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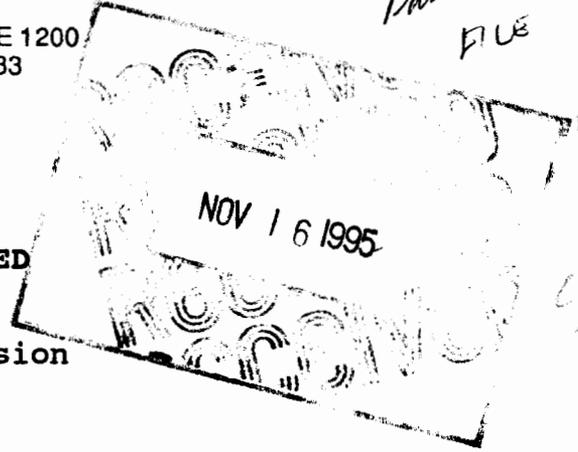
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
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DALLAS, TX 75202-2733

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CERTIFIED MAIL: RETURN RECEIPT REQUESTED

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

Dear Colonel Streifert:

The Environmental Protection Agency (EPA) has reviewed the the Kirtland Air Force Base (KAFB) Stage 2D-1 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report and has found it to be deficient.

A response to the attached deficiencies shall be submitted to EPA and the New Mexico Environment Department (NMED) within 60 days of receipt of this letter. Please note that the Hazardous and Radioactive Materials Bureau of the NMED has not submitted final comments on the Stage 2D-1 RFI Report. Additional comments may therefore be submitted to KAFB at a later date.

If you have any questions or require additional information, please contact Ms. Nancy Morlock of my staff at (214) 665-6650.

Sincerely yours,

David W. Neleigh
David W. Neleigh, Chief
New Mexico and Federal
Facilities Section

Enclosure

cc: Mr. Benito Garcia
New Mexico Environment Department

KAFB1693



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**Notice of Deficiency
Kirtland Air Force Base
Stage 2D-1 RFI Report**

General Comments

1. The report indicates background samples were collected at locations upslope from RB-7 and RB-11. However, these locations appear downslope from other potentially contaminated sites. Analytical data from the selected background locations may not indicate actual background conditions. Comparison of site-specific concentrations to these background concentrations could therefore provide false results. Kirtland Air Force Base (KAFB) should evaluate the data from the facility-wide background study being conducted by KAFB and Sandia National Laboratories (SNL) to help identify appropriate background sampling locations.

2. Though the number and location of samples collected generally followed the work plan, the data collected from the soil borings at these sites do not appear adequate to define the vertical and horizontal extent of contamination. Additional soil samples and possibly ground water samples may be required to fully characterize the nature and extent of contamination.

KAFB should utilize data from the facility-wide background study being conducted by KAFB and SNL to identify either appropriate background concentrations of constituents of interest or appropriate background sampling locations. Data quality should meet the minimum quality assurance program requirements and quality control procedures outlined in EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). If comparisons of background to monitoring data are to be made, KAFB should collect a sufficient number of background samples to ensure a sample population of normal or log-normal distribution. Once representative background values have been determined, KAFB should reevaluate the horizontal and vertical extent of contamination at RB-7 and RB-11.

3. The use of risk-based action levels as described in the RFI report is inappropriate as long as characterization is limited and incomplete. The application of action levels to limited data may imply minimal risk when sources and or contamination have not been adequately identified. Risk-based action levels should only be applied when characterization is complete.

Specific Comments: RB-7

1. Section 1.5.2, Page 1-13. The Stage 2C RFI Work Plan (Section 1.3.1, page 1-6) discussed conceptual models as part of the project objectives. The work plan specified that conceptual models required source characterization, including "location, source volume or quantity, source concentrations, time, duration, and release date." The RFI report did not discuss the issues of time, duration, and release date as specified in the work plan. KAFB should include this information.
2. Section 5.4, Page 5-7. The locations of the background soil samples appear to be downslope from a series of weapons storage bunkers. Analytical data from these background soil borings may not indicate unaffected background conditions. Before the full nature and extent of contamination can be determined, representative background levels within the area must be determined.
3. Section 5.4, Page 5-7. The RFI report states that detections of toluene, lead, and cadmium were below the human health risk-based action levels. However, the levels of lead, cadmium, and selenium in some samples were above those in the background soil sample (Table 5-2). Levels of gross alpha and beta were at or below levels detected in background samples (Table 5-2). Since the concentrations of some constituents are above background, contamination may be present. Also, it suggests the need for more reliable background samples collected from an unaffected area of KAFB. The significance of analytes detected should be reevaluated after representative background values have been established.
4. KAFB collected 12 soil samples as required by the work plan. However, no ground water was encountered in the background well, and no additional borings were drilled below 2 feet below ground surface within the area. Additional borings, both downslope and within the site, would provide more detailed characterization regarding the nature and extent of contamination. The borings should be drilled and sampled down to bedrock. If ground water is encountered, it should be collected for analysis. Samples should be analyzed for volatile organic compounds (VOCs), semivolatile compounds (SVOCs), metals, and all appropriate radionuclides.
5. Section 5.4.1, Page 5-7. The report states that "Results of gamma spectroscopy analyses revealed an absence of radiological migration of waste material." However, levels of the following radionuclides exceeded levels detected in the background soil sample: actinium 228, bismuth-212 & 214, lead-212, radium-224, and thorium-227. This apparent contradiction should be explained or corrected.

6. Section 5.5, Page 5-11. The RFI report identifies the radiological contaminants of concern as plutonium-239 and uranium-238. However, these constituents were not reported in the analytical tables in Appendix G. KAFB should explain or correct this discrepancy.
7. Section 5.6.1, Page 5-11. The RFI report does not identify which constituents were used in the statistical comparison between trench and background samples. In addition, the term D_{95} is not defined. KAFB should correct these omissions.

Specific Comments: RB-11

1. Section 4.2.3.3, Page 4-16. The RFI report states that one background sample was collected near a caretaker's trailer home and another was collected about 400 feet northeast and upslope of RB-11. Although the background sample was located upslope of RB-11, it is also located downslope from the Manzano Drying Beds and Sewage Lagoons (Site 14). According to the report, the background sampling location "was proximal to a previous, off-site release of an unknown quantity of mercury." This background location may be contaminated and therefore may not indicate unaffected background conditions. Tetrachloroethylene (PCE) was detected in one background sample at the 8-to-12-foot and 13-to-17-foot depth intervals; however, the report does not clarify which background sample contained PCE. The background sample locations should be included on a figure in the report. In addition, KAFB should reevaluate the selection of background locations.
2. Waste sources at RB-11 have not been adequately characterized. No accurate records were kept on the amount and types of wastes that were disposed of at RB-11. The work plan states that RB-11 was used to dispose of animal carcasses that received doses of radiation. Most of the radioactivity was in the form of induced activity and short half-lived elements, but several millicuries of elements with longer half-lives (zirconium, niobium, cesium, iodine, and yttrium) may be present. Small amounts of hazardous materials including acids, mercury, cyanides, and silver are also reported to have been disposed of at RB-11. The Stage 2D-1 field investigation consisted of soil borings adjacent to the perimeter and between the trenches; however, no investigation has been conducted within or directly beneath several of the trenches. In 1993, a 400-foot horizontal soil boring was drilled beneath the six southern trenches as part of an SNL technology demonstration project; however the soil boring was monitored only for gamma radiation. Additional waste characterization data are needed to

determine what action should be taken to fully characterize the nature and extent of contamination at the site.

KAFB should drill and sample soil borings within the trenches in order to characterize all sources present within and below the trenches. KAFB should drill each boring to such a depth that two consecutive samples do not indicate contamination. The entire depth of each boring should be analyzed. At a minimum, all samples should be analyzed for VOCs, SVOCs, metals and all appropriate radionuclides.

3. The vertical extent of contamination has not been adequately delineated at RB-11. Analytical results reveal contaminants above background levels at the base of several borings. KAFB should collect additional soil borings to fully characterize the extent of contamination. KAFB should drill each boring to such a depth that two consecutive samples do not indicate contamination. If a ground water perch zone is encountered, samples should be collected for analysis. Samples should be analyzed for VOCs, SVOCs, metals, and all appropriate radionuclides.

***Response to Comments
from
U.S. Environmental Protection Agency
dated November 9, 1995
for
Notice of Deficiency
Kirtland Air Force Base
Stage 2D-1 RFI Report***

General Comments

1. *The report indicates background samples were collected at locations upslope from RB-7 and RB-11. However, these locations appear downslope from other potentially contaminated sites. Analytical data from the selected background locations may not indicate actual background conditions. Comparison of site-specific concentrations to these background concentrations could therefore provide false results. Kirtland Air Force Base (KAFB) should evaluate the data from the KAFB-SNL facility-wide background study being conducted by KAFB and Sandia National Laboratories (SNL) to help identify appropriate background sampling locations.*

It is true that background samples were collected at locations downslope from other potentially contaminated sites; however, the sites were several hundred to several thousand feet from the background sample locations. Wind and overland flow via surface water runoff are the primary contaminant transport mechanisms in this geographic setting. In both cases, the contaminant source must be exposed at or near the ground surface to be transported. If, in fact, contaminants are transported by these mechanisms, they will be deposited at or near the ground surface, thus affecting only the surface interval of the background soil sample. For the background sample to be impacted at depth, the contaminants must be transported by either saturated or unsaturated flow. Lateral migration in either case will be limited and surely not exceed the large distances between background sample locations and potentially contaminated sites for these particular RFI sites. (For these reasons, the background soil samples collected at RB-7 and RB-11 are not thought to be influenced by other contaminated sites.) The background data from these two sites will be evaluated against the KAFB-SNL facility-wide background study to verify that appropriate background locations have been selected.

2. *Though the number and location of samples collected generally followed the Work Plan, the data collected from the soil borings at these sites do not appear adequate to define the vertical and horizontal extent of contamination. Additional soil samples and possibly groundwater samples may be required to fully characterize the nature and extent of contamination.*

KAFB should utilize data from the KAFB-SNL facility-wide background study being conducted by KAFB and SNL to identify either appropriate background concentrations of constituents of interest or appropriate background sampling locations. Data quality should meet the minimum quality assurance program requirements and quality control procedures outlined in the EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). If comparisons of background to monitoring data are to be made, KAFB should collect a sufficient number of background samples to ensure a sample population of normal or log-normal distribution. Once representative background values have been determined, KAFB should reevaluate the horizontal and vertical extent of contamination at RB-7 and RB-11.

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 at RB-7 and RB-11 will be reevaluated.

Quality assurance program requirements and quality control procedures outlined in the EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) are employed in field investigations and laboratory protocol.

3. *The use of risk-based action levels as described in the RFI Report is inappropriate as long as characterization is limited and incomplete. The application of action levels to limited data may imply minimal risk when sources and or contamination have not been adequately identified. Risk-based action levels should only be applied when characterization is complete.*

The need exists for a benchmark to define contamination that may cause a significant increased risk to human health or the environment even when characterization may be limited or incomplete. Since human health risk-based action levels are a conservative indicator of increase due to contamination, the application of action levels to even limited data serves as a good comparison tool until characterization is complete.

Specific Comments: RB-7

1. *Section 1.5.2, Page 1-13. The Stage 2C RFI Work Plan (Section 1.3.1, page 1-6) discussed conceptual models as part of the project objectives. The Work Plan specified that conceptual models required source characterization, including "location, source volume or quantity, source concentrations, time, duration, and release date." The RFI Report did not discuss the issues of time, duration, and release date as specified in the Work Plan. KAFB should include this information.*

The conceptual model will be discussed in the revised text. The records search and personal interviews have identified the waste source, volume, time, and duration. The concentrations of the waste are unknown and a release date can be bounded by the dates of waste burial and subsequent removal.

2. *Section 5.4, Page 5-7. The locations of the background soil samples appear to be downslope from a series of weapons storage bunkers. Analytical data from these background soil borings may not indicate unaffected background conditions. Before the full nature and extent of contamination can be determined, representative background levels within the area must be determined.*

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 at RB-7 will be reevaluated.

3. *Section 5.4, Page 5-7. The RFI Report states that detections of toluene, lead, and cadmium were below the human health risk-based action levels. However, the levels of lead, cadmium, and selenium in some samples were above those in the background soil sample (Table 5-2). Levels of gross alpha and beta were at or below levels detected in background samples (Table 5-2). Since the concentrations of some constituents are above background, contamination may be present. Also, it suggests the need for more reliable background samples collected from an unaffected area of KAFB. The significance of analytes detected should be reevaluated after representative background values have been established.*

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.

4. *KAFB collected 12 soil samples as required by the Work Plan. However, no groundwater was encountered in the background well, and no additional borings were drilled below 2 ft below ground surface within the area. Additional borings, both downslope and within the site, would provide more detailed characterization regarding the nature and extent of contamination. The borings should be drilled and sampled down to bedrock. If groundwater is encountered, it should be collected for analysis. Samples should be analyzed for volatile organic compounds (VOCs), semivolatile compounds (SVOCs), metals, and all appropriate radionuclides.*

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.

5. *Section 5.4.1, Page 5-7. The report states that "Results of gamma spectroscopy analyses revealed an absence of radiological migration of waste material." However, levels of the following radionuclides exceeded levels detected in the background soil sample: actinium-228, bismuth-212 and -214, lead-212, radium-224, and thorium-227. This apparent contradiction should be explained or corrected.*

Actinium-228, bismuth-212, lead-212, and radium-224 are part of the naturally occurring thorium-232 decay chain. In addition, the other radionuclides can also be attributed to naturally occurring decay chains: bismuth-214 to uranium-238 and thorium-227 to uranium-235. Since this site was formerly used as a disposal area for low-level waste (e.g., personnel protective equipment, swipes, paper, etc.) from weapons refitting, the radionuclides of concern are plutonium-239 and uranium-238. Weapons-grade plutonium-239 has impurities associated with it that produce americium-241, which is easily identifiable using gamma-ray spectroscopy by its 59 keV peak. Unlike plutonium-239, uranium-238 does not have a clear-cut identifier; therefore, a comparison was performed of population means for gross alpha and gross beta measurements. Since the analysis indicated the absence of contamination, it can be concluded that all waste was uncontaminated or all contamination was eliminated during the waste removal effort.

6. *Section 5.5, Page 5-11. The RFI Report identifies the radiological contaminants of concern as plutonium-239 and uranium-238. However, these constituents were not reported in the analytical tables in Appendix G. KAFB should explain or correct this discrepancy.*

The primary radiation emission from plutonium-239 and uranium-238 is alpha radiation with secondary emissions of beta radiation. The emissions from these nuclides are included in the gross alpha and gross beta measurements; therefore, these isotopes are not named specifically in Appendix G. These measurements were valid since this analysis was used as a screening tool in accordance with EPA/540/1-89/002, *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)*. If the screening analysis had indicated that contamination was present, then alpha spectroscopy, which would be isotope-specific, would be the correct analytical method to determine isotope speciation.

7. *Section 5.6.1, Page 5-11. The RFI Report does not identify which constituents were used in the statistical comparison between trench and background samples. In addition, the term D is not defined. KAFB should correct these omissions.*

The following text will be added to the appropriate Section 5.6.1 of the report.

Gross alpha and gross beta measurements were used in the statistical comparison between trench and background samples. These measurements were valid since this analysis was used as a screening tool in accordance with EPA/540/1-89/002, *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)*, to determine if a risk assessment had to be performed. D_0 is a specified number to be used in the comparison of the population means. For our analysis, D_0 is equal to zero.

Specific Comments: RB-11

1. *Section 4.2.3.3, Page 4-16. The RFI Report states that one background sample was collected near a caretaker's trailer home and another was collected about 400 ft northeast and upslope of RB-11. Although the background sample was located upslope of RB-11, it is also located downslope from the Manzano Drying Beds and Sewage Lagoons (Site 14). According to the report, the background sampling location "was proximal to a previous, offsite release of an unknown quantity of mercury." This background location may be contaminated and therefore may not indicate unaffected background conditions. Tetrachloroethylene (PCE) was detected in one background sample at the 8- to 12-ft and 13- to 17-ft depth internals; however, the report does not clarify which background sample contained PCE. The background sample locations should be included on a figure in the report. In addition, KAFB should reevaluate the selection of background locations.*

See response to General Comment 1. The analytical results revealed no mercury in either of the background soil borings. The revised report will indicate that tetrachloroethylene was detected in background location RB-11-BG01. This boring is located east of RB-11 and downslope of the mercury spill site. The background sample locations will be included on a figure in the revised report.

- Waste sources at RB-11 have not been adequately characterized. No accurate records were kept on the amount and types of waste that were disposed of at RB-11. The Work Plan states that RB-11 was used to dispose of animal carcasses that received doses of radiation. Most of the radioactivity was in the form of induced activity and short half-lived elements, but several millicuries of elements with longer half-lives (zirconium, niobium, cesium, iodine, and yttrium) may be present. Small amounts of hazardous materials including acids, mercury, cyanides, and silver are also reported to have been disposed of at RB-11. The Stage 2D-1 field investigation consisted of soil borings adjacent to the perimeter and between the trenches; however, no investigation has been conducted within or directly beneath several of the trenches. In 1993, a 400-ft horizontal soil boring was drilled beneath the six southern trenches as part of an SNL technology demonstration project; however, the soil boring was monitored only for gamma radiation. Additional waste characterization data are needed to determine what action should be taken to fully characterize the nature and extent of contamination at the site.*

KAFB should drill and sample soil borings within the trenches in order to characterize all sources present within and below the trenches. KAFB should drill each boring to such a depth that two consecutive samples do not indicate contamination. The entire depth of each boring should be analyzed. At a minimum, all samples should be analyzed for VOCs, SVOCs, metals, and all appropriate radionuclides.

An accurate, but incomplete, record of waste disposed of at RB-11 is available from historical records. This information was used in planning the RFI of this site.

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 at RB-11 will be reevaluated. Should additional characterization for contaminant extent be required, the need for additional source characterization will be evaluated. Options will be explored for characterization of waste within the trenches and the extent of contaminants directly beneath the trenches.

3. *The vertical extent of contamination has not been adequately delineated at RB-11. Analytical results reveal contaminants above background levels at the base of several borings. KAFB should collect additional soil borings to fully characterize the extent of contamination. KAFB should drill each boring to such a depth that two consecutive samples do not indicate contamination. If a groundwater perch zone is encountered, samples should be collected for analysis. Samples should be analyzed for VOCs, SVOCs, metals, and all appropriate radionuclides.*

Field-screening did not indicate the presence of contaminants in the soil at the base of any of the borings. Therefore, sampling did not proceed below the target depth of 10 ft below the base of the trenches. The RB-11 data will be reevaluated when the KAFB-SNL facility-wide background study is completed. The need for additional soil sampling and analysis to fully characterize the extent of contamination will be determined at that time. Groundwater was not encountered in any of the borings at RB-11. Should groundwater be encountered in any additional borings, samples will be collected and analyzed. Samples will be analyzed for VOCs, SVOCs, metals, and radionuclides as specified in the Work Plan. Analysis for specific radionuclides will also be conducted as recommended in the RFI Report.