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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

January 30, 2020

Colonel David S. Miller
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117

Lt. Colonel Wayne J. Acosta
Civil Engineer Office
377 Civil Engineering Division
2050 Wyoming Blvd SE, Suite 116
Kirtland AFB, NM 87117

RE: DISAPPROVAL
FINAL ST-070E – OIL WATER SEPARATOR, ST-219 (SWMU ST-70) RADIUS OF INFLUENCE INVESTIGATION REPORT, JULY 2019
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID # NM9570024423
HWB-KAFB-19-007

Dear Colonel Miller and Colonel Acosta:

The New Mexico Environment Department (NMED) received the U.S. Air Force (Permittee) Kirtland Air Force Base (Facility) *Final ST-070E – Oil Water Separator, ST-219 (SWMU ST-70) Radius of Influence Investigation Report, July 2019* (Report), on July 26, 2019.

The pilot testing of the soil vapor extraction (SVE) system was performed without an NMED-approved work plan. Upon review of the Report, NMED is unable to approve the Permittees estimates for the radius of influence (ROI) of the SVE system. The pilot testing failed to collect adequate data to determine the ROI; therefore, the estimated ROI, as well as other parameters determined through the SVE pilot testing, are not valid. There are many issues with the Report, including the lack of justification for excluding data. Based on this information, NMED disapproves of the calculation of the ROI, as well as other parameters estimated in this Report, and these parameters cannot be used for any decision-making purposes. Monitoring data is the only criteria available for decision-making at ST-070E.

When estimating a vacuum ROI from SVE-pilot test data, the vacuum response must be measured at the observation wells located some radial distance away from the test well, preferably surrounding the test well and screened in a similar depth interval as the test well.

The extraction well flow rates should be reported throughout the step test. Achieving a flow rate of at least 1 scfm per foot of open screen is typically the cut-off for a well to be considered as a possible SVE well.

The extraction well vapor concentrations for VOCs, TPH, and fixed gases such as oxygen, carbon dioxide, sulfur dioxide, and carbon monoxide should be measured using a field instrument on a frequent basis throughout each step.

The information collected during the pilot test is used to assess whether the expense of trenching, pipe installation, and plumbing to an aboveground manifold at the equipment compound is warranted, and to assess whether vapor treatment will be needed to ensure that air quality standards for contaminants of concern are not exceeded during SVE system operations.

There is no indication that air samples were collected for estimating the VOC concentrations in the extracted vapor using field instruments during the step tests described in the Report. Flow rates were not measured on a regular basis and the flow rate at end of each step was not reported. Vacuum response was reported; however, it is unclear if the gauges at the observation wells were compound magnehelic gauges able to measure both pressure and vacuum at the wellhead. The duration of each step test was not provided in the data tables. Assuming the length of each step is derived from subtracting the reported time, most of the steps were somewhere between 20-30 minutes; steps typically take several hours. Although barometric pressure readings were reported, measurements before, throughout, and after the step test on a regular basis were not provided.

2. Well Designations

NMED Comment: The Permittee has used multiple designations for wells in the Report. For instance, Section 3.3.3 of the Report discusses wells KAFB-7002 and KAFB 7003, while Table 3-2 of the Report lists these wells as ST-70-02 and ST-70-03. This is not acceptable. Use of multiple designations for wells results in confusion for reviewers and the public. This issue is evident in many documents submitted by the Permittee. The Permittee must use the official full designation for each well in every instance for this and all future documents submitted to NMED.

6. **Section 3.3, Soil Vapor and Groundwater Characterization Investigations, page 3-13**

   Permittee Statement: "Figure 3-2 which represents the TPH plume shell for soil concentrations above 250 milligrams per kilogram (mg/kg). Figure 3-3 presents a cross section of the TPH plume shell for the greater than 250 mg/kg soil concentrations."

   NMED Comment: The NMED's *Soil Screening Guidance for Human Health Risk Assessments* (Guidance), dated February 2019 lists the soil-to-groundwater target soil leachate concentrations for the petroleum hydrocarbon fractions soil screening levels which are at least one order of magnitude higher than 250 mg/kg. Explain why the TPH plume line of 250 mg/kg or more is presented in the figures or revise the figures to include the soil-to-groundwater target concentrations.

7. **Section 3.3.3, 2001 to 2004 Resource Conservation and Recovery Act Facility Investigation, page 3-14**

   Permittee Statement: "One additional soil boring was drilled with two nested soil vapor wells, KAFB-7002 and KAFB-7003, installed to depths of 95 and 330 ft bgs, respectively."

   NMED Comment: Wells KAFB-7002 and KAFB-7003 were designated as ST-70-02 and ST-70-03, respectively, in Table 3-2, *Well Construction Data.* Correct the designations of these wells for consistency. See Comment 2.

8. **Section 3.6, Contaminated Pathways and Receptors, page 3-26**

   Permittee Statement: "Vapor-phase contaminants may be responsible for low-level impacts to the regional water table through diffusion directly into the groundwater."

   NMED Comment: The solute transport process must not be speculated. The TPH-JP4 concentration in the soil sample collected from boring ST-219-09 at the depths 100 – 102 feet bgs is recorded as 49,000 mg/kg. This concentration level indicates that the solute transport process is unlikely limited to vapor diffusion. The vertical extent of contamination does not appear to be sufficiently evaluated based on the data collected from the previous investigations.

9. **Section 3.6.2, Groundwater Constituent Trends, page 3-28**

   Permittee Statement: "At the time of this Investigation Report, the SVE Well Completion Report (USAF, 2016a) has been approved and provided analytical results from soil samples from the three newly installed SVE wells."

Evaluation, the radial distances from well SVE-2 to VMPs 219-29H and 219-28H are 18.22 feet and 98.21 feet, respectively. The radial distance from SVE-2 to VMP 219-28H is approximately five times more than that of VMP 219-29H. Despite the notable differences in the radial distances, the differences in the pressure readings are very similar between the VMPs. If flow paths are established from the SVE well to the VMPs, the readings collected from VMP 219-29H would exhibit more negative (vacuum) pressure compared to those collected from VMP 219-28H due to the shorter radial distance. However, such a trend was not observed; it appears that the pressure change was only induced by the change in atmospheric pressure, rather than vacuum applied by the SVE well. If positive pressure is observed at the VMP, the radius of influence (ROI) would be less than the radial distance from the SVE well to the VMP. Since positive pressure is observed at both VMPs without any noticeable influence from the SVE well, ROI at well SVE-2 is likely less than 18.22 feet. The ROI must be reevaluated.

12. **Table 4-4. SVE Start-up Step Testing Data Collection Sheet (SVE-1), Morning Baseline Monitor/Subsurface Pressures, page 4-11**

    NMED Comment: Some of the morning baseline monitor/subsurface pressures reported have negative values (observed vacuum at the observation well), while some have positive values (observed pressure at the observation wells). Describe the gauge at each of the observation wells - a compound magnehelic gauge would be able to measure both pressure and vacuum at the wellhead of these observation wells. Also, explain why there are vacuums at the observation wells before initially applying a vacuum at the extraction well (i.e., before Vacuum Step Test #1 has commenced).

13. **Table 4-4. SVE Start-up Step Testing Data Collection Sheet (SVE-1), SVE-1M, page 4-11**

    NMED Comment: The heading for vapor monitoring well 219-40 is 219-40-40, but the screened intervals between SVE-1M and 219-40 indicate that measurements should be taken at 219-40-20. Correct the table heading if needed.

14. **Table 4-5. SVE Start-up Step Testing Data Collection Sheet (SVE-2) Morning Baseline Monitor/Subsurface Pressures, Step test #1: 30.3 in H_2O vacuum, page 4-12**

    NMED Comment: Wells SVE-1S, SVE-1M, SVE-1D and 219-29H all indicate a drop in pressure between the reported Afternoon Baseline Monitoring/Subsurface Pressures and Step Test #1. The change in pressure was 0.11 in. of H_2O on all but 219-29H, which dropped 0.10 in. of H_2O. There should be a negative sign before each of these values to be consistent with Table 4-4. Revise the table accordingly.

15. **Table 4-5. SVE Start-up Step Testing Data Collection Sheet (SVE-2) Morning Baseline Monitor/Subsurface Pressures, page 4-12**

likely inaccurate.

21. Figure 4-20, System-Wide SVE Radius of Influence, page 4-71

NMED Comment: As stated in the general comment above, there should be figures showing plan-view maps for estimating ROI depicting an iso-contour of EPA's 0.1 in. H_2O vacuum criteria. Figure 4-20 depicts an "average" ROI across the site, which is misleading. Each SVE well should have its own isocontour, taking into account both the change in pressure and the location of the control wells surrounding the SVE wells. For example, there was insufficient data for an isocontour for SVE-3D, and lack of control wells surrounding SVE-2 means the isocontour for SVE-2 should only be an incomplete arc. Appropriate figures should be prepared.

22. Section 4.6, Air Permeability Evaluation, pages 4-69 and 4-73

Permittee Statements: "Soils with air permeabilities less than about 10^{-10} cm^2 may not be amenable to SVE (USACE, 2002)."
and,
"Intrinsic air permeability (and their corresponding Coefficient of Air Permeability) ranges from a minimum of 3.1×10^{-8} cm^2 (2.0×10^{-4} cm/sec) at well SVE-3S to a maximum of 2.7×10^{-7} cm^2 (1.7×10^{-3} cm/sec) at SVE-1S. The air permeability results are indicative and typical of a fine to medium sand, thus the SVE pilot test results confirm that SVE is a potentially effective technology that can be applied at site ST070E."

NMED Comment: The calculated air permeabilities are a function of ROIs. Since the estimated ROIs need to be reevaluated, air permeabilities must be reevaluated, as well.

23. Section 4.6, Air Permeability Evaluation, page 4-74

Permittee Statement: "Note that all pore air velocities calculated at ST-070E during SVE testing meet or exceed the minimum SVE design criteria of 0.01 cm/sec."

NMED Comment: The calculated air velocities are a function of air permeabilities. Since the estimated air permeabilities need to be reevaluated, air velocities must be reevaluated, as well.

24. Section 4.6, Air Permeability Equation, page 4-74

Permittee Statement: "Hydraulic conductivity estimates for each test were made using Equation D-1 of USACE 2002 and ranged from a minimum of 3.0×10^{-3} cm/sec at well SVE-3S to a maximum of 2.6×10^{-2} cm/sec at SVE-1S. The hydraulic conductivity results are indicative and typical of a silty to clean sand."

If you have any questions regarding this letter, please contact me at (505) 476-6035, or your staff may contact Naomi Davidson at (505) 222-9504.

Sincerely,

Kevin Pierard
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
N. Davidson, NMED HWB
B. Wear, NMED HWB
L. King, EPA Region 6 (6LCRRC)
S. Clark, KAFB

File: KAFB 2019 and Reading