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

MAR 15 1994

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

2315 Report

Dear Mr. Honker:

Enclosed are two copies of the Quarterly Technical Report for October-December 1993 for the Environmental Restoration (ER) Program at the Los Alamos National Laboratory.

If you have questions, please ask your staff to call me at (505) 665-7203.

Sincerely,

T. J. Taylor

Theodore J. Taylor
Program Manager
Environmental Restoration Program

Enclosure

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Los Alamos National Laboratory

Environmental Restoration

A Department of Energy environmental cleanup program

QUARTERLY REPORT

OCTOBER-DECEMBER

FISCAL YEAR 1993

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LIST OF ACRONYMS AND DEFINITIONS

ADS	Activity data sheet
DOE	US Department of Energy
EES	Earth and Environmental Sciences (Division)
EES-1	Geology and Geochemistry Group
EES-5	Geoanalysis Group
EM	Environmental Management (Division)
EM-8	Environmental Protection Group
EM-9	Health and Environmental Chemistry Group
EM-13	Environmental Restoration Group
ENG	Facilities Engineering (Division)
ENG-3	Design Group
EPA	US Environmental Protection Agency
ER	Environmental restoration
FIMAD	Facility for Information Management, Analysis, and Display
HAZWRAP	Hazardous Waste Remedial Action Program
HS	Health and Safety (Division)
HS-5	Industrial Hygiene and Safety Group
HSWA	Hazardous and Solid Waste Amendments
LANL	Los Alamos National Laboratory
MDA	Material disposal area
MWSDF	Mixed-Waste Storage and Disposal Facility
NEPA	National Environmental Policy Act
NESHAP	National emission standards for hazardous air pollutants
NMED	New Mexico Environment Department
OU	Operable unit
OUPL	Operable unit project leader (ER Program)
PCB	Polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
SOP	Standard operating procedure
SWMU	Solid waste management unit
TA	Technical area

QUARTERLY REPORT
OCTOBER–DECEMBER
FISCAL YEAR 1993
LOS ALAMOS NATIONAL LABORATORY
ENVIRONMENTAL RESTORATION PROGRAM

ALBUQUERQUE FIELD OFFICE

CONTRACTOR: University of California

DIVISION LEADER: Thomas Gunderson

PROGRAM MANAGER: Robert Vocke

NUMBER OF POTENTIAL RELEASE SITES (sampling sites): Approximately 2,250

SUSPECT WASTE: Radionuclides, High Explosives, Metals, Solvents, Organics

1.0 INTRODUCTION

This quarterly report describes the technical status of activities in the Los Alamos National Laboratory (the Laboratory) Environmental Restoration (ER) Program. Each activity is identified by an activity data sheet (ADS) number, a brief title describing the activity or the technical area (TA) where the activity is located, and the name of the project leader. The Hazardous and Solid Waste Amendments (HSWA) portion of the facility operating permit (Section P, Task III, c) requires the submission of a technical progress report on a quarterly basis. This report, submitted to fulfill the permit's requirement, summarizes the work performed and the results of sampling and analysis in the ER Program.

2.0 ACTIVITY DATA SHEETS

2.1 ADS 1049—Canyons (Project Leader: Everett Springer)

The Canyons operable unit work started at the beginning of this quarter. The objective of this activity is to conduct a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) and any needed corrective measures studies of the Canyons operable unit (OU). Tasks include managing the ADS, preparing an RFI work plan, conducting the RFI, and preparing any needed corrective measures study plan and conducting that study. Reviews of work plans for OUs, such as 1093, 1098, and 1132 were conducted this quarter and show that their efforts can overlap with the Canyons OU. Initial programmatic guidance to operable unit project leaders (OUPLs) indicates that source terms must be identified; this can include tracking contamination into a canyon. When contamination has reached a channel in one of the canyons managed by OU 1049, it becomes the responsibility of the Canyons OU. If a solid waste management unit (SWMU) is in a canyon bottom, it should be characterized by the responsible OU. This is equivalent to defining a source term. The Canyons OU will require these data for assessment purposes. Because there are 19 separate canyons cutting the Laboratory property with a total length of over 100 miles, it was proposed that "mini work plans" be prepared for each canyon group (including tributaries) instead of one massive work plan. The State of New Mexico and the US Enviornmental Protection Agency (EPA) have indicated that they agree with this approach.

2.2 ADS 1066—NEPA (Project Leader: David Kraig)

A decision from the US Department of Energy (DOE) on the level of the National Environmental Policy Act (NEPA) documentation required for the Mixed-Waste Storage and Disposal Facility (MWSDF) has not been made, but the DOE/Headquarters Program Office has said it will provide a decision by February 1993. The Environmental Protection Group (EM-8) was asked to review a draft action description memorandum prepared by the DOE/Office of Environmental Restoration and Waste Management personnel to determine the level of NEPA documentation needed for the MWSDF. EM-8 continues to work on an environmental assessment, which is projected for completion in late April pending the completion of surveys. Although all cultural and most of the biological resource surveys were completed for the original site, the recently included area to the west of the original site requires additional surveys, which are scheduled for the 1993 summer field season. Surveys revealed more than 20 archeological sites in the original area, and more may be discovered in the newer western area. The sites will require excavation or mitigation before construction of the MWSDF can begin. A mitigation plan to be submitted to the State Historic Preservation Officer will require approval. Plots for pre-operational site appraisals, which were set up last quarter, will be evaluated during the next two years. The statement of work was prepared for FY93.

2.3 ADS 1067—RCRA Mixed Waste Storage and Disposal Facility (Project Leader: D. C. Nelson)

Draft copies of the Conceptual Design Report and the Design Criteria were sent to the DOE in August and September respectively. Comments were not received by the end of December. ERM/Golder has completed a draft document that summarizes their activities to date and presents recommendations to be considered in the Title I design for the pit liner and final cover of the disposal pits. The company has also finalized the Pit Liner Report. Geologic fracture analysis and geomorphic characterization activities at the proposed MWSDF site were completed. All field site-characterization work stopped in early November because of the weather. A meeting with the New Mexico Environment Department (NMED) to discuss the MWSDF was postponed from December to sometime next quarter because key State personnel could not attend on the December date.

2.4 ADS 1071—TAs-0, -19, -26, -73, -74 (Project Leader: Jim Aldrich)

RFI activities conducted during the first quarter of FY93 consisted of administrative activities and surface soil sampling at SWMU 0-011(d), Barranca Mesa Mortar Impact Area.

2.4.1 Administrative Activities

Administrative activities completed during the first quarter of FY93 included planning and scheduling of field work for FY93, coordination with property owners for access to SWMUs prior to field work, mobilization for field work, and the ongoing management of OU 1071. A phase report on RFI activities at SWMU Aggregate 0-G, Polychlorinated Biphenyl (PCB) Transformers, is being prepared.

2.4.2 Field Work

Field work for the first quarter of FY93 consisted of soil sampling at SWMU 0-011(d), Barranca Mesa Mortar Impact Area (Figure 2-1). This area is part of SWMU Aggregate 0-D and is described in Section 5.3 of the RFI Work Plan for OU 1071 (LANL 1992, 0781). The Barranca Mesa Mortar Impact Area was used as a bazooka range in the mid-1940s by the military and is currently located in a residential area of Los Alamos.

The RFI work plan for OU 1071 calls for an ordnance sweep and removal, geomorphic mapping, and surface soil sampling at SWMU 0-011(d). The ordnance sweep and clearance and geomorphologic mapping tasks were completed by the end of the fourth quarter of FY92. The surface soil sampling task at SWMU 0-011(d) was completed in the first quarter of FY93.

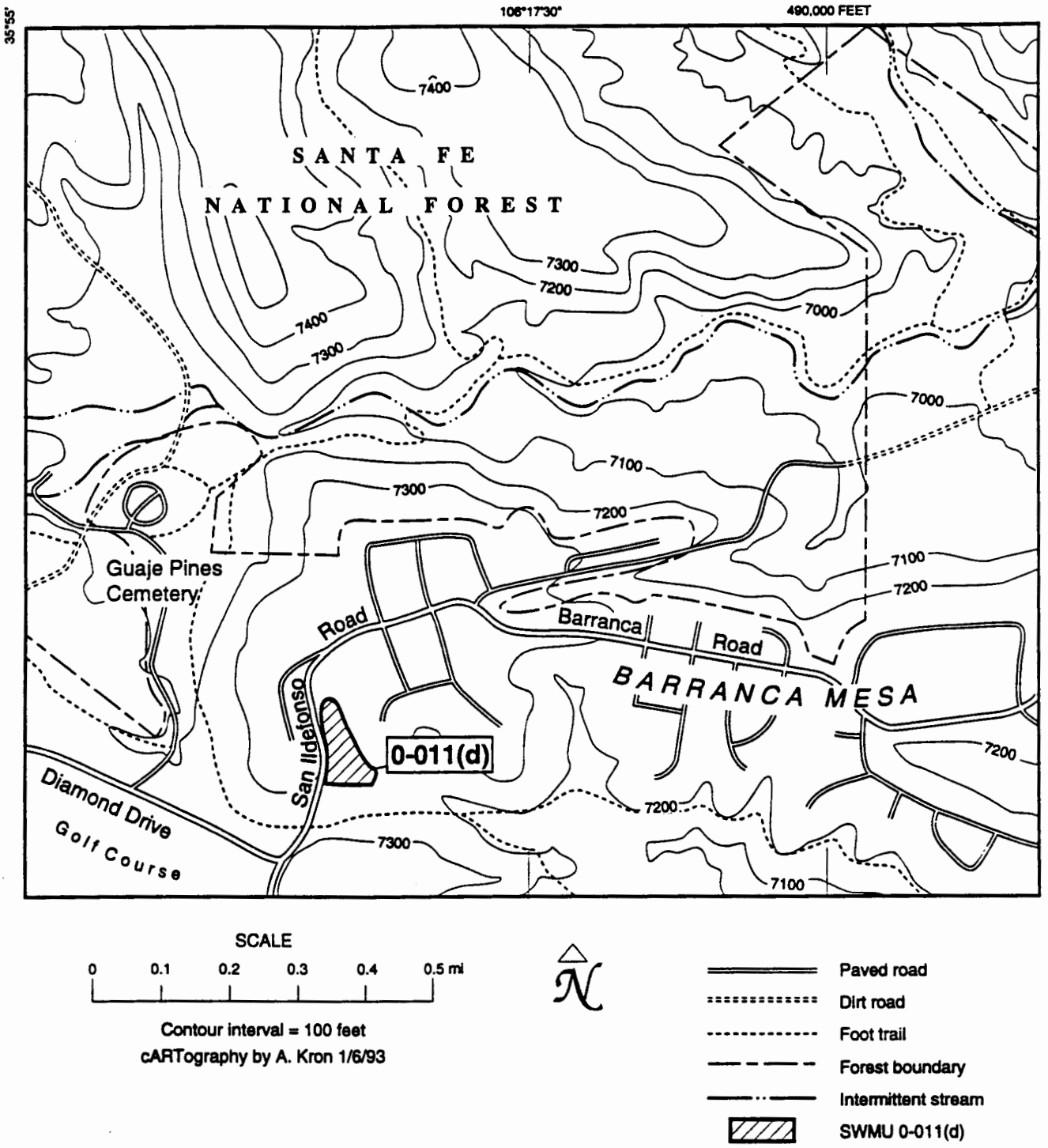


Figure 2-1. Location of SWMU 0-011(d).

2.4.2.1 Surfa.. Soil Sampling

Seven soil samples and the associated quality control samples were taken at SWMU 0-011(d) in October 1992. Surface soil sampling at SWMU 0-011(d) is described in Section 5.3.6.3 of the RFI work plan. Soil samples were collected following the procedures described in the Standard Operating Procedure (SOP) LANL-ER-SOP-06.09, "Spade and Scoop Method for Collection of Soil Samples" (LANL 1992, 0688). The soil samples were analyzed for target-analyte-list metals and high-explosive compounds as described in the Generic Quality Assurance Project Plan (LANL 1991, 0412). Results of the laboratory analyses have not yet been received.

2.4.2.2 Deviations from the Work Plan

There were no significant deviations from the OU 1071 RFI Work Plan, but there were schedule variances. Soil sampling at SWMU 0-011(d) was postponed until the first quarter of FY93 due to a funding delay. Submittal of the phase report for SWMU Aggregate 0-G, PCB Transformers, has also been postponed until the second quarter of FY93 due to a funding delay.

2.5 ADS 1078—TA-1 (Project Leader: Carl Newton)

RFI activities conducted during the first quarter of FY93 consisted of administrative activities and field work involving the collection and analyses of soil samples from trenches in the bench area below the Hillside 137 and Cooling Tower 80 SWMU Aggregates; surface- and near-surface-soil sample collection and analyses of samples in the vicinity of SWMU 1-001(m), Septic Tank 275; and the collection and laboratory screening of surface soil samples from the yards of private residences in the Los Arboles townhouse complex.

Phase I, Step 1 field work conducted for the hillside SWMUs as described in the RFI work plan for OU 1078 (LANL 1992, 0782) was completed in November 1992. Submittal of a phase report documenting field activities, analytical results, data interpretation, and recommendations for any further action will be delayed until completion of Phase I, Step 2 of the RFI in the fall of 1993. The notice of deficiency issued by the EPA Region VI on the OU 1078 RFI Work Plan indicated that explicit Phase I investigation of the subsurface SWMUs located on the mesa top was required for EPA approval of the RFI work plan. As a result, sampling and analysis plans (Phase I, Step 2) for the majority of mesa top SWMUs will be submitted to the EPA Region VI and the NMED at the end of January, with field work scheduled to begin in March 1993. Reports of field activities, analytical results and data interpretation for Phase I, Step 1 (as available) will be provided in future OU 1078 quarterly and phase reports.

2.5.1 Administrative Activities

Administrative activities completed during the first quarter of FY93 included the following: planning of field work for FY93; preparation and submittal of the response to the EPA Region VI notice of deficiency; conveyance of all Phase I, Step 1 sampling locations to the Facility for Information Management, Analysis, and Display (FIMAD); generation of FIMAD maps with all Phase I, Step 1 sample locations identified to date; coordination with property owners for access to SWMUs prior to initiation of field work; compilation of Phase I, Step 1 analytical results; mobilization for field work; and ongoing management of OU 1078.

2.5.2 Field Work

Field work for the first quarter of FY93 consisted of soil sampling activities on the bench area below the Hillside 137 and Cooling Tower 80 SWMU Aggregates; SWMU 1-001(m), Septic Tank 275; and private yards at the Los Arboles townhouses. The bench area below Hillside 137 and Cooling Tower 80 is part of

SWMU Aggregates E and G and is described in Sections 6.7 and 6.9 of the RFI work plan for OU 1078. Septic Tank 275 is part of SWMU Aggregate I and is described in Section 6.11 of the work plan. Surface soil samples were collected from the yards of the Los Arboles townhouses at the request of the DOE, area property owners, prospective buyers, and the local real estate industry to ascertain whether significant residual contamination remains from historic decontamination and decommissioning activities in TA-1.

2.5.2.1 Sampling of Bench Area Below Hillside 137 and Cooling Tower 80

The OU 1078 RFI Work Plan calls for trenching, geomorphic mapping, and subsequent surface soil sampling from the bench area below the Hillside 137 and Cooling Tower 80 SWMU Aggregates. Sampling plans for the hillside bench areas of OU 1078 are presented in Section 7.6.2 of the RFI work plan. A map depicting the location of the Hillside 137 and Cooling Tower 80 bench sampling is found as Figure 7.11-1 in the RFI work plan. On October 8, 1992, the OU 1078 sampling team hand-excavated a trench approximately 70 ft long and up to 36 in. deep (or to the tuff) in the bench crossing an old TA-1 security road that runs along the side of Los Alamos Canyon. Undisturbed tuff was encountered at a depth of between 12 in. and 3 ft. A total of 26 soil samples were collected following SOP 06.09, "Spade and Scoop Method for Collection of Soil Samples," (LANL 1992, 0688). The sample locations were 5 ft apart; 13 samples were taken at a depth of 3 in., and 13 samples were taken at the soil/tuff interface (including one replicate tuff sample). The samples were screened in the field for alpha, beta, and gamma activity in accordance with draft SOPs and for volatile organic compounds. Additionally, all 26 samples were screened at the EM-8 count laboratory using a Berthold gas proportional counter for gross alpha and beta levels and using a deep well counter for gamma activity in accordance with draft SOPs. Results from the count laboratory screening indicated that all samples had radiological activity below 20 pCi/g (gross alpha or beta).

Because none of the 26 samples exhibited elevated levels of gross radioactivity or volatile organic compounds, six samples were randomly chosen and submitted to the Health and Environmental Chemistry Group (EM-9) for a full suite of analyses. The full suite of analyses included gamma spectrometry and analyses for isotopic uranium and plutonium, total selected metals, and semivolatile organic compounds. Screening results and the sample locations and/or depths for the six samples submitted for the full suite of analyses are provided in Table 2-1.

Results from the full suite of analyses have not yet been received from the analytical laboratory and will be presented in a future OU 1078 quarterly report.

TABLE 2-1

DATA FOR HILLSIDE 137 AND COOLING TOWER 80 BENCH TRENCH

Sample ID	Depth or Location	Gross Alpha (pCi/g)	Gross Beta (pCi/g)	Gross Gamma (pCi/g)
3170	soil/tuff interface	5.82	17.8	1.82
3173	soil/tuff interface	5.65	15.8	1.57
3178	3 in.	7.71	17.0	1.81
3179	soil/tuff interface	4.96	14.1	1.56
3183	3 in.	5.82	15.5	1.51
3184	3 in.	4.10	17.7	1.53

2.5.2.2 Sampling of SWMU 1-001(m), Previous Location of Septic Tank 275

Septic Tank 275 was designed to receive sanitary waste and was located outside the TA-1 security fence at the rim of Los Alamos Canyon. This tank served Warehouse 13 and possibly Warehouse 18 and discharged directly into Los Alamos Canyon. The tank was used from 1944 to 1946, and there is no record of radioactive materials storage or use in either Warehouse 13 or 18. This SWMU was originally recommended for no further action in the OU 1078 RFI Work Plan; however, EPA Region VI requested in its notice of deficiency that additional information be provided regarding this SWMU.

On November 13, 1992, the OU 1078 sampling team hand excavated a trench approximately 30 ft long, 1 ft wide, and 1 ft deep (the depth of the soil/tuff interface). Seven soil samples were collected from the bottom of the trench at 5-ft intervals, and nine surface soil samples (0-6 in. deep) were collected from the discharge point and liquid receiving area below the septic tank location following SOP 06.09 (LANL 1992, 0688). The samples were screened in the field for alpha, beta, and gamma activity in accordance with draft SOPs and for volatile organic compounds. All 16 samples were subsequently screened in the EM-8 count laboratory using a Berthold gas proportional counter for gross alpha and beta activity and a deep well counter for gamma activity in accordance with draft SOPs. Results from the count laboratory screening indicated no elevated levels (above 20 pCi/g gross alpha or beta) of radioactivity. These screening results and sample locations and/or depths are provided in Table 2-2. Because none of the 16 samples exhibited elevated levels of radioactivity or volatile organic compounds, none of the samples were submitted for a full suite of analyses. Therefore, SWMU 1-001(m) will continue to be recommended for no further action, and these additional data are submitted to the EPA in support of this recommendation.

TABLE 2-2

DATA FOR SEPTIC TANK 275

Sample ID	Depth or Location	Gross Alpha (pCi/g)	Gross Beta (pCi/g)	Gross Gamma (pCi/g)
6200	0-6 in.	2.38	14.0	0.91
6201	0-6 in.	4.10	14.8	0.64
6202	0-6 in.	2.73	14.8	0.88
6203	0-6 in.	3.41	10.1	0.55
6204	0-6 in.	2.55	10.1	0.73
6205	0-6 in.	3.76	14.8	0.98
6206	0-6 in.	3.59	10.9	0.74
6207	0-6 in.	4.10	16.4	0.69
6208	0-6 in.	3.24	13.0	0.38
6209	1 ft	3.59	16.8	1.06
6210	1 ft	3.59	16.6	0.9
6211	1 ft	3.07	16.1	0.88
6212	1 ft	3.76	13.8	1.09
6213	1 ft	2.90	15.3	1.12
6214	1 ft	3.24	15.7	0.91
6215	1 ft	3.07	14.9	0.85

2.5.2.3 Surface Sample Collection at Los Arboles Townhouses

The purpose of the sampling effort at the Los Arboles townhouses was to provide radiological screening information on exposed surface soils in townhouse yards in TA-1. The investigation was designed to determine whether a present-day health risk exists due to residual contamination remaining on a property and being exposed as surficial soils.

On December 2, 1992, the OU 1078 sampling team collected a total of 35 surface soil samples (0-3 in. deep) from 30 townhouse yards and a play ground where bare soil was evident, following SOP 06.09 (LANL 1992, 0688). The samples were screened in the field for beta and gamma activity using an ESP-1 beta/gamma pancake meter. The samples were then screened in the EM-8 count laboratory using a Berthold gas proportional counter for gross alpha and beta activity and using a deep well counter for gamma activity in accordance with draft SOPs. Results from these screening activities revealed neither field-measured beta/gamma activity above background nor elevated levels of radioactivity (above 20 pCi/g gross alpha or beta); therefore, no samples were submitted for a full suite of analyses. Screening data are still being validated and must be presented to the homeowners prior to release to the public in accordance with an agreement between the Laboratory and the Los Arboles homeowners association. These data tables will be provided in the OU 1078 second quarter FY93 quarterly report.

2.5.2.4 Deviations From the Work Plan

Deviations from the OU 1078 RFI Work Plan included the addition of the sampling activities at SWMU 1-001(m), Septic Tank 275, and the collection of soil samples (0-3 in. deep) from the backyards in the Los Arboles townhouses for the reasons described above. There were no significant schedule variances.

2.6 ADS 1079—TAs-10, -31, -32, -45 (Project Leader: Garry Allen)

OU 1079 personnel submitted a response to the EPA's notice of deficiency for the RFI work plan for OU 1079 (LANL 1992, 0783). As requested in the notice, the subsurface sampling plan for TA-10 (Bayo Canyon) was reworked to include evaluating the maximum volume to be remediated and to specify borehole locations. The Laboratory contingent of the technical team for OU 1079 was identified and enlisted, and the corresponding statements of work were completed. Contracts for external personnel are being prepared. A baseline update for OU 1079 was prepared as part of an overall ER Program baseline update. OU 1079 personnel discovered and corrected significant scheduling errors and are preparing for a formal baseline change control. Progress is being made to learn the logistics of the ER Program data system, which transfers the data to the FIMAD from EM-9 and accesses this data base to perform statistical and risk-based analyses.

2.7 ADS 1082—TAs-11, -13, -16, -24, -25, -28, -37 (Project Leader: Brad Martin)

Most efforts were aimed at completing the drafts of the first RFI work plan for OU 1082; the first informal internal review of these drafts was completed on schedule. A letter to NMED was drafted requesting that SWMU 16-018, the Area P landfill, be addressed under the RFI process. The State of New Mexico indicated that rather than proceeding with that option, a closure plan must be submitted to the State no later than August 30, 1993. For the second RFI work plan, personnel initiated the RFI process for about 150 potential release sites in the OU. Activities included locating and analyzing existing data and delineating the potential release sites. All OU 1082 SWMUs were analyzed for inclusion in the HSWA permit modification. Efforts continue to get statements of work for each Laboratory organization that will have personnel working on the OU 1082 in FY93.

2.8 ADS 1085—TAs-12, -14, -67 (Project Leader: Calvin Martell)

OU 1085 personnel collected archival information, prepared maps of OU 1085 showing locations of SWMUs, and made multiple visits to TAs-12, -14, and -67 to see the SWMUs and talk with those who work in these areas. All necessary Laboratory and contract personnel agreed to work on the OU.

2.9 ADS 1086—TA-15 (Project Leader: Caroline Mason)

Personnel distributed the draft OU 1086 RFI Work Plan in November for informal Laboratory review. OU 1086 personnel then incorporated reviewer comments and issued the draft in December for informal DOE, formal Laboratory, and Value Engineering reviews.

2.10 ADS 1093—TA-18 (Project Leader: Gene Gould)

The RFI work plan for OU 1093 was submitted for formal internal review on November 9, 1992. The work plan is scheduled to be submitted to the DOE for formal review on January 22, 1993. There are no changes anticipated to this schedule.

2.11 ADS 1098—TAs-2, -41 (Project Leader: Patrick Longmire)

The RFI work plan for OU 1098 has undergone three major revisions this quarter. The drafts have been reviewed by team members, revised, and submitted to EM-13 for review. Comments from EM-13 personnel were addressed and the work plan was revised. The technical team has coordinated with the OUPL for OU 1049 concerning canyon activities. Technical issues for OU 1098 include alluvial groundwater contamination that has been characterized within the Laboratory boundary. The levels of strontium-90, cesium-137, and tritium were found to be above the drinking water standards for the Laboratory. Additional characterization wells were proposed in the work plan to identify source terms and contaminant distributions in the subsurface. Efforts are being made to coordinate risk assessment activities with ERM/Golder and several groups in the Laboratory.

2.12 ADS 1100—TA-53 (Project Leader: Gene Gould)

The RFI work plan for OU 1100 is in its infancy stage. Historical data are being gathered by members of the team. The first milestone will be the completion of a closure plan for the TA-53 lagoons. The closure plan is scheduled to be submitted to the NMED by February 12, 1993. There are no schedule changes anticipated.

2.13 ADS 1106—TA-21 (Project Leader: P. G. Eller)

Major activities conducted during the first quarter of FY93, October through December 1992, included the following:

- The subsurface portions of the filter building investigations were completed (see Section 2.13.2.3).
- Data management and data validation activities continued for the first and second rounds of surface grid sampling (see Section 2.13.2.1), outfall investigations (see Section 2.13.2.2), and filter building investigations (see Section 2.13.2.3).
- Efforts were continued to integrate the ER Program with the Decontamination and Decommissioning Program as directed by the DOE (see Section 2.13.1). A work plan

modification will be prepared to document the changes necessitated by the integration of the two programs.

- Stratigraphic and geomorphic studies of DP Mesa continued during the first quarter of FY93 and are nearly complete (see Section 2.13.2.4).

Budget projections for FY93 were completed during the quarter and revisions to the RFI schedule are being prepared and will be presented for approval as a work plan modification.

2.13.1 Administrative Activities

2.13.1.1 First Quarter Activities

During the first quarter of FY93 (October - December 1992), administrative support continued for

- RFI field work continuing from the fourth quarter of FY92, specifically the completion of subsurface portions of the filter building investigations;
- compilation of field-collected data and data management and data validation activities for analytical results from earlier field work; and
- cost estimation and scheduling of activities for FY93.

2.13.1.2 Delay Of Scheduled Activities

Funding limitations and NESHAP compliance issues in FY92 resulted in the delay of certain investigations scheduled for FY92. Those delayed are

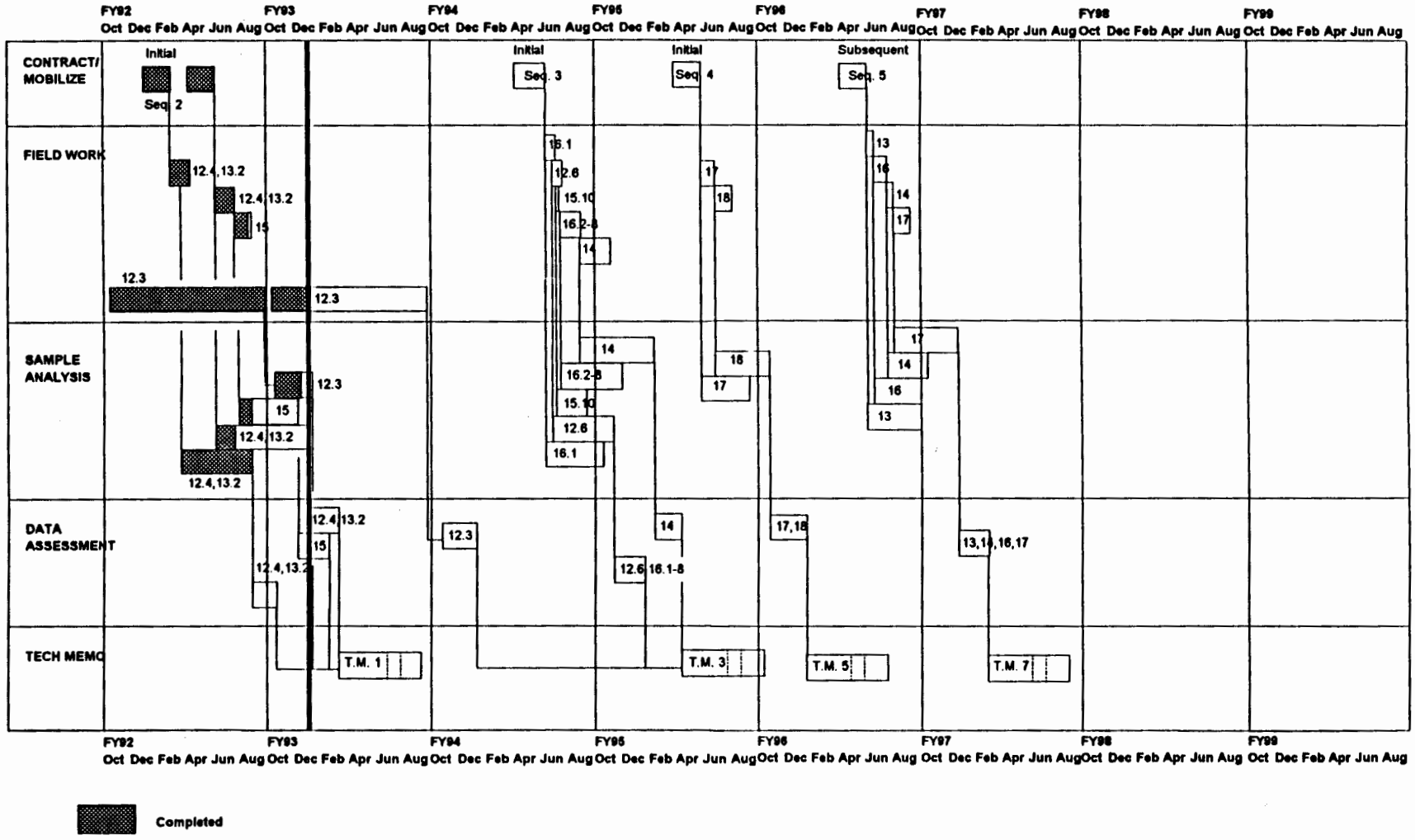
- the initial vadose zone investigations described in the RFI work plan for TA-21 (LANL 1991, 0689) in Section 12.5, Subsurface Sampling Plan (funding delay);
- initial investigations at a liquid waste disposal area as described in the work plan in Section 16.7, SWMU 21-018, Material Disposal Area V (MDA V) (funding delay); and
- subsurface investigations at outfall locations as described in the work plan in Chapter 15, Outfalls Description and Sampling Plans (NESHAP compliance delay).

The first two items are to be rescheduled during the summer of 1994. The subsurface outfall investigations may be integrated with the plans of the Decontamination and Decommissioning Program or rescheduled for the summer of 1994.

2.13.1.3 Progress Against Schedule

Figures 2-2 and 2-3 illustrate current progress through December 31, 1992, against the schedule for the TA-21 OU RFI. These figures are based on those given in the addendum to the RFI work plan for TA-21 representing the RFI schedule approved by the EPA.

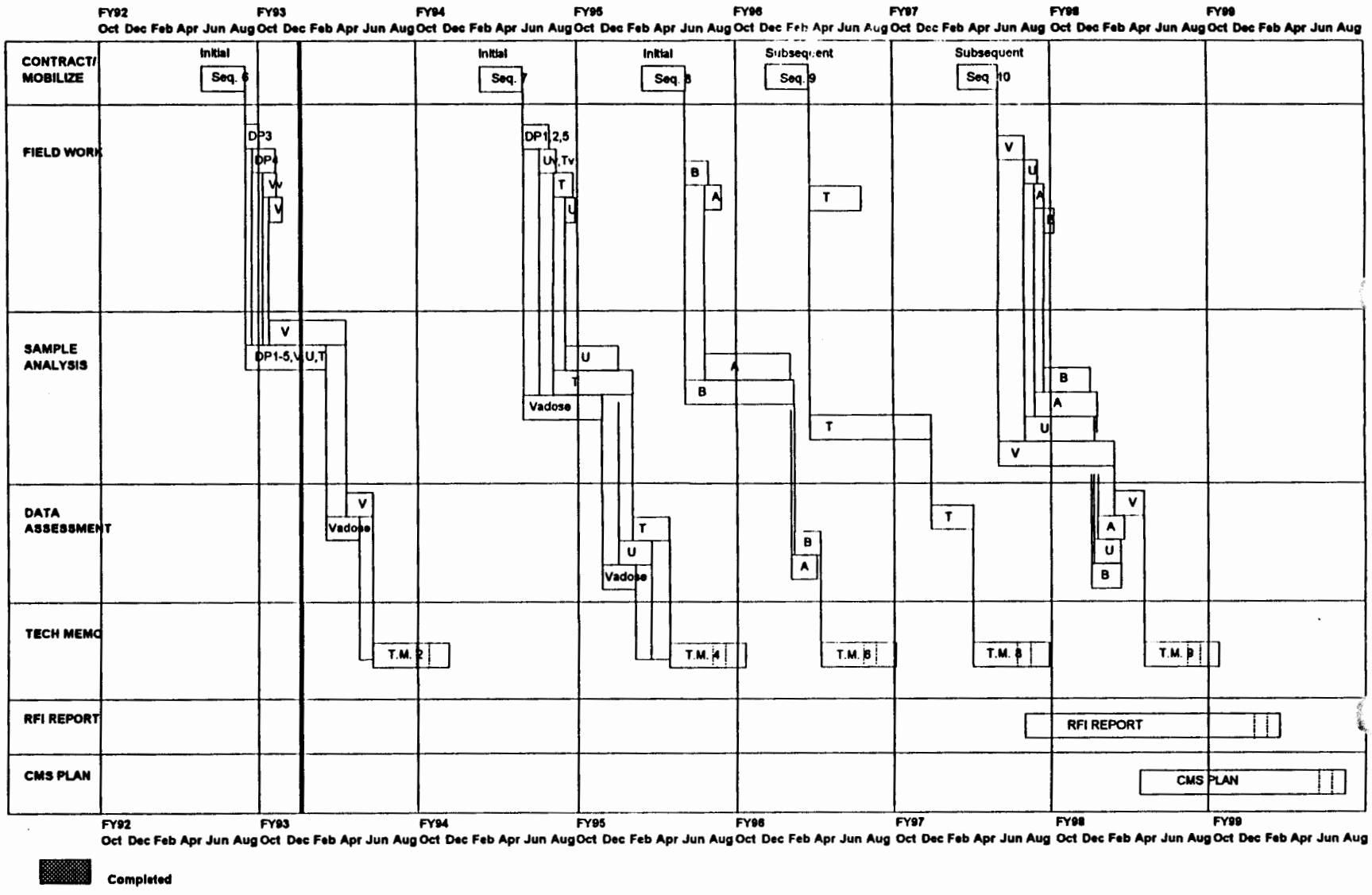
In Figure 2-2 progress is indicated as incomplete for one field work task (Chapter 15 of the work plan), representing the noncompletion of the subsurface investigations at the outfalls. Sample analyses are behind schedule due to delays in receiving analytical results.



Notes: Field work task 15 was not completed due to postponement of drilling.

Sample analysis tasks 12.4, 13.2 and 15 are not on schedule due to postponement of drilling and slow return of laboratory results.

Figure 2-2. TA-21 OU RFI Progress: near-surface investigations (12/31/92).



Note: No progress against any task is indicated since none of the scheduled work was started in FY92.

Figure 2-3. TA-21 OU RFI Progress: subsurface investigations (12/31/92).

In Figure 2-3 no tasks are shown as complete because the vadose zone investigations were not started in FY92, as discussed in Section 2.13.1.2.

2.13.2 Field Work

2.13.2.1 Mesa-Wide Surface Grid Sampling

The investigations reported in this section are those described in the work plan in Section 12.4, Surface Grid Sampling Plan, and in Chapter 13, Surface Soil Contamination from Airborne Emissions. The work plan sampling grid was found to have been based on erroneous information, as described in the ER Program's quarterly report for the second quarter of FY92. A replacement sampling plan was presented in that report and has been implemented.

Analytical laboratory results for samples from the two sampling rounds that were completed during the third quarter of FY92 continued to be delivered during the first quarter of FY93. Data validation activities for these results began during the first quarter of FY93. Table 2-3 summarizes the percentage of analysis results that were returned for the samples submitted.

TABLE 2-3

PERCENTAGE OF SURFACE GRID SAMPLE RESULTS RETURNED FROM LABORATORY

	Round 1 Samples			Round 2 Samples		
Analysis Requested	Number of Samples Submitted	Number of Sample Results Received	Percentage of Data Received	Number of Samples Submitted	Number of Sample Results Received	Percentage of Data Received
Americium-241	136	136	100%	237	66	28%
Gamma Spectroscopy	244	244	100%	269	269	100%
Plutonium-238	244	244	100%	269	126	47%
Plutonium-239	244	244	100%	269	126	47%
Strontium-90	244	244	100%	269	89	33%
Thorium-228	27	26	96%	20	14	70%
Thorium-230	27	26	96%	20	14	70%
Thorium-232	27	26	96%	20	14	70%
Tritium	244	244	100%	269	269	100%
Uranium-234	27	26	96%	20	12	60%
Uranium-235	27	26	96%	20	12	60%
Uranium-238	27	26	96%	20	12	60%
Uranium (total)	244	244	100%	269	262	97%
Metals (SW-6010) Ag	256	255	100%	282	239	85%
Metals (SW-6010) As	256	256	100%	282	238	84%
Metals (SW-6010) Se	256	256	100%	282	238	84%
Metals (SW-6010) ICPES*	256	256	100%	282	274	97%
Semivolatiles (SW-8270)	100	100	100%	80	80	100%

*inductively coupled plasma emission spectroscopy

2.13.2.2 Outfall Investigations

The investigations reported in this section are those described in the RFI work plan for TA-21 in Chapter 15, Outfalls Description and Sampling Plan (Sections 15.2 through 15.9). As described in Section 2.13.1

above, subsurface investigation activities were postponed as a result of NESHAP compliance issues. All other sampling investigations at outfall locations were completed in July 1992. Field-collected data were reported in the ER Program's quarterly report for the fourth quarter of FY92 .

Analytical laboratory results for samples from the outfall investigations continued to be received during the first quarter of FY93. Data validation activities for these results began in the first quarter. Table 2-4 summarizes the percentage of analysis results returned for the samples submitted.

TABLE 2-4

PERCENTAGE OF OUTFALL SAMPLE RESULTS RETURNED FROM LABORATORY

	Outfall Samples		
Analysis Requested	Number of Samples Submitted	Number of Sample Results Received	Percentage of Data Received
Americium-241	202	31	15%
Gamma Spectroscopy	202	178	88%
Plutonium-238	202	40	20%
Plutonium-239	202	40	20%
Strontium-90	202	56	28%
Thorium-228	98	39	40%
Thorium-230	98	39	40%
Thorium-232	98	39	40%
Tritium	202	176	87%
Uranium (total)	202	200	99%
Metals (SW-6010) Ag	213	197	92%
Metals (SW-6010) As	213	197	92%
Metals (SW-6010) Se	213	197	92%
Metals (SW-6010) ICPES	213	197	92%
Semivolatiles (SW-8270)	215	199	93%
Volatiles (SW-8240)	211	189	90%

2.13.2.3 Filter Building Investigations

2.13.2.3.1 Summary of Investigations

The investigations reported in this section are those described in the RFI work plan for TA-21 (LANL 1991, 0689) in Chapter 13, Surface Contamination from Airborne Emissions Description and Sampling Plan, in the subsections on filter buildings. The two filter buildings involved are Building TA-21-12, which served DP-West and was removed in 1973, and Building TA-21-153, which served DP-East and was removed in 1978. The investigations address the areas where the buildings once stood.

The surface investigations were conducted in July 1992. Field-collected data were reported in the ER Program's quarterly report for the fourth quarter of FY92. As noted in Section 2.13.1 above, subsurface investigations were completed in October 1992 after a delay because of NESHAP compliance issues. The field-collected data from the subsurface investigations are reported below. Table 2-5 summarizes the number of samples planned and the number actually collected.

The unplanned subsurface sampling in the footprint of Building TA-21-153 was conducted in addition to the work proposed in the RFI work plan because of the presence of tritium in near-surface soil samples collected during the surface investigation. Tritium continued to be detected in the subsurface as indicated by the field-collected data reported in Tables 2-6 and 2-7 below.

TABLE 2-5

SUMMARY OF PLANNED AND ACTUAL NUMBERS OF SAMPLES

Filter Building and SWMU No.	Samples for	Near-Surface Soil Samples Planned	Near-Surface Soil Samples Collected	Subsurface Core Samples Planned	Subsurface Core Samples Collected	QA* Samples Planned	QA* Samples Collected
TA-21-12, 21-020(a)	Field Analysis	48	48	10	10		
	Laboratory Analysis	14	15	5	5		
						16	17
TA-21-153, 21-020(b)	Field Analysis	40	40	0	8		
	Laboratory Analysis	12	10	0	4		
						11	11
Totals		114	113	15	27	27	28
Grand Total	Planned:	156					
	Collected:	168					

*quality assurance

TABLE 2-6

FIELD-COLLECTED DATA FOR BUILDING TA-21-12, SWMU 21-020(a)

Location Identification	Sample Number	Sample Depth ft	Field Laboratory: Gross Alpha pCi/g	Gross Beta pCi/g	Gross Gamma pCi/g	Gamma Spec. pCi/g	Volatile Organics microg/g	Tritium in Soil Moisture pCi/ml	Soil Moisture weight%
21-1452	AAA1367	2.5-5.0	<MDA[a]	<MDA	<MDA	<MDA	ND[b]	0	15.79
	AAA1368	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	0	10.99
21-1453	AAA1369	2.5-5.0	<MDA	<MDA	<MDA	<MDA	ND	0	16.80
	AAA1370	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	0	17.06
21-1454	AAA1371	2.5-5.0	<MDA	<MDA	<MDA	<MDA	ND	0	15.47
	AAA1372	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	49	14.07
21-1455	AAA1375	2.5-5.0	<MDA	<MDA	<MDA	<MDA	ND	0	14.69
	AAA1376	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	261	6.34
21-1456	AAA1377	2.5-5.0	<MDA	<MDA	<MDA	<MDA	ND	0	15.14
	AAA1378	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	33	17.06

a. minimum detectable activity
b. not detected

TABLE 2-7

FIELD-COLLECTED DATA FOR BUILDING TA-21-153, SWMU 21-020(b)

			Field Laboratory						
Location Identification	Sample Number	Sample Depth ft	Gross Alpha pCi/g	Gross Beta pCi/g	Gross Gamma pCi/g	Gamma Spec. pCi/g	Volatile Organics microg/g	Tritium in Soil Moisture pCi/ml	Soil Moisture weight%
21-1473	AAA1711	2.5-5.0	<MDA	<MDA	<MDA	<MDA	ND	8	7.80
	AAA1712	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	27	7.87
21-1474	AAA1716	2.5-5.0	<MDA	<MDA	<MDA	<MDA	ND	26	8.82
	AAA1717	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	130	6.07
21-1475	AAA1718	2.5-5.0	<MDA	<MDA	<MDA	<MDA	ND	7	11.37
	AAA1719	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	27	8.36
21-1476	AAA1721	2.5-5.0	<MDA	<MDA	<MDA	<MDA	ND	110	3.42
	AAA1722	5.0-7.5	<MDA	<MDA	<MDA	<MDA	ND	33	6.23

2.13.2.3.2 Status of Analytical Sample Results

Analytical laboratory results for samples from the filter building investigations continued to be received during the first quarter of FY93, and data validation activities for these results began. Table 2-8 summarizes the percentage of analysis results returned for the samples submitted.

2.13.2.3.3 Field-Collected Data

Certain field-collected data were specified in the analytical tables for the filter building investigations. In the RFI work plan, the analytical specifications are given in Table 13.2-VII, Screening and Analysis for Initial Investigations at SWMU 21-020(a) and (b), Filter Buildings.

Field-collected data specified by the work plan are summarized below.

- Field surveys: none specified. (Field surveys are measurements made at sampling locations. In areas where contaminants are present, field surveys can contribute to site knowledge in lieu of sample collection and analysis.)

- Field screening: gross gamma radioactivity, gross alpha radioactivity, and volatile organic compounds. (Field screening measurements are made on samples at the point of sample collection to identify gross contamination of significance to worker health or safety.)

- Field laboratory measurements: gross alpha radioactivity, gamma spectroscopy, tritium, volatile organic compounds. (Field laboratory measurements are made under controlled conditions in a field laboratory to provide real-time guidance to the conduct of field operations, or to aid in the selection of samples to be submitted for laboratory analysis.)

In implementing these sampling plans, a change was made to the specified field-collected data.

- Field laboratory measurements: Laboratory procedures for the transportation of potentially radioactive samples require certain radioactivity measurements to ensure compliance with the Department of Transportation regulations. Thus, two additional field laboratory measurements were made on all samples: gross beta and gross gamma.

TABLE 2-8

PERCENTAGE OF FILTER BUILDING SAMPLE RESULTS RETURNED FROM LABORATORY

	Filter Building Samples–Near-Surface			Filter Building Samples–Sub-Surface		
Analysis Requested	Number of Samples Submitted	Number of Sample Results Received	Percentage of Data Received	Number of Samples Submitted	Number of Sample Results Received	Percentage of Data Received
Americium-241	17	0	0%	7	0	0%
Gamma Spectroscopy	35	35	100%	11	0	0%
Plutonium-238	35	0	0%	11	0	0%
Plutonium-239	35	0	0%	11	0	0%
Strontium-90	35	0	0%	11	0	0%
Thorium-228	1	0	0%			
Thorium-230	1	0	0%			
Thorium-232	1	0	0%			
Tritium	35	27	77%	11	0	0%
Uranium-234	1	0	0%			
Uranium-235	1	0	0%			
Uranium-238	1	0	0%			
Uranium (total)	35	33	94%	11	0	0%
Metals (SW-6010) Ag	42	0	0%	12	0	0%
Metals (SW-6010) As	42	0	0%	12	0	0%
Metals (SW-6010) Se	42	0	0%	12	0	0%
Metals (SW-6010) ICPES	42	0	0%	12	0	0%
Semivolatiles (SW-8270)	42	26	62%	12	0	0%
Volatiles (SW 8240)	47	14	30%	13	13	100%

2.13.2.3.4 Presentation of Field-Collected Data

The presentation of data given here is based on a rapid review and compilation of the field data logs. This information is presented to document the progress to date. These data and their assessment are subject to revision after later review. The summary below should be considered a "raw data" report.

Field Screening Data. Field screening of samples in this investigation identified no samples as grossly contaminated. Since these data are primarily qualitative, and all results were non-detects or background, no specific data presentation is given.

Field Laboratory Data. Although most of the data reported by the field laboratory are less than detection limits, these data are quantitative and are reported as documentation of the low levels encountered. These results are given in Tables 2-6 and 2-7.

2.13.2.4 Geomorphologic Studies

As part of the TA-21 mesa-top characterization, geologic studies were scheduled throughout FY92 and FY93. The studies are described in Section 12.3, Geomorphologic Sampling Plan, of the TA-21 OU RFI Work Plan.

2.13.2.4.1 Stratigraphy/Lithology

Samples collected from stratigraphic section OU 1106-STRAT-2 were analyzed by x-ray diffraction to determine vertical variations in the bulk-rock mineralogy of the Bandelier Tuff at OU 1106. This stratigraphic section was measured on the north wall of Los Alamos Canyon along a north-south traverse just south of Building 209 in the eastern part of the TA-21 complex. Tuffs in the measured section consist primarily of feldspar + quartz +/- cristobalite +/- tridymite +/- glass; minor constituents include smecite, hornblende, mica, hematite, calcite, and kaolinite (Table 2-9). Volcanic glass is common in the Otowi member and in the tuffs of the Cerro Toledo interval (Figure 2-4). Glass is also present in the lower third of the Tshirege member but disappears abruptly above the vapor-phase notch, a thin, horizontal zone of preferential weathering that is widespread throughout the area. The upper two-thirds of the Tshirege member has devitrified to a high-temperature mineral assemblage of feldspar, tridymite, quartz, and cristobalite. Disposition of tridymite during vapor-phase crystallization was pervasive throughout the Tshirege member above the vapor-phase notch, but is most concentrated in the moderately welded tuffs of Unit 2 (Figure 2-4). Smectite and hematite, two minerals that are sorptive of certain radionuclides, are disseminated in small amounts throughout the stratigraphic sequence. Lateral variations in mineralogy in the Bandelier Tuff will be examined when x-ray diffraction analyses are completed for samples collected from two additional stratigraphic sections on the north wall of Los Alamos Canyon.

2.13.2.4.2 Geomorphology

Work on the geomorphic characterization of TA-21 in the first quarter included (1) completion of detailed field mapping of areas downslope of the MDAs to identify sites of potential deposition of contaminants transported by surface run-off; (2) field checking of the smaller-scale geomorphic map of the entire operable unit; and (3) investigation of the surficial deposits in DP Canyon. The deposits in DP Canyon contain a record of alternating storage and erosion of sediments that have important implications for understanding potential sediment-related transport of contaminants away from TA-21. Extensive deposits of historic sediment, up to 6 ft thick, border much of the stream channel, documenting first the aggradation of the stream bed by deposition of sediment and then the partial erosion of this sediment since construction of roads and buildings began in the drainage. The thickness and extent of this historic sediment suggest that significant quantities of contaminated material could potentially be stored in these deposits and that these sediments are appropriate sites to examine for contaminants. Active stream-bank erosion is occurring, indicating that the historic sediments are susceptible to future erosion and transport down-canyon, although radiocarbon dates of up to 26,000 years obtained from charcoal contained within older stream deposits in DP Canyon suggest that long-term storage of some of this material could also occur.

2.13.2.4.3 Faults/Fractures

A total of 1,660 fractures in the Tshirege Member Unit 2 have been measured and characterized along Los Alamos Canyon just south of TA-21. These fractures were documented by panoramic composite photographs of south-facing cliff faces along a traverse of 7,312 ft starting at a point 1,200 ft east of Omega Site and 810 ft east of the westernmost soil-sampling grid locations (second phase) and ending at a point 780 ft east of the easternmost soil-sampling grid locations (end of the mesa top). The first phase of fracture analysis has been completed with fracture numbers and locations entered into an RS/1 data base. The linear fracture density as a function of location has been computed for 10- and 100-ft intervals along the traverse (Figure 2-5). The background fracture density averages at about 20 fractures per 100-ft interval with a distinct peak showing up at about 1,700 ft west, directly south of MDA V. This fracture

TABLE 2-9

X-RAY DIFFRACTION ANALYSES OF TUFFS IN STRATIGRAPHIC SECTION OU 1106-STRAT2

Sample Field Number	Split	Elevation	Unit	I/E	Smectite	Tridymite	Quartz	Cristo-balite	Feldspar	Glass	Hornblende	Mica	Hematite	Other	Σ Crystalline Phases
OU-1106-STRAT 2-25		7103.8	Qbt-3	I	Tr	18 ± 1	15 ± 1	--	64 ± 9	--	--	--	1 ± 1	--	98 ± 9
OU-1106-STRAT 2-24		7086.7	Qbt-3	I	Tr	19 ± 1	17 ± 1	--	58 ± 8	--	--	--	1 ± 1	--	95 ± 8
OU-1106-STRAT 2-23		7069.3	Qbt-3	I	--	16 ± 1	15 ± 1	--	63 ± 9	--	--	--	1 ± 1	--	95 ± 9
OU-1106-STRAT 2-22		7053.8	Qbt-3	I	--	17 ± 1	15 ± 1	--	66 ± 9	--	Tr	--	1 ± 1	--	99 ± 9
OU-1106-STRAT 2-21		7025.9	Qbt-nw	I	Tr	18 ± 1	20 ± 2	--	58 ± 8	--	Tr	--	1 ± 1	--	97 ± 8
OU-1106-STRAT 2-20		7015.8	Qbt-2	I	--	22 ± 2	13 ± 1	--	60 ± 8	--	--	--	1 ± 1	--	96 ± 8
OU-1106-STRAT 2-19		6998	Qbt-2	I	Tr	24 ± 2	13 ± 1	--	59 ± 8	--	--	--	1 ± 1	Kaolinite-Tr	97 ± 8
OU-1106-STRAT 2-18		6977.1	Qbt-2	I	--	27 ± 2	10 ± 1	--	61 ± 9	--	--	--	Tr	--	98 ± 9
OU-1106-STRAT 2-17		6958.2	Qbt-2	I	--	19 ± 1	16 ± 1	--	58 ± 8	--	Tr	--	1 ± 1	Calcite-Tr	94 ± 8
OU-1106-STRAT 2-16		6941.2	Qbt-1v	I	--	18 ± 1	14 ± 1	5 ± 2	57 ± 8	--	Tr	Tr	1 ± 1	--	95 ± 8
OU-1106-STRAT 2-15		6923.7	Qbt-1v	I	--	9 ± 1	17 ± 1	10 ± 1	60 ± 8	--	Tr	Tr	--	--	96 ± 8
OU-1106-STRAT 2-14		6906.6	Qbt-1v	I	Tr	1 ± 1	20 ± 2	18 ± 1	60 ± 8	--	--	Tr	--	--	99 ± 8
OU-1106-STRAT 2-13		6889	Qbt-1v	I	--	--	18 ± 1	4 ± 1	46 ± 6	32 ± 6	Tr	--	Tr	--	68 ± 6
OU-1106-STRAT 2-12	Pumice	6886.5	Qbt-1g	I	Tr	--	7 ± 1	1 ± 1	20 ± 3	71 ± 3	--	--	1 ± 1	--	29 ± 3
OU-1106-STRAT 2-12	Matrix	6886.5	Qbt-1g	I	Tr	--	16 ± 1	2 ± 1	30 ± 4	52 ± 4	--	--	Tr	--	48 ± 4
OU-1106-STRAT 2-11		6873.5	Qbt-1g	I	--	--	17 ± 1	Tr	23 ± 3	60 ± 3	Tr	--	Tr	--	40 ± 3
OU-1106-STRAT 2-10		6858.1	Qbt-1g	I	--	--	15 ± 1	Tr	19 ± 3	66 ± 3	Tr	--	Tr	--	34 ± 3
OU-1106-STRAT 2-9	Pumice	6847.4	Qbt-1g	I	--	--	13 ± 1	Tr	12 ± 2	75 ± 2	--	--	Tr	--	25 ± 2
OU-1106-STRAT 2-9	Matrix	6847.4	Qbt-1g	I	--	--	12 ± 1	Tr	22 ± 3	66 ± 3	--	--	Tr	--	34 ± 3
OU-1106-STRAT 2-8		6831.8	Qbt-1g	I	--	--	11 ± 1	Tr	19 ± 3	70 ± 3	--	--	--	--	30 ± 3
OU-1106-STRAT 2-7		6816.6	Qbt-1g	I	Tr	--	18 ± 1	Tr	18 ± 3	64 ± 3	--	--	--	--	36 ± 3
OU-1106-STRAT 2-6		6800.9	Qbt-1g	I	--	--	15 ± 1	Tr	27 ± 4	58 ± 4	Tr	--	Tr	--	42 ± 4
OU-1106-STRAT 2-5		6788	Qbt-1g	I	Tr	--	12 ± 1	--	19 ± 3	69 ± 3	Tr	--	--	--	31 ± 3
OU-1106-STRAT 2-4		6771.2	Qct	I	Tr	--	4 ± 1	1 ± 1	10 ± 1	85 ± 1	--	--	--	--	15 ± 2
OU-1106-STRAT 2-3		6769.7	Qct	I	Tr	--	4 ± 1	1 ± 1	9 ± 1	86 ± 1	--	--	--	--	14 ± 2
OU-1106-STRAT 2-2		6761.3	Qbo	I	Tr	--	9 ± 1	Tr	23 ± 3	68 ± 3	--	--	--	--	32 ± 3
OU-1106-STRAT 2-1		6746.4	Qbo	I	Tr	--	9 ± 1	1 ± 1	19 ± 3	71 ± 3	--	--	--	--	29 ± 1

I/E refers to internal or external standard.

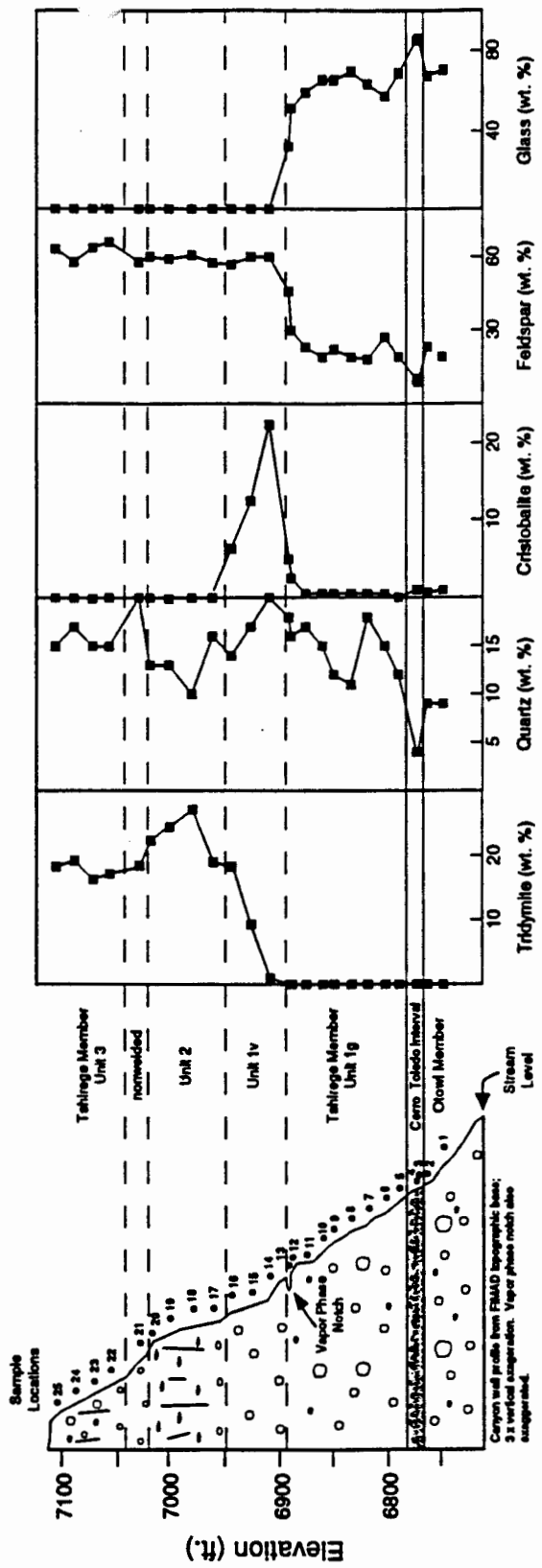


Figure 2-4. Variation diagrams showing mineralogy of tuffs in Section OU 1106-STRAT2 as a function of stratigraphic position.

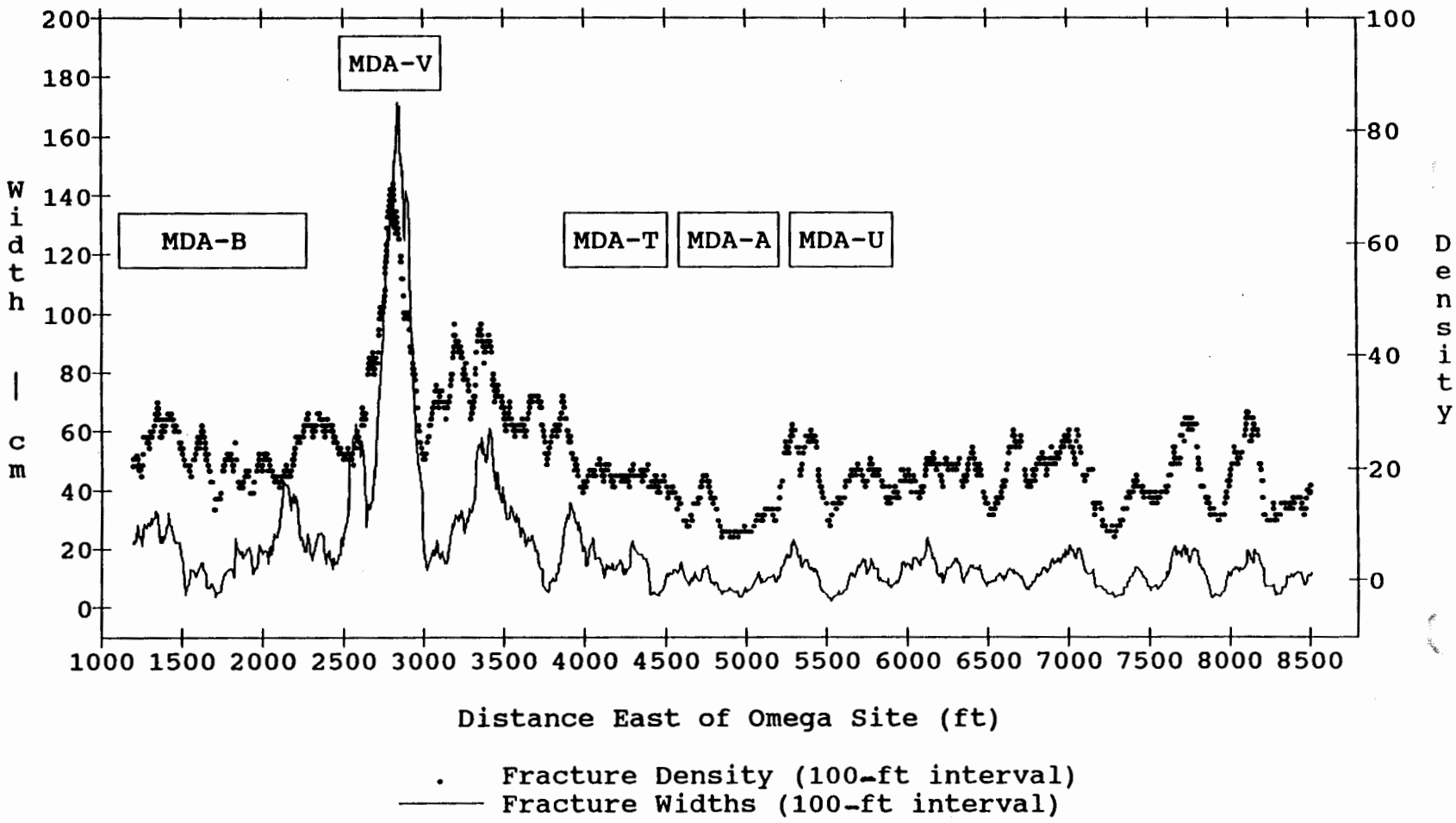


Figure 2-5. Moving window average for fracture density and fracture apertures along 7,300-ft traverse at OU 1106, north wall of Los Alamos Canyon.

density peak reaches a magnitude of 70 fractures per 100 ft and corresponds to projections of a fracture (fault) zone mapped by Vaniman and Wohletz just east of the Guaje Mountain fault zone, which approximately runs through Omega Site (3,000 ft west of the present fracture density peak). Completion of fracture analyses will involve analysis of data on fracture dips, strikes, and apertures.

2.13.2.4.4 Geologic Mapping

The bedrock geologic map for OU 1106 has been digitized and entered into FIMAD; a preliminary copy of the map is available through FIMAD. This map shows the distribution of the principal bedrock units at the site, including the following in ascending order: the Otowi member of the Bandelier Tuff, epiclastic volcanic sedimentary rocks and tuffs of the Cerro Toledo interval, and the Tshirege member of the Bandelier Tuff. The Tshirege member is subdivided into mappable subunits based on physical and erosional characteristics of the tuff. These subunits are separated by nonwelded tuffs. Alluvial and colluvial deposits are also shown where they cover the bedrock units.

2.14 ADS 1111—TAs-6, -7, -22, -40, -58, -62 (Project Leader: Cheryl K. Rofer)

Geological features, hydrological features, and SWMU configurations are being investigated in the field as needed for the development of sampling plans. The following progress was made on the OU 1111 RFI Work Plan: Chapter 4 and portions of Chapter 5 were completed; the Executive Summary, Chapter 1, Chapter 2, Chapter 6, as well as the remaining portions of Chapter 5 showed progress. To expedite decisions on remediation, OU 1111 personnel began a pilot study on the mineralogy of material in the outfall channel from a plating and etching bath, SWMU 22-015. Information on potential release sites was submitted for the HSWA permit modification. A summary of the biological survey revealed that no threatened or endangered species were found in OU 1111, but potential habitats exist. Budgets and schedules were formulated for FY93. The project leader participated in the DOE ER Technology Information Exchange Meeting in Pleasanton, California, and discussed remediation of firing sites with Lawrence Livermore National Laboratory personnel.

2.15 ADS 1114—TAs-3, -30, -59, -60, -61, -64 (Project Leader: Ed Griggs)

Primary efforts were aimed at completing the first and additional drafts of all chapters, appendices, and annexes of the OU 1114 RFI Work Plan. These were completed and the first informal internal review was completed on schedule. Comments were incorporated, and 26 draft copies were issued ahead of schedule in December for the informal DOE, formal Laboratory, and Value Engineering reviews. A compilation of SWMUs in OU 1114 was made for incorporation into the first HSWA permit modification request. SWMU 3-010(a), the late 1950s mercury spill near TA-3-30, is being prepared for voluntary corrective action. The NMED and EPA Region VI reviewed the revised sampling and remediation plan; OU 2224 personnel delivered a response letter to each agency in December. Los Alamos will conduct periodic water sampling during the winter and prepare for remediation in the late spring or early summer. Efforts continue to get the statements of work for each Laboratory organization that will have personnel working on OU 1114 in FY93.

2.16 ADS 1122—TAs-33, -70 (Project Leader: Keith E. Dowler)

ICF Kaiser Engineers, Inc. will perform surveying, radiation and geophysics measurements, and sampling at the TA-33 main site and at the Area 6 site. OU 1122 personnel specified the analysis needs and schedule for FY93 to assist the Sample Coordination Facility. The following have been addressed to prepare for a readiness review before starting field work: SOPs, national emission standards for hazardous air pollutants (NESHAP), site-specific health/safety and waste management plans, and field-personnel training requirements. All OU 1122 SWMUs and areas of concern were reviewed using criteria to select units that are to be included in a HSWA permit modification request. No response has been received from the EPA/NMED review of the RFI work plan for OU 1122 (LANL 1992, 0784).

2.17 ADS 1127—TA-35, TSL-125 (Project Leader: Dave McInroy)

OU 1127 personnel received NMED approval of the closure plan amendment, which includes a sampling plan to identify potential Ten-Site Canyon contamination related to surface impoundments activities. The Laboratory sampled Ten-Site Canyon on December 1, 1992. NMED split the samples with the Laboratory; analytical results are pending.

2.18 ADS 1129—TAs-4, -5, -35, -42, -48, -52, -55, -63, -66 (Project Leader: Allyn Pratt)

Most activities of OU 1129 involved the development of the project infrastructure to support planned field activities that begin the last quarter of FY93. To date the EPA Region VI has not reviewed the RFI work plan for OU 1129 (LANL 1992, 0785). Sampling and analysis plans for SWMUs not included in the original work plan were drafted and reviewed. Facilities Engineering's Design Group (ENG-3) established 50 geodetic reference monuments within OU 1129; vertical control for these monuments will be completed in the spring. The project schedule and budget were reviewed with the Environmental Restoration Group (EM-13) Management Information System personnel. Personnel conducted a quality assurance review of OU 1129 operations to ensure compliance with all SOPs, administrative procedures, and quality procedures. No analytical results from prior sampling activities were available this quarter.

2.19 ADS 1130—TAs-36, -68, -71 (Project Leader: Gene Gould)

The informal review of the RFI work plan for OU 1130 resulted in extensive revisions and a slight slippage in the schedule. However, there are no further schedule changes anticipated. The plan is scheduled to be submitted to the DOE for its formal review on February 22, 1993.

2.20 ADS 1132—TA-39 (Project Leader: Gene Gould)

The RFI work plan for OU 1132 was submitted for formal internal review on December 16, 1992. The work plan is scheduled to be submitted to the DOE for formal review on February 26, 1993. There are no changes anticipated to this schedule.

2.21 ADS 1135—TA-40 (Project Leader: Dave McInroy)

Final results of sampling phases I-IV identified contamination at several locations throughout the site. Because the contamination at this site was unexpected (based on historical sampling), an amendment to the closure plan is being written to address the strategy for delineation and possible clean-up of these areas. A risk assessment is being performed on those contaminants (lead, antimony, beryllium, and thallium) that were identified at the site to be above action levels . The State of New Mexico has been informed of the Laboratory's intent to modify the closure plan.

2.22 ADS 1136—TA-43 (Project Leader: Calvin Martell)

OU 1136 personnel collected archival information, prepared maps of the OU showing the locations of SWMUs, and made multiple visits to TA-43 to see SWMUs and to talk with those who work with these areas. All necessary Laboratory and contract personnel have agreed to work on the OU.

2.23 ADS 1140—TA-46 (Project Leader: Roy Michelotti)

Archival effort and data base entry of OU 1140-related documents have been completed. OU 1140 team meetings were held to review potential release sites to prepare work plan sections. A septic-system alternatives study was completed, and the results were used to decide how to approach the investigation of all septic systems and drywells in the work plan. The DOE Hazardous Waste Remedial Action Program

(HAZWRAP) team favorably received a briefing on the approach and status of the OU 1140 RFI Work Plan; the team requested that results of the study be included as an appendix in the work plan. Field work investigations of outfalls were completed. Seventeen new potential release sites (16 SWMUs and 1 area of concern) were included in the HSWA permit-modification submittal. Progress is being made on the RFI work plan. The OU team reviewed the Executive Summary, Chapter 1, and the first draft of Chapter 4. Personnel have drafted all six SWMU aggregate sections in Chapter 5, completed Chapter 6 and all annexes except the Health and Safety Plan, and are working on the appendices. A summary report of the biological resources study has been submitted, and the summary of the cultural resources study is complete.

2.24 ADS 1144—TA-49 (Project Leader: Ines Triay)

The Health and Safety Plan was completed for soil sampling at TA-49. OU 1144 personnel identified Area 2 sampling locations, named members of the sampling team, and held a readiness review. Sampling was delayed until spring because of winter weather. Plans were completed for sampling and water removal of hole CH-2 at Area 2. The Health and Safety Plan for drilling is under review. OU 1144 and the Public Affairs Office developed a presentation of environmental remediation efforts at TA-49 for public information meetings scheduled for early 1993.

2.25 ADS 1147—TA-50 (Project Leader: Cheryl K. Rofer)

Official response to the EPA's notice of deficiency was sent on October 14, 1992. A second, informal response was sent December 23, 1992, following further questions from the EPA. Comments have not been received from the State of New Mexico. OU 1147 personnel are planning soil sampling in the spring and are preparing statements of work. Potential release site information was prepared for the HSWA permit modification submittal. Budgets and schedules were formulated for FY93.

2.26 ADS 1148—TAs-51, -54 (Project Leader: Don Neeper)

The objective for this quarter was to establish scopes of work for FY93. Most of the work during FY93 will be directed to Material Disposal Area (MDA) L where RFI activities will accelerate the voluntary corrective action to remedy the subsurface chemical plume; the voluntary corrective action plan in Appendix A of the RFI work plan for OU 1148 (LANL 1992, 0788) is being revised. EM-9 has completed the analyses of all gas samples collected from monitor wells at MDA L and is reviewing the data to assess current characteristics of the plume and the changes in concentration since the installation of the network. OU 1148 personnel are developing more efficient and accurate methods for collection and analysis of gas samples. The Geology and Geochemistry Group (EES-1) has begun geologic mapping in a new disposal pit at MDA G. Although fundamental to the RFI at this site, this information will also be used when investigating subsurface air flow through the corresponding strata at MDA L. The Geoanalysis Group (EES-5) is developing a computer code to monitor the subsurface air flow at MDA L. Using the input from geologic mapping on the mesa, EES-5 will use the code in the design of the network of extraction wells to remediate the plume at this location. The EPA and NMED have not completed the review of the RFI work plan for OU 1148.

2.27 ADS 1154—TA-57 (Project Leader: Tracy Glatzmaier)

Potential release sites in OU 1154 were reviewed as part of the HSWA permit modification process. OU 1154 personnel participated in the DOE baseline review.

2.28 ADS 1157—TAs-8, -9, -23, -69 (Project Leader: Tracy Glatzmaier)

The primary goal for this quarter was to complete the first draft of the OU 1157 RFI Work Plan. The draft was submitted for informal Laboratory review. Most of the comments that were received from the

reviewers have been incorporated. The OU team also worked on the annexes and references. Potential release sites were reviewed this quarter as part of the HSWA permit modification process. OU 1157 participated in the DOE baseline review. The work plan reviewers from the DOE HAZWRAP team in Oak Ridge, Tennessee, were given an overview presentation and site tour of OU 1157 as background information before reviewing the work plan.

2.29 ADS 2105—Technical Programmatic Support

2.29.1 Decision Analysis

Background materials were reviewed on Bayo Canyon and MDA E to prepare for the development of decision analysis models. Personnel presented an invited paper, "Los Alamos Decision-Based Technical Approach for Streamlining the RFI Process," at the November DOE Technology Information Exchange/Workshop in Pleasanton, California. Also presented was a demonstration of decision analysis software to support the selection of a remediation alternative for an MDA. A draft of the model of the potential release site ranking system was completed, and the model was presented to the ER Program staff. Personnel submitted the model for DOE and ER Program review.

2.29.2 Ecological Risk Assessment

One goal for the quarter was to develop an ecological risk assessment approach for the LANL ER Program. Other goals were to develop methodology for the Natural Resource Damage Assessment and to integrate that assessment with the ecological risk assessment and environmental evaluation efforts such as NEPA and the Endangered Species Act. The sole source justification and the statement of work were completed for a contract with the Colorado State University Center for Ecological Risk Assessment and Management to develop a screening model for the terrestrial ecosystems at Los Alamos. Personnel organized and participated in the ER Program workshop, "Integrating Human Health and Ecological Risk Assessment"; participants included the Laboratory's Environmental Protection Group (EM-8) and the Environmental Science Group (EES-15), Argonne National Laboratory, Colorado State University, and operable unit project leaders who have ecological assessment problems. The technical team is reviewing ecological data for E-F Site, which will be used to prototype and test ecological models. Guaje Canyon is a tentative control area for ecological studies to include geology and plant sampling.

2.29.3 Facility for Information Management, Analysis, and Display

Development work at the FIMAD has been concentrated in three areas: the distribution and evaluation of the prototype data access interface, the establishment of high-speed communications between FIMAD clients and the ER data base, and the installation of data storage and distribution hardware and software. Feedback from the clients who tested the prototype has resulted in a more clearly defined set of requirements for the production version of this software. Phase 1 of the US West Transparent Local Area Network Service is about half-way completed. Most major acquisitions for the FIMAD upgrade were received during the past several months, including file/data servers, magnetic disks, optical disc jukeboxes, and back-up/disaster recovery system software. Production work at the FIMAD included an update of the Geographical Information System data for potential release sites and the creation of maps and illustrations for baseline studies. Scanning software and hardware were upgraded to handle 24 bits of color data so that orthophotos can be scanned and analyzed in true colors.

2.29.4 Framework Studies

The Earth Sciences Technical Team, within the ER Program, was reorganized during the first quarter of FY93. The positions of Team Leader and Principal Investigator for Framework Studies have been combined to better coordinate and integrate Earth Science activities and data. The season's geological

field investigations in support of the MWSDF and the TA-21 Operable Unit were completed. A preliminary geologic map of DP-Site is now in the FIMAD data base and generally available. Sites have been marked and permitting is proceeding for fault-locating trenches on Pajarito Mesa for the MWSDF. Collection of fluid samples for background data continued this quarter, and a preliminary report will be presented at the first ER Technical Session, which is being organized for February 1993. In addition, most analytical results have been received for background studies of soils and Bandelier Tuff. These results will be presented at the upcoming Technical Session. Representatives of the Earth Sciences Technical Team reviewed three RFI work plans, inspected and toured the surface run-off and interflow experiment station, and served on the newly formed ER Program's Quality Council.

2.29.5 Human Health Risk Assessment

The technical team continued work with Argonne National Laboratory to assemble values and ranges for hydrologic and geologic parameters for radionuclide screening action levels. The team continued the support of ten operable units to develop source information, nature and extent of contamination, and conceptual model portions of the work plans. Personnel began organizing the RESRAD workshop for February and developed examples based on data from Los Alamos sites. The Human Health Risk Assessment Committee met with the Ecological Risk Assessment Technical Team members and personnel from Colorado State University and Argonne National Laboratory to identify and discuss important human health issues.

2.29.6 Records Processing Facility

The ER Records Processing Facility received and reviewed approximately 15,400 record pages. To date the staff has entered approximately 12,000 records into the records relational data base. The staff recently had interviews with Los Alamos Technical Associates and answered questionnaires for assisting with the development of the Laboratory's Environmental Management Division Records Management Document Control Program. Personnel continued to work closely with the Laboratory's Legal Counsel to identify ER records for review. The Records Processing Facility staff are also working on the conversion of its data base to the FIMAD data base. The staff has completed a design of pre-index sheets for use on all repetitive incoming records used for field activities.

2.29.7 Statistics/Data Quality Objectives

The technical team organized, attended, and gave presentations at the Data Quality Validation/Data Quality Assessment workshop. The current draft of the Generic Quality Assurance Project Plan was reviewed and comments were prepared for the ER Program. An outline for quality assurance components that should be included in RFI work plans is being developed for presentation to the Quality Council. The team worked with Argonne National Laboratory to write Chapter 4 and Appendices G, H, I, and J for the November 1992 revision of the Installation Work Plan (LANL 1992, 0768). To learn about analytical measurements, the team met with EM-9 personnel, were briefed on a computerized methods compendium, and toured two mobile laboratories. Personnel reviewed several RFI work plans for OUs and helped develop data quality objectives, conceptual models, and sampling plans. The technical team worked with FIMAD to develop a format for analytical data retrieval. Data quality assessment sections of the OU 1071 phase report on PCB transformers were revised, and a response was made to selected NMED comments on the OU 1071 RFI Work Plan. Data assessment support was provided to OUs with field data. The technical team participated in an ER Program workshop, "Integrating Human Health and Ecological Risk Assessment" and organized a two-day on-site SitePlanner training class.

2.30 ADS 2107—Management (Program Manager: Robert Vocke)

Routine programmatic management activities continued.

2.31 ADS 2110—Mobile Field Laboratories and Sample Coordination (Project Leader: John Miglio)

2.31.1 Mobile Field Laboratories

The mobile radiological analysis laboratory completed the field support for the TA-21 OU project by analyzing the last 25 samples during the first week of October. The design and procurement process was initiated for a second mobile laboratory.

2.31.2 Quality Assurance/Data Management

Quality control samples, in support of the ER Program, were prepared and added to samples received from the field. EM-9 analytical records were archived during this quarter. Personnel evaluated the Scyllac Building and determined that it was inadequate for handling the volume of records being generated. Adequate space was located at Building TA-3-105, Rm 184. Plans are under way for the renovation of that area and its occupancy by the EM-9 sample coordination staff.

Extensive sets of semivolatile, volatile, pesticide, herbicide, radiochemical, and metals data for TAs-1, -21, -42, and -45 were received from commercial contractors this quarter. These data are being entered into the Laboratory Information Management System for the production of final reports and for transfer to the FIMAD. To date over 14,100 analyses have been entered into the system and reported to the ER Program OUPLs. In other data management activities, personnel are using the ENTER program to input the inorganic and radiochemistry data and are using LOTUS software for the semivolatile data. A steady flow of organic, inorganic, and radiochemistry data are being reviewed and reported. Personnel met with the TA-21 OU team to discuss data assessment and data reporting. Personnel also addressed problems with the entry and reporting of contractor data on the Laboratory Information Management System. In other action, software was written that will produce status reports of contractor samples, and a requirements document was developed for subcontracts. Plans are under way for PAR Enterprises, Inc. to develop LOTUS 1-2-3 spreadsheets and other spreadsheets for reporting results that incorporate generally accepted Laboratory practices. The company will also develop software to check the deliverables for completeness and compliance with specifications. Information was prepared for a data assessment workshop for the ER Program.

2.31.3 Sample Coordination Facility

The Sample Coordination Facility received 27 samples from ADS 1071 and 14 samples from ADS 1078. Data packages from contract laboratories were reviewed for completeness. The laboratories were contacted to resolve discrepancies in the data reported.

3.0 REFERENCES

LANL (Los Alamos National Laboratory), May 1991. "Generic Quality Assurance Project Plan for RCRA Facility Investigations for the Los Alamos National Laboratory Environmental Restoration Program," Rev. 0, Los Alamos National Laboratory Report, Los Alamos, New Mexico. (LANL 1991, 0412)

LANL (Los Alamos National Laboratory), May 1991. "TA-21 Operable Unit RFI Work Plan for Environmental Restoration," Volumes I-III, Los Alamos National Laboratory Report LA-UR-91-962, Los Alamos, New Mexico. (LANL 1991, 0689)

LANL (Los Alamos National Laboratory), March 16, 1992. "Environmental Restoration Standard Operating Procedures," Vols. I and II, Los Alamos, New Mexico. (LANL 1992, 0688)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1071," Los Alamos National Laboratory Report LA-UR-92-810, Los Alamos, New Mexico. (LANL 1992, 0781)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1078," Los Alamos National Laboratory Report LA-UR-92-838, Los Alamos, New Mexico. (LANL 1992, 0782)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1079," Los Alamos National Laboratory Report LA-UR-92-850, Los Alamos, New Mexico. (LANL 1992, 0783)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1122," Los Alamos National Laboratory Report LA-UR-92-925, Los Alamos, New Mexico. (LANL 1992, 0784)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1129," Los Alamos National Laboratory Report LA-UR-92-800, Los Alamos, New Mexico. (LANL 1992, 0785)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1148," Los Alamos National Laboratory Report LA-UR-92-855, Los Alamos, New Mexico. (LANL 1992, 0788)

LANL (Los Alamos National Laboratory), November 1992. "Installation Work Plan for Environmental Restoration," Revision 2, Los Alamos National Laboratory Report LA-UR-92-3795, Los Alamos, New Mexico. (LANL 1992, 0768)