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Los Alamos National Laboratory

TA-35 D&D Project
Phase Separator Pit

Project Plan

Revision 1
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REVISION 1

This revision of the Project Plan reflects minor adjustment of phase work scopes, revision of project waste volume estimates, and updated schedule.

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1.0 INTRODUCTION

The scope of project is to remove radiologically contaminated ductwork and structures from TA-35 in order to reduce environmental risk, and release structures and land for potential re-use. The decommissioning activities are scheduled to be completed in mid-1997. The information contained in this plan supports related plans for characterization and decommissioning activities.

1.1 Background Information

Los Alamos National (LANL) is located in Los Alamos County in north-central New Mexico (Figure 1). The Technical Area (TA) 35 Phase Separator Pit (PSP) is located in Operable Unit (OU) 1129 in the north-central portion of LANL (Figure 2). The background information presented in this section is summarized from the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan for OU 1129 (LANL 1992a).

1.1.1 History of Operations

TA-35, also known as Ten Site, is located on a finger mesa between Mortandad and Ten Site canyons. The main laboratory building on this site, TA-35-2, was completed in 1951. Major research programs housed in this building included a hot cell used to prepare kilocurie sources of radioactive lanthanum (^{140}La), two experimental nuclear reactors (the Los Alamos Power Reactor Experiment, or LAPRE-1; and the Los Alamos Molten Plutonium Reactor Experiment, or LAMPRE), plutonium research laboratories, and a lithium-tritide component development facility. Building TA-35-2 and neighboring facilities are shown in Figure 3.

The original operations conducted in TA-35-2 were the ^{140}La hot-cell operations, located in the basement at the east end of the building. The LAPRE-1 and LAMPRE reactor experimental programs were operated between 1956 and 1964 in the basement of TA-35-2. These reactors were decommissioned and removed from the building at the conclusion of the experiments. The tritium facility, operated in Rooms A-12, A-12A, and A-12B (also in the basement of TA-35-2) from 1954 until 1974 underwent decontamination and decommissioning (D&D) in 1979.

Current operations in TA-35-2 include research in ceramics, robotics, polymer synthesis, lasers, high-speed impact studies, and strain-rate measurements.

1.1.2 Past Waste Management Practices

Building TA-35-2 exhausted both off-gas and liquids to the PSP (TA-35-3) for segregation and disposal processing. The PSP communicated with the Air Filter Building (AFB) for filtering of off-gas products and with the Hold-Up Tank Building for processing of liquid effluents. Three underground storage tanks (TA-35-4, -5, -6; shown as 35-003 (a), (b), (c) on Fig. 3) adjoining the PSP were used to store liquid waste prior to transfer to TA-35-10. The layout of these facilities is shown in Figure 3. The PSP, underground tanks, and AFB are no longer needed to support programs at TA-35 and are scheduled for D&D. TA-35-10 was removed during previous D&D activities at TA-35 in 1985.

Figure 1
Location of Los Alamos National Laboratory

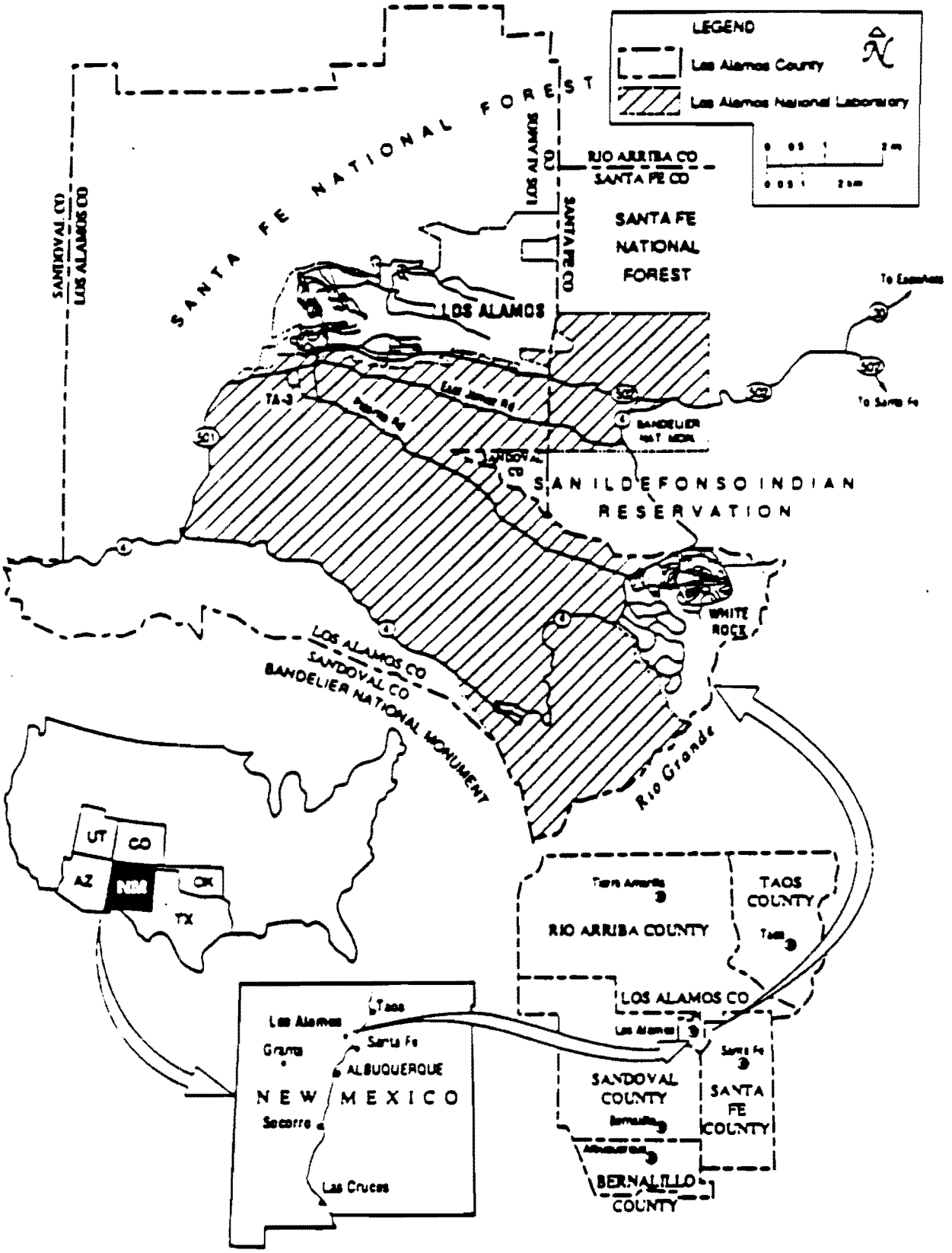


Figure 2
Location of Technical Area 35

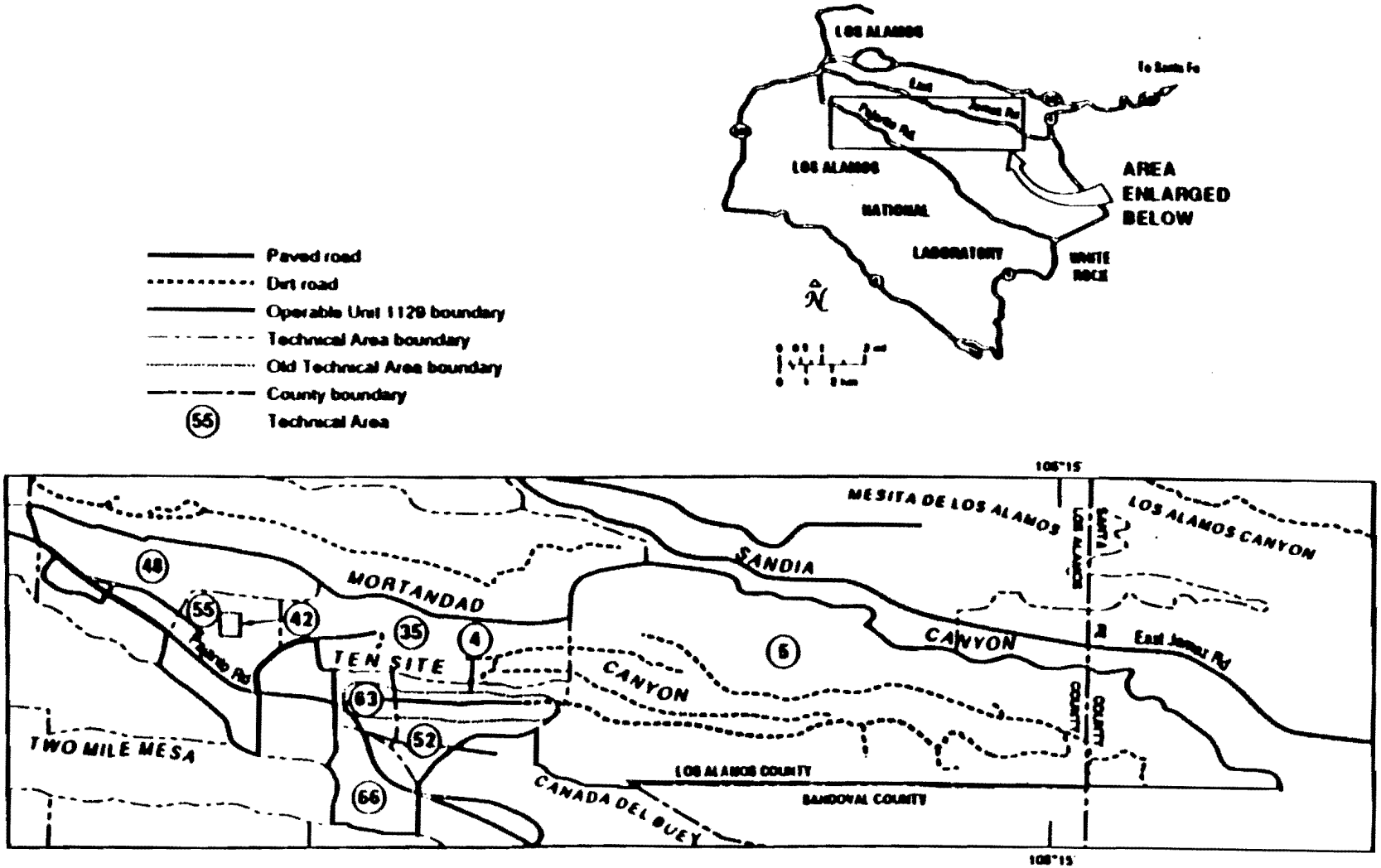
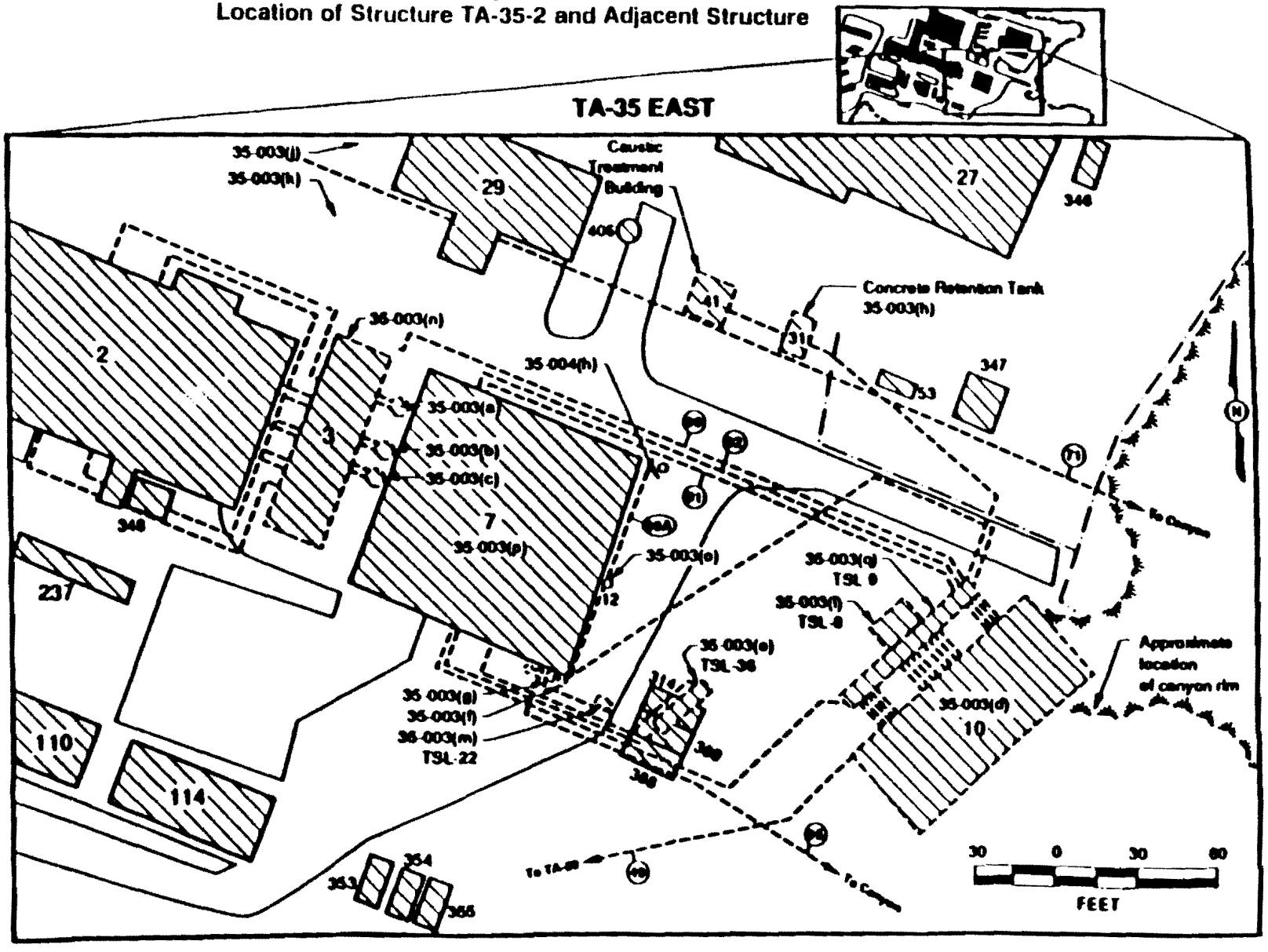


Figure 3
Location of Structure TA-35-2 and Adjacent Structure



The PSP is a large below-grade concrete structure equipped with stainless steel separator vessels, a caustic mixing apparatus, a high-efficiency particulate air (HEPA) filter bank, and liquid transfer pumps, lines, and related equipment. It was designed to receive combined liquid and gaseous wastestreams, separating the liquid and gaseous phases by means of vortex shedding. To minimize worker exposure, two lead brick shielding walls were added inside the PSP some time after construction.

Wastes initially discharged to the PSP originated from the radiochemistry laboratories and from the operations of the radioactive ^{140}La hot cells. The radioactivity in the waste came from barium-140 (^{140}Ba), ^{140}La, strontium-89, -90 (^{89}Sr ^{90}Sr), and yttrium-90 (^{90}Y) isotopes. There were also traces of other radionuclides, such as cesium-137 (^{137}Cs) and ruthenium-106 (^{106}Ru).

Liquid wastes were collected and stored in three 1,300-gal. stainless steel underground storage tanks (TA-35-4, -5, -6), caustic-treated for acidity in a 600-gal stainless steel tank within the PSP, then discharged to the concrete hold-up tanks at TA-35-10.

Radioactively contaminated air was sent from the PSP to the AFB. There, the contaminated air passed through a series of air-cleaning filters, which were washed with tap water and/or with long-decayed wastewater from the tank farms (TA-35-10). The system worked as designed, with ^{140}La and ^{140}Ba decaying out of the washwater. Other radionuclides, however, became concentrated during storage and evaporation; ^{90}Sr and ^{89}Sr became major constituents in the wastes stored longest, accounting for more than 50% of the remaining activity. Buildup of radiostrontium in the closed system became a problem in the air-cleaning equipment and required numerous hot-cell washings. This produced greater volumes of radioactively contaminated water. Because the radioactive strontium prevented discharge of treated wastewater, a strontium removal system was added to the AFB in 1955. This system consisted of a single-column cation exchanger; a second ion-exchange column was added in 1958.

1.1.3 Current Conditions

Laboratory exhaust in TA-35-2 is presently routed through both underground and overhead piping to the PSP, then to exhaust fans and/or HEPA filters, and finally out through steel exhaust stacks at TA-35-7. In addition, a TA-35-2 condensate pump and a janitor slop sink are connected to the PSP collection piping.

Previous D&D activities in 1975 and 1980 removed all but one of the exhaust air scrubbers from TA-35-7. Underground radioactive waste lines from TA-35-10 liquid waste storage tanks were removed in 1985.

1.1.4 Historical Contamination Data

Previous surveys of the PSP showed radioactive contamination with activities as high as 2,000 dpm/60 cm^2 in 1980 and 10,000 dpm/60 cm^2 in 1990. Soil contamination was discovered during D&D of TA-35-10 in 1985. During this effort, several sections of radioactive waste lines were removed along the north side of the AFB. Initial gross-beta contamination as high as 3,243 pCi/g ($^{90}Sr/^{90}Y$) was found 17 ft to 20 ft below grade. The soil was

decontaminated to 1,100 pCi/g beta activity, and the site was backfilled with clean soil to match the existing site topography.

Soils on the southwest side of TA-35-2 are known to have been contaminated by releases from a laboratory exhaust stack on the south side of the building. This stack released several thousand curies of tritium each year from 1954 to 1979. Contamination with plutonium-239 (^{239}Pu), uranium-235 (^{235}U), and ^{90}Sr is also expected. Levels of contamination in the soil have not been quantified.

The soil south of the southeast corner of TA-35-2 was contaminated in 1956 by a release from the LAPRE-1 reactor. The exact location of this release is unknown, but it is believed to be near the edge of the canyon. Soil samples collected in 1956 near the release had gross alpha contamination of 1,420 counts per minute per gram (c/m/g), gross beta contamination of 304 to 400 c/m/g, and gross gamma contamination of 44,000 c/m/g. Gross gamma contamination reportedly decayed to near background level after several months.

2.0 SCOPE AND OBJECTIVES OF PROJECT

The scope of project is to remove radiologically contaminated ductwork and structures from TA-35 in order to reduce environmental risk, and release structures and land for potential re-use. The objective of this project is to perform necessary remediation of the identified facilities that minimize the impact on ongoing operations, and dispose of project debris.

2.1 Objectives

We intend to develop and implement new methods for reducing environmental and worker exposure as technological advancements for D&D project work at LANL. The project team will work closely with OU 1129 to exchange sampling information, address methods to expedite demolition activities, and maximize the potential reuse of materials to reduce waste production.

The project directive to remove the facilities eliminates significant consideration of alternative solutions. The nature and use of this facility does not warrant continued remedial repair work, given the presence of radioactively contaminated material. Additionally, these facilities are no longer required to support LANL missions.

2.2 Scope

The project will remove a system of exhaust ductwork, above/below-grade structures, and liquid waste hold-up tanks. All structures and systems are in exterior locations, except for the TA-35 Building 2 interior removals (hoods, overhead exhaust duct (internal portion only), and floor penetrations). The D&D project will not remediate soil. However, should contaminated soil be identified within the two-foot working envelope around buried structures, it will be removed. If contamination exceeds this working envelope, the remediation of this additional soil will be the responsibility of OU 1129.

2.2.1 Phase 1

This phase will remove contaminated hoods. exhaust equipment, and associated overhead pipes from building TA-35-2. In addition, the underfloor exhaust duct will be permanently sealed in place. Removal of the underfloor exhaust duct is not feasible at this time due to major demolition of the concrete floor and building foundation required for removal of the embedded piping.

a. Decommissioning will begin at the west end of TA-35-2 A-wing and proceed east, removing the overhead exhaust ducts from the facility. During this operation, the existing exhaust system will remain in operation to control potential contamination during demolition activities. The removed duct sections will be capped and/or bagged, individually surveyed for both fixed and removable contamination, and placed into shipping containers for transport for burial at TA-54, or to a specialized off-site metal recycler.

b. When all overhead ductwork has been removed from a room, any remaining hoods will be removed, surveyed for both fixed and removable contamination, and bagged for transport to TA-54 waste disposal area.

c. After all other floor exhaust duct fixtures have been removed, the remaining openings will be permanently sealed and covered with floor tile.

d. The roof-mounted HEPA exhaust filter and exhaust ductwork will be removed from the roof of room A-17-A following completion of the exhaust system capping.

e. After the exhaust systems in Building 2 have been sealed, the Phase Separator Pit to Building 7 ductwork will be removed.

f. Exposed asbestos jacketed piping within Building 7 shall be removed.

g. Removal of the exhaust fans, roof mounted stacks, ductwork, and HEPA filter bank in Building 7 will be completed.

2.2.2 Phase 2

This phase will remove the contaminated floor and superstructure at TA-35-7. This includes the associated electrical and mechanical building services, abandoned waste piping along the northern edge of the facility, and exhaust stacks. The concrete floor of this facility has a two-part construction. The upper layer consists of a nominal 4-inch concrete cap layer over the original slab. The upper surface of this cap layer is flat, compensating for the sloped surface of the original floor. During core sampling of the concrete floor, evidence of magnetite concrete was observed. The building structure consists of a steel column- supported roof, block-wall exterior, with spread footings for the interior columns.

a. Decommissioning of the structure will begin by removing the concrete floor while the exterior building shell is still in place. This approach will serve to control fugitive dust emissions and the potential releases. The relatively wide column spacing will permit

floor access around the roof columns. Barricades will be used to guide the work force and minimize the potential for column damage. The concrete floor will be cut and removed.

b. The superstructure will be removed by disassembly of the steel sections, decontamination, surveyed for both fixed and removable contamination for release of uncontaminated material. Contaminated material will be buried at TA-54 or sent to a specialized off-site metal recycler. The concrete block-wall perimeter of the structure contains some fixed contamination and is not releasable. The walls will be demolished and removed as low-level radwaste (LLW).

c. Control of dust and debris for this phase of the project will require a combination of techniques to minimize the potential for dust while permitting decommissioning activities to proceed without excessive restriction. The use of water and foam sprays to control dust while generating a minimal amount of liquid wastes will be a key mitigating factor.

2.2.3 Phase 3

This phase will remove the PSP and the three buried underground hold-up tanks (TA-35-4, -5, -6), including all piping leading to and from the tanks. UST Regulations do not apply to this project, as the project is governed by RCRA.

a. The PSP tanks, transfer piping, and equipment will be size-reduced, cleaned, and packaged for shipment to the metal recycler. The lead-brick shield walls will be dismantled, and the lead bricks transferred into the LANL recycling program.

b. Following removal of non-structural items, the main structure will be excavated to provide working clearance. This excavation is designed to include the three hold-up tanks. The three tanks will be excavated and removed as individual units, surveyed for both fixed and removable contamination for release of uncontaminated material. Contaminated material will be buried at TA-54 or sent to a specialized off-site metal recycler.

c. The PSP concrete structure will be demolished and removed as waste. Embedded structural metal items will be segregated, surveyed for both fixed and removable contamination for release of uncontaminated material. Contaminated material will be buried at TA-54 or sent to a specialized off-site metal recycler.

d. Close coordination with the OU 1129 RFI Program will be required to schedule the sampling of the soil exposed after removal of the PSP structure. Particular attention to excavation slope stability and undermining of the Building 2 structure will be addressed during development of the field work plans.

2.2.4 Phase 4

This phase will excavate and remove the external underground ducts along the south side of

Building 2. The underground ducts will be cut at the building wall, and a permanent cap will be attached to seal the remaining embedded section of pipe.

a. The underground exhaust pipe excavation will begin at the east end of the routing, where the pipe is connected with the PSP. A section of the piping will be excavated, surveyed for both fixed and removable contamination for potential release as uncontaminated material. Contaminated material will be buried at TA-54 or sent to a specialized off-site metal recycler. Following removal, soil samples will be collected for analysis. Detailed coordination with the OU 1129 Program will be required for this entire phase.

b. As piping to the individual rooms is encountered, the entire room length of spur duct, from the main duct header to the wall connection, will be removed as a unit. The removed section will be surveyed for both fixed and removable contamination for release of uncontaminated material. Contaminated material will be buried at TA-54 or sent to a specialized off-site metal recycler. The embedded section of the exhaust duct will be permanently capped in place. Following removal, soil samples will be collected for analysis.

2.2.5 Phase 5

This phase will excavate and remove the underground ducts on the north side of Building 2, and remove Room A-175A. The underground ducts will be cut at the building wall, and a permanent cap will be attached to seal the embedded section of pipe that remains. The removal of Room A-175A is necessary because of its degraded condition and its location over the exhaust ducts to be removed.

a. Removal of Room A-175A will require demolition of the roof and block-wall superstructure. All electrical and mechanical systems will be removed from the facility, surveyed for both fixed and removable contamination for release of uncontaminated material. Contaminated material will be buried at TA-54 or sent to a specialized off-site metal recycler.

b. The foundation for this room consists of a concrete slab that supports a series of reactor-rod storage tubes, originally fitted with depleted uranium caps. The storage tubes were surrounded with concrete for shielding and support. The decommissioning of this foundation will require careful demolition to segregate the storage tube materials from the surrounding concrete matrix.

c. The underground exhaust pipe excavation will begin at the east end of the routing, at the connection to the phase separator pit. A section of the piping will be excavated, surveyed for both fixed and removable contamination for potential release as uncontaminated material. Contaminated material will be buried at TA-54 or sent to a specialized off-site metal recycler. Following removal, soil samples will be collected for analysis. Detailed coordination with the OU 1129 RFI Program will be required for this entire phase.

d. As piping to the individual rooms are encountered, the entire length of spur duct, from the main duct header to the wall connection, will be removed as a unit. The removed section will be surveyed for both fixed and removable contamination for potential release as uncontaminated material. Contaminated material will be buried at TA-54 or sent to a specialized off-site metal recycler. The embedded section of the exhaust duct will be permanently capped in place. Following removal, soil samples will be collected for analysis.

3.0 MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

The D&D of the TA-35 PSP and associated structures will be completed by a team of individuals from LANL, a remediation contractor, and ICF Kaiser Engineers. The formal project organization is presented as Attachment 1.

Overall Environmental Restoration Project management direction is provided by Jorg Jansen. The D&D program is an integral part of the overall ER program. D&D programs are directed by Miguel Salazar, whose primary responsibilities include the coordination of D&D planning and remediation activities among on-going and future projects.

The project leader for the TA-35 D&D project is Al Rey, who has full project responsibility for project direction, scope control, budget, and schedule performance.

ICF KE provides technical support and engineering analysis to the project team. Specialized sampling equipment and personnel are added to the project team as required to meet unique project requirements.

ENG-5 and the remediation contractor are responsible for physical labor support of the project. ENG-5 has direct contract management authority of the labor assignment for this project. The remediation contractor supplies the necessary field labor to execute the decommissioning plans for this project.

The direct project team is supported by the balance of the LANL organization, with a key support team of ESH-1 Health Physics Technician David Siddoway, and ESH-5 Industrial Hygienist Joe Louck.

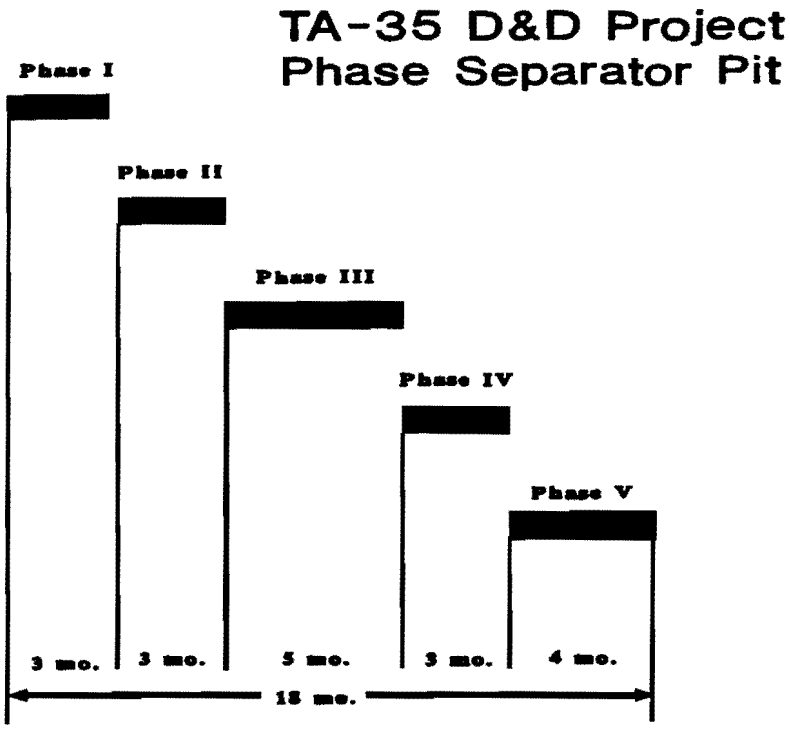
3.1 Work Breakdown Structure

The standard DOE work breakdown style task listing has been prepared for this project. An outline of the WBS has been included as Attachment 2.

3.2 Logic and Schedule Diagrams

The overall project schedule is presented as Figure 4. A specific phase-by-phase logic baseline schedule is presented as Attachment 4.

Figure 4



Phase I: Remove overhead exhaust & seal floor ducts
Phase II: Remove Bldg. 7 floor & structure
Phase III: Remove U/G tanks (TSL-4,-5,-6) and PSP structure
Phase IV: Remove U/G ducts - South
Phase V: Remove Rm. A-176A & U/G ducts - North

3.3 Performance Criteria

The development and implementation of an effective waste minimization plan, methods to control fugitive dust emissions, techniques for cost-effective demolition of large concrete structures, and the ability to achieve these goals with minimal effect on ongoing operations will serve as the performance measure-in-fact. The project leader will define specific performance goals and monitor project progress accordingly.

Traditional project cost accounting in accordance with DOE Order 4700.1 will be implemented to monitor the cost-performance (BCWP, ACWP) and schedule-performance (BCWS) of the project.

3.4 Cost and Manpower Estimates

The overall project cost estimate is $ 6.0 M, requiring an estimated 64,720 manhours. A detailed breakdown of the cost and schedule is presented in Attachment 4.

3.5 Project Functional Support Requirements

The project organization chart (Attachment 1) identifies the formal reporting path for project related-activities. The most essential element of this project will be the ability of the support groups to provide service when requested and to coordinate the multiple approvals required for this project.

Al Rey (ESA-4) will function as the project leader for all project activities. Keith Rendell (FSS-6) will direct the remediation contractor and coordinate the LANL Engineering Support Team.

3.5.1 Project Management, Measurement, and Planning and Control Systems

The project schedule provides the key element for planning and tracking tasks associated with this project. Each contractor and LANL support group will be scheduled and encouraged to participate in project planning meetings. All elements have a performance-based budget to track costs. Should a task require additional resources, an estimate of the change shall be reviewed and approved by the Project Leader. The net effect of the change may invoke a revision of the project baseline, and require preparation of a Baseline Control Proposal, per DOE Order 4700.1.

The existing accounting, contracting, and technical reporting networks remain; no duplication of effort is required.

3.5.2 Information and Reporting

The current list of required project documentation is presented as Attachment 3.

Project information from the remediation contractor and ICF KE includes weekly project staff meetings, and monthly reports of progress. Additionally, special events such as dry-run practices, special procedure training, and unique milestone activities will be documented

3.5.3 Systems Engineering Management

The scope of this project will not require a Systems Engineering Management Plan. However, it will require interface with various support services for replacement of ventilation, drainage, and miscellaneous piping systems.

3.5.4 Configuration Management

The configuration management of the D&D efforts for this project will require significant documentation of as-found information and extensive location of as-left/capped services. Detailed surveys will be performed during the characterization process as elements are exposed, specifically during the demolition phase.

3.5.5 Release Requirements

The project release requirements for structures will meet authorized limits developed from guidance provided in DOE Order 5400.5. This D&D project will remove the required

structures and the surrounding soil envelope as described in section 2.2. Any additional remediation of soil will be governed by the approved RFI work plan for OU 1129.

3.7 Contingency

In accordance with DOE Order 5400.5, this project must address the need for consideration of contingency planning for unknown conditions or events which may impact overall project performance. The nature of D&D projects in general, require a higher level of contingency funds be set aside for potential use during project execution. The following are key areas of concern:

1) The underground portion of the PSP
2) Removal of the underground hold-up tanks
3) Removal of the underground process lines to the phase separators
4) Removal of concrete structures
5) Interfacing costs associated with on-going laboratory activities

In order to expedite project execution, the project has been divided into five phases. This approach also supports reduction of project risk by transfer of "lessons learned" from one phase being factored into subsequent phases to minimize the potential for repeat errors as well as introduce new technologies in a controlled manner.

Additionally, the project team is evaluating the potential to use large-scale demolition equipment will reduce worker exposure while improving the rate and effectiveness of material removal. By reducing the variable labor-cost component of the work, contingencies for labor overrun may be reduced.

The use of a formalized characterization plan has increased the thoroughness of the planning effort, minimizing the potential for discovery of unknown conditions during decommissioning activities. Samples from overhead/underground ductwork, soils, general structural areas, known tanks, and vessels will create a clear description of the project to support detailed planning.

3.8 Quality Assurance

Quality assurance elements for this project shall be implemented as required by the overall Environmental Restoration Quality Assurance Project Plan. In order to specifically control the decommissioning process, a project-specific Quality Assurance Plan will be developed which is designed to more closely monitor the unique aspects of decommissioning. The decommissioning activities for this project will produce two groups of data:

Documentation of as-found conditions, which will be used to support preparation of demolition methods, environmental exposure models, and waste volume/characteristic estimates.

Documentation of actual work-related environmental readings obtained during decommissioning, which will be used for decommissioning performance monitoring.

Both sets of project data must be obtained through the use of calibrated equipment and standardized test methods to ensure consistency and accuracy. Records developed for project activities must include calibration of equipment, standardized operational procedures, and operator training.

4.0 WASTE MANAGEMENT

The decommissioning of this facility is expected to generate two general classes of waste--Low level radioactive (LLW) and mixed waste. Table 1 has been prepared to present the projected waste volumes.

4.1 Low level radioactive waste

4.1.1 Protective

The protective stream consists of personal protective equipment (PPE) and physical barriers used to contain the spread of contamination. This stream is generally related to the individual operation and method selected for decommissioning. The use of recyclable clothing, where practical, can provide significant reduction in waste volume. In addition, the use of controlled airflow in structures/equipment can limit the extent of protective coverings required for a project. Other techniques include the use of large equipment to remove structures remotely and minimization of potential contamination through the use of fine mist sprays instead of plastic sheeting.

4.1.2 Metal

The metals wastestream consists of two groups: recyclable and non-recyclable. The recyclable group includes stainless steel piping (some 54 tons are available from this project), lead bricks, and major structural steel sections (from Building 7). Non-recyclable (or difficult to recycle) materials include concrete reinforcement steel, metal roof panels, and miscellaneous piping/conduit/connectors.

4.1.3 Non-Metals

This wastestream consists of concrete, soil, brick, and concrete block used for the various structures. This material may be recycled as clean fill or disposed of as waste. Extensive testing/monitoring of the materials will be required to ensure that release limits are 100% achieved. The project team will address methods to minimize the volume of waste generated through the use of surface decontamination methods.

4.1.4 Liquids

This wastestream consists of liquids collected during the decommissioning process and contents of miscellaneous piping systems, tanks, and vessels. Detailed radiochemical analysis of these liquids will be required for completion of individual waste profiles for each specific

volume. The existing LANL liquid waste management system will be used to process these liquids if appropriate. Off-site disposal will be arranged for those wastes that cannot be treated and released by LANL.

4.2 Mixed waste

4.2.1 Solid

The solid mixed wastes that may be encountered during demolition include lead shielding bricks and soil. Lead shielding bricks will be transferred to the LANL lead brick recycling facility for cleaning and reuse. Soil will be sampled for detailed chemical and radiochemical analysis. The individual waste volumes will be temporarily stored at TA-54 Area G for final disposition either off-site at a commercial facility, or on-site in the future mixed waste disposal facility at TA-54.

4.2.2 Liquid

Liquid mixed wastes will be sampled, and treated. The resultant liquid will:

1) Be temporarily stored at TA-54 area G for final off-site disposal at a commercial facility; or
2) Be disposed of through the LANL liquid waste treatment facility if the treated material is within acceptable guidelines.

Table 1

Waste Type	Waste Volume (cu ft)		Recycled Material	
LLW	Protective	7,580	Cloth Anti-C	400 cu ft
	Metals	6330	Stainless Steel	54.5 Tn
	Non-Metals	146,000		
	Liquid	6,800		
Mixed Waste	Solid	150		
	Liquid	260		