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State of New Mexico
ENVIRONMENT DEPARTMENT
Ground Water Protection and Remediation Bureau

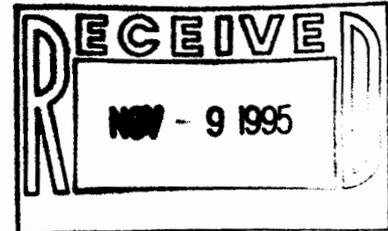
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November 7, 1995



Scott E. Streifert, Colonel, USAF
Director, Environmental Management Division
377 ABW/EM
2000 Wyoming Boulevard SE
Kirtland Air Force Base, NM 87117-5659

RE: Kirtland Air Force Base Albuquerque, New Mexico RCRA Facility Investigation (RFI) Stage 2D-1 Final Draft - December 8, 1994

Dear Col. Streifert:

The New Mexico Environment Department (NMED) Defense State Memorandum of Agreement (DSMOA) staff reviewed the report mentioned above and offer the following comments.

General Comments:

1. Omitting constituents from inclusion in risk assessment because they occur in insignificant levels (but over Human Health Risk Based (HHRB) action levels) is not a supportable rationale. Please provide further discussion and reasoning to support this approach. Furthermore, in some cases the data indicate that the last interval sampled in borings still reveal the presence of contamination greater than HHRB Action Levels. This occurrence indicates that vertical (and possibly horizontal) extent of contamination has not been determined. Finally, HHRB Action Levels must be calculated using current toxicological values for all constituents detected. If no toxicological data is available, then comparison to a compound with similar chemical characteristics is acceptable.
2. It is suggested that Kirtland Air Force Base (KAFB) provide concentration maps and cross sections of constituents detected to better illustrate their occurrence.
3. When collecting background samples it is beneficial to collect samples from the same strata and soil types found at the site. Concentrations detected in those similar strata and soil types

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should be compared to these values. KAFB may wish to compare specific site background values to the facility-wide background study to assure that the results are within the facility-wide range.

It is suggested that a minimum of 10 samples within the similar strata and soil type be used to give a 95% UTL of the mean. It appears possible, that at both sites, that too few samples were taken within the same strata or soil type, to be from a representative population. Please provide lithologic logs and comparison of sampling intervals when determining background. Finally, please provide plots of observations versus concentration to indicate distribution and show how the 95% UTL of the mean was calculated.

4. NMED typically refers to the U.S. EPA Region III Risk Based Concentration (RBC) table to assess the need to perform a baseline risk assessment for organic constituents and metals above background concentrations. After a site is adequately characterized, and either the Subpart S screening action levels are exceeded, excluding constituents shown to be naturally occurring background, or the site does not meet the seven criteria outlined in the RBC table, then a baseline risk assessment should be performed.

Specific Comments:

1. Page 3-4, section 3.1.2 Geophysical Survey. Were there any geophysical anomalies detected with the electromagnetic conductivity instruments which may reveal the shape of the drum of Mercury?
2. Page 3-5, first complete paragraph. This paragraph states that soil samples were homogenized. Was this methodology used when sampling for volatiles? If so this is an unacceptable sampling procedure. Please explain this rationale.
3. Page 3-23, 3.6 Methodology for Determining Background Concentrations. It appears soil borings used for determining background levels for naturally occurring metals and radioactive constituents are located too close to trenches and down gradient from other trenches to ensure no affect from anthropogenic sources. Additionally, see general comment number 3 above.
4. Page 3-25, Risk Assessment Overview. "Based on the analytical results summarized in Sections 4.4 and 5.4, neither site contained organic or inorganic constituents of anthropogenic origin at concentrations above HHRB action levels that warranted assessment of risk." This sentence seems unclear.

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Are there any constituents at concentrations above HHRB action levels that are not naturally occurring metals? Please explain further. See general comment number 4 above.

5. Page 4-4, RFI Field Investigation. Did KAFB consider using directional borings to sample under the trenches in an effort to determine if a release had occurred?
6. Page 4-36, Organic Compounds. A risk-based concentration level should be calculated for 1,1,1-trichloroethane. Additionally, the use of tables alone to present data, without graphical representation of detected constituents, is not conducive to determining vertical and horizontal extent of contamination. See general comment number 2 above.
7. Page 4-36, Metals. Please refer to general comment number 3 above regarding comparison to background concentrations. Additionally, reasoning for not including concentrations exceeding UTL's based on location is not clear. Please explain this rationale further. See general comment number 4 above.
8. Page 4-39, Baseline Human Health Risk Assessment. "The chemical analytes in excess of HHRB action levels were not at concentrations which warranted an assessment of risk." This conclusion must be deferred until acceptable background levels for naturally occurring metals are established, HHRB action levels are established for all organic constituents detected, and after the nature and extent of constituents is fully delineated. See general comment number 1 above.
9. Page 4-40, Data Evaluation. It seems infeasible that adequate representation of radiological concentrations within the trenches would be likely if no actual samples from the trenches were collected. Were angled boreholes directed under the trenches considered as an option in evaluating whether releases have occurred? Please discuss and describe the site characterization reasoning further. Additionally, providing a peer reviewed reference for this method of assessing risk from radiological data is recommended.
10. Page 4-46, Recommendations, "The subsurface soil samples, which should be located in areas of higher permeability (and therefore likely pathways for any contaminant migration)...." In unsaturated flow contaminant migration may selectively occur in areas of lower permeability and should not be overlooked.
11. Page 5-5 Regarding background determination. The number (too few for significant statistical consideration) of and location

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(too near and possibly within trenches) of sampling for background constituent concentrations seems questionable. Please explain. See general comment number 3 above.

12. Page 5-7, Nature and Extent of Contamination. Constituents detected above calculated background concentrations indicate contamination or inadequate background sampling.
13. Page 5-11, Data Evaluation. Please list the background concentrations used and the average radiological concentrations from the trench.

Please do not hesitate to call me at 827-2754 if you have any questions or if I can be of any assistance in this matter. I would appreciate knowing your response to these comments. If you concur, a copy of the revised workplan is adequate; if you disagree with the comments or believe an alternative approach is preferable, please let me know as soon as possible.

Sincerely,



Lee Winn
Ground Water Protection &
Remediation Bureau

cc: Chris DeWitt
Barbara Hoditschek, NMED HRMB
Ronald A. Kern, NMED HRMB
Garth Graves, NMED Dist. I
Nancy Morlock, U.S. EPA, Region VI

*Response to Comments
from
New Mexico Environment Department
dated November 7, 1995
for
Kirtland Air Force Base
RCRA Facility Investigation (RFI) Stage 2D-1
Final Draft, December 8, 1994*

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General Comments

1. *Omitting constituents from inclusion in risk assessment because they occur in insignificant levels (but over Human Health Risk Based (HHRB) action levels) is not a supportable rationale. Please provide further discussion and reasoning to support this approach. Furthermore, in some cases the data indicate that the last interval sampled in borings still reveal the presence of contamination greater than HHRB action levels. This occurrence indicates that vertical (and possibly horizontal) extent of contamination has not been determined. Finally, HHRB action levels must be calculated using current toxicological values for all constituents detected. If no toxicological data is available, then comparison to a compound with similar chemical characteristics is acceptable.*

The KAFB-SNL facility-wide background study will be used to identify appropriate background concentrations. Once representative background values have been determined, the horizontal and vertical extent of contamination will be reevaluated. Upon delineation of the horizontal and vertical extent of contamination, HHRB action levels will be established for all organic constituents detected above the UTL. The constituents to be included in a risk assessment will then be identified. The HHRB action levels presented in the RFI Report were based on the current toxicological data available at the time of the writing. Revisions to this document will incorporate revised HHRB action levels based on the most recent toxicological data available or, where appropriate, data from a compound with similar chemical characteristics.

2. *It is suggested that Kirtland Air Force Base (KAFB) provide concentration maps and cross-sections of constituents detected to better illustrate their occurrence.*

Cross-sections of constituents detected above the UTL will be provided in the revised RFI Report.

3. *When collecting background samples it is beneficial to collect samples from the same strata and soil types found at the site. Concentrations detected in those similar strata and soil types should be compared to these values. KAFB may wish to compare specific site background values to the KAFB-SNL facility-wide background study to assure that the results are within the KAFB-SNL facility-wide range.*

It is suggested that a minimum of 10 samples within the similar strata and soil type be used to give a 95% UTL of the mean. It appears possible, that at both sites, that too few samples were taken within the same strata or soil type, to be from a representative population. Please provide lithologic logs and comparison of sampling intervals when determining background. Finally, please provide plots of observations versus concentration to indicate distribution and show how the 95% UTL of the mean was calculated

It is agreed that it is beneficial to collect background samples from the same strata and soil types found at the site. However, determining background concentrations at RB-11 is problematic, as with other Kirtland AFB sites, because of the inhomogeneous nature of alluvial sediments. Data collected at nearly 500 boreholes throughout Kirtland AFB indicate that strata, defined on the basis of grain size, organic content, and mineralogy, can rarely be demonstrated as continuous over distances greater than 200 ft. This is not surprising given the episodic nature of depositional processes, both aeolian and fluvial. Background data from approximately 140 boreholes basewide indicate that these depositional processes may cause nonuniform concentrations of metals.

The suggestion that a UTL be calculated from a minimum of 10 background samples collected within similar strata is problematic. Approximately one-half of the samples collected at RB-11 are from strata that apparently do not extend beyond the site boundaries, and, therefore, background samples from similar strata are not possible. The geologic cross-sections of RB-11 presented in Appendix M demonstrate the variability and discontinuous nature of the strata at this site.

The number of background samples collected at both sites was in accordance with the approved Work Plan. The soil boring logs in Appendix C of the RFI Report contain lithologic descriptions and sampling intervals for all soil borings. Plots of observations versus concentration will be prepared using the existing 140-sample RFI database of background samples. These will be updated as soon as results of the KAFB-SNL facility-wide background investigation become available.

4. *NMED typically refers to the EPA Region 3 Risk Based Concentration (RBC) table to assess the need to perform a baseline risk assessment for organic constituents and metals above background concentrations. After a site is adequately characterized, and either the Subpart S screening action levels are exceeded, excluding constituents shown to be naturally occurring background, or the site does not meet the seven criteria outlined in the RBC table, then a baseline risk assessment should be performed.*

The EPA Region 3 RBC tables were used to assess the need to perform a baseline risk assessment because several constituents were found to be in excess of background concentrations. The KAFB-SNL facility-wide background study will be used to identify appropriate background concentrations. Once representative background values have been determined, the horizontal and vertical extent of contamination will be reevaluated. After the site has been adequately characterized, the need for a baseline risk assessment will be evaluated.

Specific Comments

1. *Page 3-4, Section 3.1.2, Geophysical Survey. Were there any geophysical anomalies detected with the electromagnetic conductivity instruments which may reveal the shape of the drum of mercury?*

Contoured results for the EM-31 in phase response shows the presence of 15 distinct anomalies indicative of buried metal objects or collections of objects throughout the survey area. Results from the EM-61 survey have clearly identified the location of more than 70 metallic objects buried within the upper 3 to 5 meters of the subsurface. The shape of a

drum of mercury cannot be discerned from the numerous anomalies identified in the survey. The complete geophysical survey report is in Appendix D of the RFI Report.

2. *Page 3-5, first complete paragraph. This paragraph states that soil samples were homogenized. Was this methodology used when sampling for volatiles? If so, this is an unacceptable sampling procedure. Please explain this rationale.*

This paragraph states that this method was used only for **surface** soil samples collected as field replicates for matrix spike/matrix spike duplicate analysis. The next paragraph explains that this methodology was not used for sample aliquots designated for volatile organic analysis.

3. *Page 3-23, Section 3.6, Methodology for Determining Background Concentrations. It appears soil borings used for determining background levels for naturally occurring metals and radioactive constituents are located too close to trenches and downgradient from other trenches to ensure no affect from anthropogenic sources. Additionally, see General Comment Number 3 above.*

The background data will be evaluated against the KAFB-SNL facility-wide background study to verify that appropriate background locations have been selected.

4. *Page 3-25, Risk Assessment Overview. "Based on the analytical results summarized in Sections 4.4 and 5.4, neither site contained organic or inorganic constituents of anthropogenic origin at concentrations above HHRB action levels that warranted assessment of risk." This sentence seems unclear. Are there any constituents at concentrations above HHRB action levels that are not naturally occurring metals? Please explain further. See General Comment Number 4 above.*

In response to this comment, the paragraph will be changed to read:

Based on the analytical results summarized in Sections 4.4 and 5.4, neither site contained organic or inorganic constituents of anthropogenic origin at concentrations above HHRB action levels. However, a few naturally occurring inorganic constituents were identified at

Kirtland AFB above HHRB action levels (e.g., beryllium and chromium). EPA/540/1-89/002, *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)*, Section 5.7.3 states that the naturally occurring inorganic constituents should be eliminated from the quantitative risk assessment.

5. *Page 4-4, RFI Field Investigation. Did KAFB consider using directional borings to sample under the trenches in an effort to determine if a release had occurred?*

Angled boreholes directed under the trenches were considered as an option in evaluating whether releases have occurred but were decided against for the following reasons:

1. The Geoprobe direct push technology was chosen as the preferred methodology for obtaining soil samples because very little investigative-derived waste is generated, which is particularly important in an area where mixed waste is possible. One limitation of the Geoprobe system is the limited capability to drive sampling tools any greater than 15 degrees from vertical. The close proximity of the trenches would not allow for adequate lateral spacing of the boreholes without penetrating adjacent trenches.
 2. As stated in the Work Plan, the intent was to collect most samples from vertically driven holes. This is not considered to be a disadvantage because contaminants are extremely unlikely to migrate straight downward. Volatile organic compounds will migrate laterally in a gaseous phase. Water-borne contaminants and less volatile liquid petroleum products will also spread laterally following the lenses of the Santa Fe Group under the forces of gravity and capillarity. Capillary forces will tend to cause lateral, as well as vertical, movement of liquids in the vadose zone. For these reasons, if contaminants are present beneath a unit, they can be sampled from vertical holes driven near the edge of the unit to a depth below the bottom of the unit.
6. *Page 4-36, Organic Compounds. A risk-based concentration level should be calculated for 1,1,1-trichlorethane. Additionally, the use of tables alone to present data, without graphical representation of detected constituents, is not conducive to determining vertical and horizontal extent of contamination. See General Comment Number 2 above.*

The EPA Region 3 RBC for 1,1,1 trichloroethane is 7,000 mg/kg for a Residential Soil Ingestion scenario; this value will be added to the revised text. Concentration maps and cross-sections of constituents detected above the UTL will be provided in the revised RFI Report.

7. *Page 4-36, Metals. Please refer to General Comment Number 3 above regarding comparison to background concentrations. Additionally, reasoning for not including concentrations exceeding UTLs based on location is not clear. Please explain this rationale further. See General Comment Number 4 above.*

The KAFB-SNL facility-wide background study will be used to identify appropriate background concentrations. Once representative background values have been determined, the horizontal and vertical extent of contamination will be reevaluated. Cross-sections of constituents detected above the UTL will be graphically presented and discussed in the text of the revised RFI Report.

8. *Page 4-39, Baseline Human Health Risk Assessment. "The chemical analytes in excess of HHRB action levels were not at concentrations which warranted an assessment of risk." This conclusion must be deferred until acceptable background levels for naturally occurring metals are established, HHRB action levels are established for all organic constituents detected, and after the nature and extent of constituents is fully delineated. See General Comment Number 1 above.*

The KAFB-SNL facility-wide background study will be used to identify appropriate background concentrations. Once representative background values have been determined, the horizontal and vertical extent of contamination will be reevaluated. Upon delineation of the contamination, HHRB action levels will be established for all organic constituents detected above the UTL and a risk assessment will be conducted.

9. *Page 4-40, Data Evaluation. It seems infeasible that adequate representation of radiological concentrations within the trenches would be likely if no actual samples from the trenches were collected. Were angled boreholes directed under the trenches considered as an option in evaluating whether releases have occurred? Please discuss and describe the site characterization reasoning further. Additionally, providing a peer-reviewed reference for this method of assessing risk from radiological data is recommended.*

The concentrations presented in this section were those of the samples collected from borings adjacent to the trenches. From the borehole samples, a trench mean was developed for each trench. The trench mean was then compared to the background sample mean. There was no intent to infer that the mean associated with a given trench is representative of the radiological concentration within the trench. The statistical analysis was intended to determine if contaminants had migrated from the trenches, not to determine if contaminants are located within the trenches.

See Specific Comment 5 for a discussion on angled boreholes.

In response to the last part of this comment, there are many peer-reviewed references outlining similar methodologies for evaluating radiological data. The most noted of these is the 1968 work of research radiochemist L. A. Currie, who published *Limits for Qualitative Detection and Quantitative Determination*, *Analytical Chemistry* 40: No.3, 586-593. In addition, Currie published other papers on this subject, for example: *Lower Limits of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements*, NUREG/CR-4007. There have been other such published works:

A Handbook of Radioactivity Measurements, National Council on Radiation Protection and Measurements (NCRP), NCRP Publications, Report No. 58, Washington, D.C. 1985.
pp. 188-195.

Handbook of Environmental Radiation, Alfred W. Klement, CRC Press. 1982.
pp. 153-187.

10. *Page 4-46, Recommendations. "The subsurface soil samples, which should be located in areas of higher permeability (and therefore likely pathways for any contaminant migration)...." In unsaturated flow contaminant migration may selectively occur in areas of lower permeability and should not be overlooked.*

It is acknowledged that vapor-phase transport and liquid-phase transport differ. For any future investigations, a sampling plan will be developed to take into account the contaminants of concern and site-specific conditions. The plan will identify proposed sample locations to best characterize the extent of contamination and provide rationale for those choices. As always and prior to initiation, the regulatory community will have the opportunity to review and comment on the plan.

11. *Page 5-5, Regarding background determination. The number (too few for significant statistical consideration) of and location (too near and possibly within trenches) of sampling for background constituent concentrations seems questionable. Please explain. See General Comment Number 3 above.*

The background boring was located outside of the fenced area and upslope of the trenches. The KAFB-SNL facility-wide background study will be used to identify appropriate background concentrations.

12. *Page 5-7, Nature and Extent of Contamination. Constituents detected above calculated background concentrations indicate contamination or inadequate background sampling.*

The waste disposed of in the trenches at RB-7 was contained in cardboard boxes. If contaminant migration had occurred, contaminants should be detected in the soil remaining in the bottom of the trenches and the soil that surrounded the waste. For this reason, soil samples were collected from the bottom of the trench and the stockpiled soil. As stated previously, the KAFB-SNL facility-wide background study will be used to identify appropriate background concentrations. Once representative background values have been determined, the significance of analytes detected will be reevaluated and the need for additional site characterization will be reassessed.

13. *Page 5-11, Data Evaluation. Please list the background concentrations used and the average radiological concentrations from the trench.*

The following text will be added to the appropriate section of the report:

For the purposes of analysis of RB-07, it was assumed that all borehole samples were associated with a common trench. Therefore, the background and radiological concentration averages are as follows:

| | <i>Gross Alpha</i> | <i>Gross Beta</i> |
|----------------------------|---------------------------|--------------------------|
| Sample average (pCi/g) | 25.84 | 29.2 |
| Background average (pCi/g) | 42.5 | 36 |