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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

September 26, 2018

Colonel Stewart A. Hammons
Commander, 27th Special Operations Wing
110 E. Alison Avenue, Suite 1098
Cannon Air Force Base
New Mexico 88103

**RE: DISAPPROVAL
RCRA FACILITY INVESTIGATION AT FL070-REVISION 2
CANNON AIR FORCE BASE, NEW MEXICO
EPA ID #NM7572124454
HWB-CAFB-15-006**

Dear Colonel Hammons:

The New Mexico Environment Department (NMED) has received the Cannon Air Force Base (Permittee) *RCRA Facility Investigation at FL070 [Solid Waste Management Unit (SWMU) 70]-Revision 2* (Report), received November 29, 2017. NMED has reviewed the Report and hereby issues this Disapproval with the following comments.

COMMENTS

1. Section 5.2.1, Soil Vapor Sample Results, Pg. 5-1 and 5-2

NMED Comment: The Permittee calculated groundwater concentrations of chemicals of concern (COC) in equilibrium with soil gas concentration data collected during the 2015 investigation in order to evaluate the presence of sinking and potentially pooling vapors. Equilibrium groundwater concentrations for the COCs benzene, ethylbenzene, toluene, m, p-xylene, and o-xylene (BTEX) were then compared to NMED Vapor Intrusion Screening Level (VISL) groundwater concentrations and tap water screening levels. The evaluation was intended to demonstrate that the maximum soil vapor concentrations detected in the

subsurface would not result in an exceedance of the applicable risk-based screening levels. The equilibrium groundwater concentrations for BTEX were calculated by the Permittee with the following equation:

$$C_{eq} = (C_{sg}/H') \times C_1 \quad (1)$$

where:

C_{eq} = equilibrium groundwater concentration ($\mu\text{g/L}$)

C_{sg} = soil vapor concentration ($\mu\text{g/m}^3$)

H' = Henry's law constant (unitless)

C_1 = $1\text{m}^3/1000\text{ L}$

m^3 = cubic meter

L = Liter

μg = micrograms

Use of equation (1) has resulted in equilibrium groundwater concentration values that are not conservative or acceptable for evaluation of the soil vapor to groundwater pathway because the equation does not account for attenuation. Uncertainty has also been introduced into the evaluation of risk-based impacts due to subsurface contamination by use of the calculated equilibrium groundwater concentrations instead of groundwater sampling results.

The revised Report must include a recalculation of equilibrium groundwater concentrations with VISL calculation equations provided in NMED's 2017 *Risk Assessment Guidance for Site Investigations and Remediation* (RA Guidance) and Environmental Protection Agency's (EPA) *Vapor Intrusion Screening Level (VISL) Calculator Users Guide*. The calculation results must be reevaluated with applicable risk-based screening criteria.

For reference, NMED and EPA VISL calculation equations relate the concentration of a constituent in indoor air (C_{ia}) due to vapor intrusion to soil gas concentrations as follows:

$$C_{sg} = (C_{ia}/\alpha_{ss}) \quad (2)$$

The concentration of a constituent in indoor air due to vapor intrusion is related to the groundwater concentration by:

$$C_{gw} = [C_{ia}/(H' \times \alpha_{gw})] \times C_1 \quad (3)$$

Rearranging the terms of equation (2) to solve for C_{ia} and substituting the result into equation (3) yields:

$$C_{gw} = [(C_{sg} \times \alpha_{ss})/(H' \times \alpha_{gw})] \times C_1 \quad (4)$$

This can be further expressed by:

$$C_{gw} = (C_{sg}/H') \times (\alpha_{ss}/\alpha_{gw}) \times C_1 \quad (5)$$

where:

C_{gw} = equilibrium groundwater concentration ($\mu\text{g/L}$)

C_{sg} = soil vapor concentration ($\mu\text{g/m}^3$)

H' = Henry's law constant (unitless)

α_{ss}/α_{gw} = ratio of the subslab attenuation factor to the groundwater attenuation factor

$\alpha_{ss} = 0.03$

$\alpha_{gw} = 0.001$

$C_1 = 1\text{m}^3/1000 \text{ L}$

m^3 = cubic meter

L = Liter

μg = micrograms

Equation (5) must be utilized in the revised Report to recalculate BTEX equilibrium groundwater concentrations. Any exceedance of applicable risk-based screening levels must be addressed by providing additional lines of evidence that demonstrate the groundwater pathway is incomplete and/or subject to controls that prevent exposure to SWMU 70 groundwater. Two options are available to address this issue:

1. Revise the comparison of equilibrium groundwater concentrations to applicable NMED residential groundwater VISLs and tap water screening levels based on recalculated concentrations as required by NMED. Address the actions that will be taken for all noted exceedances of the applicable screening criteria to include additional risk-based evaluation, lines of evidence that demonstrate that potential exposure pathways are incomplete for residential receptors or subject to controls that prevent such exposure, and/or environmental medium (e.g., groundwater) monitoring.
2. Alternatively, apply the 2017 NMED-recommended soil gas VISLs to the 2015 soil gas data to demonstrate the vapor intrusion pathway is not currently a concern at SWMU 70. This alternative approach must include a strategy for monitoring the subsurface until sufficient data are available to demonstrate no vertical migration of total petroleum hydrocarbon (TPH) and/or BTEX contamination is occurring.

Revise the Report accordingly.

2. Section 5.5.5, Refined Quantitative Risk Screening Evaluation for Residents, Pg. 5-8

Permittee Statement: "The ProUCL input data and output for the datasets are provided in Appendix F, Attachment F.1."

NMED Comment: The ProUCL input and output datasets were not provided in Appendix F, Risk Assessment Tables, Attachment F.1. The revised Report must include all ProUCL input data and output datasets in Appendix F.

3. Section 5.5.6, Soil-to-Groundwater Evaluation, Pg. 5-10 and 5-11

NMED Comment: The soil gas to groundwater pathway evaluation information presented in Section 5.5.6 must be revised in accordance with the following comments:

- a. Discuss the maximum concentration of benzene detected during soil gas sampling (68 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)) and specifically indicate that the maximum concentration does not exceed the NMED 2017 VISL ($120 \mu\text{g}/\text{m}^3$).
- b. NMED does not agree with the Permittee's assumption that the soil vapor concentrations utilized for evaluation of the soil vapor to groundwater pathway and resulting equilibrium groundwater concentration represent maximum concentrations. Additional sampling data is required to fully characterize subsurface contamination impacts and substantiate the Permittee's statement. Remove the reference to maximum concentrations.
- c. Summarize the results of the revised equilibrium groundwater concentration and soil vapor to groundwater pathway reevaluation in the revised Report.

4. Section 5.7, Site Conceptual Exposure Model, Pg. 5-13

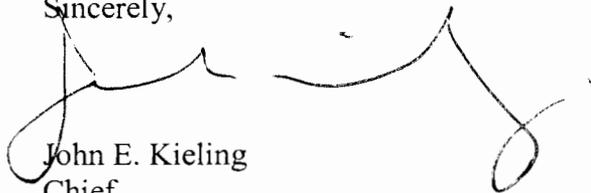
NMED Comment: Three constituents, naphthalene, arsenic, and iron, exceeded the NMED soil-to-groundwater screening level for dilution attenuation factor 20. The section discussion provides lines of evidence, including the lack of exceedances of soil-to-groundwater screening levels beyond nine feet below ground surface, supporting the assertion that the soil-to-groundwater pathway is incomplete at SWMU 70. However, additional evidence is available and must be provided to support the conclusions of the soil-to-groundwater evaluation. As additional evidence supporting an incomplete soil-to-groundwater pathway, discuss downward COC concentration trends in the subsurface for naphthalene, arsenic, and iron. Revise the Report accordingly.

The Permittee must submit a revised Report that address all comments contained in this Disapproval. In addition, the Permittee must include a response letter that cross-references where NMED's numbered comments were addressed. The Permittee must also submit an electronic redline-strikeout version of the revised Report showing where all changes have been made to the Report, as well as an electronic version of the revised Report. The revised Report must be submitted to NMED no later than **January 31, 2019**.

Colonel Hammons
September 26, 2018
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If you have any questions regarding this letter, please contact Gabriel Acevedo at (505) 476-6043.

Sincerely,

A handwritten signature in black ink, appearing to read "John E. Kieling". The signature is fluid and cursive, with a large initial "J" and a long, sweeping underline.

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED
B. Wear, NMED HWB
G. Acevedo, NMED HWB
L. King, EPA Region 6 (6MM-RC)
R. Lancaster, CAFB
S. Kottkamp, CAFB
M. Fuchs, CAFB
D. Canales, CAFB

File: CAFB 2018 and Reading, CAFB-15-006