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**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

September 7, 2017

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-17-040

**RE: DISAPPROVAL  
SMALL ARMS FIRING RANGES (SWMUS 29-31)  
REMEDY COMPLETION REPORT  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
JOHNSON SPACE CENTER WHITE SANDS TEST FACILITY  
DOÑA ANA COUNTY, NEW MEXICO  
EPA ID #NM08800019434  
HWB-NASA-17-006**

Dear Mr. Davis:

The New Mexico Environment Department (NMED) has received the National Aeronautics and Space Administration Johnson Space Center White Sands Test Facility (NASA, Permittee) *Small Arms Firing Ranges (SWMU [Solid Waste Management Unit] 29-31) Remedy Completion Report* (Report), dated March 30, 2017. NMED has reviewed the Report and hereby provides this Disapproval. The Permittee must address the following comments.

## COMMENTS

### 1. Section 3.4, Site Conceptual Exposure Model, Pg. 5

**Permittee's Statement:** "To summarize the site conceptual exposure model discussed in the ACMWP [Accelerated Corrective Measures Work Plan], spent ammunition scrap in soil is the source of contamination at the firing ranges, airborne transport by wind and surface transport by precipitation runoff of contaminated soil are the primary release mechanisms, and exposure pathways of ingestion, inhalation, and dermal contact with the lead-contaminated soil are considered complete for the construction and industrial worker exposure scenarios."

**NMED Comment:** The industrial exposure scenario was identified as complete in the Site Conceptual Exposure Model (SCEM) in the ACMWP; however, soil confirmation sample analysis results were only evaluated against the NMED residential and construction worker soil screening levels (SSLs) throughout the Report. All soil sample analysis results must be evaluated for the industrial exposure scenario, in addition to residential and construction worker exposure scenarios. Revise the Report and supporting data analysis tables accordingly.

### 2. Section 3.5.4, Performance or Acceptance Criteria, Pg. 6

**Permittee's Statement:** "Following completion of the RCR [Remedy Completion Report] and any subsequent site restoration activities, a "Corrective Action Complete" status determination for each of the firing ranges will be requested."

**NMED Comment:** The evaluation of remedy completion results for a potential Corrective Action Complete status determination by NMED must always include a human health and ecological risk assessment in accordance with the requirements of NMED's Risk Assessment Guidance for Site Investigations and Remediation (RA Guidance), as updated. The human health risk evaluation must be conducted in accordance with the RA Guidance and must always include an evaluation of the residential, industrial, and construction worker exposure scenarios. The ecological risk evaluation must also be conducted in accordance with the RA Guidance.

The required risk assessment must be provided as a separate report submittal in addition to the revised Remedy Completion Report. A human health and ecological risk assessment is required to determine whether corrective action is complete at SWMUs 29, 30, and 31.

### 3. Section 3.5.5, Study Constraints, SWMU 29, Pg. 7

**Permittee's Statement:** "The cleanup of SWMU 29 was performed in conjunction with the ongoing investigation and closure of the STGT [Second Tracking and Delay Relay Satellite System Ground Terminal] waste water lagoon and focused on the more heavily utilized range floor and fallout area of the north half of the north cell. Additional ACM [accelerated

corrective measures] activities may be required at the south half of the north lagoon cell following removal of the wastewater, sludge, and liner materials.”

**NMED Comment:** Additional assessment of the southern portion of the SWMU 29 STGT firing range will be required when the remaining portion of the site becomes accessible. NMED will not be able to provide a status determination for the site until a full assessment of the northern and southern portions of SWMU 29 has been completed. The results of investigation for the northern portion of SWMU 29 may remain in the Report. However, the results of the combined investigations and risk assessment for the northern and southern portions of the site must be provided under a separate cover once the information becomes available for review by NMED.

**4. Section 4.2, Field Documentation, Pg. 7**

**NMED Comment:** All field notes documenting field activities, including data collection logs documenting ammunition scrap spatial location information (horizontal and vertical), initial site screening activities, ammunition scrap recovery, and confirmation sampling activities, must be included as an additional appendix to the revised Report.

**5. Section 4.4, Investigation-derived Waste Management, Pg. 9**

**NMED Comment:** Provide additional information in this section that describes the actual waste management activities implemented during cleanup operations at all firing range areas. Discuss any deviations from the originally proposed and approved ACMWP Waste Analysis Plan and the rationale for changes to the originally proposed plan.

**6. Section 4.5.1, Chronology of Events, Pg. 9 and 10**

**NMED Comment:** Based on the information provided, the collection of soil samples for the range floor at SWMUs 29, 30, and 31 and the fallout area at SWMU 29 appear to have been collected prior to completion of ammunition scrap recovery. Typically, during cleanup, the contamination source is removed before conducting confirmation sampling. NMED’s May 11, 2016 Approval with Modification for the *Status Update of NASA WSTF Small Arms Firing Ranges (SWMUs 29-31) Accelerated Corrective Measures* (Firing Range Status Update) specifically provided direction for the collection of confirmation sampling only after all source materials had been removed. Provide the rationale for conducting sampling in these areas prior to removal of the source materials. Discuss any potential effects the implemented sampling strategy may have on the sample analytical results.

**7. Section 4.5.2, Soil Sample Procedures, Pg. 10**

**NMED Comment:** NMED’s May 29, 2015 Approval with Modification response to the ACMWP provided additional direction for discrete confirmation sampling at the firing range perimeter, impact berms, and range floors. Field screening and professional judgement were required to make a final determination on discrete sample locations. A reference to NMED’s

Approval with Modification response to the ACMWP was also cited in the Firing Range Status Update. However, confirmation soil samples from the range floors and fallout areas for SWMUs 29, 30, and 31 were collected as composite samples. Additional Report information provided in Appendix I of the NASA WSTF Materials Technology Group analytical data report includes a narrative documenting X-Ray Florescence (XRF) analysis that indicates that approximately five pounds of soil from five sampling locations within each grid cell were combined into a twenty-five-pound composite sample. Four additional subsamples were then composited into the final sample aliquot, which was split for submittal to an off-site analytical laboratory for metals analysis and the NASA WSTF Materials Technology Group laboratory for XRF analysis. This is consistent with the originally proposed sample methodology; however, NMED's only modification to the ACMWP required discrete confirmation sampling at each SWMU. Discrete sampling is necessary to provide accurate representative concentration result data for human health and ecological risk evaluation. Provide the rationale for not complying with NMED's modification to the ACMWP. The discussion must also address the potential for bias in the sampling analytical results due to the collection of composite samples. Failure to adequately address the noncompliance with NMED's required modification to the ACMWP will require resampling at SWMUs 29, 30, and 31 where composite samples were collected instead of discrete samples.

#### **8. Sections 4.5.3, Manual Recovery of Ammunition Scrap, Pg. 12**

**NMED Comment:** In order to further validate the alternative ammunition scrap cleanup method employed (manual recovery) during field screening, additional information must be provided in the Report as follows:

- a. Provide additional detail regarding the systematic screening method utilized during ammunition scrap location efforts such as screening patterns, additional confirmation screening, and accuracy of the screening survey.
- b. Discuss the potential for remaining ammunition scrap at the firing ranges based on the manual recovery methods employed during cleanup activities at each SWMU. Any deviations from the documented trowel and sieve recovery method must also be discussed.
- c. Reconcile the ammunition scrap information by volume or weight for each SWMU after completion of screening and manual recovery of ammunition scrap.

#### **9. Sections 5.2, Chemical Analytical Results, Pg. 17**

**Permittee's Statement:** "The XRF [X-Ray Florescence] data collected in conjunction with the laboratory analytical data provided lead results that were comparable to the laboratory analytical results. As a result, for limited situations where laboratory analytical data was not collected for a cell (STGT firing range floor cells #2, #7, and #11 and WB-2 firing range floor cells #2, #6, #7, and #20), the XRF data is considered reliable".

**NMED Comment:** Explain why soil samples were not collected for laboratory analysis at each of the designated cell locations at the STGT and WB-2 firing ranges. Explain why analysis was not conducted for the other identified constituents of concern (COCs) (antimony, arsenic, copper, iron, tin, and zinc) at the firing ranges.

**10. Sections 5.2.1, 5.2.2, and 5.2.3, Chemical Analytical Results, STGT (SWMU 29) Range Floor, Fallout Area, and Impact Berm, Pg. 18**

**NMED Comment:** Adequate analysis of SWMU 29 analytical results with respect to established background concentrations, receptor exposure, and the required constituent of potential concern (COPC) evaluation was not conducted in accordance with NMED's RA Guidance or the established SCEM. For example, a soil background range for arsenic of 2.8 to 12.4 milligrams per kilogram (mg/kg) was cited in the Report as the soil background comparison range for NASA WSTF Area 1, where SWMU 29 is located. This is not the correct use of the NASA WSTF September 2015 *Soil Background Study Investigation Report* (SBS) reference data. The correct soil background reference value for comparison of arsenic concentrations at SWMU 29 is the 95% upper tolerance limit (UTL) (12 mg/kg) listed in Table 4.1, Data Set Background Area 1 Shallow. The industrial worker exposure scenario was also documented as complete in the exposure model presented in the ACMWP, but was not evaluated in the Report. Additionally, all COC's must also be evaluated for retention as COPCs in accordance with NMED's RA Guidance Identification of COPCs section, and, as necessary, retained in the required human health and ecological risk evaluations. Revise the Report to include a complete evaluation of analytical results for SWMU 29.

**11. Sections 5.2.4 and 5.2.5, Chemical Analytical Results, 200 Area (SWMU 30) Range Floor and Fallout Area, Pg. 18**

**NMED Comment:** Adequate analysis of SWMU 30 analytical results with respect to established background concentrations, receptor exposure, and risk assessment were not addressed in the Report. Revise the Report to include a complete evaluation of analytical results as required by NMED's RA Guidance for SWMU 30.

**12. Sections 5.2.6, 5.2.7, and 5.2.8, Chemical Analytical Results, WB-2 (SWMU 31) Range Floor, Fallout Area, and Impact Berm, Pg. 19**

**NMED Comment:** Adequate analysis of SWMU 31 analytical results with respect to established background concentrations, receptor exposure, and risk assessment were not addressed in the Report. Revise the Report to include a complete evaluation of analytical results as required by NMED's RA Guidance for SWMU 31.

**13. Section 5.2.9, Potential Bias Due to Sample Collection Conditions, Pg. 19**

**Permittee's Statement:** "At the request of NMED, NASA did not composite confirmation soil samples. NMED indicated that compositing soil samples may result in contaminant concentrations that are not representative of concentrations remaining in the soil.

Compositing may dilute the concentrations of a contaminant to below its threshold detection limit. NASA collected discrete confirmation samples from the impact berms at the STGT and WB-2 firing ranges.”

**NMED Comment:** NMED’s modification to the ACMWP required discrete sampling during confirmation sampling at each SWMU at the impact berms, range floors, and fallout areas. Apart from the impact berms, the Permittee’s statement contradicts the implemented sampling method documented in the Report and does not adequately address potential bias caused by composite sampling. Revise the Report to address this issue.

#### **14. Section 6.0, Remedy Completion Summary and Interpretation of Results, Pg. 20**

**Permittee’s Statement:** “Arsenic was identified regularly at levels above the NMED RSSLs [residential SSLs] of 4.25 mg/kg and occasionally (for three samples or approximately 1% of the soil sample population) above the CWSSL [construction worker SSL] of 57.4 mg/kg. Concentrations of arsenic above the CWSSL remained within the same order of magnitude ( $10^2$  mg/kg). All Target metals were also observed at concentrations that were consistent with background concentrations reported for the WSTF SBS and other site background evaluations.”

**NMED Comment:** The results of confirmation soil sample concentration data have not been adequately evaluated in accordance with NMED’s RA Guidance. Comparison of SWMU concentration data indicates maximum arsenic concentrations exceeded the residential SSL at SWMUs 29, 30, and 31; the industrial and construction worker SSLs for arsenic at SWMU 30; and the industrial SSL for arsenic at SWMU 31. The interpretation of the analytical results attributed the SSL exceedances to natural background. However, adequate evaluation of arsenic requires proper use of the established SBS UTL values, and as necessary after initial screening, further statistical evaluation in accordance with the NMED RA Guidance. If further evaluation of encountered site conditions does not resolve the SSL exceedances, additional excavation or further data evaluation must be conducted to resolve the exceedances. Revise the Report to address these issues.

#### **15. Section 6.2, Waste Management, Pg. 20**

**NMED Comment:** In addition to the provided waste soil reconciliation information, provide a reconciliation of the amount of ammunition scrap that was collected at each firing range as a volume or weight for each SWMU prior to disposal.

#### **16. Table 1.1, Contaminants of Potential Concern, Pg. 37**

**NMED Comment:** The applicable May 2016 Environmental Protection Agency Regional Screening Level (EPA RSL) for tin is 47,000 mg/kg. Revise the table to provide the 2016 EPA RSL. The revised table must also include the screening levels for the industrial exposure scenario (700,000 mg/kg).

**17. Tables 5.1, 5.2, and 5.3 SWMU 29, 30, and 31 Analytical Results, Pg. 38 through 42**

**NMED Comment:** The following discrepancies were noted for the Analytical Results tables and must be addressed in the revised Report:

- a. All soil sample analysis results reported below the laboratory detection or reporting limits must be reported as such in the table. Sample analysis results below the laboratory reporting limits must never be reported as a value of zero. Correct Tables 5.1, 5.2, and 5.3 accordingly.
- b. Revise the tables to include an evaluation of the analytical results for the industrial exposure scenario. Industrial exposure was identified as a complete exposure pathway in the SCEM for SWMUs 29, 30, and 31.
- c. Revise the tables to provide the May 2016 RSLs for the residential and industrial exposure scenarios for tin.

**18. Appendix C, Soil Metals Analytical Results (All Samples), Pg. C-1**

**NMED Comment:** The following discrepancies were noted for the Appendix C table and must be addressed in the revised Report:

- a. Revise the Appendix C table to include the complete analytical results for the fallout areas, range floors, and berms for each SWMU. For example, fallout area sampling results for SWMU 31 (Cells 31 through 72) do not appear in their entirety in the table as logged in the respective chain of custody record for the collected samples. A similar discrepancy was noted for fallout area soil samples for SWMU 29 (Cells 47 through 65). Additionally, the provided table does not appear to include the results for the berm samples collected at SWMUs 29 and 31. All missing data must be provided in the table and the missing information evaluated to support the Report findings and conclusions.
- b. All soil sample analysis results reported below the laboratory detection or reporting limits must be reported as such in the table. Sample analysis results below the laboratory reporting limits must never be reported as a value of zero. Correct the Appendix C table accordingly.

**19. Appendix D, Analytical Results Above NMED Residential SSLs and Construction Worker SSLs, Pg. D-1**

**NMED Comment:** The following issues were noted for the data presented in the Appendix D table and must be addressed:

- a. Various exceedances of NMED's arsenic SSLs for berm confirmation samples were noted during review of the Report information for SWMU 29. This information was

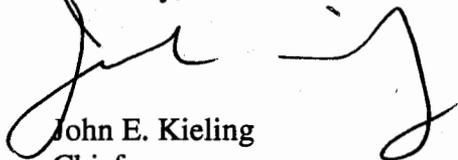
not included in the Appendix D table for the site. Revise the table to include the data for the berm samples where exceedances of SSLs were identified.

- b. The established SBS arsenic UTL for the applicable area must be cited as the background evaluation value for SMWU 29, 30, and 31.
- c. Revise the tables to include evaluation of the data for the arsenic industrial exposure SSL in addition to the provided residential and construction worker SSLs.
- d. The berm sample designations for SWMU 31 do not match the sample designations utilized in various tables and figures in the Report. Correct the table to reflect the correct sample designations.

The Permittee must submit a revised Report that addresses 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. The revised Report must be submitted on or before **December 29, 2017**.

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

Sincerely,



John E. Kieling  
Chief  
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB  
B. Wear, NMED HWB  
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