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**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

October 28, 2010

Mr. David Scruggs, Chief
Environmental Restoration Program
49 CES/CEVR
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

**SUBJECT: NOTICE OF DISAPPROVAL**
**BASEWIDE BACKGROUND STUDY REPORT DECEMBER 7, 2009**
**REVISION**
**HOLLOMAN AIR FORCE BASE, EPA ID# NM6572124422**
**HWB-HAFB-09-004**

Dear Mr. Scruggs:

The New Mexico Environment Department (NMED) has reviewed the United States Air Force's (Permittee) December 7, 2009, response to the May 4, 2009, Notice of Disapproval (NOD) of the *Basewide Background Study Report* for Holloman Air Force Base (Report).
This NOD is organized into two major parts. Part 1 includes comments that apply to all constituents and media. Part 2 includes additional comments on radiochemical constituents. A compliance schedule follows Part 2. The Permittee must submit a response to each comment of each Part by the deadlines indicated and in accordance with the compliance schedule.

## PART 1
## COMMENTS ON ALL CONSTITUENTS AND MEDIA

1. Section 5.5 of the subject Report states, in part, "While nitrate and nitrogen are a part of the natural ecosystem at HAFB, the present quantities, distributions, and historical conditions at HAFB are not natural." Additionally, background levels and statistical descriptors for nitrate, nitrite, and ammonia are proposed in Tables 5-5, 5-15, and 5-18.
NMED does not approve the proposed background levels in the Report for nitrate, nitrite, or

ammonia because some of the groundwater samples acquired as part of the background study are contaminated by one or more of these compounds, and thus are not representative of natural conditions. The Permittee is therefore required to conduct an investigation of nitrate and the other nitrogen-bearing compounds in groundwater to establish true and reliable background conditions for them, and to determine the source, extent, and rate of migration of these compounds where they are known or suspected to be a contaminant of anthropogenic origin. The Permittee must submit to the NMED for its review and approval a plan to investigate background conditions and known or suspected sites of contamination with respect to nitrate, nitrite, and ammonia by the deadline indicated in the compliance schedule at the end of this letter. This investigation of nitrate, nitrite, and ammonia will be considered by the NMED as a separate action from the subject background study because of the pressing need to establish background levels for other naturally occurring constituents.

The investigation plan shall include the sampling requirements and statistical methods to be employed for the purpose of establishing background conditions for nitrate, nitrite, and ammonia. The plan shall also provide construction details and the locations and anticipated depths of groundwater monitoring wells to be installed to determine background conditions and the nature and extent of contamination, geology, hydrology, groundwater flow direction and velocity at each site where contamination of the groundwater by nitrate, nitrite, or ammonia is known or suspected to occur. The plan shall also present details on field procedures, sampling and analysis of the groundwater and related quality control, and discuss the historical use of sites that have groundwater contamination to the extent that such use is known. The plan shall also contain a summary of the results to be reported after the investigation phase is completed, and a schedule for implementation of the work, including monitoring.

2. The sixth paragraph of Section 5.6.3 reads: "As required by comment No. 5 in NMED correspondence dated May 4, 2009 (provided in attachment 2 of this report), if 100% of the measurements in the data set are non-detects, then the UTL value was arbitrarily set at the lowest DL in the data set. This practice is not in agreement with current USEPA guidance but was determined to be non-negotiable after significant discussion with NMED. See note below."

According to Tables 5-13 through 5-16 and 5-18, some background levels were set by the Permittee at two times the Method Detection Limit (MDL) (MDL is referred to in the quote from the Report as DL).

The referenced comment (No. 5) does not require that an Upper Tolerance Limit (UTL) be set at the lowest MDL in all cases where 100% of the data are non-detect values, as the Permittee was given the opportunity to justify setting background levels to twice the MDL in such cases. Contrary to the Permittee's assertion, NMED has not rejected setting background levels to twice the MDL where it can be justified. But, as noted previously in the May 4, 2009 NOD, for some constituents all or nearly all samples (more than 100) were found to be less than the MDL. However, NMED continues to believe that it would be difficult to justify setting a background level to two times the MDL when 100% of a large sample population was found to be less than one times the MDL.

The use of data greater than the MDL, but less than the Practical Quantification Limit (PQL), is acceptable for use in a background study. The purpose of the background study is to provide an estimate of background conditions for soil and groundwater at the Facility. Data for any given constituent that are greater than the MDL but less than the PQL indicate that the analyte is present at a high level of confidence, but with respect to accuracy are considered to be estimated values only. However, NMED notes that its data in many cases closely matches facility data, suggesting that the accuracy of these estimated values are likely within an acceptable range. Statistical analyses applied to data sets for establishing background conditions help eliminate bias from exceptionally inaccurate data, provided such data do not make up a considerable majority of the data in a data set.

A PQL is typically five times greater than the MDL. Data at or exceeding the PQL are considered accurate at a high level of confidence. Setting a background level for a data set that consists of all non-detects to twice the MDL, instead of at the MDL, will still result in establishing a background level that is less than the PQL. Another disadvantage of setting a background level to twice the MDL instead of at the MDL is that lower levels of potential contamination could escape recognition. Finally, setting a background level to no more than one times the MDL is conservative with respect to carrying contaminant levels forward into risk assessments.

The NMED will consider any reasoned argument made on a case-by-case basis that values set at two times the MDL in Tables 5-13 through 5-16 and 5-18 should be approved as representative of background levels for the constituents/media involved. Any such argument should consider the above discussion.

3. The note below the sixth paragraph of Section 5.6.3, the subject Report states: "Therefore, the use of the term "UTL" is inappropriate to describe a value arbitrarily set at the DL." While the NMED agrees with this statement, it used the term "UTL" in the May 4, 2009, NOD, to remain consistent with the terminology used in the original version of the Report. Both versions of the Report list and refer to background levels as "UTLs" whether or not they are true UTLs or some other statistic chosen as representative of background levels.

Because the proposed background levels are sometimes UTLs and sometimes other statistical descriptors, the NMED prefers to denote them simply as "background levels." Background levels are the values that will be used for simple comparisons to environmental samples to screen for potential contamination. Ideally, background levels would be UTLs based on a 95% coverage and a 95% confidence level. However, UTLs can not always be calculated for some constituents, especially those with censored data sets.

Although background levels are important as a screening tool, the other statistical descriptors (e.g., mean, standard deviation, ranges) have value. For example, such descriptors may be considered when making a determination that low level contamination is present, but is not obvious, or in comparing verification samples to background conditions after a site remediation is completed.

Re-label the columns in Tables 5-12 to 5-18, as appropriate, to read "background levels" instead of UTLs.

4. The User's Guide for ProUCL was provided in Appendix D. However, it does not appear that any of the input/output files from use of ProUCL were provided in the Report. The Permittee must submit all the input/output files for review.

5. Data Validation Reports: (DVRs) – Several problematic issues were identified in the review of the DVRs. The samples, analyses, and resulting data were the subject of 25 separate nonconformance reports by the laboratory. These primarily document a number of matrix effects. Some of the nonconformance reports are redundant, some were resolved, and some were not resolved. The samples seemed to present significant difficulty for the laboratory; this both complicates the DVRs as well as impacts data quality. A general finding of NMED's review is that the matrix effects and their impact on data usability were not properly identified in the DVR and conveyed to the data users. The DVRs should discuss what steps, such as contacting the laboratory to obtain clarification of the many issues, were applied to obtain resolution of these issues.

Also, the DVRs provide an assessment section which includes the statement: "Overall, the data is suitable for the intended data usage." Typically this type of statement is reserved for a data quality assessment and not included in a DVR. If a DVR is going to include such conclusions, the intended use must be fully described (including data quality objectives (DQOs) and measurement quality objectives (MQOs)), and the data reconciled against those criteria.

Furthermore, on future DVRs, a column titled "Reason for Qualifier" should be added to all the tables currently titled "Summary of Qualified Data." This column should be used to describe why the particular data validation qualifier is being assigned (e.g., due to method blank contamination, LCS recoveries outside acceptable limits) As the DVRs are currently written, it is difficult to tell exactly why a validation qualifier was applied without looking at the raw data package Quality Control forms. Adding this "Reason for Qualifier" column will greatly enhance the clarity of the validation qualifiers for any reviewer or reader, and will significantly reduce the time spent on any technical review of DVRs.

Because of these issues, as well as the more specific data validation issues identified in Part 2 of this letter, the Permittee must submit to the NMED the Permittee's data validation plan for the HAFB Facility. NMED intends to review the plan with the goal of determining if the plan should be revised and improved for future application to assess and validate environmental data.

6. Method Blanks were positive for a number of analytes and samples. A statistical evaluation of significance in accordance with the *Evaluation of Radiochemical Data Usability* (U. S. Department of Energy, April 1997) (ERDU)) to determine flagging status was applied. This procedure is appropriate and adequate. However, it was not possible to determine if the procedure was applied properly from the data supplied as nearly all positive results were already

qualified for being below the reporting limit, and no data qualifier reason codes were provided. Provide clarification of this issue.

7. Section 6 – The Permittee must clarify for each constituent/medium what final distribution was assigned to the data set for the constituent/medium, and if the data set was censored, if Cohen's or some other method was applied to the data set. When ProUCL was used for censored data sets, indicate what specific method under ProUCL was used to calculate the statistical descriptors (such as mean and standard deviation) listed in the Report for each of these data sets.

8. A quality control (QC) review was conducted to verify the accuracy of the data validator's comments and qualifiers documented in the DVRs. For SDG #D8I060136, Method 6010B, Sample BWBG-SB03-30, the results noted on the DVR for total copper and total magnesium do not match the results given in the data package. Clarify and/or correct as needed.

9. Table 5-18 – The April 2009 NMED Soil Screening Levels (SSLs) were applied in the data tables. The SSLs were updated in December 2009. A review against the December 2009 SSLs was conducted. The only difference is the SSL for arsenic, which is now 3.9 milligrams per kilogram (mg/kg). Revise Table 5-18 accordingly.

10. Table 5-18 –The SSL for hexavalent chromium was applied for comparison purposes. However, the analytical results are representative of total chromium. Revise Table 5-18 accordingly.

11. Tables 5-12 through 5-17 – These tables contain transformed data. Revise the tables to list the data in their original form. For example, if the transformed data are the natural logs of the original data, revise and report the data in the tables as the anti-natural logs of the transformed data. Revise the titles in the tables to reflect the changes in data form.

## PART 2
## ADDITIONAL COMMENTS ON RADIOCHEMICAL CONSTITUENTS

1. In several cases, the laboratory used "truncation" to limit the effect of poor carrier or tracer recovery. A detailed explanation of this procedure describing its effects and supporting references for its use must be provided as part of the validation corrective action process. Provide an explanation that includes details on the extent to which this technique corrects for poor recoveries and the conditions or uncertainties introduced by poor recoveries which are not corrected by truncation. Explain any truncation effects.

2. Matrix spikes (MS) were not reviewed in accordance with the ERDU, which provides for the statistical evaluation of the significance of anomalous MS results. The review standard applied is not clearly stated nor does it appear to conform with the National Functional Guidelines. For instance, in aqueous samples the carbon-14 (C-14) MS was recovered below the lower acceptance limit, and the precision for the MS/MS Duplicate (MSD) pair was also out of

limits. The laboratory notes in non-conformance No. 06-0120707 that the cause is "possible matrix effects" and that no corrective action was taken in the laboratory. Application of the "Test for matrix-induced bias" found at Section 5 E 5 (page 32 of 41) of ERDU for sample SS61-MW01 as part of this review produced a result of 3.6, which under ERDU would result in consideration of the "R" flag. Considering the low recovery of the spike, the failure of the relative percent difference (RPD), and the non-detect status of the associated results, at a minimum the "UJ" data qualifier was required, and the "R" qualifier should, at a minimum, have been discussed and either applied, or a rationale for non-application presented. The DVR indicates that the issue was noted, but states that because the Laboratory Control Sample (LCS) was in control no data qualification was necessary. The normal interpretation of this situation is that the data identify a matrix effect, as the laboratory concluded. Provide additional information to include: 1) a clearly stated and developed MS/MSD review standard; 2) a reassessment of all results associated with an MS or MSD result outside of laboratory limits; and 3) a scientifically defensible rationale for the use of data associated with out of control MS, MSD or RPD.

3. There were several matrix issues noted for lead-210 (Pb-210) aqueous samples. A series of non-conformance reports in the laboratory report indicated that undissolved matter remained in sample preparations and that carrier recoveries were low. The laboratory effected corrective actions by repeating the preparation of the samples using reduced sample volume. For some samples this was effective, and for others the preparations were repeated again using even less sample. The amount of sample used is not documented. In the end, the laboratory indicates that a matrix effect is still present, even after repeat analysis, and that it may be causing a low bias. The laboratory "truncated yields at 100%" to minimize or eliminate the low bias (stated as "minimize" in one non-conformance and as "eliminate" in another non-conformance). The DVR deals with the resulting increase in minimum detectable activity (MDA), but does not address the potential for low bias or the validity and impact of the "truncation" procedure, noting only that "Sample results were corrected for carrier recovery and/or re-extracted and compared to LCS recoveries. Therefore, no qualification was required." Additionally, for some samples, the LCS was out of control as well (high). This is noted properly in the DVR (typically a high bias with non-detect sample results is a valid result), but there is no consideration of the combined impact of multiple data quality indicator failures anywhere in the DVR. Ultimately, no reasonable rationale for acceptance of the data subject to matrix-effect is presented. This situation leaves the question of whether this method is suitable for the subject samples, and whether there are serious issues of laboratory performance that have gone unanswered. Discuss these issues and provide an assessment of their impact on the results and data usability. A scientifically defensible rationale for the use of these data must be presented.

4. Numerous issues affected Pb-210 analysis in soils, resulting in several non-conformance reports with limited corrective action in the laboratory. Affected samples vary, but the following issues were noted:

a. For one sample, BWBG-SB20-40, the LCS was high, and the MS was high. The DVR properly identified this sample and reasonably determined that since bias was high and the sample was a non-detect, no qualification was necessary.

b. For 13 samples, the MS and MSD were low and the laboratory noted, "physical evidence of matrix interference."
c. For 17 samples, the laboratory noted that the carrier recovery was high which could lead to low bias, and "physical evidence of matrix interference" was present. Yields were truncated.
d. For 13 samples the LCS carrier yield was out of limits.

These conditions are noted to some extent in the matrix spike section and the reporting limits section of the DVR, but in each case it was concluded that because the LCS was within limits, no data qualification was necessary. There was no detailed identification of the issues, no consideration of their magnitude, no consideration of the effect of multiple failures on the same samples, and "Physical evidence of matrix interference" was not acknowledged in the DVR. The DVR does not engage in any meaningful evaluation or discussion, and provides no meaningful rationale for acceptance of these data nor were the data assessed in accordance with ERDU. The overall result of the review is that matrix interference was clearly and unambiguously established for this method and matrix, resulting in a low bias for many samples; the DVR failed to account for this problem. Provide a discussion of these issues.

5. Matrix issues were noted for the radium-226 (Ra-226) soil samples. For sample BWBG-SB20-20, repeated efforts at the laboratory resulted in failure of the sample preparation. The laboratory indicated that the sample would not precipitate. This method failure was not mentioned in the DVR. The laboratory reported this as a non-detect. However, no result should have been reported at all. Unless a scientifically defensible rationale for the use of this datum is provided, this result must be qualified "R" and the completeness description and the statistics for Ra-226 in the Report revised.

6. For eight additional soil samples for Ra-226, the carrier recovery was less than the acceptable lower limit, and for six of these samples, yields were truncated. The laboratory concluded that there was "physical evidence of matrix interference." For 18 samples the MS/MSD RPD was out of limits. The DVR notes carrier and RPD conditions and states that because results "were cross referenced with their LCSs" no qualification was required, and that "Sample results were corrected for carrier recovery and/or re-extracted and compared to LCS recoveries. Therefore, no qualification was required." This treatment is not adequate and does not meaningfully address the issues. Provide a more detailed examination of the Ra-226 results with specific description of their handling and specific assessment of the impacts of analytical anomalies on data usability. Provide a scientifically defensible rationale for the use of these Ra-226 results in spite of clear evidence of matrix interference.

7. Ra-228 soil samples experienced similar issues as those noted above for Ra-226 in soil. Six samples exhibited unacceptable carrier recovery; also, yields were truncated. The RPD for the MS/MSD pair was out of limits for 20 samples. The DVR makes no mention of these matters. Re-assess the Ra-228 results and discuss data usability.

8. Two matrix spikes exhibited low recovery affecting 13 samples. The DVR notes this in a very generic and cursory manner: "The MS and/or MSD percent recoveries (%Rs) for Lead-210 were outside QC limits associated with the soil samples as well as Carbon 14 MS %Rs." However, the LCS result is used to conclude that no qualification is necessary. Either the procedure for testing the significance of MS results from ERDU should be applied, or another approach proposed. The appropriate conclusion when an LCS is well-controlled and an MS fails is that there is suspect matrix interference. Passage of the LCS cannot be a rationale for acceptance of failed spike results. Revise the Report to include at a minimum a scientifically defensible rationale for data acceptance, or appropriately qualify the results.

9. Several matrix issues were noted for isotopic thorium (Th) aqueous samples. Non-conformance reports document that thorium was re-extracted using reduced sample volume due to severe matrix effects. It appears that this procedure was effective in eliminating the matrix effect. The issue is noted to some extent in the DVR under the reporting limit heading, as the ultimate effect on the data is an elevated MDA. However, this should be addressed in both the matrix and reporting sections of the report, and not primarily the reporting limit section. The DVR states that "The LCS tracer recovery for Thorium 229 was outside QC limits for all aqueous samples." An LCS was reported for Th-230, but Th-229 was not an analyte. It is assumed that Th-229 is a typographic error and that Th-230 was intended. It appears that the statement refers to the initial analysis of thorium, and not the reported final analysis. The closing statement of the reporting limits section of the DVR seems to support this, as does the laboratory report. However, this statement appears in the reporting limits section along with the summary of matrix effects and re-extractions; its significance is not explained. Overall, this mixing of matrix assessment, reporting limit and LCS is confusing, not informative, and awkward. Submit additional information on the following:

a. A discussion of matrix effects with matrix spikes.
b. A discussion of the LCS.
c. A discussion of the overall combined impacts of matrix spikes and LCS.
d. A scientifically defensible rationale for acceptance or qualification of the data when anomalies exist.

## COMPLIANCE SCHEDULE

The Permittee must respond to the comments in Part 1 of this letter by no later than **December 18, 2010,** and to the comments in Part 2 of this letter by no later than **January 18, 2011** (Table 1). The Permittee must submit the groundwater investigation plan for nitrate, nitrite, and ammonia (see general comment #1 in Part 1 of this letter) by no later than **February 15, 2011** (Table 1).

| Table 1 – Compliance Schedule | |
|---|---|
| **Submittal** | **Due Date** |
| Response to Part 1 | December 18, 2010 |
| Response to Part 2 | January 18, 2011 |
| Investigation Plan for Nitrate, Nitrite, and Ammonia | February 15, 2011 |

Contact William Moats of my staff at (505) 222-9551 should you have any questions.

Sincerely,

James P. Bearzi
Chief
Hazardous Waste Bureau

cc: J. Kieling, NMED HWB
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File: HAFB 2010 and Reading