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September 20, 2022

Tim Davis
Chief Environmental Officer
National Aeronautics and Space Administration
White Sands Test Facility
P.O. Box 20
Las Cruces, NM 88004-0020

Attention of: RE-20-021

RE: DISAPPROVAL
200 AND 600 AREA VAPOR INTRUSION ASSESSMENT REPORT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHNSON SPACE CENTER WHITE SANDS TEST FACILITY
DOÑA ANA COUNTY, NEW MEXICO
EPA ID #NM08800019434
HWB-NASA-18-010

Dear Mr. Davis:

The New Mexico Environment Department (NMED) has received the National Aeronautics and Space Administration Johnson Space Center White Sands Test Facility (Permittee) *200 and 600 Area Vapor Intrusion Assessment Report* (Report) dated January 29, 2020. NMED has completed review of the Report and hereby issues this Disapproval. The following comments must be addressed.

COMMENTS

1. **Section 4.10, Data Assessment and Review, Pages 27 and 28**

   NMED Comment: The section only addresses the steps used for the project data assessment and usability review. Revise the section to discuss the data usability assessment results. Include data usability reports and sample analysis data reports for the August 2017 and February 2018 sampling events provided as Report Enclosure 3 as additional appendices in the revised Report. Revised the Report accordingly.

2. Section 6.0, Screening Level Risk Assessment and Evaluation Lines of Evidence, Pages 32 through 42

NMED Comment: The following project risk assessment issues must be addressed in the revised Report as follows:

a. Review of the 200 and 600 Area risk screen evaluations indicate that only residential exposure was evaluated, and the risk assessments are incomplete. Additionally, it was noted that if a chemical exhibited both carcinogenic and noncarcinogenic toxicity, only the most conservative screening criteria were used to evaluate risk for a detected chemical of concern (COC) for the vapor intrusion risk screen evaluations. NMED's June 2022 *Risk Assessment Guidance for Site Investigations and Remediation* (RA Guidance), Section 5.0, Use of the SSLs [soil screening levels], specifies that if a chemical exhibits both carcinogenic and noncarcinogenic toxicity, impact based on both forms of toxicity must be evaluated. This requirement applies to risk assessments for vapor intrusion. As an example, Section 6.1.1.1, and Table 6.1, 200 Area Soil Vapor: Residential Cumulative Cancer Risk Assessment data, indicate that benzene was the only carcinogen detected in soil vapor at the 200 Area; this is not accurate. RA Guidance Table A-4, NMED Vapor Intrusion Screening Levels (VISLs), has been updated to include cancer and non-cancer VISLs that must be used to evaluate site risk and hazard for the COCs detected in soil vapor and indoor air samples from the 200 and 600 Areas. The Report must be revised to address these issues.

b. ProUCL output files provided in Appendix C, UCL95 Results for Cumulative Risk Assessment, indicate that insufficient data observations were used to derive 95% upper confidence levels (95UCLs) for various contaminants of concern detected in soil vapor and indoor air samples. As an example, Table 6.2, 200 Area Soil Vapor Residential Cumulative Hazard Assessment, lists a 95UCL for trichloroethylene (TCE) as 3.8E+05 $\mu g/m^3$. Appendix C ProUCL output files lists six observations for the reported 95UCL. NMED's review has identified only four valid data points unless duplicate sample data is included, and the data set does not appear to be appropriate for 95UCL calculation. Additionally, RA Guidance, Section 2.8.3, Identification of COPCs [contaminants of potential concern], specifies that the maximum detected concentration between the parent and duplicate sample must be applied as the sample result. To further clarify, only the maximum detected concentration between the parent and duplicate samples must be used as an input value in ProUCL calculations. The revised Report must discuss how duplicate sample results were used in the risk assessments. Revise the Report accordingly.

c. For appropriate UCL calculation, RA Guidance Section 2.8.4.1, Discrete Data, specifies that the minimum requirements for calculating UCLs are: 1) each data set

must contain at least eight samples (i.e., n ≥ 8) for the analyte being evaluated; and 2) there must be a minimum of five detections (i.e., ≥ 5 detected observations) for the analyte being evaluated. Although it is possible to calculate UCLs with small datasets (i.e., n ≤ 8) and low frequencies of detection (i.e., < 5 detected observations), these estimates are not considered reliable and representative enough to make defensible decisions. Therefore, UCLs must only be calculated for data sets that meet the RA Guidance minimum requirements. Alternatively, for datasets with less than four detects or datasets with less than 10 samples and a low level of detection (less than 10%), the median concentration may be used as the exposure point concentration (EPC). Risk screen evaluation with refined EPCs derived from data sets that do not conform to RA Guidance specifications must not be used for risk assessment. The Report must be revised to resolve the identified issues with various refined EPCs used for the 200 and 600 Area risk screen evaluations.

d. Section 6.1.1.1, 200 Area Screening Risk Assessment, addresses the use of bias-corrected and accelerated (BCA) bootstrap 95UCL for 1,1-dichloroethene due to the ProUCL recommended 95UCL being greater than the maximum detected concentration for the COC; however, sufficient data to calculate a BCA bootstrap 95UCL was not provided. To clarify, October 2015 *ProUCL Version 5.1.00 Technical Guide*, Section 1.7, Minimum Sample Size Requirements and Power Evaluations, recommends that bootstrap methods must not be used for small data sets with less than 15-20 data point observations. The datasets used for the calculation of 95UCLs in the Report for various COCs including 1,1-dichloroethene appear to contain only four valid data point observations; therefore, use of BCA bootstrap methods are not appropriate. To address this issue, either the maximum detected concentration for a contaminant of concern must be retained as the EPC, or if data of sufficient type and integrity are available, the median may potentially be used as an EPC. Revise the Report to address this issue accordingly.

e. An additional concern with deriving 95UCLs for use as refined soil vapor and indoor air EPCs is that maximum detected concentrations were from either the 2017 or 2018 sampling event. Based on this observation, it is inferred that historical data used to derive UCLs were of lower concentrations (to mitigate the maximum concentration) and that there is an increasing trend in concentration. However, using historical data to mitigate increasing concentrations with time is not representative of current or future exposure. An EPC must represent a reasonable maximum exposure (RME) while also being representative of current and future receptors. In addition, the EPC must factor in temporal variations between seasons. Using the data from the two current sampling events summarized in Tables 5.1 and 5.2 will accomplish these tasks. However, refined EPCs appear to have been derived using additional data, which were either data from an unspecified prior investigation

or included the use of duplicate sample results as standalone data points. Depending on the historical trend of the data used, the revised EPCs are likely underestimated and not representative of the RME. If data from years other than 2017 and 2018 were used, a clear discussion of the trend in the data for soil vapor, outdoor air, and indoor air must be included in the revised Report to address the representativeness of the data for evaluating current and future site risk. Additionally, a clear explanation of where the additional data was sourced must be provided and the data tabulated in an additional Excel spreadsheet to be included in an appropriate enclosure to the revised Report. If the additional data was not collected under an NMED-approved work plan, included in an NMED-approved report, and in NMED's Administrative Record for NASA, it cannot be used for risk assessment. The Report must be revised as necessary to address this comment.

f. Risk for the industrial worker scenario was not appropriately evaluated for the 200 and 600 Areas. Only a qualitative discussion of comparison of indoor air data to NMED's industrial VISLs and permissible Occupational Safety and Health Administration (OSHA) exposure limits (PELs) was provided in Section 6.2.6, Indoor Air Quality-Risk to Worker. PELs are a tool for an industrial hygienist to monitor workplace environments and are not appropriate for risk assessment required under the White Sands Test Facility Hazardous Waste Permit and in accordance with the RA Guidance. Use of PELs is not an appropriate tool for assessing total risk to a site worker because many of the PELs are outdated and inadequate for ensuring protection of worker health. In addition, comparison to a PEL does not allow for cumulative or total exposure to multiple contaminants that may be detected in environmental samples. The PEL evaluation must be removed from the revised Report. The risk screen evaluation for the industrial exposure scenario must be completed for the 200 and 600 Areas in accordance with the RA Guidance and the results documented in the revised Report. Revise the Report accordingly.

g. In accordance with the RA Guidance, exposure to contaminants in soil at the 200 and 600 Areas must be evaluated for the industrial worker and the results of the soil risk screen evaluation added to the results of the soil vapor risk screen evaluations. For the 600 Area, applicable surface soil data between 0 to 4 feet below ground surface are available and may be used to calculate cumulative risk and hazard for industrial workers. Table 6.6, 200 Area Soil Background Threshold Value Comparison, indicates surface soil data may not be available for the 200 Area. In this case, the Report must address the data gap and assess exposure to contaminants in soil for the industrial worker with other available information, if available. The results of the industrial worker soil vapor and indoor air risk screen evaluations for the 200 Area must be reported and discussed in appropriate sections of the revised Report. The Report must be revised accordingly.

h. The risk screen evaluations for the 200 and 600 Areas for residential and industrial worker exposure must be conducted using current NMED or United States Environmental Protection Agency VISLs and site specific NMED-approved risk-based concentrations (RBCs) for carcinogenic and non-carcinogenic toxicity in accordance with the RA Guidance. Revise the Report accordingly.

i. All comments included in this letter for residential exposure must also be applied for the required risk screen evaluations for the industrial worker, as applicable. Revise the Report accordingly.

3. Tables 5.1 and 5.2, Summary of 200 and 600 Area Buildings 200 and 637 and Vicinity Soil Vapor, Outdoor Air, and Indoor Air Analytical Results, Pages 73 and 91

NMED Comment: The Table 5.1 and 5.2 issues must be addressed as follows:

a. Revise Tables 5.1 and 5.2 to include the screening level evaluation results for residential and industrial exposure for COCs detected in site samples. Revise the tables and any affected Report section discussions accordingly.

b. Review the analytical reporting limits for all COCs and ensure they have not exceeded respective VISLs or RBCs. COC concentrations reported as non-detect with reporting limits above applicable screening levels must be flagged as data quality exceptions and the identified issues addressed in the revised Report. Revise the Report as necessary.

c. The RBCs for the five-foot interval are listed on Tables 5.1 and 5.2. Clarify footnote two to indicate that the data for the five-foot interval represents the most conservative RBC and is listed for comparison only. In addition, the footnote must indicate that the RBC appropriate for the depth of each sample was applied during the risk assessment. Revise the Report accordingly.

The Permittee must submit a revised Report that addresses the comments contained in this Disapproval. In addition, the Permittee must include a response letter that cross-references where NMED's comments were addressed in the Report. The Permittee must also submit an electronic redline-strikeout version of the revised Report showing all changes made to the Report. The revised Report must be submitted to NMED no later than **April 28, 2023**.

If you have any questions regarding this letter, please contact Gabriel Acevedo at (505) 690-5760.

Sincerely,

Rick Shean Digitally signed by Rick Shean Date: 2022.09.20 15:01:58 -06'00'

Rick Shean
Chief
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