Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

file

JUN 4 1993

Guanita Reiter, Acting Chief
RCRA Permits Branch
Hazardous Waste Management Division
U. S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

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Dear Ms. Reiter:

Enclosed is the response to the Notice of Deficiency (NOD) regarding the Resource Conservation and Recovery Act Facility Investigation (RFI) Work Plan for Operable Unit (OU) 1148 at Los Alamos National Laboratory. In addition to providing the specific responses to the NOD that are contained in the enclosure, the Los Alamos Area Office (LAAO) and the University of California (UC) plan to evaluate the feasibility of proposing all or part of this OU as a Corrective Action Management Unit (CAMU). LAAO and UC plan to complete this evaluation within 90 days, and we offer to brief you and your staff on the status of the evaluation within approximately 45 days. We will discuss our plan with your staff at our scheduled monthly meeting on June 24, 1993.

Our decision to evaluate the feasibility of proposing this OU as a CAMU is based on several considerations. First and most importantly, the characteristics of this OU and our most likely remediation strategy for it closely align with the requirements in the CAMU rule. Application of the CAMU approach may substantially reduce remediation costs while providing for satisfactory containment of contaminants. Second, the CAMU rule was issued only recently and since there is no experience with it, it was mutually suggested at a meeting on May 13, 1993, with your staff that a draft proposal be investigated by LAAO and UC and presented to your office for consideration. Third, field work for this RFI is not anticipated until spring or summer 1994, so there is sufficient time to conduct the evaluation without affecting RFI progress. Fourth, consideration of the applicability of the CAMU approach coincides with our effort to expand and consolidate our public involvement program, for which a task force has been appointed. Finally, the Work Plan was submitted in May 1992, prior to the issuance of the CAMU rule, and this represents the first opportunity to evaluate its applicability to this OU.

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If this evaluation demonstrates the feasibility of the CAMU approach for this OU, it will be our intention to propose a plan to you for conducting the analysis necessary to prepare a CAMU application. We would work closely with your staff to develop the CAMU application. The CAMU application would be accompanied by a request to withdraw all or part of the RFI Work Plan for the OU.

If you have questions, please call me at FTS 8-505-665-5027, or your staff may call Steve Slaten, Environment, Safety and Health Branch at FTS 8-505-665-5050.

Sincerely,

Joseph C. Vozella

Joseph C. Vozella, Acting Chief
Environment, Safety and Health
Branch

LESH:3TT-001

Enclosure

cc w/enclosure:
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K. Bitner, ERPO, AL, MS-A906

Barbara
Very important
we get involved
Bob

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possiblility of fine and imprisonment for knowing violation.

Document Titles:

Response to Notice of Deficiency for OU 1148

Name: _____ Date: 6-9-93

Thomas Gunderson
Environmental Management
Division Leader
Los Alamos National Laboratory

Name: _____ Date: 6-4-93

Joseph Vozella
Acting Chief
Environmental Safety & Health Branch
Los Alamos Area Office - DOE

RESPONSE TO EPA NOTICE OF DEFICIENCY
RFI WORK PLAN OU 1148

Preamble

The work plan for the material disposal areas (MDAs) in OU 1148 follows the conditional remedy guidance presented in the proposed RCRA Subpart S. The criteria for implementation of a conditional remedy include

- protecting human health and the environment,
- achieving media cleanup standards beyond the facility boundary,
- preventing further significant environmental degradation,
- implementing institutional controls,
- continuing monitoring, and
- complying with waste management standards.

Corrective action for the MDAs will include stabilization and post-closure monitoring to insure that contaminants are not being transported beyond controlled site boundaries at concentrations that exceed health risk-based standards or action levels. Remediation of release sites located within the area of institutional control will be based on conditional remedy requirements.

The recently promulgated Corrective Action Management Unit (CAMU) Rule raises fundamental issues concerning the RCRA Facility Investigation for the (MDAs) in Operable Unit 1148. The CAMU rule was promulgated long after the work plan was submitted to EPA. We wish to investigate if Operable Unit 1148 or discrete MDAs within the operable unit qualify to be designated as CAMUs.

There is also interest by the Laboratory in accelerating the remediation of the subsurface plume of solvents at MDA L. Therefore, extensive revision is being done to the Voluntary Corrective Action Plan (VCAP) that was submitted as Appendix A of the work plan. The revised VCAP will be sent to EPA on July 27, 1993. The revised VCAP is described in Appendix A attached to this response.

General Comments

1. *The work plan repeatedly applies the concept that Phase I will be used to determine whether contaminants of concern (COCs) exceed health risk-based criteria. The actual goal of an RFI work plan is to provide the rationale necessary to determine if a release has occurred to the environment. If a release has occurred, then the rationale necessary to determine the complete horizontal and vertical extent of contamination must be presented.*

   Response: It is apparent that the Work Plan did not clearly present the overall logic and operational method of the Phase I investigation. This Operable Unit includes four material disposal areas (MDAs) at which contaminants were deliberately buried as a means of disposal. Therefore, we do not seek to establish whether contaminants have been released to the soil within an MDA. Rather, the investigation is intended to determine if contaminants are (or will be) transported beyond the security fence

surrounding each MDA or be transported vertically to the aquifer, in sufficient quantity to generate a risk to human health or to the environment. To detect any potential vertical or horizontal escape of contaminants, this Phase I investigation will measure the concentrations of contaminants near the MDA boundaries and beneath the MDAs. The investigation will also measure the hydrogeologic properties necessary for modeling future transport.

2. *All portions of the work plan which address Phase II sampling will need additional sampling information if Phase II becomes necessary.*

   Response: Additional sampling will be done as appropriate.

3. *The RFI work plan does not address monitoring well sampling of wells already installed in the area of OU 1148. LANL shall provide the monitor well sampling schedule and constituents analyzed.*

   Response: The revised work plan will present the monitor well sampling schedule and the constituents analyzed. Soil gas samples are collected from the wells on a quarterly schedule each year. Sampling is generally in the months of March, June, September, and December. The gas samples are analyzed for the following thirteen compounds:

Analyte	Cas#
Ethylbenzene	100414
Bromobenzene	108861
Toluene	108883
Chlorobenzene	108907
Tetrachloroethene	127184
Mix-xylenes	1330207
Carbon Tetrachloride	56235
Chloroform	67663
Benzene	71432
111-Trichloroethane	71556
Trichloroethene	79016
o-Xylene	95476
124-Trimethylbenzene	95636

   We are developing a revised sampling procedure that will enable analysis of additional organic compounds.

Specific Comments

1. *Table ES-2, Baseline Schedule and Budget for OU 1148 RFI, p. ES-12 - This table indicates that RFI field work will be completed November 13, 1998, and an RFI Final Report will not be completed until October 30, 2000. LANL shall submit a draft final RFI Report within eight months of receipt of analytical data.*

   Response: The draft final RFI Report will be submitted within eight months of receipt of validated analytical data.

2. *Table 1.4-2, Criteria for a Recommendation of NFA or DA at Decision Point 1, p. 1-32 The table provides very liberal criteria which are used for a no further action (NFA) recommendation. For example:*

a. *Statement #1: "The site was never the location of hazardous-or radioactive-waste generation, treatment, storage or disposal." If the intent of this statement is that a unit did not receive regulated hazardous waste, the NFA is appropriate. If a unit handled solid waste, and there has been a release from the unit, then a RFI is required. The statement should be clarified or deleted.*

Response: Statement #1 of Table 1.4-2 will be modified to state: The site never received D.O.E. radioactive waste, regulated hazardous waste, or hazardous waste constituents.

b. *Statement #3: "The SWMU was constructed after November 18, 1987 and has operated under a permit." Does the permit contain corrective action provisions? The rationale for this statement must be provided.*

Response: A review of the SWMUs recommended for NFA in the work plan (see specific comments #19 and #20) indicates that the language of statement #3 is inappropriate. We will modify the work plan to retract the statement and replace it with a new statement #3 as follows: "The SWMU has engineered release controls and no history or evidence of release."

c. *Statement #5: "Currently available data indicate that the SWMU has undergone characterization or cleanup, and that COC's are not present in concentrations that exceed health risk-based levels." The extent and maximum concentration of contamination must be determined and all available data supplied with the NFA request.*

Response: All NFA requests will be supported with appropriate data.

3. *1.4.2.3 Decision Point 4 p. 1-35 - The third sentence of the first paragraph reads, "A recommendation of NFA at this point in the decision process will be justified for a SWMU if the mean sample concentration for any listed COC does not exceed the risk-based action level for that COC". The use of a mean sample concentration is not appropriate for a NFA decision. The maximum concentration should be compared with action levels as defined in Subpart S.*

Response: The sentence will be revised to state "A recommendation of NFA at this point in the decision process will be justified for a SWMU if the maximum sample concentration for any listed COC does not exceed the screening action level for that COC".

4. *3.9.3.4 Characterizations of Groundwater, p. 3-40 - The work plan states: "The samples will be collected using a method to prevent aeration and will be sealed in an air tight glass bottle". This is not an adequate description for sample collection. The work plan must provide the specific detail necessary to collect groundwater samples. What method will be used to analyze the samples?*

   Response: The work plan will be revised to reference SOPs for collection of groundwater samples and list methods for analysis of groundwater samples.

5. *Table 3.9-2 p. 3-41 - The analytical methods being used should also be listed.*

   Response: The work plan will be revised to list analytical methods for groundwater samples.

6. *5.1.3.1.1 Source Characterizations, p. 5-11 - The work plan states, "If Phase I sampling indicates contaminants are moving beyond the point of institutional control, additional source characterization may be included as part of the Phase II sampling program". The phrase "Beyond institutional control" must be defined and clarified. If a release has occurred to the environment from a SWMU, then it must be fully characterized.*

   Response: The work plan will be modified to state "If Phase I sampling indicates that contaminants are escaping or will escape from a MDA at concentrations that pose a threat to human health and the environment, additional source characterization may be included as part of the Phase II sampling program. At operable Unit 1148, "beyond institutional control" means beyond an area from which the public is physically excluded, and will be physically excluded in perpetuity.

7. *Table 5.1-9, p. 5-25 - The QC samples should be specified. The format used in Table 5.1-7 should be used in this Table and other subsequent tables that specify sample collection.*

   Response: The tables that summarize Phase II sampling plans will be modified to specify quality control samples.

8. *5.1.4.2.5 Sampling Activity, p. 5-28 - Neither this section nor Section 2.0 of Appendix B as indicated in the text, detail the depth of sample collection. This information should be stated either in the text or in Appendix B. In addition, how will the sample location be determined within each random grid chosen (i.e. center of the grid)?*

   Since the purpose of the RFI Phase I sampling is to determine if a release has occurred, LANL shall also use judgmental sampling of catchment areas and collection points in the streambed. This comment also applies to the following sections and, a response is required for each section:

5.2.4.2.5 Sampling Activity, p. 5-81
5.3.4.2.5 Sampling Activity, p. 5-141
5.4.4.2.5 Sampling Activity, p. 5-231

Response: The text for all Phase I surface sediment sampling activities will be modified to specify that the depth of sample collection is from 0 to 6 inches with the actual sample selected from judgment. The random grid sampling strategy will not be used. The number of samples specified in each activity will be distributed along drainage pathways using judgmental sampling to collect samples from the best developed sediment traps.

9. *5.1.4.3.5.1 Boreholes at MDA J, p. 5-36 -*

a. *LANL shall add two additional vertical boreholes, similar to the one described in this section (vertical borehole B2), one between pits 2 and 3, and one next to shafts 1 and 2.*

Response: The Sampling Plan for MDA J will be revised to include two additional vertical boreholes; Borehole B3 will be located between pits 2 and 3 at the center of the long axis of the pits; and Borehole B4 will be located south of Pit 2 between shaft 1 and 2. The boreholes will each be drilled to a minimum depth of 20 feet below the disposal units, with continuous core collected during drilling. Samples will be submitted for contaminant analysis from each 20 foot depth interval. Sample selection from each interval will be guided by the results of field screening to detect contamination. The total depth for the boreholes shall be determined by field screening but shall not be greater than 200 feet in the Phase I investigation.

b. *Soil samples should be collected where field screening indicates possible contamination, in addition to a sample being collected every 10 or 20 feet depending on which type of borehole (angled or vertical) is being sampled.*

Response: Sampling will be from each designated 10 or 20 foot interval with the exact zone within that interval established from field screening information as described in the work plan.

10. *5.1.4.4.2 Sampling and Analysis Approach, p. 5-39 - The following comment applies to all the air sampling proposed in this OU: Additional information needs to be provided on the EMFLUX sample cartridges. Passive dosimeters generally do not provide high quality data due to uncertain flow rates of air across or through the dosimeter. We strongly recommend that use of flux chambers or similar techniques to accurately quantify releases of VOCs from the facility.*

Response: The EMFLUX technology does not rely, as dosimeters do, on ambient air-flow rates; the system in effect creates a preferential sink, closed to ambient air, for gas-phase compounds emanating from the surface of the earth. Generally speaking, dosimeters are sensitive in the part-per-million range and are not expected to provide what is normally termed high-quality data. EMFLUX, by contrast, is effective in the

low parts-per-billion range, and has been evaluated at EPA's test bed near Las Vegas, NV, where the system's performance relative to ground water contamination earned a correlation coefficient (r) of 0.91. (Please see National Environmental Technology Applications Corporation [NETAC] Report C9-003, "Field Evaluation of the EMFLUX Soil Gas Emanation Flux Survey Technique," June 20, 1989.)

The purpose of the passive air sampling investigation at MDA J and MDA G is to screen the MDAs for the presence of buried wastes that contain VOCs. The measurements at the two MDAs will be compared with passive sampling simultaneously taken at MDA L above a known VOC plume. The text in the work plan will be revised to state that the measurements are for screening to define subsurface plumes of VOCs. If in the future a quantitatively accurate flux measurement is required, then a flux chamber will be used that meets EPA approval.

11. *Figure 5.1.-7 Passive air sampling locations at MDA L, p. 5-43 - The sampling height above ground level should be included in this figure and in the following figures: Figure 5.3.9 MDA L, Figure 5.4-12, Figure 5.4-13, Figure 5.4-14, and Figure 5.4-15.*

Response: The figures will be modified to include a statement that the passive air sample is collected at ground surface.

12. *5.1.4.4.3 Sampling Activity, p. 5-44 - In paragraph three of this section, it is unclear how the periods of maximum vertical gas movement will be determined; therefore, more information needs to be provided.*

Response: The periods of maximum vertical gas movement will be calculated from a computer model. The model is based on the influence of periodic change in tidal dilatation on the vertical migration of soil gas.

EPA methods are preferred for all air sampling. An additional reference for use in air sampling is: EPA (U.S. Environmental Protection Agency), June 1988, "A Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air", EPA/600/4-89-017, June, 1988.

Response: See Response to comment #10.

13. *5.2.4.3.5.1 Boreholes at MDA H, p. 5-87 - Samples should be collected on ten-foot intervals down to a depth of ten feet below the bottom of the shafts. Below that depth they may be collected on twenty-foot intervals. The borings should be located close to the existing shafts. Boring number LSH-92-01 should be moved closer to the shafts (within the fenced area), not sixty feet away.*

Response: The four boreholes at MDA H are located at the perimeter of the site to investigate if contaminants are escaping from the MDA. The 20 foot sampling interval is appropriate for this objective. A fifth borehole will be added to the Phase 1 investigation at a location inside the perimeter fence near disposal shafts 4 and 9. The

sample interval for this borehole will be every ten feet to a depth of ten feet below the shafts. Below that depth, samples will be collected on an interval of every twenty feet. The minimum depth for the borehole is 90 feet. The maximum depth of the borehole will be determined from field screening information, but shall not exceed 200 feet for the Phase I investigation.

14. *5.3.4.3.5.1 Boreholes at MDA L, p. 5-149 -*

a. *One of the rationales for sampling activity was to delineate the horizontal and vertical extent of the organic vapor plumes and any residual soil or rock contamination. Three of the proposed vertical boreholes will be extended to 300 feet, and other eight boreholes will be extended to approximately 100 feet. In order to fully delineate the vertical extent of the plume, all boreholes should be advanced until no radiological contaminants or VOCs are detected by field screening techniques, as indicated in the last sentence of paragraph two.*

Response: The drilling activities in the work plan for MDA L will be revised to integrate with the voluntary corrective action plan to remediate the plume with vapor extraction. The three vertical boreholes located close to disposal units that were planned to extend to 300 feet are now planned for a total depth of 500 feet each. The 500 foot depth was chosen because it is the distance that the plume has migrated outward from the source area. The plume may have migrated vertically a similar distance. The three boreholes will investigate the vertical extent of contamination below the MDA and will be instrumented as monitor wells for collection of pore gas samples. Further characterization of the lateral boundary of the plume is not required presently, because of the accelerated schedule to remediate the plume at MDA L beginning with the outer part of the plume. The existing monitor wells are an adequate monitor of the lateral extent of the plume at the present time, and will serve in the future to monitor clean up of the plume by vapor extraction. The location and number of proposed boreholes within the plume, but remote from the disposal units, has been modified so that those boreholes will serve multiple purposes. Six remote boreholes area planned and will be drilled to the top of the basalt, which is estimated to be 200 ft to 300 ft below the surface of the mesa. Drilling to this depth will accomplish the following objectives: 1. characterization of the vapor contamination that is important to the design of the accelerated remediation; 2. characterization of the subsurface geology; and 3. use during remediation as monitor wells, extraction wells, or injection wells. Continuous core will be collected during drilling. Core samples will be selected from each 20 foot interval based on field screening for VOC analyses. Laboratory analyses for other contaminants will not be performed on the core of these six boreholes because of the distance of these boreholes from MDA L.

b. *All boreholes shall be sampled on ten-foot intervals down to a depth of ten feet below the bottom of the unit. Below that depth they may be collected on twenty foot intervals.*

Response: The boreholes that are located close to disposal units will be sampled on ten foot intervals down to a depth of ten feet below the bottom of the unit. Below that depth VOC samples will be collected on a twenty foot interval to 200 feet, and then on a forty foot interval to the bottom of the borehole. Samples for other constituents listed in the work plan will be collected on a twenty foot interval to 200 feet, and on a 100 foot interval at greater depths.

15. *5.4.4.2.4 Rationale for Sampling Activity, p. 5-231 - Are there any additional surface water runoff channels on the north side of Area G which could also be sampled?*

Response: A recently completed study of the north facing slope of Canada del Buey identified a total of 5 surface water runoff channels on the north side of MDA G. The work plan will be modified to include samples from these channels.

16. *5.4.4.3.5.1 Boreholes at MDA G, p. 5-142 - Five sample boreholes in an area this large is insufficient to determine if a release has occurred. Additional borings are necessary.*

a. *At a minimum the 14 high priority pits should have a boring on each side. Samples should be collected on five-foot intervals down to a depth of ten feet below the bottom of the cells. Below that depth they may be collected on ten-foot intervals. Samples should be analyzed for Appendix VIII constituents.*

Response: We are exploring the feasibility of submitting a proposal to the EPA for designating MDA G as a Corrective Action Management Unit (CAMU). The CAMU designation was not addressed in the work plan as the rule was very recently promulgated. The CAMU decision will impact the design of the Phase I field investigation at MDA G. We have not scheduled any subsurface field investigations at MDA G in FY 93 in order to pursue a decision on the CAMU designation. We propose to provide a briefing to EPA within the next 45 days on issues concerning the CAMU designation for MDA G. After the briefing a plan would be submitted to EPA within 90 days that would present the strategy for designating MDA G as a CAMU. This plan would also describe the conceptual design of the characterization program that would be required for MDA G under the CAMU rule.

Appendix B attached to this document discusses the analysis of samples for Appendix VIII constituents.

b. *Additional boreholes shall be located in the shaft fields. Two additional boreholes should be located on the west side of the shaft field containing shafts 1-135. Two boreholes should also be placed next to shafts C1-C13. Samples should be collected on ten-foot intervals down to a depth of ten feet below the bottom of the shafts. Below that depth samples may be collected on twenty-foot intervals. Samples should be analyzed for Appendix VIII constituents.*

Response: Please see Response to specific comment # 16a.

c. *A better map(s) should be provided showing the numbers for each disposal shaft.*

Response: The work plan will be revised to include a map that shows the location and identification number for each disposal shaft at MDA G.

17. *5.4.4.4.5 Sampling Activity, p. 5-247 - Provide more details about how the remaining soil gas samples will be collected from the new boreholes, and the remaining two existing boreholes for which sampling intervals are not included. This should include information as to how a sampling interval will be determined, and are there a minimum number of samples to be collected per borehole.*

Response: The locations of gas sampling ports is determined from geologic information on continuous core samples collected during drilling. The revised work plan will state the minimum number of samples to be collected from each borehole. The revised work plan will include information on the sampling intervals in all existing boreholes.

18. *Annex I - The schedule information does not really provide timeframes for sampling individual MDA's. Did the boreholes for MDA L get drilled in 1992? Provide scheduling information (approximate month/year) for each MDA Phase I sampling.*

Response: The schedule in the work plan will be revised to provide timeframes for sampling individual MDAs. The boreholes scheduled for 1992 in the work plan at MDA L have not been drilled in 1992. The drilling program at MDA L will be modified to integrate with the accelerated schedule for remediation of the subsurface vapor plume.

19. *No Further Action Units - As part of the ongoing RCRA Facility Assessment (RFA) conducted by LANL, the following Solid Waste Management Units (SWMUs) do not appear to require an RFI; therefore the permit does not need to be modified to include them:*

54-008 septic tanks - These active units did not manage hazardous waste.
54-015(g) Lead casks - the containerized casks were overpacked and returned to MDA G for storage as mixed wastes. They have been removed from MDA L.
54-015(i) Forklift Battery - The battery was containerized before storage at MDA L, and overpacked before storage at MDA G.
54-001(f) Empty drum storage - This drum storage area never handled any hazardous waste or hazardous waste constituents.
54-007(b) Septic Tank - Septic tank for sanitary sewage, scheduled for removal.
54-010 Supply wash water tank - This tank was not part of the waste stream.
54-021 Six empty storage tanks - These tanks have been removed under a RCRA closure plan.
54-002 PCB transformer spill - Cleanup of this site has been implemented.
54-002(a,b) Environmental research caissons - The research caissons never managed hazardous waste or hazardous waste constituents.
AOC C-51-001 Former storage area for clean, drummed soil - This storage area never managed hazardous waste or hazardous waste constituents.
54-016(a) Nondestructive Testing Facility Sump - This waste management unit was

constructed after November 18, 1987. No releases have occurred from this unit. AOC C-51-002 Former location of explosives magazines - The structures have been removed.

Response: We concur and will propose the units for NFA as appropriate.

20. *A Class III permit modification will be required prior to removal of the following units from the HSWA permit:*

54-001(c) Bermed Storage Pad - Never managed any hazardous waste or hazardous waste constituents, and has been removed from MDA L. SWMU no longer exists.
54-013(a) Truck washing pit - This pit was never constructed.
54-015(h) Drum storage area - This is listed as 54-003(b) in the HSWA permit. This waste management unit was constructed after November, 1987. No releases have occurred from this unit.

Response: A class III permit modification will be submitted to remove the units from the HSWA permit.

APPENDIX A
RESPONSE TO NOD, OU 1148

DESCRIPTION OF
THE VOLUNTARY CORRECTIVE ACTION PLAN FOR
THE ORGANIC VAPOR PLUME AT MDA L

Purpose. The purpose of this voluntary corrective action is:

a) to retract the horizontal boundary of the organic vapor plume to the vicinity of the security fence at MDA L;
b) to retract the bottom of the plume to the depth of the basalt layer (if indeed the plume has spread to lower depths); and.
c) to provide a means for preventing any future regrowth of the plume away from the subsurface sources.

The situation and reasoning. The 18 multi-port vapor monitoring wells in the monitoring network provide data that are adequate for locating the horizontal extent of the plume. The plume is known to extend to a 200 foot depth at some locations, but the profile of the bottom of the plume is not known. Although the contaminant concentration in the plume is decreasing with time, the plume is spreading very slowly. New boreholes will be drilled to characterize the vapor plume and the transport of any other contaminants from MDA L. With adequate planning, many or all of these new boreholes can be utilized for remediation by vapor extraction. The Voluntary Corrective Action Plan, which now appears as Appendix A of the RFI Work Plan, will be rewritten so that the drilling and sampling activities serve both the needs of the RFI and the proposed corrective action.

New boreholes. For RFI purposes, angle boreholes will be drilled under disposal units as indicated in the RFI Work Plan. Other new boreholes that serve both RFI and VCA purposes are indicated on the attached Figure A-1. Six new multi-purpose vertical boreholes will be drilled to the basalt in the low-concentration region of the plume southeast of MDA L. (We refer to these as "shallow" boreholes, although the depth to basalt is 200 to 300 feet.) Also, three vertical boreholes, ("deep boreholes") will be drilled to a depth of 500 feet adjacent to disposal units. Sampling of the deep boreholes will reveal the extent of vertical migration of both volatile and other contaminants. In addition, the deep boreholes will permit air injection or extraction below the basalt, if that becomes necessary for remediation. The shallow boreholes will initially be fitted with flexible liners to prevent unwanted vapor migration. The deep boreholes will be drilled with Odex technology in which a metal casing is immediately pulled behind the drill head to prevent migration of contaminants along the borehole during or after drilling. After drilling, a smaller polymer casing will be installed within the metal outer casing, and the intervening annular space will be grouted from a tremie while the outer casing is withdrawn. This will leave a secure, gas-tight completion from the surface through the basalt, below which flexible or fixed casings may be used. When the deep boreholes are no longer needed, the holes will be drilled to remove the casing and plugged with grout to eliminate a potential pathway for future vertical migration of contaminants.

Investigations. The contaminant sampling to be performed on the new boreholes at MDA L is described in our response to Question 14. In addition to sampling for contaminants, cores will be sampled for hydrogeological properties including moisture, air permeability, porosity, particle density, specific surface, and moisture characteristic curve. With in-situ flow tests,

we will measure the effective permeability of fractured and non-fractured portions of the tuff in different boreholes. We plan to install flexible, removable, instrumented liners in five of the shallow boreholes and in one deep borehole to measure pressure, vapor concentration, and moisture as functions of time. We will measure the natural flows into and out of an open shallow borehole. The sampling and core logging will reveal variations in subsurface geology transverse to the mesa. The in-situ measurements will reveal the natural breathing of the mesa in response to barometric and tidal variations, and the effect of these variations on vapor concentrations. In turn, this knowledge will enable better design of an active vapor extraction system to retract the plume, and may enable the design of a passive ventilation system for long-term control of the vapor sources. Data on the hydrogeologic properties will be applied in future modeling of transport.

Continuing activities. The boreholes described above will enable initial pilot tests for the voluntary extraction of the vapor plume. Additional boreholes will subsequently be drilled as needed to enlarge the extraction network.

Schedule. The six shallow boreholes and two of the deep boreholes are scheduled to be drilled during the 1993 field season. If this is accomplished, the pressure and flow measurements will be made during the winter of 1993-4, and the pilot extraction test will be installed and operated during the summer of 1994.

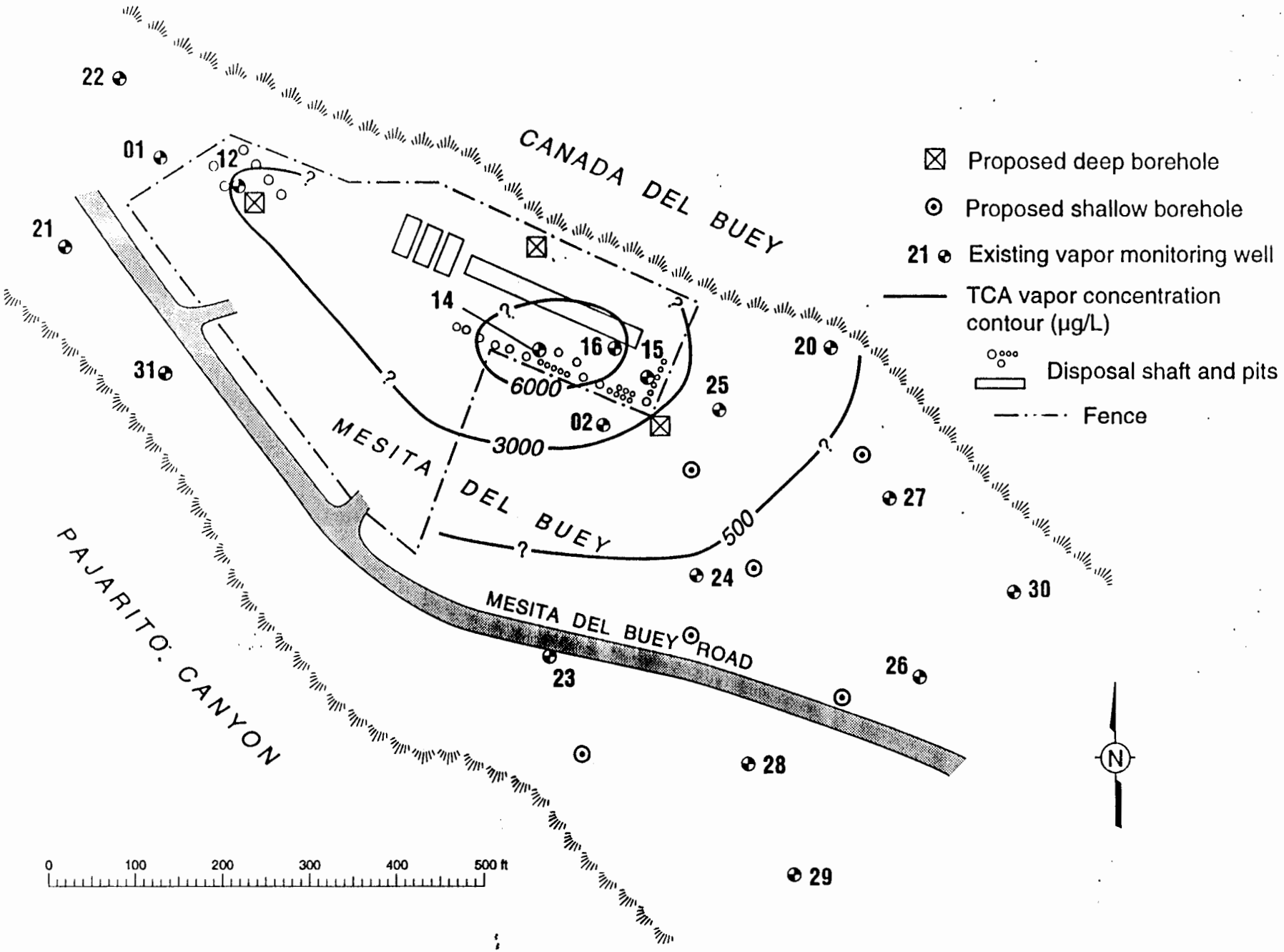

Fig. A-1. Location map of proposed boreholes for the Voluntary Corrective Action Plan.

Appendix B

Comments by the Environmental Chemistry Group

Item 16.a., page 6 of the Response to the EPA Notice of Deficiency indicates that soil samples from borings near the 14 high priority pits should be analyzed for Appendix VIII constituents. Because methods are not available for a large number of the Appendix VIII analytes, we are proposing to focus on the Appendix IX List which EPA developed to provide a list of analytes for which methods and standards are available, or which were similar in chemical structure and existing methods were expected to be applicable. Appendix IX started with Appendix VIII as the parent list. Some additional analytes (not in Appendix VIII) are included in Appendix IX because of the original need for this list as guidance for investigation of contamination in ground water.

Since there are still difficulties associated with analyses for some of the Appendix IX analytes (and lack of easy availability of some standards), we propose to use EPA Superfund's Contract Laboratory Program (CLP) target lists for organics and inorganics as our required list of target analytes.

For inorganics, the CLP list contains all Appendix IX analytes except tin. If Region VI needs information on tin, we can supply analyses for tin in addition to the CLP suite of metals (plus cyanide).

For organics, in addition to the CLP target compound list, we propose to follow CLP procedures for searching the NIST/EPA/MSDC mass spectral library of approximately 53,000 organic compounds ("Tentatively Identified Compounds") to provide information about additional organic analytes that may be present. We will use the services of a highly skilled mass spectrometrist to interpret the data from the mass spectral search and determine if there is any indication of the presence of organic constituents from the Appendix IX list. We will confirm the presence and concentration of any of these possible Appendix IX compounds for which standards are available.

The proposed CLP lists are attached.

INORGANIC TARGET ANALYTE LIST (TAL)

Analyte	Contract Required Detection Limit (1,2) (ug/L)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	3
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

(1) Subject to the restrictions specified in the first page of Part G, Section IV of Exhibit D (Alternate Methods - Catastrophic Failure) any analytical method specified in SOW Exhibit D may be utilized as long as the documented instrument or method detection limits meet the Contract Required Detection Limit (CRDL) requirements. Higher detection limits may only be used in the following circumstance:

If the sample concentration exceeds five times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the Contract Required Detection Limit. This is illustrated in the example below:

For lead:

Method in use - ICP
Instrument Detection Limit (IDL) - 40
Sample concentration - 220
Contract Required Detection Limit (CRDL) - 3

The value of 220 may be reported even though the instrument detection limit is greater than CRDL. The instrument or method detection limit must be documented as described in Exhibits B and E.

(2) The CRDLs are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The detection limits for samples may be considerably higher depending on the sample matrix.

CONTRACT LABORATORY PROGRAM

TARGET COMPOUND LIST (TCL) FOR ORGANIC COMPOUNDS

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

Volatiles	CAS Number	Quantitation Limits* Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
1. Chloromethane	74-87-3	10	10	1200	(50)
2. Bromomethane	74-83-9	10	10	1200	(50)
3. Vinyl Chloride	75-01-4	10	10	1200	(50)
4. Chloroethane	75-00-3	10	10	1200	(50)
5. Methylene Chloride	75-09-2	10	10	1200	(50)
6. Acetone	67-64-1	10	10	1200	(50)
7. Carbon Disulfide	75-15-0	10	10	1200	(50)
8. 1,1-Dichloroethene	75-35-4	10	10	1200	(50)
9. 1,1-Dichloroethane	75-34-3	10	10	1200	(50)
10. 1,2-Dichloroethene (total)	540-59-0	10	10	1200	(50)
11. Chloroform	67-66-3	10	10	1200	(50)
12. 1,2-Dichloroethane	107-06-2	10	10	1200	(50)
13. 2-Butanone	78-93-3	10	10	1200	(50)
14. 1,1,1-Trichloroethane	71-55-6	10	10	1200	(50)
15. Carbon Tetrachloride	56-23-5	10	10	1200	(50)
16. Bromodichloromethane	75-27-4	10	10	1200	(50)
17. 1,2-Dichloropropane	78-87-5	10	10	1200	(50)
18. cis-1,3-Dichloropropene	10061-01-5	10	10	1200	(50)
19. Trichloroethene	79-01-6	10	10	1200	(50)
20. Dibromochloromethane	124-48-1	10	10	1200	(50)
21. 1,1,2-Trichloroethane	79-00-5	10	10	1200	(50)
22. Benzene	71-43-2	10	10	1200	(50)
23. trans-1,3-Dichloropropene	10061-02-6	10	10	1200	(50)
24. Bromoform	75-25-2	10	10	1200	(50)
25. 4-Methyl-2-pentanone	108-10-1	10	10	1200	(50)
26. 2-Hexanone	591-78-6	10	10	1200	(50)
27. Tetrachloroethene	127-18-4	10	10	1200	(50)
28. Toluene	108-88-3	10	10	1200	(50)
29. 1,1,2,2-Tetrachloroethane	79-34-5	10	10	1200	(50)
30. Chlorobenzene	108-90-7	10	10	1200	(50)
31. Ethyl Benzene	100-41-4	10	10	1200	(50)
32. Styrene	100-42-5	10	10	1200	(50)
33. Xylenes (Total)	1330-20-7	10	10	1200	(50)

* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

Semivolatiles	CAS Number	Quantitation Limits* Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
34. Phenol	108-95-2	10	330	10000	(20)
35. bis(2-Chloroethyl) ether	111-44-4	10	330	10000	(20)
36. 2-Chlorophenol	95-57-8	10	330	10000	(20)
37. 1,3-Dichlorobenzene	541-73-1	10	330	10000	(20)
38. 1,4-Dichlorobenzene	106-46-7	10	330	10000	(20)
39. 1,2-Dichlorobenzene	95-50-1	10	330	10000	(20)
40. 2-Methylphenol	95-48-7	10	330	10000	(20)
41. 2,2'-oxybis (1-Chloropropane)#	108-60-1	10	330	10000	(20)
42. 4-Methylphenol	106-44-5	10	330	10000	(20)
43. N-Nitroso-di-n-propylamine	621-64-7	10	330	10000	(20)
44. Hexachloroethane	67-72-1	10	330	10000	(20)
45. Nitrobenzene	98-95-3	10	330	10000	(20)
46. Isophorone	78-59-1	10	330	10000	(20)
47. 2-Nitrophenol	88-75-5	10	330	10000	(20)
48. 2,4-Dimethylphenol	105-67-9	10	330	10000	(20)
49. bis(2-Chloroethoxy) methane	111-91-1	10	330	10000	(20)
50 2,4-Dichlorophenol	120-83-2	10	330	10000	(20)
51. 1,2,4-Trichlorobenzene	120-82-1	10	330	10000	(20)
52. Naphthalene	91-20-3	10	330	10000	(20)
53. 4-Chloroaniline	106-47-8	10	330	10000	(20)
54. Hexachlorobutadiene	87-68-3	10	330	10000	(20)
55. 4-Chloro-3-methylphenol	59-50-7	10	330	10000	(20)
56. 2-Methylnaphthalene	91-57-6	10	330	10000	(20)
57. Hexachlorocyclopentadiene	77-47-4	10	330	10000	(20)
58. 2,4,6-Trichlorophenol	88-06-2	10	330	10000	(20)
59. 2,4,5-Trichlorophenol	95-95-4	25	800	25000	(50)
60. 2-Chloronaphthalene	91-58-7	10	330	10000	(20)
61. 2-Nitroaniline	88-74-4	25	800	25000	(50)
62. Dimethylphthalate	131-11-3	10	330	10000	(20)
63. Acenaphthylene	208-96-8	10	330	10000	(20)
64. 2,6-Dinitrotoluene	606-20-2	10	330	10000	(20)
65. 3-Nitroaniline	99-09-2	25	800	25000	(50)
66. Acenaphthene	83-32-9	10	330	10000	(20)
67. 2,4-Dinitrophenol	51-28-5	25	800	25000	(50)
68. 4-Nitrophenol	100-02-7	25	800	25000	(50)

Previously known by the name bis(2-Chloroisopropyl) ether

Semivolatiles	CAS Number	Quantitation Limits* Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
69. Dibenzofuran	132-64-9	10	330	10000	(20)
70. 2,4-Dinitrotoluene	121-14-2	10	330	10000	(20)
71. Diethylphthalate	84-66-2	10	330	10000	(20)
72. 4-Chlorophenyl-phenyl ether	7005-72-3	10	330	10000	(20)
73. Fluorene	86-73-7	10	330	10000	(20)
74. 4-Nitroaniline	100-01-6	25	800	25000	(50)
75. 4,6-Dinitro-2-methylphenol	534-52-1	25	800	25000	(50)
76. N-nitrosodiphenylamine	86-30-6	10	330	10000	(20)
77. 4-Bromophenyl-phenylether	101-55-3	10	330	10000	(20)
78. Hexachlorobenzene	118-74-1	10	330	10000	(20)
79. Pentachlorophenol	87-86-5	25	800	25000	(50)
80. Phenanthrene	85-01-8	10	330	10000	(20)
81. Anthracene	120-12-7	10	330	10000	(20)
82. Carbazole	86-74-8	10	330	10000	(20)
83. Di-n-butylphthalate	84-74-2	10	330	10000	(20)
84. Fluoranthene	206-44-0	10	330	10000	(20)
85. Pyrene	129-00-0	10	330	10000	(20)
86. Butylbenzylphthalate	85-68-7	10	330	10000	(20)
87. 3,3'-Dichlorobenzidine	91-94-1	10	330	10000	(20)
88. Benzo(a)anthracene	56-55-3	10	330	10000	(20)
89. Chrysene	218-01-9	10	330	10000	(20)
90. bis(2-Ethylhexyl)phthalate	117-81-7	10	330	10000	(20)
91. Di-n-octylphthalate	117-84-0	10	330	10000	(20)
92. Benzo(b)fluoranthene	205-99-2	10	330	10000	(20)
93. Benzo(k)fluoranthene	207-08-9	10	330	10000	(20)
94. Benzo(a)pyrene	50-32-8	10	330	10000	(20)
95. Indeno(1,2,3-cd)pyrene	193-39-5	10	330	10000	(20)
96. Dibenz(a,h)anthracene	53-70-3	10	330	10000	(20)
97. Benzo(g,h,i)perylene	191-24-2	10	330	10000	(20)

* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

Pesticides/Aroclors	CAS Number	Quantitation Limits* Water ug/L	Soil ug/Kg	On Column (pg)
98. alpha-BHC	319-84-6	0.05	1.7	5
99. beta-BHC	319-85-7	0.05	1.7	5
100. delta-BHC	319-86-8	0.05	1.7	5
101. gamma-BHC (Lindane)	58-89-9	0.05	1.7	5
102. Heptachlor	76-44-8	0.05	1.7	5
103. Aldrin	309-00-2	0.05	1.7	5
104. Heptachlor epoxide	1024-57-3	0.05	1.7	5
105. Endosulfan I	959-98-8	0.05	1.7	5
106. Dieldrin	60-57-1	0.10	3.3	10
107. 4,4'-DDE	72-55-9	0.10	3.3	10
108. Endrin	72-20-8	0.10	3.3	10
109. Endosulfan II	33213-65-9	0.10	3.3	10
110. 4,4'-DDD	72-54-8	0.10	3.3	10
111. Endosulfan sulfate	1031-07-8	0.10	3.3	10
112. 4,4'-DDT	50-29-3	0.10	3.3	10
113. Methoxychlor	72-43-5	0.50	17.0	50
114. Endrin ketone	53494-70-5	0.10	3.3	10
115. Endrin aldehyde	7421-36-3	0.10	3.3	10
116. alpha-Chlordane	5103-71-9	0.05	1.7	5
117. gamma-Chlordane	5103-74-2	0.05	1.7	5
118. Toxaphene	8001-35-2	5.0	170.0	500
119. Aroclor-1016	12674-11-2	1.0	33.0	100
120. Aroclor-1221	11104-28-2	2.0	67.0	200
121. Aroclor-1232	11141-16-5	1.0	33.0	100
122. Aroclor-1242	53469-21-9	1.0	33.0	100
123. Aroclor-1248	12672-29-6	1.0	33.0	100
124. Aroclor-1254	11097-69-1	1.0	33.0	100
125. Aroclor-1260	11096-82-5	1.0	33.0	100

* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

There is no differentiation between the preparation of low and medium soil samples in this method for the analysis of Pesticides/Aroclors.