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Draft - not mailed

May 3, 2014

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**RE: DISAPPROVAL
SOIL-VAPOR EXTRACTION SYSTEM PILOT TEST REPORT
BULK FUELS FACILITY SPILL
SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111
KIRTLAND AIR FORCE BASE
EPA ID# NM9570024423, HWB-KAFB-14-002**

Dear Colonel Miller and Mr. Pike:

The New Mexico Environment Department (NMED) has reviewed the U. S. Air Force (Permittee) Kirtland Air Force Base document *Soil-Vapor Extraction System Pilot Test Report Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS111* dated February 25, 2014 and received on February 27, 2014. NMED hereby issues this disapproval with the following comments.

GENERAL COMMENTS

1. Interpretation of Data used in Design of SVE System

NMED Comment: The Permittee has not provided sufficient information regarding characterization of the subsurface lithology and contamination. This is integral in designing an adequate SVE treatment system. In addition the information provided contains inaccuracies as described below.

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First, the lithology cross-sections provided in the Permittee's quarterly reports appear to be inaccurate and based solely on soil classifications documented during well drilling operations. These wells were drilled using air-rotary drilling methods, which utilize air to blast cuttings to the surface. Collected air rotary cuttings are typically not indicative of actual subsurface conditions based on loss of fines, mixing of materials, and travel time to the surface. In addition, where split-barrel sampling occurred, the fine-grained soils were consistently misclassified on boring logs provided in the July-September 2011 Quarterly Report. Specifically, based on a preliminary review of boring logs for wells KAFB-106120 and KAFB-106124, silts classified as "soft" on the boring logs were, in actuality, "very stiff" or "hard" based on blow counts reported, and silts and clays classified as "stiff" on the boring logs should have been classified as "hard", based on the blow counts reported.

Borehole logging based on cuttings and split-barrel sampling is subjective and dependent on the qualifications and experience of the individual performing the logging. The inaccurate classification of cohesive soils suggests that the logger(s) was not as experienced as would be expected for this project. Borehole logging from air-rotary cuttings should not be the sole method of characterization of the subsurface for a project where the collection of additional data is costly and time-consuming. As an example, geophysical logging of the boreholes could provide a reliable source of corroborating information for characterization of actual subsurface lithology; however, these data were not referenced.

Based on geophysical logging of boreholes, the subsurface at the site consists of a mostly continuous layer of fine-grained soils, i.e., clays and silts, between 250 and 300 feet (ft) below ground surface (bgs). This has been discussed in previous reports by the Permittee (e.g., January 30, 2006 Summary and Performance Report), but was omitted in more recent reports. In addition, the lithologic units within the subsurface appear to dip eastward to southeastward. The effect of this stratigraphy, which extends below the former fuel offloading racks (FFOR), is to retard and divert the downward migration of the fuel contaminants as they move through the subsurface. The data suggests that as the contaminants reached the finer-grained layers, they were unable to continue migrating directly downward, likely spread out along the top of the clay layer and migrated towards the east-southeast.

The geophysical logging data indicate a discontinuity in this mostly continuous fine-grained layer between the Pneulog© wells KAFB-106148 and KAFB-106149. Based on this information and the soil gas data logs from these wells, it is likely that the fuel contaminants from the FFOR made their way vertically downward until reaching the fine-grained layer between 250 and 300 ft bgs. It is likely that the fuels then spread laterally towards the east-southeast until they encountered the discontinuity in these fine-grained soils and then continued to migrate vertically to the water table.

The total VOC vapor plume footprint by elevations maps provided by the Permittee, dated March 2013, also support this model. These maps illustrate that the highest contaminant levels in the vadose zone above 250 ft bgs are directly below the FFOR. The highest levels of soil vapor contamination are located to the east-southeast of the FFOR at depths greater than 250 feet bgs.

The historic location of observed NAPL on the groundwater surface also supports this interpretation. Data from the SVE pilot tests showing the highest levels of contaminants being extracted from well 106148 at 199-349 ft bgs and from well 106150 at 355-484 ft bgs also support this interpretation.

Based on the information above, it is likely that there is a large source of contaminants located at the interface of, and adsorbed within, the fine-grained layer between 250 and 300 ft bgs beneath the FFOR. This is where the highest concentration of TPH was found in the historical data (from a soil sample collected from boring SB-26 at 269 ft bgs).

In reviewing data from previous quarterly reports, NMED found many instances of inaccurate and misleading information. As an example, in the Permittee's July – September 2011 Quarterly Monitoring and Site Investigation Report (2011 July-Sept Quarterly), Section 4, three dimensional (3D) analysis and mapping of soil TPH levels was performed. The data used for this analysis and mapping excluded all soil TPH data from within the source zone below the FFOR.

Figure 4-3, Soil TPH Footprints by Elevation, indicates that there is very little soil where TPH concentrations exceed 100 mg/kg. While the maximum concentration of TPH in soil used by the Permittee for 3D analysis and mapping was 1519 mg/kg, a cursory review of the data by NMED found a minimum of 36 soil samples that exceed a concentration of 1519 mg/kg TPH and range up to 114,000 mg/kg TPH. By excluding these data, the Permittee presents an inaccurate representation of subsurface conditions. Further, even where data used by the Permittees report elevated soil TPH concentrations, there are reported inconsistencies of 1168 mg/kg in boring KAFB-106120 at 400-450 ft bgs, while Figure 4-3 depicts TPH levels between 10 and 99 mg/kg in the same interval.

In the 2011 July-September Quarterly, the Permittee state, "Based on previous experience at other NAPL sites, soil TPH concentrations are typically greater than 1,000 mg/kg in NAPL zones. The Kirtland AFB 2011 data set shows only three samples with a TPH-GRO+DRO greater than 1,000 mg/kg (KAFB-106078, 400 to 450 ft bgs; KAFB-106120, 400 to 450 ft bgs; and KAFB-106147, 0 to 5 ft. bgs), and the vast majority of the soil sampling results are less than 100 mg/kg. Similarly, concentrations of other compounds are relatively low. For example, the highest benzene concentration is 3 mg/kg, and most of the benzene soil detections are less than 0.01 mg/kg. The low-level concentrations of TPH compounds are not typical for a NAPL site." The Permittee points out that this is not typical while overlooking contradictory reported TPH concentrations far above 1,000 mg/kg in the comprehensive database included in Appendix E of the same report, which was referenced in the paragraph preceding the above statement .

Based on the examples cited above, the analyses presented in Section 4 of the 2011 July-Sept Quarterly, including Figures 4-3 through 4-58, are unsuitable for use in evaluating or designing appropriate remediation systems for the KAFB Bulk Fuels Facility. Because the Permittee relies on these inconsistent data, the locations of the vapor extraction wells are not optimal for addressing the highest concentration source areas of contamination. In addition, the wells proposed by the Permittee to be used for expansion of the SVE system are small in diameter (e.g., 3 inches) and the screened intervals are long (e.g., approximately 130 to 150 ft) and therefore will be relatively inefficient.

The small diameter of the wells restrict the ability to extract vapors at higher flow rates, and the long screened intervals effectively dilute the high concentration vapors with relatively clean air and may be subject to short-circuiting. Regardless, the current CATOX treatment system is too small to effectively treat the high-concentrations of hydrocarbon vapors present at the site. In addition to being undersized, the Permittee has only been able to operate the CATOX system at approximately 50-80% of its rated capacity since the unit began operation in January 2013.

The Permittee must reassess and redefine their subsurface cross-section maps using geophysical data and the subsurface soil TPH concentration maps using all sampling data from borings and wells in the FFOR area. Larger diameter soil vapor extraction wells with targeted shorter screened intervals near the top of the fine-grained layer below the FFOR and near the groundwater surface in the historic NAPL area are necessary to optimize the efficiency of an SVE system. New wells likely must be installed with tighter grid spacing in these two high TPH soil vapor concentration areas. In addition, in order to treat these higher concentration vapors, the Permittee must employ a treatment system capable of destroying the higher rates and concentrations of hydrocarbons with a minimum 98% or greater efficiency.

2. Radius of Influence Determination

NMED Comment: The Permittee does not provide justification for defining 0.3 inches of water column (in. WC) as the edge of the effective radius of influence (ROI) of vapor extraction from a well where vacuum is applied. This value appears to be arbitrary, which is supported by the Permittee's use of 0.2 in. WC in a previous Quarterly Report as defining the edge of the ROI.

A minimal decrease in pressure at an observation well does not indicate that effective movement of contaminated soil vapor would occur at that distance. The effective ROI for SVE system design must be based on air permeability and flow within the subsurface. The June 3, 2002 US Army Corps of Engineers' *Engineering and Design Soil Vapor Extraction and Bioventing Engineer Manual* (Manual) specifically states, "[t]he radius of vacuum/pressure influence does not provide, in most cases, an estimate of the zone of effective air exchange of the vent....which is often much smaller than the radius of pressure influence."

The Manual goes on to state, "[p]ractitioners who use ROI testing to design soil venting systems assume that observation of subsurface vacuum ensures sufficient airflow in contaminated soils for timely remediation via organic compound volatilization and/or biodegradation. As Johnson and Ettinger describe, however, measurement of vacuum says very little about pore-gas velocities that prevail within the subsurface. Pore gas velocity is proportional to the product of the pressure gradient (i.e., pressure difference over a given distance within the soil) and the air permeability within that soil. **Since air permeability, k_a, can often vary 100 to 10,000-fold from one soil type to another, it is the k_a value within the soil, rather than the pressure gradient, that usually governs the pore-gas velocity** [bold emphasis from the Manual]."

An observed 0.3 in WC (0.02 in. Hg) change in barometric pressure is quite typical over the period of one hour at the Albuquerque International Sunport. Therefore, 0.3 in. WC is not an appropriate basis for determination of radius of vacuum influence. This point is further emphasized in the Manual, which states, "[e]ven containment comes into question when the magnitude of applied vacuum in soil is so small as to be comparable to pressure differentials caused by natural variation in barometric pressure and/or fluctuation of the water table. Diurnal barometric pressure changes in soil can be on the order of a few mbar…, whereas 0.1 inch water vacuum (the value often adopted by ROI practitioners as indicative of significant vacuum) is equivalent to only 0.25 mbar. Thus natural pressure gradients can overwhelm the smaller pressure gradients exerted at a distance from venting wells."

In addition to the Manual, EPA's 1992 *Evaluation of Soil Venting Application* indicates that the ROI is not an effective parameter for locating extraction wells, as well as their 1998 *Innovative Site Remediation Technology, Volume 7: Vacuum Extraction and Air Sparging* (EPA ISRT), which indicates that vacuum ROI is not adequate, but rather air flow predictions should be used to design the well field. The EPA ISRT states, "Historically, radius of influence has been determined by plotting the log of subsurface pressure with distance from the extraction well, regression, and interpolating the regression line to an arbitrary pressure value, typically ranging from 0.01 to 1 inch water column… The radius of influence evaluated in this way is arbitrary, because the vacuum cutoff level is arbitrary….Many alternative approaches have been developed that focus on air flow."

The use of pressure observation data by the Permittee results in overestimations of the ROI of the soil vapor extraction wells. Consequently, the calculated ROIs in the report (180 ft to 340 ft) should not be used for system design; that is, 340 ft is not an acceptable SVE well spacing. Instead, calculation of the air permeability of soil and establishing minimum soil gas flow parameters (such as air flow velocities) must be conducted for full-scale design. In addition, it is unclear if the barometric pressure correction methodology utilized is appropriate (See Comment 11).

The Permittee must collect and utilize appropriate data to calculate air permeability and air flow velocities for the site. The Permittees must use this information to determine realistic and appropriate spacing for SVE system extraction wells.

3. Pilot Test Design

NMED Comment: The SVE pilot test was not designed to maximize useful information. The Permittee states, "[s]ix wells were used as observation wells during the long-duration tests. The six wells included the five SVM wells nearest to the extraction well and one background observation well." By following this restriction of using the nearest wells, the Permittee missed pertinent information regarding pressure effects in all directions from the tested wells. This resulted in the inability to complete pressure influence contours for many of the wells tested. For example:

a) During the long-duration test at well KAFB-106160, no monitoring point west of the well was utilized. Monitoring well KAFB-106156 may have provided data to add to the vacuum influence contours depicted on Figure 4-25
b) During the long-duration test at well KAFB-106154, no northern monitoring point was utilized. Monitoring from well KAFB-106152 may have provided data to add to the vacuum influence contours depicted on Figure 4-33
c) During the long-duration test at well KAFB-106148, no monitoring point northwest of the well was utilized. Monitoring from the SVMW or SVEW wells to the north and west of KAFB-106148 may have provided data to add to the vacuum influence contours depicted on Figure 4-35

The Permittee must use a well-specific approach to selecting observation wells for any future SVE testing instead of using a standardized approach that potentially limits the collection of useful data.

4. Report Layout and Reviewability

NMED Comment: The information provided in the report is limited and discussions of the testing omit pertinent information, forcing the reviewer to search through the document to find related information during review. For instance, discussions of long duration tests at individual wells in Section 4 of the document provide no information on the well screen depths utilized for testing, which is pertinent to the discussion of vacuum observed at various depths in observation wells. Readers must page back through the document to determine the screened intervals where vacuum was applied.

The Permittee did not provide detailed descriptions of test or sample procedures. References to previous documents are not acceptable descriptions of procedures actually implemented for the tests. NMED is unable to conduct a complete review and/or approve the Report without detailed descriptions of these procedures.

Also, the Permittee included 53 figures in the text, most of which do not add value to the Report and are not referenced in any discussions of the pilot test results. Figures 4-15 through 4-21, Cumulative Mass of Hydrocarbons Removed Versus Time, are all seemingly identical graphs of straight line data that do not provide additional useful information to the Report beyond what is found in Tables 4-4 through 4-10.

The bulk of the figures, Figures 4-22 through 4-47, ROI maps, provide limited information. On these 26 maps, the Permittee has included inaccurate and ambiguous contouring of vacuum pressures in observation wells. Most of the maps show incomplete contour lines because the Permittee did not select appropriate observation wells for the tests or there were an insufficient number of wells in appropriate locations. In addition, although the threshold criteria for ROI was arbitrarily set at 0.3 in.WC (see Comment 2), the majority of the contour lines depicted on the maps are for measured vacuums less than 0.3 in. WC. Instead of recognizing heterogeneity and anisotropy in the subsurface, the Permittee has forced highly improbable contouring to fit the minimal pilot test data. The contour lines pinch in at various wells in manners that are unlikely and unrealistic (e.g., Figures 4-43 and 4-46). Some maps depict multiple contour lines of the same value, (e.g., Figure 4-45). The ROI maps are not accurate and are therefore potentially misleading.

The Report generally lacks an attention to detail. There are many typographical and grammatical errors within the Report, as well as a lack of correlation between text and tables and text and figures. The Permittee varied the number of significant digits when values were compared both within the text and within figures.

Revise the Report to include pertinent information regarding screened interval depths utilized for testing in the discussion area and include detailed descriptions of all testing and sample collection procedures actually implemented during the pilot tests. In addition, revise the Report to correct all typographical and grammar errors, discrepancies between text, tables and figures, and significant figure errors. Remove the irrelevant and misleading figures from the Report.

SPECIFIC COMMENTS

5. Section 1.1, Current SVE System Overview, page 1-2, second paragraph

Permittee's Statement: "[t]he blower motor horsepower and variable frequency drive speed allow the blower to operate at start-up conditions (approximately 1,600 SCFM and 40 inches of water vacuum) and later in the remediation when it may be necessary to apply high vacuum to the wells (1,000 SCFM and 11 inches of mercury vacuum)."

NMED's Comment: The Permittee switches between units of vacuum within the same sentence. Use consistent units to describe measurements of vacuum throughout the Report. Inches of water column is the typical unit of vacuum used in discussions and is the preferred unit of measure for vacuum; therefore, report vacuum in inches of water column in the Report.

6. Section 2, Soil Vapor Extraction Pilot Test Wells, page 2-1, second paragraph

Permittee's Statement: "[t]wo types of tests were conducted as part of pilot testing; long duration tests generally lasted between 8 to 10 hours, and quick tests lasted about 1 hour."

NMED's Comment: The Permittee refers to "log duration tests" in this statement. It appears as though this is a typographical error. Correct the error. In addition, throughout the report, the Permittee interchanges long-duration test and long duration test, as well as short-term test and short term test. Use the hyphenated versions of these terms consistently throughout the report.

7. Section 2.1, Quick-Test Wells, page 2-1, first paragraph

Permittee's Statement: "[q]uick tests were performed at a total of 16 wells."

NMED's Comment: This statement contradicts Table 2-1, which indicates that quick-tests were performed on only 14 wells. In addition, the wells listed following the quoted statement include KAFB-106148 and KAFB-106150. Long-duration tests were performed on these wells rather than quick-tests. Although quick-tests were planned for these two wells as explained in the text, the report should describe only the tests that were actually conducted. Resolve this discrepancy.

8. Section 2.2, Long-Duration Test Wells, page 2-3, first full paragraph

Permittee's Statement: "[a]t the Pneulog® wells KAFB-106149, and KAFB-106154, the middle screened interval was chosen for the long-duration test. Even though these two wells were low in hydrocarbon concentrations, they were included in the long-duration testing. These wells were intended to address benzene and ethylene dibromide (EDB) in the soil above the current SVE system zone of influence…"

NMED's Comment: Table 4-11 indicates that the highest concentrations of EDB were observed in wells KAFB-106160, -106161, -106148, and -106150. Therefore, adding wells KAFB-106148 and -106150 in the interim to the existing SVE system would effectively address a significant source of EDB.

9. Section 3.1.1, Quick-Test Procedures, page 3-2, first full paragraph

Permittee's Statement: "[f]or wells that were directly connected to the existing CATOX unit, flow rate was measured by the system and recorded from the PLC."

NMED's Comment: The abbreviation PLC was used without definition. All acronyms and abbreviations must be defined in the Acronyms and Abbreviations section. Ensure that all acronyms and abbreviations utilized within the Report are included in the Acronyms and Abbreviations section.

10. Section 3.1.2, Long Duration Test Procedures, page 3-2, last paragraph

NMED's Comment: Well KAFB-106148 is incorrectly listed in the text for both the mobile SVE system and the CATOX SVE system. KAFB-106154 is not listed at all in the text, although it also underwent a long-duration pilot test. Resolve these issues.

11. Section 3.5, Calculations, page 3-7 – 3-12

NMED's Comment: The Permittee's explanation of calculations used for barometric pressure correction is confusing. The Permittee refers to "rounds" without providing a definition of this term. The Permittee provides tables in Appendix C, but the tables do not include any explanation; they also do not include gridlines for ease of review; some do not include column or row headings or titles; some have various unexplained highlighting. It is impossible to decipher the tables in order to review the calculations. Provide a full detailed example of these calculations showing all data used and results from each calculation, as well as how these data are used for barometric pressure correction and provide a more detailed explanation of each step of the process, as well as for the selection of individual background wells.

As noted above (Comment 2) a metric of 0.3 inWC was chosen as the determinant for radius of influence, referencing a USACE document. Include a discussion that clarifies that, as defined, the ROI is not the same as a radius of effective remediation and that effective air flow is typically the design metric.

12. Section 3.5.1, ROI Calculations, page 3-7, first paragraph

Permittee's Statement: "[d]ata collected during the ROI tests were overprinted by the vadose zone's response to changes in barometric pressure."

NMED's Comment: This sentence does not make sense. It appears that "overprinted" is a typographical error. Correct this error or provide an explanation.

13. Section 3.5.1, ROI Calculations, page 3-11, second full paragraph

Permittee's Statement: "[f]or the most part, wells with a corrected-observed vacuum near the edge of ROI varied between appearing to be within or outside of the ROI, depending on the barometric pressure."

NMED's Comment: This statement is confusing. Clarify this statement in the revised Report.

14. Section 4 General

NMED's Comment: When describing the results of the long term tests, the report consistently describes the vacuums recorded in the observation wells as "applied" vacuum. These are "observed" vacuums and should be reported as such. The error represents either a lack of QA/QC or a lack of technical understanding by the preparers or reviewers. Correct the error in the revised report.

NMED's Comment: The discussions of observed vacuums (cited as applied vacuum) in observation wells discusses wells where influence may have been detected but is vague with regard to depths of the observation well screens. The individual sections frequently cite small differences from the 0.3 in. WC threshold but don't discuss barometric pressure changes, which could be responsible for the observed vacuums. Discuss this issue in the revised Report in each section where barometric pressure could be the cause of the observed vacuums.

NMED's Comment: For each well test, a description of the screened interval tested must be included. The radius of influence based on 0.3 inches of water column, which does not reflect the radius of effective remediation, presents an overly optimistic interpretation that could result in design problems. Revise the Report as necessary.

NMED's Comment: Only the results of the long term tests are presented in any detail. A description of all the tests must be included. At the very least, the step test, vacuum, flow and effluent concentration data must be presented with a discussion of SVE system expansion inclusion/exclusion criterion for each well tested. Revise the Report as necessary.

15. Section 4.1, page 4-2.

There is no description of the test on SVEW-11 other than to say it demonstrated "a low flow rate." However, a description is included of a test conducted n well on KAFB-10628, which is a ¾ inch diameter well with 2.5 feet of screen. Provide the rationale for conducting a test on well on KAFB-10628. In addition, provide a description and discussion of the significance of the "linear regression coefficients", "slope" and "intercept" of the plotted data in the revised Report.

16. Section 4.2.8, ROI Calculations, page 4-15, third paragraph

NMED's Comment: The Permittee concludes that "inconsistent results" were observed for well KAFB-106150, but provide no discussion of the significant anisotropy exhibited by the long-duration test results. Soil vapor was extracted from the 484 ft bgs interval at KAFB-106150, but higher vacuum influence results were observed in the 50 ft bgs level observation wells than in lower observation points. The Permittee provides no discussion of the possibility of vertical short-circuiting of air flow in this well. Revise the Report to provide discussion of anisotropy in the subsurface and possible short-circuiting issues during testing.

17. Sections 4.3.2 and 5, Results and Conclusions.

NMED's Comment: Describe the test results for all wells in context of future viability for application to the overall remediation strategy. Include a discussion of and upgrade to the overall SVE system that would expand treatment capabilities to allow for vapor extraction from wells located in the zones where the highest concentrations of hydrocarbons have been detected. Discuss the selection of wells to be included in such an expansion and provide the rationale for the decision. Describe the wells that are not appropriate with a similar justification. In addition, describe, at least conceptually, future expansion of the system and how these test results indicate well coverage and the need for potential additional wells.

The limited description provided in the Report suggests that Pneulog® wells 106148, 106150, 106154, 106155 and possibly 106149 may likely be viable candidates for expansion inclusion. Identify which wells were selected and explain why only three of these wells were selected for testing in the revised Report.

18. Figures 4-1 through 4-6, Test Well Parameters versus Time

NMED's Comment: The Permittee presents nine charts per figure to illustrate parameter performance throughout the long-term pilot tests for each well, but uses two or three different time scales for the x-axes in each figure. This creates difficulty for the reviewer when comparing the subject parameters. All charts within each figure must have the same time scale on the x-axis, similar to that depicted on Figure 4-7.

In addition, the Permittee provides no information as to how this data was obtained. Detailed descriptions of data collection methods for all measured parameters must be provided in the Report text. Also, the Permittee provides no interpretation of this data or even a discussion of its usefulness to the pilot test. Revise the Report to incorporate equivalent time scales on Figures 4-1 through 4-6, include detailed descriptions of data collection methods utilized for these parameters, and provide discussion of the usefulness and meaning of the data presented.

19. Figures 4-4, Test Well Parameters versus Time during Long Term Pilot Test on Well 106154 on 10/18/2013

NMED's Comment: The Barometric Pressure vs. Time chart reports pressures exceeding 60 inches of mercury (inHg). This is likely an error. Correct the chart in the revised Report.

20. Appendix E, Wells Identified for Immediate Addition to the SVE System, E-1

Permittee's Statement: "…the following Pneulog® wells will be permanently piped into the existing SVE treatment system (Figure E-1):

- KAFB-106149 (middle screened interval, 200 feet to 350 feet below ground surface [bgs]) – replaces ambient dilution air and increases ROI at 350 foot level of vadose zone."

and

- KAFB-106154 (middle screened interval, 200 feet to 350 feet bgs) – replaces ambient dilution air and increases ROI at 350 foot level of vadose zone."

NMED's Comment: Based on the Permittee's reports on the CATOX efficiency, the system has been treating between 55 and 70 pounds of hydrocarbons per hour, utilizing approximately 80% of the capacity of the CATOX system; therefore, low hydrocarbon concentration dilution air should not be required. In addition, the assertion that the ROI at the 350 level of the vadose zone will be increased by applying a relatively low vacuum pressure to a 150-ft long screen that terminates at 350 feet bgs is unlikely. Remove these statements from the Report.

21. Appendix E, Wells Identified for Immediate Addition to the SVE System, E-3

Permittee's Statement: "[t]here are two Pneulog® wells that were included in the long-test phase of the SVE pilot test that were not selected for the SVE expansion at this stage. These are wells KAFB-106148 and KAFB-106155. KAFB-106148 has high total volatile organic compound concentrations but significantly lower EDB and benzene concentrations in comparison with KAFB-106150. EDB concentrations at KAFB-106148 and KAFB-106150 were measured at 680 ppbv and 1300 ppbv respectively, while benzene concentrations were measured at 54,000 ppbv and 100,000 ppbv – i.e., concentrations of EDB and benzene at KAFB-106150 are almost twice as high as at KAFB-106148."

NMED's Comment: The statement above is misleading through selective use of data. While comparing well KAFB-106148 to KAFB-106150 shows concentrations of EDB and benzene at well KAFB-106150 that are almost twice as high as at KAFB-106148, comparing well KAFB-106148 to either KAFB-106149 or KAFB-106154 (the other two wells proposed to be added to the current system) shows concentrations of EDB over ten times as high as at KAFB-106149 or KAFB-106154 and concentration of benzene at well KAFB-106148 is about three times as high as at KAFB-106149 or KAFB-106154. Include a discussion of all relevant data in the Report rather than discussing only a portion of the relevant data. NMED provided partial approval of this Report, specifically Appendix E, in a letter dated March 6, 2014 so that the Permittee could connect the three recommended wells to the current SVE system as proposed. The intent was to increase the hydrocarbon treatment rate. The data suggest that it is likely the three wells selected based on the spurious data described above will not increase the hydrocarbon treatment rate.

22. Section 5 Conclusions

NMED's Comment: The conclusions are based on the assumption that 0.3 in. WC constitutes and acceptable method for determining ROI. As discussed above in this letter, the use of this criterion is not appropriate. The conclusion that"[t]he pilot tests generated adequate data to complete the design of an expanded BFF SVE system" is not supported by any justification in this section. In addition, the description of the proposed expansion does not indicate how the pilot testing will be used to design and expanded system. Provide explanations and clarification for the stated conclusions.

The Permittee must address all comments herein and submit a revised Report by **August 31, 2014**. All submittals (including maps) must be in the form of two paper copies and one electronic copy. In addition, the Permittee must submit a redline-strikeout version that includes all changes and edits to the Report (electronic copy) with the response to this Disapproval.

Please contact me at (505) 827-2855 if you have questions.

Sincerely,

Tom Blaine, P.E.
Director
Environmental Health Division

cc: B. Grantham, NMED OGC
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