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RECEIVED
APR 20 1995

Date: APR 14 1995
Refer to: EM/ER:95-141

Ms. Barbara Driscoll
RCRA Permits Branch
U.S. Environmental Protection Agency
Region 6
1445 Ross Ave, Suite 1200
Dallas, TX 75202-2733

Dear Ms. Driscoll:

SUBJECT: RESPONSE TO THE NOTICE OF DEFICIENCY (NOD) FOR THE RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) REPORTS 1B, 1C, AND ADDENDUM 1B-1C, OPERABLE UNIT (OU) 1106

Enclosed are two copies of the Los Alamos National Laboratory's response to the Environmental Protection Agency's NOD concerning RFI Reports 1B, 1C, and Addendum 1B-1C, OU 1106. A certification form signed by the appropriate officials is also enclosed. The NOD was received at the Los Alamos Area Office on March 8, 1995. The enclosed response repeats each comment from the NOD for convenience in reviewing.

Also enclosed is a summary table of proposed status for solid waste management units presented in the RFI Reports 1B, 1C, and Addendum 1B-1C.

Please contact Garry Allen at (505) 667-3394 or Bonnie Koch at (505) 665-7202, if you have any questions about this response to the NOD.

Sincerely,

Jorg Jansen, Project Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

Environmental
Restoration

10190

JJ/TT/bp

Enclosures: (1) "NOD Response: Operable Unit 1106, RFI Reports 1B, 1C, and Addendum 1B-1C" (18 pages + 7 figures, 2 tables and draft memorandum)
(2) RFI Report Recommendations vs. Environmental Protection Agency's NOD Comments (2 pages)

Cy (w/enc.):
G. Allen, CST-18, MS E525
H. Decker, NMED-AIP, MS J993
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EM/ER File, MS M992
CIC-10, MS A150
RPF, MS M707

CERTIFICATION

I certify under penalty of law that these documents 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 possibility of fine and imprisonment for knowing violation.

Document Title:

NOD Response: Operable Unit 1106, RFI Reports 1B, 1C and Addendum 1B-1C

Name: _____ for TBB Date: 4/13/95

Tom Baca, Program Director
Environmental Management
Los Alamos National Laboratory

Name: _____ Date: 4/14/95

Joseph Vozella,
Acting Assistant Area Manager of
Environment Projects
Environment, Safety, and Health Branch
DOE-Los Alamos Area Office

or

Theodore J. Taylor
Program Manager
Environment Restoration Program
DOE-Los Alamos Area Office

Environmental Restoration Project
Los Alamos National Laboratory

NOD Response: Operable Unit 1106
RFI Reports 1B, 1C and Addendum 1B - 1C

Field Unit One

Technical Area 21

April 12, 1995

General Comments:

Comment 1 - All figures as presented lack detail, either the scale needs to be revised so the reader can obtain a clear picture of sample locations, or larger figures need to be provided. For the majority of figures in these reports a revision of scale would be adequate to allow the reader a better view of actual sampling and outfall locations.

Response - FIMAD has prepared more detailed maps (Attachment 1) which depict the sampling locations, adjacent structures, and a scale. These maps should be sufficient in providing site-specific detail.

Comment 2 - For all SWMUs which will have phase II sampling, a detailed sampling and analysis plan should be provided with detailed figures of sampling locations. LANL shall provide a schedule for submittal of these work plans.

Response - The Laboratory will submit detailed phase II sampling and analysis plans to the EPA for PRSs 21-024 (c), 21-027 (a), and 21-024 (i) by November 30, 1995.

Comment 3 - LANL should indicate if contamination was found in laboratory blanks whenever constituents are eliminated due to possible laboratory contamination. This information should be presented for each unit summary, and the actual blank information should also be included in analytical tables.

EPA will not approve Class 3 permit modifications for the following units until the information related to blanks is provided by LANL:

21-024(a,f,g,h,l)

Response - Tables 1 and 2 present results for contaminated field blanks and associated FY92 samples for PRS 21-024 (a, f, g, h, l).

The tables show that acetone was detected in the blanks at 21-024(a,h,l) and methylene chloride was detected in blanks from 21-024(l and h). Since the investigations at these PRSs were biased to the locations expected to identify the highest contaminant concentrations, it is proposed that no further action be taken at PRSs 21-024 (f, g, h, l) because the volatiles reported at these units were all well below their SALs.

The situation is different at PRS 21-024 (a) where benzene and 1,1-dichloroethene were reported above the SAL in the 6-12" sample at location ID 1389. Confirmation resampling and potential Phase II investigations are proposed for PRS 21-024(a).

Table 1. Sample and Field QA Sample Volatile Organic Analyses.

PRS	Location ID	Depth (in.)	Analyte	Sample Type	Resuit (ug/kg)*	SAL (ug/kg)
21-024(a)	21-1385	0-6	Acetone	SU	55	8000000
		0-6	Toluene	SU	9.9	910000
		Blank	Acetone	FE	38	NA
		Blank	Acetone	FR	42	NA
		12-18	Toluene	NS	6.9	910000
	21-1386	12-18	Toluene	NS	40	910000
		6-12	Acetone	NS	55	8000000
	21-1387	6-12	Toluene	NS	29	910000
		12-18	Acetone	NS	30	8000000
	21-1388	6-12	Acetone	NS	42	8000000
	21-1389	6-12	Benzene	NS	3000	670
		6-12	Chlorobenzene	NS	2500	67000
		6-12	Dichloroethene (1,1-)	NS	2900	400
		6-12	Toluene	NS	2600	910000
		6-12	Trichloroethene	NS	2400	3200
	21-1390	Blank	Acetone	FB	24	NA
21-024(h)	21-1413	0-6	Acetone	SU	15	8000000
		6-12	Acetone	NS	19	8000000
		12-18	Acetone	NS	32	8000000
	21-1414	0-6	Acetone	SU	19	8000000
		0-6	Acetone	FD	17	8000000
		6-12	Acetone	NS	18	8000000
	21-1415	6-12	Acetone	NS	14	8000000
		12-18	Acetone	NS	16	8000000
		12-18	Methylene chloride	NS	16	5600
21-024 (l)	21-1421	0-6	Acetone	SU	20	8000000
		0-6	Methylene chloride	SU	9	5600
21-024 (g)	21-1428	0-6	Acetone	SU	37	8000000
		0-6	Acetone	SU	37	8000000
		6-12	Acetone	NS	37	8000000
		6-12	Acetone	NS	37	8000000
	21-1429	0-6	Acetone	SU	17	8000000
		6-12	Acetone	NS	35	8000000
	21-1430	0-6	Acetone	SU	21	8000000
21-024(f)	21-1431	0-6	Acetone	SU	28	8000000
		6-12	Acetone	NS	25	8000000
		12-18	Acetone	NS	19	8000000
	21-1432	0-6	Acetone	SU	35	8000000
		6-12	Acetone	NS	55	8000000
		6-12	Toluene	NS	8	910000
		12-18	Acetone	NS	20	8000000
	21-1433	6-12	Acetone	NS	36	8000000
		12-18	Acetone	NS	42	8000000
		12-18	Methylene chloride	NS	7	5600

* water blanks are in ug/l FR Field Reagent Blank NA Not Applicable SU Surface Sample
FE Field Equipment Blank FB Field Trip Blank FD Field Duplicate NS Near Surface Sample

Table 2. List of Results for Contaminated Laboratory Blind* Blanks

PRS	Analyte	Result (ug/kg)
21-024(a)	Acetone	86
21-024(a)	Acetone	7.8
21-024(a)	Acetone	11.4
21-024(h)	Acetone	16
21-024(h)	Acetone	10
21-024(h)	Acetone	10
21-024(h)	Methylene chloride	9
21-024(l)	Acetone	16
21-024(l)	Acetone	13
21-024(l)	Acetone	11
21-024(l)	Methylene chloride	9
21-024(l)	Methylene chloride	10
21-024(l)	Methylene chloride	7
21-024(l)	Methylene chloride	7
21-024(l)	Methylene chloride	10
21-024(g)	None	Below DL
21-024(f)	None	Below DL

* "Blind" soil samples were submitted to the contract laboratories by the LANL's SCF. The table reflects the analytical results from those samples

Comment 4 - Both in FY92 and FY93 field investigations, quality assurance samples transferred to the Sample Coordination Facility (SCF) were arbitrarily batched separately from the corresponding field samples. This makes it impossible to efficiently correlate field samples with their associated quality assurance samples. If this situation has not already been corrected with SCF, then LANL should immediately put controls in place to ensure that this does not continue to occur. LANL shall provide documentation to EPA demonstrating that this practice by SCF has been discontinued, or how LANL will address the problem. This failure in procedures should invalidate any comparisons of sampling results to laboratory contamination.

In addition, quality control (QC) samples should not be separated from field samples and put into their own batch for analysis. QC samples should be analyzed in the same batch as the field samples for which they are supposed to provide quality control.

Response - LANL has addressed the problem with sample batching. A memo will be forthcoming from the ER Project Office.

Comment 5 - When LANL indicates that a risk assessment will be conducted because action levels are exceeded for radioactive constituents, are the hazardous constituents found in the sampling included in the risk assessment?

Response - Yes, with the following qualifications. The PRSs included in Chapter 5 of the phase report addendum (LANL 1995b) are sites where any detected concentrations of chemical constituents were below their respective screening action levels (SALs). A

multiple constituent analysis for chemical constituents was also conducted for these sites where necessary, and no potential for additive effects was indicated for any of them. Risk assessment for radioactivity for these PRSs is recommended based on the presence of radioactive contaminants above SALs. The radioactivity risk assessment will address risk associated with radioactive contaminants only, unless there is evidence for potential of additive health effects from the low-level concentrations of chemical contaminants that are present in addition to the existing radionuclide contamination.

Comment 6 - LANL may request a Class 3 permit modification for the following units. As indicated below, several of these units will continue to be investigated due to their radioactive component.

21-024 (j, k, m, n, o)
21-027 (b,d)

Risk assessment to be conducted: 21-024(b), 21-024(e).

Corrective action for radioactive component: 21-024(d).

Response - Comment acknowledged. A Class 3 permit modification will be submitted to remove from the permit the units listed below:

21-024 (j, k, m, n, o)	21-024 (b)	21-027 (b, d)
21-024 (e)	21-024 (d)	

Further action related to radioactive contamination will be pursued as necessary.

Comment 7 - Decisions concerning the following units will be deferred until additional sampling has been conducted. LANL shall provide schedules for sampling of neighboring SWMUs and report schedules for these units.

21-006(b) 21-027(c)

Response - The boundaries within which a neighboring SWMU would fall are based on the area to which a worker could be exposed in a long-term occupational scenario, 500 m^2, as shown in "Technical Assumptions for Data Collection and Evaluation" (ER 1993). Assuming this area is circular, it would have a radius of approximately 13 m.

Based on this assumption, schedules for sampling neighboring SWMUs and reporting results will be as follows:

- For PRS 21-006(b), the original recommendation in RFI Report 1C (LANL 1994) was to defer decision until the investigation of the associated settling pit was completed.

Investigation of this settling pit is described in Chapter 17.2 of the RFI Work Plan (LANL 1991). According to the current baseline schedule for TA-21, the investigation will start on October 2, 1997, and the phase 1 RFI report will be submitted to the EPA by February 2, 1999.

- The PRS 21-027(c) risk assessment was to be coordinated with the risk assessment of the neighboring PRS, PRS 21-024(d); however, PRS 21-024(d) is now being considered for expedited cleanup instead of additional sampling and so is not appropriate for this approach. The remaining candidate is the site-wide PRS, PRS 21-021 (see response to comment 9 for details on PRS 21-021). The current baseline does not include a schedule assessing for the site-wide PRS because it will be contingent on the decontamination and decommissioning (D&D) of TA-21 facilities. The sampling and analysis plans for PRSs that are contingent on D&D are scheduled to be revised by April 24, 1996. During this revision, D&D and RFI schedules, including the schedule for assessing PRS 21-021, will be reviewed and coordinated.

Comment 8 - The following units do not need to be added to the HSWA portion of the RCRA permit:

21-004(d)	21-019(a-m)
21-008	21-020(a,b)

Response - Comment acknowledged. The units listed above will not be added to HSWA permit.

Specific Comments:

Report 1B

Comment 9 - Of the 18 solid waste management units identified in this report only two are listed in the HSWA portion of the RCRA permit, 21-007 and 21-021. On Figure 1.3 which shows the locations of the SWMUs covered by this report, the location of these two SWMUs are not included for various reasons. LANL needs to submit the following information for the two listed units:

a. A figure indicating the location of the salamander incinerators as known, and the stack emissions which were covered by 21-021. Sampling points which relate to these SWMUs should be indicated and numbered.

b. Sampling results which related directly to these two units. Results should be presented by sampling location and include the inorganic data. A table format would be helpful. EPA needs to evaluate individual sampling points in relation to these units, as opposed to the grouping of all results as was indicated in the report.

Response 9.a - The locations of the salamander incinerators (PRS 21-007) are unknown because they were portable and could have been used at numerous locations. The individual stacks which also contributed airborne emissions at TA-21 were enumerated and identified in PRSs 21-008, 21-019 (a-m), and 21-020 (a,b) (in addition to 21-007). We have interpreted PRS 21-021 to represent site-wide contamination of surface soils at TA-21 resulting from the deposition of airborne contaminants released from all of these sources, and extending to the boundaries of TA-21. Our assessment of the data is that no individual emission point can be identified as the discrete source of contaminants in surface soils. In this view, we propose that 21-007 be removed from the permit, and 21-021 be retained to ensure that the site-wide effects of airborne releases are addressed.

PRS 21-021 extends to the boundaries of the TA-21 OU, to the stream channels of Los Alamos and DP Canyons, including DP Mesa. Sampling points included in the investigation of PRS 21-021 are all of the 0 to 1 inch grid sampling locations, for which the results were reported in Chapter 3 and Appendix B of RFI Phase Report 1B.

Response 9.b - The sampling points related to PRSs 21-007 and 21-021 (see discussion in Response 9a) are the 0 to 1 inch grid sampling locations for which the results were reported in Chapter 3 and Appendix B of the RFI Phase Report 1B. The data are summarized and tabulated in Appendix B, for location IDs 21-1001 through 21-1301, including information on inorganics.

Comment 10 - LANL should provide an explanation why Grid 1 samples were often extracted differently or analyzed by a different method than Grid 2 samples. Has LANL corrected this situation, and if so are there now procedures in place to ensure that extraction methods and analytical methods for inorganics are standardized?

Response - Round 1 and round 2 grid samples were taken approximately 2 months apart. Since this was the first project out in the field, both the SOPs and the analytical procedures were untested. TA-21 management wanted to test the system with the round 1 samples, correct any problems and return to the field for the round 2 samples. One problem that was not identified until the analytical data was returned, was that some of the inorganics samples were digested using a different techniques resulting in inconsistent analytical values.

This situation has been corrected and has not recurred at TA-21. Extraction with the standard SW-846 method using nitric acid during the extraction process is the current method being used.

Comment 11 - 2.3 Data Assessment Overview, p. 2-2, Assessment 2 - LANL refers to local background as the "Non-Process Area" on Map 2. The samples collected in the non-process area include samples in Los Alamos Canyon and on strata which is different then

the process area. LANL needs to provide information to EPA which demonstrates that these sampling locations (those not on the mesa) are not compared with the process area locations. If these areas were combined with areas on the mesa top then LANL needs to remove the data from final results of the non-process area background.

Response - All decisions for NFA or further investigation were made based on comparison to the SALs, not the baselines. However, if the baselines had been used, the decisions would have been conservative because the adjacent canyons exhibited lower concentrations of metals than the mesa top. The resulting mesa top baseline was therefore lower (more conservative) than it would have been if the canyon data had not been used.

Comment 12 - Assessment 3 - Table 2-4 - LANL cannot use the mean of all the non-process area sampling results to compare with process area results. There needs to be differentiation based on strata type and geochemistry.

Response - Where the "background" analyte concentration statistics for the "Process Area" did not differ from that for the "Non-Process Area," the same range was used as "background" values, and the fact that there are few Process Area-specific analytes identified for the Process Area "background" indicates there was little difference in the statistics for Non-Process Area and Process Area data. Thus, the Process Area background turned out to be the same as the Non-Process Area, not that comparisons were made inappropriately to a potentially biased Non-Process Area background.

Filter Building:

Comment 13 - 4.3 Data Conclusions and Recommendations, p. 4-2 - What does LANL mean by the sentence, "No hazardous constituents were identified at levels of concern". How are levels of concern defined?

Response - TA-21 OU RFI Phase Report 1B, Chapter 4 "Summary of Filter Buildings Investigations." The fourth line of the 2nd paragraph of the Data Assessment Overview, on page 4-2, should be revised as follows:

- Radionuclides were detected and included americium-241, plutonium-239/240, plutonium 238, and tritium. These radionuclides were reported at levels below screening action levels. There were no *RCRA* hazardous constituents reported *above SALs.*

Comment 14 - 4.4 Conclusions and Recommendations, p. 4-3 - The third paragraph indicates that no RCRA hazardous constituents were detected in the filter buildings investigation which contradicts the statement above in 4.3. Appendix E indicates that

volatiles were detected in the filter buildings. Were these volatiles also detected in the laboratory blanks? There should have been discussion of this in the report.

Response - The statement discussed in Comment 4.3 (above), as revised, is no longer contradictory. Both acetone and methylene chloride are common laboratory contaminants which were identified in field, rinsate, and trip blanks associated with samples from PRS 21-020 (a,b). All field and laboratory QA samples can be identified in Table 3 below:

Table 3. Field and Laboratory Quality Assurance Samples at PRS 21-020 (a,b).

Location ID	Sample ID	Analyte	Sample Type	Result (ug/l)
21-1437	AAA1310	Acetone	FE	36
21-1437	AAA1311	Acetone	FR	42
21-1439	AAA0931	Acetone	FB	39
21-1441	AAA1326	Acetone	FR	42
21-1444	AAA1338	Acetone	FB	47
21-1445	AAA1341	Acetone	FE	36
21-1445	AAA1342	Acetone	FR	49
21-1448	AAA1351	Acetone	FB	41
21-1449	AAA1358	Acetone	FR	66
21-1454	AAA1373	Acetone	FE	26
21-1454	AAA1374	Acetone	FR	28
21-1459	AAA1392	Acetone	FR	37
21-1462	AAA1363	Acetone	FB	35
21-1463	AAA1412	Acetone	FR	44
21-1466	AAA1428	Acetone	FE	27
21-1466	AAA1429	Acetone	FR	55

FR - Field Reagent Blank (Field Blank) FB - Field Trip Blank (Trip Blank) FE - Field Equipment Blank (Rinsate Blank)

Appendix A:

Comment 15 - A.1.1 Revision of Sampling Plan - When significant problems such as those indicated in part A.1.1 Revision of Sampling Plan, resulted in major changes from the approved sampling plan, LANL should notify EPA in writing of the problems and the proposed solutions for an approved modification to the work plan.

Response - Comment acknowledged. LANL reported the discrepancy in the first TA-21 Quarterly Report (2nd quarter, 1992). However, LANL does not have record of any correspondence from EPA approving the proposed solution. This oversight will not be repeated and all correspondence will be directed to EPA in a timely manner.

Comment 16 - A.3.2 Regional Background Concentrations, p. A-11 - The national study by Shacklette and Boemgen, 1984, is too general and should not be used by LANL for background comparisons. Background should be documented locally for the facility. In addition, the depth of collection for the Los Alamos study is different. Text should indicate which analytical methods were used for all studies.

Response - Comment acknowledged. No PRS was proposed for NFA on the basis of the 1984 Shacklette and Boemgen national background values. Because the 1984 data was not used as a basis for decision, the analytical methods used are not relevant.

Comment 17 - A.6 Non-Process Area Inorganic Baseline, p. A-18 - What is the source of the regional background data which sampling data from TA-21 is being compared to? Is the data from the Longmire background study combined with other studies?

Response - The regional background data used at the time of issuance for Phase Report 1B was from the Longmire study. However, these values may not match the current background information because Longmire's study was not completed when Phase Report 1B was produced. At the time, the data was the most relevant set of values in existence.

Appendix B:

Comment 18 - Appendix B: B.5 Deposition Layer Inorganics, p. B-13 - Text indicates that four arsenic outliers are near TSTA, are these locations being addressed under the investigation of another SWMU? If yes, then LANL should indicate which investigation will address this unit, and the schedules for those investigations.

Response - Table 4 summarizes the arsenic results for deposition layer samples near TSTA. Information now available indicates these values are less than the regional upper tolerance level (UTL) for arsenic. Based on this new information, we do not consider the arsenic further in the investigation of any SWMU or PRS.

Table 4 Arsenic Results for Deposition Layer Grid Samples Associated with TSTA

Location ID	Arsenic Results (ug/g)	Non-Process Area Baseline 95.5% (ug/g)	Process Area Baseline 95.5% (ug/g)	UTL (ug/g)
21-1168	4.4	3.67	3.44	11.6
21-1185	6.5	3.67	3.44	11.6
21-1189	5.2	3.67	3.44	11.6
21-1230	5.0	3.67	3.44	11.6
21-1233	4.9	3.67	3.44	11.6
21-1288	4.5	3.67	3.44	11.6

As noted in the response to Comment 7, although area-specific baselines are still in use, they will be eliminated in the future.

Comment 19, Map 2 - The legend does not indicate what the black square symbols indicate. LANL should provide this information.

Response - The black squares on Map 2 indicate that the samples were collected at both 0-1 and 0-6 in. intervals within the fenced area.

Report 1C:

Comment 20 - Recommendation for Further Action, p.2-9 - Detection limits should not be revised upwards to correlate with action levels. The QAPjP as prepared should be followed, unless there is a programmatic decision to change portions of the QAPjP with approval by EPA.

Response - If the comment refers to detection limits that are *greater* than the SAL, then the last sentence of the first paragraph on page 2-9 of Report 1C (LANL 1994) should be deleted. The policy used at LANL when a detection limit is greater than a SAL can be summarized as follows. First, process knowledge of the site is used to determine if it is likely that the chemical may have been used at the site. If it is determined that the chemical may be present at the site, then new detection limits below the SAL are identified. If there is no reason to expect the chemical to be present at the site, then the detection limit is adopted as a surrogate SAL (LANL 1993).

Comment 21 - Chapter 6: 21-022(h) 6.1.3 Data Assessment, p. 6-4 -

a. LANL makes the assumptions that the samples which contained the semi-volatile organics are related to widespread environmental contaminants or polyaromatic hydrocarbons typical of paving materials. These semi-volatiles cannot be attributed to anthropogenic causes until a risk assessment has been conducted to demonstrate anthropogenic causes.

b. In addition, what is the schedule for the associated sump to be sampled? Should this have occurred in the FY93 field sampling along with the other units in Report 1C?

Response 21a - The text should be revised to explain why these semi-volatiles do not require further evaluation. Table 6.1-2 should be replaced with the table attached. The first paragraph on page 6-4 should be deleted and replaced with the following paragraphs (a copy of the position paper on polyaromatic hydrocarbons [PAHs] referenced in this response is also attached):

> Six semivolatile organics were detected at low levels in surface soil samples collected from SWMU 21-022(h). One of the six detected contaminants was bis (2-ethylhexyl)phthalate, which was detected at a maximum concentration of 2.2 mg/kg (location ID 21-1380[FD]). This concentration is significantly below the SAL for this compound (50 mg/kg).

The other five semivolatile organic constituents detected in surface soil were PAHs, and maximum detected concentrations of these constituents are summarized in Table 6.1-2. A screening assessment was conducted for these constituents, and the first step of the screening assessment was comparison of the maximum detected concentrations to background values. A guidance document for comparing detected concentrations of PAHs in soil to background values has been developed by LANL (LANL 1995a, attached). This document specifies that maximum detected concentrations of PAHs are to be compared to upper tolerance limit (UTL) values for background provided in the guidance document. Maximum concentrations of all PAHs were below their respective UTLs, as summarized in Table 6.1-2.

Since the concentrations of all PAHs are below background reference UTLs, and the concentration of bis (2-ethylhexyl)phthalate is below its SAL, none of these constituents is considered to be present at levels of concern, and all constituents are eliminated from further evaluation.

Response 21b - The RFI Work Plan (LANL 1991) describes two separate investigations for the sump and the outfall at PRS 21-022(h). The sump investigation is tied to D&D activities and is detailed in Chapter 18.9. The current baseline schedule for TA-21 indicates the investigation will start on May 7, 1999, but the date depends on D&D plans and schedules.

Comment 22 - Chapter 9 - SWMU 21-026(d) - Several semi-volatiles were detected above SALs, and cannot be dismissed as indicative of contamination from paving materials. LANL should conduct a risk assessment for this site.

Response - The text should be revised to explain why these semi-volatiles do not require further evaluation. Table 9.1-2 should be replaced with the table attached. The following paragraphs should be added after the last paragraph on page 9-3:

Twelve semivolatile organics were detected in surface and subsurface soil samples collected from SWMU 21-026(d). One of the 12 detected contaminants was bis (2-ethylhexyl)phthalate, at a maximum concentration of 0.87 mg/kg (location ID 21-1401). This concentration is significantly below the SAL for this compound (50 mg/kg).

The other 11 semivolatile organic constituents detected in surface soil were PAHs, and maximum detected concentrations of these constituents are summarized in Table 9.1-2. A screening assessment was conducted for these constituents, and the first step of the screening assessment was comparison of the maximum detected concentrations to background values. A guidance document for comparing detected concentrations of

> PAHs in soil to background values has been developed by LANL (LANL 1995a, attached). This document specifies that maximum detected concentrations of PAHs are to be compared to upper tolerance limit (UTL) values for background provided in the guidance document. Maximum concentrations of all PAHs were below their respective UTLs, as summarized in Table 9.1-2.

The second and third sentences of Section 9.1.4, first paragraph, should be replaced with the following:

> Since the concentrations of all PAHs are below background reference UTLs, and the concentration of bis(2-ethylhexyl)phthalate is below its SAL, none of these constituents is considered to be present at levels of concern, and all constituents are eliminated from further evaluation.

Addendum 1B and 1C:

Comment 23 - Grid Extension, 2.4 Conclusions, p. 2-4 - LANL cannot dismiss the presence of semi-volatiles above action levels due to anthropogenic reasons without conducting a risk assessment to ensure this is the actual source of the semi-volatiles.

Response - The text should be revised to explain why these semi-volatiles do not require further evaluation. Table 2.2-1 should be replaced with the table attached. The last paragraph on page 2-4 should be deleted and replaced with the following paragraphs:

> Eight semi-volatile organics were detected in grid extension subsurface soil samples, and concentrations detected are summarized in Table 2.2-1. A screening assessment was conducted for these constituents, and the first step of the screening assessment was comparison of the maximum detected concentrations to background values. A guidance document for comparing detected concentrations of PAHs in soil to background values has been developed by LANL (LANL 1995a, attached). This document specifies that maximum detected concentrations of PAHs are to be compared to upper tolerance limit (UTL) values for background provided in the guidance document. Maximum concentrations of all PAHs were below their respective UTLs, as summarized in Table 2.2-1.
>
> Since the concentrations of all PAHs are below background reference UTLs, none of these constituents is considered to be present at levels of concern, and all constituents are eliminated from further evaluation.

Comment 24 - 4.1.4 Conclusions and Recommendations, SWMU 21-011(k), p. 4-5 - The second sentence in this section is incorrect; because a risk assessment would not take

into account the synergistic nor antagonistic effects of different constituents. Rather in a risk assessment the additive effects of different constituents would be evaluated. LANL needs to substantiate their assumption that the metals of concern included in the multiple constituent evaluation exert different toxicological effects.

Response - The text should be revised to explain the different toxicological effects of nonradioactive constituents. The first paragraph in section 4.1.4 should be replaced with the following paragraphs:

> All nonradioactive constituents were detected at levels at or below SALs. However, the multiple constituent evaluation resulted in a value that slightly exceeded 1.0 (1.023), indicating the potential for additive effects from multiple constituents if the health effects of these constituents were similar.
>
> As shown on Table 4.1-1, the constituents contributing most weight to the multiple constituent evaluation are cadmium, lead, and nickel. The noncarcinogenic toxicity criteria used to derive the SALs for these constituents were derived based on very different health effects: kidney toxicity (cadmium), neurotoxic effects (lead), and decreased organ weight (nickel). Therefore, the additive effects for noncarcinogenic toxicity are not of concern.
>
> When considering carcinogenic effects, both cadmium and nickel are known human lung carcinogens. While lead is considered a suspect human carcinogen by EPA, its cancer potency has not been derived and is not considered in the lead SAL. Therefore, an additive effect can only be considered for cadmium and nickel. Removal of lead from the multiple constituent evaluation results in a total SAL fraction of 0.9, which is below a level of concern for additive effects for carcinogenicity.
>
> Based on evaluation of both noncarcinogenic and carcinogenic toxicological effects, the additive effects of multiple constituents are considered to be below a level of concern, and all constituents listed in Table 4.1-1 are eliminated from further evaluation.

Comment 25 - 4.2.1 Site Summary, SWMU 21-023 (c), p. 4-14 - The multiple constituent analysis performed on the metals with concentrations above background for this site exceeded one. LANL must either use the chromium results as analyzed and pursue further action for metals, or resample and determine the actual amount of hexavalent chromium.

Response - The text should be revised to explain why the additive effects of multiple constituents and the chromium results do not require further investigation or evaluation.

The last sentence of the last paragraph on page 4-14 should be deleted and replaced with the following paragraphs:

> As shown on Table 4.2-1, the constituents contributing most weight to the multiple constituent evaluation are chromium and lead. The noncarcinogenic toxicity criteria used to derive the SALs for these constituents were derived based on very different health effects: a no-effect level (chromium) and neurotoxic effects (lead). Therefore, the additive effects for noncarcinogenic toxicity are not of concern.
>
> When considering carcinogenic effects, chromium is a known human carcinogen (through inhalation only). While lead is considered a suspect human carcinogen by EPA, its cancer potency has not been derived and is not considered in the lead SAL. Therefore, adding SAL fractions for chromium and lead does not reflect additive effects for carcinogenicity.
>
> Since neither noncarcinogenic nor carcinogenic health effects of chromium (assumed to be present in the hexavalent valence state) and lead would be considered additive, and addition of the other metals listed in Table 4.2-1 would not affect the outcome of the analysis, the additive effects of multiple constituents are considered to be below a level of concern, and all metals listed in Table 4.1-1 are eliminated from further evaluation.

Comment 26 - 7.1 SWMU 21-024(c) -

a. A release from the outfall has been identified; therefore, LANL should also examine any piping from the septic tanks for leaks. The septic tank if in place should also be sampled if not filled in.

b. LANL should provide an explanation for the carbon disulfide observed in the 15-20 foot interval.

c. In follow-up sampling, several samples should be located at the 18-24 inch depth to ensure that the vertical extent of contamination has been determined.

Response 26a and 26c - The Laboratory will prepare a phase II sampling and analysis plan in accordance with the schedule provided in response to comment 2. The plan will include examination and sampling of the septic tank and sampling of the soil to a depth of 24 in. in the outfall drainage to determine the vertical extent of contamination. The results of sampling will be used to determine if remedial action is necessary. If remedial action is taken, the pipes associated with the septic tank will be removed.

Response 26b - Carbon disulfide is not classified as a common laboratory contaminant however it is detected in laboratory blanks on occasions. This fact, coupled with the fact

that process knowledge would indicate that carbon disulfide was not used in the area and because carbon disulfide was not detected in the outfall drainage or in the 0-5 or 5-10 ft intervals, indicates that the carbon disulfide detect was due to laboratory contamination.

Comment 27 - 7.2 SWMU 21-027(a) - LANL needs to include some sample locations at the 6-18 inch depth when resampling occurs in the drainage ditch; because, the vertical extent of contamination has not been determined for the chromium.

Response - The Laboratory will prepare a phase II sampling and analysis plan in accordance with the schedule provided in response to comment 2. The plan will include sampling in the drainage channel at depths of 0-6 in., 6-12 in., and 12-18 in. for radioactive contamination; these samples will also be analyzed for chromium species (see LANL 1995b, p. 7-14).

Comment 28 - 8.1 SWMU 21-024(I)

a. The data related to the organic compounds identified should be provided.

b. LANL has not adequately identified the extent of contamination. Sample 21-1397 has the highest levels of arsenic, and is located furthest down the drainage ditch. Additional samples should be collected in the drainage ditch below Sample 21-1397. The depth of sampling should be the same three depths previously used.

Response 28a - Results of organic analyses from 1992 samples were reported in RFI Phase Report 1C, with the conclusion that only metals and radionuclides were of concern. Follow-on sampling limited to metals and radionuclides was planned for 1993. Since the 1992 results did not indicate organic contamination, the sampling plan did not call for additional organic analyses.

Response 28b - The Laboratory has reassessed the data and concurs that the extent of contamination has not been adequately defined. The Laboratory will prepare a phase II sampling and analysis plan in accordance with the schedule provided in response to comment 2. The plan will include sampling in the drainage channel downgradient of the FY92 sample 21-1397, below the mesa rim on the canyon wall, and at depths of 0-6 in., 6-12 in., and 12-18 in. These samples will be analyzed for metals and actinium-227 progeny (to confirm results of FY92 sampling), in addition to other analytes described in the RFI Work Plan (LANL 1991).

Comment 29 - Appendix I: Item 16, p. J-22 - Text indicates that SWMU 21-024(i) is proposed for NFA with a corrective action for radioactivity. However, Chapter 8 of Addendum 1B and 1C proposes a risk assessment for this SWMU. Other portions of the "Open Issues" portion of Appendix I are incorrect.

Response -

Corrections: TA-21 OU RFI Phase Report 1B and 1C Addendum, Appendix I "Open Issues from RFI Report 1B and 1C." Pages 22 and 23 should be revised as follows:.

Item 7 Phase Report 1C defers the detailed sampling plan for additional sampling at PRS 21-011(k) to the Phase Report 1C and 1B Addendum.

The data assessment and summary for 21-011(k) is in Section 4.1 of the addendum. This PRS is proposed for NFA with additional investigation. The summary of the phase II sampling and analysis plan is included in the section.

Item 8 Phase Report 1C defers the detailed sampling plan for additional sampling and the FY93 data report for PRS 21-023(c) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-023(c) is in Section 4.2 of the addendum. This PRS is proposed for NFA with additional investigation. The summary of the phase II sampling and analysis plan is included in the section.

Item 9 Phase Report 1C defers the detailed sampling plan for additional sampling and the FY93 data report for PRS 21-024(b) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-024(b) is in Section 5.1 of the addendum. This PRS is now recommended for NFA with a risk assessment for radioactivity. 21-024(b) does not have a detailed sampling plan associated with it.

Item 10 Phase Report 1C defers the decision to perform a Baseline Risk Assessment and defers the detailed sampling plan for additional sampling and the FY93 data report for PRS 21-024(c) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-024(c) is in Section 7.1 of the addendum. This PRS is now recommended for additional investigation. A summary of the phase II sampling and analysis plan is included in the section.

Item 11 Phase Report 1C defers the follow-on sampling and the FY93 data report for PRS 21-024(d) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-024(d) is in Section 6.1 of the addendum. This PRS is now proposed for NFA with a corrective action for radioactivity.

Item 12 Phase Report 1C defers the follow-on sampling and the FY93 data report for PRS 21-024(e) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-024(e) is in Section 5.2 of the addendum. This PRS is now recommended for NFA with a risk assessment for radioactivity.

Item 13 Phase Report 1C defers the follow-on sampling and the FY93 data report for PRS 21-024(f) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-024(f) is in Section 3.2 of the addendum. This PRS is now proposed for NFA.

Item 14 Phase Report 1C defers the follow-on sampling and the FY93 data report for PRS 21-024(g) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-024(g) is in Section 5.3 of the addendum. This PRS is now recommended for NFA with a risk assessment for radioactivity.

Item 15 Phase Report 1C defers the follow-on sampling and the FY93 data report for PRS 21-024(h) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-024(h) is in Section 5.4 of the addendum. This PRS is now recommended for NFA with a risk assessment for radioactivity.

Item 16 Phase Report 1C defers the detailed sampling plan for additional sampling and the FY93 data report for PRS 21-024(i) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-024(i) is in Section 8.1 of the addendum. This PRS is proposed for a risk assessment under HSWA. (Please note: this correction makes this item internally consistent within Phase Reports 1B and 1C, and the Addendum, agreeing with the conclusion of Section 8.1. However, our position regarding PRS 21-024(I) has changed, as a result of the EPA NOD, due to comment 28.

Item 17 Phase Report 1C defers the follow-on sampling and the FY93 data report for PRS 21-024(j) and PRS 21-024(k) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summaries for 21-024(j) and 21-024(k) are in Sections 3.3 and 3.4 of the addendum. PRS 21-024(j) and PRS 21-024(k) are proposed for NFA.

Item 18 Phase Report 1C defers the detailed sampling plan for additional sampling and the FY93 data report for PRS 21-027(a) to the Phase Report 1C and 1B Addendum.

The FY93 data assessment and summary for 21-027(a) is in Section 7.2 of the addendum. This PRS is now proposed for additional investigations under HSWA. A summary of the phase II sampling and analysis plan is included in the section.

References

ER 1993: "Technical Assumptions for Data Collection and Evaluation," Environmental Restoration Program at the Los Alamos and Sandia National Laboratories, New Mexico (1993).

LANL 1991: "TA-21 Operable Unit RFI Work Plan for Environmental Restoration," LA-UR-91-962, Los Alamos National Laboratory, Los Alamos, New Mexico (1991).

LANL 1993: "Installation Work Plan for Environmental Restoration," LA-UR-93-3987, Los Alamos National Laboratory, Los Alamos, New Mexico (1993).

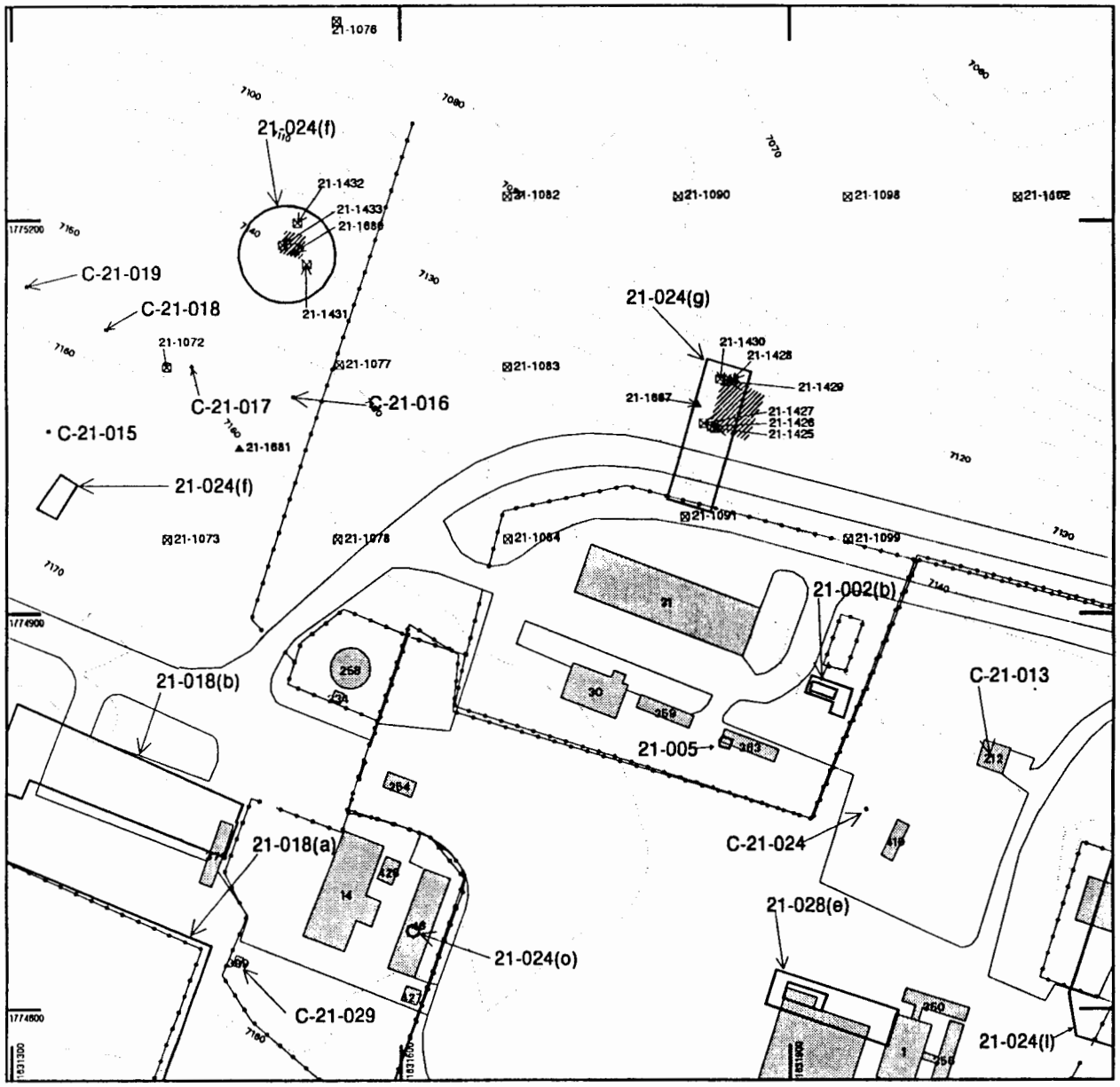
LANL 1994. "Phase Report 1B: TA-21 Operable Unit RCRA Facility Investigation Operable Unit-Wide Surface Soil Deposition Layer and Filter Building Investigation," LA-UR-93-4390, Los Alamos National Laboratory, Los Alamos, New Mexico (1994).

LANL 1994: "Phase Report 1C: TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation," LA-UR-94-228, Los Alamos National Laboratory, Los Alamos, New Mexico (1994).

LANL 1995a: "Draft Memorandum on Interim Guidance for Evaluating Polycyclic Aromatic Hydrocarbons in Soil," Los Alamos National Laboratory, Los Alamos, New Mexico (1995).

LANL 1995b: "Phase Report Addendum 1B and 1C," LA-UR-94-4360, Los Alamos National Laboratory, Los Alamos, New Mexico (1994).

ATTACHMENTS



LEGEND

- Contours, 10 foot
- Fence
- Potential Release Site
- Roads, Dirt
- Roads, Paved
- Building
- Radiological Survey Area
- FY92 Sample Points
- FY93 Sample Points
- Boreholes

N

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FEET

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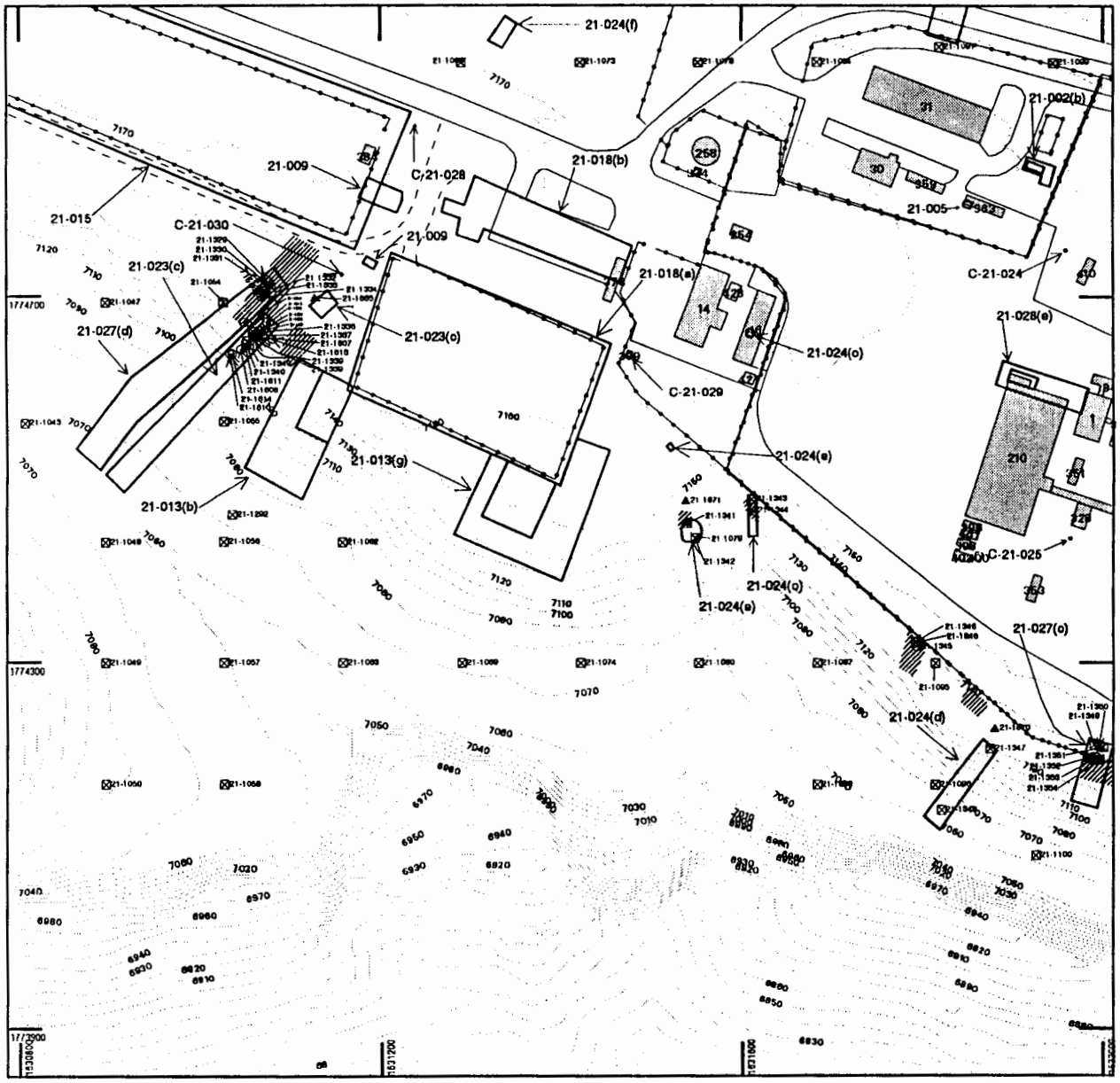
Earth and Environmental Sciences
FIMAD

Map Coordinates in New Mexico State Plane Feet
Grid Interval, in feet: 300
Feet per inch on map = 132

Produced by: Doug Walther
Date: April 12, 1995 FIMAD ID: G103304

TA-21: Sample Points for FY92 and FY93, Boreholes, and PRSs, map 1



LEGEND

- Contours, 10 foot
- Fence
- Potential Release Site
- Roads, Dirt
- Roads, Paved
- Building
- Radiological Survey Area
- FY92 Sample Points
- FY93 Sample Points
- Boreholes

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Map Coordinates in New Mexico State Plane Feet
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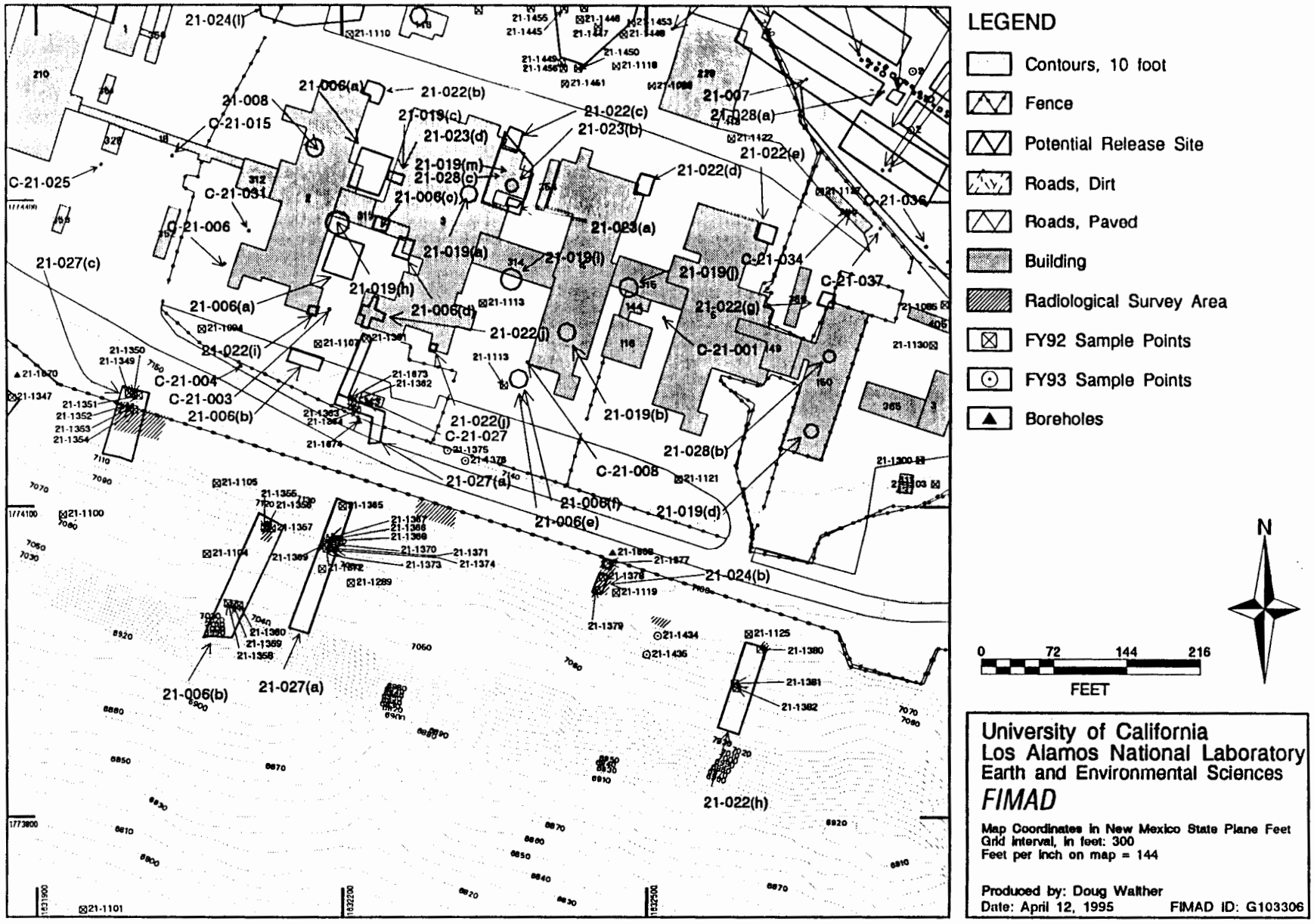
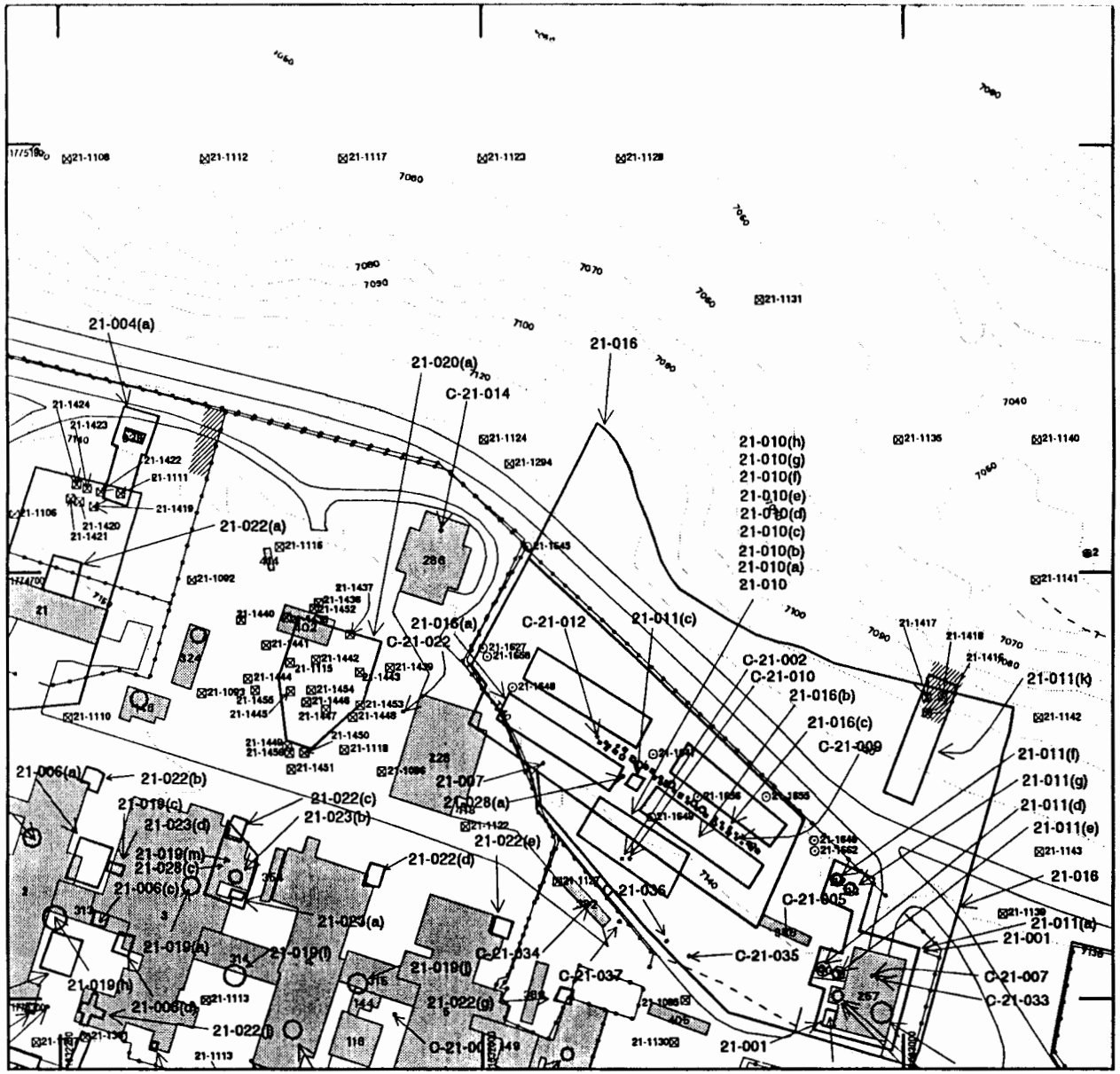
Date: April 12, 1995 FIMAD ID: G103305

TA-21: Sample Points for FY92 and FY93, Boreholes, and PRSs, map 2



TA-21: Sample Points for FY92 and FY93, Boreholes, and PRSs, map 3



LEGEND

- Contours, 10 foot
- Fence
- Potential Release Site
- Roads, Dirt
- Roads, Paved
- Building
- Radiological Survey Area
- FY92 Sample Points
- FY93 Sample Points
- Boreholes

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Map Coordinates in New Mexico State Plane Feet
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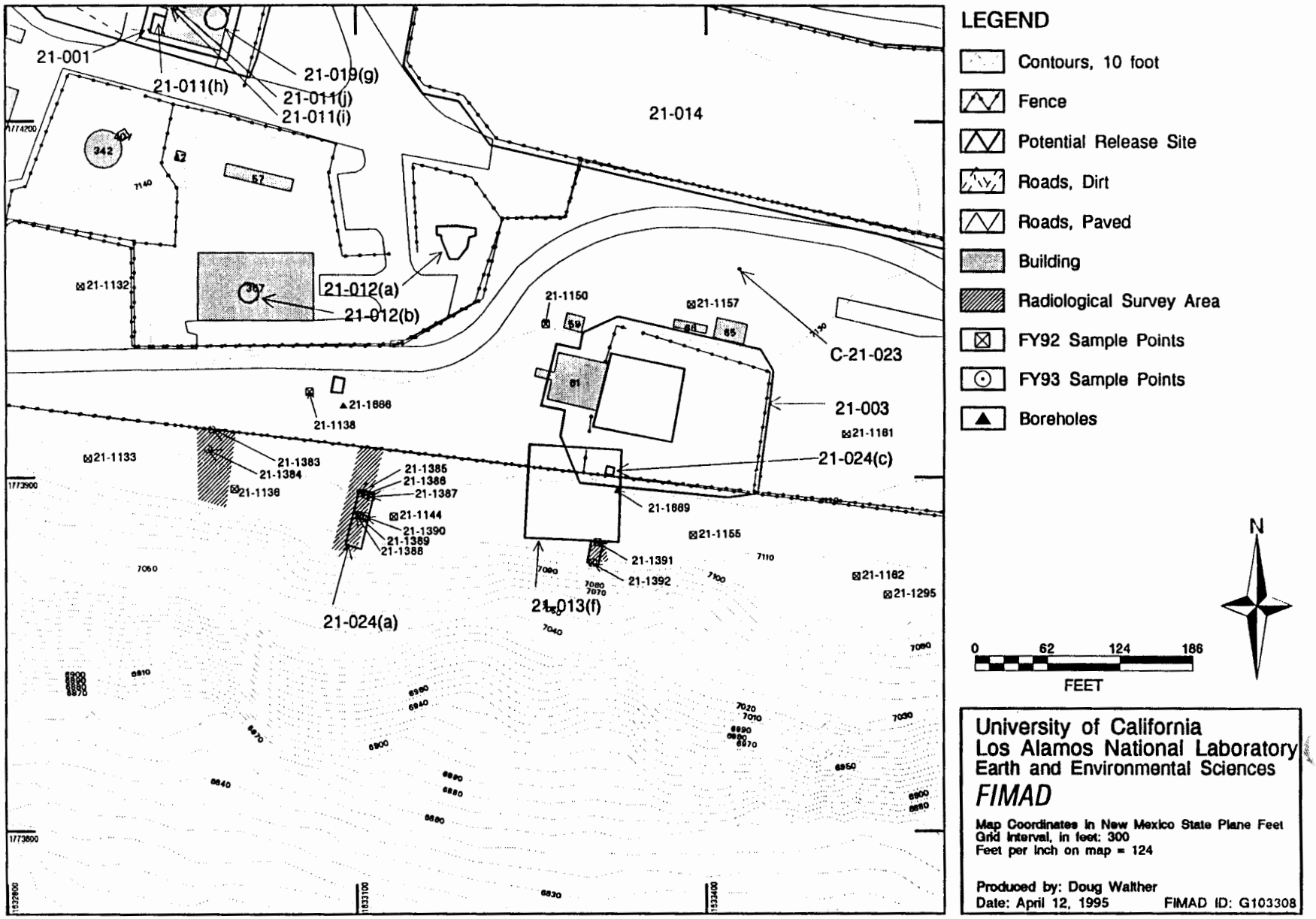
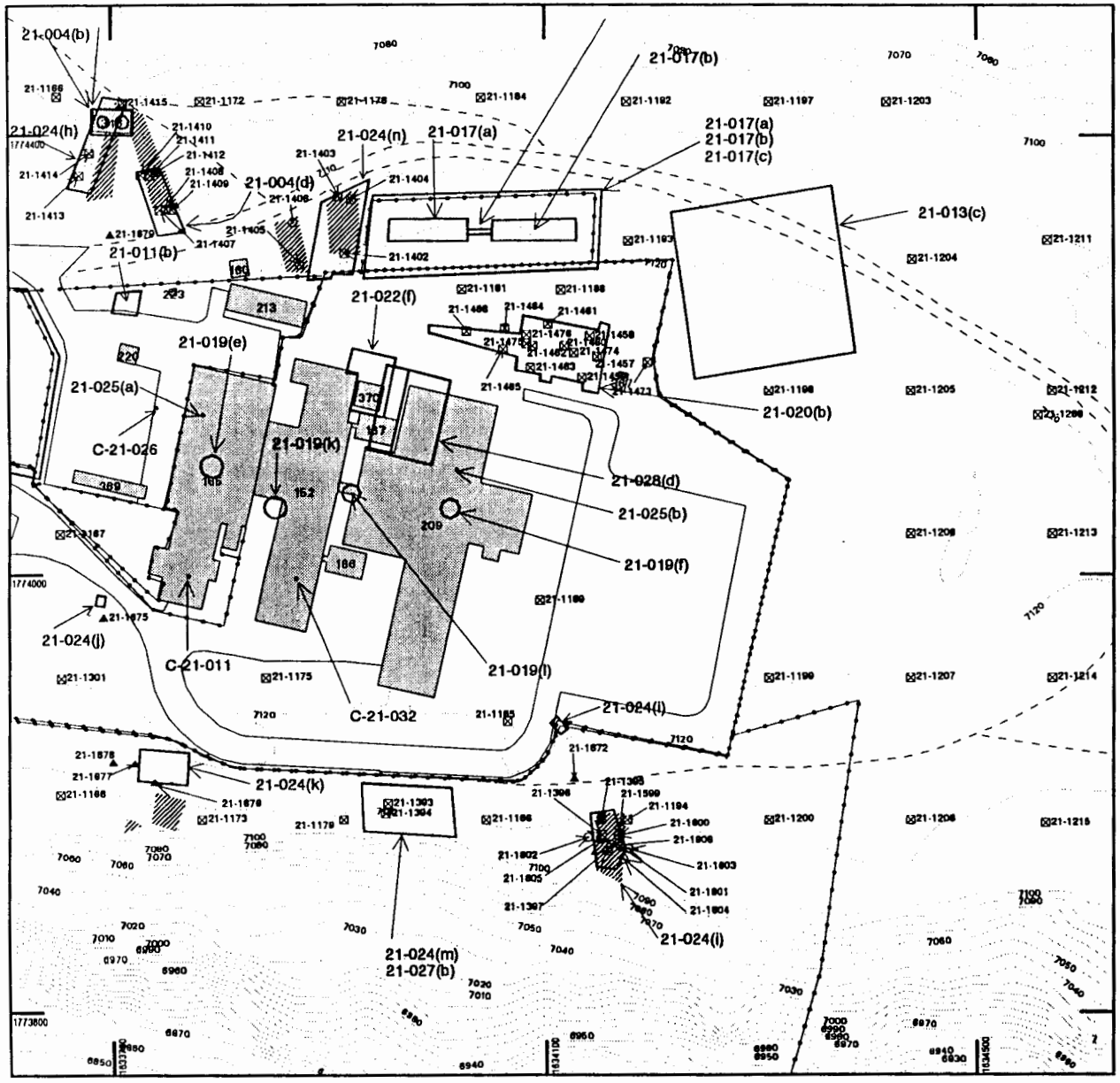
Date: April 12, 1995 FIMAD ID: G103307

TA-21: Sample Points for FY92 and FY93, Boreholes, and PRSs, map 4



TA-21: Sample Points for FY92 and FY93, Boreholes, and PRSs, map 5



LEGEND

- Contours, 10 foot
- Fence
- Potential Release Site
- Roads, Dirt
- Roads, Paved
- Building
- Radiological Survey Area
- FY92 Sample Points
- FY93 Sample Points
- Boreholes

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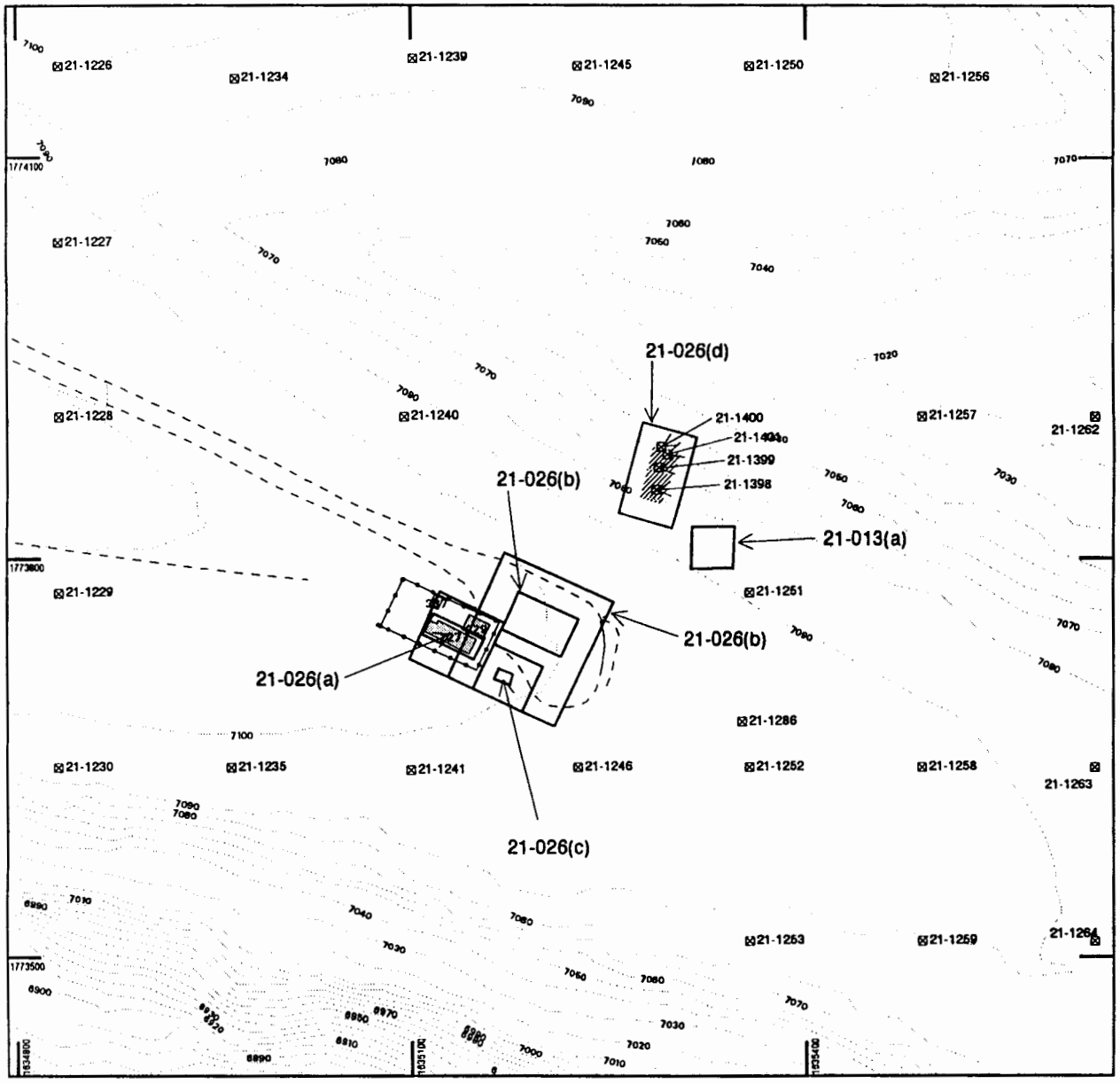
Date: April 12, 1995 FIMAD ID: G103309

TA-21: Sample Points for FY92 and FY93, Boreholes, and PRSs, map 6



LEGEND

- Contours, 10 foot
- Fence
- Potential Release Site
- Roads, Dirt
- Roads, Paved
- Building
- Radiological Survey Area
- FY92 Sample Points
- FY93 Sample Points
- Boreholes

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Map Coordinates in New Mexico State Plane Feet
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Feet per inch on map = 130

Produced by: Doug Walther
Date: April 12, 1995 FIMAD ID: G103310

TA-21: Sample Points for FY92 and FY93, Boreholes, and PRSs, map 7

Table 2.2-1 FY93 Analytes Detected Above the 95.5 Percentile of the Applicable Area Baseline along the Grid Extension

Analyte	Location	Area[1]	UTL*	Baseline* [1]	SAL*	0-1 in. Interval*	0-6 in. Interval*
Plutonium-239	21-1590	NP	-	2.04	18.0	B	3.03
Strontium-90	21-1590	NP	-	0.73	5.9	B	0.76
Uranium-234	21-1582	NP	-	2.03	86.0	2.19	B
	21-2587	NP	-	2.03	86.0	2.31	2.10
	21-1588	NP	-	2.03	86.0	2.07	B
	21-1590	NP	-	2.03	86.0	2.81	2.27
Uranium-235	21-1581	NP	-	0.15	18.0	0.31	B
	21-1582	NP	-	0.15	18.0	0.18	B
	21-1589	NP	-	0.15	18.0	0.16	B
	21-1590	NP	-	0.15	18.0	B	0.2
Uranium-238	21-1583	NP	-	2.19	59.0	B	2.23
	21-1587	NP	-	2.19	59.0	2.28	B
	21-1590	NP	-	2.19	59.0	3.2	2.52
Strontium-90	21-1590	NP	-	.73	5.9	B	.76
Cadmium	21-1578	NP	NC	1.17	80	1.3	B
Copper	21-1583	NP	15.7	18.9	3,000	26.3	B
Lead	21-1581	NP	39.0	41.1	400	46.3	68.49
	21-1590	NP	39.0	41.1	400	47	41.3
Manganese	21-1576	NP	1,030	485	11,000	542	B
	21-1577	NP	1,030	485	11,000	506	547
	21-1578	NP	1,030	485	11,000	536	B
	21-1582	NP	1,030	485	11,000	652	B
	21-1585	NP	1,030	485	11,000	516	B
Selenium	21-1577	NP	NC	0.37	400	B	0.53
	21-1581	NP	NC	0.37	400	B	0.45
	21-1590	NP	NC	0.37	400	B	0.64
Zinc	21-1581	NP	101	69	24,000	B	79.52
	21-1586	NP	101	69	24,000	B	78.9
Benzo[a]anthracene	21-1581	NP	11.9	NA	1	ND	0.82
Benzo[a]pyrene	21-1581	NP	11.4	NA	0.1	ND	0.85
Benzo[b]fluoranthene	21-1581	NP	12.1	NA	1	ND	1.4
Benzo[k]fluoranthene	21-1581	NP	18.2	NA	1	ND	1.1
Chrysene	21-1581	NP	18.3	NA	96	ND	1
	21-1583	NP	18.3	NA	96	ND	0.41
Fluoranthene	21-1581	NP	30.9	NA	3,200	ND	2.1
	21-1583	NP	30.9	NA	3,200	ND	1.1
Phenanthrene	21-1581	NP	22.7	NA	NA	ND	1.2
	21-1583	NP	22.7	NA	NA	ND	1
Pyrene	21-1581	NP	12.5	NA	2,400	ND	1.3
	21-1583	NP	12.5	NA	2,400	ND	0.94

* Organic and inorganic compounds are reported in mg/kg. Radionuclides are reported in pCi/g.
1. See LANL 1994a for discussion of variations in Baseline concentrations

- Not applicable
B Below Baseline
FY Fiscal year
NA Not available
ND Not detected
NP Non-Process area
SAL Screening action level
UTL Upper tolerance limit

Table 6.1-2

Maximum Detected Concentrations of Polynuclear Aromatic Hydrocarbons in Soil Samples Collected From SWMU 21-022(h) Compared to SALs and UTL Background Values

Analyte	Sample Depth	Location ID	Maximum Detected Concentration (mg/kg)	SAL (mg/kg)	UTL (mg/kg)
Anthracene	0-6 in	21-1382	0.340	24,000	4.0
Benzo(b)fluoranthene	0-6 in	21-1380	0.710	1.0	12.1
Fluoranthene	0-6 in	21-1380	1.1	3,200	30.9
Phenanthene	0-6 in	21-1380 (FD)	1.8	NA	22.7
Pyrene	0-6 in	21-1380 (FD)	2.2	2,400	12.5

NA = Not Available
FD = Field Duplicate

Table 9.1-2

Maximum Detected Concentrations of Polynuclear Aromatic Hydrocarbons in Soil Samples Collected From SWMU 21-026(d) Compared to SALs and UTL Background Values

Analyte	Sample Depth	Location ID	Maximum Detected Concentration (mg/kg)	SAL (mg/kg)	UTL (mg/kg)
Anthracene	6-12 in	21-1401	1.5	24,000	4.0
Benzo(a)anthracene	6-12 in	21-1401	9.1	1.0	11.9
Benzo(a)pyrene	6-12 in	21-1401	5.2	0.10	11.4
Benzo(b)fluoranthene	6-12 in	21-1401	7.8	1.0	12.1
Benzo(g,h,i)perylene	6-12 in	21-1401	1.5	NA	5.9
Benzo(k)fluoranthene	6-12 in	21-1401	2.6	1.0	18.2
Chrysene	6-12 in	21-1401	11.9	96	18.3
Fluoranthene	6-12 in	21-1401	9.3	3,200	30.9
Indeno(1,2,3-cd)pyrene	6-12 in	21-1401	2.2	1.0	6.0
Phenanthrene	6-12 in	21-1401	4.2	NA	22.7
Pyrene	6-12 in	21-1401	10.9	2,400	12.5

NA = Not Available

DRAFT MEMORANDUM

Subject: Interim Guidance for Evaluating Polycyclic Aromatic Hydrocarbons in Soil

The purpose of this memorandum is to provide ER Project personnel with an overview of interim guidance to be implemented by the Assessments Council for evaluating polycyclic aromatic hydrocarbons (PAHs) detected in soil at LANL potential release sites (PRSs). This guidance is intended to be finalized by mid-1995, pending completion of the Assessments Council's position paper on background comparisons for metals and radionuclides. Until that time, however, ER Project personnel are cautioned that evaluations completed according to this interim guidance may require revision at a later date to be consistent with the final guidance document. It should also be noted that this interim guidance does not address potential ecological concerns. Therefore, the procedures described herein should not be implemented without the assistance of a risk assessor and statistician from the Assessments Council.

Basis for Interim Guidance

PAHs have been detected in soil at several PRSs that have been investigated in the last few years. PAHs are present in the environment as a result of both natural and anthropogenic sources. Therefore, the Assessments Council is attempting to develop a consistent strategy for distinguishing the concentrations of PAHs that can be reasonably attributed to background sources from those that are the result of past Laboratory releases. If PAH concentrations at a PRS are indistinguishable from background, then remedial action may not be necessary.

Information regarding background levels of PAHs in soil in the vicinity of the Laboratory is not currently available. This interim guidance represents a phased approach that will initially rely upon a surrogate background data set based on data published in the scientific literature. If a PRS fails this initial comparison, then PRS-specific background samples may be collected during Phase 2 sampling to determine the need for further action. As data specific to LANL become available, the surrogate background data set will be re-evaluated, and the background distributions will be adjusted as necessary. Ultimately, sufficient site-specific data that are representative of local background conditions will be collected such that inclusion of surrogate data will no longer be necessary.

Surrogate Background Data Set

Various researchers have published background concentrations of PAHs in rural, agricultural, and/or urban soils collected throughout the United States and the world. Ideally, the surrogate background data set would be comprised of data collected under conditions as close as possible to site-specific conditions at LANL PRSs. The Assessments Council has reviewed several existing data sets; however, most are not applicable to LANL and/or do not contain sufficient information to be useful (e.g., analysis of benzo(a)pyrene only). At this time, the Assessments Council has adopted data from a single source (Bradley et al., 1994) to be used as the surrogate background data set. This data set was chosen because:

- the analyses included all of the individual PAHs in which the ER Project is interested,
- the analytical methods and quality assurance/quality control measures were consistent with those used by the ER Project, and
- the data were collected specifically to identify background concentrations of PAHs in soil.

The Bradley et al. data are summarized in Table 1, and are the **only** data to be used at this time. As noted above, this data set will be amended as more information becomes available. A new memorandum will be issued by the Assessments Council each time the surrogate background data set is refined.

Comparing PRS Data to Surrogate Background Data Set

In February 1995, the Assessments Council issued a draft position paper on background comparisons for metals and radionuclides (Statistical Comparisons to Background, Part I, Los Alamos National Laboratory, Environmental Restoration Project, Assessments Council, March 20, 1995). The draft position paper describes two types of comparisons: a "hot measurement" test involving comparison of the maximum detected concentration with an estimated upper tolerance

TABLE 1

Compound	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Arithmetic Mean (mg/kg)	Frequency of Detection	
2-Methylnapthalene	.017	0.64	0.151	19	62
Acenaphthene	.024	0.34	0.201	30	62
Acenaphthylene	.018	1.10	0.173	24	62
Anthracene	.029	5.70	0.351	54	62
Benzo(a)anthracene	.048	15.00	1.319	58	62
Benzo(a)pyrene	.040	13.00	1.323	57	62
Benzo(b)fluoranthene	.049	12.00	1.435	55	62
Benzo(g,h,i)perylene	.200	5.90	0.891	36	62
Benzo(k)fluoranthene	.043	25.00	1.681	59	62
Chrysene	.038	21.00	1.841	60	62
Dibenzo(a,h)anthracene	.020	2.90	0.388	32	62
Fluoranthene	.110	39.00	3.047	60	62
Fluorene	.022	3.30	0.214	35	62
Indeno(1,2,3-cd)pyrene	.093	6.00	0.987	43	62
Napthalene	.018	0.66	0.125	35	62
Phenanthrene	.071	36.00	1.838	61	62
Pyrene	.082	11.00	2.398	61	62

limit (UTL) of the background distribution, and a "distributional shift" test involving a comparison of the distribution of measured concentrations to the entire background distribution. At this time, the Assessments Council is recommending that only the hot measurement test be used for PAHs, because:

- UTLs can be estimated from the summary data presented in Table 1, and
- the distributional shift test requires the raw data, which Bradley et al. have not agreed to release to LANL.

It should be noted that the Assessments Council's position paper on background comparisons is currently being revised, and will contain several additional statistical tests that may be used to perform background comparisons. One or more of these additional tests may be applicable in

cases where the raw data are not available. If so, a new memorandum regarding PAHs will be issued by the Assessments Council.

The UTLs estimated from Bradley et al.'s summary data are presented in Table 2; the method used to calculate the UTLs is presented in Appendix A. In general, if the maximum concentration detected at a PRS falls below the UTL of the surrogate background concentration for a particular PAH, then no further evaluation of that PAH may be necessary. It is strongly recommended, however, that historical site information and process knowledge be considered in this decision, especially if the measured concentrations of all PAHs are below their respective UTLs and no further action at the site may be recommended. In addition, the presence of other potential chemicals of concern may also affect the decision to further evaluate PAHs, even if they are present at concentrations below the UTLs.

TABLE 2

COMPOUND	UTL (mg/kg)*	SAL (mg/kg)
2-Methylnapthalene	0.640	NA°
Acenaphthene	3.400	4,800
Acenaphthylene	1.100	NA
Anthracene	4.016	24,000
Benzo(a)anthracene	11.949	1
Benzo(a)pyrene	11.368	0.1
Benzo(b)fluoranthene	12.084	1
Benzo(g,h,i)perylene	5.900	NA
Benzo(k)fluoranthene	18.185	1
Chrysene	18.345	96
Dibenzo(a,h)anthracene	2.900	0.1
Fluoranthene	30.928	3,200
Fluorene	3.300	3,200
Indeno(1,2,3-cd)pyrene	6.000	1
Napthalene	0.660	3,200
Phenanthrene	22.683	NA
Pyrene	12.526	2,400

* The UTL is used except when more than 20% of the samples had non-detectable amounts of the compound of interest, then the maximum observed value is given.

If the maximum concentration for a particular PAH exceeds the corresponding UTL, then one of several possible actions may be undertaken, including, but not necessarily limited to:
If the maximum concentration detected at a PRS falls below the UTL of the surrogate background concentrations for a particular PAH, then no further evaluation of that PAH will be necessary. However, if the maximum concentration for a particular PAH exceeds the corresponding UTL, then one of several possible actions may be undertaken, including, but not necessarily limited to:

- comparing the maximum detected concentration to the appropriate screening action level (SAL),

- identifying the PAH as a chemical of potential concern to be included in a baseline risk assessment, or

- collecting PRS-specific background data for PAHs during Phase 2 sampling.

The SALs for the PAHs are also presented in Table 2. Of the 17 individual compounds,

- 7 PAHs have SALs greater than the UTLs by at least a factor of 5 (i.e., acenaphthene, anthracene, chrysene, fluoranthene, flourene, naphthalene, and pyrene),

- 4 PAHs do not have SALs due to lack of toxicity information [i.e., 2-methylnaphthalene, acenapthylene, benzo(ghi)perylene, and phenanthrene], and
- 6 PAHs have SALs that are lower than the estimated UTLs [i.e., benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene].

The relationship between the UTLs and the SALs will be taken into account when deciding the need for further action.

Conclusions

This guidance memorandum provides an overview of interim guidance for evaluating PAHs in soil at LANL PRSs. This guidance will be finalized following completion of the Assessments Council's position paper on background comparisons for metals and radionuclides. As such, ER personnel are cautioned that evaluations completed according to this interim guidance may require revision at a later date to be consistent with the final guidance document. This interim guidance also does not address potential ecological receptors, which may be of concern at some PRSs. Therefore, it is highly recommended that a risk assessor and statistician from the Assessments Council be consulted before implementing any of the procedures described herein.

REFERENCES

Bradley, L. J. N., B. H. Magee, and S. L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," in Journal of Soil Contamination, Vol. 3(4), p. 349. **(Bradley et al. 1994, 1144)**

SWMU	RFI Report 1B, C, Addendum Recommendations	NOD Comment	Proposed Status
21-004(d)	NFA	Does not need to be added to the HSWA portion of the RCRA permit	NFA
21-006(b)	Decision deferred until SWMU completely investigated	Provide schedule for adjacent SWMU investigations and reports	Phase II investigation
21-007	NFA	Need map with salamander locations; need sampling results	NFA
21-008	NFA	Does not need to be added to the HSWA portion of the RCRA permit	NFA
21-011(k)	NFA (Phase II for rad)	Risk assessment statement is wrong	NFA (Phase II for rad)
21-019(a-m)	NFA	Does not need to be added to the HSWA portion of the RCRA permit	NFA
21-020(a-b)	NFA	Does not need to be added to the HSWA portion of the RCRA permit	NFA
21-021	NFA	Need map with location; need sampling results	Keep in permit, schedule for assessment TBD
21-022(h)	Decision deferred until SWMU completely investigated	Need to do a risk assessment to write off semi-voa; need schedule for sump investigation	Continue characterization; Phase II may be required; the associated sump Phase I investigation is scheduled for May 7, 1999.
21-023(c)	NFA (Phase II for rad)	Chromium must be addressed by further sampling for hexavalent or use existing data as is	NFA (Phase II for rad)
21-024(a)	NFA	No Class 3 Mod. until blank sample info. provided	Confirmatory re-sampling, possible Phase II
21-024(b)	NFA (risk assessment for rad)	NFA (risk assessment for rad)	NFA (risk assessment for rad)
21-024(c)	Additional investigation	LANL should investigate piping and septic tank if tank not filled in; Explain carbon disulfide at 15-20' interval; Follow up sampling should identify vertical extent	Phase II investigation
21-024(d)	NFA (risk assessment for rad)	NFA (corrective action for rad)	NFA (corrective action for rad)
21-024(e)	NFA (risk assessment for rad)	NFA (risk assessment for rad)	NFA (risk assessment for rad)

SWMU	RFI Report 1B, C, Addendum Recommendations	NOD Comment	Proposed Status
21-024(f)	NFA	No Class 3 Mod. until blank sample info. provided	NFA
21-024(g)	NFA (risk assessment for rad)	No Class 3 Mod. until blank sample info. provided	NFA (risk assessment for rad)
21-024(h)	NFA (risk assessment for rad)	No Class 3 Mod. until blank sample info. provided	NFA (risk assessment for rad)
21-024(i)	Risk assessment/additional investigation	Extent of arsenic not defined; need data on organics	Phase II investigation
21-024(j)	NFA	LANL may request a Class 3 Mod.	NFA
21-024(k)	NFA	LANL may request a Class 3 Mod.	NFA
21-024(l)	NFA	No Class 3 Mod. until blank sample info. provided	NFA
21-024(m)	NFA	LANL may request a Class 3 Mod.	NFA
21-024(n)	NFA	LANL may request a Class 3 Mod.	NFA
21-024(o)	NFA	LANL may request a Class 3 Mod.	NFA
21-026(d)	NFA	Need to do a risk assessment to write off semi-voa	NFA
21-027(a)	Additional investigation	Include 6-18" intervals in phase II to bound chromium	Phase II investigation
21-027(b)	NFA	LANL may request a Class 3 Mod.	NFA
21-027(c)	Decision deferred until adjacent SWMUs investigated	Provide schedule for adjacent SWMU investigations and reports	Phase II investigation
21-027(d)	NFA	LANL may request a Class 3 Mod.	NFA