ppmv. Correct the cross-sections as needed.
4. KAFB-106127 is not shown on Figure 4-2, VOC Vapor Sample Locations, yet Table 4-2, Soil Vapor Analytical Results presents VOC data for this well. Correct the table as appropriate.
5. Section 5.2, Liquid Level Data, first sentence states "*Commencing with the First Quarter 2012, liquid levels are measured on a quarterly basis as opposed to monthly basis....*" NMED did not approve this change. The Groundwater Investigation Work Plan (March 2011) Section 5.2.1, first paragraph states "Measurements will be made monthly during the well installation program and immediately before purging and sampling." The Permittee must continue measuring water levels on a monthly basis unless NMED's approves in advance a change to the schedule.

6. The groundwater potentiometric surface map (Fig. 5-2) does not cover a large enough area. Add wells KAFB-510 (see Comment 2), KAFB-0519, KAFB-0118, KAFB-0119, KAFB-0121, KAFD-015, KAFB-016, KAFB-003, the VA Hospital, Ridgecrest 3, and Ridgecrest 5 to the map. The groundwater elevations from the water supply wells (and KAFB-0519) should not be used for contouring, but the elevation data must be posted on the map.
7. 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 ug/L at well KAFB-10621 that extends from the water table to below 4,800 ft elevation, but Figure 5-13 shows contamination at the water table to be 0.084 ug/L. Figure 7-8 also shows EDB contamination greater than 0.10 ppb at well cluster KAFB-106085-86-87 that extends from the water table to below 4,800 ft elevation, but Figure 5-13 shows water table contamination of 0.062 ug/L EDB at this cluster. And, Figure 7-10 depicts EDB at the water table at well KAFB-10611 that is not reflected in Figure 5-13. The Permittee must resolve these discrepancies between the maps and the cross sections.
8. Many figures have unrealistic or erroneous contours. For example, the eastern side of Figure 4-5 at KAFB-106139 shows a thin 500-ft-long "clean" layer at about the 5,250 ft elevation, with no data that separates two data points with values greater than 500 ppmv. This and other soil vapor and groundwater contamination figures show greater-than 50-ft vertical walls as sides or edges of plumes, which, in reality, probably have a more lens-like geometry. Correct the figures as appropriate.
9. Section 5.2.1, Groundwater Levels, 3<sup>rd</sup> bullet states "*Field technicians measure water levels and field-check to verify that measurements within a given cluster are within plus or minus 0.5 ft. If not, they then re-measure each water level in the cluster. This QC evaluation is documented on the water level measurement field form.*" For clusters listed as having a "no" flag qualifier attached to a well in Appendix G-6, apparently only the well with this qualifier was rechecked and not the other wells in the cluster. Explain why the procedure in Section 5.2.1 was not followed.
10. Section 5.2.1, Groundwater Levels, fifth bullet states "*Additionally, the Field Sampling Coordinator compares the measurements against the measurements from the preceding quarter. If any measurements fail a plus or minus 1.0-ft check, they are marked and measured again the following day. This QC evaluation is documented on the water level measurement field form.*" Second quarter water level measurements for most wells have water levels more than a foot higher than first quarter 2012 measurements, yet NMED could not find evidence of re-measurement in most of these wells. In the first quarter, field personnel mentioned that if all wells in a cluster were more than one foot off of the previous level the wells are not flagged. This appears to be contrary to the text describing the procedure in Section 5.2.1 and should be noted as a variance from the QA Plan.
11. It appears that some of the wells on the Quarterly Water Levels Recheck Form in Appendix G-6 fail test criteria ( $\geq 0.5$  ft within cluster or  $\geq 1$  ft from last reading) and some do not. Some

are rechecked 5 days after the initial reading (not the next day). Explain why re-measuring is not being conducted in accordance with the written procedure.

Some of the readings appear in the typed version of the water level field measurements form and some do not. Explain why some data are not recorded in the typed version.

Explain the process for choosing which groundwater elevation to use when multiple values are recorded.

Explain the meaning of the entry "anomalous" which is handwritten at certain wells on typed copies of the water level field measurement forms presented in Appendix G-6

12. The last bullet of Section 5.2.1 states "*All measurements (including re-measurements) are entered into the database along with associated flags noting that the QC checks were performed.*" However, NMED notes, for example, that the re-measurement data for KAFB-106001 on 1/10/12 and for KAFB-106049 on 4/4/12, KAFB-106077 on 4/3/12, and KAFB-106-087 on 4/4/12 are not in the electronic file under Appendix E-2, QTR1\_liquid\_level\_2012. Indicate if all data are included, as appropriate.
13. Section 3.2.1 Geophysical Logging, 1<sup>st</sup> paragraph, states "*the goal of the geophysical investigation was to refine the conceptual site model in order to optimize the placement of SVE, groundwater extraction, 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.
14. Section 3.2.1 Geophysical Logging, 2<sup>nd</sup> paragraph, states "*Jet West geophysical logs have been verified as being calibrated....*" 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.

Furthermore, 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. The Pneulog wells were installed during the third and fourth quarters 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.

Additionally, submit all outstanding geophysical logs to the NMED as directed by the agency's letter of June 4, 2010, for quarterly report submittals. NMED has only received geophysical logs for the first three logging mobilizations.

15. 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.

16. Explain the apparent 30 ft shift in groundwater levels at KAFB-016, Appendix F-1, page F1-3 (about January 2007).
17. 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.

Appendix I-1, Field work variances, contains four variances, FWV-1, 2, 3, and 7. Other quarterly reports have presented other variances. For example, the December pre-remedy quarterly report included FWV-4. FWV-4 exhibited 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 "alternat" (alternative?) proposed solution. The recommended solution on page 1 is the "alternat" solution on page 2. QA/QC Field Work Variance Forms should be free of errors, present final decisions, and have appropriate signatures.

The Permittee must explain why Variances 4, 5 and 6 were removed from Appendix I of the April 12, 2012, KAFB Quarterly Pre-Remedy Monitoring and Site Investigation Report for October - December 2011, Kirtland AFB Bulk Fuels Facility (SS-111, ST-106).

18. Figure Appendix J2-13, Lithology and TPH Soil, East-West Cross-Sections 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.

19. Appendix J-1, Plate J-10, TPH Soil Concentration for Geologic Cross-Section A-A' indicates 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.
20. Appendix J-1, There are multiple figures with the same number designation in Appendix J-1. Correct the figures as appropriate.
21. Appendix J-1, Explain the occurrence of the two areas of EDB contamination of at least 150 foot thickness in groundwater on Appendix J-1 Figure J-10 that does not appear on Figure 5-15.
22. 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 475 ft 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.
23. Appendix L, Radius of Influence Test Report, Section 4.1.2, last sentence, page L-20 states "*The results for the data analysis are presented in Section 4.6.*" There is no section 4.6. Correct as appropriate.
24. The March 2011 Interim Measures Work Plan, Section 4.6.11, states "*The data from the ROI testing will be contoured across the testing area.*" No such figure was found in the Quarterly Report. Explain how the Permittee plans to determine effective ROI at higher vacuums to help design the soil vapor extraction system.
25. For the Radius of Influence test, provide a graph for each long term test by plotting the radial distance of each observation well from the test well along the x-axis against the observed vacuum response (corrected for barometric pressure) along the y-axis for each depth being monitored.
26. The Executive Summary, Page ES-3, 2<sup>nd</sup> bullet, states "*...the ROI within the BFF is most likely between 220 and 300 horizontal ft using the current SVE system*". Of the three 5-day tests discussed, only one test, 5DTKAFB106149-484, had an interpreted ROI in that range (page 3-35). The Quarterly Report indicates that test 5DKAFB106121-450 had an interpreted ROI of about 75-95 ft (p. 3-36), and results section for test 5DTSVEW-01 stated "*No meaningful conclusions about the ROI of extraction well SVEW-5 can be made from this analysis of the data.*" Clarify whether ROI estimates are solely based on the well with the highest numbers.
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. The stiff diagrams (Figures 5-52 through 5-63) should be posted on a map(s) at the sample locations (wells) each diagram represents.
29. Appendix M-1 presents geophysical logging calibration data. NMED notes that for the gamma logs (on the induction tool), the shop, pre-log field, and post-log field calibrations do not always correlate well. For example, only one of the field calibrations agrees with the shop calibration (5/1/11), both field calibrations agree with each other but not with the shop calibration (9/16/11), or none of the three agree with each other (9/13/11). At times they vary by as much as 25%. Explain the accuracy specifications for the gamma pre- and post-logging calibrations in comparison to the shop calibration.
30. Also, with respect to the gamma calibration log charts, the x-axis of each chart is labeled with resistivity units instead of gamma API units. Correct the charts.
31. 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.
32. NMED is under the impression that the geophysical subcontractor, Jet West, uses an Advanced Logic Technologies DIL45 for induction logging (Jet West website <http://www.jetwestgeophysical.com/files/ALT-DIL45.pdf>). The DIL45 Operation Manual refers to a 606 mmhos/m calibration standard. The calibration logs submitted in the Quarterly Report, Appendix M1, indicate that the induction logs are calibrated to 606 mmhos/cm. Verify the value of the induction log standard actually used to generate logs for wells installed for the Bulk Fuels Facility Spill.
33. In Appendix E-1, describe the difference between column X – VALIDATION\_QUALIFIER, column AG – QUALIFIER, and column AH – QUALIFIER\_ORIG, and which one should be used.
34. In Appendix E-1, describe if a blank in columns AG and AH signifies the same thing as “=” or something else.
35. In Appendix E-1, describe what is column AJ - VALIDATED\_BY is referring to and why it is generally blank.
36. 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.
37. Appendix E-1, in column T, labeled PARAMETER\_ORIG, there are entries such as *APPENDIX A, FINAL WORKPLAN FOR SITE INVESTIGATION AT SITES 6, 7 AND 17, CLEAR AFS, OCT 2005; CASTLE AIRPORT LONG TERM GRDWTR SAMPLING PROG*

*SUPPLEMENTAL QAPP, CASTLE AIRPORT, MERCED, CA - OCT 20; APP B - DRAFT SITE 5 INVESTIGATION QAPP ADDENDUM FOR PETERSON AFB - JUL 2005; BASEWIDE QAPP FOR MAXWELL AFB/GUNTER ANNEX ERP, 2004; and QAPP FOR KING SALMON AIR STATION, ALASKA, 2004.* Explain these entries.

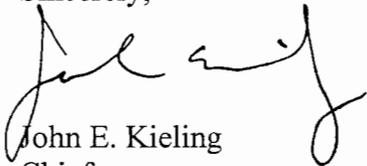
38. Appendix N, *PneuLog Evaluation Report*, is marked as a "Preliminary Draft Report". Indicate when the final report will be submitted to the NMED.
39. Appendix N, Figure 7, Indicate the level of resolution of the PneuLog measurements regarding depth. For example, some depths seem to have resolution on the order of one foot, but for most depths the resolution appears to be a 10 foot interval.
40. Appendix N, Figure 7, Explain why the gaps in the log where the screen intervals end, for example at the 200 and 350 ft depths, don't seem to approach closure.
41. Appendix N, Figure 7, explain why the majority of the results lie in the clayey or silty fields, which is in contrast to the geologic logs for the site which indicate mostly sands and gravels at depths below about 135 ft.
42. Explain why the other six PneuLog analyses have not been presented, as all PneuLog boreholes were completed in the last quarter of 2011.

Additional Data Request

43. 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.

The Permittee must submit a written response to these comments by **April 30, 2013**. Should you have any questions, please contact Mr. William McDonald of my staff at (505) 222-9582.

Sincerely,



John E. Kieling  
Chief  
Hazardous Waste Bureau

Col. Kubinec and Mr. Pike

February 1, 2013

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