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Mr. David Cobrain
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Dr. East
Building One
Santa Fe, NM 87505

RE: Draft Technical Review Comments on *Site Investigation at Eight Sites,* Cannon Air Force Base, New Mexico, December 2013.

Dear Mr. Cobrain:

Attached please find draft technical review comments on the risk assessment portion of the "*Site Investigation at Eight Sites*" dated December 2013.

If you or any of your staff have questions, please contact me at (801) 451-2864 or via email at paigewalton@msn.com.

Thank you,

Paige Walton
AQS Senior Scientist and Program Manager

Enclosure

cc: Dan Comeau, NMED (electronic)
Joel Workman, AQS (electronic)
Sunny McBride, AQS (electronic)

Draft Technical Review Comments on the
Site Investigation of Eight Sites, Site Investigation Report
Cannon Air Force Base, New Mexico, December, 2013

General Comments

1. The report is titled as a Site Investigation report and includes methodology and terminology consistent with a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigation rather than a Resource Conservation and Recovery Act (RCRA) investigation of a permitted site. While not all of the sites included in this investigation are permitted Solid Waste Management Units (SWMUs), one of the sites included in this report is a RCRA permitted site (SWMU 129). However, all these sites are regulated by the State of New Mexico and as such are subject to RCRA corrective action and investigations must be consistent with New Mexico specific guidance, to include the 2012 Risk Assessment Guidance for Site Investigations and Remediation (NMED SSG) (http://www.nmenv.state.nm.us/HWB/guidance.html).

2. Out of the eight sites that were evaluated in this Site Investigation Report at Cannon Air Force Base (CAFB), it was concluded that four of the sites (ST-C505, SS-C507, SD-C508, and SWMU-129) need further sampling in order to completely define the extent of contamination of various chemicals of potential concern (COPCs). When the additional proposed sampling is conducted, the results of the human health risk screening and screening level ecological risk assessments (SLERAs) presented in this report may change. As such, it is not necessary to present risk screening results at sites where contamination (nature and extent) has not been completely defined. Once it has been determined that contamination at the site has been defined both horizontally and vertically (i.e., decreasing levels of contamination with increasing depth and decreasing levels of contamination laterally in all directions), human health and ecological risk screening results may be presented. It was also noted that the Decision Diagram for Site Investigation at Eight Sites (Figure 3-1) indicates that a comparison of site concentrations to screening criteria will only be conducted if the extent of contamination is defined. Either modify the investigation report to only present risk screening results if the extent of contamination has been defined or indicate that the risk screening results for these sites are only preliminary and will be revised upon completion of site characterization.

3. The assessment does not include an evaluation of the migration of chemicals through soil to an underlying potable aquifer or water-bearing unit (e.g., a soil-to-groundwater assessment). This is of special concern for site where no controls are recommended. While levels may meet residential risk, contaminated has been shown to have migrated vertically and may still pose a threat to contamination of groundwater. Following the NMED SSG, either an assessment of the potential for contaminants in soil to migrate to groundwater is required using the appropriated screening levels (refer to Section 4.0 of the NMED SSG) or sufficient lines of evidence must be provided to demonstrate this as an incomplete pathway. Revise the report accordingly.

4. The methodology used for the human health screening evaluation is not in accordance with NMED SSG or standard Environmental Protection Agency (EPA) risk assessment guidance [e.g., Risk Assessment Guidance for Superfund (RAGS) and Regional Screening Level User's Guide (RSLs)]. Although maximum site concentrations were compared with appropriate soil screening levels (SSLs), total human health risks and hazard indices were not estimated. As sites SS-C501, ST-502, and ST-503 are recommended for corrective action complete without controls, it must be shown that total risks and hazards are below NMED target levels. As directed in NMED (2012) as well as other EPA guidance, for screening level assessments, the risks and noncarcinogenic hazards should initially be considered additive. Maximum site concentrations should be divided by their corresponding SSLs, summed, then multiplied by the NMED target hazard quotient (1) for SSLs based on a noncarcinogenic endpoint, or by the NMED target risk level (1E-5) for SSLs based on a carcinogenic endpoint. For example:

$$\text{Site Risk} = \left(\frac{\text{conc}_x}{\text{SSL}_x} + \frac{\text{conc}_y}{\text{SSL}_y} + \frac{\text{conc}_z}{\text{SSL}_z} + \ldots + \frac{\text{conc}_i}{\text{SSL}_i} \right) \times 10^{-5}$$

$$\text{Site Hazard Index (HI)} = \left(\frac{\text{conc}_x}{\text{SSL}_x} + \frac{\text{conc}_y}{\text{SSL}_y} + \frac{\text{conc}_z}{\text{SSL}_z} + \ldots + \frac{\text{conc}_i}{\text{SSL}_i} \right) \times 1$$

Modify Sections 3.5 and 5.4 to include and utilize the NMED (2012) methodology for estimating risks and hazards for all identified receptors to include residential, commercial/industrial, recreational, and construction worker scenarios at each site. If the site risks and hazard indices exceed target risk and hazard levels utilizing maximum detected concentrations, additional analyses and lines of evidence as addressed in the NMED SSG may be warranted.

5. The vapor intrusion pathway was not evaluated at all sites. Although an evaluation of the vapor intrusion pathway is recommended for site ST-504, this pathway must also be considered at the remaining sites since: 1) sites SS-C501, ST-502, and ST-503 are recommended for corrective action complete without controls; 2) volatile and toxic chemicals were detected in subsurface soil that could potentially migrate through the vadose zone and into indoor air; and 3) the nature of contamination is fuel spills and it is likely that volatile and toxic chemicals are present in soil vapor. Modify the human health risk screening assessments evaluated in this investigation to include the vapor intrusion pathway. During the vapor intrusion evaluations, please note the following:

   - Detected concentrations of volatiles at all sampling depths (including samples collected >10 ft bgs) should be considered for the vapor intrusion pathway;
   - Risk and hazard estimates from exposure via the vapor intrusion pathway should be added to the cumulative risk and hazard estimates from exposure to soil at each site;
   - Active soil gas data are preferred to quantitatively evaluate this pathway, as recommended by US EPA's (2002) *OSWER Draft Guidance for Evaluating the Vapor*

Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance).

6. It was noted that exposure pathways are potentially complete for recreational users as indicated in Figures 5-14 through 5-18. Soil screening levels and methodology were not presented to evaluate exposure to COPCs by a recreational user. Either modify the report to include methodology and/or screening levels for a recreational user and estimate recreational risks and hazards from exposure to COPCs or provide a discussion that demonstrate the risk calculated for the other receptors (i.e., residential) would be protective of a recreational receptor.

7. Representative ecological receptors were not identified during the SLERAs conducted at CAFB. Although the preliminary site conceptual exposure models indicate that plants, invertebrates, and vertebrates may be exposed to contaminants at the sites, representative receptors specific to each of the appropriate trophic levels are not provided. Revise the report to include these for each site. Examples may include plants, a deer mouse, a horned lark, etc.

8. Table 5-10 through 5-13 summarize the SLERAs conducted for individual sites. However, there is no discussion nor indication for which representative specific the project action level (PAL) is representing. While the report indicates the more conservative PAL would be used, a list of the PALs and the actual source from which they were derived was not provided. Revise the report to include for each site where a SLERA was conducted, a complete list of the representative species, the corresponding screening criteria used for each species, and the reference for that source.

Specific Comments

1. Figures 5-11, 5-12, and 5-13. The site conceptual exposure models for sites SS-C501, ST-502, and ST-503 indicate that there are no completed pathways for any receptors. While it has been shown that there are no completed exposure pathways for ecological receptors, a hypothetical residential scenario is assumed for these sites. In addition, it has been determined that current land use is industrial and soil exposure pathways are assumed complete for industrial and construction worker receptors. Since human receptors are evaluated in the human health screening evaluations at the eight sites at CAFB, modify Figures 5-11, 5-12, and 5-13 to indicate that soil exposure pathways and vapor intrusion pathways are complete at a minimum for future site workers, construction workers and current and future resident in order to discern whether the site meets the criteria for closure without controls (No Further Action).

2. Tables 5-1 through 5-8. The human health screening level of 310 mg/kg for 2-methylnaphthalene is inconsistent with the US EPA Regional Screening Level of 230 mg/kg. Revise Tables 5-1 through 5-8 accordingly.

3. Section 5.6. Text in section 5.6 states that exposure to surface soil is considered to be the only complete and significant pathway for ecological receptors. However, burrowing ecological receptors and deep rooted plants are expected to be exposed to soil from 0-10 feet

below ground surface (ft bgs) as stated in NMED (2012). It was noted that Tables 5-10 through 5-14 indicate that soil data 0-10 ft bgs were considered for ecological receptors. Clarify whether soil data from 0-10 ft bgs were used for the SLERAs. Modify text in Section 5.6 accordingly.

In addition, it is noted that for some species (such as surface foraging and shallow burrowing receptors), the exposure interval evaluated should focus on surface soil. Including detections from deeper soil intervals could result in an under estimation of potential risk. Revise the SLERA to include evaluation of surface soil to appropriate surface and shallow burrowing receptors (such as the deer mouse, horned lark, and grasses).

4. Section 3.6. The methodology used to calculate hazard quotients for ecological receptors is not in accordance with NMED (2008 and 2012) guidance. According to the NMED SSG, calculated exposure doses for selected ecological receptors should be compared with toxicity reference values in order to estimate hazard quotients (HQs). Subsequently, HQs should be added to calculate hazard indices (HIs) for each receptor at each site as follows:

$$HI = HQ_x + HQ_y + \ldots + HQ_z$$

The calculation of HIs for a screening assessment includes all COPECs at the site, not those located in proximity (such as the polycyclic aromatic hydrocarbons, PAHs). If the screening that includes all COPECs results in an HI greater than one, then refinements may be made that include:

- Modification of the screening level (or project action level) to reflect the lowest-observed adverse effect level (LOAEL),
- Use of more refined exposure algorithms that incorporate more realistic exposure assumptions (such as specific bird and mammal ingestion rates for plants, soil, and/or water),
- Use of site-specific area use factors and population use factors,
- Evaluation of bioaccumulation, and
- Evaluation of risk by mechanism of effect.

It is acknowledged that the comparison of site concentrations with site-specific ecological screening levels is an acceptable method for calculating HQs. However, it must be shown that the exposure assumptions on which the ecological screening levels are based are representative of site receptors and site conditions at CAFB. In addition, if this method is to be used, ecological screening levels for each representative receptor must be presented. Given that representative receptors and exposure assumptions were not provided, it is unknown whether the selected ecological screening levels used in the SLERAs are appropriate for use and whether they are protective of the types of receptors found at CAFB.

Modify the SLERAs to follow NMED (2012) guidance by: 1) calculating exposure doses for the selected ecological receptors; 2) calculating HQs by comparing the exposure doses by

appropriate toxicity reference values; and 3) adding HQs together to calculate HIs for each receptor at each site.

5. Section 5.5.5.1. Refined ecological screening level hazard quotients were greater than one for several chemicals at the sites evaluated in SLERAs. If the hazard index (HI) for any receptor is above the target risk level, then there is a potential for adverse effects on ecological receptors and additional evaluation and possibly a site-specific ecological risk assessment is warranted. Some additional lines of evidence that may be used to assess risk when the HQ or HI is above the target level include:

    - Modification of the screening level (or project action level) to reflect the lowest-observed adverse effect level (LOAEL),
    - Use of more refined exposure algorithms that incorporate more realistic exposure assumptions (such as specific bird and mammal ingestion rates for plants, soil, and/or water),
    - Use of site-specific area use factors and population use factors,
    - Evaluation of bioaccumulation, and
    - Evaluation of risk by mechanism of effect.

    Revise the SLERAs accordingly.

6. Section 5.5.4.4 and Table 5-12. It is noted that barium was not retained as a constituent of potential ecological concern (COPEC) as the maximum concentration is only 5% greater than the background Upper Tolerance Level (UTL). This is not an acceptable line of evidence for eliminating a COPEC. If the Hazard quotient (HQ) or additive hazard index (HI) for any receptor is above this target risk level, then there is a potential for adverse effects on ecological receptors and additional evaluation and possibly a site-specific ecological risk assessment is warranted. Some additional lines of evidence that may be used to assess risk when the HQ or HI is above the target level include:

    - Modification of the screening level (or project action level) to reflect the lowest-observed adverse effect level (LOAEL),
    - Use of more refined exposure algorithms that incorporate more realistic exposure assumptions (such as specific bird and mammal ingestion rates for plants, soil, and/or water),
    - Use of site-specific area use factors and population use factors,
    - Evaluation of bioaccumulation, and
    - Evaluation of risk by mechanism of effect.

    Revise the SLERAs accordingly.