



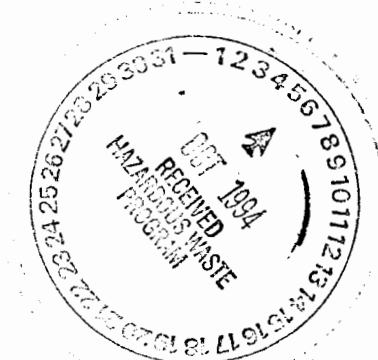
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 6
 1445 ROSS AVENUE, SUITE 1200
 DALLAS, TX 75202-2733

Handwritten: Honker, Steve P, file ✓

SEP 22 1994

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

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



Dear Major Streifert:

The Environmental Protection Agency (EPA) has completed a review of your draft RCRA Facility Investigation (RFI) Stage 2A Technical Report and found it to be deficient. The attached deficiencies were discussed with you and your staff at a September 8, 1994 meeting and shall be addressed in an NOD response letter to be submitted to the EPA within two months of receipt of this letter.

The EPA has also determined that a separate background study, independent of the Stage 2A RFI, is required. Kirtland shall submit a work plan for the background study within two months of receipt of this letter.

Please contact Nancy R. Morlock of my staff at (214) 665-6650 if you have any questions or require additional information.

Sincerely yours,

Handwritten signature of William K. Honker

William K. Honker, P.E., Chief
 RCRA Permits Branch (6H-P)

Enclosure

cc: Mr. Benito Garcia, Chief
 Hazardous and Radioactive Materials Bureau
 New Mexico Environment Department

Mr. Christopher DeWitt, Acting Chief
 Restoration Branch
 Environmental Management Division
 Kirtland Air Force Base

KAFB1501



**Notice of Deficiency
Stage 2A/Appendix I Draft RFI Report
Kirtland Air Force Base
NM9570024423**

Comments have been divided into two sections: General and Site-Specific. *General Comments* include those which pertain to the majority of the sites investigated during the Stage 2A/Appendix I RFI. Specific site examples have been given in parentheses where appropriate. *Site-Specific Comments* relate to individual sites and include comments submitted by the New Mexico Environment Department (NMED). Site-Specific Comments have not been included for either the Sewage Lagoons or the Golf Course Pond since these sites are currently being closed by the NMED.

Kirtland shall explain and justify the following deficiencies, comments and discrepancies, in their NOD response which is due within two months of receipt of this letter. The EPA will review Kirtland's NOD response to determine which items have been adequately justified and which items must be included in a new Stage 2A Work Plan. If appropriate, the requirement for a new Stage 2A Work Plan will be stipulated in the EPA's letter issued at the conclusion of the NOD response review.

GENERAL COMMENTS

Borehole Sampling

1. In the Work Plan (WP)/Sampling and Analysis Plan (SAP), borehole sampling analysis was scheduled at specific, predetermined depth intervals, and at additional intervals based on odor, discoloration, or organic vapor analyzer (OVA) instrument readings. The Report indicates that, in some cases, fewer samples were obtained than had originally been scheduled (eg. Site 3).
2. Some borehole sampling locations were changed or deleted, resulting in the collection of fewer samples than scheduled (eg. Site 4). The Report did not explain why sampling locations were changed.
3. It appears that no attempt was made to collect samples at intervals where elevated OVA or explosimeter readings were recorded.
4. Additional samples were collected at some sites without explanation (eg. Sites 1 and 11).
5. The Report did not explain how the field or sample identification numbers relate to the borehole or monitoring well numbers presented in Volume I.

Borehole Logging

1. The borehole logs do not provide OVA or explosimeter readings.
2. Limited sampling information is indicated on the logs.
3. Samples were obtained at infrequent intervals which exceeded the 5-foot interval specified in the WP/SAP.
4. No geologic features were included in the lithologic descriptions.
5. Soil descriptions were based on a nonstandard combination of the Wentworth and Unified Soil Classification Systems rather than one classification system.

Soil-Gas Surveys

1. Soil-gas surveys were not performed at Sites 14 and 15, as was proposed in the WP/SAP.
2. The analytical equipment was not calibrated using gas phase standards in accordance with the WP/SAP. Instead, an unusual and nonstandard methodology, based upon headspace readings from aqueous samples, was used as a calibration method. The modification of the approved methodology was not explained. For soil-gas survey work, the gas chromatograph should be calibrated with gas-phase standards, as supplied to laboratories for routine calibrations for gas-phase analysis. Reporting soil-gas survey results in terms of headspace concentration relative to aqueous or dissolved phase concentration is inappropriate and could significantly underestimate the actual gas phase. The only apparent use for the soil-gas results obtained using this nonstandard calibration procedure is to indicate the possible presence of soil-gas constituents. Based on the various discussions in the Report, high soil-gas concentrations are apparently present at several sites.

Groundwater Monitoring Well Installations

1. The WP/SAP indicated that groundwater monitoring wells would be built with the top of 25-foot stainless steel screen placed approximately 5 feet above the static groundwater level. Yet several of the groundwater monitoring wells were screened below the lowest seasonal groundwater level and, in some cases, included screen lengths of up to 45 feet (eg. Site 3). This means that during the seasonal-high groundwater levels almost all of the groundwater monitoring wells will be screened significantly below the top of the groundwater table. The seasonal groundwater surface fluctuates approximately 20 feet, according to Figure 2.3.2.4.3 on page 2.29 of the Report.

2. Many monitoring wells were built with filter packs that exceeded the 2-foot clearance recommended in the WP/SAP (eg. Sites 1, 2, 3, 4, 5, 6, 9, 10, and 19). Many of these filter packs totaled more than 50 feet in length.
3. The drilling description indicated that OVA instruments were used to monitor possible contamination encountered during drilling. It also indicated that samples would be collected at predetermined depth intervals and at additional intervals based on OVA readings. However, reviews of the individual site descriptions, boring logs, and other records do not indicate that OVA readings were recorded or that additional samples were collected.
4. Page 3.8 of the Report indicated that explosimeter readings reached levels that were considered excessive for safe working conditions and that the drilling operations were temporarily suspended at Sites 1, 2, 3, 4, 10, 11, and 15. The Report did not provide the elevated meter readings. This information is required for characterizing waste source and contaminated environmental media. Such information should have been recorded on field boring logs as a routine part of the drilling operation, by an environmental field crew working under the current standard of care.
5. Groundwater monitoring wells were installed using bentonite additives in the drilling fluids to maintain borehole stability. Removal of bentonite from less transmissive zones during the development process would have likely been difficult. As a result, the monitoring wells may actually be monitoring only the most transmissive portion of the saturated interval in which they were installed. As a consequence, water quality results from these wells may not be representative of the entire formation.
6. Page 3.8 of the Report stated that groundwater levels were measured to define seasonal variations in the groundwater levels. However, there is no information regarding the establishment or definition of the seasonal variations included in the Report.
7. Page 3.10 of the Report stated that, before groundwater monitoring wells were purged for sampling purposes, headspace in the monitoring well was monitored with an OVA to determine if organic vapors were present. This data, which was not recorded, would provide useful information on (1) possible vapor or gas-phase contamination above the groundwater table, and (2) possible off-gassing from any dissolved constituents within the groundwater.

Surface Geophysical Surveys

Page 134 of the SAP indicates that surface geophysical surveys would be conducted at eight sites. The Report indicates that geophysical surveys were conducted at only four sites.

Analytical Procedures

Only limited portions of the analytical results were discussed in the Report. In most cases the Report only presented the maximum concentrations detected. For groundwater samples, results were provided only for dissolved inorganic constituents detected in field filtered samples. Analytical results based strictly on filtered samples could be significantly biased and fail to indicate actual conditions. EPA Region 6 policy prohibits field filtering of environmental samples.

Data Validation

1. Significant blank contamination is present in the laboratory and field blanks. The majority of the blank contaminants reported are not considered common laboratory contaminants. Section 1.9.3 of the SAP states that the impact of blank contamination on data results would be assessed. However, the Report never discusses the actual impact of the contamination on the validity and usability of the data.
2. The Report fails to adequately discuss the surrogate recoveries and their impact on data validation. For example, sample KAFB011707 had surrogate recoveries for the dioxin and furan analysis that were below the reported quality control (QC) limits. Section 4.2.1 of the Report does not discuss the impact of these low recoveries on the sample results. The Report should discuss (1) all data that are affected by poor QC results, and (2) their usability.

Environmental Setting

1. The description of groundwater hydrology is limited and may have significantly affected (1) the adequacy of the RFI characterization, and (2) the description of contaminant migration, exposure pathways, and potential receptors.
2. The Report includes seasonal water level data for only one well, KAFB Production Well 5. Based upon the observations recorded in this well, there was a seasonal variation of approximately 20 feet and an observed decrease in overall water levels from 1986 through 1993. It is not clear if other wells in the area are experiencing similar trends and, if so, whether this trend is the result of rainfall, season, or seasonally-related pumping effects. In general, production wells are not suitable for measuring groundwater levels.

3. Only one regional groundwater table map is provided for the KAFB area. This regional map is based on September 1992 conditions. A comparison of this map with the previously referenced Well 5 data makes it apparent that this regional groundwater table map was based on the seasonal low groundwater table condition.
4. For RFI purposes, a seasonal high groundwater condition should also be mapped to determine whether there are flow direction changes and/or gradient changes associated with the change in seasons. In addition, the regional groundwater table map shows inferred contours in certain areas, indicating that a basin or trough has developed across Kirtland. However, no explanation for this inferred feature is given in the Report.
5. The influence of the Kirtland production wells and municipal pumping (northeast of the site) on the groundwater beneath Kirtland is not clearly defined.
6. The regional groundwater table map shows numerous faults within the KAFB boundary. However, except for the Tijeras fault in the southeast corner of Kirtland, little information is provided concerning the effects of these faults on the groundwater table. Further, based on a review of site-specific information, the regional groundwater map may be oversimplified and may indicate groundwater flow directions that do not actually occur at individual sites. The discrepancies at individual sites may be a result of local or site-specific recharge influence and/or geologic features.
7. Page 2.21 indicates that perched groundwater was encountered during the drilling of some wells. No further reference could be located in the site-specific descriptions or on the boring logs.

Background Concentrations

1. The Report indicates that 18 background soil samples were collected at locations upslope and updip from seven of the 18 investigated sites. Sixteen of these samples were collected at depths of 3 to 5 feet, and the other two samples were collected at depths of about 25 feet. Eight background groundwater samples were collected from wells upgradient of four of the 18 sites that were investigated.

Although the background soil samples may be upslope from specific sites, they may be downslope of other site(s) (background sites 4, 5, and 18). These background soil samples were also possibly obtained from a variety of different soil classifications and horizons.

2. The background groundwater samples may be upgradient from specific sites; however, they may be downgradient of other site(s) (background sites 1, 2, 3, and 10). Data from these background sampling locations may not represent actual background conditions.

The use of these background concentrations, when compared to site-specific concentrations, could generate false-negative results. Conclusions based on questionable background levels being exceeded should not be used for input into a CMS.

3. Due to the size and complexity of this facility, a separate background study, independent of the Stage 2A RFI, is required. Kirtland shall submit a separate work plan for the background study within two months of receipt of this letter.

Risk-Based Action Levels

The use of proposed risk-based action levels, as described in the Report, is inappropriate while characterization is still limited and incomplete. The application of action levels to limited data may imply minimal risk when significant sources and/or contamination have yet to be identified. Therefore, risk-based action levels should be applied only when the characterization at each site has been completed. Furthermore, the human health risk-based action levels should be based on the most current toxicological data rather than solely on the proposed Subpart S levels.

Potential Contaminant Pathways and Receptors

The identification of potential contaminant pathways and receptors, as described in the Report, is inappropriate while characterization is still limited and incomplete. The identification of potential contaminated pathways and receptors from limited data may imply minimal risk when significant sources and/or contaminant pathways have yet to be identified. Potential contaminant pathways and receptors should not be identified until after the characterization at each site has been completed.

Geologic Characterization

1. Because of the limited amount of subsurface exploration that was performed, and/or the poor to nonexistent field records that are available from the field exploration activities, geologic characterization at each of the 18 sites is poorly defined. Typically, the boring logs for each site fail to provide the following information:
 - Elevations
 - Field screening results

- Method of sample collection
 - Frequency of sample collection
 - Whether drill cuttings or samples were described
 - When perched groundwater is encountered
 - When saturated conditions are encountered
 - Geologic features (such as the presence of a clay layer within a sand or whether the sand has a clayey matrix)
 - Drill action
2. The geophysical borehole logs conducted as part of the exploration activities are of poor quality. In many cases, interpretation of the geophysical log and the corresponding boring log (needed for calibration) is impossible.
 3. Any general orientation of subsurface conditions (such as cross sections and plan views) that might influence contaminant movement has not been interpreted and provided.

Hydrogeologic Characterization

1. In the unsaturated zone, the presence of perched groundwater, although noted on page 2.21 of the Report, is not reported at the individual sites at which it was encountered.
2. With respect to the saturated zone, the individual site-specific flow directions, based on groundwater surface contouring, have been developed in a manner that is inconsistent with conventional technical practice (at sites 1, 3, and 6). Based on the data in the Report, other interpretations are possible.
3. The effects of groundwater mounding or recharge have not been discussed, although a review of the individual site-specific topographies indicates surface depressions and/or water bodies that would serve as recharge locations (at sites 1, 3, 5, 6, 9, 10, 13, 14, 17, 18, and 19). A review of the groundwater level data indicates mounding or local recharge at sites 6 and 10.
4. The geologic depositional environment affecting groundwater flow and preferential pathways for contaminant migration is not discussed. The Report also fails to mention less transmissive zones, such as silt and clays, that could function as barriers to downward migration and cause perching and lateral contaminant migration.
5. With the exception of the Tijeras Fault, there is little discussion of the impact of faulting on site-specific hydrogeology. The numerous faults within the Kirtland boundary could become barriers to flow or preferential conduits for contaminant migration. In addition, because of the graben-type nature of the faulting pattern, the presence of faulting could also result in local reversal of groundwater flow patterns.

6. Monitoring well locations and vertical screen placements are inadequate to fully define site-specific hydrogeologic conditions. Based on a limited characterization of the regional environmental setting, monitoring wells may not have been located appropriately to define both upgradient and downgradient conditions, or screened across the top of the seasonal high and low groundwater tables. Groundwater-level data could be misleading, and additional unidentified flow paths may be present.
7. The excessive filter packs placed above the top of the well screens (Sites 1, 2, 3, 4, 5, 6, 9, and 10) could provide a preferential contaminant pathway to the groundwater table and could cause dilution of groundwater samples.
8. Most of the information regarding monitoring well spacing, screen placement, and groundwater flow direction was apparently based on a previously assumed regional flow pattern that has not been fully characterized. Apparently, little adjustment was made in the field as new information became available.
9. Slug test data were not included in the Report. Only the final conclusions obtained from the slug test data were provided. As a consequence, the EPA was unable to evaluate the slug test data for accuracy or applicability.

Waste Source Characterization

1. There is very little waste source characterization in the Report. The field soils investigation procedures generally consisted of (1) limited surficial soil sampling, typically to 3 feet below ground surface (bgs), at Sites 3, 8, 14, 17, 18, and 20, (2) limited shallow subsurface sampling, typically 25 to 100 feet bgs, at Sites 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 15, 19, 20, and 21, and (3) soil sampling outside of the actual boundaries of Sites 2, 3, 10, 11, and 19. At some of these sites, two or more of these soil investigation procedures were combined. Based on these procedures, no investigation has been performed within, or directly beneath, the SWMUs at about half of the sites. Nevertheless, contaminants have been detected at several of these sites that did not have investigations within, or directly beneath, the SWMU (eg. Sites 2 and 3).
2. Surface geophysical surveys at Sites 1, 2, 3, and 13 indicated significant conductivity and/or magnetic anomalies. Surface soil-gas surveys at Sites 1, 2, and 3 (at about 3 feet bgs) detected chlorinated solvents and petroleum hydrocarbons. However, as previously noted, the soil-gas survey calibrations were performed by using a nonstandard methodology. The actual soil-gas source concentrations are therefore unknown.

3. Drilling activities were suspended at Sites 1, 2, 3, 4, 10, 11, and 15 because the explosimeter readings of vapor or gas-phase material exiting the borehole exceeded safe levels for drilling operations.
4. At sites 2, 3, 10, and 11, drilling was performed outside of the site boundaries, neither within nor beneath the SWMU.
5. At some locations (eg. Site 10), no sampling was conducted at the depth of the probable source. Sampling was conducted to the 100-foot depth; however, the documented depth of the explosives testing exceeded 300 feet bgs.
6. The Stage 2 waste source characterization results were not completely integrated into this latest Stage 2A Report. Data obtained somewhat contemporaneously should be combined to provide overall conclusions in the Report.
7. Based on the information in the Report and the previous Stage 2 report, there are waste sources at sites 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 15, 19, and 20. Several waste sources have been identified by investigative work performed only around the perimeters of some sites. In this case, higher concentrations would apparently be encountered if characterization was conducted within, or directly beneath, these sites.

Contaminated Environmental Media

1. Based on the explosimeter results during drilling, there is obviously vapor-phase or soil-gas contamination within and around Sites 1, 2, 3, 4, 10, 11, and 15. Soil-gas surveys at sites 1, 2, and 3 have indicated volatile organic compounds at these sites. However, because of the methodology used for the soil-gas analysis, it is difficult to identify the level of vapor-phase or soil-gas contamination. Also, other sites that indicate SOC and petroleum hydrocarbon contamination could contain soil-gas contamination.
2. Groundwater contamination has been indicated at Sites 1, 2, 3, 5, 6, and 9. No groundwater monitoring wells were installed at sites 8, 11, 13, 14, 15, 17, 18, 20, and 21. Many of the sites with monitoring wells do not have enough wells to fully characterize contaminants in the groundwater. Also, these monitoring wells have nonstandard excessive screen lengths, which are screened below the seasonal low water table (at site 3) and below the seasonal high water table (at sites 1, 2, 3, 4, 5, 6, 9, and 10). Because of the excessive screen lengths that are screened below the seasonal fluctuating groundwater tables, the well installations may not provide representative results or even detect contaminants. For example, at site 3, three of the five monitoring wells are screened below the seasonal low groundwater table, and the other two wells are screened across

the seasonal low groundwater table. At the seasonal high groundwater table, the latter two monitoring wells would be about 20 feet below the groundwater table surface. The other three monitoring wells would be even more than 20 feet below the seasonal high groundwater table.

SITE-SPECIFIC COMMENTS

Site 1, Landfill 1

1. Section 4.2.1.5.4, Page 4.44, Paragraph 2
The text states that "TOX was detected at concentrations of..." Halogenated hydrocarbons in monitor well KAFB0107 have shown an order of magnitude increase in each of the last two sampling rounds, yet this increase is not discussed in the "conclusions and recommendations" section of the Report, nor are the chlorinated compounds identified. TOX analyses shall be discontinued in favor of more specific analyses, including volatile and semivolatile organic analyses.
2. Table 4.2.1.1, Page 4.26
Field sample ID #KAFB011301-1, KAFB011403-1, and KAFB011703-1 have an inordinate number of inorganic constituents above the upper threshold limit (UTL). Several samples contained beryllium above the UTL. Please explain the significance of these numbers.
3. Section 4.2.1.4, Page 4.23, Paragraph 1
Kirtland states that "The local slope of the water table is to the northeast, toward Kirtland AFB Production Well No. 2..." Because of the proximity of KAFB Production Well #2, annual monitoring of the wells downgradient of Landfill 1, as well as KAFB Production Well #2, is required.

Site 2, Landfill 2

1. Section 4.2.2.1, Page 4.48, Paragraph 1
Kirtland states that "The landfill contains general refuse..." Please indicate the source(s) of this information.
2. Section 4.2.2.2, Page 4.50, Paragraph 6
Kirtland describes the results of a previous soils investigation but does not locate previous sampling sites with respect to the current soil sampling sites. All information must be presented in the Report.
3. Section 4.2.2.2, Page 4.51
The reported chromium value, which exceeds both the UTL and the MCL, indicates contamination, yet there is no discussion of the contamination, source, etc. Kirtland should expand the discussion of this section of the Report.

Site 3, Landfills 4, 5, and 6

Section 4.2.3.1, Page 4.73, Paragraph 1

"Site 3 is located on the north-central part of Kirtland AFB." Kirtland should provide a map showing the location of Site 3 with respect to Landfills 4, 5, and 6.

Site 4, Fire Training Area

1. Section 4.2.4.2, Page 4.115, Paragraph 1
Kirtland states that "All 19 TOX values are within the range of background values." Please explain why there would be any background organic halogens.
2. Section 4.2.4.7, Page 4.115, Paragraph 4
"Data from the ground-water analyses suggest no further monitoring at this Site." Discontinuation of groundwater monitoring at the Fire Training Area will depend on a satisfactory demonstration that the complete extent of contamination has been defined.

Site 10, McCormick Ranch

Kirtland should describe more completely the nature of the activities at this site, including the amounts of explosives used and the locations of major tests.

CONCLUSION

In the Report, Sites 1, 2, 3, 4, 8, 9, 10, 11, 14, and 19 have been recommended for additional investigation. Sites 5, 6, 13, 15, 17, 18, 20, and 21 have been recommended for no further action. The EPA has determined that the characterizations of the environmental setting, waste source, and environmental media at all 18 sites are (1) limited and poorly-defined, and (2) should be completed. In particular, incomplete characterizations at Sites 5, 6, 13, 15, 17, 18, 20, and 21 do not support recommendations of no further action. The EPA has concluded that additional investigation is required at 16 of the 18 sites. Sites 5 and 6 are being addressed under RCRA closure by the New Mexico Environment Department and are therefore excluded from additional investigation under the RFI.

Additional investigation at the 16 sites should provide the site-specific characterizations needed to support a CMS or a determination that no further action is required.

Each site should be assessed, and an investigation characterization strategy, incorporating all prior results, should be developed. This strategy should meet the characterization requirements of the RFI so that recommendations for a CMS or no further action can be stated and supported.

This strategy should meet the characterization requirements of the RFI so that recommendations for a CMS or no further action can be stated and supported.

A Work Plan outlining each site-specific strategy should be prepared and submitted to the EPA within two months of receipt of this letter. The deficiencies in investigation and environmental setting, wastes and sources, and contaminated media characterization, as discussed throughout this document and at the September 8, 1994 meeting, should be considered.