

TA-53

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Mr. John Young, Corrective Action Project Leader
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SUBJECT: SUBMITTAL OF ADDENDUM II TO THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) FACILITY INVESTIGATION (RFI) WORK PLAN AND SAMPLING AND ANALYSIS PLAN (SAP) FOR POTENTIAL RELEASE SITES (PRSS) 53-002(a) AND 53-002(b) AND ASSOCIATED PIPING AND DRAINAGES AT TA-53

Dear Mr. Young:

Enclosed are two copies of the Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project's Addendum II to the RFI Work Plan and SAP for PRSS 53-002(a) and 53-002(b) and Associated Piping and Drainages at TA-53 for your review.

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**Addendum II to the
RFI Work Plan and
Sampling and Analysis Plan
for Potential Release Sites
53-002(a) and 53-002(b)
and Associated Piping and
Drainages at TA-53**

Produced by the Remedial Actions Focus Area

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List of Acronyms and Abbreviations

AP	administrative procedure
AH	auger hole
BH	borehole
CAA	Clean Air Act
COPC	chemical of potential concern
CS	confirmatory sample
CWA	Clean Water Act
DOE	US Department of Energy
DQO	data quality objective
EPA	US Environmental Protection Agency
EQL	estimated quantitation limit
ER	environmental restoration
ERDB	ER Project database
FEHM	finite element heat and mass transfer
FIMAD	Facility for Information Management, Analysis, and Display
HSWA	Hazardous and Solid Waste Amendments of 1984
IA	interim action
IWP	Installation Work Plan
LANL	Los Alamos National Laboratory
LIR	Laboratory [LANL] Implementation Requirement
NFA	no further action
NMED	New Mexico Environment Department
NOD	notice of deficiency
PCB	polychlorinated biphenyl
PID	photoionization detector
PRS	potential release site
QAPP	Quality Assurance Project Plan
Qbt 2	unit 2 of the Tshirege Member of the Bandelier Tuff
QC	quality control

QP	quality procedure
RFI	RCRA facility investigation
RLWS	radioactive liquid waste system
RSI	request for supplemental information
SAP	sampling and analysis plan
SOP	standard operating procedure
SOW	statement of work
SVOC	semivolatile organic compound
TA	technical area
TAL	target analyte list
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
VOC	volatile organic compound

1.0 INTRODUCTION

This addendum (addendum II) describes the sampling and analysis activities necessary for determining the extent of contamination remaining at potential release site (PRS) 53-002(a)-99, the surface impoundments at technical area 53 (TA-53). [See Figures 1.0-1 and 1.0-2 for the location of TA-53 within Los Alamos National Laboratory (LANL) and the location of the surface impoundments within TA-53.]

PRS 53-002(a)-99 consists of PRS 53-002(a) (two northern surface impoundments) and PRS 53-002(b) (one southern impoundment). It is located near the southeastern boundary of TA-53 (Figure 1.0-3). The surface impoundments were part of the TA-53 radioactive liquid waste system (RLWS) and were used for the holding and decay of radioactively contaminated wastewater from 1970 to 1998.

The original "RFI [RCRA Facility Investigation] Work Plan and SAP [Sampling and Analysis Plan] for Potential Release Sites 53-002(a) and 53-002(b) and Associated Piping and Drainages at TA-53" (from this point forward referred to as "the work plan") (LANL 1998, 58841.2) was designed to determine the nature and extent of contamination to a predetermined depth of 15 ft below the surface impoundments (derived from predicted depths accessible by hand augering equipment). It was not meant to completely define the extent of contamination at the site. This addendum to the work plan provides the sampling plan for collecting and analyzing soil and tuff samples in order to determine the extent of contamination at the site. Once samples have been collected and analyzed, the data will be used to determine if contamination at the site has been reduced to levels that are protective of human health and the environment.

A no further action (NFA) decision is anticipated for this site because the interim actions (IAs) performed in 2001 and 2002 removed contaminated media within the impoundments that presented a potential health risk based on both industrial and residential scenario screening assessments (see risk target levels in section 1.1).

This addendum is organized as follows:

- Section 1.1 presents PRS descriptions and history, section 1.2 describes previous field investigations, and section 1.3 contains the regulatory framework for the investigation.
- Section 2.1 and section 2.2 describe the scope and objectives.
- Section 3.0 presents the investigative approach and data quality objectives (DQOs), the previous data collected, and the conceptual model for the TA-53 surface impoundments based on the current understanding of the existing data and data gaps.
- Section 4.0 reviews the proposed sampling activities.
- Section 5.0 reviews the sampling and analysis procedures to be used when collecting the required data.
- Section 6.0 reviews project management.
- Section 7.0 contains the references.

For the sake of completeness and clarity, note that the first addendum to the work plan contained the proposed sampling plan for the underground storage tanks and waste lines, PRSs 53-006(a,b,c,d,e), that were connected to the RLWS which flowed to the three surface impoundments (LANL 1998, 59997.2).

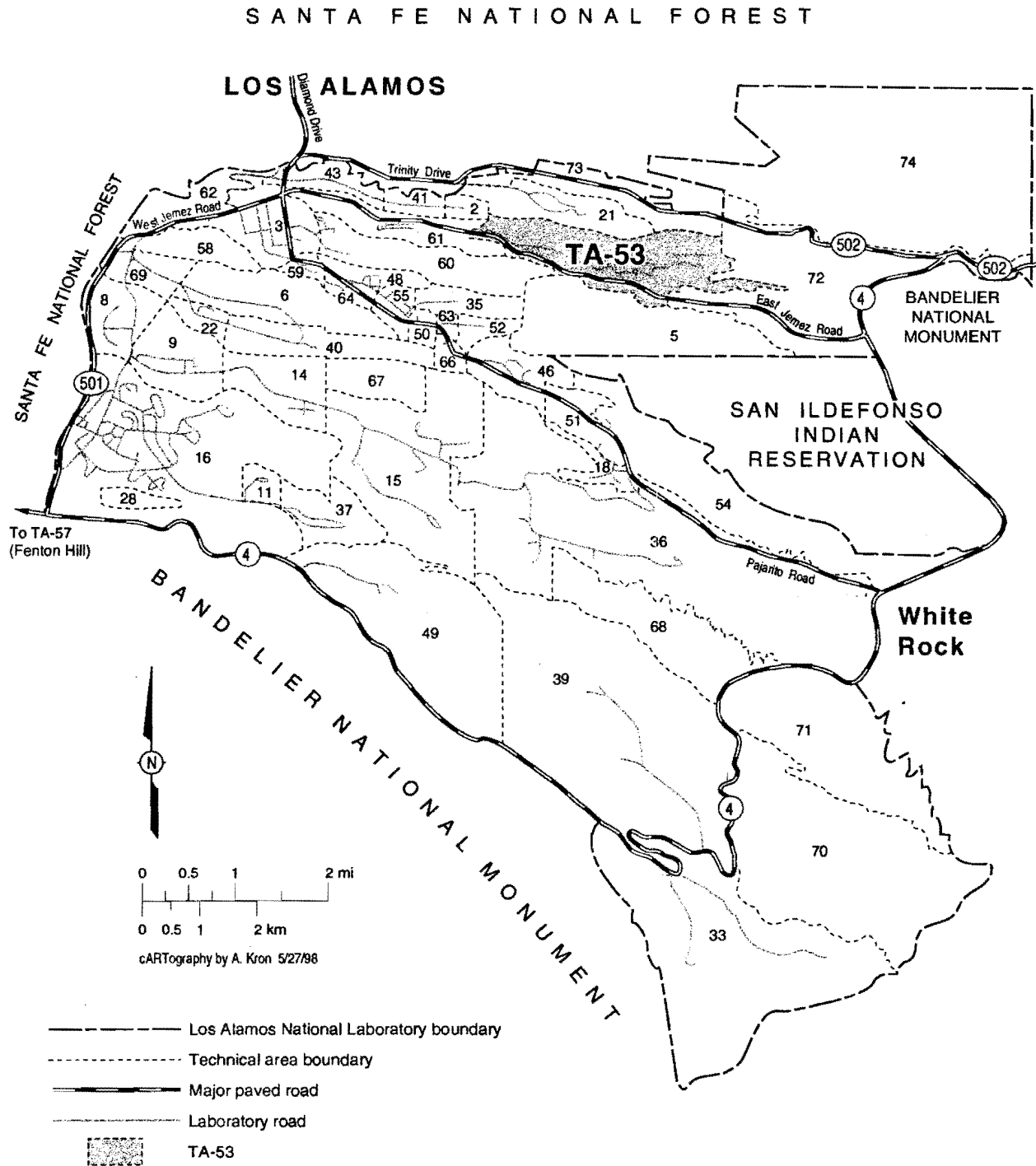


Figure 1.0-1. Los Alamos National Laboratory technical areas

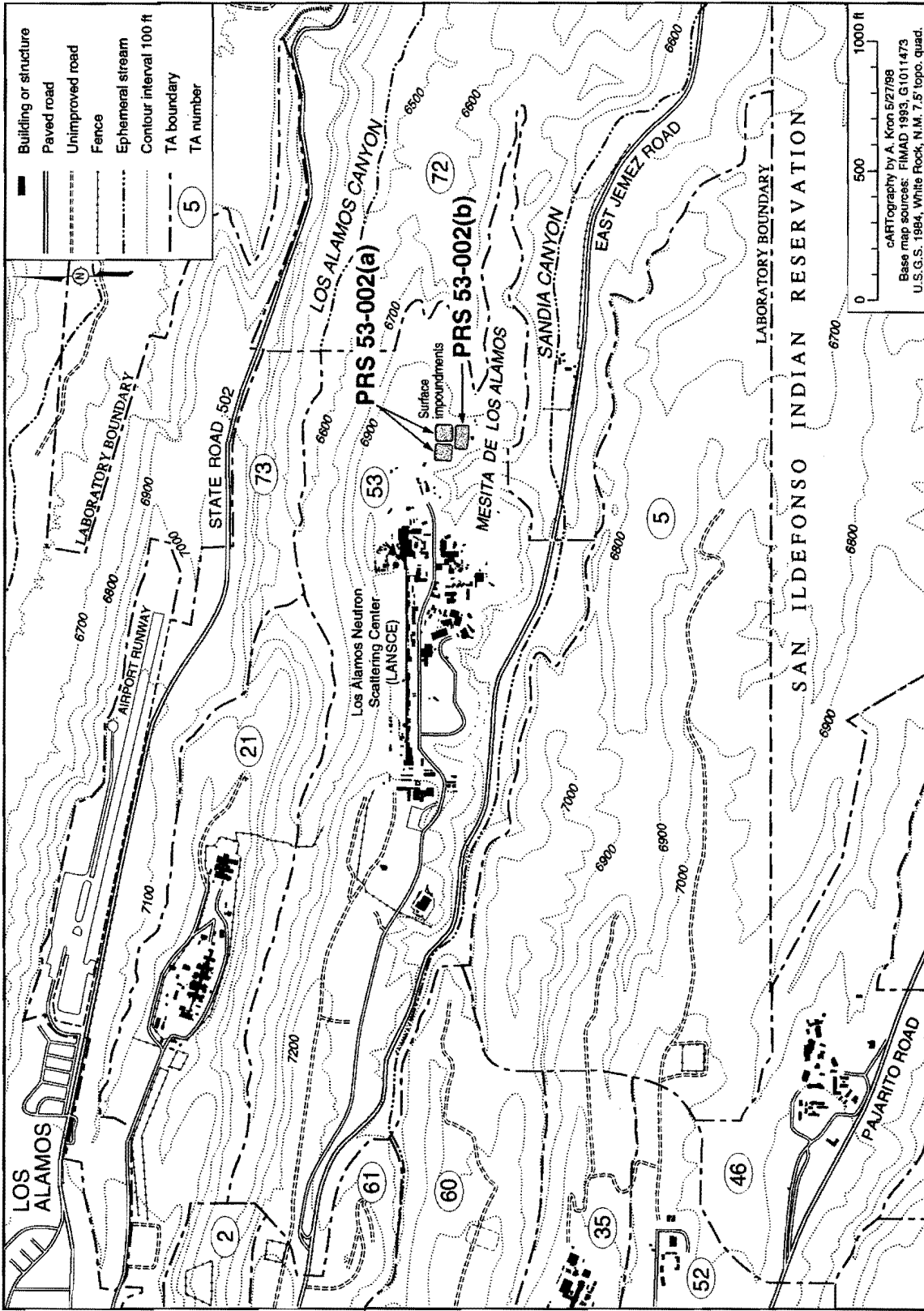


Figure 1.0-2. Topographic map showing surface impoundments at TA-53

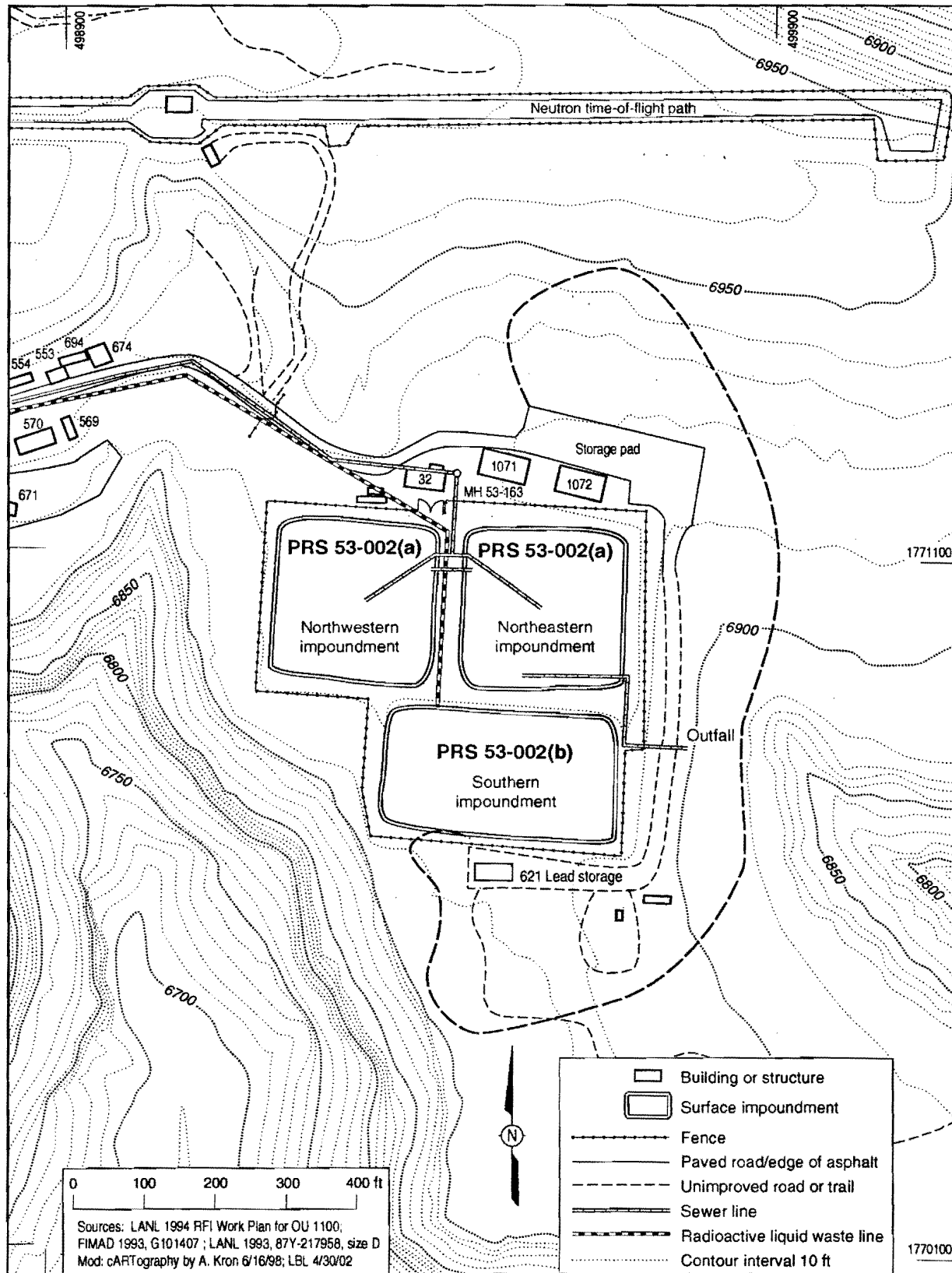


Figure 1.0-3. Current configuration of the TA-53 surface impoundments

1.1 PRS Descriptions and History

Consolidated PRS 53-002-99 consists of PRSs 53-002(a) and 53-002(b). PRS 53-002(a) itself consists of two northern surface impoundments designed to hold a combined total of 3.2 million gal. of sanitary and radioactive liquid wastewater from various TA-53 facilities. The northern surface impoundments were used from 1970 to 1992 as holding ponds for biodegradation, evaporation, and natural radionuclide decay. Radioactive wastewater was diverted from the northern surface impoundments to the new southern surface impoundment when it came online in 1985.

The northern impoundments were constructed by excavating into the tuff, adding a clay liner on top of the tuff, and spraying gunite (concrete) onto the crushed tuff berm. Effluent was released from the northern surface impoundments to a tributary of Los Alamos Canyon from 1978 to 1993 via an outfall to the east of the lagoons (see Figure 1.0-3).

The southern surface impoundment received excess sanitary wastewater from the northern impoundments through 1989 and radiological wastewater through 1998. It was designed to hold 2.5 million gal. and was constructed by excavating into tuff, overlaying the area with crushed tuff and sand, and then overlaying that with a Hypalon (rubber polymer) liner. Although the southern surface impoundment was constructed with an effluent discharge pipe to Los Alamos Canyon, the discharge pipe was plugged and no effluent was ever discharged.

In two separate field campaigns (one in 1994/1995 and one in 1999/2000), the ER Project collected samples from within and around the northern surface impoundments to characterize the nature and extent of contamination. The southern surface impoundment was also sampled in 1999/2000. Assessment of the data from samples collected within the dried sludge from the northern and southern impoundments and the clay liner of the northern impoundments determined that the concentrations of radionuclides surpassed the human health target levels of 15 mrem/yr dose, set by the US Department of Energy (DOE), and that carcinogenic chemicals surpassed the 10^{-5} cancer risk level, set by the New Mexico Environment Department (NMED) (LANL 2001, 71352). Therefore, the Laboratory proposed IAs to reduce the potential contaminant risk/dose to acceptable levels.

The IAs consisted of removing sludge from the three impoundments and removing the clay liner from the northern impoundments. Sludge was removed from the southern impoundment in 2000. The sludge and clay liner were removed from the northern two impoundments in May/June 2002. The data presented in this second addendum do not include any sample data from the removed material. The data included for assessment come only from tuff around and below the impoundments, or from soil and tuff from the outfall area.

1.2 Previous Field Investigations

1.2.1 1994/1995 Sampling Campaign

In 1994/1995, the ER Project conducted sampling at the northern surface impoundments to (1) assess the nature of the contamination, and (2) determine if contaminants were migrating into the subsurface. Samples of the sludge, the bentonite clay liner, the tuff below the bentonite liner, and the tuff below the gunite liner around the periphery were collected from the northern surface impoundments. Detections of chemicals located within the tuff (only) below the excavated liner are also presented in this second addendum to support the data gap summary (Appendix B).

Sample locations for the 1994/1995 sampling of tuff below the liner are shown in Figure 2.2-1. The list of samples taken during the 1994/1995 sampling campaign was presented in the work plan (LANL 1998, 58841.2).

The 1994/1995 samples—those taken for contaminants located within the tuff below the excavated liner—were used in the current data assessment to bound extent of contamination (see Appendix A). Appendix B presents the detected concentrations for those samples.

The 1994/1995 data for the northern impoundments indicated that the extent of contamination for most COPCs (with the exception of tritium) could be determined within a 12-ft depth. According to the NMED's notice of deficiency (NOD) (LANL 1999, 65120) regarding the work plan, a 15-ft depth within all surface impoundments was required as the maximum for the investigation due to the limited capabilities of the proposed sampling methods (i.e., hand and/or power augering). The historic drainage pathways associated with PRS 53-002(a) were also sampled to determine the lateral extent of contaminant migration.

Assessment of the 1994/1995 data indicated that the extent of contamination was not yet defined. Also, some of the data collected in 1994/1995 were of questionable quality, especially the polychlorinated biphenyl (PCB) data collected from the northern surface impoundments. It was also unknown what percentage of chromium VI made up the total chromium concentrations based on the 1994/1995 data. In addition, no sampling plan had been written or implemented for the southern surface impoundment.

1.2.2 1999/2000 Sampling Campaign

In 1998, the work plan (LANL 1998, 58841.2) was prepared for all three surface impoundments to collect samples needed to define extent-of-contamination to a 15-ft depth within all surface impoundments and up to a 29-ft depth around the perimeter of the surface impoundments. This work plan was implemented in 1999/2000. Samples were collected at depth beneath the liners to assess the movement of contaminants through the vertical profile and to determine extent of contamination for most contaminants.

Sample locations for the 1999/2000 sampling campaign are also shown in Figure 2.2-1. The list of samples taken during the 1999/2000 sampling campaign is presented in Appendix A. Appendix A does not include any samples from the removed material. Appendix B presents the detected concentrations for those samples.

1.3 Regulatory History

Before 1997, PRSs 53-002(a) and (b) were considered treatment, storage, and disposal (TSD) units regulated under RCRA. An interim status closure plan was submitted on February 12, 1993. On July 21, 1997, in response to a request from LANL, the Hazardous and Radioactive Materials Bureau (HRMB) of NMED approved a change in status for the TA-53 surface impoundments and added these units as PRSs 53-002(a) and 53-002(b) to Module VIII of the Laboratory's Hazardous Waste Facility Permit (EPA 1990, 01585). RCRA activities at these PRSs after 1997 have been conducted in accordance with the Hazardous and Solid Waste Amendments of 1984 (HSWA)

Although radionuclides are not regulated under RCRA, they are regulated under DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (proposed rule 58 FR 16268). Because it is more efficient and cost-effective to investigate all types of potential contamination during a single site characterization, this addendum addresses radiochemical concerns for PRS 53-002(a)-99.

Guidance for the ER Project's overall approach to site investigation, as well as the general history of the Laboratory, is available in the ER Project's draft "Installation Work Plan [IWP] for Environmental Restoration Project" (LANL 2000, 66802). The draft IWP contains the ER Project's Quality Assurance Project Plan (QAPP), which describes the requirements for personnel training; sample handling and custody; and data management review, validation, and verification. When appropriate, this addendum will reference the quality procedures (QPs) and standard operating procedures (SOPs) included in the QAPP. The documents referenced in this second addendum are available from the ER Project Reference Library and the Laboratory's public reading room.

2.0 OBJECTIVES AND SCOPE (HISTORIC AND CURRENT)

2.1 Objectives

2.1.1 1998 Work Plan Objective

The 1998 work plan (LANL 1998, 58841.2) investigation focused on determining if the surface impoundment liners (both the clay and Hypalon liners) prevented contaminants from migrating to subsurface media. The migration of contaminants was determined by sampling beneath and around the impoundments to the underlying material (sand and tuff) at various depths below both liners and around the perimeter of the surface impoundments.

The work plan was designed to answer the following questions:

- What is the nature, extent, and concentration of contaminants in the media (sludge, clay liner, sand layer, and underlying tuff [to a 15-ft depth]) associated with the three TA-53 surface impoundments and in the sediment of the drainage pathways leading from PRS 53-002(a)?
- What is the extent of historical transport or potential for future mobility, and what is the potential for down-canyon or vertical transport of contaminants into the vadose zone or the sediment in the side canyons of Los Alamos Canyon and Sandia Canyon?
- Do concentrations of potentially persistent bioaccumulators or other contaminants pose a potential unacceptable risk to ecological or human receptors?
- Do the sampling results of the investigation indicate that [best management practices] BMPs, either temporary or permanent, or interim measures may be needed to mitigate contaminant transport or reduce unacceptable risks? (LANL 1998, 58841.2, pp. 1-6 and 1-8)

In addition, the work plan stated, "The data collected from implementing this [work plan] and the data collected during the 1994/1995 sampling campaign will be used two ways: to determine the extent (to a 12 ft depth) of contamination and to conduct both baseline human health risk and ecological screening assessments. Baseline human health and/or ecological risk assessment(s) may be conducted with these data for these PRSs and their area of influence. If the extent is defined and the data indicate that human health and ecological risks are negligible, and groundwater/surface water contamination do not constitute a risk, no further action (NFA) will be proposed for this site" (LANL 1998, 58841.2, p. 1-8). (Note that 12 ft was changed to 15 ft by a subsequent NOD and NOD response.)

2.1.2 Addendum II Objective

The objective of this addendum is to confirm that the residual levels of contamination at the site do not pose unacceptable risk to human health and the environment by presenting a SAP designed to

- define extent of tritium present at the site within and around the impoundments by verifying the tritium model described in this document;
- define extent of other contaminants within and around the impoundments; and
- define verification sampling for the IAs, following removal of the sludge and liners.

The area of the site is approximately 7 acres; therefore, the design of a SAP demands consideration of the spatial scale. Although the extent of contamination may not be defined at every data point within and around the impoundments, by considering the data set as a whole, it is the objective of this plan to define extent of contamination with a few strategically placed boreholes for sample collection.

2.2 Scope

The best way to outline the scope of this addendum is to describe the original scope and to continue where it left off. The following paragraphs present an overview of what the 1998 work plan scope of work accomplished and what is still needed to complete the RFI for this site. Figure 2.2-1 displays the 1994/1995 and 1999/2000 sampling locations.

2.2.1 Overview of Previous and Currently Proposed Sample Collection and Analyses for PRS 53-002(a), Northern Surface Impoundments

In 1999/2000, the sludge, bentonite clay liner, and underlying tuff of the northern surface impoundments that comprise PRS 53-002(a) were sampled. Samples of all media types were collected from locations within the northwestern and northeastern surface impoundments as in the 1994/1995 ER Project sampling campaign. Samples were collected for PCB analyses from the sludge, clay liner, and at one depth interval into the tuff (underlying the clay liner). In addition, the tuff of both northern surface impoundments was sampled at two depth intervals and analyzed for semivolatile organic compounds (SVOCs), PCBs, target analyte list (TAL) metals, and for gamma-emitting isotopes, tritium, isotopic plutonium, and strontium-90. Ten percent of the samples were analyzed for chromium VI.

The resulting sludge and clay liner data indicated a potential human health risk for site workers exposed to contaminants (LANL 2001, 71352). In 2002, an IA was performed to remove the sludge and clay liner.

Ten confirmatory surface samples are proposed in this second addendum. Samples will be collected and analyzed from newly exposed tuff to complete the IA. In addition, to fill data gaps, samples are to be collected from depths of 30- and 50-ft at two locations (one in each impoundment) and analyzed for cobalt-60, strontium-90, and phthalates. (See section 4.0 for proposed sample collection details and figures.)