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Revised Sampling and Analysis Plan for OU 1129 Aggregate J

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REVISED SAMPLING AND ANALYSIS PLAN FOR OU 1129 AGGREGATE J

Introduction

This document is designed to incorporate by reference pertinent information contained in the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan for Operable Unit (OU) 1129 (May 1992). Because of the extent of the RFI Work Plan, certain key elements of the Work Plan are summarized below, along with points unique to this document. Readers are encouraged to review Chapter 4.0, Conceptual Model, and Chapter 5.0, Technical Approach, of the May 1992 RFI Work Plan for a comprehensive explanation of data quality objectives, exposure models, and data analysis.

Key features of this sampling plan are as follows:

- Data quality will be Level III (as defined in the May 1992 RFI Work Plan for OU 1129); field work will be performed in accordance with standards outlined in the RFI Work Plan, Environmental Restoration (ER) standard operating procedures (SOPs), and Installation Work Plan (IWP); and analytical work for the report will be done by a certified outside laboratory under contract to Los Alamos National Laboratory's (LANL's) Environmental Chemistry Group (EM-9).
- The OU Project Leader (OUPL) for OU 1129 will be responsible for the quality and data analysis of all work, and will coordinate with the Environmental Protection Group (EM-8), which will perform the actual field sampling work.
- The data will be treated as all other data gathered under the RFI Work Plan for OU 1129: data will be kept in the Facility for Information Management, Analysis, and Display (FIMAD) data base management system and copied to the Records Processing Facility; analysis will consist of statistical tests of the data and various modeling exercises to develop a three-dimensional picture of contamination extent for remedial plan use; and data reporting will follow ER Program guidelines and any special user-defined needs.
- Quality assurance (QA) guidelines of the ER Program will be followed throughout the process.

1.0 Interim Action TA-42

This sampling and analysis plan (SAP) is a revision of the SAP for Aggregate J in the RFI Work Plan for OU 1129 (May 1992). This SAP was revised to support an institutionally driven interim action. The interim action study of solid waste management units (SWMUs) in former Technical Area (TA)-42 is comprised of the investigation of six sites. The following SWMUs are included in this SAP (Figure 1):

- 42-001(a), an incinerator,
- 42-001(b and c), two ash storage tanks,
- 42-002(a), an indoor storage and decontamination area,
- 42-002(b), an outdoor decontamination area, and
- 42-003, an inactive septic system.

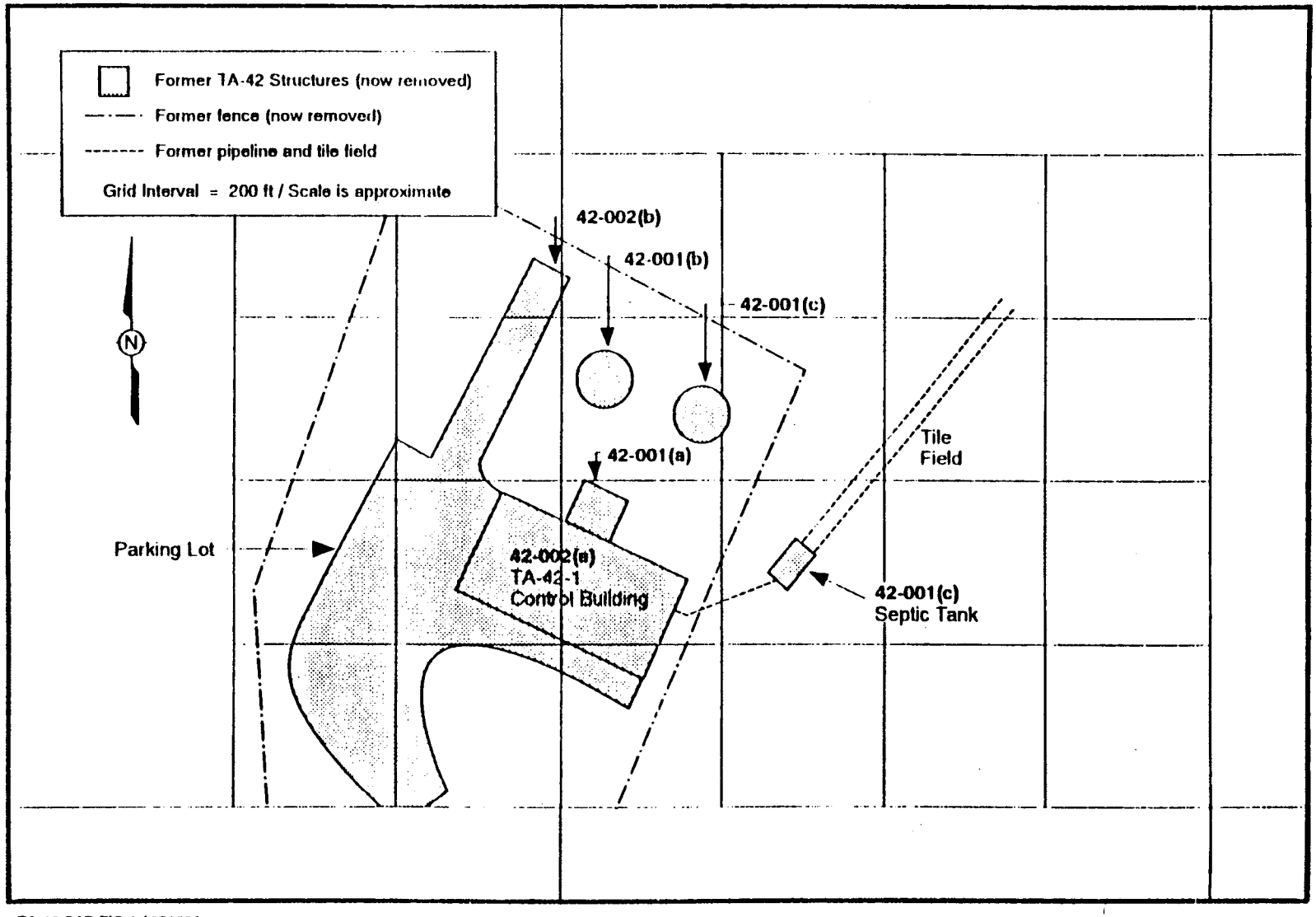
1.1 Background Information

Former TA-42 was located within the current boundaries of TA-55, north of Pajarito Road and Pecos Drive. A detailed description of the location, site activities, and history of Aggregate J SWMUs is found in Section 3.4, Description of Former TA-42, Incinerator Site, of the May 1992 RFI Work Plan for OU 1129. A detailed discussion of the decontamination and decommissioning (D&D) activities can be found in Harper and Garde (1981, 0591). Summaries of the operational history and D&D activities at former TA-42 follow.

Former TA-42, the Incinerator Site, was designed to reduce the volume of radionuclide-contaminated waste produced throughout the Laboratory (Emelity et al. 1975, 0282; Harper and Garde 1981, 0591; LANL 1990, 0145). Construction of the site was completed in 1951. The incinerator was intended to burn radionuclide-contaminated wastes generated at the Laboratory. However, because of the poor performance of the incinerator and operational problems associated with the off-gas cleanup system, very little waste was actually incinerated at former TA-42. The incinerator operated for little more than one year (1951-1952) (Harper and Garde 1981, 0591).

Between 1956 and 1969, the main floor area of the incinerator/control building was used by Group H-1 as an area for storage and decontamination of contaminated equipment (e.g., dry boxes and vehicles) (Roy F. Weston, Inc. 1989, 0486). In the decontamination process, a "vacublaster" was used to remove radionuclides and possibly other contaminants including grease and oil from various laboratory equipment. This process generated wastes probably consisting of fine solid residues and liquids containing radionuclides, and possibly acids and solvents. Waste liquids apparently went to the septic system that served this building. It is believed that fine solid residues were bagged and sent to a material disposal area (Roy F. Weston, Inc. 1989, 0486).

The septic tank received radioactive liquid wastes that contained Pu, uranium, associated fission products, tritium solvents, acids, and greases. Most of these contaminants are believed <u>not</u> to be associated with incinerator operations, but entered the septic system between 1956 and 1969. During this time, wastewater



TA-42 SAP FIG 1 / 071392

Figure 1. Schematic location map and grid bondary for SWMU Aggregate J.

containing ^{239}Pu, ^{235}U, tritium, and fission products passed through the septic system and was discharged into Mortandad Canyon (Meyer 1977, 04-0157).

Because of the specialized nature of the incinerator facility and the extensive contamination of the control building and other structures at the site, the decision was made in the mid-1970s to decommission and decontaminate former TA-42. Most of the contamination present, excluding the contents of the ash storage tanks, was attributed to the decontamination operations that were conducted at former TA-42 between 1956 and 1969 (Harper and Garde 1981, 0591).

Decommissioning work began in January 1978 with the removal of the incinerator and associated equipment in the control building. After dismantling and removing the structure, the drain pipes under the building foundation were filled with hot asphalt to contain the contamination. The uncontaminated foundation was crushed with a crane and steel ball and removed. The ash storage tanks contained 2,000 liters (473 gal.) of dry sludge and 2,600 liters (615 gal.) of wet sludge. The sludges were removed, mixed with cement, and taken to Area G, TA-54, for storage in accordance with the Department of Energy's (DOE's) 20-year retrievable storage criteria. The tanks were excavated and taken to TA-54 for disposal. The drain lines were filled with hot asphalt to contain radioactive contamination (Harper and Garde 1981, 0591). It is not known if the drain lines were removed or left in place (Ahlquist 1987, 04-0017).

The supernatant liquid from the 4,000-liter concrete septic tank was pumped into a tank and transported to the Laboratory's radioactive liquid waste treatment facility (TA-50). Cement was added to solidify 35 gal. of sludge in the tank. An attempt to remove the tank intact failed when the walls collapsed. The remaining rubble was loaded on a dump truck with a backhoe (Harper and Garde 1981, 0591).

This operation generated wastes, which were all buried or stored at the Laboratory's TA-54 radioactive solid waste disposal/storage site located 2.5 km from the decommissioning site. Six hundred cubic meters (m^3) of building debris and equipment and 1,200 m^3 of soil contaminated with less than 10-nCi ^{239}Pu per gram of waste were buried in trenches at TA-54. Former TA-42 was then contoured to conform with the surrounding terrain and native grasses were planted (Harper and Garde 1981, 0591).

Former TA-42 is also the future site for construction of the Nuclear Safeguards Technology Laboratory (NSTL) (Figure 2). The need for NSTL construction to start in FY93, plus the results from a reconnaissance sampling program (Fresquez 1991, 04-0075), has accelerated the investigation and the development of an interim action work plan pursuant to Section 3.12.2 of the Laboratory's IWP and Section I of the Laboratory's RCRA Part B permit Hazardous and Solid Waste Amendments module. This investigation will focus on the

extent of the contamination found at the SWMUs during the reconnaissance survey conducted in January 1991 (Fresquez 1991, 04-0075). Following the collection of field samples and the evaluation of analytical results, a remediation plan will be recommended. A schedule of activities is detailed in Attachment I.

As part of this interim action, the investigation of the SWMUs has been prioritized to concentrate on those SWMUs or SWMU areas that will be impacted by the construction of the NSTL. Therefore, surface sampling below the canyon rim will be conducted at a later date when the previously scheduled OU 1129 field investigation is conducted.

1.2 Reconnaissance Survey

Philip Fresquez of EM-8 collected soil samples at the former TA-42 site in January 1991 to document soil contamination levels at the site of the proposed NSTL at the request of N Division (Fresquez 1991, 04-0075). During the reconnaissance survey, the sampling locations were selected to coincide with the SWMU locations. Figure 2 depicts the location of reconnaissance sampling within SWMU Aggregate J (sample locations are labeled PF-XXX). The sampling protocol followed is described in SW-846 (EPA 1986, 0291), the Environmental Protection Agency (EPA) sampling manual, and ER SOPs. Complete chain-of-custody documentation was kept. Analyses for concentrations of toxicity characteristic leaching procedure (TCLP) metals, radiological isotopes (U, ^{137}Cs, ^{238}Pu, and ^{239}Pu), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs) were done at data quality Level III as defined in EPA/540/G-87/003 (1987, 0086). Table 1 shows the method of detection used in the data quality Level III analyses of the reconnaissance samples. Field screening for gross-alpha, -gamma, and -beta was done at data quality Level II, as defined in EPA/540/G-87/003 (1987, 0086). There was no statistical analysis done at the end of the reconnaissance survey to validate the data because not enough data was collected at each location.

The soil samples for this reconnaissance survey were collected at the former incinerator/control site, SWMU No. 42-002(a); at the former ash holding tank site, SWMU Nos. 42-001(c and b); at depths of 10, 15, 20, and 25 ft beneath the former site of the septic tank and at the canyon disposal area of the septic tank, SWMU No. 42-003; and at the site of the former parking lot area/outdoor decontamination area, SWMU No. 42-002(b). Results of the reconnaissance survey alpha, beta, and gamma field screening are presented in Table 2. These results are data quality Level II. Results for VOCs, SVOCs, PCBs, TCLP metals, ^{238}Pu, ^{239}Pu, ^{137}Cs, and U analysis are presented in Table 3. The data quality level of the analytical results is Level III.

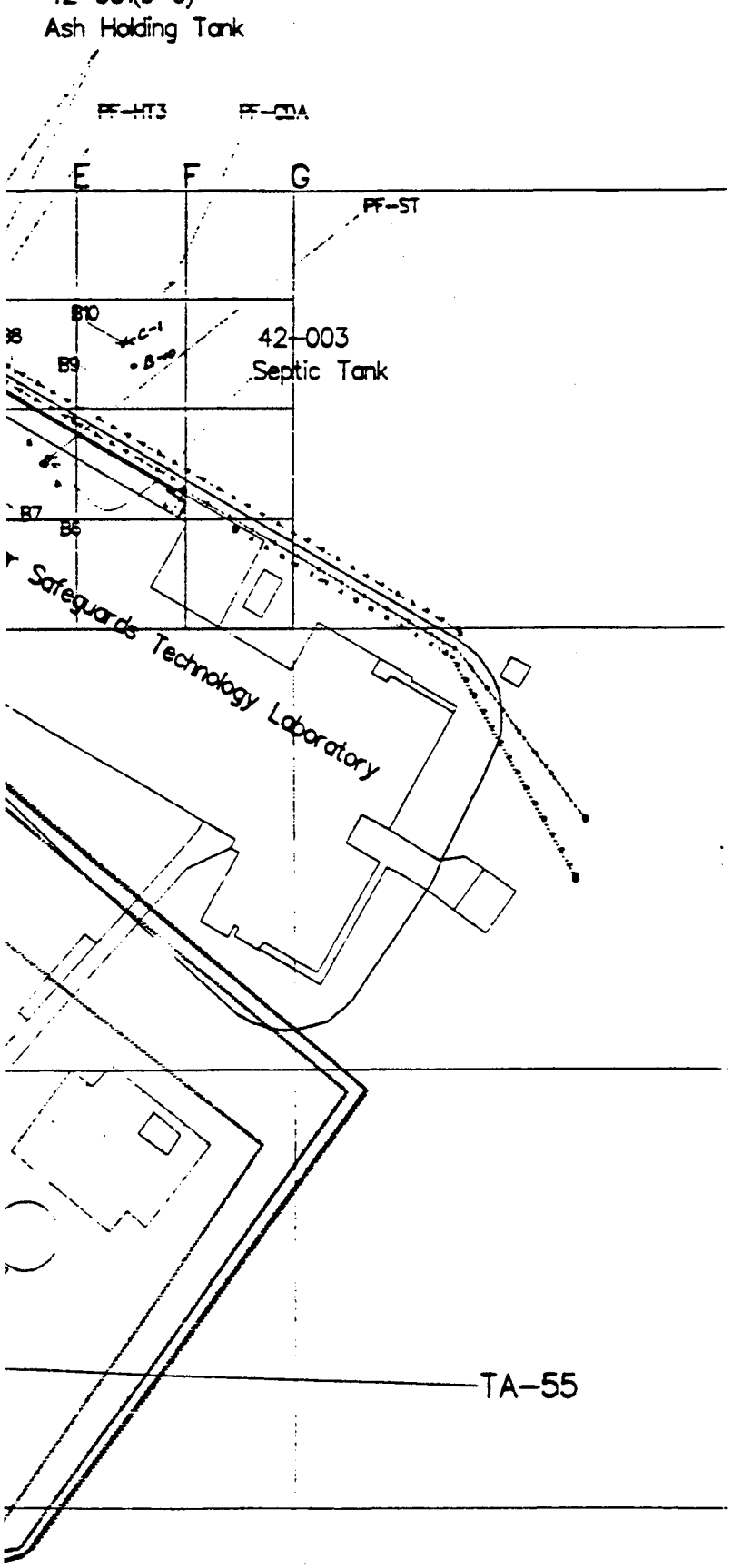
TABLE 1

METHODS USED TO DETECT ANALYTES DURING RECONNAISSANCE SAMPLE ANALYSES

ANALYTE	EPA SW-846 METHOD	TECHNIQUE
PCBs	8080	Gas Chromatograph-Electron Capture
VOCs	8260	Gas Chromatography with Mass Spectroscopy (GCMS) Capillary Column
SVOCs	8270	GCMS Capillary Column
Ba, Cd, Cr, and Pb	6010	Inductively Coupled Plasma Spectroscopy
Hg	7470	Cold Vapor Atomic Absorption (AA)
As	7060	Graphite Furnace AA (GFAA)
Se	7740	GFAA
Ag	7760	AA Direct Aspiration
EP-TOX Metals TCLP Preparation	1310	Extraction Procedure (EP) Toxicity Test Method
^{238}Pu, ^{239}Pu	Not an EPA Method	Alpha Spectroscopy
^{137}Cs	Not an EPA Method	Gamma Spectroscopy
Isotopic U	Not an EPA Method	Alpha Spectroscopy

For the purposes of this sampling plan. background levels of radionuclides of concern will be referenced to the background levels presented in the annual LANL environmental surveillance report (Environmental Protection Group 1992, 0740). The background soil concentration levels quoted are based on soil samples collected throughout northern New Mexico from 1974 through 1986. This sampling was conducted for the purpose of establishing statistical background levels of certain radionuclides, including ^{238}Pu, ^{239}Pu, and ^{240}Pu. The background concentrations (the mean plus two standard deviations, encompassing 97.5% of all sample values) is established in the LANL environmental surveillance report (Environmental Protection Group 1992, 0740) and adopted in this sampling plan. The surveillance report puts the soils background concentration at 0.005 pCi/g for ^{238}Pu, 0.025 pCi/g for ^{239}Pu and ^{240}Pu, 3.4 μg/g for total uranium, and 1.09 pCi/g for ^{137}Cs. Residual contamination above the referenced background level for soil includes subsurface amounts of Pu at the former septic tank (SWMU No. 42-003), at the former ash holding tanks (SWMU Nos.

es and NSTL



LEGEND

- Electrical, Proposed
- Fence, Security
- Gas Line, Proposed
- Gate
- Road, Access
- SWMU, Probable
- Telephone Line, Proposed
- Water Line, Proposed
- Former Structure
- Permanent Structure
- Proposed Structure
- Temporary Structure
- Previous Samples
- Proposed Samples

NORTH, NM State Plane

Grid provides NMSP coordinates, in feet

Grid interval, in feet: 200

0 40 80 120 FEET ON GROUND

NOTICE: Information on this map is provisional and has not been checked for accuracy

University of California
Los Alamos National Laboratory
Earth & Environmental Sciences Division
FIMAD Facility for Information Management, Analysis and Display

Produced by: Marcia Jones
Date: 92-07-10

TA-42 - Former Structures and

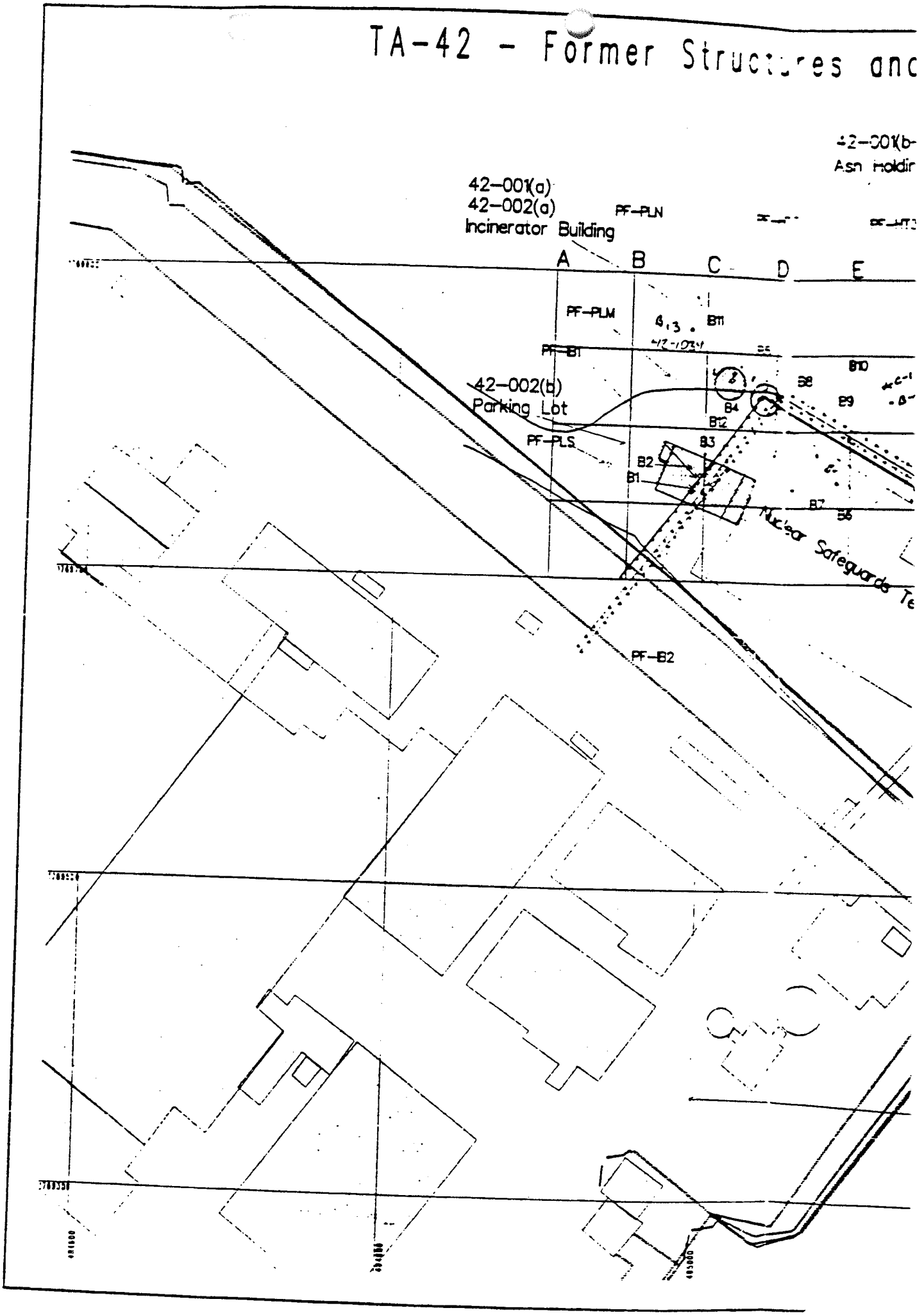


TABLE 2

RESULTS OF RECONNAISSANCE SAMPLING FIELD SCREENING

SAMPLE ID [a, b] TA-55	pCi/g		
	GROSS-ALPHA	GROSS-BETA	GROSS-GAMMA
PF-IB1-0	22	≤ 18	0.6
PF-IB1-5	≤ 18	≤ 18	0.4
PF-IB2-0	≤ 18	≤ 18	0.5
PF-IB2-5	26	≤ 18	0.6
PF-HT2-0	≤ 18	≤ 18	0.4
PF-HT2-10	≤ 18	≤ 18	0.6
PF-HT3-0	59	≤ 18	0.7
PF-HT3-5	22	≤ 18	0.5
PF-HT3-10	97	≤ 18	0.6
PF-CDA-0	≤ 18	≤ 18	0.1
PF-ST-10	67	≤ 18	0.5
PF-ST-15	37	≤ 18	0.7
PF-ST-20	26	≤ 18	0.8
PF-ST-25	≤ 18	≤ 18	0.6
PF-PLN-0	130	≤ 18	0.5
PF-PLM-0	61	≤ 18	0.5
PF-PLS-0	71	≤ 18	0.6
North Drainage	≤ 18	≤ 18	0.6
South Drainage	≤ 18	≤ 18	0.5

[a] Last number on sampling site identifier indicates the depth of sampling in feet.

[b] Definitions of acronyms used in sample IDs are as follows:

PF = Philip Fresquez (sample collector)
IB = incinerator building
HT = holding tank, (sample)
CDA = canyon disposal area
ST = septic tank
PLN = parking lot north
PLM = parking lot middle
PLS = parking lot south

42-001[b and c]), and at the former outdoor decontamination site (SWMU No. 42-002[b]), and near-surface amounts of Pb at the old incinerator (SWMU No. 42-001[a]) (Figure 2 and Table 3).

The history of the former septic tank may indicate why the reconnaissance survey detected contamination. In 1973, the septic tank was observed to contain contaminated water and possibly to have overflowed (Roy F. Weston, Inc. 1989, 0486). In 1978, during decommissioning, an attempt to remove the concrete septic tank intact failed when the walls collapsed. The resulting rubble was loaded on a dump truck with a backhoe (Harper and Garde 1981, 0457). It is not known if all the sludge and small pieces of rubble were picked up. Due to the depth of the contamination (approximately surface to 10 ft before additional fill was added), it is believed that the contamination detected during the reconnaissance survey is a combination of contaminated water from an overflow, and sludge and rubble from the tank collapse.

1.3 Sampling Rationale and Objectives

The objective of this sampling plan is to detect and quantify contaminants and estimate the extent of contamination at SWMU Aggregate J within former TA-42. The SAP takes into consideration the reconnaissance studies discussed in Section 1.2, Reconnaissance Survey. This SAP is based on the following broad assumptions:

- The short-term land use is institutionally controlled with no public access.
- Sampling will be conducted at locations that may be excavated for utility lines in such a way that the risk to the worker can be evaluated.
- Data from this SAP may be used to design an interim action remediation plan leading to a final remedy for the SWMUs impacted by the NSTL construction.

The characterization process will fulfill the following sampling objectives:

1) Detecting and quantifying contaminants,
2) Conducting investigations to determine the extent of contamination,
3) Collecting geologic data (e.g., size and attitude of fill materials) to support transport and exposure model calculations, and
4) Classifying contaminant pathways (if any exist) on the surface and subsurface.

Sampling activities are based on the following conceptual model for the existence of contamination at this site:

1) Previous D&D activities removed most of the contaminants of concern (COCs), although the reconnaissance survey indicates some contaminants are still present.

2) Remaining contaminants are localized within the vicinity of the structures (i.e., septic tank, holding tanks, etc.) and in the shallow subsurface. The septic tank system could have leaked sludge to the subsurface, but the contamination would be constrained to a few feet (perhaps 10 ft) from the septic tank because Pu is very strongly retarded in soil and tuff media. Figure 3 snows a schematic cross section showing the conceptualization of the contaminant migration around the septic tank and tile field. The septic tank contamination identified during the reconnaissance study is believed to be associated with leakage from the base of the tank.

3) Surface contamination is likely to be nonexistent because the existing surface material is fill that was brought into the area during the D&D activities. Additionally, nearly 15 ft of fill was added to the site in 1986 in conjunction with security enhancements for TA-55. Figure 4 shows a schematic cross section of the area; the abrupt change in elevation is because of the fill material.

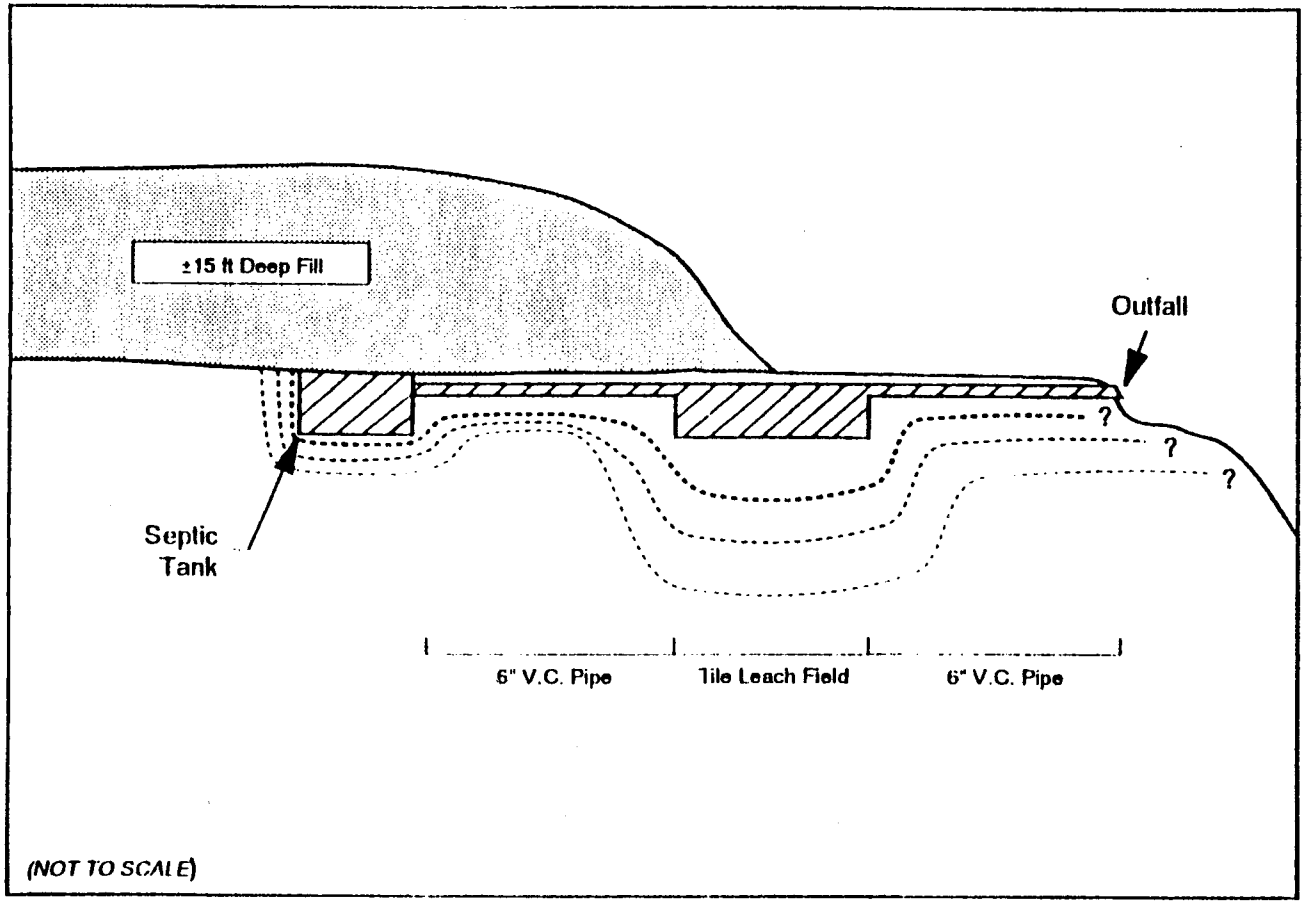
4) The Pb contamination (11.4 ppm by the TCLP method) found in the surface sample collected from the decontamination area of the containment building (incinerator building) is believed to be an anomaly. None of the other samples collected in both the surface and subsurface exceeded the EPA guidelines of 5 ppm (Table 3). The sample collected to the west of this location contained 0.05 ppm. It is believed that the Pb contamination observed at this sample point originated from the fill that was placed in this location during D&D activities and is localized. There is no reason to believe that the Pb contamination resulted from activities in the control building. However, samples will be collected to confirm the presence of Pb and to estimate the extent of the Pb contamination if it is confirmed.

5) Workers placing utility lines for the NSTL building could dig through the contaminated area and expose contaminated soils, which could disperse those soils over a larger area or create an inhalation (dust) hazard from the Pu and other contaminants.

6) Contaminants deposited on the surface are transported by water off site and/or infiltrate into the soil horizon (unsaturated zone) as colloids. The depth of migration of colloidal particles is controlled by flux and sorption. In the mesa top environment, migration is expected to be nil because of low flux and high sorption. Therefore, Pu is not expected to have migrated beyond a few feet from the source term based on accepted geochemical assumptions (sampling data will be used to test this hypothesis).

7) Because of the separate locations of contaminant findings, no locations are considered to contain mixed waste. If mixed wastes are encountered during the sampling phase, approval for chemical analysis of samples is covered under LANL memorandum ADO-92-442 (Environmental Chemistry for Mixed Waste). Additionally, guidance will be developed in the remediation plan, in cooperation with the Waste Management Group (EM-7), for the removal of any potential mixed waste.

8) The above-background gross-alpha field screening taken during the reconnaissance sampling is believed to be from radon because it is common in the area and no source could be determined from the analytical suite tested at the location. This conceptual model will be tested by analyzing selected samples from the areas of concern (i.e., the holding tank area and the parking lot area) for isotopic U and isotopic Th. If U and Th



TA-42 SAP FIG 3 / 071092

Figure 3. Schematic cross section of the conceptualization migration around the septic tank and tile drain field.

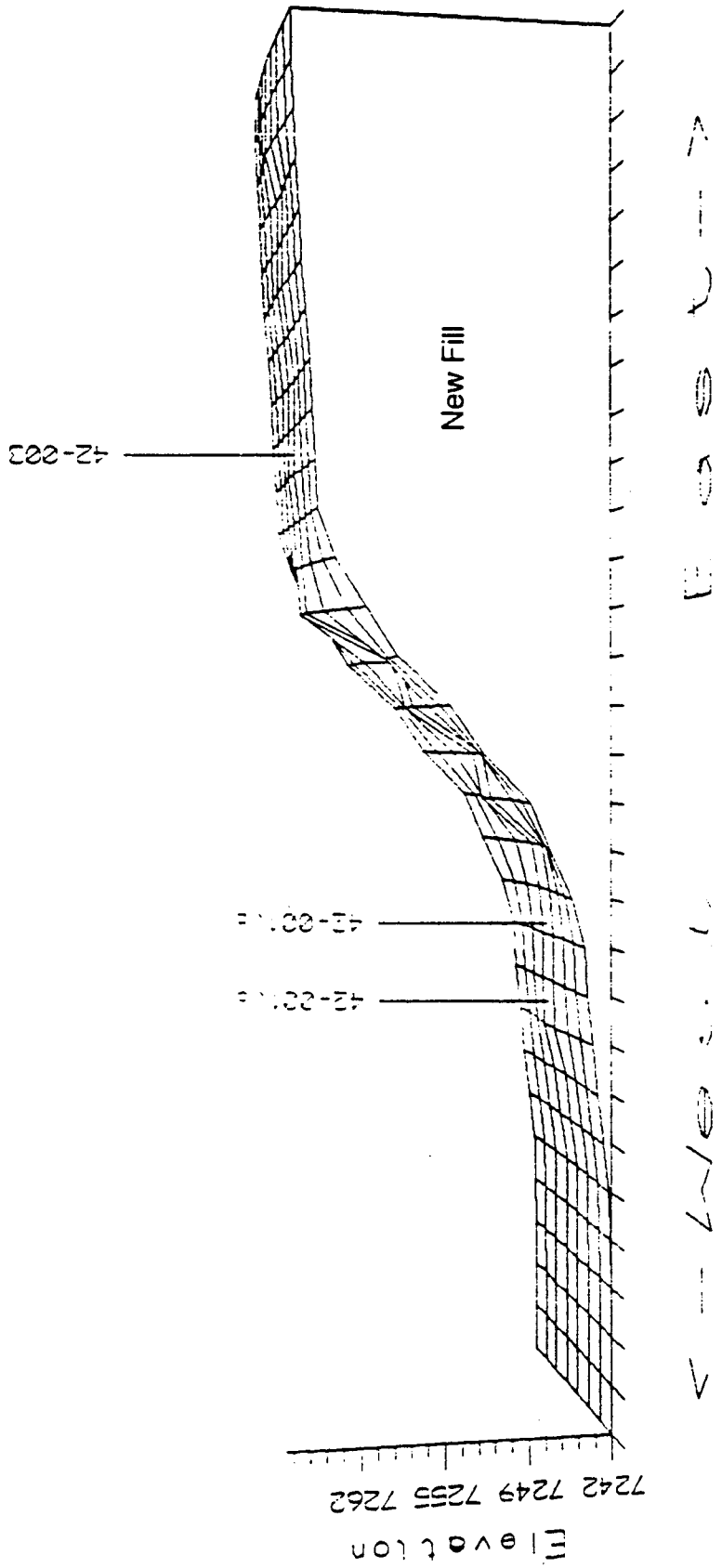


Figure 4. Cross section of TA-42, west to east.

are detected in the samples, then it must be assumed that the anomalous alpha readings are caused by radon, a daughter product of these two isotopes.

The investigations at Aggregate J are designed primarily to answer the following questions:

1) Will subsurface contamination that currently exists in Aggregate J be exposed during the construction phase of the NSTL?

2) Based on the results from sampling and analysis, can a realistic remediation plan be developed?

3) Is there any risk to the public or workers of exposure, and if there is, what is the risk of exposure from the present amount and location of contamination at the site?

1.4 Field Activities

The sampling plan is designed to locate potential contaminants at their most likely source. The field activities will include an engineering survey, a radiation survey, a geologic survey, and sampling.

1.4.1 Engineering Survey

The engineering survey (which will be performed by the LANL Design Group [ENG-3]) will locate the former incinerator building, both ash holding tanks, the septic tank and associated tile drain field and outfall, the outdoor decontamination area and associated drainage channel, and the utility lines associated with the NSTL building. In preparation for this revised SAP, extensive research into as-built drawings and survey data has produced significant information on building and facility locations. This information has been converted to New Mexico State Plane (NMSP) coordinates and compiled into a FIMAD map. All available information will be used in the engineering survey. Accuracy will be quantified in the final report. The location of the structures and the utility lines will be marked with stakes and the sampling points will be established before field work begins. All points associated with the SAP will be recorded in the NMSP Coordinate System. After all field activities are completed, all sample locations will be surveyed and results registered on the site base map. A 300-ft (east-west) by 200-ft (north-south) grid will be established across the entire site and appropriately flagged (Figure 1); individual grid blocks will be 50 ft by 50 ft. The grid will facilitate locations of finding and assist in mapping the extent of contamination. For additional information on the survey, refer to the RFI Work Plan for OU 1129 (May 1992), Section 7.4, Surveys.

1.4.2 Radiation Survey

Following the engineering survey, a radiation survey will be conducted across the TA-42 grid to identify potential radiological anomalies within the grid area for health and safety reasons. Scintillation detector surveys will be conducted across the first 100 ft of both the outfall drainage channel of the septic system (SWMU No. 42-003) and the drainage channel of the outdoor decontamination area, or until topographic limitations are reached.

1.4.3 Geologic Survey

During the geologic survey, observations will be made to note any drainage arroyos to the canyons; if any exist, they will be mapped because they are potential transport pathways for contaminated sediment. Observations will also be made on the mesa top to identify fracture patterns in the tuff underlying the soils; any prevailing fracture geometry will be mapped as it could impact contaminant migration.

1.4.4 Sample Collection

Thirteen locations will be sampled in the areas in which the reconnaissance has shown higher concentrations of radionuclides or metals (Figure 2— NOTE: The information in Figure 2 is approximate and will be verified and updated in the future). The number, locations, and depths of samples, and the analytes to be sampled are based on professional judgment, limited data from the reconnaissance survey, and archival information about former TA-42. The number of intervals of the sampled sections that will be collected is based on the professional judgment and knowledge of the soil profile, which is shallow in the areas of the parking lot, incinerator building, and ash holding tanks, and deeper in the area of the septic tank. Table 4 shows sample locations, depths, and amounts.

All samples (except for possibly those collected at SWMU No. 42-002[a]) will be analyzed for ^{238}Pu, ^{239}Pu, and ^{241}Am (Table 5) to detect the alpha spectrum. These isotopes have a detectable alpha spectrum that can be resolved for each isotope and were selected based on the information from the D&D activities, the operations at the site, and the findings of the reconnaissance survey. In addition, a selected number of samples (Table 5) will be analyzed for isotopic U and Th to help determine the source of the above-background gross-alpha reading measured during the reconnaissance survey. All samples will also be screened for gross-alpha, -beta, -gamma activity before analyses. The screening will help confirm the areas in which the reconnaissance survey showed levels above background and will also check radiation levels before handling samples and shipping to the analytical laboratories.

TABLE 3

ANALYTICAL RESULTS OF RECONNAISSANCE SAMPLING

SAMPLE No.[a,b]	PCBs[c] µg/g	Pb[d] mg/l	VOCs[e]	SVOCs[e]	^{238}Pu pCi/g	^{239}Pu pCi/g	U µg/g	^{137}Cs pCi/g
PF-IB1-0	<0.05	11.4	NTCF	NTCF	0.0004	0.015	3.58	0.0883
PF-IB1-5	<0.05	0.29	NTCF	NTCF	0.007	0.0002	3.44	0.176
PF-IB2-0	<0.05	0.05	NTCF	NTCF	0.003	0.0554	3.5	0.0944
PF-IB2-5	<0.05	0.03	NTCF	NTCF	0.0003	0.000	3.76	0.193
PF-HT2-0	1.02	<0.01	NTCF	NTCF	0.002	0.0179	3.85	0.169
PF-HT-2-5	0.4	0.04	NTCF	NTCF	0.009	0.0628	3.76	0.0643
PF-HT2-10	<0.05	<0.01	NTCF	NTCF	0.0006	0.0013	3.7	0.236
PF-HT3-0	0.08	0.04	NTCF	NTCF	0.0012	0.0205	3.65	0.245
PF-HT3-5	0.11	<0.01	NTCF	NTCF	0.0035	0.0086	3.13	0.241
PF-HT3-10	<0.05	0.04	NTCF	NTCF	0.0016	0.0292	3.6	0.238
PF-CDA-0	<0.05	0.17	NTCF	NTCF	0.0036	0.0014	1.86	0.0643
PF-ST-10	<0.05	2.2	NTCF	NTCF	0.015	0.151	4.17	0.143
PF-ST-15	<0.05	0.45	NTCF	(see note f)	2.48	4.77	5.2	0.0579
PF-ST-20	<0.05	<0.01	NTCF	NTCF	0.155	0.40	3.34	0.0239
PF-ST-25	<0.05	<0.01	NTCF	NTCF	0.016	0.0032	3.9	0.463
PF-PLN-0	0.52	0.01	NTCF	(see note g)	0.0012	0.006	3.7	0.0662
PF-PLM-0	0.12	<0.01	NTCF	NTCF	0.009	0.0148	3.44	0.272
PF-PLS-0	<0.05	0.34	NTCF	NTCF	0.006	0.0151	2.47	0.16

a. The definition of acronyms used in samples IDs are as fillows: PF = Philip Fresquez (sample collector). IB = incinerator building, ST = septic tank, HT = holding tank, PLS = parking lot south, PLM = parking lot middle, PLN = parking lot north, CDA = canyon disposal area.

b. Last number on sampling site identifier indicates the depth of sampling in feet.

c. SWMU remedial action determinations for PCBs at <10 µg/g (or ppm) is no further action (Gunderson 1992, 04-0279).

d. TCLP metals analyzed for included Hg, As, Se, Ag, Ba, Cd, Cr, and Pb. All TCLP metals were below action levels except for one sample that contained Pb above action levels; therefore, only Pb results are shown.

e. No target compound found (NTCF).

f. Eight SVOCs were detected in this sample. Seven of the eight were polyaromatic hydrocarbons (PAHs). Although these hydrocarbon compounds are carcinogen hazards in volatile forms (Sax and Lewis 1987, 04-0277), they are all common constituents in paving (asphalt) and roofing tar (coal tar pitch) materials (Windholz 1983, 04-0278). The soil sample collected at the 15-ft level was fill material, thus the PAHs detected in this soil sample were probably from a piece of asphalt or paving tar, a nonhazardous material (nonsoluble and nonvolatile) in its present form. The other SVOC detected is bis-2-ethyl-hexylphthalate, but at trace amounts (400 ppb).

g. This sample contained a trace amount of bis-2-ethyl-hexylphthalate (400 ppb), which is below the EPA action level guideline of 83 ppm (EPA 1989, 0088).

TABLE 4

SAMPLING SUMMARY FOR TA-42

Location (FIMAD No.)	Sample Designation	Depth of Samples Collected (ft)	Minimum Amount of Sample Required		
			Screening	INC-12	EM-9
B_1 (42-1021)	B-1-1 B-1-2	0 - 3 3 - 6	100 g/ea	25 g/ea	100 g/ea
B_2 (42-1022)	B-2-1 B-2-2	0 - 3 3 - 6	100 g/ea	25 g/ea	100 g/ea
B_3 (42-1023)	B-3-1 B-3-2	0 - 3 3 - 6	100 g/ea	25 g/ea	100 g/ea
B_4 (42-1025)	B-4-1 B-4-2	0 - 3 3 - 6	100 g/ea	25 g/ea	100 g/ea
B_5 (42-1027)	B-5-1 B-5-2	0 - 3 3 - 6	100 g/ea	25 g/ea	100 g/ea
B_6 (42-1028)	B-6-1 B-6-2 B-6-3	10-15 15-20 20-25	100 g/ea	25 g/ea	100 g/ea
B_7 (42-1029)	B-7-1 B-7-2 B-7-3	10-15 15-20 20-25	100 g/ea	25 g/ea	100 g/ea
B_8 (42-1030)	B-8-1 B-8-2 B-8-3	10-15 15-20 20-25	100 g/ea	25 g/ea	100 g/ea
B_9 (42-1031)	B-9-1 B-9-2 B-9-3	10-15 15-20 20-25	100 g/ea	25 g/ea	100 g/ea
B_{10} (42-1032)	B-10-1 B-10-2 B-10-3	0-5 5-10 10-15	100 g/ea	25 g/ea	100 g/ea
B_{11} (42-1026)	B-11-1 B-11-2	0 - 3 3 - 6	100 g/ea	25 g/ea	100 g/ea
B_{12} (42-1024)	B-12-1 B-12-2	0 - 3 3 - 6	100 g/ea	25 g/ea	100 g/ea
B_{13} (42-1034)	B-13-1 B-13-3	0 - 3 3 - 6	100 g/ea	25 g/ea	100 g/ea

SWMU No. 42-002(a)

Soil samples will only be collected at the former control building site to confirm the presence of Pb that may exist in the soil. The reconnaissance survey showed no evidence of any VOCs, SVOCs, and PCBs, background concentrations of gross-alpha, -beta, -gamma and radionuclides, and metals below EPA guideline limits except for Pb. Furthermore, the Pb contamination (11.4 ppm by the TCLP method) found in the surface sample PF-IB1 (Figure 2) collected from the decontamination area of the containment building (incinerator building) is believed to be an anomaly as discussed in the conceptual model. However, three borings, B_1, B_2, and B_3, will be installed in the vicinity of the control building and the location of the original reconnaissance survey sample PF-IB1 (Figure 2) to determine the extent of Pb contamination.

Because no Pb was detected at the location of sample PF-IB2, which is to the east of PF-IB1 (Figure 2), B_1, B_2, and B_3 will be drilled and sampled to the north, west, and south bounds of PF-IB2. Because soils in the area of the incinerator building are about 2 to 3 ft deep (Fresquez personal communication in Gainer 1992, 04-0276) and then tuff is encountered below 3 ft (Fresquez 1991, 04-0075), the three borings will be hand augured to a depth of 6 ft. The borings at this site are intended to assess if soil contamination exists at a shallow depth below the former structures. Two intervals, 0 to 3 ft and 3 to 6 ft, of the recovered section will be collected as samples (Table 4). Each sample will be screened for radioactivity before submittal to the analytical laboratory. Four samples will be sent to the Separations and Radiochemistry Group (INC-12) for ^{238}Pu and ^{239}Pu quick-turnaround analysis. If the INC-12 analysis shows of above-background levels of these two isotopes, samples from the boreholes B_1, B_2, and B_3 will be submitted for data quality Level III analysis. Otherwise, samples will only be analyzed for total Pb (Table 5) at data quality Level III.

SWMU No. 42-001(a)

One boring, B_{12}, will be drilled and soil samples will be collected at the former location of the incinerator building (Figure 2) to estimate the extent of COCs that may exist in the subsurface. Because soils in the area of the incinerator building are about 2 to 3 ft deep (Fresquez personal communication in Gainer 1992, 04-0276) and then tuff is encountered below 3 ft (Fresquez 1991, 04-0075), the boring will be hand-augured to a depth of 6 ft. The boring at this site is intended to assess if soil contamination exists at a shallow depth below these former structures (this site was not investigated during the reconnaissance survey in 1991). Two intervals, 0 to 3 ft and 3 to 6 ft, of the recovered section will be collected as samples (Table 4). Each sample will be screened for radioactivity before submittal to the analytical laboratory. Samples will be analyzed for ^{238}Pu, ^{239}Pu, and ^{241}Am (Table 5).

SWMUs Nos. 42-001(b and c)

Soil samples will be collected at the two former ash holding tank sites to help define the extent of radiological contamination in the subsurface. During the 1991 reconnaissance survey, alpha activity in samples (PF-HT3) of surface soils from SWMU No. 42-001(c) ranged from 59 to 97 pCi/g. Three borings, B_4, B_5, and B_{11}, will be drilled in the vicinity of the former ash holding tanks (Figure 2) to a depth of 6 ft. Boring B_{11} provides samples from outside of the tank's boundaries and B_5 provides samples from the midway point between the two holding tanks. Boring B_5 could also identify a possible drain line between the two tanks. Boring B_4 could identify the drain line between the incinerator building and the holding tanks and define the concentration of contaminants at the site of excavation for NSTL utility lines. During D&D activities, the drain lines that connected the tanks to the incinerator were filled with hot asphalt and either left in place or removed. The borings at this site are intended to assess the extent of contamination at a shallow depth below these former structures. Two intervals, 0 to 3 ft and 3 to 6 ft, of the recovered section will be collected as samples (Table 4). Each sample will be screened for radioactivity before submittal to the analytical laboratory. Samples will be analyzed for ^{238}Pu, ^{239}Pu, and ^{241}Am (Table 5). In addition, samples from boreholes B_5 and B_{11} will be analyzed for isotopic U and Th to help determine the source of the gross-alpha readings during the reconnaissance survey.

SWMU No. 42-002(b)

Soils samples will be collected at the former outdoor equipment decontamination area located at the end of the asphalt driveway northwest of former TA-42 (Figure 2). During D&D activities, this area was not addressed, but the 1991 reconnaissance survey (sample PF-PLN) found alpha activity, which ranged from 61 to 130 pCi/g, in surface soils from SWMU No. 42-002(b). It is suspected that this activity is from radon emissions. However, the presence of radionuclides was not confirmed by the radionuclide analysis. Two borings, B_{11} and B_{13}, will be installed: one between the ash holding tank (SWMU No. 42-001[b]) and the parking lot area; and the other between PF-PLN and PF-PLM (Figure 2). Samples at B_{11} and B_{13} will be taken to help define the extent of radiological contamination in the soils to the east of samples PF-PLN and PF-PLM (Table 4). B_{11} is located midway between PF-PLN and PF-PLM, and immediately east of the edge of the former parking lot pad. B_{13} is located midway between PF-PLN and PF-PLM. Boreholes B_{11} and B_{13} will be drilled to a depth of 6 ft. The borings at this site are intended to assess if soil contamination exists at the surface and at a shallow depth below the former structures. Two intervals, 0 to 3 ft and 3 to 6 ft, of the recovered section will be collected as samples. Each sample will be screened for radioactivity before submittal to the analytical laboratory (this will also confirm the existence of the above-background gross-alpha readings in this area). Samples will be analyzed for ^{238}Pu, ^{239}Pu, and ^{241}Am (Table 5). In addition, a

sample from borehole B_{11} and two from B_{13} will be analyzed for isotopic U and Th to help determine the source of the gross-alpha readings during the reconnaissance survey.

SWMU No. 42-003

Subsurface (tuff) samples will be collected at the former septic tank site to confirm the presence of radiological contamination that was identified in the subsurface during reconnaissance activities (sample PF-ST). During D&D activities, the lines that connected the septic tank to the incinerator building were filled with hot asphalt and either left in place or removed. Alpha activity in surface soils collected from the tile drain field in 1978 had gross-alpha readings ranging from <25 pCi/g to 99 pCi/g. No sample collection at the tile drain field was done during the 1991 reconnaissance survey. Three borings, B_6, B_7, and B_8, will be installed in the vicinity of the septic tank (Figure 2) to a depth of 25 ft. The borings at this site are intended to determine the extent of the contamination in a lateral and vertical direction at depth around the former structure. Of the 25-ft depth for the borings, the first 10 ft is not being sampled because it is clean fill; subsequently, sampling will take place from 10 to 15 ft. 15 to 20 ft, and 20 to 25 ft to determine any downward contaminant migration. In addition, borehole B_7 will possibly identify the location and associated contamination of the line between the incinerator building and the septic tank. The three intervals of the recovered section (10-25 ft) will be collected as samples.

Two borings, B_9 and B_{10}, will be installed in the vicinity of the drain pipe and tile leach field (Figure 2). Borings B_9 and B_{10} will be drilled to a depth of 25 ft and 15 ft, respectively (Figure 3). The borings at this site are intended to determine the extent of the contamination in a lateral and vertical direction at depth around the former tile field. In addition, borehole B_9 will possibly define the concentration of contaminants at the site of excavation for NSTL utility lines. Three intervals of the recovered section will be collected as samples. Each sample will be screened for radioactivity before submittal to the analytical laboratory. Samples will be analyzed for ^{238}Pu, ^{239}Pu, and ^{241}Am (Table 5).

General Sample Collection Guidelines

The target is to sample locations in which contamination boundaries are expected to occur and in which construction activities may impact residual contamination around the structures as predicted by the conceptual model and as found during the screening process.

Samples will be taken by hollow-stem auger and split-spoon sampler (hand auger in the shallow holes [power-assisted if necessary], i.e., 6 ft). Logs describing soil horizon changes will be prepared. Two to three

samples will be taken per location: 0 to 3 ft and 3 to 6 ft for the shallow borings; and 10 to 15 ft, 15 to 20 ft, and 20 to 25 ft for the deep holes. On the split-spoon samples, not all the section may be used. After screening, the section of sample that shows the highest rad screening value may be collected for analysis (if the section shows some levels of radiation in the rad screening, the entire section will be aggregated and samples will be taken from the aggregate). The field log will document selection criteria.

1.5 Sample Screening and Analysis

Each sample will be screened for radiation with a Micro R meter or a FIDLER, a Geiger-Muller meter, and scintillation detector for contact radiation. All sample packages will be screened for surface contamination and contact radiation.

All the samples will be screened for gross-alpha, -beta, and -gamma to detect the extent of contamination before laboratory analysis, and to select more sampling sites if necessary.

Table 4 outlines the total number of analyses, QA/QC samples required for this field investigation, the corresponding analyses, and sample requirements. Appendix B, the Field Operations Plan, of the RFI Work Plan for OU 1129 (May 1992) should be consulted for procedures regarding the use of specified field sampling equipment, sample handling, packaging and shipping, equipment decontamination, and Level I and II field instruments. All sampling will be done under the appropriate SOPs and administration.

TABLE 5

ESTIMATED ANALYTICAL REQUIREMENTS FOR TA-42 SAMPLING

	TYPE OF ANALYSIS REQUIRED								
SAMPLE	^{238}Pu		^{239}Pu		^{241}Am	U Isotopic	Th Isotopic	Pb (ICPES)	
ANALYTICAL GROUP	INC-12	EM-9	INC-12	EM-9	EM-9	E-9	EM-9	INC-12	EM-9
TOTAL	20	41	20	41	41	4	4	4	9
B-1-1	1	0*	1	0*	0*			1	1
B-1-2		0*		0*	0*				1
B-2-1	1	0*	1	0*	0*			1	1
B-2-2	1	0*	1	0*	0**			1	1
B-3-1		0*		0*	0*				1
B-3-2	1	0*	1	0*	0*			1	1
B-4-1	1	1	1	1	1				0
B-4-2	1	1	1	1	1				0
B-5-1		1		1	1				0

	TYPE OF ANALYSIS REQUIRED								
SAMPLE	^{238}Pu		^{239}Pu		^{241}Am	U Isotopic	Th Isotopic	Pb (ICPES)	
ANALYTICAL GROUP	INC-12	EM-9	INC-12	EM-9	EM-9	E-9	EM-9	INC-12	EM-9
TOTAL	20	41	20	41	41	4	4	4	9
B-5-2	1	1	1	1	1	1	1		0
B-6-1		1		1	1				0
B-6-2	1	1	1	1	1				0
B-6-3		1	1	1	1				0
B-7-1		1		1	1				0
B-7-2	1	1	1	1	1				0
B-7-3		1		1	1				0
B-8-1		1		1	1				0
B-8-2	1	1	1	1	1				0
B-8-3		1	1	1	1				0
B-9-1	1	1	1	1	1				0
B-9-2	1	1	1	1	1				0
B-9-3		1		1	1				0
B-10-1	1	1	1	1	1				0
B-10-2		1		1	1				0
B-10-3	1	1	1	1	1				0
B-11-1	1	1	1	1	1	1	1		0
B-11-2		1		1	1				0
B-12-1	1	1	1	1	1				0
B-12-2	1	1	1	1	1				0
B-13-1	1	1	1	1	1	1	1		0
B-13-2		1		1	1	1	1		0
C-1-1		1		1	1				0
C-1-2	1	1		1	1				0
C-1-3	1	1		1	1				0
C-1-4		1		1	1				0
C-1-5		1		1	1				0
C-1-6		1		1	1				0
C-1-7		1		1	1				0
C-1-8		1		1	1				0
C-1-9		1		1	1				0
C-1-10		1		1	1				0
TRIP BLANK		0		0	0				0
DUPLICATES		2		2	2				1
BOTTLE BLANK		2		2	2				1
RINSATE BLANK		2		2	2				1

* These analyses will be conducted if the INC-12 results indicate ^{238}Pu and ^{239}Pu above background levels.

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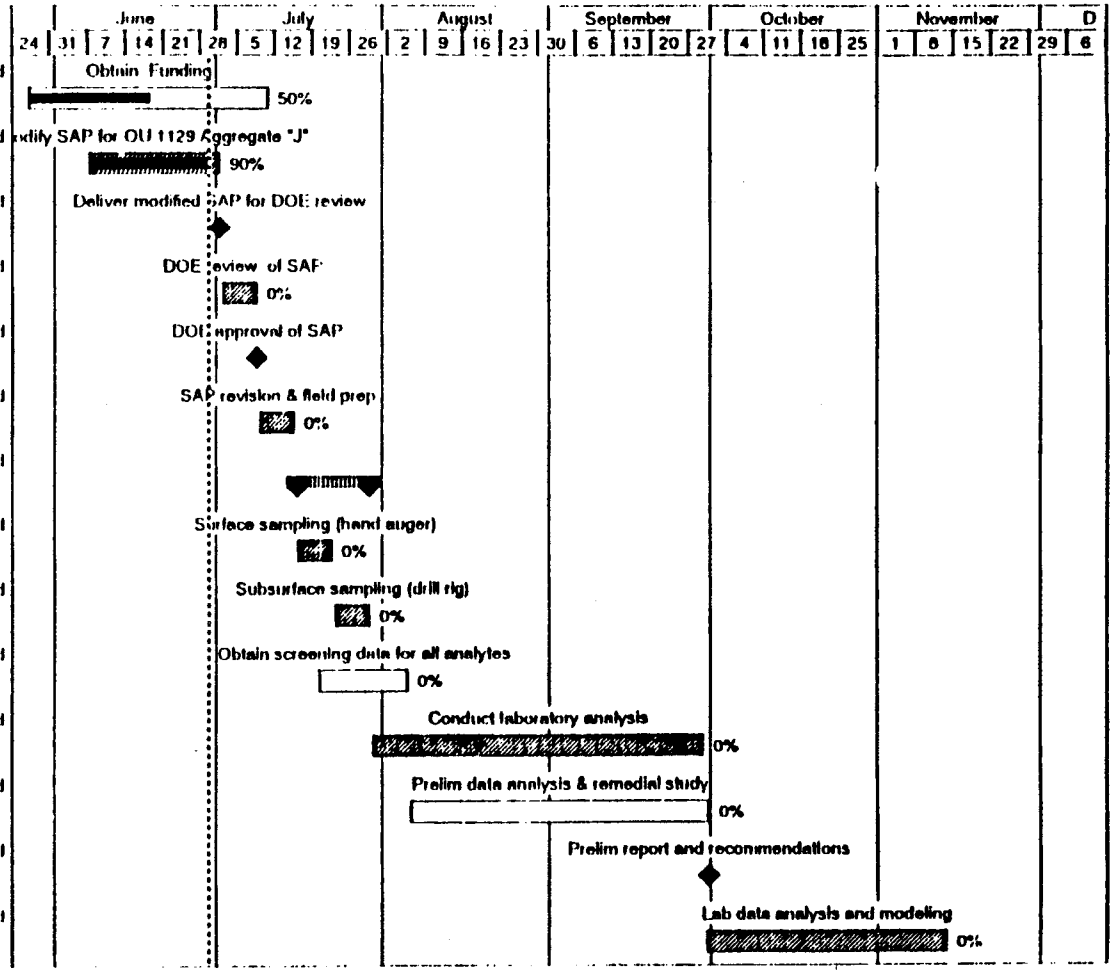
Attachment I

NSTL (TA-42) Interim Action Projected Schedule

Manager: Allyn Pratt, OU 1129

ID	Name	Duration
1	Obtain Funding	33d
2	Modify SAP for OU 1129 Aggregate "J"	23d
3	Deliver modified SAP for DOE review	0d
4	DOE review of SAP	5d
5	DOE approval of SAP	0d
6	SAP revision & field prep	5d
7	Conduct field sampling	10d
8	Surface sampling (hand auger)	5d
9	Subsurface sampling (drill rig)	5d
10	Obtain screening data for all analytes	13d
11	Conduct laboratory analysis	44d
12	Prelim data analysis & remedial study	40d
13	Prelim report and recommendations	0d
14	Lab data analysis and modeling	3.3d



Project NSTL (TA 42) Interim Action
Date 6/29/92

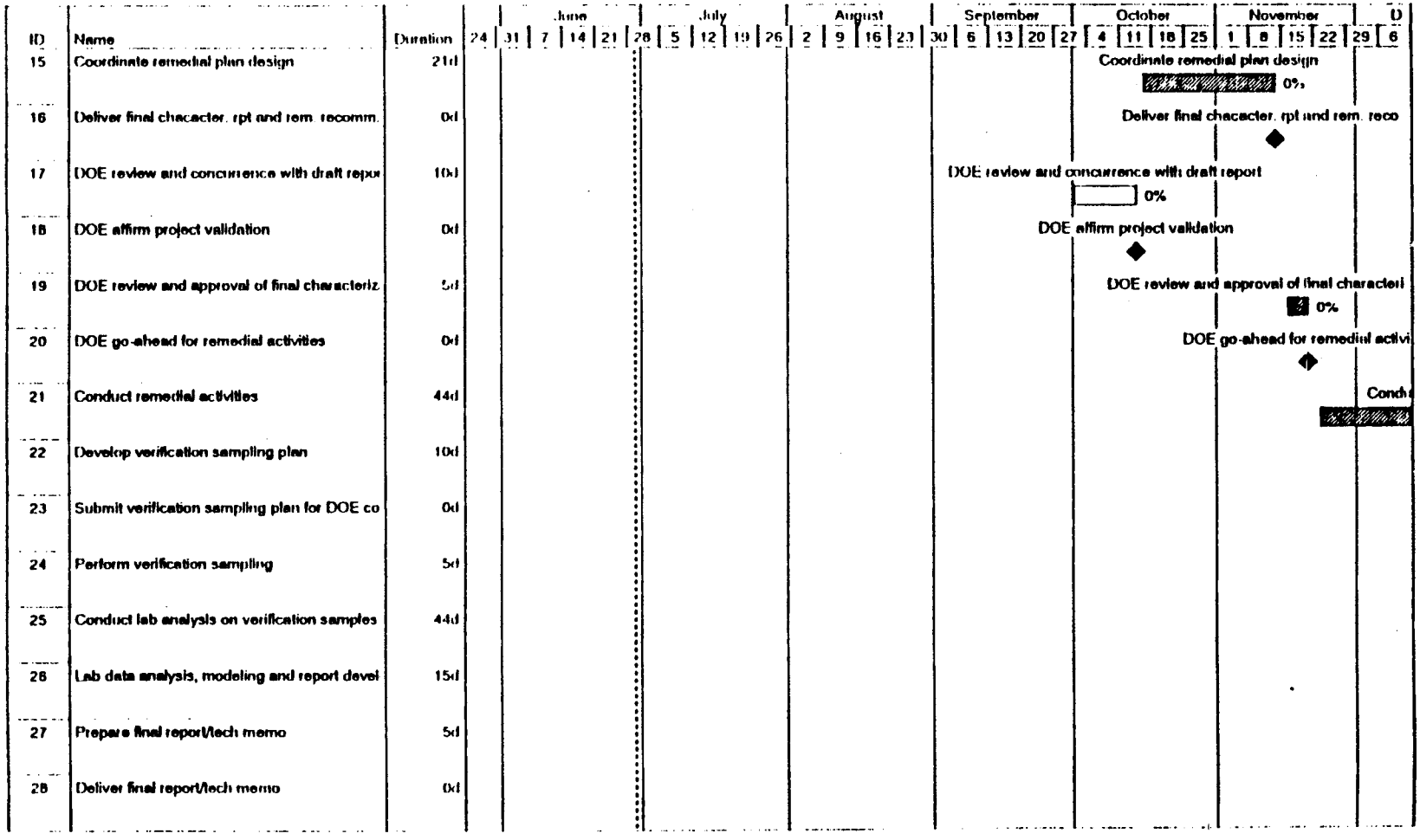
Critical — Progress — Summary
Noncritical — Milestone — Rolled Up

Attachment I

NSTL (TA-42) Interim Action Projected Schedule

Manager: Allyn Pratt, OU 1129

ID	Name	Duration
15	Coordinate remedial plan design	21d
16	Deliver final chacacter. rpt and rem. recomm.	0d
17	DOE review and concurrence with draft repor	10d
18	DOE affirm project validation	0d
19	DOE review and approval of final characteriz	5d
20	DOE go-ahead for remedial activities	0d
21	Conduct remedial activities	44d
22	Develop verification sampling plan	10d
23	Submit verification sampling plan for DOE co	0d
24	Perform verification sampling	5d
25	Conduct lab analysis on verification samples	44d
26	Lab data analysis, modeling and report devel	15d
27	Prepare final report/tech memo	5d
28	Deliver final report/tech memo	0d



Project NSTL (TA-42) Interim Action
Date 6/29/92

Critical
Noncritical
Progress
Milestone
Summary
Rolled Up