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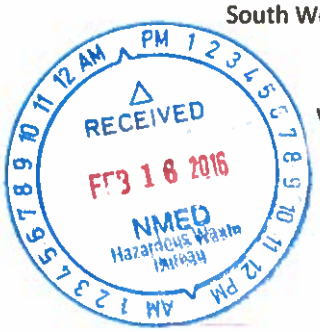

February 10, 2016
DCN: NMED-2016-03

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

RE: Evaluation of *Revision 2 of the Final Risk Screening Evaluation for Solid Waste Management Unit (SWMU) 127, Petroleum, Oil, and Lubricants (POL) Wash Pad at Facility 4095*, dated November 2013, Cannon Air Force Base, New Mexico, EPA ID #NM7572124454, October 22, 2015.

Dear Mr. Cobrain:

This letter serves as a deliverable and includes an evaluation of *Revision 2 of the Final Risk Screening Evaluation for Solid Waste Management Unit (SWMU) 127, Petroleum, Oil, and Lubricants (POL) Wash Pad at Facility 4095*, dated November 2013, Cannon Air Force Base (AFB), New Mexico, EPA ID #NM7572124454, October 22, 2015 (Revision 2).

The majority of the issues associated with previous versions of the *Final Risk Screening Evaluation for Solid Waste Management Unit (SWMU) 127, Petroleum, Oil, and Lubricants (POL) Wash Pad at Facility 4095*, dated November 2013 have been addressed in Revision 2. The second paragraph of Section 2.5, Page 5 of 11, in Revision 2 begins with a description of the methodology used in 2014 to obtain soil gas samples at SWMU 127. This discussion indicates that the samples were collected as active soil vapor samples. While the level of detail provided is not comparable to that expected in a sampling and analysis plan, the information is summarized at a level appropriate for the screening level risk analysis performed on the POL Wash Pad.

Revision 2 does not include additional analyses justifying the collection of only one soil gas sample from the eastern portion of SWMU 127. A review of the soil gas sampling results presented in Table 5 of Revision 2 indicates that the maximum soil gas concentrations were obtained for 2-hexanone 4-methyl 2-pentanone, acetone, carbon tetrachloride, chloroethane, and chloromethane at sampling location SV-01 (at the 5 foot sampling depth), the sole sampling location in the eastern portion of SWMU 127. A review of the results presented in Table 6 showed that under the residential exposure scenario, cancer risks for carbon tetrachloride and chloromethane via the vapor intrusion pathway were both on the order of 10^{-9}; hazard quotients ranged from 10^{-2} (2-hexanone) to 10^{-7} (chloroethane) for the six constituents. The results were similar for the industrial exposure scenario with carbon tetrachloride and chloromethane still on the order of 10^{-9} and hazard quotients ranging from 10^{-3} for 2-hexanone to 10^{-7} for chloroethane.

Under the residential exposure scenario, the maximum risk and hazard quotient obtained at location SV-01 are approximately 3 orders of magnitude and one order of magnitude below the maximum risk and hazard obtained for trichloroethylene (2.2×10^{-6} and 0.71, respectively). Results for the industrial scenario are approximately two orders of magnitude less than the maximum trichloroethylene risk (7.4×10^{-7}) and hazard quotient (0.25). These results as well as other lines of evidence (e.g., investigation of site history) should have been presented in support of the sampling locations used to collect soil gas samples during the August 2014 sampling event.

Revision 2 does not reflect the collection of additional background samples for polycyclic aromatic hydrocarbons (PAHs) or include a discussion of surface features and surface water flow directions. Rather, Cannon AFB has recalculated risk and hazard for organics in soil without consideration of PAH background concentrations. Results based on the maximum detected concentrations in soil are provided in Table 2. For both land use scenarios, risks are above the 1×10^{-5} target level while hazard indices are less than 1. Table 3 presents the results of a refined analysis in which the 95% Upper Confidence Limit (UCL) was used as the exposure point concentration (EPC) for five PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The 95% UCL values were determined with ProUCL version 5.0 as recommended in NMED's 2014 *Risk Assessment Guidance for Site Investigations and Remediation* (NMED Guidance). Use of the 95% UCL as the EPC appears appropriate for these five constituents. Table 3 shows that the residential exposure scenario exceeds the risk target level while the risk for the industrial scenario is below the target at 7.6×10^{-6}. As part of the uncertainty analysis, Cannon AFB repeated the risk and hazard calculations assuming that the five PAHs were due to background conditions (i.e., the five PAHs were removed from the analysis). As listed in Table 11, the results still show that the risk target level of 1×10^{-5} is exceeded under the residential exposure scenario but not the industrial scenario. As expected, hazard is less than the NMED target of 1 for both scenarios. The refined analysis and the analysis presented in the uncertainty section provide adequate defensible, technical support for the risk-based closure with land use restrictions under an industrial scenario of SWMU 127 as proposed by Cannon AFB in Revision 2. Thus, additional background sampling for PAHs and characterization of surface water flows within the SWMU are not necessary lines of evidence for characterizing the risk and hazard posed by the site.

In response to NMED concerns, Cannon AFB provided a revised evaluation of the vapor intrusion (VI) pathway in Revision 2. Examination of Section 2.5 and Appendices B-1 through B-4 of Revision 2 indicates that the following revisions were incorporated into the evaluation:

- A default indoor air exchange rate of 0.25 per hour was used for both the 5 feet below ground surface (bgs) and the 10 feet bgs data sets.

- Revision 2 does not include justification for the values of soil total porosity and soil water-filled porosity used for Stratum A in vapor intrusion evaluation. In addition, an expanded discussion on the assumed soil type (sand) was not provided. A review of the figures provided in Revision 2 provides one line of evidence supporting the assumption of sandy soils at SWMU 127 (appearance of sandy areas in Figures 1 and 2). Further support was found in Section 3.6.1.2 of *Installation of a Digital Airport Surveillance*

Radar Final Environmental Assessment Cannon Air Force Base, New Mexico dated July 6, 2005 which indicates that the abundance of soil at the base is Amarillo fine sandy loam. In addition, comparison of the values of soil total porosity and soil water-filled porosity used in the VI evaluation to NMED recommended values indicates that the values used by Cannon AFB fall within the range considered in the sensitivity analysis of input parameters for the soil partitioning equation in Section 4.7 and Table 4-1 of the 2014 NMED Guidance. Thus, it appears the assumption of sandy soils and the values for the soil porosities of Stratum A, while not rigorously justified, are acceptable.

- The methodology used by Cannon AFB ensures that the risk and hazard from the VI evaluation used in calculating cumulative impacts is always based on the maximum detected soil gas concentration regardless of depth. While depth-specific risk and hazard values were determined, the approach employed by Cannon AFB uses site-specific data and applies those data in the evaluation at the depth interval in which it was collected. Table 6 indicates that the three drivers of the maximum risk and the two drivers of maximum hazard determined for the VI pathway are all based on soil gas samples collected 10 feet bgs. *Uncertainty and the Johnson-Ettinger Model*, EPA/600/R-05/110, dated September 2005, indicates that changes in sampling depth led to a 21% decrease in predicted risk for a "best case" while a "worst case" value led to a 35% increase in risk. Based on the formulation of the Johnson-Ettinger Model, a decrease in sampling depth would be expected to lead to an increase in indoor air concentration and the associated risk and hazard. If the numerical results for the risk and hazard drivers in the far right column of Table 6 of Revision 2 are increased by 35%, the maximum risk and hazard increase to 1.1×10^{-6} and 0.36, respectively. Thus, the cumulative results in Table 7 of Revision 2 would increase to a risk of 9×10^{-6} and a hazard index of 0.48. However, the conclusion presented in Section 2.6 of Revision 2 (i.e., cumulative risk and hazard are below NMED target levels for an industrial land use scenario) would not change and the approach used by Cannon AFB is deemed acceptable.

- Table 6 and Appendices B-1 through B-4 of Revision 2 demonstrate that 2-hexanone has been included in the revised VI evaluation.

- Table 6 and Appendices B-1 through B-4 of Revision 2 demonstrate that the maximum detected concentration for trichloroethylene has been used in the VI evaluation.

- Tables 2 and 3 of Revision 2 indicate that the maximum detected concentration for ethylbenzene was used in the risk and hazard calculations.

Based on our evaluation, it appears that the outstanding issues and concerns with the risk-based screening evaluation of SWMU 127 have been adequately addressed and the risk-based screening appears to provide adequate support for proceeding with a corrective action complete with controls proposal. However, Revision 2 does identify or discuss the types of controls that would be implemented. AQS recommends that NMED require legally binding instruments that prevent residential development and land use as part of the land use controls implemented at SWMU 127.

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

Paige Walton
AQS Senior Scientist and Program Manager

cc: Gabriel Acevedo, NMED (electronic)
Joel Workman, AQS (electronic)