DOE/EA-1410

Environmental Assessment of the Proposed Disposition of the Omega West Facility at Los Alamos National Laboratory, Los Alamos, New Mexico

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Department of Energy
National Nuclear Security Administration
Office of Los Alamos Site Operations

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EXECUTIVE SUMMARY

Los Alamos National Laboratory (LANL) is a Federal installation administered by the U.S. Department of Energy (DOE) National Nuclear Security Administration (NNSA) as a national security laboratory. Following the May 2000 Cerro Grande Fire, the NNSA identified a number of facilities, including the Omega West Facility, that were at risk of flooding or other damaging events resulting from fire damage.

The Omega West Facility is located in Los Alamos Canyon at LANL in New Mexico. The Omega West Facility, originally constructed in 1944, and associated structures are of advanced age and not in a condition suitable for renovation or reapplication. Further, they are located within a potential flood pathway. There is no foreseeable future use for the Omega West Facility, which is eligible for inclusion in the National Register of Historic Places. Up until 1992, the Omega West Reactor operated within the Omega West Facility. In 1992, the Omega West Reactor was shut down. By the end of 1994, actions were completed in placing the Omega West Facility into a shut down condition. The actions taken included the removal of the fuel, draining of liquids from tanks, and removal of radiological sources and flammable materials. The Omega West Facility includes ancillary support structures, remains of a reactor vessel, and emissions stack.

Six months after the May 2000 Cerro Grande Fire, which burned across the upper and mid-elevation zones of several watersheds, including the Los Alamos Canyon watershed, immediate actions were taken to remove several of the Omega West Facility's small support buildings and structures. The remaining structures and buildings that constitute the Omega West Facility (which include the main building, Building 2-1, which houses the empty reactor vessel) continue to be vulnerable to damage from flooding and mudflows as a result of the fire and the changed environmental conditions upstream from the Omega West Facility. While all buildings are vulnerable, the support buildings and structures are especially at risk due to their construction.

The Proposed Action is to remove the Omega West Facility and the remaining support structures from Los Alamos Canyon. The Proposed Action includes the characterization, decontamination of structures (the removal of radiological and chemical contamination to minimize the amount of waste disposed), the demolition of structures (including the reactor vessel), the segregation, size reduction, packaging, transportation, and disposal of wastes; and removal of several feet of potentially contaminated soil from beneath the Omega West Facility. Under the Proposed Action, two waste disposal options are evaluated. One would involve the transportation of up to 330 covered truckloads (approximately 144,000 cubic feet (4,080 cubic meters)) of radioactive low level waste to another disposal site or a commercial facility. The other option would involve managing the low-level waste onsite at LANL at TA-54, Area G.

The Phased Removal Alternative involves similar decontamination and demolition actions to ensure the safe removal and disposal of waste resulting from the immediate removal of the support buildings and structures. In the Phased Removal Alternative, the demolition the reactor vessel and Room 101 of Building 2-1, which houses the empty reactor vessel, would be conducted at an undetermined time in the future before 2025.

Under the No Action Alternative, the Omega West Facility and associated structures would be left in place and allowed to deteriorate. As a result, they would remain vulnerable to flooding and other potentially damaging events. This is not an alternative that satisfies the NNSA's Purpose and Need for Agency Action.

Removal of the Omega West Facility under the Proposed Action and the Phased Removal Alternative would result in emissions associated with vehicle and equipment exhaust as well as radiological and particulate (dust) emissions from demolition activities. No discernible effects on air quality would result, and no negative effects on human health are anticipated. Waste types and quantities generated by removal of the structures would remain within the capacity of existing waste management facilities. The Omega West Facility is not located in an easily viewed area; however, some improvement in the visual quality of the area would result. Once the Omega West Facility is removed, the ecosystem would gradually return to a state more closely resembling its pre-construction configuration. Removal of the Omega West Facility would be coordinated with the New Mexico State Historic Preservation Officer to address the loss of this historic property. Effects on water resources, socioeconomic conditions, and soils are not anticipated.

Cumulative effects of the Proposed Action, along with past, present, and reasonably foreseeable actions on Los Alamos and surrounding lands, are anticipated to be beneficial over the long term.

1.0 PURPOSE AND NEED

Chapter 1 presents the Department of Energy's (DOE's) requirements under the *National Environmental Policy Act* (NEPA), background information of the Omega West Facility the purpose and need for agency action and a summary of public involvement activities.

1.1 INTRODUCTION

NEPA requires Federal agency officials to consider the environmental consequences of their proposed actions before decisions are made. In complying with NEPA, the DOE National Nuclear Security Administration (NNSA)[1] follows the Council on Environmental Quality (CEQ) regulations (40 *Code of Federal Regulations* [CFR] 1500-1508) and DOE's NEPA implementing procedures (10 CFR 1021). At this time, the NNSA must make a decision regarding the disposition of the Omega West Facility, which is located within Technical Area (TA-2) and TA-61 at Los Alamos National Laboratory (LANL). The Omega West Facility includes all remaining ancillary support structures as well an empty research reactor vessel (located in Building 2-1).

To assess the environmental effects of the Proposed Action and reasonable alternatives to the Proposed Action, the NNSA has decided to prepare an Environmental Assessment (EA). Appendix D to Subpart D of 10 CFR 1021.410 identifies DOE actions that normally require the preparation of an Environmental Impact Statement (EIS). Specifically, Appendix D4 identifies the "siting, construction, operation, and decommissioning of power reactors, nuclear material production reactors, and test and research reactors" as normally requiring an EIS. In 1992, the research reactor, which operated within the Omega West Facility, was shut down. In 1994, following the shutdown of the research reactor, all liquids were drained, and the fuel rods as well as interior combustible materials (such as furnishings) were removed and shipped from LANL for disposal. The Omega West Facility was downgraded from a hazard category of "nuclear facility" to that of a "radiological facility"[2]. During the summer of 2000, several small outbuildings were demolished and removed as part of the emergency response actions taken during and immediately after the May 2000 Cerro Grande Fire. The remaining scope associated with the disposition of the Omega West Facility includes characterization and demolition of the remaining structures (including the empty reactor vessel), and disposal of the resulting waste. Because the full scope of activities usually associated with the "decommissioning" of a research reactor would not occur (removal of fuel rods, preparing the facility for shutdown), the NNSA has decided that an EA is the appropriate level of analysis for this project.

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[1] The NNSA is a semi-autonomous agency within the DOE established by the 1999 *National Nuclear Security Administration Act* (Title 32, of the *Defense Authorization Act* for FY 2000 [Public Law 106-65]).

[2] DOE maintains hazard categories that place facilities into certain ranks depending upon facility material inventories, material at risk, and the potential safety hazards associated with them. Nuclear facilities have high potential hazards. Radiological facilities are less hazardous, containing only small amounts of radioactive materials or containing larger amounts in configurations that are not considered to have credible potential for serious accidents. A facility with radioactive contamination present is often considered a radioactive facility (DOE/LANL 2000).

The purpose of an EA is to provide Federal decisionmakers with sufficient evidence and analysis to determine whether to issue a Finding of No Significant Impact (FONSI) or prepare an EIS. The NNSA has therefore decided to proceed with an EA rather than an EIS to determine the appropriate level of analysis for its compliance with NEPA. This EA has been prepared to assess the potential environmental consequences of two alternatives for disposition of the Omega West Facility, together with the No Action Alternative.

The objectives of this EA are to (1) describe the underlying Purpose and Need for NNSA's action; (2) describe the Proposed Action and identify and describe any reasonable alternatives that satisfy the Purpose and Need for Agency Action; (3) describe baseline environmental conditions at LANL; (4) analyze the potential direct, indirect, and cumulative effects to the existing environment from implementation of the Proposed Action; and (5) compare the effects of the Proposed Action with the No Action Alternative and other reasonable alternatives. For the purpose of compliance with NEPA, reasonable alternatives are identified as being those that meet NNSA's Purpose and Need for action by virtue of timeliness, appropriate technology, and applicability to LANL.

In addition, the EA process provides NNSA with environmental information that can be used in developing mitigative actions, if necessary, to minimize or avoid adverse effects to the quality of the human environment and natural ecosystems, should NNSA decide to proceed with implementing the disposition of the Omega West Facility at LANL. Ultimately, the goal of NEPA and this EA is to aid NNSA officials in making decisions based upon an understanding of environmental consequences and taking actions that protect, restore, and enhance the environment.

1.2 BACKGROUND

The original installation for research and development of the world's first nuclear weapon was established at Los Alamos, New Mexico, in 1943, by the Manhattan District of the U.S. Army Corps of Engineers. This installation has evolved into LANL and is now administered by NNSA as a national security laboratory. The facilities that support the diverse NNSA missions at LANL have changed considerably since the 1940s. LANL is comprised of 43 square miles (mi^2) (111 square kilometers [km^2]) of buildings, structures, and forested land (see Figure 1-1). The University of California (UC) is under contract to DOE for the day-to-day management and operations of LANL.

The Cerro Grande Fire, which started in May 2000, burned over 43,000 acres (ac) (17,200 hectares [ha]) along the eastern flank of the Pajarito Plateau before it was extinguished.[3] The upper and mid-elevation zones of several watersheds, including Los Alamos Canyon, were burned to varying degrees. Many LANL structures, equipment, and infrastructure were destroyed or damaged. LANL and surrounding communities remain vulnerable to the occurrence of flooding, mudflows, and avalanche due to the significant loss of watershed plants and groundcover.

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[3] The number of acres is an estimate based on data derived from the Burned Area Emergency Rehabilitation (BAER) Team Report (BAER 2000). Any differences in acres affected among the BAER Report, other published sources, and this document are the result of data entry variations or rounding differences and are not intended to indicate significant differences.

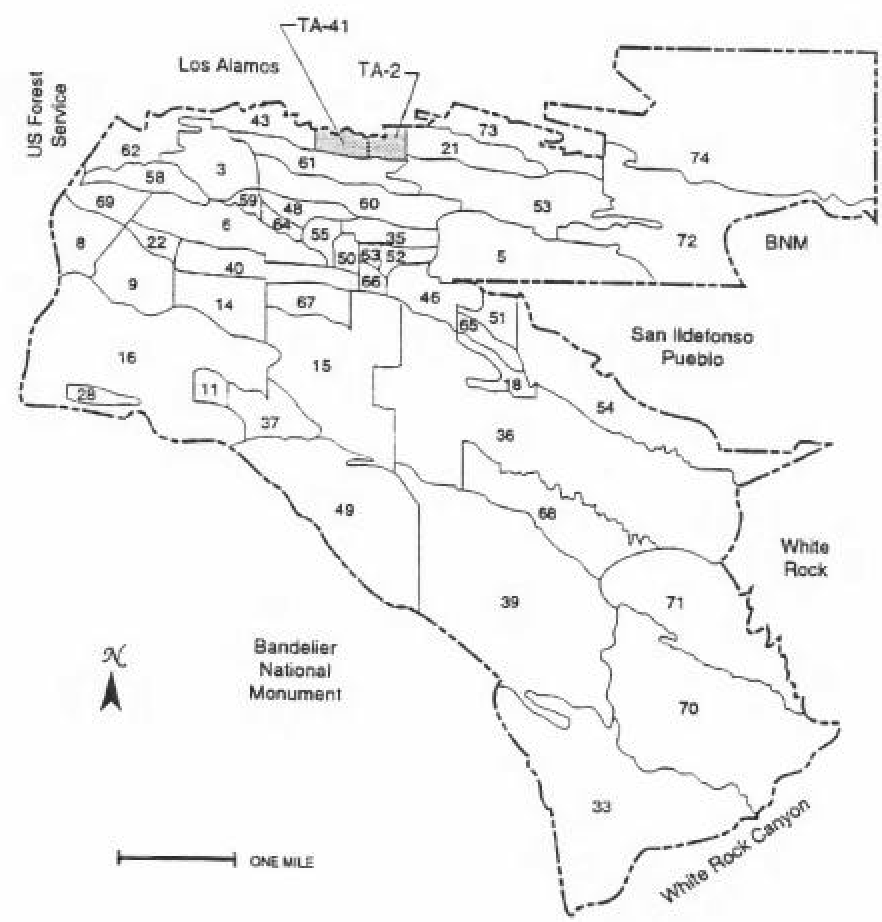

Figure 1-1. Los Alamos National Laboratory and Technical Areas.

The Omega West Facility sits within the middle reach of Los Alamos Canyon near the LANL site boundary to the south of the Los Alamos townsite (see Figure 1-2). This area is known as TA-2. The Omega West Facility is situated immediately adjacent to the stream that flows through the canyon and is actually built over the historical streambed. The Cerro Grande Fire reached a location 2 miles (mi) (3 kilometers [km]) upstream of the Omega West Facility. The upper reaches of Los Alamos Canyon also contain a reservoir and dam. The potential for flash floods in Los Alamos Canyon resulted in a determination that the Omega West Facility was at very high risk for structural damage leading to the spread of radiological contamination and is unsuitable for continuous human occupation due to its location.

Several of the smaller ancillary support structures at the Omega West Facility were demolished and resulting waste was disposed of immediately after the Cerro Grande Fire. In addition to the removal of these smaller ancillary support structures, other protective measures were taken to reduce flooding risk to the Omega West Facility. These protective measures included the installation of diversion structures, engineered streambed (concrete and rock gabions), and its access road. These actions are identified and analyzed in the Special Environmental Analysis (DOE 2000) issued by the NNSA in September 2000. The remaining structures that define the Omega West Facility (including Building 2-1 and the empty reactor vessel) continue to be vulnerable to damage from flooding and mudflows as a result of the fire and the changed environmental conditions upstream from the Omega West Facility.

Given the location and construction of some of the Omega West Facility structures, which remain, there is a risk that structural integrity could be lost during a major flood event causing debris to be swept downstream. This debris could cause further damage to structures, objects and populations in the pathway of a major flood. This represents a liability for the NNSA due to the radiological contamination present in the Omega West Facility. If the main building (Building 2-1 of the Omega West Facility) were to be flooded and damaged by floodwaters, radiological contamination could be spread over a large area downstream from the reactor vessel.

1.3 STATEMENT OF PURPOSE AND NEED FOR AGENCY ACTION

The NNSA must reduce the potential for the spread of radiological contamination downstream from the Omega West Facility in the event of a severe flood. The Omega West Facility has aged over the 58 years; as a result, the wooden and other portions of the Omega West Facility lack adequate structural integrity to withstand flooding. It is located at a site that is judged to be hazardous for continuous human occupation. In summary, the Omega West Facility is no longer a useful facility for LANL operations in support of the DOE and NNSA missions. Therefore, the NNSA needs to demolish the entire Omega West Facility and properly dispose of the resulting wastes.

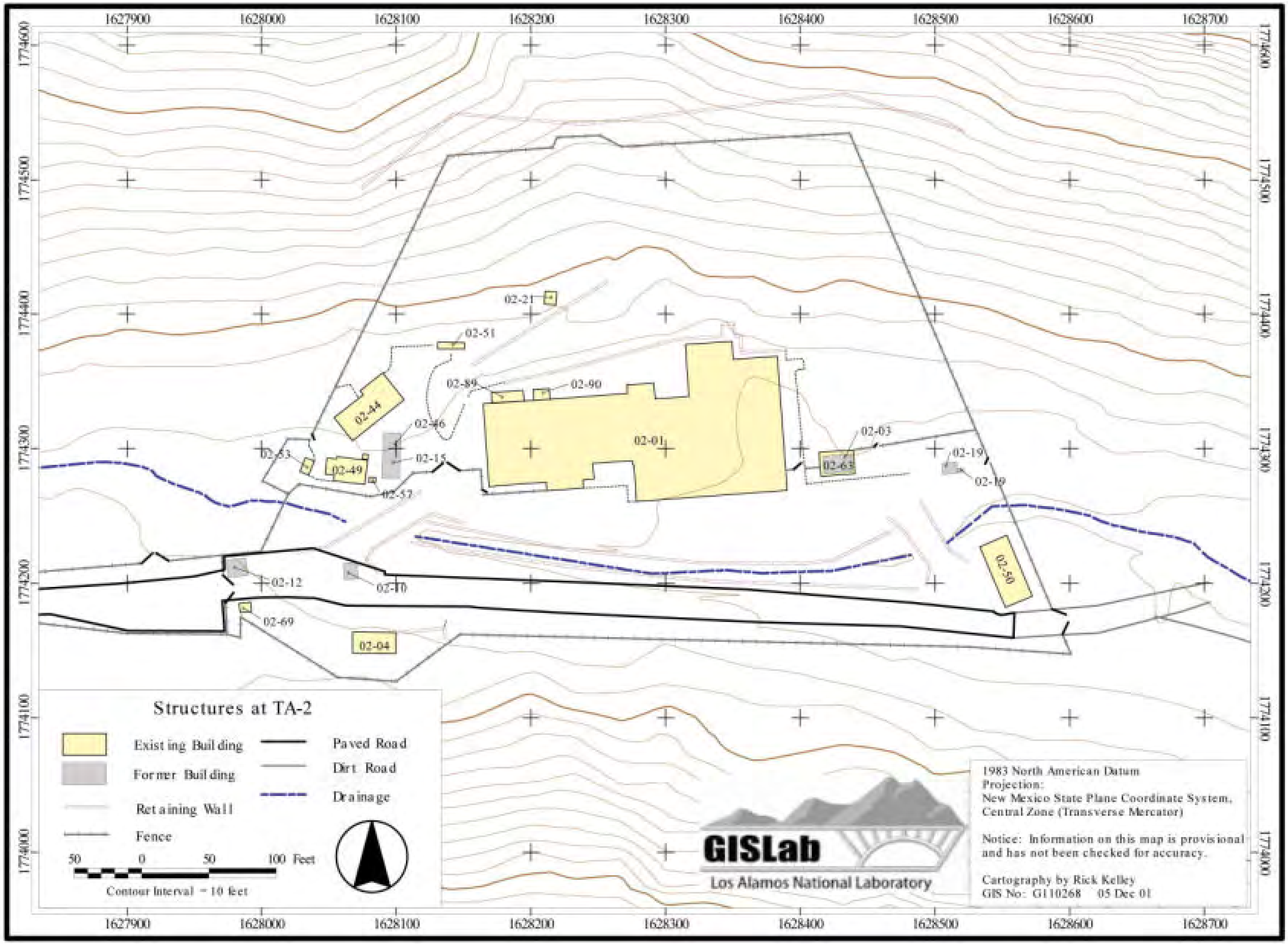

Figure 1-2. Technical Area 2 and Omega West Facility.

1.4 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

A sliding-scale approach (DOE 1993) is the basis for the analysis of potential environmental and socioeconomic effects in this EA. That is, certain aspects of the Proposed Action have a greater potential for creating environmental effects than others; therefore, they are discussed in greater detail in this EA than those aspects of the action that have little potential for effect. For example, implementation of the Proposed Action could affect biological resources in the area. This EA, therefore, presents in-depth descriptive information on these resources to the fullest extent necessary for effects analysis. On the other hand, implementation of the Proposed Action would cause only a minor effect on socioeconomics in the Los Alamos area. Thus, a minimal description of socioeconomic effects is presented.

When details about a Proposed Action are preliminary or incomplete, as a few are for the Proposed Action evaluated in this EA (such as, the exact details on how the work would proceed), a bounding analysis is often used to assess potential effects. When this approach is used, reasonable maximum assumptions are made regarding potential emissions, effluents, waste streams, and project activities (see Chapter 2, Chapter 4 and Appendix C of this EA). Such an analysis usually provides an overestimation of potential effects. Therefore, if the bounding analysis shows the potential effects are not significant, the effects resulting from the Proposed Action would also not be significant. In addition, any proposed future action(s) that exceed(s) the assumptions (the bounds of this effects analysis) would not be allowed until an additional NEPA review could be performed. A decision to proceed or not with the action(s) would then be made.

1.5 PUBLIC INVOLVEMENT

NNSA provided written notification of this NEPA review to the State of New Mexico, the four Accord Pueblos (San Ildefonso, Santa Clara, Jemez, and Cochiti), the Acoma Pueblo, the Mescalero Apache Tribe, and to over 30 stakeholders in the area on March 22, 2001. In addition, NNSA issued a separate letter to these same stakeholders requesting scoping comments for the EA. Upon release of this Draft EA, NNSA will provide stakeholders with a 21-day comment period. Where appropriate and to the extent practicable, concerns and comments will be considered in the Final EA.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter presents the Proposed Action and Alternatives. Since the Proposed Action and Alternatives involve an existing non-operational facility, a detailed description of the facility is presented in Section 2.1. This description provides the background and perspective required by the NNSA decisionmaker and LANL stakeholders. The Proposed Action, the Complete Removal Alternative, is described in Section 2.2. Section 2.3 presents the Phased Removal Alternative. Section 2.4 presents the No Action Alternative. Section 2.5 presents alternatives considered but eliminated from further analysis.

General D&D methods that could be used or that have been used in the past in similar situations were identified and are described in this chapter and then used in this EA to assess the potential effects to human health and the environment. For both the Proposed Action and the Phased Removal Alternative, two options for the disposal of resulting waste were reviewed.

2.1 HISTORY AND DESCRIPTION OF THE OMEGA WEST FACILITY

The Omega West Facility is located in Los Alamos Canyon within TA-2 (Figure 1-2). The structures that comprise the Omega West Facility within TA-2 consist of a main building (Building 2-1) that housed past research reactors and currently contains an empty reactor vessel, which was part of the Omega West Reactor (OWR). Other structures include several ancillary support buildings or their remains, the access paved road, bridge, paved parking lot, engineered streambed segments enhanced with concrete and rock gabions, wire mesh fences, and a barrier which is constructed of chain link mesh fence material for the purpose of catching debris. Also considered to be a part of the Omega West Facility are a fan blower house, an exhaust stack, and stack monitoring buildings that are located within TA-61 on top of the mesa, south of Los Alamos Canyon (see Figure 2-1).

2.1.1 History of Omega West Facility

The Omega West Facility was originally constructed to conduct criticality research and for research and development of nuclear reactor devices. Building 2-1 of the Omega West Facility has housed five nuclear research reactors. Table 2-1 provides the name, description, and location of each reactor that has occupied Building 2-1 in chronological order. The first three reactors used enriched uranium solution for fuel. The fourth reactor, Clementine, used plutonium fuel and a mercury coolant. All of these reactors have been decommissioned and removed.

The OWR, the fifth and final reactor at the Omega West Facility, was built on the foundations of Clementine in the western half of Building 2-1. This water-cooled research reactor became operational in 1956. The OWR was designed primarily to facilitate experimentation in nuclear physics and other sciences. The largest single use of this reactor was neutron activation analysis. The OWR was a tank-type research reactor that had a full power rating of 8 MW thermal. It used highly enriched uranium for its fuel source.

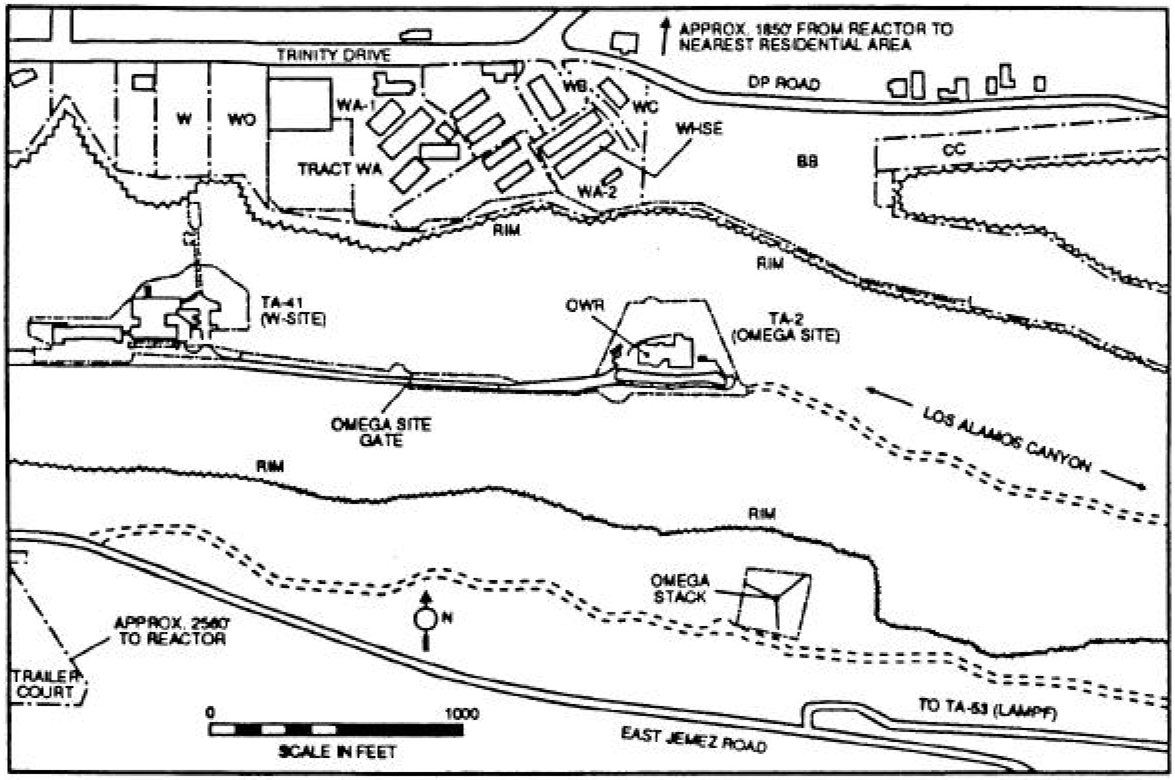

Figure 2-1. Relative Location of Omega West Facility, Including the Omega Stack.

Four Basic Types of Ionizing Radiation of Concern in Nuclear Facilities			
Type of Radiation	**Characteristics**	**Hazard**	**Shielding**
Alpha	Particle Very Short Range (About 2 inches in air)	Internal	Paper Outer layer of skin
Beta	Particle Short range (10 feet in air per MeV of energy)	External (Skin and eyes) Internal	Plastic Glass Aluminum
Gamma Ray X-Ray	Ray or beam Long range (Several hundred feet in air)	External (Whole body) Internal	Lead Concrete Steel
Neutron	Particle Long Range (Several hundred feet in air)	External (Whole body)	Water Plastic Concrete

Source: LANL 1998.

Table 2-1. Historical Reactors at the Omega Facility

Reactor	Description	Location	Period of Operation
LOPO	Low-power, water boiler type reactor	Room 123	1944
HYPO	High-power, water boiler type reactor	Room 122	1944 to 1951
SUPO	High-power, water boiler type reactor (a conversion of HYPO)	Room 122	1951 to 1974
Clementine	Fast-neutron research reactor with plutonium fuel surrounded by mercury coolant	Room 101	1949 to 1954
OWR	Tank-type, light water moderated and cooled reactor	Room 101	1956 to 1992

In 1992, a reactor safety mechanism automatically shut down the OWR. The automatic shutdown was attributed to a leak that was later discovered in an underground pipe. No damage to the OWR, fuel elements, or the cooling system occurred. This 1992 leak appears to have been the source of tritium[1] contamination present in the soil at TA-2. The OWR was removed from operation and placed in safe shutdown mode in 1992.

In 1994, the fuel was removed from the OWR and the reactor vessel and associated process piping was drained of all coolant and liquids. All operations ceased within the Omega West Facility and it has been closed since 1995 (Garcia 1999). No further use for the Omega West Facility has been identified by NNSA. It has been downgraded from a safety classification of "nuclear facility" to that of "radiological facility" as residual contamination exists in the buildings along with the radioactively activated[2] shielding of the empty reactor vessel, which became radiologically activated during its operation.

2.1.2 Omega West Facility Description

Building 2-1. Building 2-1 is a two-story structure with a basement that was constructed in 1943 of concrete blocks and wood. The rooms in Building 2-1 consist of a large bay (Room 101) that contains the remaining reactor vessel, approximately 20 small rooms that served as labs, offices, and storage spaces, and five large rooms that served as bays for other small reactors and large lab spaces (see Figures 2-2 and 2-3).

Room 101 is a 2,430 square feet (ft^2) (226 square meters [m^2]) that is 24 ft (7 m) above floor level at the west end of Building 2-1 (LANL 1995). Between Room 101 and the rest of the building is a 5 ft (1.5 m) thick hollow concrete wall filled with earth. The rest of the walls in the building are made up of 8 inches (in) (20 centimeters [cm]) concrete building blocks.

[1] Tritium is a radioactive isotope of hydrogen whose nucleus contains one proton and two neutrons.

[2] The nuclei of many of the atoms which have been hit by neutrons would become unstable (i.e. radioactive) and continue to emit radiation. This radioactivity is referred to as *induced radioactivity* and the resulting radiation *residual radiation*. The process causing the bombarded atoms to become radioactive is known as *activation* (TRIUMF 1996).

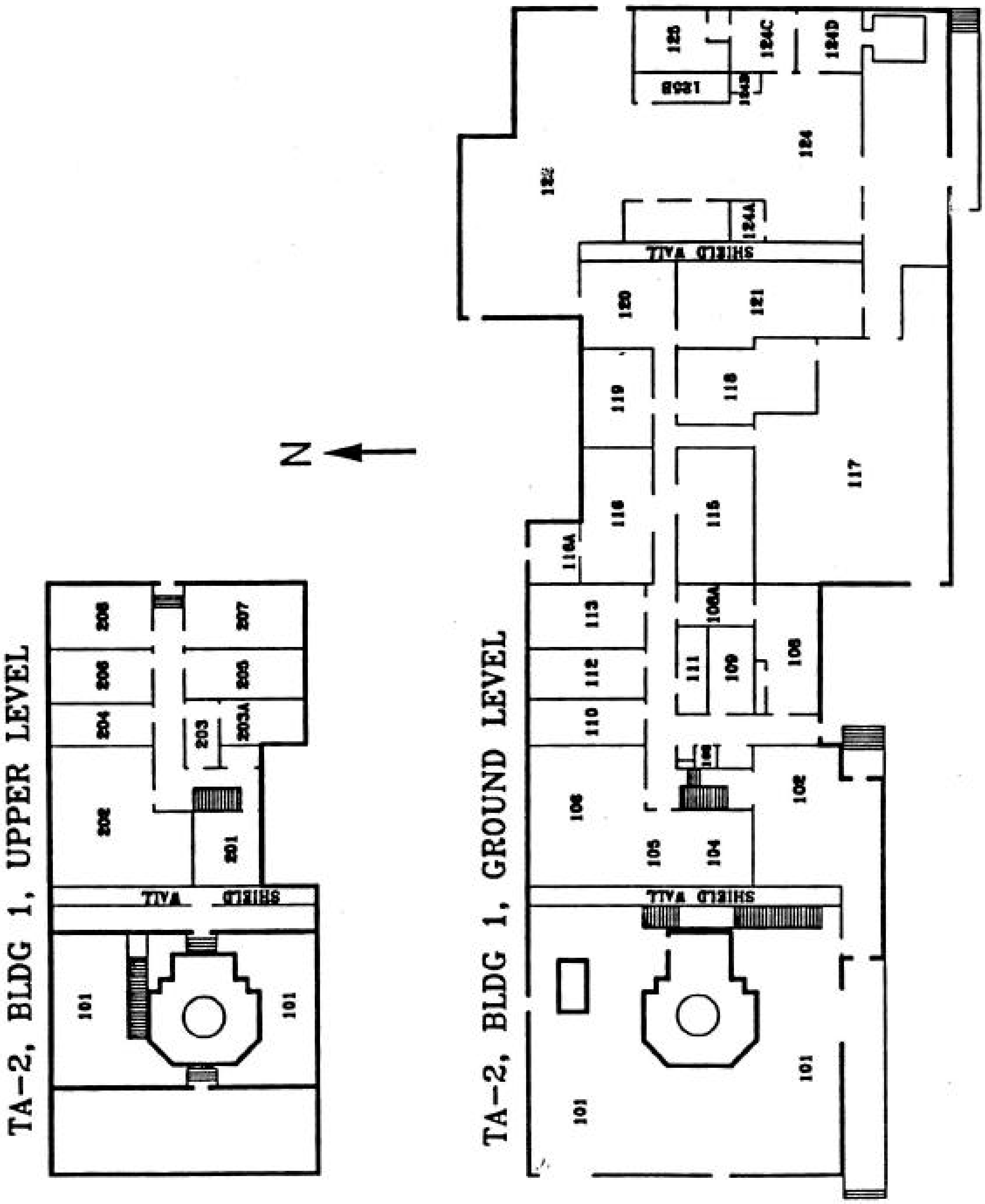

Figure 2-2. First and Second Floorplans of Omega West Building 2-1.

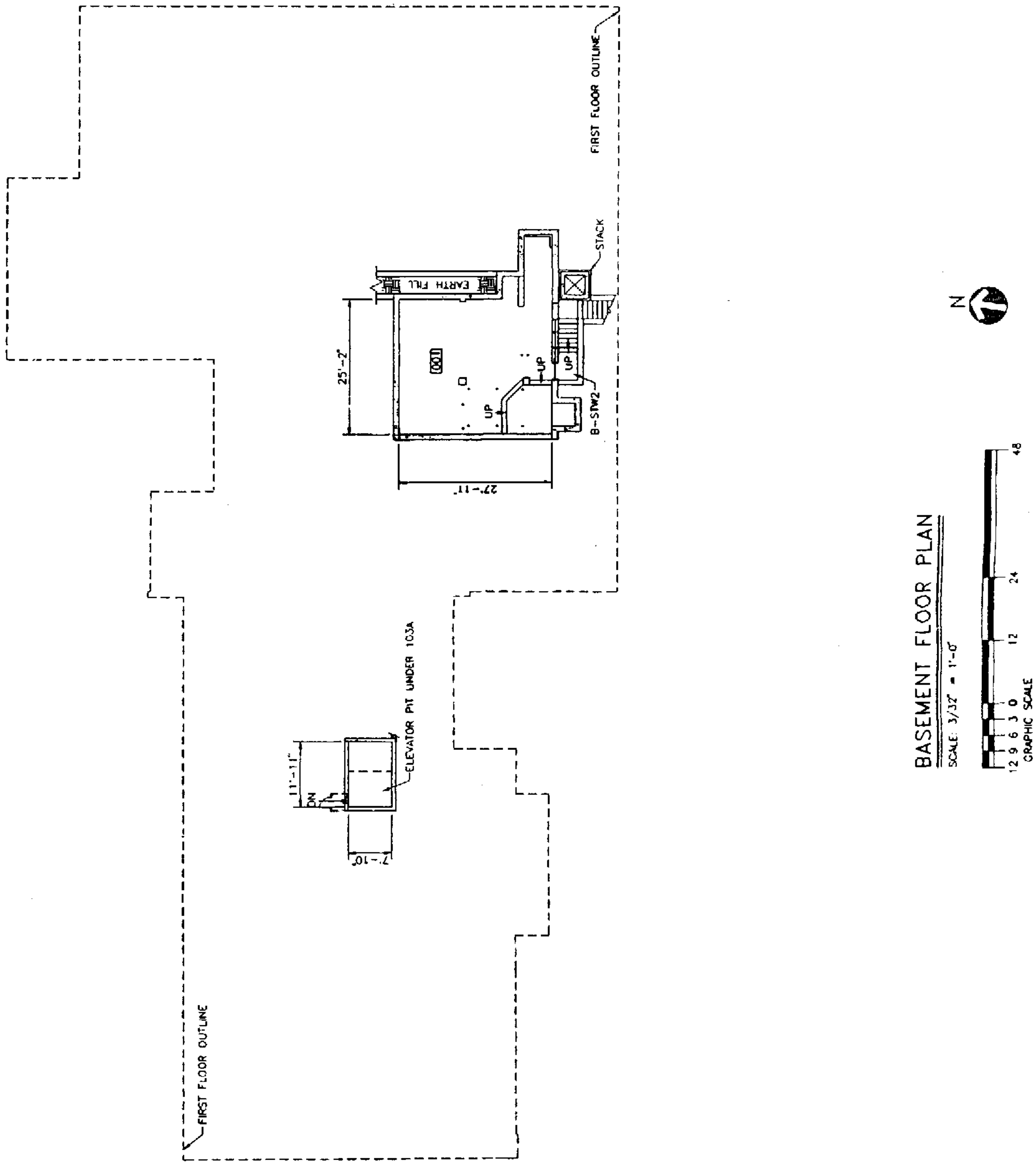

Figure 2-3. Basement Floorplan of Omega West Building 2-1.

Reactor Vessel Description. The OWR was a tank-type research reactor; the cylindrical tank is referred to as the reactor vessel. The reactor vessel is 8 ft (2.4 m in diameter and 0.25 in (0.6 cm) thick, composed of stainless-steel. It has an 8 ft (2.4 m) diameter bottom plate that is 0.75 in (1.9 cm) thick. The bottom plate opened to release water into a stainless-steel lined sump. The vessel is 24 ft (7 m) high and surrounded by a shell of reinforced concrete that is 5 ft (1.5 m) thick up to a height of 11 ft (3.4 m) above the reactor room floor; the concrete shell is at least 3 ft (1 m) thick from a height of 11 ft (3.4 m) up to the top of the tank (see Figure 2-4). This shell comprises the radiation safety shield (also called a bioshield) that surrounds the tank. When the OWR was operational it used enriched uranium-235 (^{235}U – see isotope in the Glossary), stainless steel control blades, and was cooled and moderated by light water.[3] Inside the reactor vessel, the fuel was supported by an aluminum fuel element rack with a nickel and beryllium reflector on one side and lead and bismuth shielding on the other side. As discussed in Section 2.1.1, the fuel, control blades, and light water were removed from the OWR in 1994. The fuel rack, nickel and beryllium reflector, and bismuth and lead shielding were left in the reactor vessel.

The designs of modern reactors include considerations for dismantling the reactors. However, when the OWR vessel was built, little was known about tank-type reactors, and the shielding and reinforcement were designed very conservatively.[4] This conservative design did not consider dismantlement. During the construction of the reactor, the steel concrete reinforcement bars were welded to the reactor vessel itself, providing a degree of reinforcement that is not common in more recently constructed research reactors. This conservatism ensured integrity of the reactor vessel during operation but resulted in a concrete radiation shielding that is attached directly to the reactor vessel.

Radiological Condition of Reactor Vessel. Materials incorporated in the reactor vessel and its components design include aluminum, beryllium, bismuth, stainless steel (cobalt), iron, lead, and nickel. These materials have become radiologically activated from the operation of the reactor. Estimated radionuclide concentrations of the remaining reactor vessel, based on the continuous reactor operation during the 36 years of use were derived as presented in Appendix C.

In October and November of 2001, actual radiation surveys were conducted within the reactor vessel. The first survey was conducted in the reactor vessel through the west hatch. The second survey was conducted in the reactor vessel through the east hatch. The exposure rates observed in the area of these hatches were 30 to 50 milli-Roentgen (mR) per hour (see Rem in Glossary). Table 2-2 presents the survey results from the second survey. Readings were also taken on, in, and around the fuel element rack located in the center of the vessel. The readings at that location averaged 1,050 R per hour with a peak reading encountered of 1,110 R per hour.

[3] Light water is ordinary water (hydrogen oxide or H_2O) in contrast to heavy water which consists of deuterium oxide (D_2O) when used as a moderator or coolant in a nuclear reaction. Deuterium is an atom of hydrogen with an extra neutron. A moderator is a material used to decelerate neutrons from high energies to low energies (DOE 1990).

[4] Conservatively in this context means the reactor was built stronger than it was believed that it needed to be.

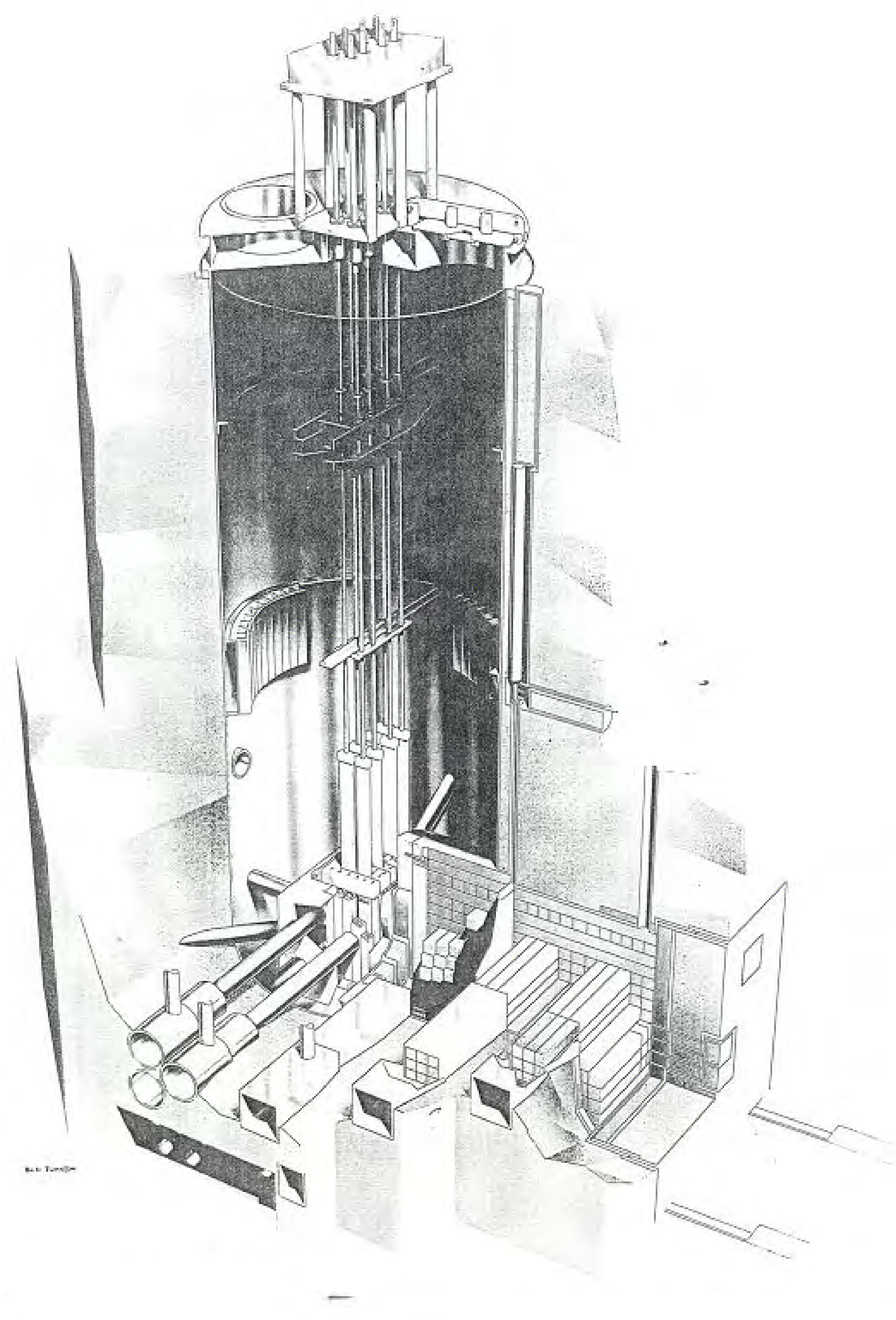

Figure 2-4. Cutaway View of Omega West Reactor.

Table 2-2. Radiation Survey Results

Depth from top of Reactor Vessel	Open Window	Closed Window
5 feet	4.7 R per hr	4.6 R per hr
10 feet	11.4 R per hr	10 R per hr
15 feet	9.5 R per hr	44.1 R per hr
20 feet	50.1 R per hr	54 R per hr
24 feet	65.7 R per hr	55 R per hr

* Open and closed window refers to the detector's two modes of measurement. The closed window mode prevents lower energy beta or gamma radiation from entering the detector. Measurements were taken at 5-foot intervals using an Eberline RO-7 with a mid-range RO-7-BM probe.

A particulate sample was collected from the sludge located at the bottom of the reactor vessel using a piece of weighted metal with double-sided adhesive tape. A gamma spectroscopy was performed on the particulates that adhered to the tape. Other than normal background radiological energy levels, only Cobalt-60 (^{60}Co) was identified. Two energy level peaks were identified, one at 1,173 thousand electron volts (KeV), and one at 1,332 KeV.

Other Buildings and Structures at the Omega West Facility. In addition to Building 2-1, buildings and structures in TA-2 that are part of the Omega West Facility include a general storage building (Building 2-50), a storage building previously used for slightly radioactive equipment (Building 2-4), and the Boiler House (Building 2-63). The concrete foundation of two buildings, Building 2-44 (a storage building that previously housed pumps and equipment) and Building 2-49, are also included. Other remaining structures include a manhole, electric transformers and associated concrete slabs, two small sheds attached to Building 2-1, concrete flumes, metal fences, rock catching fence culverts, utility poles, debris catchers, and other miscellaneous structures. The TA-2 asphalt parking area, the asphalt driveway from the Los Alamos Canyon access road to the TA-2 parking area, and the small bridge over which the driveway passes are also included.

Buildings and structures in TA-61 that are part of the Omega West Facility include the Fan Blower House, an exhaust stack, and a small storage shed. Spanning the two TAs is a pipe connecting the Omega West Facility to the exhaust stack. The Fan Blower House is a one-story building with approximately 121 ft^2 (11.2 m^2) of floor space. The storage shed contains about 88 ft^2 (8.2 m^2) of floor space. Building materials include asbestos and lead paint. The stack consists of a 150 ft (46 m) tall steel pipe secured by guy wires. The base of the stack rests on a 16 ft^2 (1.5 m^2) concrete footing about 2 ft (0.6 m) thick.

2.2 PROPOSED ACTION: COMPLETE REMOVAL ALTERNATIVE

The Proposed Action is to remove the non-operational Omega West radiological facility from Los Alamos Canyon and the stack from the neighboring mesa top to the south of the canyon. The disposition of the Omega West Facility includes the characterization, decontamination and demolition (D&D) of the structures, and characterization and proper disposal of the resulting wastes. The disposition of the entire Omega West Facility is conceived to be conducted using a project management approach. The activities involved in the disposition of the facility would

D&D Work Elements

The D&D of the Omega West Facility and its associated structures would involve the following work elements:

Characterization
The surfaces of the walls, floors, ceilings, roofing, equipment, ductwork, plumbing, and other building and site elements would be tested or sampled to determine the presence of contamination, and where present, as well as the type and extent of contamination present. This could include surface swipes or sampling of portions of the building materials themselves.

Segregation of Work Areas
The results of the Characterizations would be evaluated and the buildings, structures, and other areas would be segregated into areas of contamination and non-contamination. Locations with contamination present would be further subdivided by the type of contamination. Divisions would include areas that are contaminated with radioactive materials, hazardous materials, toxic materials, including asbestos, and any other *Resource Conservation and Recovery Act* (RCRA) listed or characteristic contamination. Some areas may be contaminated with a combination of these materials. Physical barriers (such as plastic curtains, ropes, tape, saw horses) would be established between work areas so that only those workers that are appropriately trained and equipped would work in each area. For example, only trained asbestos removal workers would be allowed into the asbestos contaminated work area.

Structural Evaluation
As part of the Characterization and Segregation of Work Areas, consideration would be given to the structural integrity of the structures. Since structures undergoing D&D may have been constructed many years ago and maintenance may have been discontinued, portions of the structures may not be safe for the D&D workers. Special equipment or worker training may be required for the workers before activities begin. Some areas may be determined to be so unsafe that demolition would have to proceed without decontamination, or perhaps decontamination using remote controlled devices may be required. Areas determined during the Structural Evaluation to have structural weakness would become part of the segregated work areas.

Removal of Contamination
Workers would remove or stabilize contamination according to the type and condition of the materials. For example, the surface of a wall might be contaminated with radioactive materials. If the paint on the wall contained the contamination, the paint might be physically stripped off. If the paint could not be stripped or if the contamination was also within the wall itself, a surface coating might be applied to keep the paint and wall from breaking off and releasing contaminated dust during dismantlement of the wall keeping the surface paint intact. Materials like asbestos containing floor tiles or ceiling panels would be removed. Pipes, traps, drains, cabinets, and other storage equipment would be tested for hazardous contamination and handled appropriately.

D&D Work Elements (cont')

include the characterization of structures, planning of the work, a decontamination effort, the demolition of structures, and the disposal of resulting debris. The work is estimated to consist of up to 11,450 personnel hours. The removal of approximately 2 to 4 ft (1 m) of soil from the footprint of the facility is included in the Proposed Action. Depending on the results of subsequent soil sampling and testing, LANL's Environmental Restoration (ER) Project staff would determine the need, priority, and timing for any other clean-up of the site. The ER actions are not part of the Proposed Action. Currently, the ER actions for TA-2 are scheduled for 2025 and would undergo their own NEPA review.

At this time, the Omega West Facility has not been completely characterized with regard to types and locations of contamination. In addition, project-specific workplans have not been prepared, which would define the actual methods, timing, or workforce to be used for the D&D of the Facility. Instead, general or typical methods have been identified which may be used in the D&D. Therefore, the D&D of the Omega West Facility is described in general bounding terms.

The general or typical work elements involved in the D&D of facilities similar to the Omega West Facility are discussed in the highlighted box on the left side of this and subsequent pages. The actual D&D of the Omega West Facility may require some special considerations that would affect or differ from these work elements or that may add other work elements. Special considerations or conditions associated with the demolition of the Omega West Facility are discussed in Section 2.2.1.

Demolition of Structures
After the contaminated materials have been removed, wherever possible and practical, the demolition of the structures would begin. Depending upon the removal of contaminated materials, the demolition could involve simply knocking down the structures and breaking up any large pieces. Knocking down the structures in this case might include the use of front end loaders, bulldozers, wrecking balls, shears, pneumatic hammers, and other heavy equipment. Hand operated power tools such as jackhammers, cutting torches, saws, and drills, could also be used. If stabilized materials or areas where contamination could not be removed were present, a slower, step-wise demolition might be undertaken. For example, removal of the roof materials first might be undertaken with subsequent removal of the other portions of the structure in the reverse order of their construction (namely, roof, walls, and flooring materials). The removal of the roof and parts of the walls might enable workers to reach contaminated plumbing, which would then be removed before proceeding with the remainder of the building elements. Demolition might proceed in steps to improve the segregation of wastes. Fuel for the heavy equipment and generators would be stored onsite in aboveground portable tanks that would be removed when work was completed.

Segregation of Debris
The debris from demolition of the buildings and structures would be segregated according to type, size, potential for contamination, and ultimate disposition. For example, the debris that is still radiologically contaminated would be segregated as low-level waste[1] if no hazardous[2] contamination was present. Low-level debris with asbestos would be segregated from the rest. Asbestos with no radiological contamination would also be segregated. Other types of debris that could be segregated could be mixed waste[3], non-contaminated construction debris, glass, debris requiring special handling, and so forth. Waste generated during D&D would be characterized as required by LANL procedures using a combination of acceptable knowledge, field screening, and sampling and analysis. Segregation activities could be conducted on a gross scale using heavy machinery or may be conducted on a smaller scale using hand held tools and equipment. Remote controlled devices may also be used for segregation of debris if required. The waste would be segregated by type (such as radioactive versus nonradioactive), packaged as appropriate (discussed separately later), and temporarily stored within the Facility work area fenced boundary pending transport to an appropriate onsite or offsite facility.

D&D Work Elements (cont')

Some of the work elements could involve technologies and equipment that have been used in similar operations, and some may use newly developed technologies and equipment. It is not likely that all of the D&D work elements discussed would be utilized. All work conducted under the Proposed Action would be carefully planned in accordance with established state and Federal laws and regulations (such as National Emissions Standards for Hazardous Air Pollutants (NESHAPs)), DOE Orders, and LANL procedures and best management practices. Detailed project-specific work plans would be developed and approved by NNSA before any actual work proceeded. These plans would include those required for environmental compliance (such as a Stormwater Pollution Prevention Plan) and monitoring activities (such as using a real-time gamma radiation monitor. compliance activities like The size of the work force would be established in accordance with LANL's ALARA[5] principals. DOE's limit for worker exposures is 5 rem per year (10 CFR 835) and LANL's policy is for a total lifetime dose of 1 rem per year of age (LANL 2000). For example, if the worker is 40 years old, his total lifetime dose is limited to 40 rem. These limits would not be exceeded for any worker involved in the project. As previously stated, the D&D work is estimated to require up to 11,450 personnel hours. At any given time a work force from 2 to 100 or more workers

[1] Low-level waste is radioactive waste that is not high-level waste, transuranic waste, spent nuclear fuel, or by-product tailings from processing of uranium or thorium ore.

[2] Hazardous waste is a category of waste regulated under the RCRA. To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the U.S. Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.

[3] Mixed waste is that contains both hazardous waste, as defined under the RCRA, and source, special nuclear, or by-product material subject to the *Atomic Energy Act*.

[5] ALARA stands for "as low as reasonably achievable." The principals of ALARA include minimizing both external and internal doses from radiation and radioactive material. Basic protective measures used to reduce external radiation dose are minimizing time in a field of radiation, maximizing distance from a source of radiation, using shielding wherever practicable, and using source reduction wherever practicable (LANL 1998).

Packaging of Waste
Debris would be packaged for transportation and disposal according to waste type, ultimate disposition, and Department of Transportation (DOT) or LANL transportation requirements. The physical form of the waste, solid or liquid, and size of waste articles each have their own packaging requirements that depend on the type of contamination. The destination for the waste (offsite or onsite) affects the transportation required. The disposition can also add its own packaging requirements. For example, non-contaminated construction debris could be sent by truck with no packaging to the local landfill. Low-level mixed waste being transported offsite to a commercial vendor would have to be packed according to Resource Conservation and Recovery Act (RCRA) regulations, DOT regulations, and any acceptance requirements, established by the commercial entity. Packaging can include stabilization requirements. The packaging of the debris would greatly influence the ultimate total waste volumes.

Temporary storage at the work area would include a combination of container storage areas and waste piles depending on the waste type and volume. The container storage areas or waste piles would be equipped with liners or drip pallets to prevent dispersion of the material. Waste piles may be used for debris that are not contaminated with hazardous or radioactive materials. Appropriate fugitive dust suppression methods, such as the use of plastic tarps, may be used as needed for radioactive materials.

Materials from D&D actions would be recycled or reused to the extent practicable. For example, concrete and soil with extremely low amounts of contamination could be reused as fill or cover material at the work site or elsewhere at LANL. Steel (both radioactive and non-contaminated) could be recycled. Contaminated lead removed from the Facility may be used as radiation shielding for packaging of highly activated components.

Transportation of Waste
The transportation of the waste would be dependent on the ultimate disposition of the waste. Waste could be disposed of either offsite or onsite. Onsite disposal would depend on the existence and capacity of disposal facilities for all of the waste types. Offsite disposition would require packaging (see above) and characterization according to the waste acceptance criteria of the receiving facility. Offsite disposition would involve greater transportation requirements. The route and distance associated with the transportation of the waste would vary according to waste type and the location of the receiving facility.

Breakup of Foundation
The concrete foundation of the buildings and other structures would be broken up into small pieces. This would require the use of heavy machinery, such as backhoes, bulldozers, front end loaders, and possibly hand held tools and equipment such as sledge hammers and mechanized jack hammers. The soil beneath the foundations would be sampled to determine if contamination migrated through the foundation (soil testing and removal are discussed in more detail separately in the following paragraphs). The results of this testing may result in reclassification of the waste type of the foundation debris.

D&D Work Elements (cont')

may be onsite during various work element activities.

General activities that would be a part of the Proposed Action, that would continue while the structures were still standing, include animal and pest control efforts, as well as other security and surveillance activities needed to maintain the facility and prevent unauthorized entry by non-involved employees of LANL and members of the public. Depending on the work schedule, some additional activities may be required, such as reinforcement of parts of the structures until the structure portions can be removed.

2.2.1 Special Considerations and Conditions Associated with the Omega Facility

Use of Foundation as Base for Crane. If a large site crane is required to assist in the demolition of the reactor vessel, the foundation of the east portion of Building 2-1, or the parking lot, may be left intact to serve as a stable base for the crane until the reactor vessel demolition is completed. The foundation of the building would then be broken up using similar methods to those described herein. If a crane is not required for the demolition of the reactor vessel, the foundation would be broken up when the other site building and facility foundations were demolished.

Soil Contamination. Standard D&D procedures for a LANL facility include the cleanup to the soil to a depth of 2 to 4 ft (about 1 m) below the foundation under circumstances that do not involve soil contamination with hazardous or radioactive substances. Soil sampling and testing would be performed to determine the presence, extent, and type of any contamination. Depending on the results of this testing, the removal of additional

D&D Work Elements (cont')

Demolition of Parking Lot

Any asphalt covered parking lot would be sampled and then broken up using heavy machinery such as a backhoe, or hand held equipment, such as a jackhammer. The asphalt would be containerized and trucked away to established storage sites within LANL, such as those present at TA-59 on Sigma Mesa. This material, if determined not to be contaminated, may be reused onsite at LANL or be disposed of as construction waste onsite or offsite. The location of the disposal site would depend on whether the asphalt was contaminated or not, and if contaminated, what type of contamination was present.

Testing of Underlying Soils

The soils that underlie the building, and structure foundations, and parking lot would be sampled and tested for contamination. These test results would be collated with other existing information from soil testing in the area to determine the presence and extent of any contamination.

Cleanup of Soil

Any contaminated soil would under go a cleanup action per the applicable environmental regulations and permit requirements. The contaminated soil would be packaged and transported to the appropriate disposition facility depending on the type and concentration of the contamination present.

Contouring and Seeding

After clean fill and soil were brought to the site as needed, the site would be recontoured. The design of the contouring would be to minimize erosion and replicate or blend in with the surrounding environment. Subsequent reseeding activities would utilize native plant seeds and the seeds of non-native cereal grains selected to hold the soil in place until the native vegetation becomes stabilized.

soil could be required. LANL's ER Project staff would determine the need, priority, and timing of any other cleanup of the site. Depending on the extent of any contamination and the risk to human health and the environment, ER Project soil clean-up activities may be deferred to a later date, or may occur immediately following the demolition of the Omega West Facility. The ER actions are not part of the Proposed Action.

Bridge and Road. The bridge over the stream connecting the main access road at the bottom of the Los Alamos Canyon to the driveway and parking lot would remain in place during all D&D activities, and soil clean up efforts. The bridge would be used by personnel and to accommodate light equipment use. For the heavy pieces of equipment, a temporary culvert and earthen bridge or temporary portable bridge may be needed for site access. Depending on the weight bearing limits of the existing bridge, the waste transportation trucks may also have to use a temporary bridge.

If in the process of sampling the soils underneath the Omega West Facility foundation are shown to need further immediate remediation, then the bridge may not be dismantled until the ER activities are completed. Otherwise, the bridge will be removed after the completion of the D&D activities. The Omega West Facility access road to the top of the mesa, may require more extensive maintenance due to the increased traffic of heavy trucks bringing in equipment and removing the waste.

Contouring and Seeding. The contouring and seeding of portions of the site and post-site cleanup may be delayed depending on the soil contamination clean-up schedule. If the soil cleanup is delayed for any reason, the site would likely be contoured and seeded to stabilize the site until any ER actions are taken. This could require subsequent reseeding efforts to be undertaken.

2.2.2 Decontamination of Omega West Facility Structures

The decontamination of the Omega West Facility would involve:

- Initial detailed radiation surveys
- Asbestos abatement

- Decontamination of contaminated structures (such as walls, pipes, tanks) using vacuum blasting, sand blasting, carbon dioxide bead blasting, scabbling, and mechanical separation of radioactive and nonradioactive materials
- Final detailed radiation surveys to allow demolition activities

Decontamination of the Omega West Facility would include the removal of nonradiological and radiological contamination from building and structure surfaces throughout the Omega West Facility. This would include removal of standard industrial type material such as flooring material, ceiling tiles, insulation, and paint which are contaminated with asbestos, lead, and other toxic contaminated constituents. A portion of these standard industrial materials may also be contaminated with radionuclides and require special handling. The radiological decontamination would primarily consist of removing the surface material that has become contaminated or activated in the case of the reactor vessel and associated components, which is discussed later in the text. Waste minimization practices would be employed by segregating radiologically contaminated and uncontaminated debris to the maximum extent possible.

The extent of decontamination performed would be limited to those activities required to minimize radiological and hazardous material exposure to workers, the public, and the environment. This would involve mostly decontamination of the reactor vessel and spot contamination around and within the Omega West Facility.

The Proposed Action would involve the removal of approximately 4,530 cubic feet (ft^3) (128 cubic meters [m^3]) of asbestos-containing materials. A majority of the asbestos-containing materials (4,505 ft^3 [127.6 m^3]) would likely be free of radiological contamination and standard asbestos abatement protocols could be used. The remaining asbestos-containing materials, about 25 ft^3 (0.71 m^3), are expected to be contaminated with radioactive material and would require special handling per established LANL procedures and practices employed by UC at LANL.

Workers removing asbestos contamination would be protected by personal protective equipment (PPE) and other engineered and administrative controls. Air emissions generated during asbestos removal activities would be controlled by the use of containment tents (such as plastic drapes) around highly contaminated areas and the use of temporary high-efficiency particulate air (HEPA)-filtered work enclosures and HEPA-filtered particulate collection devices used to collect asbestos-containing dust particles. Dust suppression techniques would be employed to ensure that particulate emissions are kept to a minimum.

Decontamination of the Reactor Vessel. Decontamination of the reactor vessel may proceed using one or more of the work elements as follows:

- Fill the reactor vessel with water
- Paint the empty fuel pool with strippable paint and fill with water
- Detach fuel element rack and nickel and beryllium shield from within the reactor vessel using underwater cutting techniques (for example, mechanical shears or an underwater cutting plasma torch)
- Transfer fuel rack and beryllium shield to water-filled fuel pool for sectioning or disassembly
- Drain the reactor vessel using a siphon truck

- Process the water taken from the reactor vessel tank through ion exchange columns[6] at TA-50
- Fill reactor vessel with concrete or other inert material, if necessary, to provide radiation shielding

Removal of reactor vessel internal components (including the beryllium shield and the fuel element rack), would likely involve flooding of the reactor vessel with water to reduce worker radiological exposure as water is a good radiological shield against gamma radiation (see highlight box in Section 2.1.1). It would also involve the installation of a temporary filtration system in the vessel to maintain water clarity, the use of plasma torches to section the internal components, and removal of sectioned components to the existing fuel storage pool. The fuel storage pool would have been previously checked for leaks, repaired if necessary, and then filled with water. The sectioned components would await subsequent disposition, which would involve appropriate packaging and direct landfill disposal using shielded casks. The water from the pool and the water used to fill the reactor vessel would be siphoned into and removed from TA-2 by tanker truck. This water would be treated onsite at LANL at the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF). Any ion exchange resins from the ion exchange columns used to decontaminate (treat) waters used in the process would also be characterized and disposed of either onsite or offsite as discussed in waste disposal Options 1 and 2.

Worker exposure to ionizing radiation (see highlight box in Section 2.1.1) would be controlled under established LANL ALARA requirements that limit any individual's dose to less than 1 rem per year. Where practical, shielding and remotely operated equipment would be used to reduce the radiation levels at worker locations.

2.2.3 Demolition of Omega West Facility

Once the Omega West Facility buildings, structures, foundations, and other facility components have been decontaminated, demolition could proceed. All building and structural materials would be sent to appropriate disposal sites, which are discussed later in this Chapter. The buildings are not expected to be technically difficult to demolish and the resultant wastes would handled, transported, and disposed of in accordance with standard LANL D&D procedures. Demolition of noncontaminated structures would be performed using standard industry demolition practices. A final post-demolition site survey would be performed in accordance with the requirements of the Nuclear Regulatory Commission Manual for Conducting Radiation Surveys (NUREG/CR-5849). These requirements include sampling protocols and statistical methods to be used to analyze the results of the samples.

Demolition of the Reactor Vessel. Demolition of the reactor vessel is expected to proceed as follows:

- Cut reactor vessel and radiation shield into segments using diamond wire saws

[6] Process that removes ions from a solution by passing the solution through a column of special material that exchanges the ions in the solution with ions from the special material. This process is often used to remove ions of radioactive material from liquids. Afterwards the ion exchange material of the entire column itself is managed as radioactive waste (DOE 1995).

- Attach lifting eye bolts to sides of segments
- Containerize segments and transport to waste disposal site

The demolition of the reactor vessel and its concrete radiation shielding would generate high exposure rates to workers located in the room as the vessel was dismantled. Therefore, methods of demolition would be employed that would assure the involved workers could maintain their occupational dose below one rem per year. The reduction of dose rates associated with non-removable internal components could be achieved by filling the entire reactor vessel with an inert material such as cement or with specialized foam material that would dry to a hard mass. This action using such a filler material would provide both a reduction in expected occupational dose rates as well as the immobilization of radioactive material contained within the vessel. Once filled with a filler material, the vessel and radiation shielding would be horizontally sectioned using diamond wire saws or other similar equipment for cutting the structure. The resultant cut sections would be packaged as appropriate and transported for disposal.

The demolition of the west end of Building 2-1 is inextricably linked with that of the reactor vessel. In the event that heavy lifting cranes, which are present in Room 101, cannot be restored to operational status, or cannot be used since they rely on the concrete shielding present around the reactor vessel as part of their own foundation, an independent crane would have to be used. This might require the demolition of Building 2-1 before the demolition of the reactor vessel could proceed.

There are access doors present in the roof of the building that could allow an outside crane to be used. If this access portal proves to be large enough for the pieces of the reactor vessel to be removed, the building could be kept in place during demolition of the reactor vessel and shielding. The building would then serve as part of the containment for any dust or other emissions generated by cutting the shielding into smaller pieces. If the access portal is not large enough, the building would be demolished. In either case, a portable disposable tent equipped with HEPA filters would be erected over the reactor vessel and shielding or over the subject portion of Building 2-1 to contain emissions during the demolition of the reactor vessel and shielding.

Radioactive concrete, resulting either from activation due to close proximity to the reactor vessel or from retention of low levels of radioactive dust left after the completion of decontamination efforts, would be removed after being sectioned. Radioactive concrete would likely be present in Rooms 101, 122 and 123 of Building 2-1.

Radiological and industrial hygiene surveys would be performed to focus control measures required for specialized demolition efforts. These surveys would be performed in unison with facility demolition activities to minimize the generation of unnecessary radioactive and mixed waste.

2.2.4 Waste Management

As part of its Record of Decision (ROD) for the Site-Wide EIS for Continued Operation of the LANL (64 FR 50797; September 20, 1999), DOE committed to a number of waste minimization and pollution prevention initiatives as mitigation measures. These initiatives included integration of waste minimization into the Integrated Safety Management Program at LANL, development of procedures to assure that all projects implement waste minimization for transuranic (TRU) waste and mixed TRU waste streams, reduction of hazardous LLW, and mixed LLW generation from routine operations by 80 percent from the 1993 baseline, and recycling of 40 percent of sanitary wastes generated from routine operations. In this ROD, DOE stated its intention to continue use of the LLW disposal site at Area G and to increase this site as identified in the EIS Expanded Operations Alternative.

There are currently no DOE sites in use for low-level mixed waste (LLMW) disposal. LLMW is presently sent to a commercial facility for disposal. On February 25, 2000, DOE issued a Record of Decision (ROD) for proceeding with its preferred alternative for the disposal of LLW and LLMW based on the Waste Management Programmatic EIS (65 FR 10061). DOE decided to establish regional LLW and LLMW disposal at two DOE sites: Hanford and the Nevada Test Site. (The term "regional" does not impose restrictions on which DOE sites may ship waste to a disposal site.) In addition, DOE would continue, to the extent practicable, disposal of onsite LLW at the Idaho National Engineering and Environmental Laboratory, LANL, Oak Ridge, and the Savannah River Site. This decision does not preclude DOE's use of commercial facilities for disposal, consistent with current DOE Orders and policy as stated in the ROD.

The Proposed Action for this EA would involve generation of a variety of waste types associated with D&D activities. Waste minimization and pollution prevention principles would be incorporated into these activities to the maximum extent practicable. For the Proposed Action, it is expected that low-level waste (LLW) would be disposed of either mostly offsite or entirely onsite as described in Options 1 and 2. The first option focuses on disposition of most of the LLW generated by the D&D activities at offsite disposal facilities. The second option would involve onsite disposal of all LLW generated by the Proposed Action. Within both Options 1 and 2, various waste types would be reused and recycled. Both options are discussed below and disposal dispositions are presented and compared by waste category in Table 2-3.

Waste management techniques applicable to the Proposed Action would include:

- Conducting routine briefings of workers
- Segregating wastes at the point of generation to avoid mixing and cross-contamination
- Decontaminating and reusing equipment and supplies
- Removing surface contamination from items before discarding
- Avoiding use of organic solvents during decontamination
- Using drip, spray, squirt bottles or portable tanks for decontamination rinses
- Using impermeable materials such as plastic liners or mats and drip pallets to prevent the spread of contamination
- Avoiding areas of contamination until they are due for decontamination
- Reducing waste volumes (by such methods as compaction)
- Engaging in the use of recycling actions (materials such as lead, scrap metals, and stainless steel could be recycled to the extent practical)

Table 2-3. Disposition of Wastes for Both Disposal Options

Waste	Estimated Volume		Planned Disposition	
	English	Metric	Option 1	Option 2
Low Level Waste (optional disposition):				
Concrete	55,206 ft^3	1,563 m^3	Material would be disposed at an offsite commercial facility.	Material would be disposed onsite at Area G, TA-54
Soil	29,940 ft^3	847 m^3		
Steel	7,689 ft^3	217.7 m^3		
Personal Protective Equipment	51,600 ft^3	1,460 m^3		
Low Level Waste				
Nickel and beryllium reflector	12 ft^3	0.34 m^3	Material would be disposed at TA-54, Area G disposal cells.	
Bismuth shield	12 ft^3	0.34 m^3		
Deionizer resin	35 ft^3	0.99 m^3		
Asbestos	25 ft^3	0.71 m^3	Radioactively contaminated asbestos may be sent to monofill disposal cell.	
Residual Radioactive Material:				
Concrete	44,707 ft^3	1,266.0 m^3	Material may be crushed and used as site backfill.	
Soil	36,940 ft^3	1,046 m^3	Soil would be used at the LANL for fill or cover.	
Steel	12,518 ft^3	354.47 m^3	Steel material may be stored and recycled onsite.	
Uncontaminated lead	36 ft^3	1.0 m^3	Lead to be reused at LANL	
Roofing material	364 ft^3	10.3 m^3	Roofing material would be disposed in the Los Alamos County Landfill.	
Wood and Fiberglass	3,590 ft^3	102 m^3	Wood and Fiberglass material would be disposed in the Los Alamos County Landfill.	
Asbestos	4,505 ft^3	127.6 m^3	Asbestos would be sent to asbestos transfer station and prepared for shipment offsite to a permitted asbestos disposal facility.	
Elemental Lead (Potentially activated)	212 ft^3	6.00 m^3	Lead may be used as package shielding for highly activated components. Non-useable lead would be sent to mixed waste storage.	
Radioactive Liquid	8,000 gallons	30,000 L	Liquid waste from the reactor and fuel pool would be packaged and transported to the RLWTF, Bldg. 50-01 at TA-50.	

Residual Radioactive Material - US Department of Energy Order 5400.5, February 8, 1990, any radioactive material which is in or on soil, air, equipment, or structures as a consequence of past operations or activities. Order 5400.5 establishes guidelines, procedures, and requirements to enable the reuse, recycle, or release of materials, which are below these established limits.
RLWTF: Radioactive Liquid Waste Treatment Facility

Containers for transport of wastes vary widely and depend on type of waste, its management or disposal destination, and Federal and state transport regulations. Offsite transport of waste would require packaging preparations including use of DOT-specified packaging and certification of waste to meet the waste acceptance criteria (WAC) of the receiving facility. The shipments would be transported on interstate and state highways using commercial carriers operating in compliance with DOT regulations.

The main difference between the two waste disposal options concerns the disposition of certain LLW referenced as "LLW (optional disposition)" in Table 2-3. Most of the LLW that would be generated by the Omega West Facility D&D activities would be LLW (optional disposition) that could either be sent offsite for disposal or disposed of onsite at LANL, in Area G, TA-54. Under Option 1, NNSA proposes to dispose of the LLW (optional disposition) generated from the Omega West Facility D&D activities at offsite facilities. The remaining LLW would be disposed of onsite. NNSA recognizes that some of the LLW (optional disposition) types may be stored for a long period of time onsite before an appropriate disposal facility becomes available. While Option 2, in which all of the LLW including LLW (optional disposition) would be disposed of onsite at LANL, meets NNSA's purpose and need for action, it is not the preferred option under the Proposed Action. For both options, any contaminated demolition debris that was characterized as LLMW would be stored onsite at Area G, TA-54, pending identification of an offsite treatment and disposal facility where it could then be shipped for treatment or disposal.

<u>Option 1.</u> Under this Option, DOE would pursue offsite disposal of the LLW (optional disposition) resulting from D&D of the Omega West Facility. The types of LLW (optional disposition) that would be sent offsite would include contaminated concrete, soil, steel, and personal protective equipment (PPE) worn by site workers. The total quantity of the LLW (optional disposition) expected to be generated from these D&D activities is estimated to be about 144,000 ft^3 (4,080 m^3). Under this Option, NNSA would ship an estimated 143,000 ft^3 (4,050 m^3) of LLW (optional disposition) to another DOE facility with existing LLW disposal capacity at the Nevada Test Site, or to a commercial facility, such as an existing facility in Clive, Utah, for disposal.

The remaining LLW expected to be generated by the D&D of the Omega West Facility would not be disposed of offsite under either option. This LLW include parts of the reactor vessel (specifically pieces of the nickel and beryllium reflector and pieces of the bismuth shield), deionizer resins, and asbestos contaminated with LLW. Deionizer resins that would result from decontaminating water, should water be used to fill the reactor vessel, would also be LLW. The amount of this category of LLW anticipated from the D&D activities is about 60 ft^3 (1.7 m^3). This particular category LLW would be disposed of onsite at Area G, TA-54. Asbestos contaminated with LLW would be disposed of in a disposal cell in Area G that is dedicated to the disposal of radioactively contaminated asbestos waste. The amount of material contaminated with asbestos expected from the Omega West Facility D&D activities is about 25 ft^3 (0.71 m^3).

Some of the wastes generated from the Omega West Facility D&D activities would be considered residual radioactive material. DOE Order 5400.5 establishes guidelines, procedures, and requirements to enable the reuse, recycle, or release of materials, which are below established limits. Materials that are below these limits are acceptable for use without restrictions. The residual radioactive material that would be generated by the Omega West Facility D&D activities would include uncontaminated concrete, soil, steel, lead, roofing material, wood, and fiberglass. The concrete material may be crushed and used as backfill at LANL. The soils could also be used as backfill or as top soil cover depending on its characteristics. The steel and lead could be stored and reused or recycled at LANL. The wood, fiberglass, and roofing materials would be disposed at the Los Alamos County Landfill or its replacement facility. The total amount of these types of materials that would be generated from the D&D activities associated with the Omega West Facility is just under 100,000 ft^3 (2,780 m^3). The total volume of waste generated from D&D of the Omega West Facility and suitable for disposal at the Los Alamos County Landfill (or its replacement facility) is estimated at 4,000 ft^3 (113 m^3). Asbestos that is not radiologically contaminated would be packaged according to applicable requirements and sent to the LANL asbestos transfer station for shipment offsite to a permitted asbestos disposal facility along with other asbestos waste generated at LANL. The anticipated amount of this type of waste is around 4,500 ft^3 (128 m^3).

Elemental lead that was potentially contaminated would be transferred to the Lead Decontamination Trailer, Building 50-185 where surface decontamination would be conducted. Some of the lead would then be reused as radiation shielding at LANL. The non-useable lead would be sent to mixed waste storage at LANL pending shipment offsite for disposal.

Radioactive liquid waste would be transferred to the RLWTF in TA-50 at LANL for treatment. Transfers to the RLWTF would be made using either a special tanker truck or using 40- to 55-gallon drums depending on the quantity of liquid waste produced. An estimated 8,000 gallons (30,000 liters) of liquid radioactive waste would be produced by the D&D of the Omega West Facility.

If any other RCRA-regulated hazardous wastes were generated during the Omega West Facility D&D activities, they would be handled, packaged, and disposed of according to LANL's hazardous waste management program. Hazardous wastes are stored at Area L of TA-54 at LANL until sufficient quantities are accumulated for shipment to offsite treatment, storage, and disposal facilities. Any hazardous waste generated under the Proposed Action would be transferred to an appropriate offsite facility for disposal. All offsite shipments would be transported by a properly licensed and permitted shipper and conducted in compliance with DOT regulations. None of this waste type is anticipated to be generated by the D&D activities proposed.

Option 2. Under this option for waste disposal, the LLW (optional disposition) would be disposed of onsite within Area G at TA-54. This facility is currently used at LANL and is expected to be expanded. The reuse, recycle and disposal of all other waste categories would be the same as described above for Option 1.

2.2.5 Post-D&D Actions

After the demolition of the Omega West Facility, the soil in the area, including that under the foundations of the building, would be characterized. The Proposed Action includes removal of any contaminated soil down to depth of around 2 to 4 ft (around 1 m). After the removal of the contaminated soil, the land would be contoured and seeded to prevent erosion. If soil contamination extends deeper than 2 to 4 ft (around 1 m), the LANL ER Program would take responsibility for the cleanup. The cleanup might immediately follow the performance of waste management activities discussed above. In that case, the ER cleanup would take place before the contouring and seeding. If the ER Program cleanup was to occur at a later time over the next 10 years, the site would be contoured and seeded to prevent erosion immediately following the performance of waste management activities.

2.3 PHASED REMOVAL ALTERNATIVE

Under this alternative, part of the Omega West Facility would be demolished in the near-term and part would be left undemolished until some point in the future before 2025. For the Phased Removal Alternative, the Omega West Facility would be would be assessed and decontaminated as discussed under the Proposed Action (see Sections 2.1 and 2.1.1); however, in this alternative Room 101 of Building 2-1 which contains the OWR, the parking lot, the driveway between the access road and the parking lot, and the rock catching fence would not be demolished in the near-term (see Figure 2-5). The rest of the Omega West Facility, including the foundation of the rest of Building 2-1, the exhaust line to TA-61, the exhaust stack in TA-61, and other associated structures would be demolished as discussed under the Proposed Action. Both waste disposal options for certain LLW identified for the Proposed Action would be applicable for the Phased Removal Alternative.

Room 101 of Building 2-1 and the OWR would be decontaminated as discussed in Section 2.2.2 with the exception of the sectioning and removal of the nickel and beryllium reflector, bismuth shield, and fuel element rack components. Room 101 and the OWR would not be demolished. The demolition of nonreactor facilities would proceed as outlined in Section 2.2.3. Some portions of contaminated exhaust piping connecting the OWR to the exhaust stack, as well as some structural concrete connected to Room 101 would be removed to reduce residual facility radioactivity. The reactor vessel, with internal components in place, could be filled with materials as discussed in Section 2.2.3 to reduce worker radiological exposures as well as immobilize radioactivity associated with the vessel itself.

The demolition of the OWR, Room 101, the driveway, bridge, and rock catching fence and associated soil removal would take place as funds become available. This demolition would take place in the same manner as described in Section 2.2.3. This alternative would extend indefinitely the timeframe up until 2025 for completion of the removal of all of the Omega West Facility, but would reduce most of the more immediate risks. While the Purpose and Need for Agency Action would not be totally satisfied immediately by this alternative, the majority of the potential for damage and spread of contamination would be alleviated in the near-term with the remainder to be dealt with later.

Post demolition activities would be the same as described in Section 2.2.5, but would be conducted over a longer period of time as each building and structure is demolished concluding after the last structure comprising the Omega West Facility was demolished sometime before 2025.

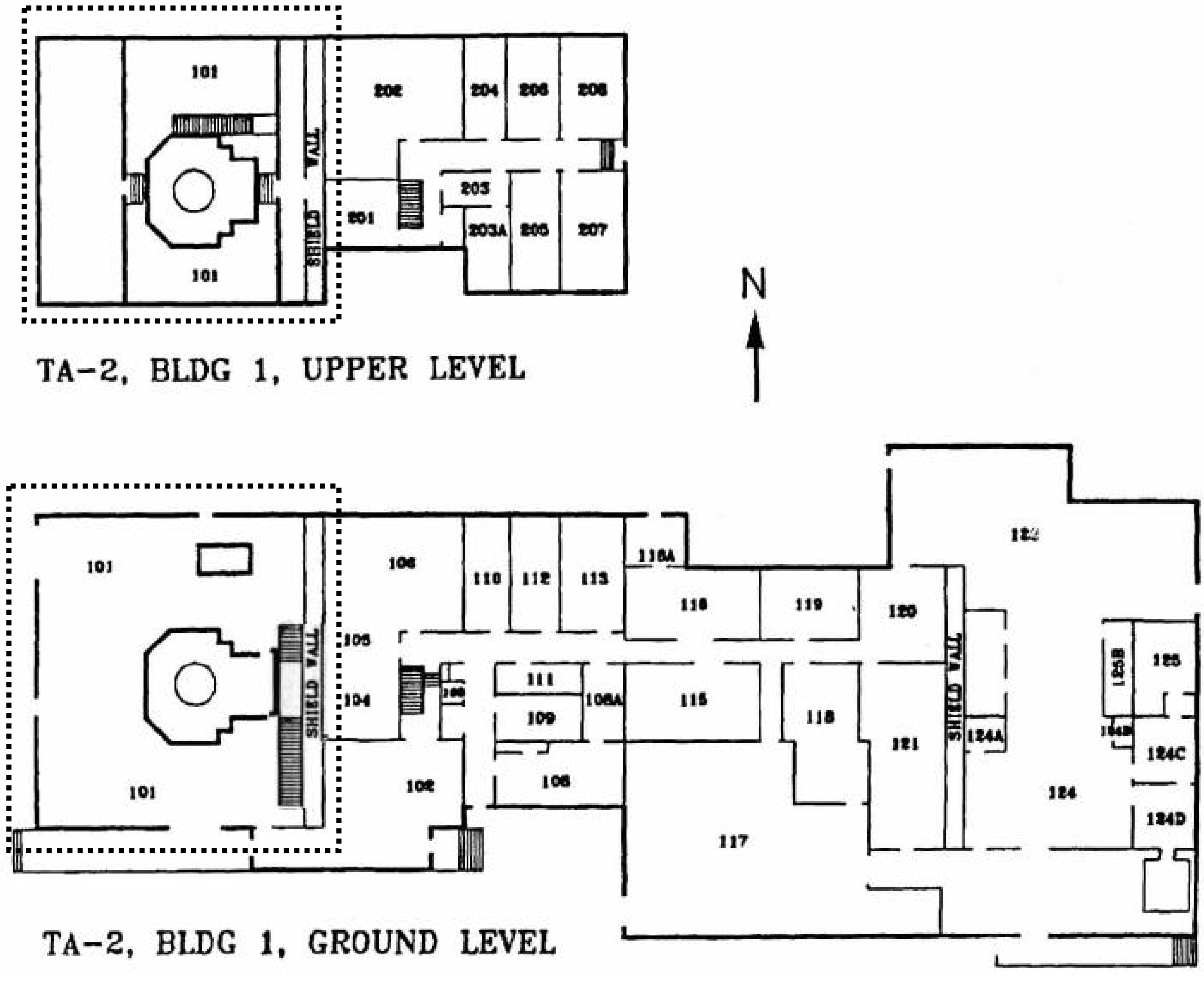

Figure 2-5. Dashed Lines Show Part of Building 2-1 to be Left Undemolished Under Phased Removal Alternative.

2.4 NO ACTION ALTERNATIVE

Under the No Action Alternative, no D&D of the Omega West Facility would occur within the next 10 years. Eventually, before 2025, the Omega West Facility would be considered for D&D activities as LANL's ER Project is completed. During the interim period, the risk of damage and spread of contamination being flash flood would remain. The site conditions would remain as essentially as described in Chapter 3, Affected Environment. Ongoing erosion control, and surveillance activities would continue. The Omega West Facility buildings and structures would continue to deteriorate making any eventual D&D actions more difficult and hazardous to workers. The D&D actions under these circumstances would likely include less successful decontamination and waste minimization efforts due to this deterioration. If a severe flood occurs, the risk of Omega West Facility components becoming debris may be realized, as well as the risk of contaminant spread downstream.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

2.5.1 Historical Preservation of Reactor Vessel and Omega West Facilities Alternative

Consideration was given to preservation of the reactor vessel and associated buildings and structures in situ due to their historical significance. The eastern half of Building 2-1 was built in 1944 and housed the third reactor ever constructed and the first reactor to be fueled by enriched uranium (^{235}U). These and other prototype reactors housed in Building 2-1 represent important stages in the development of modern nuclear reactor technology. Building 2-1 was also the site of the first nuclear engineering school at the Los Alamos Scientific Laboratory, the predecessor to LANL. Although the Omega West Facility has suffered a loss of interior integrity, it is still a historically significant property and eligible for listing on the National Register of Historic Places.

While clearly of an historic nature, preservation of Building 2-1 in situ was not considered a reasonable alternative. The risk of severe flooding at TA-2 has increased dramatically as a result of the Cerro Grande Fire. This potential flooding could release radiological contamination from the building to the environment and thus increase the urgency for removal of the Omega West Facility. The flood potential and isolated location does not make the Omega West Facility a suitable candidate for investments in restoration as an historical interpretive center for the public or other reuse activity. Additionally, radioactivity associated with the vessel and building components would result in any visitors to the site being exposed to low-level doses for many years to come. Health and safety considerations further render this alternative imprudent and unreasonable to meet the Purpose and Need for Agency Action. This alternative was not analyzed further in this EA.

2.5.2 Moving Reactor Vessel Alternative

Consideration was also given to removing the reactor vessel intact to a disposal facility. This alternative was determined to be impractical and could be associated with additional potential environmental effects. Access to the site is limited because of the canyon location. Equipment of the size and scale necessary to remove the vessel in such a manner could not be used within the TA-2 physical setting. The reactor vessel was not designed to be removed intact because it was built into the foundation of the structure. If it were possible to move the vessel over public highways and roads, DOT regulations would not allow its transport on public highways given the current configuration of the vessel. This alternative is technically unfeasible and does not meet the Agency's purpose and need for action. It was therefore not analyzed further in this EA.

2.6 RELATED ACTIONS

2.6.1 *Final Site-wide EIS* (SWEIS) *for the Continued Operation of the LANL*

The Final LANL SWEIS (DOE 1999a) was issued in February of 1999. A Record of Decision (ROD) was issued in September 1999, and a Mitigation Action Plan was issued in October 1999. The SWEIS discussed D&D actions as Supporting Activities along with waste management, infrastructure services, maintenance, ER and natural resource management actions. The SWEIS stated that "these activities are crucial to LANL's capabilities in supporting its assigned missions. However, these activities present minimal risk to the public and the environment…" The SWEIS listed future D&D actions for Building 86 (Tritium Facility) in TA-33, certain high explosive areas at S-Site (TA-16), and decommissioning of TA-21 (DP West Site). Although not listed specifically, the D&D of the Omega West Facility is an action similar in nature to the included facilities. The analysis contained in this EA tiers from the general, larger scope analysis provided in the SWEIS.

2.6.2 *Final EIS for the Conveyance and Transfer of Certain Land Tracts Administered by the DOE and Located at LANL, Los Alamos and Santa Fe Counties, New Mexico* (C&T ElS)

On November 26, 1997, Congress passed Public Law 105-119, *the Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act, 1998* (Section 632, 42 U.S. Code Sections 2391; the Act). Section 632 of the Act directs the Secretary of Energy to convey to the Incorporated County of Los Alamos, New Mexico, or to the designee of the County, and to transfer to the Secretary of the Interior, in trust for the Pueblo of San Ildefonso, parcels of land under the jurisdictional administrative control of the Secretary at or in the vicinity of LANL.

DOE prepared the C&T EIS (DOE 1999b) to examine potential environmental impacts associated with the conveyance or transfer of each of the land parcels tentatively identified in the DOE's Land Transfer Report to Congress Under Public Law 105-119, a preliminary identification of Parcels of Land in Los Alamos, New Mexico, for Conveyance or Transfer (DOE 1998). One of the parcels identified for transfer was the DP Road Tract that includes the TA-21 Records Storage and Archives Building. The DP Road Tract is above TA-2 on the north rim of Los Alamos Canyon. A ROD for this action was issued in December 1999. Land along the DP Road Tract road has been identified for development for commercial and industrial uses. This development would bring additional workers into the vicinity of the Omega West Facility. The cumulative effects section of this EA considers development and population of the adjacent parcels of land adjacent to TA-2.

2.6.3 *Special Environmental Analysis for the DOE, NNSA Actions Taken in Response to the Cerro Grande Fire at LANL, Los Alamos, New Mexico* (DOE/SEA-03)

During and after the Cerro Grande Fire, NNSA undertook emergency actions to suppress the fire and address the extreme potential for erosion and flood damage after the fire. In upper Los Alamos Canyon, the reservoir dam was reinforced, and some structures were removed from the middle reach of the canyon bottom to prevent them from becoming debris that could be carried in a flood. Barriers were placed at various locations at TA-2 and TA-41 to reduce damage to the remaining structures from flood waters. Other post-fire actions discussed in the Special Environmental Analysis include the construction of major and minor storm water control projects in the floodplains to protect downstream floodplains and wetlands from erosion.

NNSA did not issue a formal record of decision for the Special Environmental Analysis, since the actions had already been implemented or were being implemented on an emergency schedule prior to November 30, 2000. The Special Environmental Analysis states that actions that were not needed on an emergency basis would undergo the routine NEPA compliance review process. While the Special Environmental Analysis did not analyze the D&D of the Omega West Facility, the fire and the post-fire actions and planning resulted in the conditions under which the D&D of the Omega West Facilities are being proposed.

3.0 AFFECTED ENVIRONMENT

Chapter 3 describes the natural and human environment that could be affected by the Proposed Action and Alternatives. Given the sliding scale approach to impact analysis, certain resources are discussed in greater depth, while the data for others have been reviewed and are briefly summarized in the document. Table 3-1 outlines the resources and environmental issues addressed and identifies the location of the EA discussion.

Table 3-1. Resources and Environmental Issues Considered

Environmental Issue	Potentially Affected	Section
Human Health	Yes	3.3.1
Air Quality	Yes	3.3.2
Waste Management	Yes	3.3.3
Transportation	Yes	3.3.4
Noise	Yes	3.3.5
Biological Resources	Yes	3.3.6
Cultural Resources	Yes	3.3.7
Water Resources	Yes	3.3.8
Geology, Soil, and Seismicity	Yes	3.3.9
Visual Resources	Yes	3.3.10
Socioeconomics	Yes	3.3.11
Environmental Justice	No, no offsite effect to environmental justice populations	3.2
Land Use	No, no new land use anticipated	3.2
Infrastructure and Utilities	No, inconsequential use of utilities	3.2

3.1 REGIONAL AND LOCAL SETTING

The subject area is located within Los Alamos County in north-central New Mexico. Detailed information regarding the region can be found in the *LANL Site-Wide Environmental Impact Statement* (SWEIS) (DOE 1999a), *Conveyance and Transfer EIS* (C&T EIS) administered by DOE at LANL (DOE 1999b), and the *Special Environmental Analysis for the Actions Taken in Response to the Cerro Grande Fire at LANL* (DOE 2000). The information contained in these documents has been summarized in this chapter.

Figure 3-1 illustrates the location of the Omega West Facility and other local features. The local setting consists of a large plateau (the Pajarito Plateau) that has been eroded to form several deep canyons that run west to east. Los Alamos Canyon is located at the northern side of the LANL immediately south of the Los Alamos townsite. Residential and commercial properties within the Los Alamos townsite are located at the top of the mesa along the north side of the canyon. The Omega West Facility is located at the bottom of Los Alamos Canyon along a streambank.

3.2 ENVIRONMENTAL RESOURCES NOT AFFECTED

Several environmental resources or conditions present in the existing environment would neither be greatly affected by the Proposed Action and alternatives nor affect the decision to be made concerning the D&D of the Omega West Facility. These resources or conditions, as follows, will not be discussed in detail:

Environmental Justice. Environmental effects would be limited to the area immediately surrounding the Omega West Facility, which does not contain any low-income or minority populations for which there would be disproportionately high negative effects as a result of implementing the Proposed Action or alternatives.

Land Use. The Omega West Facility has not been used for several years and there are no plans for future use of the area that would change or affect the Land Use described in the 2000 Site Plan for LANL. Section 4.1.1 of the LANL SWEIS (DOE 1999a) provides detailed information on land use at LANL.

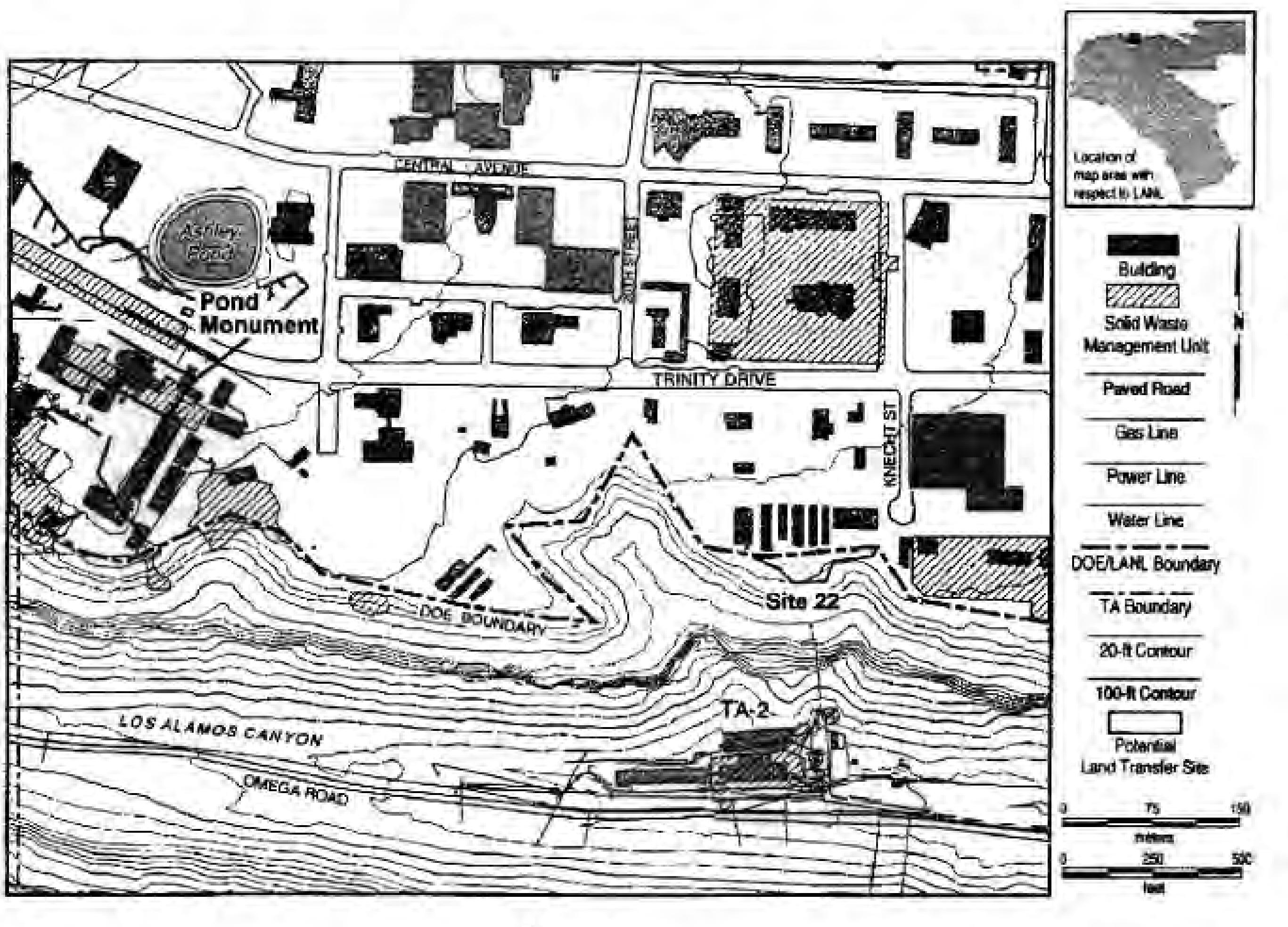

Figure 3-1. Los Alamos Canyon and Omega West Facility.

Infrastructure and Utilities. Infrastructure at the Omega West Facility includes roads and parking lots. Utilities at the Omega West Facility include water, sewer, and electricity. The electric power to the Omega West Facility is currently in a shut-down condition, as are all other utilities serving the Omega West Facility. The electric power service would be turned on for the D&D activities during which usage rates would be negligible: only lighting and electric powered tools would be energized from the power grid. As part of the demolition activities under both the Proposed Action and Phased Removal Alternative, all utility lines would be removed. Only those infrastructure and utility elements serving TA-2 would be affected.

3.3 ENVIRONMENTAL RESOURCES POTENTIALLY AFFECTED

3.3.1 Human Health

Section 4.6 of the SWEIS (DOE 1999a) provides detailed information on human health conditions at LANL. Sources of radiation exposure for the public in the general region include radon, cosmic and terrestrial radiation, self-irradiation, exposures from medical and dental procedures, and LANL operations. In 1996, the total effective dose equivalent to residents from all natural sources was 360 millirem (mrem) at Los Alamos and 340 mrem at White Rock. The U.S. population receives an average of 53 mrem per year from medical and dental sources. The maximum potential dose to an offsite individual in 1996 resulting from operations at LANL was calculated to be approximately 5.3 mrem. The baseline average measurable dose to workers in 1996 was 93 mrem. Administrative controls developed as a result of DOE policy specify an allowable dose of 100 mrem per year.

For LANL workers in the immediate vicinity of the Omega West Facility the residual radioactivity from past Omega West Facility operations is a source of radiation exposure. The Omega West Facility is located in a fenced, restricted access area and public access is prohibited.

3.3.2 Air Quality

The Omega West Facility has not been active for several years and therefore is not a source of operational air emissions. During reactor operations, airborne releases of radioactive noble gases and activation gases were the primary radiological effects and contributed an estimated 0.0061 mrem per year to the maximally exposed individual during 1992, the last year of reactor operation (DOE 1999a). The doses reported from the Omega West Facility in 1993 and 1994 were 0.000061 and 0.0000255 mrem per year, respectively, attributable to release of particulate activation products. Further decreases over time are expected due to the radioactive decay of the residual radioactivity. With the exception of a negligible amount of radon gas resulting from the decay of residual uranium contamination, no gaseous radionuclides are currently present or being generated at the site. The underground leak of tritium contaminated water that was discovered in 1992 is not a source of air emissions.

Section 4.4 of the LANL SWEIS (DOE 1999a) presents detailed regional air climate and air quality data. Los Alamos has a semi-arid, temperate mountain climate characterized by seasonal, variable rainfall with precipitation ranging from 10 to 20 in (25 to 51 cm) per year. Much of this precipitation results from summer thundershowers and snow during winter (DOE 1999a).

Wind conditions observed at the weather station in TA-41, which adjoins TA-2 to the west, tend to be calmer than many of the other stations at LANL; calm conditions are observed approximately 9.5 percent of the time, as compared to the other stations which have calm conditions from 0.8 to 1.2 percent of the time. Winds blow from all directions, usually at relatively low velocities, with the most commonly observed winds blowing from the west, as shown by wind rose diagrams contained in the LANL SWEIS (DOE 1999a).

3.3.3 Waste Management

The Omega West Facility has not been active for several years and no operational wastes are generated at TA-2. Typical waste streams at LANL include, but are not necessarily limited to:

- Liquid wastes, including sanitary liquid wastes, high explosives contaminated liquid wastes, and industrial effluent
- Nonhazardous solid waste
- Radioactive waste, including radioactive liquid waste, LLW, LLMW, TRU waste, and mixed TRU waste
- Hazardous waste
- Asbestos waste

Waste quantities and waste management activities at LANL are described in Section 4.9.3 of the LANL SWEIS (DOE 1999a).

Waste Disposal and Handling Sites

The following paragraphs describe the LANL facilities that could be used to manage wastes generated during D&D of the Omega West Facility.

Technical Area 54 (TA-54) , Area G. Waste management facilities at Area G (TA-54) include LLW disposal cells and shafts, a 200-ton compactor for LLW, temporary tension domes used to store drums of TRU waste and LLMW, and a monofill disposal cell for radioactively-contaminated asbestos waste.

Area G has been a disposal site for LANL's solid radioactive waste since 1957 and is the only active disposal site at LANL for LLW. Three disposal cells are currently in use (31, 38, and 39). Two of these cells (38 and 39) receive solid LLW and one cell (31) receives radioactively-contaminated asbestos wastes. These three cells have a limited remaining disposal capacity. The existing footprint for Area G disposal operations has space for new cells that would provide approximately 357,000 ft^3 (10,100 m^3) of additional capacity. Continued disposal at TA-54 will require expansion of disposal operations beyond the current footprint. Alternatively, wastes would have to be packaged and shipped offsite for disposal. The Expanded Operations Alternative analyzed in the LANL SWEIS included the expansion of LLW disposal operations in

Area G into Zones 4 and 6 of Area G. The expansion of Area G was selected for implementation in the Record of Decision for the LANL SWEIS (64 FR 50797, September 20, 1999). LLW disposal activities will expand westward from the existing footprint of Area G with the excavation of new disposal cells as needed. This expansion of Area G is expected to adequately meet LANL's projected LLW disposal needs for at least the next 10 years once disposal begins in the expansion zones.

Area G is used primarily for disposal of solid LLW and storage of TRU waste. Some treatment (such as compaction and other nondestructive volume reduction technologies) of LLW and TRU waste occurs in Area G. Packaged solid LLMW is stored in tension support buildings or sheds (for tritiated LLMW) in part of Area G. Area G also has U.S. Environmental Protection Agency (EPA) approval for disposal of polychlorinated biphenyl (PCB) waste (greater than 50 parts per million [ppm]) in either disposal cells or shafts. This disposal is limited to radioactively-contaminated PCB waste. Stabilized PCB waste may also be disposed of in Area G, provided it is stabilized in accordance with EPA requirements.

TA –54, Area L. Area L houses *Toxic Substances Control Act* and mixed waste storage facilities. The facilities include:

- Liquid LLMW Storage Building 54-215 used for storing drums of LLMW
- Gas Cylinder Canopy 54-216 used to store gas cylinders until shipped offsite for treatment and disposal
- PCB Building 54-039 and Attached Canopy used to store packaged liquid and solid PCB wastes until shipped offsite for treatment and disposal (some liquid PCB wastes are also contaminated with hazardous or radioactive wastes)
- Liquid Chemical Waste Storage Canopy 54-032 used to store packaged liquid chemical wastes
- Laboratory Pack Storage Units 54-68, 54-69, and 54-70 used to store small quantities of hazardous waste packaged in 5-gallon containers
- Sampling, Shipment, and Treatment Canopies 54-058, 54-35, and 54-36 include two treatment tanks (not currently in use) and equipment used to survey and sort mixed wastes

TA-60 Material Recycling Facility. The TA-60 Material Recycling Facility (MRF) is used for handling of recyclable solid wastes. Packaged asbestos wastes are staged at the MRF prior to shipment to a permitted asbestos disposal facility. Two roll-off containers are used to store bagged friable asbestos waste. Nonfriable asbestos wastes packed in bags are stored on an asphalt pad.

Los Alamos County Landfill. Both LANL and Los Alamos County use the same solid waste landfill located on DOE land. The Los Alamos County Landfill accepts waste from other neighboring communities. The Los Alamos County Landfill receives about 18,850 tons of solid waste per year (17,100 metric tons per year), with LANL contributing about 2,860 tons per year (2,600 metric tons per year) of this waste type. Based on discussions with the Los Alamos County Solid Waste Manager (Bachmeier 2001), the current plans are to close the Los Alamos County Landfill by June 30, 2004. Several landfill possibilities within New Mexico could be used after 2004, such as the Rio Rancho Sanitary Landfill in Rio Rancho, which is approximately 85 mi (137 km) south of Los Alamos. Access to the Rio Rancho Landfill is along state highways and Interstate 25 (I-25). The current Los Alamos County Landfill would be capped and would enter the monitoring phase of its life cycle, and a portion of the site would be used as a transfer station. The recycling center would continue to operate.

Offsite Facilities. Some waste types are shipped offsite from LANL to an appropriately licensed commercial facilities for disposal. An above-ground engineered disposal cell facility near Clive, Utah is permitted to receive and treat a variety of wastes including LLW. The Utah facility can be accessed by state and Federal highways or rail. All shipments would be made via commercial truck carriers.

3.3.4 Transportation

Because the Omega West Facility is not operational, there is no regular commuter traffic or shipment of materials to and from the Omega West Facility. A paved access road through Los Alamos Canyon connects the Omega West Facility to the mesas to the north and south of the Omega West Facility.

Motor vehicles are the primary means of transportation to and within LANL. The public bus service with in Los Alamos County consists of seven buses and runs 5 days per week. The nearest commercial rail connection is at Lamy, New Mexico, 52 mi (83 km) southeast of LANL. The primary commercial international airport in New Mexico is located in Albuquerque. The Los Alamos County Airport, located near the southern edge of the county, is a small federally-owned airport operated by the county of Los Alamos and usually open to private pilot use.

Interstate Highway 25 (I-25) is the dominant interstate highway in the vicinity of the LANL site. U.S. Highway 84/285 and State Road (SR) 502 connects LANL with I-25 in Santa Fe. I-40 bisects the State in an east to west direction.

Hazardous and radioactive wastes and industrial, commercial, and recyclable materials are transported to, from, and on the LANL site during routine operations. Onsite shipments are typically transported in LANL-operated vehicles, while offsite shipments are carried by commercial carriers and DOE vehicles. Detailed information on transportation issues at LANL is provided in Section 4.10 of the LANL SWEIS (DOE 1999a).

The Los Alamos County Landfill is located on Jemez Road, and Area G is located off of Pajarito Road, both of which are located onsite at LANL. Other major onsite or adjacent routes include State Roads (SRs) 502, 501 and 4.

3.3.5 Noise

Noise is traditionally defined as unwanted or unpleasant sounds, air blasts, or vibrations. Noise is a function of the sources and the distance between the source and the receptor. Topography and air conditions can play a role in the transmission of noise. Although workers and members of the public are most often considered receptors of noise, noise can also effect wildlife species. Since the TA-2 area is no longer active, the only nearby source of periodic, temporary man-made noise results from activities relating to erosion control efforts and forest thinning currently ongoing in the canyon and to noise generated on the mesa tops, although this generally dissipates within several yards of the mesa edges. Noise produced at LANL includes noise generated by workers, operations, pavements, and vehicles equipment.

3.3.6 Biological Resources

The biodiversity of the LANL region is shaped by the variety of elevations, topography, climate, water, soil, and vegetation present in the area. The mesa tops, mountains, canyon bottoms, cliffs, and slopes support a variety of plant and animal species. The LANL SWEIS details the species in the region including sensitive, threatened and endangered species and their habitat (DOE 1999a).

Plant communities range from urban and suburban areas to grasslands, wetlands, shrublands, woodlands, and mountain forest. A large number of animal species including elk, deer, bear, mountain lions, coyotes, rodents, bats, reptiles, amphibians, invertebrates, and a variety of resident, seasonal, and migratory birds may be found at LANL. Several threatened, endangered species, and numerous other sensitive species utilize LANL resources (DOE 1999a).

Los Alamos Canyon includes potential nesting and roosting habitat for the Mexican Spotted owl, which is a federally-protected threatened species. It is one of six areas of environmental interest (AEIs) for the Mexican spotted owl located within LANL; there are many areas within the nearby Jemez Mountains that also provide potential suitable nesting for the species. Los Alamos Canyon is also one of four AEIs within LANL for the American peregrine falcon, which is a recently delisted threatened species.

3.3.7 Cultural Resources

Cultural resources are those aspects of the physical environment that relate to human culture and society, and those cultural institutions that hold communities together and link them to their surroundings. The cultural resources identified within LANL boundaries reflect the patterns of human use of this land from the last several thousand years through the present. The LANL SWEIS (DOE 1999a) detail the types and distribution of the prehistoric, historic and traditional cultural resources in the region. Consultation with Native American and traditional Hispanic communities indicate continuing cultural use and the presence of traditional cultural properties within the lands administered by NNSA.

The principal Federal law addressing cultural resources is the *National Historic Preservation Act* (NHPA) of 1966, as amended (16 *United States Code* [USC] Section 470), and implementing regulations (36 *Code of Federal Regulations* [CFR] 800), that describe the process for identification and evaluation of historic properties; assessment of the effects of Federal actions on historic properties; and consultation to avoid, reduce, or minimize adverse effects. The term "historic properties" refers to cultural resources that meet specific criteria for eligibility for listing on the National Register of Historic Places (NRHP). This process does not require preservation of historic properties, but does ensure that the decisions of Federal agencies concerning the treatment of these places result from meaningful considerations of cultural and historic values and of the options available to protect the properties.

Under the NHPA, cultural resources are evaluated to determine whether they meet any one or more of the eligibility criteria for listing on the NRHP (36 CFR Part 60). Eligible resources include those that:

- Are associated with events that have made a significant contribution to the broad patterns of our history

- Are associated with the lives of persons significant in our past

- Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction

- Have yielded, or may be likely to yield, information important in prehistory or history

In addition, the resource must possess most, if not all, of the seven aspects of integrity: location, design, setting, workmanship, material, feeling, and association.

Other major Federal laws, regulations, and executive orders that outline DOE's cultural resource responsibilities include: the *Archaeological Resources Protection Act* (ARPA) (16 USC 470aa-47011), the *American Indian Religious Freedom Act* (AIRFA), as amended (42 USC 1996-1996a), NEPA (42 USC 4321-4370c), the *Native American Graves Protection and Repatriation Act* (NAGPRA) (25 USC 3001-3013), Executive Order 13007 - Indian Sacred Sites, Executive Order 13084 - Consultation and Coordination With Indian Tribal Governments, and Presidential Memorandum: Government-to-Government Relations with Native American Tribal Governments.

Archaeological surveys have been conducted on the valley floor in the vicinity of the Omega West Facility. No known archaeological sites are located at the Omega West Facility although there is a possibility of subsurface deposits. Building 2-1 has been determined eligible for listing on the NRHP because of its association with events that have made a significant contribution to the broad patterns of history. The eastern portion of the building was constructed in 1944 during the Manhattan Project and housed the third reactor ever constructed and the first reactor to be fueled by enriched U^{235}. Important work in the development of modern reactor technology was conducted from 1944 to 1992. Building 2-1 was also the site of the first nuclear engineering school at the Los Alamos Scientific Laboratory, the predecessor to LANL. Although the Omega

West Facility has suffered a loss of interior integrity, it is still a historically significant property (LANL 2000).

3.3.8 Water Resources

Surface Water. The predominant surface water features at LANL are the perennial, ephemeral, and intermittent streams in the canyon bottoms. The only surface water developed for economic use in Los Alamos County is contained in the Los Alamos Reservoir located in upper Los Alamos Canyon. It has been used in the past for landscape irrigation in the Los Alamos townsite but is not currently used due to high facility maintenance costs (DOE 1999a). The Los Alamos municipal storm drain system also contributes to the surface water flow into Los Alamos Canyon, as does the storm drain system from LANL's TA-3. The stream draining Los Alamos Canyon, which experienced flow for approximately 247 days during the one-year period from October 1, 1994 to September 30, 1995, currently flows beside the Omega West Building 2-1 to the south side of that structure.

There are LANL 12 outfalls located in Los Alamos Canyon. These outfalls are associated with the Los Alamos Neutron Science Center (LANSCE), Health Research Laboratory (HRL), laboratories, and TA-21 tritium facilities, none of which are located in TA-2, at least two parking lots within TA-3 drain to Los Alamos Canyon above TA-2. Los Alamos Canyon, where the Omega West Facility is located, is within a flash-flood zone downstream from the Los Alamos reservoir. Flash flooding in canyons following heavy precipitation is common in July and August. This danger has been increased due to the removal of vegetation within the upper part of the Los Alamos Canyon watershed by the Cerro Grande Fire. The Omega West Facility is downstream from severely burned mountainside areas.

The Omega West Facility is located within a floodplain (see Figures 3-2 and 3-3). The floodplain is in the floor of a narrow, steep-sided canyon. The floodplain is about 250 ft (76 m) wide. The stream flow is ephemeral, occurring only during periods of enhanced runoff. Vegetation is ponderosa pine forest, a continuation of canyon wall vegetation. There are other man-made structures in the floodplain above the Omega West Facility. The majority of wetlands at LANL are associated with the canyon bottoms. Section 4.5.1.2 and Figure 4.5.1.2-1 of the LANL SWEIS (DOE 1999a) provide detailed information on locations of wetlands at LANL, none of which are located in TA-2. Floodplains within LANL canyons have been altered by the Cerro Grande Fire. Current conditions have been computer-modeled and reveal that a severe flood could cover the canyon floor within Los Alamos Canyon with up to a foot of water from canyon wall to canyon wall at TA-2.

Groundwater. Although the recharge from surface water to groundwater in Los Alamos Canyon is uncertain, the possibility exists that the discharges from outfalls and stormwater runoff could result in contaminant transport to the groundwater beneath Los Alamos Canyon. Depth to groundwater in the area of the Omega West Facility appears to be relatively shallow. Review of ER Project soil boring logs (LANL 2001) indicates that groundwater was encountered at depths of approximately 7.5 to 17 ft (3.2 to 5.2m) below ground surface.

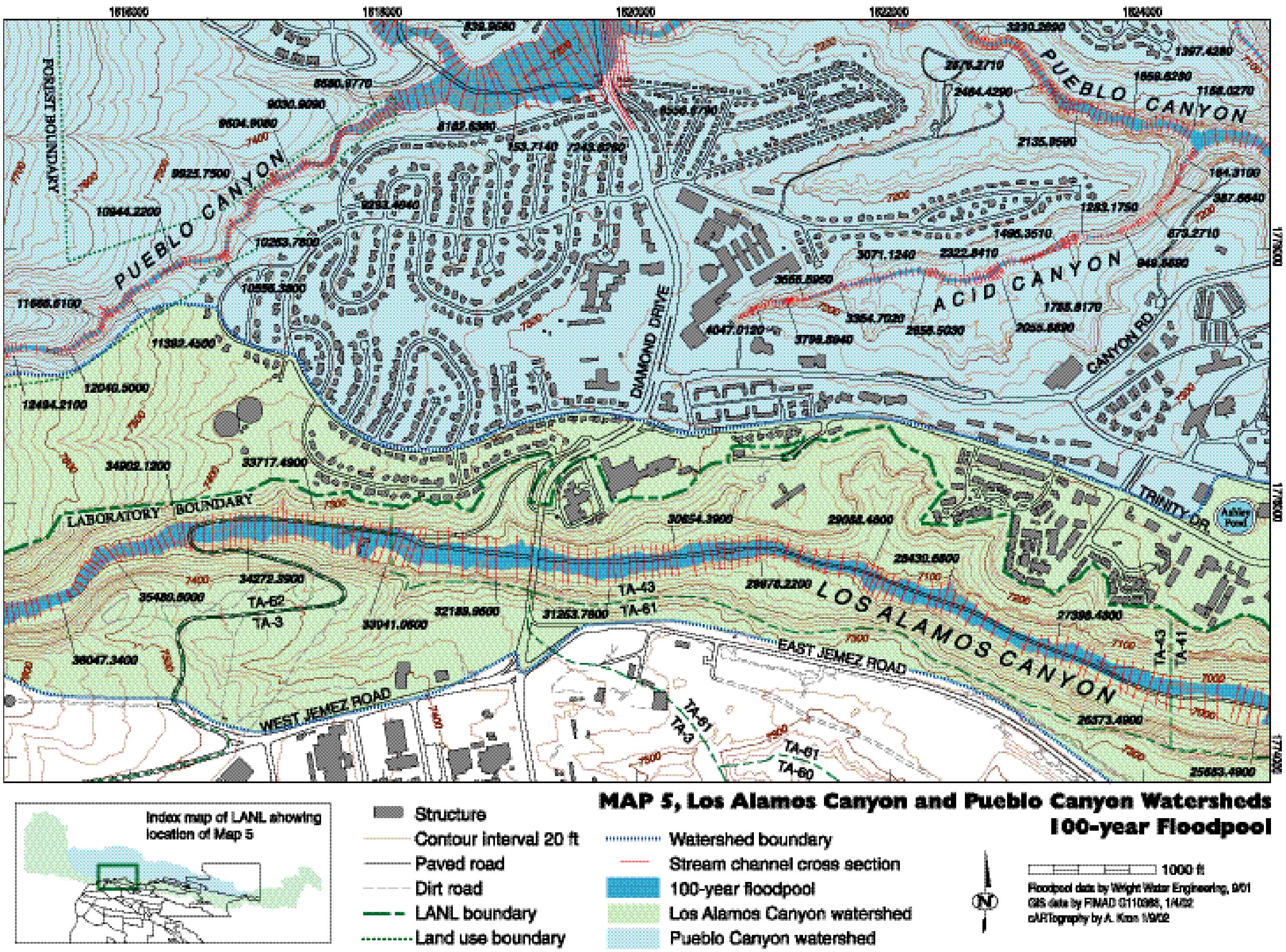

Figure 3-2. Los Alamos Canyon Floodplain Upstream of TA-2.

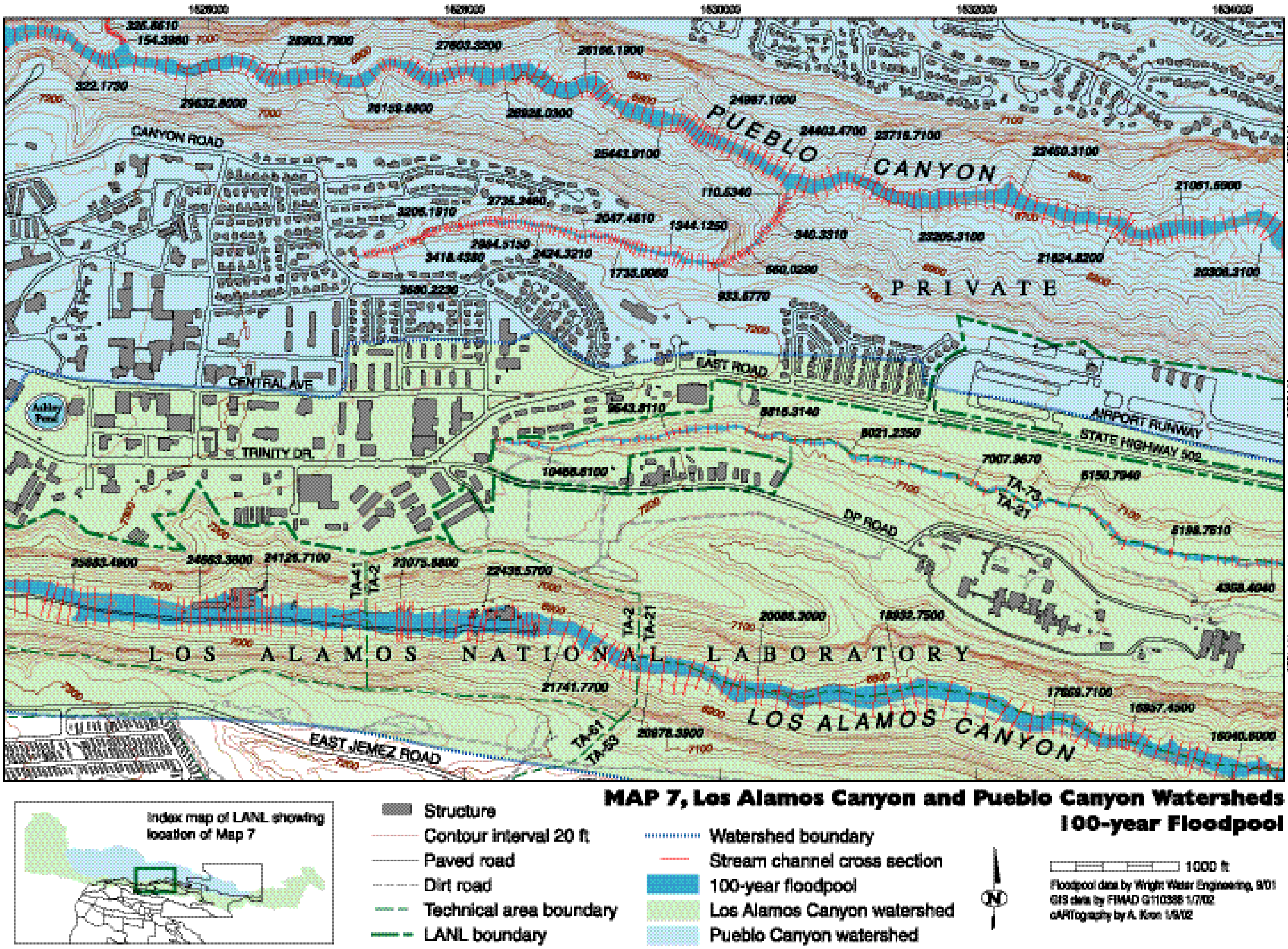

Figure 3-3. Los Alamos Canyon Floodplain at TA-2.

A leak was discovered in the Omega West Facility cooling system in 1992. Coolant waters containing tritium entered the surficial aquifer at the site. The extent of groundwater contamination is under investigation and has not been conclusively determined. The EPA drinking water standard for strontium-90 was exceeded for at least half of the alluvial groundwater samples collected from Los Alamos Canyon from 1990 to 1994, and the EPA standard for tritium was exceeded in most of the samples (DOE 1999a). The deep water aquifer is used for a potable water source within Los Alamos County. One drinking supply water well is located within Los Alamos Canyon to the east of TA-2, within TA-21. Water quality for this well is monitored and has not deteriorated with regard to radioactive contamination since this well was drilled in.

3.3.9 Geology, Soils, and Seismicity

LANL is located on the Pajarito Plateau lying between the Jemez Mountains to the west and the Rio Grande to the east. The surface of the Pajarito Plateau is divided into numerous narrow finger-like mesas separated by deep east-to-west oriented canyons that drain toward the Rio Grande; Los Alamos Canyon is one of these canyons.

The downward cutting that results from erosion in Los Alamos Canyon has resulted in steep canyon walls. The sides of Los Alamos Canyon are susceptible to slope instability and rockfalls. In 1944, a chain linked mesh barrier was installed to protect the Omega West Facility from rockfalls. Rockfalls have occurred in the past within LANL canyons. Excessive rainfalls, continued erosion, and any seismic activity could contribute to large rockfalls at LANL in the future.

The LANL SWEIS discusses the geologic history of the region in greater detail, including stratigraphy, structural geology, seismicity, and volcanism. It also discusses slope stability as a function of canyon wall steepness, depth, and stratigraphy. The geochemistry, geomorphology, and formation of soils in the LANL area have been characterized also (DOE 1999a).

Sediments occur along most segments of these canyons as narrow bands of canyon-bottom deposits, which can be transported by surface water during runoff events. Soil erosion can have consequences to the maintenance of biological communities and also may be a mechanism for the transport of contaminants. The soils in the area of the Omega West Facility have been characterized for contaminants. As stated earlier in the text of this chapter, the soil contaminants present in the TA-2 area include strontium and tritium.

ER removal actions in the vicinity of TA-2 to date have included the following (LANL 2001):

- Metal Nugget Pile (C-02-001): Approximately 31,280 pounds (lbs) (14,218 [kilograms] kg) of soil and metal nuggets were removed from an area southeast of TA-2 and transported to the Los Alamos County Landfill.

- Location 02-01228: A small amount of radioactive soil was removed using hand tools from a location east of TA-2 and north of the streambed.

- PRS-02-009(a) Site: Approximately 58 cubic yards (yd^3) (44 m^3) of radioactively contaminated soil was removed from an area southeast of the TA-2 fence.

- About 915 yd^3 (700 m^3) of contaminated silt and soil were removed from a 2.5 acre (1 ha) site in Los Alamos Canyon east of TA-2 at the confluence of DP Canyon and Los Alamos Canyon in June 2000 (DOE 2000).

Restoration of the metal nugget pile and the PRS-02-009(a) Site, including grading, seeding, and stabilization, was completed in October 2000. Sand and gravel have been taken out of terrace deposits in Los Alamos Canyon; however, there are no extensive resources suitable for commercial mining (DOE 1999a).

3.3.10 Visual Resources

The natural setting in the Los Alamos vicinity is very scenic with diverse views of mountains, canyons, forest and rock formations. The Los Alamos Canyon area includes scenery of forests (including burned areas), stream valley, and rocky cliffs. These views are common in each of the canyons of the region. The portion of Los Alamos Canyon where the Omega West Facility is located is restricted to general public vehicle access and is not a common viewpoint.

The view of the Omega facilities from outside the canyon is very limited. Due to the steepness of the canyon walls, the view is primarily seen by those standing on the edge of the canyon rims adjacent to the Omega West Facility. Occasional hikers within the canyon reach may also view the Omega West Facility.

3.3.11 Socioeconomic Resources

LANL operations are an important positive contributor to the economy of north-central New Mexico. In fiscal year (FY) 1998, the total funding for LANL in north-central New Mexico was $1.3 billion in direct expenditures yielding a total economic impact of about $3.8 billion when indirect and induced income is included. This accounts for approximately 30 percent of the economic activity in the region. Total personal income impact was $1.1 billion in FY 1998, or about 26 percent of the total income generated in Los Alamos, Santa Fe and Rio Arriba counties. LANL accounted for a total 27,688 direct or indirect jobs. Approximately 80 percent of the indirect jobs created occurred in the trade, finance, insurance, real estate and services sector (DOE 1999c).

The Omega West Facility has not been active for several years. Some security and environmental monitoring activities are associated with the Omega West Facility, but these contribute insignificantly to regional employment or the economy.

4.0 ENVIRONMENTAL CONSEQUENCES

This Chapter describes and compares the potential environmental effects of the Proposed Action, the Phased Removal Alternative, and the No Action Alternative. As discussed in Chapter 2, the evaluation of the D&D of the Omega West Facility is based on the use of general industry D&D methods and known practices that could be used to D&D the Omega West Facility.

4.1 PROPOSED ACTION

The Proposed Action involves characterization and D&D of the Omega West Facility. These activities will have an effect, or be affected by, several of the components of the Affected Environment described in Chapter 3.

4.1.1 Human Health

Removal of the Omega West Facility under the Proposed Action would result in emissions associated with vehicle and equipment exhaust as well as radiological and particulate (dust) emissions from demolition activities. No discernible effects on air quality would result and no negative effects on human health would be anticipated.

The primary source of potential consequences to workers and off-site members of the public would be associated with the release of radiological contaminants during the demolition process. Due to the large distance between the Omega West Facility site and the nearest non-involved worker locations, the only radiological effect on non-project workers at the LANL site or members of the public would be from radiological air emissions (see Section 4.1.2, Air Quality). Any emissions of contaminated particulates would be reduced by the use of plastic draping and contaminate containment coupled with HEPA-filters. Contaminate releases of radioactive particulate from D&D activities are expected to be lower than the dose estimated during past reactor operations. The dose would be a very small fraction of the public and worker dose resulting from current and future LANL site operations (DOE 1999a).

Depending on the location of the workers and members of the public, the average radiation dose levels are estimated to range between background and 10 mrem per hour, with the highest levels anticipated to occur in the vicinity of the ion exchangers if used. Ion exchangers could be used onsite or at TA-50 to treat water that would be placed in the reactor vessel for shielding purposes and later removed. Worker exposure from direct radiation at TA-2 would be limited to less than 1 rem per worker and the estimated collective worker dose would be approximately 5.5 person-rem. Based on an occupational risk factor of 0.0004 fatal latent cancers per person-rem (ICRP 1991), workers engaged in the Proposed Action would incur a calculated annual 0.00022 collective risk for a fatal latent cancer.

Federal regulations found at 40 CFR Part 61, §61.92, limit the dose to any member of the public to 10 mrem per year. The technologies and practices that wold be employed in D&D of the Omega West Facility would result in doses of less than 10 mrem per year to members of the public, based on observed population risk factors.

The Proposed Action would involve removal of some asbestos-contaminated material; however, such removal would be conducted according to existing asbestos management programs at LANL in compliance with strict asbestos abatement guidelines. Workers would be protected by PPE and other engineered and administrative controls, and no asbestos would likely be released that could be inhaled by members of the public. No cases of asbestosis are anticipated as a result of the Proposed Action.

4.1.2 Air Quality

Removal of the facility under the Proposed Action would result in emissions associated with vehicle and equipment exhaust as well as radiological and particulate (dust) emissions from demolition activities. No discernible effects on air quality would be expected to result from the Proposed Action.

During reactor operations, airborne releases of radioactive noble gases and activation gases were the primary radiological emissions. Currently, no gaseous radionuclides are present or being generated at the Omega West Facility. Therefore, no releases of gaseous radionuclides are anticipated from the D&D of the Omega West Facility. The Proposed Action would generate very small amounts of particulate air emissions (dust) from size reduction of activated lead, metal and concrete. The dust could include lead, asbestos, and a small amount of radionuclides, primarily radioactive ^{137}Cesium, and ^{60}Cobalt isotopes.

The location of the Omega West Facility in the Los Alamos Canyon bottom limits the transport of and promotes the deposition of airborne particulates, thus reducing the concentration of airborne particulates at the site boundary. Effects of the Proposed Action with regards to air quality would be negligible compared with potential annual air contaminant emissions from the LANL site as a whole.

4.1.3 Waste Management

Waste types and quantities generated by removal of the structures would be within the capacity of existing waste management systems, and would not result in substantial impact to existing waste management disposal operations. It is anticipated that the majority of the waste produced during D&D activities under the Proposed Action would be LLW (optional disposition) all of which could be transported offsite for disposal. For the purpose of this analysis, however, DOE has evaluated both onsite and offsite disposal options for LLW (optional disposition) to ensure that the potential environmental consequences of all these potential waste management options for the Proposed Action have been bounded.

Waste Generation During D&D. The waste types and volumes expected to be generated under the Proposed Action's two disposal options are summarized and compared in Table 2-3 of Section 2.2.4. The wastes are discussed below according to category. The various recyclable wastes would be reused and recycled to the extent practicable and allowed under DOE policy.

Some of the LLW generated by the proposed D&D activities would have to be disposed of onsite at Area G, TA-54, facilities currently used at LANL. This amount would not affect the Area G operations. However, most of the LLW generated by the proposed D&D activities would be LLW (optional disposition). The LLW (optional disposition) could be disposed of onsite or offsite. Two options are evaluated below for the LLW (optional disposition). While the Proposed Action waste management Option 1 is to ship the LLW (optional disposition) offsite for disposal, the possibility that some or even all of the LLW (optional disposition) may be disposed of onsite as described in Option 2 is considered as well.

Option 1. Under this option, DOE would pursue offsite disposal of the LLW (optional disposition) resulting from D&D of the Omega West Facility including concrete, soil, steel, and personal protective equipment (PPE). Both the Nevada Test Site facilities for waste disposal and the existing commercial facility at Clive, Utah, have the capacity to accept the amount of these types of waste. Under this option, there would be little reduction of LANL's remaining LLW disposal capacity at Area G, TA-54.

Option 2. Under this option for waste disposal, the LLW (optional disposition) would be disposed of onsite at Area G, TA-54, at LANL. The current disposal site footprint has limited waste capacity, although adequate room for expansion exists. The current footprint is expected to be adequate for the amount of LLW (optional disposition) and the remaining type of LLW that would be generated by the Omega West Facility D&D activities. Implementing this option of the Proposed Action would reduce the remaining capacity. This reduction could result in expediting the planned expansion of Area G by up to one year or in the prioritization and potential delay of other LLW generating activities at LANL.

All other wastes expected to be generated by the Omega West Facility D&D activities would be handled, managed, packaged, and disposed of in the same manner as the same wastes generated by other activities at LANL (see Section 2.2.4). Any contaminated demolition debris that is characterized as LLMW would be stored onsite at Area G, TA-54 pending identification of an off-site treatment and disposal facility. Most LLMW generated at LANL is sent offsite to other DOE or commercial facilities for treatment and disposal. The Proposed Action would generate LLMW that would be within the current disposal capacity of both the NTS and the existing commercial facility at Clive, Utah.

Asbestos contaminated with radioactive material would be disposed of in a disposal cell in Area G that is dedicated to the disposal of radioactively contaminated asbestos waste. This amount of waste is within the capacity of the disposal cell at Area G. The asbestos waste that is not radiologically contaminated generated during the proposed D&D activities would be packaged according to applicable requirements and sent to the LANL asbestos transfer station for shipment offsite to a permitted asbestos disposal facility along with other asbestos waste generated at LANL. It is not expected that the anticipated amount of waste would be beyond the disposal capacity of the existing disposal facilities.

Some of the wastes generated from the Omega West Facility D&D activities would be considered residual radioactive material. Some of these materials can be recycled or reused as backfill, topsoil cover. The steel and lead could be stored and reused or recycled at LANL to the extent practicable and in accordance with DOE policy. The rest of the material would be disposed at the Los Alamos County Landfill or its replacement facility. The Los Alamos County Landfill is expected to be closed within the next 3 years, although this is not due to having been filled to capacity. LANL, along with Los Alamos County, would have to contract for waste disposal with another solid waste disposal facility offsite.

Up to 212 ft^3 (6.0 m^3) of lead that was potentially contaminated would be generated by the D&D of the Omega West Facility. It is not expected that this amount of lead would be beyond the management or storage capacity at LANL. Radioactive liquid waste would be transferred to the RLWTF in TA-50 at LANL for treatment. The liquid waste from the D&D activities for the Omega West Facility would be well within the treatment and disposal capacity of the RLWTF. No affect on RLWTF is anticipated.

Although not anticipated, if any small amounts of hazardous waste were generated during the Omega West Facility D&D activities they would be handled, packaged, and disposed of according to LANL's hazardous waste management program. These small amounts would be well within the capacity of LANL's hazardous waste management and disposal program.

4.1.4 Transportation

The Proposed Action would produce D&D wastes that would need to be transported to storage or disposal sites. These sites could be at LANL or an offsite location. The results of NNSA's analysis indicate that no excess fatal cancers are likely to result from implementing the Proposed Action. Transportation has potential risks to workers and the public from incident-free transport such as radiation exposure as the waste packages are transported along the highways. There is also increased risk from traffic accidents (without release of radioactive material) and radiological accidents (in which radioactive material is released). This section addresses the potential effects of incident-free transportation for the Proposed Action. Sections 4.2.4 and 4.3 address the consequences of the Phased Removal and the No Action Alternatives, respectively. Appendix D presents the methodology for the transportation analysis.

The effects from incident-free transportation of demolition wastes under both waste options for the worker population and the general public are presented as collective dose in person-rem resulting in excess latent cancer fatalities (LCFs) in Table 4-1. Excess LCFs are the number of excess cancers estimated to occur in the exposed population over the lifetimes of the individuals. If the number of LCFs is less than one, the subject population is not expected to incur any LCFs resulting from the actions being analyzed. Statistically, nearly 20 percent (1 in 5 persons) of the U.S. population is expected to develop LCFs within their lifetimes from all causes. The risk for development of excess LCFs is highest for workers under the offsite disposition option. This is because of the duration of exposure during transport.

Table 4-1. Incident-Free Transportation Impacts

	Occupational Impacts		Public Impacts	
	Collective Dose (rem)	LCFs	Collective Dose (rem)	LCFs
Onsite disposition	29	0.012	0.011	0.0000055
Offsite disposition	720	0.29	1.0	0.00050

4.1.5 Noise

Noise levels during demolition activities would be consistent with those typical of construction activities. As appropriate, workers would be required to wear hearing protection to avoid adverse effects on hearing. Non-involved workers at the edges of the mesas above the Omega West Facility would be able to hear the activities below; however, the level of noise would not be distracting. Construction noise at LANL is common. Some wildlife species may avoid the immediate vicinity of the Omega West Facility as demolition proceeds due to noise; however, any effects on wildlife resulting from noise associated with the Proposed Action's demolition activities are expected to be temporary. Wildlife effects due to potential noise at the site are discussed in the following section.

4.1.6 Biological Resources

All D&D activities associated with the Proposed Action would take place within TA-2, at an area that has been dedicated to industrial use since the early 1940s. The entire Omega West Facility is enclosed within an 8-ft (2.4-m) high security fence and provides very little wildlife habitat. There are some small trees and brush overgrown areas around buildings, but the Omega West Facility is dominated by asphalt roads, parking areas, concrete pads, and foundations of buildings previously razed. Wildlife in canyon lands adjacent to the Omega West Facility could be intermittently disturbed by construction activity and noise over the 12 to 18 month period when the reactor vessel and components are removed, structures razed, building foundations and buried utilities removed, contaminated soils excavated, and waste trucked to disposal sites.

Noise generated from construction activities should attenuate to below Habitat Management Plan limits within 0.25 mi (0.4 km) of the construction site (BA 2001). No Mexican spotted owls have been observed in Los Alamos Canyon in 7 years (1994 to 2001) of monitoring specifically for that species. It is anticipated that activities associated with implementing the Proposed Action would not result in an adverse affect to potential Mexican spotted owl habitat located in the vicinity of TA-2. Ongoing D&D activities would likely preclude future use of the canyon habitat for their duration. Ultimately, the canyon habitat would be restored, which would be a beneficial effect on the potential Mexican spotted owl habitat in the area.

Although noise levels would be relatively low outside the immediate area of construction, the combination of demolition noise and human activity would probably displace small numbers of animals (birds and mammals) that forage, roost, nest, rest, or den in adjacent canyon lands. Construction-related disturbances are likely to create effects to wildlife that would be small, intermittent, and localized. Species most likely to be affected are those commonly associated with Mixed-Conifer Forest, Ponderosa Pine Forest, and Pinyon-Juniper woodland communities, all found in Los Alamos Canyon in the vicinity of TA-2.

4.1.7 Cultural Resources

No prehistoric or other archaeological resources are known to be present in TA-2, which was disturbed during the construction of the Omega West Facility and associated structures. The Omega West Facility Building 2-1 is a Cold War-period structure eligible for the NRHP (LANL 2000). The Proposed Action would involve the demolition of this structure. The structure has been extensively documented photographically, and historical information has been compiled describing the Facility's history. A draft Memorandum of Understanding between DOE and the SHPO regarding demolition of the Omega West Facility has been submitted to the SHPO for consideration, and demolition activities would be conducted only after a final agreement is reached regarding the appropriate level of documentation of the site and its history. Because the site's history would be documented to the point that no further useful information would likely be obtainable from inspection of the facility, and preservation of the facility is not advisable for safety reasons, no effect to the historical record of the Omega West Facility would result from the demolition.

4.1.8 Water Resources

Little or no effect on water resources is anticipated. The Proposed Action would not result in the disturbance of watercourses or generation of liquid effluents that would be released to the surrounding environment. Silt fences, hay bales, or other appropriate Best Management Practices would be employed to ensure that fine particulates are not transported by stormwater into surface water features in the vicinity of the Omega West Facility. Potable water use at the site would be limited to that necessary for equipment washdown, dust control, and sanitary facilities for workers. The Proposed Action would take place in the floodplain. Since the goal of this soil disturbance is to clean up existing contamination, the action would overall have a beneficial effect on the floodplain. The disturbance of soils due to the Proposed Action is discussed in Section 4.1.9. The action would benefit the floodplain. Removal of the Omega West Facility would restore floodplain values by removing obstructions to the conveyance capability of the floodplain. It would remove a source of potential contamination to the downstream floodplain.

4.1.9 Geology, Soil and Seismicity

The potential effect on soils at the Omega West Facility would result from removal of up to 4 ft (~1 m) of soil (depending on whether contamination is present) from beneath the reactor vessel and the removal of foundations and concrete flooring from the Omega West Facility and associated structures. These activities would result in the generation of approximately 25,920 ft^3 (734 m^3) of radioactively contaminated soil, which would be removed from the site for disposal. Because any negative features (depressions) resulting from the Proposed Action would be graded even with the surrounding land surface, it is unlikely that the Proposed Action would result in soil erosion. Use of best management practices would prevent the movement of soils downstream during the D&D activities. If soil contamination is present at the site at greater than 4 foot depths, soil removal could be much greater. Fill dirt may be required to be trucked to the site and placed at locations were excess soil removal was required in order to be able to establish a natural contour and blend the site into the surrounding areas.

4.1.10 Visual Resources

Removal of the Omega West Facility and associated structures under the Proposed Action would return the scenery in the project area to a state similar to its preconstruction configuration. However, the facility is located within a restricted area in a position that is not easily visible from a distance. Therefore, it is anticipated that effects on visual resources, while essentially positive in nature, would not likely be noticeable by large numbers of offsite viewers.

4.2 PHASED REMOVAL ALTERNATIVE

Under the Phased Removal Alternative, part of the Omega West Facility would be demolished in the near-term and part would be left undemolished until some point in the future before 2025 (See Section 2.3). Under this alternative, Room 101 of Building 2-1 which contains the OWR, the parking lot, the driveway between the access road and the parking lot, and the rock catching fence would not be demolished in the near-term. The rest of the Omega West Facility, including the foundation of the rest of Building 2-1, the exhaust line to TA-61, the exhaust stack in TA-61, and other associated structures would be demolished as discussed under the Proposed Action.

Under this alternative, the remaining portion of the Omega West Facility would continue to be prone to flooding. A flood could compromise the integrity of the remaining part of the facility and spread contaminants. However, it should be noted that Room 101 is the part of Building 2-1 with the most structural integrity, and that the majority of the remaining contaminants would be contained within the reactor vessel. Due to its design, it appears unlikely that the reactor vessel itself would be compromised by flood events.

The overall environmental effects resulting from the total of the immediate actions and those to be conducted over the long-term under the Phased Removal Alternative would be similar to those resulting from the Proposed Action. The major difference between the effects of the two alternatives results from the undetermined amount of time between phases and the continuation of the risks associated with the potential for flooding in Los Alamos Canyon. Since Room 101 and the OWR would remain undemolished for a period of time under the Phased removal Alternative, ongoing maintenance, security, and animal control activities would result in worker exposure to radiation and safety risks that would not occur under the Proposed Action.

4.2.1 Human Health

As with the Proposed Action, the only radiological effect on non-project workers at the LANL site or members of the public would be from radiological air emissions from the D&D activities at the Omega Facility (see Section 4.2.2, Air Quality). The radiological effects from air emissions from the immediate activities would be slightly less than those discussed for the Proposed Action because the reactor vessel and its surrounding structure would not be removed. Therefore, there would be much less emission of radiologically contaminated particulates in the immediate phase of the project.

As with the Proposed Action, the potential average radiation exposure levels are estimated to range between background and 10 mrem per hour. Worker personnel exposures from direct radiation are expected to average less than 1 rem per worker. The estimated total collective worker dose for all workers would be approximately 1.4 person-rem. Based on an occupational risk factor of 0.0004 fatal latent cancers per person-rem (ICRP 1991), workers engaged in the Proposed Action would incur a 0.000055 collective risk for a fatal latent cancer during the initial phase of the Phased Removal Alternative. The remainder of the 0.00022 would be associated with the eventual completion of the reactor vessel removal activities. Worker exposure to radiation during the D&D activities would be controlled under established procedures that require doses be kept ALARA and that limit any individual's dose to less than 1 rem per year. Some exposure to workers would occur during security, maintenance, and animal control activities. The amount of time these workers would spend in the remaining structure would be limited. The effect on the individual workers' health would be negligible. Overall, under this alternative a greater number of workers would be expected to receive small levels of exposure due to implementing the Phased Removal Alternative as compared to the Proposed Action.

The primary source of potential effects to members of the public would be associated with the release of radiological contaminants during the demolition process. Federal regulations, (40 CFR Part 61, §61.92), limit the dose to any member of the public to 10 mrem per year. This limit ensures that the releases are below levels that could result in adverse effects to public health. Since the releases would be below these levels, no effects to public health are anticipated.

The majority of radiological contaminants at the Omega West Facility are likely contained within the reactor vessel. Radiological emissions and the potential for worker exposures during the first phase of the project would therefore be less than those associated with the ultimate demolition of the reactor vessel and Room 101 of Building 2-1.

4.2.2 Air Quality

Effects to air quality would be similar to those anticipated for the Proposed Action, but would be spread out over a greater duration. Equipment exhaust resulting from demolition of the reactor vessel would occur at a different time from that associated with demolition of support structures, resulting in a lower annual emissions of carbon monoxide. Dust suppression techniques would be employed during D&D activities.

4.2.3 Waste Management

As with the Proposed Action, the Phased Removal Alternative would result in the generation of a variety of waste types. The categories of waste would be handled, stored, and disposed of in the same manner as discussed for the Proposed Action. However, the waste volumes resulting from implementing the immediate timeframe would be substantially lower than those estimated for the Proposed Action. Therefore, the amounts of waste would be well within the handling, storage, and disposal capacities of the waste management facilities, including Area G's current footprint disposal area. By the time Room 101 of Building 2-1 and the OWR would be demolished, it is likely that the expansion of Area G would have already occurred.

Long-term effects to LANL waste management facilities would be similar to those that would occur under the Proposed Action; however, consequences would be spread out over a longer period. The removal of the remaining portion of the Omega West Facility would occur at some point in the future before 2025, and therefore, the total amount of waste generated would be essentially the same as that discussed in Section 4.1.3. The only difference is that the activity of some of the radioactive waste could be slightly lower in radioactive energy in the future as a result of radioactive decay.

Waste Generation During D&D. The waste types and volumes expected to be generated under the Proposed Action's two disposal options are summarized and compared in Table 2-3 of Section 2.2.4. The wastes are discussed below according to category. The various recyclable wastes would be reused and recycled to the extent practicable and allowed under DOE policy.

Only 10 percent of the LLW discussed for the Proposed Action would be generated in the immediate timeframe under the Phased Removal Alternative. This is due to the majority of LLW being associated with the OWR and Room 101.

Option 1. Under this option, NNSA would pursue offsite disposal for the LLW (optional disposition) resulting from D&D of the Omega West Facility including concrete, soil, steel, and PPE. Both the Nevada Test Site facilities for waste disposal and the existing commercial facility at Clive, Utah, have the capacity to accept the amount of these types of waste. Under this option, there would be little reduction of LANL's remaining LLW disposal capacity at Area G, TA-54.

Option 2. Under this option for waste disposal, the LLW (optional disposition) would be disposed of onsite at Area G, TA-54, at LANL. The current disposal site footprint has sufficient waste capacity for the amount of waste expected in the immediate timeframe. By the time Room 101 of Building 2-1 and the OWR would be demolished, it is likely that the expansion of Area G would have already occurred. There would be little reduction of LANL's remaining LLW disposal capacity at Area G, TA-54, and no impact to other LLW generating activities at LANL.

All other wastes expected to be generated by the Omega West Facility D&D activities would be handled, managed, packaged, and disposed of in the same manner as the same wastes generated by other activities at LANL (see Section 2.2.4). The effects of the total amount of waste expected over the immediate and long-term timeframes would be the same as for the Proposed Action. The waste categories and quantities generated by removal of the structures would be within the capacity of existing waste management systems, and would not result in substantial impact to existing waste management disposal operations. The effects of the amount of waste expected from the immediate timeframe would be less than the total, and would also be within the capacity of existing waste management systems, and would not result in substantial impact to existing waste management disposal operations.

4.2.4 Transportation

The Phased Removal Alternative would produce decontamination wastes that would need to be transported to storage or disposal sites. No excess fatal cancers are likely to result from implementing the Phased Removal Alternative; however, the probability is highest for workers under the offsite disposition option, because of the duration of the proximity to the waste during transportation of each shipment. Implementing the Phased Removal Alternative would result in almost the same effects as the Proposed Action with regards to transportation effects.

4.2.5 Noise

Noise levels during demolition activities would be consistent with those typical of construction activities. Non-involved workers at the edges of the mesas above the Omega West Facility would be able to hear the activities below; however, the level of noise would not be distracting. Construction noise at LANL is common. Some wildlife species may avoid the immediate vicinity of the Omega West Facility as demolition proceeds due to noise; however, any effects on wildlife resulting from noise associated with demolition activities are expected to be temporary. Wildlife effects due to potential noise at the site are discussed in the following section.

4.2.6 Biological Resources

Under the Phased Removal Alternative, the demolition activities would be conducted in two separate phases. During the initial phase of the project, substantially less waste would be generated (approximately 10 percent of the volume expected under the Proposed Action). This would reduce the number of heavy trucks moving in and out of the canyon and the associated site disturbance during the first phase from the total number of truck trips expected over the same timeframe as described in the Proposed Action. The level of disturbance for the second phase of activities would be greater than that generated during the first phase; however, it is not anticipated that activities conducted under either phase would result in adverse affects to potential Mexican spotted owl habitat in the vicinity of TA-2. Although the disturbance would be generally lower than that projected for implementation of the Proposed Action, the measures for protection of sensitive biological resources recommended in the HMP would still apply. All D&D activities associated with the Phased Removal Alternative would take place within TA-2, at an area that has been dedicated to industrial use since the early 1940s. The entire Omega West Facility is enclosed within an 8-ft (2.4-m) high security fence and provides very little wildlife habitat. Disturbance of the potential Mexican spotted owl and effects to the habitat would be extended over a longer period; it would take much longer for the habitat to be returned to a non-industrial state if the Phased Removal Alternative were implemented. This extension in timeframe may result in greater stress on the species.

4.2.7 Cultural Resources

As with the Proposed Action, the Phased Removal Alternative would involve removal of the Omega West Facility. As discussed in Section 4.1.7, removal of the facility and associated structures would have little effect on the historical information available regarding the Omega West Facility.

4.2.8 Water Resources

Little or no effect on water resources is anticipated. The Phased Removal Alternative would not result in the disturbance of watercourses or generation of liquid effluents that would be released to the surrounding environment. Silt fences, hay bales, or other appropriate methods would be employed to ensure that fine particulates are not transported by stormwater into surface water features in the vicinity of the Omega West Facility. Because of the extended timeframe under this alternative, more maintenance of BMP would be required by NNSA. Water use at the site would be limited to that necessary for equipment washdown, dust control, and sanitary facilities for workers.

4.2.9 Geology, Soil and Seismicity

Under the Phased Removal Alternative, Building 2-1 would not be demolished immediately. Only the outlying structures would be removed. Therefore, the amount of soils that would be disturbed would be minor in the immediate phase of the project. Because any negative features (depressions) resulting from the Phased Removal Alternative would be graded even with the surrounding land surface, it is unlikely that the Phased Removal Alternative would result in effects due to erosion. The long-term actions associated with contaminated soil removal after the eventual demolition of Building 2-1 are discussed under the Proposed Action.

4.2.10 Visual Resources

Removal of part of the Omega West Facility and associated structures under the Phased Removal Alternative would return little of the scenery in the project area to a state similar to its pre-construction configuration during the first phase. The Omega West Facility is located within a restricted area in a position that is not easily visible from a distance by a large number of offsite viewers. Therefore, it is anticipated that effects on visual resources, while essentially positive in nature, would not likely be noticeable for a long period of time, possibly until after 2025.

4.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, no D&D of the Omega West Facility would occur within the next 10 to 15 years. Eventually, before 2025, the Omega West Facility would be considered for D&D activities as LANL's ER Project is completed. During the interim period, the risk of damage and spread of contamination being flash flood would remain. The site conditions would remain as essentially as described in Chapter 3, Affected Environment. Ongoing erosion control and surveillance activities would continue. The Omega West Facility buildings and structures would continue to deteriorate making any eventual D&D actions more difficult and hazardous to workers. The D&D actions under these circumstances would likely include less successful decontamination and waste minimization efforts due to this deterioration. If a severe flood occurs, the risk of Omega West Facility components becoming debris may be realized, as well as the risk of contaminant spread downstream.

Until the ER Project took action, no characterization or D&D activities would be conducted, and there would be no effect on socioeconomic conditions resulting from associated activities. There would be no noise associated with demolition activities and no transportation of wastes, personnel, and equipment. The wastes discussed in Section 4.1.3 and 4.2.3 would not be generated, packaged, transported, or disposed until later, up until 2025. Effects to human health, air quality, biological resources, cultural resources, and visual resources in the vicinity would remain unchanged.

Surveillance and maintenance of the area would continue, with minimal use of vehicles to transport security and maintenance personnel in and out of TA-2. Because the structures would remain vulnerable to future flooding events, there would be a greater likelihood of damage and resulting contaminant transport should the facility and associated structures be compromised. This could represent an increased likelihood of effects to surface water and soils, and possible effects to human health.

4.4 ACCIDENT ANALYSIS

Accidents could occur in all phases of the Proposed Action including onsite and offsite transportation, characterization, disassembly, and packaging for disposal. Potential causes of accidents could include vehicles, contact with objects and equipment, and falls. Based on an estimate of 11,450 person hours of effort required to implement the Proposed Action and an occurrence rate for fatalities of about 0.00000006 fatalities per hour for construction-related activity (BLS 2001a), no fatal accidents would be expected to occur during the Proposed Action. Based on a rate of nonfatal occupational injuries and illnesses of about 0.00002 cases per hour for construction workers (BLS 2001b), no nonfatal occupational injuries and illnesses are anticipated.

The numbers of fatalities and injuries estimated for the Proposed Action (less than one) are based on average construction industry rates. Accident rates for the Proposed Action would be expected to be lower because of the safety programs that would be in place for D&D workers at LANL.

Two recently completed D&D projects at Argonne National Laboratory, the Experimental Boiling Water Reactor and the Janus Reactor, involved 80,000 person hours of work. No lost-time accidents and only three minor injuries (non-fatal) occurred during the performance of these projects (ANL 1998).

Transportation Accidents

Transport of decontamination and demolition wastes is subject to transportation accidents. For purposes of analysis, these accidents are classified as vehicle-related (traffic accidents without release of radioactive material) and cargo-related (radiological accidents in which radioactive material is released). This section addresses both types of accidents for the Proposed Action and the Phased Removal Alternative. The methodology is presented in Appendix D.

Vehicle-Related Accidents

Table 4-2 presents the impacts from vehicle-related transportation accidents for both the Proposed Action and the Phased Removal Alternative. The results are provided as number of accidents and number of fatalities for both the onsite and the offsite disposition scenarios. The results indicate that no traffic fatalities would be expected under either the Proposed Action or its alternative, but that the offsite disposition scenario produces a 70-times greater probability of a traffic accident fatality than for the on site disposition scenario.

Table 4-2. Vehicle-Related Transportation Impacts.

	Number of Accidents		Number of Fatalities	
	Proposed Action	Phased Removal Alternative	Proposed Action	Phased Removal Alternative
Onsite Disposition	0.0025	0.00019	0.00026	0.000020
Offsite Disposition	0.42	0.032	0.019	0.0014

Cargo-Related Accidents

Table 4-3 presents the impacts from cargo-related transportation accidents. The only shipment for which the radioactivity content has been characterized is the demineralizer resin in its vessel. These values apply to both the Proposed Action and the Phased Removal Alternative. The impacts are presented as collective dose risk [in person-rem and latent cancer fatality risk (LCFs)] and dose to the maximally exposed individual (MEI). The results of DOE's analysis indicate that no excess fatal cancers are likely to happen from the Proposed Action or its alternative.

Table 4-3. Cargo-Related Transportation Impacts.

	Collective Dose Risk		MEI
Shipment	Person-rem	LCFs	Rem
Demineralizer Resin	3.8×10^{-15}	1.9×10^{-18}	1.6×10^{-5}

5.0 CUMULATIVE EFFECTS

Cumulative effects on the environment result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes them. These effects can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7). This section considers the cumulative effects resulting from the implementation of the Proposed Action and reasonably foreseeable future actions in the TA-2 area and Los Alamos Canyon.

LANL Operations at TA-2 and Los Alamos Canyon. Land use within TA-2 would remain the same. No new types of operations and no new personnel would be introduced into LANL as a result of the Proposed Action. The canyon would remain restricted to the public. It is currently planned that TA-41, west of Omega West Facility in the canyon, would also undergo D&D. However, this action has yet to be scheduled. The land use for the TA-41 area would also remain unchanged and restricted to the public. Future foreseeable actions in Los Alamos Canyon consist of ongoing erosion control activities. The paved road in Los Alamos Canyon would be maintained for use in inspecting and servicing the wells to the east of TA-2.

The overall visual quality within Los Alamos Canyon would change with the D&D of the Omega West Facility and TA-41. The area in Los Alamos Canyon and on both rims is currently restricted to the public; there are currently no public viewpoints of Omega West Facility or TA-41. The land on the north rim would be transferred to Los Alamos County and the public would have viewpoints of Los Alamos Canyon in the TA-2 and TA-41 areas. Under the Proposed Action, the D&D of Omega West Facility would be completed before the transfer of land so the public view of the canyon bottom would increase after the removal of Omega West Facility. Therefore, the view for this vantage point would not be effected. It is uncertain whether the D&D of TA-41 would take place before or after the transfer of the canyon rim. If the D&D of TA-41 occurs after the transfer of land, TA-41 would be visible to the public and the D&D activities would be visible as well. After the D&D of TA-41, the only man-made structure in the viewshed of the canyon would be the road.

Implementing the Proposed Action would generate noise primarily during the daytime hours during D&D activities. This noise generation would be mostly confined to the immediate area of generation and would mostly be heard by the involved workers. Due to the general manner in which sound attenuates across mesas and canyons, residents should not be disturbed by the sound originating from these projects. Some species may avoid the immediate vicinity of the Omega West Facility as noise proceeds due to demolition; however, any effects on wildlife resulting from noise associated with demolition activities is expected to be temporary, and should not adversely affect wildlife longterm in the project area.

No suitable Mexican spotted owl habitat would be removed or lost as a result of implementing the Proposed Action, but noise levels from the Proposed Action would temporarily exceed the limits (6 decibel units above background) imposed by the Threatened and Endangered Species Habitat Management Plan (LANL 1998b). However, noise generated from construction activities should attenuate to below Habitat Management Plan limits within 0.25 mi (0.4 km) of the construction site (BA 2001). No Mexican spotted owls have been observed in Los Alamos

Canyon in 7 years (1994 to 2001) of monitoring. However, the D&D of the Omega West Facility may affect and is likely to adversely affect the Mexican spotted owl's potential habitat use in the area of TA-2 for a short temporary period of time. Overall effect would be positive with the removal of the Omega West Facility and restoring of the site, subsequent revegetation, and decrease in human activity would benefit the habitat.

The Proposed Action would generate very small amounts of dust from size reduction of activated lead, metal and concrete. The dust would include lead, asbestos, and a small amount of the radionuclides ^{137}Cesium, ^{60}Cobalt. Due to the long distance between the Omega West Facility site and the nearest non-involved worker locations, the only radiological effect on nonproject workers at the LANL site or members of the public would be from radiological air emissions. The location of the Omega West Facility in the Los Alamos Canyon bottom reduces the concentration of airborne particulates at the site boundary. Effects of the Proposed Action with regards to air quality would be negligible compared with potential annual air contaminant emissions from the LANL site as a whole. No discernible effects on air quality would be expected to result from the Proposed Action, and no negative effects on human health are anticipated. Worker exposures from direct radiation are expected to average less than 1 rem per worker and the estimated collective worker dose would be approximately 5.5 person-rem.

Nearby Areas Within LANL and Offsite Areas Administered by Others. Other activities that would likely occur at or nearby to LANL over the next 10 years include the conveyance of most of the northern rim of Los Alamos Canyon to Los Alamos County and the subsequent demolition of the existing DOE Los Alamos Area Office Building at TA-43. The ultimate visual character of the conveyed land would depend on any new construction. The northern rim is already developed and has existing structures. New structures could be built with more aesthetic aspects than the current buildings. The visual impact of the new buildings is anticipated to be the same or slightly improved. The newly constructed buildings are expected to result in only a very slight increase in nighttime lighting of the area. The addition of more people along the canyon rim would be expected to increase motion and noise stresses to wildlife in the area and would decrease the likelihood that sensitive species would use potential habitat in the canyon reach.

LANL, the Forest Service, Bandelier National Monument and Los Alamos County will all be conducting wildfire hazard reduction activities that would include forest thinning activities over the Pajarito Plateau (including within LANL) and possibly some prescription burns outside the areas of immediate LANL and urban interfaces within the forested areas nearby. The resulting forest areas in and around LANL would be more open in appearance than currently and the hazard from wildfires is expected to be reduced. Although wildfires would still occur, they would be much easier to control and manage as lower and mid-level fires rather than as crown fires of the type exemplified by the Cerro Grande Fire.

Within LANL, forests would be managed according to the Wildfire Hazard Reduction and Forest Health Improvement Program, with specific project plans, such as the Wildfire Hazard Reduction Project Plan (LANL, LA-UR-01-2017). Use of the forest areas west and south of LANL and Los Alamos County for recreation, habitat management purposes, and timber production (only within the Santa Fe National Forest) should remain unchanged.

Waste volume generation during the next 10 years from D&D and decommissioning of buildings and through ER efforts would be large. The wastes would likely be a variety of types, including nonhazardous waste, hazardous wastes, mixed wastes, and radioactive wastes (both LLW and TRU wastes).

Proposed actions elsewhere within LANL include the decontamination and decommissioning of TA-18 facilities within Pajarito Canyon, and their possible demolition (in whole or in part), and some small-scale building and structure construction and demolition activities within the TA-8 and TA-16 areas. Additional construction and demolition actions may be proposed at TA-3, TA-55 and other technical areas at LANL to replace aging structures and facilities; these are currently being contemplated in very general terms. These contemplated actions could include some additional construction and demolition work as infrastructure, structures and buildings approach 50 years of continuous use and may include demolition and replacement of the Chemical and Metallurgy Research Building.

The Los Alamos County Landfill is expected to be closed within the next 3 years, although this is not due to having been filled to capacity. LANL, along with the county, would have to contract for waste disposal with another solid waste disposal facility offsite or develop a new facility.

Low-level radioactive waste can be disposed of at Area G at LANL. The current disposal site footprint has limited waste capacity. However, plans to expand Area G are under development that would ensure adequate room to accommodate waste generation estimates beyond the next 10 years as identified in the 1999 LANL SWEIS and Record of Decision. TRU waste generated at LANL from ER activities would be managed and stored at LANL but no disposal path is currently available for this non-defense generated waste type. Mixed wastes (both LLMW and TRU-mixed wastes) are managed and stored at LANL; however, there is currently no disposal of this waste type available and the majority is sent offsite to DOE commercial facilities. Hazardous wastes generated at LANL are managed and stored onsite and shipped offsite for treatment and disposal as adequate and appropriate facilities become available. Detailed projections of wastes by types are provided in the 1997 Final Waste Management Programmatic EIS for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste and DOE's subsequent Record of Decision based on that analysis. Additionally, the waste generated at LANL over the next 10 years would be managed in accordance with the analysis provided in the 1999 LANL SWEIS and the DOE's Record of Decision.

The implementation of the Proposed Action considered in this EA, together with other site waste generations, would be in accordance with DOE's Record of Decision and is not expected to result in any waste generation projection exceedences. Cleanup from the Cerro Grande Fire has mostly been accomplished; waste generation within the County of Los Alamos peaked in mid to late 2000 and early 2001. Waste generation is now within its historical range and no anticipated actions are expected that would result in greater than normal waste generation levels over the next 10 years.

Data and analysis of LANL surface and groundwater quality samples taken from test wells indicate that LANL operations and activities have influenced the surface water within LANL boundaries and some of the alluvial and intermediate perched zones within the LANL region. Detail on surface and groundwater quality can be found in the annual LANL Environmental Surveillance and Compliance Report (LANL 2000b). No LANL activities or projects are foreseen over the next 10 years that would cause increased deterioration of surface and groundwater quality in the region. Efforts underway to control erosion downstream from LANL and within the LANL boundaries resulting from the Cerro Grande Fire and its recovery efforts are expected to address potential problems resulting from storm events until up-gradient vegetation has been reestablished.

Cultural resources, especially prehistoric archaeological sites are very prevalent in the Pajarito Plateau area. DOE and UC have developed an Integrated Cultural and Natural Resource Management Plan which includes a detailed assessment of the cultural resources on DOE lands. The Proposed Action would document historic aspect of the Omega West Facility prior to the D&D, but it is not expected to affect any other cultural resources. Implementation is not anticipated to result in any changes to the management of these resources.

6.0 AGENCIES AND PERSONS CONSULTED

U.S. Department of the Interior
U.S. Fish and Wildlife Service
New Mexico Ecological Services Field Office

Initiation of consultation with the U.S. Fish and Wildlife Service, October 19, 2001 (see Appendix A).

Acknowledgement of consultation with the Fish And Wildlife Service, February 5, 2002 (see Appendix A).

U.S. Fish and Wildlife response to consultation, March 15, 2002 (see appendix A).

New Mexico State Historic Preservation Officer

A report the historical aspect of the Omega West Facility was sent to the State Historic Preservation Officer (SHPO) September 20, 2000. The SHPO's offices concurred in the report's eligibility determination for the Omega West Facility on October 13, 2000. On June 12, 2001 (See Appendix B), a Memorandum of Agreement was transmitted to the SHPO that presents the resolution of the adverse effects to the Omega West Facility by the Proposed Action.

7.0 REFERENCES

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10 CFR 61 — "Licensing Requirements for Land Disposal of Radioactive Waste," Title 10, Energy; Chapter I, Nuclear Regulatory Commission; *Code of Federal Regulations*; National Archives and Records Administration, Washington, DC.

16 USC 470 — *National Historic Preservation Act*; "Congressional Finding and Declaration of Policy;" Title 16, Conservation; Chapter 1A, Historic Sites, Buildings, Objects, and Antiquities; Subchapter II, National Historic Preservation; *United States Code*, (USC) Washington, DC; October 15, 1966, as amended.

25 USC 3001-3013 — *Native American Graves Protection and Repatriation Act*; "Definitions;" Title 25, Indians; Chapter 22, Native American Graves Protection and Repatriation; USC, Washington, DC; November 16, 1990, as amended.

36 CFR 60 — "National Register of Historic Places;" Title 36, Parks, Forests, and Public Property; Chapter I, National Park Service, U.S. Department of Interior; *Code of Federal Regulations*; National Archives and Records Administration, Government Printing Office, Washington, DC; revised as of July 1, 1999.

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8.0 GLOSSARY OF TERMS AND ACRONYMS

Absorbed dose For ionizing radiation, the energy imparted to matter by ionizing radiation per unit mass of the irradiated material (e.g., biological tissue). The units of absorbed dose are the rad and the gray. (See rad.)

Accident An unplanned event or sequence of events that results in undesirable consequences.

Actinide Any member of the group of elements with atomic numbers from 89 (actinium) to 103 (lawrencium) including uranium and plutonium. All members of this group are radioactive.

Acute exposure A single, short-term exposure to radiation, a toxic substance, or other stressors that may result in biological harm. Pertaining to radiation, the exposure incurred during and shortly after a radiological release. Acute exposure involves the absorption or intake of a relatively large amount of radiation or radioactive material.

Air pollutant Generally, an airborne substance that could, in high enough concentrations, harm living things or cause damage to materials. From a regulatory perspective, an air pollutant is a substance for which emissions or atmospheric concentrations are regulated or for which maximum guideline levels have been established due to potential harmful effects on human health and welfare.

Air quality The cleanliness of the air as measured by the levels of pollutants relative to standards or guideline levels established to protect human health and welfare. Air quality is often expressed in terms of the pollutant for which concentrations are the highest percentage of a standard (e.g., air quality may be unacceptable if the level of one pollutant is 150 percent of its standard, even if levels of other pollutants are well below their respective standards).

Alpha particle A positively charged particle ejected spontaneously from the nuclei of some radioactive elements. It is identical to a helium nucleus and has a mass number of 4 and an electrostatic charge of +2. It has low penetrating power and a short range (a few centimeters in air).

Alpha radiation A strongly ionizing, but weakly penetrating, form of radiation consisting of positively charged alpha particles emitted spontaneously from the nuclei of certain elements during radioactive decay. Alpha radiation is the least penetrating of the four common types of ionizing radiation (alpha, beta, gamma, and neutron). Even the most energetic alpha particle generally fails to penetrate the dead layers of cells covering the skin and can be easily stopped by a sheet of paper. Alpha radiation is most hazardous when an alpha-emitting source resides inside an organism.

Applicable or relevant and appropriate requirements (ARARs) Requirements that must be met when taking an action under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA). They include cleanup standards, standards of control, and other substantive environmental protection requirements and criteria established under Federal and state law and regulations. (See CERCLA.)

Aquifer A body of rock or sediment that is capable of transmitting groundwater and yielding usable quantities of water to wells or springs.

As low as reasonably achievable (ALARA) An approach to radiation protection to manage and control worker and public exposures (both individual and collective) and releases of radioactive material to the environment to as far below applicable limits as social, technical, economic, practical, and public policy considerations permit. ALARA is not a dose limit but a process for minimizing doses to as far below limits as is practicable.

Attainment area An area that the Environmental Protection Agency has designated as being in compliance with one or more of the National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. An area may be in attainment for some pollutants but not for others. (See nonattainment area)

Background radiation Radiation from (1) cosmic sources, (2) naturally occurring radioactive materials, including radon (except as a decay product of source or special nuclear material), and (3) global fallout as it exists in the environment (e.g., from the testing of nuclear explosive devices).

Baseline The existing environmental conditions against which impacts of the proposed action and its alternatives can be compared.

Best available control technology (BACT) Available devices, systems, or techniques for achieving the maximum reduction of air-pollutant emissions while considering energy, environmental, and economic impacts. BACT is determined on a case-by-case basis for new sources or major modifications to existing sources in areas that are in attainment of NAAQS. BACT does not permit emissions in excess of those allowed under any *Clean Air Act* provisions.

Best management practices (BMP) Structural, nonstructural, and managerial techniques, other than effluent limitations, to prevent or reduce pollution of surface water. They are the most effective and practical means to control pollutants that are compatible with the productive use of the resource to which they are applied. BMPs are used in both urban and agricultural areas. BMPs can include schedules of activities; prohibitions of practices; maintenance procedures; treatment requirements; operating procedures; and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Beta radiation Ionizing radiation consisting of fast moving, positively or negatively charged elementary particles emitted from atomic nuclei during radioactive decay. Beta radiation is more penetrating, but less ionizing than alpha radiation. Negatively charged beta particles are identical to electrons; positively charged beta particles are known as positrons. Both are stopped by clothing or a thin sheet of metal.

Bound To use simplifying assumptions and analytical methods in an analysis of impacts or risks such that the result overestimates or describes an upper limit on (i.e., “bounds”) potential impacts or risks. A *bounding analysis* is an analysis designed to overestimate or determine an upper limit to potential impacts or risks.

By-product material Any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material, and the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

Candidate species Plants and animals native to the United States for which the U.S. Fish and Wildlife Service or the National Marine Fisheries Service has sufficient information on biological vulnerability and threats to justify proposing to add them to the threatened and endangered species list, but cannot do so immediately because other species have a higher priority for listing. The Services determine the relative listing priority of candidate taxa in accordance with general listing priority guidelines published in the *Federal Register*. (See endangered species and threatened species.)

Canister A general term for a container, usually cylindrical, used in handling, storage, transportation, or disposal of waste.

Cask A heavily shielded container used to store or ship radioactive materials.

Characteristic waste Solid waste that is classified as hazardous waste because it exhibits any of the following properties or "characteristics": ignitability, corrosivity, reactivity, or toxicity, as described in 40 CFR 261.20 through 40 CFR 261.24. (See hazardous waste, solid waste, and waste characterization.)

Cladding The outer metal jacket of a nuclear fuel element or target. It prevents fuel corrosion and retains fission products during reactor operation and subsequent storage, as well as providing structural support. Zirconium alloys, stainless steel, and aluminum are common cladding materials. In general, a metal coating bonded onto another metal.

Closure Refers to the deactivation and stabilization of a waste treatment, storage, or disposal unit (such as a waste treatment tank, waste storage building, or landfill) or hazardous materials storage unit (such as an underground storage tank). For storage units, closure typically includes removal of all residues, contaminated system components, and contaminated soil. For disposal units (i.e., where waste is left in place), closure typically includes site stabilization and emplacement of caps or other barriers. Specific requirements for the closure process are found in the regulations applicable to many types of waste management units and hazardous material storage facilities.

Collective dose The sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation. Collective dose is expressed in units of person-rem or person-sievert.

Committed dose equivalent The dose equivalent to organs or tissues that will be received by an individual during the 50-year period following the intake of radioactive material. It does not include contributions from radiation sources external to the body. Committed dose equivalent is expressed in units of rems or sieverts.

Committed effective dose equivalent The dose value obtained by (1) multiplying the committed dose equivalents for the organs or tissues that are irradiated and the weighting factors applicable to those organs or tissues and (2) summing all the resulting products. Committed effective dose equivalent is expressed in units of rem or sievert.

Committed equivalent dose The committed dose in a particular organ or tissue accumulated in a specified period (e.g., 50 years for workers and 70 years for members of the public) after intake of a radionuclide.

***Comprehensive Environmental Response, Compensation, and Liability Act* of 1980 (CERCLA)** A Federal law (also known as Superfund), enacted in 1980 and reauthorized in 1986, that provides the legal authority for emergency response and cleanup of hazardous substances released into the environment and for the cleanup of inactive waste sites.

Contact-handled waste Radioactive waste or waste packages whose external dose rate is low enough to permit contact handling by humans during normal waste management activities.

"Contact-handled transuranic waste" means transuranic waste with a surface dose rate not greater than 200 millirem per hour.

Criteria pollutant An air pollutant that is regulated by National Ambient Air Quality Standards (NAAQS). The U.S. Environmental Protection Agency must describe the characteristics and potential health and welfare effects that form the basis for setting, or revising, the standard for each regulated pollutant. Criteria pollutants include sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and two size classes of particulate matter, less than 10 micrometers (0.0004 inch) in diameter, and less than 2.5 micrometers (0.0001 inch) in diameter. New pollutants may be added to, or removed from, the list of criteria pollutants as more information becomes available.

Critical habitat Habitat essential to the conservation of an endangered or threatened species that has been designated as critical by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures outlined in the Endangered Species Act and its implementing regulations (50 CFR 424). (See endangered species and threatened species.) The lists of Critical Habitats can be found in 50 CFR 17.95 (fish and wildlife), 50 CFR 17.96 (plants), and 50 CFR 226 (marine species).

Criticality The condition in which a system is capable of sustaining a nuclear chain reaction.

Chain reaction: A reaction that initiates its own repetition. In nuclear fission, a chain reaction occurs when a neutron induces a nucleus to fission and the fissioning nucleus releases one or more neutrons which induce other nuclei to fission.

Critical Mass: The smallest mass of fissionable material that will support a self-sustaining nuclear chain reaction.

Cumulative impacts Impacts on the environment that result when the incremental impact of a proposed action is added to the impacts from other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Curie (Ci) A unit of measure of radioactivity equal to 37,000,000,000 decays per second. A curie is also a quantity of any radionuclide or mixture of readionuclides having one curie of radioactivity.

Decay, radioactive The decrease in the amount of any radioactive material with the passage of time, due to spontaneous nuclear disintegration (i.e., emission from atomic nuclei of charged particles, photons, or both).

Decibel A unit for expressing the relative intensity of sounds on a logarithmic scale from zero for the average least perceptible sound to about 130 for the average level at which sound causes pain to humans. For traffic and industrial noise measurements, the A-weighted decibel (dBA), a frequency-weighted noise unit, is widely used. The A-weighted decibel scale corresponds approximately to the frequency response of the human ear and thus correlates well with loudness.

Dose (chemical) The amount of a substance administered to, taken up by, or assimilated by an organism. It is often expressed in terms of the amount of substance per unit mass of the organism, tissue, or organ of concern.

Dose (radiological) A generic term meaning absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or committed equivalent dose, as defined elsewhere in this glossary.

Dose equivalent A measure of radiological dose that correlates with biological effect on a common scale for all types of ionizing radiation. Defined as a quantity equal to the absorbed dose in tissue multiplied by a quality factor (the biological effectiveness of a given type of radiation) and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and sievert (Sv).

Ecology A branch of science dealing with the interrelationships of living organisms with one another and with their nonliving environment.

Ecosystem A community of organisms and their physical environment interacting as an ecological unit.

Effective dose equivalent The dose value obtained by multiplying the dose equivalents received by specified tissues or organs of the body by the appropriate weighting factors applicable to the tissues or organs irradiated, and then summing all of the resulting products. It includes the dose from radiation sources internal and external to the body. The effective dose equivalent is expressed in units of rems or sieverts.

Effluent A waste stream flowing into the atmosphere, surface water, ground water, or soil. Most frequently the term applies to wastes discharged to surface waters.

Electron volt (eV) unit of energy used in atomic and nuclear physics; 1 electron-volt is the energy transferred in moving a unit charge, positive or negative and equal to that of one electron, through a potential difference of 1 volt.

Endangered species Plants or animals that are in danger of extinction through all or a significant portion of their ranges and that have been listed as endangered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures outlined in the *Endangered Species Act* and its implementing regulations (50 CFR 424). (See threatened species.) The lists of endangered species can be found in 50 CFR 17.11 (wildlife), 50 CFR 17.12 (plants), and 50 CFR 222.23(a) (marine organisms).

Enriched uranium Uranium whose content of the fissile isotope uranium-235 is greater than the 0.7 percent (by weight) found in natural uranium. (See uranium.)

Environmental assessment (EA) A concise public document that a Federal agency prepares under the *National Environmental Policy Act* (NEPA) to provide sufficient evidence and analysis to determine whether a proposed agency action would require preparation of an environmental impact statement (EIS) or a finding of no significant impact. A Federal agency may also prepare an EA to aid its compliance with NEPA when no EIS is necessary or to facilitate preparation of an EIS when one is necessary.

An EA must include brief discussions of the need for the proposal, alternatives, environmental impacts of the proposed action and alternatives, and a list of agencies and persons consulted. (See finding of no significant impact, environmental impact statement, and NEPA.)

Environmental impact statement (EIS) The detailed written statement that is required by section 102(2)(C) of the NEPA for a proposed major Federal action significantly affecting the quality of the human environment. A DOE EIS is prepared in accordance with applicable requirements of the Council on Environmental Quality NEPA regulations in 40 CFR Parts 1500-1508, and the Department of Energy NEPA regulations in 10 CFR Part 1021.

The statement includes, among other information, discussions of the environmental impacts of the proposed action and all reasonable alternatives, adverse environmental effects that can not be avoided should the proposal be implemented, the relationship between short-term uses of the human environment and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources.

Environmental justice The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies.

Executive Order 12898 directs Federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse effects of agency programs, policies, and activities on minority and low-income populations. (See minority population and low-income population.)

Exposure The condition of being subject to the effects of or acquiring a dose of a potential stressor such as a hazardous chemical agent or ionizing radiation; also, the process by which an organism acquires a dose of a chemical such as mercury or a physical agent such as ionizing radiation. Exposure can be quantified as the amount of the agent available at various boundaries of the organism (e.g., skin, lungs, gut) and available for absorption.

In the radiological context "exposure" refers to the state of being irradiated by ionizing radiation or the incidence of radiation on living or inanimate material. More specifically, radiation exposure is a dosimetric quantity for ionizing radiation, based on the ability of radiation to produce ionization in air. It is the time integral of the radiation intensity incident at a given position. Exposure is expressed in units of roentgens (R) or coulombs per kilogram (C/kg).

Finding of no significant impact (FONSI) A public document issued by a Federal agency briefly presenting the reasons why an action for which the agency has prepared an environmental assessment has no potential to have a significant effect on the human environment and, thus, will not require preparation of an environmental impact statement.

Floodplains The lowlands and relatively flat areas adjoining inland and coastal waters and the flood prone areas of offshore islands. Floodplains include, at a minimum, that area with at least a 1.0 percent chance of being inundated by a flood in any given year.

The *base floodplain* is defined as the area which has a 1 percent or greater chance of being flooded in any given year. Such a flood is known as a 100-year flood.

The *critical action floodplain* is defined as the area which has at least a 0.2 percent chance of being flooded in any given year. Such a flood is known as a 500-year flood. Any activity for which even a slight chance of flooding would be too great (e.g., the storage of highly volatile, toxic, or water reactive materials) should not occur in the critical action floodplain.

The *probable maximum flood* is the hypothetical flood that is considered to be the most severe reasonably possible flood, based on the comprehensive hydrometeorological application of maximum precipitation and other hydrological factors favorable for maximum flood runoff (e.g., sequential storms and snowmelts). It is usually several times larger than the maximum recorded flood.

Gabion An engineering structure used in the construction and rerouting of waterways and for flood control. A gabion usually consists of a metal container or wire mesh construction filled with earth and stones.

Groundwater Water below the ground surface in a zone of saturation. Subsurface water is all water that exists in the interstices of soil, rocks, and sediment below the land surface, including soil moisture, capillary fringe water, and groundwater. That part of subsurface water in interstices completely saturated with water is called groundwater.

Hazardous waste A category of waste regulated under the *Resource Conservation and Recovery Act* (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.

Source, special nuclear, or by-product materials as defined by the *Atomic Energy Act* are not hazardous waste because they are not solid waste under RCRA. (See characteristic waste, RCRA, solid waste, and waste characterization.)

HEPA (High Efficiency Particulate Air) filter An air filter capable of removing at least 99.97 percent of particles 0.3 micrometers (about 0.00001 inch) in diameter. These filters include a pleated fibrous medium (typically fiberglass) capable of capturing very small particles.

Highly Enriched Uranium (HEU) Uranium whose content of the fissile isotope uranium-235 has been increased through enrichment to 20 percent or more (by weight). (See natural uranium.). Highly enriched uranium can be used in making nuclear weapons and also as fuel for some isotope-production, research, naval propulsion, and power reactors.

Involved worker Worker who would participate in a proposed action.

Irradiated Exposed to ionizing radiation. The condition of reactor fuel elements and other materials in which atoms bombarded with nuclear particles have undergone nuclear changes.

Isotope Any of two or more variations of an element in which the nuclei have the same number of protons (i.e., the same atomic number) but different numbers of neutrons so that their atomic masses differ. Isotopes of a single element possess almost identical chemical properties, but often different physical properties (e.g., carbon-12 and -13 are stable, carbon-14 is radioactive).

Latent cancer fatalities (LCF) Deaths from cancer resulting from, and occurring some time after, exposure to ionizing radiation or other carcinogens.

Low-income population Low-income populations, defined in terms of Bureau of the Census annual statistical poverty levels (Current Population Reports, Series P-60 on Income and Poverty), may consist of groups or individuals who live in geographic proximity to one another or who are geographically dispersed or transient (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect.

Low-level radioactive waste or Low-level waste (LLW) Radioactive waste that is not high-level waste, transuranic waste, spent nuclear fuel, or by-product tailings from processing of uranium or thorium ore. (See radioactive waste.) Low-level radioactive waste is generated in many physical and chemical forms and levels of contamination.

Millirem (mrem) One-thousandth of a rem (0.001 rem). (See rem.)

Minority population Minority populations exist where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than in the general population or other appropriate unit of geographic analysis (such as a governing body's jurisdiction, a neighborhood, census tract, or other similar unit). "Minority" refers to individuals who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. "Minority populations" include either a single minority group or the total of all minority persons in the affected area. They may consist of groups of individuals living in geographic proximity to one another or a geographically dispersed/transient set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. (See environmental justice and low-income population.)

Mitigation Mitigation includes:
(1) avoiding an impact altogether by not taking a certain action or parts of an action;
(2) minimizing impacts by limiting the degree or magnitude of an action and its implementation;
(3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment;
(4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; or
(5) compensating for an impact by replacing or providing substitute resources or environments.

Mixed waste Waste that contains both hazardous waste, as defined under the RCRA, and source, special nuclear, or by-product material subject to the *Atomic Energy Act*.

***National Environmental Policy Act* of 1969 (NEPA)** NEPA is the basic national charter for protection of the environment. It establishes policy, sets goals (in Section 101), and provides means (in Section 102) for carrying out the policy. Section 102(2) contains "action-forcing" provisions to ensure that Federal agencies follow the letter and spirit of the Act. For major Federal actions significantly affecting the quality of the human environment, Section 102(2)(C) of NEPA requires Federal agencies to prepare a detailed statement that includes the environmental impacts of the proposed action and other specified information.

National Register of Historic Places The official list of the Nation's cultural resources that are worthy of preservation. The National Park Service maintains the list under direction of the Secretary of the Interior. Buildings, structures, objects, sites, and districts are included in the National Register for their importance in American history, architecture, archeology, culture, or engineering. Properties included on the National Register range from large-scale, monumentally proportioned buildings to smaller scale, regionally distinctive buildings. The listed properties are not just of nationwide importance; most are significant primarily at the state or local level. Procedures for listing properties on the National Register are found in 36 CFR 60.

Nonattainment area An area that the U.S. Environmental Protection Agency has designated as not meeting (i.e., not being in attainment of) one or more of the NAAQS for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. An area may be in attainment for some pollutants, but not for others.

Nuclear facility A facility that is subject to requirements intended to control potential nuclear hazards. Defined in DOE directives as any nuclear reactor or any other facility whose operations involve radioactive materials in such form and quantity that a significant nuclear hazard potentially exists to the employees or the general public.

Person-rem A unit of collective radiation dose applied to populations or groups of individuals (see collective dose); that is, a unit for expressing the dose when summed across all persons in a specified population or group. One person-rem equals 0.01 person-sieverts (Sv).

pH A measure of the relative acidity or alkalinity of a solution, expressed on scale from 0 to 14, with the neutral point at 7.0. Acid solutions have pH values lower than 7.0, and basic (i.e., alkaline) solutions have pH values higher than 7.0.

Plume The elongated volume of contaminated water or air originating at a pollutant source such as an outlet pipe or a smokestack. A plume eventually diffuses into a larger volume of less contaminated material as it is transported away from the source.

Plutonium A heavy, radioactive, metallic element with the atomic number 94. It is produced artificially by neutron bombardment of uranium. Plutonium has 15 isotopes with atomic masses ranging from 232 to 246 and half-lives from 20 minutes to 76 million years. Its most important isotope is fissile plutonium-239.

Pollution prevention The use of materials, processes, and practices that reduce or eliminate the generation and release of pollutants, contaminants, hazardous substances, and waste into land, water, and air. For the Department of Energy, this includes recycling activities. (See waste minimization.)

Rad Radiation absorbed dose; the basic unit of absorbed dose equal to the absorbtion of 0.01 joules per kilogram of absorbing material.

Radiation (ionizing) Particles (alpha, beta, neutrons, and other subatomic particles) or photons (i.e., gamma, x-rays) emitted from the nucleus of unstable atoms as a result of radioactive decay. Such radiation is capable of displacing electrons from atoms or molecules in the target material (such as biological tissues), thereby producing ions.

Radioactive waste In general, waste that is managed for its radioactive content. Waste material that contains source, special nuclear, or by-product material is subject to regulation as radioactive waste under the *Atomic Energy Act*. Also, waste material that contains accelerator-produced radioactive material or a high concentration of naturally occurring radioactive material may be considered radioactive waste.

Radioactivity The spontaneous transformation of unstable atomic nuclei, usually accompanied by the emission of ionizing radiation (defined as a process). The property of unstable nuclei in certain atoms to spontaneously emit ionizing radiation during nuclear transformations (defined as a property).

Radioisotope or radionuclide An unstable isotope that undergoes spontaneous transformation, emitting radiation. (See isotope.)

Record of Decision (ROD) A concise public document that records a Federal agency's decision(s) concerning a proposed action for which the agency has prepared an EIS. The ROD is prepared in accordance with the requirements of the Council on Environmental Quality NEPA regulations (40 CFR 1505.2). A ROD identifies the alternatives considered in reaching the decision, the environmentally preferable alternative(s), factors balanced by the agency in making the decision, whether all practicable means to avoid or minimize environmental harm have been adopted, and if not, why they were not.

Rem (Roentgen equivalent man) The unit of dose for biological absorption of radioactivity. It is equal to the product of the absorbed dose in rads and a quality factor and a distribution factor. Although still encountered occasionally as a unit of exposure, the roentgen is no longer in favor; the coulomb per kilogram is the S1 unit of exposure and is now generally accepted.

***Resource Conservation and Recovery Act* (RCRA)** A law that gives the U.S. Environmental Protection Agency the authority to control hazardous waste from "cradle to grave" (i.e., from the point of generation to the point of ultimate disposal), including its minimization, generation, transportation, treatment, storage, and disposal. RCRA also sets forth a framework for the management of non-hazardous solid wastes.

Risk The probability of a detrimental effect from exposure to a hazard. Risk is often expressed quantitatively as the probability of an adverse event occurring multiplied by the consequence of that event (i.e., the product of these two factors). However, separate presentation of probability and consequence is often more informative.

Rock Catching Fence A fence whose purpose is to stop any falling rocks from impacting a structure or rolling onto a road. The fence is usually constructed of well anchored steel posts or poles wit heavy wire or cable stretched between the posts.

Safety analysis report (SAR) A report that systematically identifies potential hazards within a nuclear facility, describes and analyzes the adequacy of measures to eliminate or control identified hazards, and analyzes potential accidents and their associated risks. Safety analysis reports are used to ensure that a nuclear facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations. Safety analysis reports are required for DOE nuclear facilities and as a part of applications for Nuclear Regulatory Commission licenses. The NRC regulations or DOE Orders and Technical Standards that apply to the facility type provide specific requirements for the content of safety analysis reports.

Scoping An early and open process for determining the scope of issues to be addressed in an EIS or EA and for identifying the significant issues related to a proposed action.

Sievert The SI (International System of Units) unit of radiation dose equivalent. The dose equivalent in sieverts equals the absorbed dose in grays multiplied by the appropriate quality factor (1 Sv = 100 rem).

Solid waste In general, solid wastes are non-liquid, non-soluble discarded materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes include sewage sludge, agricultural refuse, demolition wastes, and mining residues.

For purposes of regulation under the RCRA, solid waste is any garbage; refuse; sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility; and other discarded material. Solid waste includes solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities. Solid waste does not include solid or dissolved material in domestic sewage or irrigation return flows or industrial discharges which are point sources subject to permits under Section 402 of the *Clean Water Act*. Finally, solid waste does not include source, special nuclear, or by-product material as defined by the *Atomic Energy Act*. A more detailed regulatory definition of solid waste can be found in 40 CFR 261.2. (See hazardous waste and RCRA.)

Source term The amount of a specific pollutant (e.g., chemical, radionuclide) emitted or discharged to a particular environmental medium (e.g., air, water) from a source or group of sources. It is usually expressed as a rate (i.e., amount per unit time).

Spent nuclear fuel Fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated.

Surface water All bodies of water on the surface of the earth and open to the atmosphere, such as rivers, lakes, reservoirs, ponds, seas, and estuaries.

Threatened species Any plants or animals that are likely to become endangered species within the foreseeable future throughout all or a significant portion of their ranges and which have been listed as threatened by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures set out in the Endangered Species Act and its implementing regulations (50 CFR 424). The lists of threatened species can be found at 50 CFR 17.11 (wildlife), 17.12 (plants), and 227.4 (marine organisms).

Total effective dose equivalent (TEDE) The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

Transuranic Refers to any element whose atomic number is higher than that of uranium (atomic number 92), including neptunium, plutonium, americium, and curium. All transuranic elements are produced artificially and are radioactive.

Transuranic (TRU) waste Radioactive waste that is not classified as high-level radioactive waste and that contains more than 100 nanocuries (3700 becquerels) per gram of alpha-emitting transuranic isotopes with half-lives greater than 20 years.

Tritium A radioactive isotope of hydrogen whose nucleus contains one proton and two neutrons. The symbols for tritium are T and ^{3}H; the latter symbol is more frequently encountered.

Uranium A radioactive, metallic element with the atomic number 92; the heaviest naturally occurring element. Uranium has 14 known isotopes, of which uranium-238 is the most abundant in nature. Uranium-235 is commonly used as a fuel for nuclear fission. (See natural uranium, enriched uranium, and depleted uranium.)

Waste characterization The identification of waste composition and properties by reviewing process knowledge, nondestructive examination, nondestructive assay, or sampling and analysis. Characterization provides the basis for determining appropriate storage, treatment, handling, transportation, and disposal requirements.

Waste minimization Actions that economically avoid or decrease waste production by reducing waste generation at the source, reducing the toxicity of hazardous waste, improving efficiency of energy usage, or recycling wastes.

Wetlands Those areas that are inundated by surface or groundwater with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas (e.g., sloughs, potholes, wet meadows, river overflow areas, mudflats, natural ponds).

Jurisdictional wetlands are those wetlands protected by the *Clean Water Act*. They must have a minimum of one positive wetland indicator from each parameter (i.e., vegetation, soil, and hydrology). The U.S. Army Corps of Engineers requires a permit to fill or dredge jurisdictional wetlands.

Wind rose A circular diagram showing, for a specific location, the percentage of the time the wind is from each compass direction. A wind rose for use in assessing consequences of airborne releases also shows the frequency of different wind speeds for each compass direction.

Appendix A

Memo for Record:

OCT 19 200[illegible]

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

Dr. Joy Nicholopoulos, Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, NM 87113

Dear Dr. Nicholopoulos:

Reference: Consultation Regarding the Proposed Decontamination and Demolition of the Omega West Facility Project

The National Nuclear Security Administration (NNSA) has recently informed you of several actions and contemplated proposals for Los Alamos National Laboratory (LANL) that may affect potential threatened or endangered species habitat in Los Alamos Canyon, either directly, indirectly or cumulatively.

The first of these actions to occur within this canyon reach are the activities planned for the Wildfire Hazard Reduction Program, scheduled to start this year and potentially continuing through the fall of 2003. Land conveyance and transfer actions for specific tracts adjacent to or partially within this canyon are expected to commence in mid-to late-2002 and could extend through 2007, with the associated Los Alamos County site actions likely delayed from the point of conveyance by at least one to several years. The proposed demolition of the Omega West Facility within Technical Area 2 in Los Alamos Canyon is projected to commence in late 2002 and continue through most of 2003 and possibly beyond.

Another proposed project, the installation of a natural gas line in lower Los Alamos Canyon, has an unknown associated proposed schedule; however, it is likely to start within the next couple of years so that it occurs sometime over the next five year period. We have either initiated or completed the formal consultation process (as required by 50 CFR 402.14) on the proposed Wildfire Hazard Reduction Program activities and the land conveyance actions. With the enclosed Biological Assessment (BA), entitled: Biological Assessment of the Potential Effects of the Decontamination, Decommission and, Demolition of the Omega West Site Reactor on Federally Listed Threatened and Endangered Species, NNSA would like to initiate formal consultation on the proposed decontamination and demolition project for the Omega West Facility at LANL. We will soon initiate formal consultation on the proposed gas line project as well, and have included this project in our cumulative affect discussion of the enclosed BA.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

February 5, 2002

Cons. # 2-22-02-F-203

David A. Gurule, Area Manager
Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

Dear Mr. Gurule:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) October 23, 2001, receipt of your October 19, 2001, letter requesting initiation of formal section 7 consultation under the Endangered Species Act as amended (16 U.S.C. § 1531 to 1544 *et seq.*) (ESA). The consultation concerns the possible effects of your proposed decontamination and demolition of the Omega West Facility Project at Los Alamos National Laboratory, Los Alamos County, New Mexico on the Mexican spotted owl (*Strix occidentalis lucia*) and its habtiat.

The Service has now received the information necessary to initiate formal consultation, as outlined in the regulations governing interagency consultation (50 CFR § 402.14). All information required of you to initiate this consultation was either included with your letter and assessment or is otherwise accessible for our consideration and reference.

Section 7 of the Endangered Species Act allows the Service up to 90 calendar days to conclude formal consultation with your agency and an additional 45 calendar days to prepare our biological opinion (unless we mutually agree to an extension). Therefore, we expect to provide you with our biological opinion no later than March 8, 2002.

As a reminder, the Endangered Species Act requires that after initiation of formal consultation, the Federal action agency may not make any irreversible or irretrievable commitment of resources that limit future options. This practice insures agency actions do not preclude the formulation or implementation of reasonable and prudent alternatives that avoid jeopardizing the continued existence of endangered or threatened species or destroying or modifying their critical habitats.

We have assigned log number 2-22-02-F-203 to this consultation. Please refer to that number in future correspondence on this consultation. If you have any questions or concerns about this consultation or the consultation process in general, please feel free to contact Santiago R. Gonzales of this office at (505)346-2525, ext. 155.

Sincerely,

Brian Hanson
for Joy E. Nicholopoulos
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
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March 15, 2002

Cons. # 2-22-02-I-203

David A. Gurule, Area Manager
Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

Dear Mr. Gurule:

This letter transmits the U.S. Fish and Wildlife Service's (Service) review of the proposed Department of Energy (DOE) decontamination, decommission, and demolition (D&D) of the Omega West Reactor (OWR) and its effects on the bald eagle (*Haliaeetus leucocephalus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and Mexican spotted owl (*Strix occidentalis lucida*) (owl) and its critical habitat in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The DOE has submitted the Biological Assessment of the Potential Effects of the Decontamination, Decommissioning, and Demolition of the Omega West Reactor Site on Federally Listed Threatened and Endangered Species (BA) dated October 2001. The BA evaluated the anticipated effects on federally listed species and their habitats, resulting from D&D of the OWR at Technical Area 2 of the Los Alamos National Laboratory (LANL). The proposed project is in Los Alamos Canyon, in Los Alamos County, New Mexico.

The DOE has determined that the proposed D&D "is likely to adversely affect" the owl and its critical habitat. The Service concurs with your "no effect" determination for the bald eagle and the southwestern willow flycatcher.

Based on information provided in the October 19, 2001, BA and other information available to the Service, one field site visit, and telephone conversations with your staff, we believe the appropriate conclusion is "may affect, not likely to adversely affect" for the owl and its critical habitat. The following reasons are given to support our determination: 1) no owls have been recorded in Los Alamos Canyon during the last 8 years of surveys; 2) no suitable habitat (nesting, roosting, or foraging) will be removed because of the D&D; 3) potential disturbance during D&D is expected to be insignificant or discountable based on the information provided in the BA; 4) Delaney *et al.* (1997) suggested that owls may habituate to repeated noise disturbance exposures as the nesting season progresses; 5) they also reported that owls did not flush at distances greater than 105 meters (m) from the noise source; 6) Gallegos *et al.* (1997) and Gonzales *et al.* (1997)

reported at least 100 potential nesting sites in the Canon de Valle and Los Alamos Canyon areas of environmental interests (AEIs); therefore, nest-site selection should not be precluded; 7) the size of the building site (1,650-m^2) is insignificant, and 8) LANL will conduct owl presence/absence surveys before D&D activities began. Therefore, we believe that the effects of the D&D project on the owl will be insignificant or discountable because of the small project size and disturbance of impact, and the habitat has not been occupied for at least 8 years.

The Service appreciates the thorough analyses provided in the BA and your efforts to protect endangered and threatened species. Please contact the Service if you have questions or wish to discuss our conclusion.

Please contact the Service if: 1) future surveys detect listed, proposed or candidate species in habitats where they have not been previously observed; 2) the projects are changed or new information reveals effects of the actions to listed species that may be affected by these projects; 3) a new species is listed or critical habitat designated that may be affected by the action. In future communications regarding this project, please refer to Consultation #2-22-02-I-203. If we can be of further assistance, please contact Santiago R. Gonzales of my staff at (505) 346-2525, ext. 155.

Sincerely,

Joy E. Nicholopoulos

Joy E. Nicholopoulos
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

Literature Cited

Delaney, K. D., T. G. Grubb, and L. L. Pater. 1997. Effects of helicopter noise on nesting Mexican spotted owls. Report to Holloman Air Force Base, US Air Force, Alamogordo, New Mexico. 49 pp.

Gallegos, A. F., G. J. Gonzales, K. D. Bennett, and L. E. Pratt. 1997. Preliminary risk assessment of the Mexican spotted owl under a spatially-weighted foraging regime at the Los Alamos National Laboratory. Los Alamos National Laboratory Report LA:13259-MS. 62 pp.

Gonzales, G. J., A. F. Gallegos, and T. S. Foxx. 1997. Second annual review update: preliminary risk assessment of federally listed species at the Lao Alamos National Laboratory. Los Alamos National Laboratory. Los Alamos National Laboratory Report LA-UR-97-4732. 14 pp.

Appendix B

Memo for Record:

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

JUN 1 2 2001

Mr. Elmo Baca
State Historic Preservation Officer
Office of Cultural Affairs
La Villa Rivera, Room 320
228 E. Palace Ave.
Santa Fe, NM 87501

Dear Mr. Baca:

The Department of Energy Los Alamos Area Office proposes to decontaminate and decommission Building 1 at Technical Area 2, Los Alamos National Laboratory, Los Alamos, New Mexico. A short report describing the historic property and outlining the proposed demolition project was sent to your office on September 27, 2000 *(The Omega West Reactor and Water Boiler Building, TA-2-1; A Preliminary Report,* Historic Building Survey Report No. 186, LA-UR-00-3854). In correspondence dated October 13, 2000, your office concurred with the eligibility determination and the finding of adverse effect contained in the report.

In continuation of consultation on this project as required by Section 106 of the National Historic Preservation Act, the enclosed Memorandum of Agreement (MOA) is being submitted for your signature. By signing the MOA, the Department of Energy acknowledges that adverse effects to the eligible historic building will be resolved by implementing the proposed treatment of effects contained in the MOA.

If you have any comments or questions, please feel free to contact Elizabeth Withers, NHPA Compliance Coordinator, at 505-667-8690.

Sincerely,

Original Signed By
DAVID A. GURULE

David A. Gurulé, P.E.
Area Manager

LAAME:3EW-554

Enclosure

cc:
See page 2

OFFICIAL FILE COPY

Appendix C

In October and November of 2001, actual radiation surveys were conducted within the reactor vessel (see below). These surveys were preliminary and not comprehensive. In order to provide a bounding estimate of the radioactivity present in the reactor vessel, the Mann 1995 letter report was included. Mann's report provides estimates of radionuclide concentrations of the reactor vessel based on the continuous reactor operation during the 36 years of use.

The majority of the radiation present in the OWR is ^{60}Cobalt (^{60}Co), which is due to the activation process in the stainless-steel sleeves at the experiment port tubes that penetrate the vessel and extend to the core faces. Mann reports calculated exposure rates resulting from the decay of ^{60}Co and other radionuclides in various locations within the reactor.

These exposure rates were calculated to provide an upper bound on the amount of radiation that could be expected from the parts of the reactor that remain in the reactor vessel. Exposure rates resulting from the activation in the vessel itself were not calculated because the thermal flux[1] at the interior surface of the vessel is quite low and varies considerably over the surface. Exposure rates from the activated reinforcing steel in the concrete are likewise expected to be comparatively low.

Mann also provides estimates of radionuclide concentrations of the reactor vessel and waste disposal classes that were estimated based on the continuous reactor operation during the 36 years of use.

[1] Thermal flux – ~~define here and add to the glossary~~ More accurately "thermal neutron flux" is the product of neutron number density and velocity (energy) giving an apparent number of neutrons flowing through a unit area per unit time (DOE/EIS – 0147).

Survey Report
Omega West Reactor
TA-2

On Sunday, October 28, 2001, an operation took place at the Omega West Reactor in order to gather information as part of the pre-decommissioning characterization effort for the Omega West Reactor. All work was performed under a Radiation Work Permit (# ESH-1-01-060). An ALARA review was conducted prior to the job in accordance with LIR 402-700-01.0, Attachment C, and Appendix 3 B, in which possible radiation hazards were discussed with members of the ESH-12 Radiological Engineering Team. Hazards were identified and a Task Analysis was developed in which dose levels for various stages of the job were developed. A pre-job briefing was given on-site the morning of the 28th to all personnel involved. The pre-job briefing included a description of the work to be performed, a review of RWP #ESH-1-01-060, and a review of the Cerro Grande Project Special Environmental Projects Hazard Control Plan (HCP Number: CGRP-SEP-013, R-1).

The work involved JCNNM laborers removing approximately fifty lead blankets from the supporting framework on the deck covering the top of the reactor. This was done in order to allow the hatch on the reactor cover to be opened so that sampling could be accomplished. Dose rates in the general area were 30 to 50 millirem (mR)/ hour.

Before the hatch was opened, all non-essential personnel were evacuated from the building in order to keep the potential for exposure to a minimum. ESH-1 personnel then conducted dose measurements of the interior of the reactor vessel. Two sets of measurements were taken, using an Eberline RO-7 ion chamber instrument (PN# 70400 with calibration due 2/10/02. Measurements were taken at five-foot intervals. The following are the recorded readings:

LEVEL	**Set #1**	**Set # 2**
5 feet	**4.2 R/hr**	**4.9 R/hr**
10 feet	**9 R/hr**	**10.6 R/hr**
15 feet	**24.2 R/hr**	**30 R/hr**
20 feet	**72 R/hr**	**110 R/hr**
25 feet	**11.3 R/hr**	**8.5 R/hr**

The instrument probe was brought up and wiped down by RCTs, then placed aside for a release survey at the completion of the job.

A remote video camera was then lowered into the vessel in order to get a visual record of the vessel interior. This was accomplished and the equipment was wiped down and set aside for later use.

The third part of the operation consisted of gathering a sample of material from the bottom of the vessel for later analysis. This was accomplished using a weight covered with double-sided tape, suspended on a rope from an overhead tripod assembly. The sample was collected and placed in a lead pig, to await analysis.

After the hatch was sealed, RCTs wiped down the area, pulled up the plastic "lay-down area", bagged all equipment and performed a contamination and radiation survey of the area. When swipes were counted, the JCNNM personnel were brought back into the building to put the shielding back in place (under ESH-1 supervision). The area was then re-surveyed, and posted appropriately. A post-job survey has been conducted for both the area and the materials, tools and supplies. Results will be included with the project Health Physics file when they are received. All dose received by personnel working on the job was well within the expectations set forth in the RWP, ALARA review and the Task Analysis.

Marty Peifer, Team Leader
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Los Alamos National Laboratory
Los Alamos, New Mexico 87545 MS. M-769
Phone: (505) 665-4342
Pager: (505) 664-6649
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GAMMA SPECTROSCOPY RESULTS
TA-2, OWR

On October 28, 2001 a sample was collected during radiological survey activities associated with the D&D effort being conducted by the Cerro Grande Recovery Project. The sample was taken by wrapping a piece of weighted metal with double-sided duct tape and lowering it to the bottom of the reactor vessel in order to collect any loose particulates.

The sample was later taken to ESH-4 where gamma spectroscopy was performed. The goal was not to quantify, but to merely identify isotopes present. Other than normal background, only ^{60}Co was identified. Two peaks were identified, one at 1173 KeV, and one at 1332 KeV.

The sample was counted on Detector #50 GMX – 7 (92% Eff.), and was counted Real Time: 5055.48 seconds / Live Time: 5000.00 seconds.

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Radiation Survey Report
Omega West Reactor
TA-2
November 16, 2001

On November 16, 2001, a radiation survey was conducted at the Omega West Reactor at TA-2. This survey was conducted to supplement information gathered in a survey conducted on October 28, 2001 as part of the pre-decommissioning characterization effort for the Omega West Reactor. The first survey was conducted in the reactor vessel through the west hatch. The second survey was conducted through the east hatch in hopes of getting more complete data.

Work for both surveys was conducted under ESH-1 Radiation Work Permit (RWP) # ESH-1-01-060. An ALARA review was conducted prior to the first survey in accordance with LIR 402-700-01.0, Attachment C, Appendix B. Hazards were identified, and a task Analysis was written in which dose levels for various sages of the job were developed. The same RWP and ALARA Review were used for both surveys. The pre-job briefing also included a review of the Cerro Grande Project Special Environmental Projects Hazard Control Plan (HCP), # CGRP-SEP-013, R-1.

A pre-job safety briefing was given to all personnel on the morning of the 16th. A pre-job RWP briefing was also given. The work once again involved JCNNM laborers removing approximately 50 lead blankets and the aluminum plate they were sitting on from the supporting framework on the reactor deck at the top of the reactor. This was done in order to allow access to the east reactor hatch cover. General dose rates in the area were 30 to 50 (millirem) mR / hour.

When the shielding had been removed, and before the hatch was opened, all non-essential personnel were removed from the building in order to keep the potential for exposure to a minimum. ESH-1 personnel then conducted dose measurements of the reactor vessel interior. Measurements were taken at five-foot intervals using an Eberline RO-7 with a mid-range RO-7-BM probe. The instrument used was as follows:
RO-7 PN# 7041 calibration due: 5/15/02.

The readings were as follows:

DEPTH	OPEN WINDOW	CLOSED WINDOW
5 feet	**4.7 R/hr**	**4.6 R/hr**
10 feet	**11.4 R/hr**	**10 R/hr**
15 feet	**9.5 R/hr**	**44.1 R/hr**
20 feet	**50.1 R/hr**	**54 R/hr**
24 feet	**65.7 R/hr**	**55 R/hr.**

A second survey was conducted on the fuel element rack in the center of the vessel. This survey was accomplished using an RO-7 with an RO-7-BH probe (PN # 7043, calibration due: 3/14/02). The RO-7-BH probe is calibrated for a range of 0 – 20KR/hr. Readings were taken on, in and around the fuel element rack and averaged 1,050 R/hr. The highest reading encountered was 1,110 R/hr.

A sample was collected from the bottom of the reactor vessel. This was accomplished by lowering a "Dust Buster" vacuum suspended on a rope and moving it around the vessel bottom as well as possible. The vacuum was brought back up and bagged. It will be emptied, and the contents sent to the Health Physics Analysis Laboratory for gamma spectroscopy.[a]

A remote video camera was then lowered into the vessel interior in order to add to the visual record of the project. The camera and equipment were wiped down and set aside for later use.

The hatch was then resealed. RCTs wiped down the area, pulled up the plastic "lay-down area", bagged all equipment and performed a contamination and radiation survey of the area. When swipes were counted, JCNNM personnel were returned to the area where they replaced the shielding under ESH-1 supervision. The area was then re-surveyed and posted appropriately. A post-job survey has been conducted for both the area, and the tools and supplies used. Results will be included in the project Health Physics file when they are received.

Marty Peifer, Team Leader
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Fax: (505) 667-0189
E-mail:peiferm@lanl.gov

[a] The laboratory reported that there was insufficient sample for analysis. Hence, there are no sampling results to report for this sampling event.

J. R. Mann, Inc.

JOHN MANN, CERTIFIED HEALTH PHYSICIST
P.O. BOX 35338
PHOENIX, ARIZONA 85069-5338
(602) 934-4050

13 April 1995

Reactor Activation Products and Exposure Doses for Omega West Reactor Preliminary D&D Planning

Morrison Knudsen Corporation requested that calculations of activation product activity and radiation exposures therefrom be made to aid in scoping the requirements for D&D of the Omega West Reactor (OWR) reactor vessel and shielding. An evaluation of activated reactor vessel components vs. 10CFR61 radioactive waste disposal requirements was also requested.

The OWR first went critical in August 1956. It has operated over a range from 5 MW to 8 MW power until 1992, when it was permanently shut down. All fuel elements and control blades have since been removed. The remaining reactor vessel components were examined for activation potential and contribution to personnel exposure doses during the D&D process. In-core materials include aluminum, beryllium, bismuth, stainless steel (cobalt), iron, lead and nickel. Of these only ^{59}Co, ^{58}Ni, and ^{62}Ni were found to have a sufficiently high (n,γ) cross section to make a significant contribution to the activation product inventory (activation of bismuth, for example, produces only 70 mCi of ^{210}Bi, negligible in terms of activity and radiation exposure; the activities of the other isotopes were even less than bismuth, and were therefore not considered further). The (n,γ) activation products of the three significant isotopes are, respectively, ^{60}Co, ^{59}Ni, and ^{63}Ni. The activity concentration of each isotope was calculated with standard reactor activation equations[1], assuming a continuous reactor flux of 8×10^{13} n cm^{-2} sec^{-1} during the 36 year operational period for conservancy. The resultant radionuclide concentrations and the 10CFR61 waste disposal limits are:

SIGNIFICANT REACTOR VESSEL COMPONENT ACTIVATION PRODUCTS

	Concentration in Ci m^{-3}			
Isotope	**Amount in reactor**	**Class A Limit**	**Class B Limit**	**Class C Limit**
^{60}Co	8.6×10^5	700	*	*
^{59}Ni	6.6×10^4	22	*	220
^{63}Ni	7.6×10^5	35	700	7000

*No limits for these radionuclides are established in 10CFR 61.55, Tables 1 & 2.

Radiation exposure from the nickel isotopes is negligible since neither isotope emits gamma rays and ^{63}Ni only emits low-energy β-rays. The significant radiation exposure

[1] M. F. Fair, Radiation Physics Problems, Vanderbilt University, 1960.

dose is due to the ^{59}Co (n,γ) ^{60}Co activation process in the stainless steel sleeves for the experiment port tubes that penetrate the vessel and extend to the core faces. The exposure rate in the vessel above the grid plate had been remotely measured earlier, after the fuel and control elements were removed.

The exposure from the ^{60}Co produced was calculated using the equilibrium-induced ^{60}Co activity in stainless steel from Rockwell[2]. Exposures in air and with water shielding inside the vessel were calculated using standard distributed source geometry and wide-beam build-up factors[3]. The following exposure doses resulted:

REACTOR VESSEL INTERIOR
RADIATION EXPOSURES FROM ^{60}Co

Location & Conditions	Exposure, R Hr^{-1}
Calculated at 0.1 m. above tube sleeve plane, in air	11,446
Measured at 0.6 m (est.) above fuel element support grid, in air	2600
Calculated at 1 m above tube sleeve plane, in air	1588
Calculated at upper surface of a 1 m water column in reactor vessel	252
Calculated at upper surface of a 3 m water column in reactor vessel	0.127

Doses due to activation in the vessel itself have not been calculated because the thermal flux at the interior surface of the vessel is quite low and varies considerably over the surface. Doses from activated reinforcing steel in the concrete are likewise expected to be comparatively low.

John Mann

John Mann

[2]Rockwell III, Theodore, Reactor Shielding Design Manual, p. 46, Table 3.7, USAEC, March 1956.
[3]Bevelacqua, J. J., Contemporary Health Physics, Wiley Interscience, 1995.

Appendix D

Methodology

For the transportation analysis, DOE first determined the volume and characteristics of the waste to be transported, as described in Section 4.1.3. Except for uncontaminated soil and selected lead shielding, no credit was taken for reuse or recycle of the waste materials. Clean soils were assumed to be used at the site of OWR so there was no transportation. DOE identified appropriate packaging methods for transport under two transport scenarios: onsite disposition and offsite disposition. For some waste streams, offsite disposition (such as disposal at Envirocare) was not appropriate and only onsite disposition was analyzed. The shipment campaigns analyzed are indicated in Table D-1, including the number of shipments of each waste stream. As Table 4-1 indicates, the onsite disposition scenario includes only onsite shipment of wastes. The offsite disposition scenario maximizes offsite shipment to the extent practical, but includes onsite shipment to give a complete accounting of transportation impacts.

As described in Section 2.1.3, the various waste streams are destined for one of several locations which include the Los Alamos County Landfill, Area G Cells in TA-54, the RLWTF in TA-50, general storage in TA-3, and the Envirocare facility in Utah. DOE determined the routes and their characteristics from the 1999 LANL SWEIS (DOE 1999a) and from the DOE computer code HIGHWAY (Johnson et al. 1999). The analyzed routes are representative of the routes DOE may ultimately select and do not indicate any current preference.

For radiological health impacts, DOE used the computer code RADTRAN (Neuhauser and Kanipe 2000). Principle inputs to this code are the package characteristics and route characteristics, including population densities of those living near the route. One of the most important package characteristics is the Transport Index, a measure of the radiation dose rate one-meter from the side of the vehicle.

Most shipments are expected to have extremely low dose rates. For these low dose rate shipments, DOE used a transport index of 1 millirem per hour, a value estimated to be conservatively high. However, some shipments have high dose rates and would thus be shielded. DOE conservatively assumed that the shipments would be shielded to reduce the dose rate to the regulatory limit for offsite shipments, 10 millirem per hour. In these calculations, DOE did not take advantage of the "exclusive use" provision that would permit up to 10 millirem at 6 ft (2 m) from the vehicle.

Table D-1. Waste Transport Campaign Assumptions for the Proposed Action

Waste Stream	Quantity	Onsite Disposition Scenario	Offsite Disposition Scenario	Model Assumptions and Comments
Releasable concrete releasable steel wood/fiberglass roofing material	44,707 ft^3 12,518 ft^3 3,590 ft^3 364 ft^3	220 dump truck trips to LACLF	**same as onsite disposition**	**truck volume is 400 ft^3 with 30% void space**
Radioactive concrete radioactive soil radioactive steel (does not include reactor, etc.)	55,206 ft^3 29,940 ft^3 6,181 ft^3	**330 covered dump truck trips to Area G cells**	330 covered dump truck trips to Envirocare	truck volume is 400 ft^3 with 30% void space; assume TI=1
Ni/Be reflectors Bi shield	**12 ft^3** **12 ft^3**	One shielded transport cask; transport to Area G cells	same as onsite disposition	assume TI=10
Reactor tank & highly contaminated/activated piping	1508 ft^3	4 flat bed trips to Area G cells; sections wrapped in plastic plus 1 cask of hot piping to Area G cells	same as onsite disposition	cut into 4 6-foot long sections; special transport considerations (escort, road closing); drivers shielded; assume TI=10
PPE	51,600 ft^3	8,900 drums in 20-foot vans; 280 trips to Area G cells	8,900 drums in 20-foot vans; 280 trips to Envirocare	assume 20% voids; assume TI=1
Radioactive asbestos	25 ft^3	5 55-gallon drums loaded into a single truck to Area G cells	same as onsite disposition	assume 20% voids
Releasable asbestos	4,505 ft^3	**60 B-25 boxes or equivalent on flatbed trailer to LACLF; loaded 9 per 40-foot trailer; 7 trips**	same as onsite disposition	assume 20% voids
Elemental lead	248 ft^3	Palletize and send to TA-3 in 9 trips	**same as onsite disposition**	analysis ignores the radioactive contamination on a fraction of the lead; 174,000 total pounds; assume 20,000 pounds per trip (< ½ load of a semi trailer)
Radioactive liquid	8,000 gallons	2 tanker trucks to RLWTF	same as onsite disposition	assume 2 trips of 4,000 gallons; assume TI=1
Diesel fuel	560 gallons	11 55-gallon drums to TA-3; 1 trip	**same as onsite disposition**	
Deionizer resin	35 ft^3	1 truck to Area G cells	same as onsite disposition	assume TI=10

TI = transport index
LACLF = Los Alamos County Landfill
RLWTF = Radioactive Liquid Waste Treatment Facility

Methodology

Vehicle-Related Accidents

As described in Section 4.1.4, DOE determined the routes and their characteristics from the 1999 LANL Site-Wide EIS and from the DOE computer code HIGHWAY. Coupling these route characteristics with accident rates provides the number of traffic accidents and their associated traffic fatalities. Accident rates were taken from the DOE (1999) and from Saricks and Tomkins (1999).

Cargo-Related Accidents

The only shipment for which the radioactivity content has been characterized is the demineralizer resin in its vessel. DOE believes that this cargo has the greatest potential for accident impacts, because of its fairly high radioactivity content and its greater potential to become airborne. Therefore, this shipment is the only one that DOE analyzed. All other radioactive shipments should have smaller impacts per single shipment. DOE used the route characteristics determined for the incident-free transportation as inputs to the computer codes RADTRAN (Neuhasuser 2000) to project radiological accident risk (probability times impact) for population exposures and RISKIND (Yuan 1995) to provide dose to a maximally exposed individual.

Appendix E

areas. Maclaren does not own or control any electric power generation or transmission facilities and does not have a franchised service area.

Maclaren proposes to arrange for the delivery of electric energy to Canada over the existing international transmission facilities owned by Basin Electric Power Cooperative, Bonneville Power Administration, Citizen Utilities, Eastern Maine Electric Cooperative, International Transmission Company, Joint Owners of the Highgate Project, Long Sault, Inc., Maine Electric Power Company, Maine Public Service Company, Minnesota Power Inc., Minnkota Power Cooperative, New York Power Authority, Niagara Mohawk Power Corporation, Northern States Power, and Vermont Electric Transmission Company. The construction, operation, maintenance, and connection of each of the international transmission facilities to be utilized by Maclaren, as more fully described in the application, has previously been authorized by a Presidential permit issued pursuant to Executive Order 10485, as amended.

Procedural Matters

Any person desiring to become a party to this proceeding or to be heard by filing comments or protests to this application should file a petition to intervene, comment or protest at the address provided above in accordance with §§ 385.211 or 385.214 of the FERC's Rules of Practice and Procedures (18 CFR 385.211, 385.214). Fifteen copies of each petition and protest should be filed with DOE on or before the date listed above.

Comments on the Maclaren application to export electric energy to Canada should be clearly marked with Docket EA –258. Additional copies are to be filed directly with Ginette Berthel, Maclaren Energy Inc., Legal Counsel and Corporate Secretary, 2 Montreal Road West, Masson-Angers, Quebec J8M 1K6.

A final decision will be made on this application after the environmental impacts have been evaluated pursuant to the National Environmental Policy Act of 1969, and a determination is made by the DOE that the proposed action will not adversely impact on the reliability of the U.S. electric power supply system.

Copies of this application will be made available, upon request, for public inspection and copying at the address provided above or by accessing the Fossil Energy Home Page at http://www.fe.de.gov. Upon reaching the Fossil Energy Home page, select ''Electricity Regulation, ''and then ''Pending Procedures '' from the options menus.

Issued in Washington, D.C., on February 13, 2002.

Anthony J. Como,

Deputy Director, Electric Power Regulation, Office of Coal & Power Import/Export, Office of Coal & Power Systems, Office of Fossil Energy.

[FR Doc. 02 –4050 Filed 2 –19–02; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

National Nuclear Security Administration; Notice of Floodplain/ Wetlands Involvement for the Disposition of the Omega West Reactor Vessel and Ancillary Structures at Los Alamos National Laboratory, Los Alamos, New Mexico

AGENCY: National Nuclear Security Administration, Office of Los Alamos Site Operation, Department of Energy.

ACTION: Notice of Floodplain Involvement.

SUMMARY: The Department of Energy 's National Nuclear Security Administration, Office of Los Alamos Site Operations hereby provides notice for its proposal to decontaminate and demolish the Omega West Reactor vessel along with the remaining structures associated with the Omega Facility, and to remove the resulting waste from the Los Alamos canyon floodplain and out of the canyon bottom. The Omega Facility, located in Los Alamos Canyon at LANL in New Mexico, housed an old research reactor known as the Omega West Reactor (OWR). The OWR was shut down in 1992 and the fuel removed in 1994. The Facility, originally constructed in 1944, and its associated structures are of advanced age and not in a condition suitable for renovation or reapplication. Further, they are located within a potential flood pathway. There is no foreseeable future use for the Facility, which is eligible for inclusion in the National Register of Historic Places.

DATES: Written comments are due to the address below no later than March 7, 2002.

ADDRESSES: Written comments should be addressed to Jeff Robbins, U.S. Department of Energy, National Nuclear Security Administration, Albuquerque Operations Office, P.O. Box 5400, Albuquerque, New Mexico, 87185 or transmitted by E-mail via Internet to jfrobbins@doeal.gov, or by facsimile to (505) 284 –7101.

FOR FURTHER INFORMATION CONTACT: Rich Nevarez, Document Manager, U.S. Department of Energy, Albuquerque Operations Office, ERD SC –1, PO Box 5400, Albuquerque, New Mexico 87185, Telephone (505) 845 –5804, or transmitted by E-mail via Internet to rnevarez@doeal.gov, or by facsimile (505) 845 –4239.

For Further Information on General DOE Floodplain Environmental Review Requirements, Contact: Carol M. Borgstrom, Director, office of NEPA Policy and Compliance (EH –42), U.S. Department of Energy, 1000 Independence Avenue, SW, Washington, DC 20585 –0119, Telephone (202) 586 –4600 or (800) 472 –2756, facsimile (202) 586 –7031.

SUPPLEMENTARY INFORMATION: In May 2000, the Cerro Grande Fire burned across the upper and mid-elevation zones of several watersheds, including the Los Alamos Canyon watershed. Several of the Omega Facility 's small support buildings and structures were demolished and disposed of during the first 6 months post Cerro Grande Fire. The remaining buildings, including Building 2 –1 that houses the OWR vessel, and the associated structures and utilities and infrastructure, continue to be vulnerable to damage from flooding and mudflows as a result of the fire and the changed environmental conditions upstream from the Facility. While all buildings are vulnerable, the support buildings and structures are especially at risk due to their construction characteristics. An assessment of the floodplain is being included in the Disposition of the Omega West Vessel and Ancillary Structures Environmental Assessment (EA).

According to the requirements of E.O. 11988 —Floodplain Management and 10 CFR part 1022 —Compliance with Floodplain Environmental Review Requirements, notice is given that NNSA is planning to decontaminate and demolish (D&D) the OWR vessel and the remaining Omega Facility structures located within Los Alamos Canyon at Los Alamos National Laboratory, Los Alamos, New Mexico.

The D&D activities would consist of characterization and removal of radiological and other potential contamination in all the structures and subsequent demolition of the structures; dismantlement of the reactor vessel; segregation, size reduction, packaging, transportation, and disposal of wastes; and removal of several feet of potentially contaminated soil from beneath the reactor vessel. The D&D of the entire Omega Facility is proposed to be conducted using a phased approach. For each individual structure, the initial phase would include the characterization and planning of the work, followed by the decontamination effort, and lastly the demolition of the structure and disposal of resulting debris. Decontamination of the Omega Facility would include the removal of nonradiological and radiological contamination from building and structure surfaces throughout the Omega Facility. The extent of decontamination performed would be limited to those activities required to minimize radiological and hazardous material exposure to workers, the public, and the environment. This would involve mostly decontamination of the Omega Facility, its components and spot contamination of surrounding areas, buildings and structure components.

Once the Omega Facility has been decontaminated, the buildings, structures, foundations, and other facility components would be demolished. All building and structural materials would be removed from the canyon and sent to appropriate disposal sites. The buildings are not expected to be technically difficult to demolish and the resultant wastes can be handled, transported, and disposed of in accordance with standard LANL D&D procedures. The demolition of the OWR vessel and its concrete radiation shielding would generate high exposure rates in the room as the vessel is dismantled. Therefore, a safe method of demolition would be employed that would assure the involved workers could maintain their exposure limits below one rem per year. The OWR vessel and radiation shielding would be horizontally sectioned using diamond wire saws or other similar equipment for cutting the structure. The result cut sections would be packaged as appropriate, transported out of the canyon for eventual disposal.

An assessment of the floodplain effects is being included in the draft EA for the proposed disposition of the OWR vessel and associated structures, which is under preparation. After NNSA issues the assessment, a floodplain statement of findings will be published in the Federal Register .

Issued in Los Alamos, New Mexico on February 4, 2002.

Corey A. Cruz,

Acting Director, U.S. Department of Energy, National Nuclear Security Administration, Office of Los Alamos Site Operations.

[FR Doc. 02 –4045 Filed 2 –19–02; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

National Energy Technology Laboratory; Notice of Availability of a Financial Assistance Solicitation

AGENCY: National Energy Technology Laboratory, Department of Energy (DOE).

ACTION: Notice of Availability of a Financial Assistance Solicitation.

SUMMARY: Notice is hereby given of the intent to issue Financial Assistance Solicitation No. DE –PS26 –02NT15373 entitled ''Focused Research in Air Quality and Produced Water Management in Oil and Gas Exploration and Production. '' The Department of Energy (DOE) National Energy Technology Laboratory (NETL), on behalf of its National Petroleum Technology Office (NPTO), seeks applications for cost-shared research projects that address specific air quality or produced water management issues faced by the oil and gas industry. Applications will either address (1) solutions to air quality issues in emission control technology, monitoring technology or air modeling or (2) produced water management issues in low cost treatment technologies, beneficial use of produced water, or best management practices for handling, treatment and/or disposal. The goal is to provide solutions to issues that are limiting domestic on-shore or off-shore production while providing the same or higher levels of environmental protection.

DATES: The solicitation will be available on the DOE/NETL 's Internet address at http://www.netl.doe.gov/business and on the ''Industry Interactive Procurement System '' (IIPS) webpage located at http://e-center.doe.gov on or about February 28, 2002.

FOR FURTHER INFORMATION CONTACT: Keith R. Miles, U.S. Department of Energy, National Energy Technology Laboratory, P.O. Box 10940, MS 921 –107, Pittsburgh, PA 15236, E-mail Address: miles@netl.doe.gov, Telephone Number: 412 –386 –5984.

SUPPLEMENTARY INFORMATION: The Department of Energy (DOE) National Energy Technology Laboratory (NETL), on behalf of its National Petroleum Technology Office (NPTO), is soliciting applications for cost-shared research projects that address specific air quality or produced water management issues faced by the oil and gas industry. The goal is to provide solutions to issues that are limiting domestic on-shore or off-shore production while providing the same or higher levels of environmental protection.

The mission of the Department of Energy 's Fossil Energy Oil Program is derived from the National need for increased oil production for national security, requirements for Federal Lands stewardship, and increased protection of the environment. The Oil and Gas Environmental Program supports those goals and the National Energy Policy goal of increasing domestic oil and gas production, by providing technologies and approaches that reduce the cost of effective environmental protection and by providing technologies and approaches that improve environmental protection.

The two areas of interest for this solicitation are:

(1) Air Quality

This area of interest is directed toward providing better tools to meet existing requirements as well as providing a more accurate assessment of the impacts of oil and gas activities on regional air quality. Applications in this area should address emissions control technologies for oil and gas E&P activities or address monitoring and modeling improvements that will provide more accurate assessments and predictions of the impacts of both current and future oil and gas activities on regional air quality. Applications in this area of interest should clearly demonstrate that the results of the project meet current legal and regulatory requirements or that the appropriate government agencies are appropriately involved with the project and support the project goals.

(2) Produced Water

This area of interest is directed toward reducing the cost of produced water management. Applications in this area should address lower cost treatment processes, economic beneficial use of produced water, or best management practices that reduce the overall cost of produced water handling. All applications should clearly describe how a successful project will result in cost savings to operators and the magnitude of those savings. Applications addressing beneficial use of produced water may address treatment technologies designed to meet certain use criteria or may address ecological and/or regulatory concerns that limit producers ' options for managing produced water. If implementation of the results of the project are dependent upon approval or concurrence of one or more regulatory agencies, applications should clearly demonstrate that such agencies are appropriately involved with the project and support the project goals.

A Floodplains and Wetlands Assessment for the Potential Effects of the Decontamination and Demolition of the Omega West Reactor

Prepared by: David C. Keller and Laura K. Marsh

ESH-20, Ecology Group

Los Alamos National Laboratory

October 23, 2001

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FIGURES

SUMMARY

Los Alamos Canyon within Los Alamos National Laboratory (LANL) boundaries is the location of the demolition and decontamination (D&D) of the Omega West Reactor (OWR). Floodplains and wetlands, as defined in 10 Code of Federal Regulations (CFR) 1022, are present in Los Alamos Canyon. Floodplain and wetland values for this area in Los Alamos Canyon were evaluated against the guidance in 10 CFR 1022, Executive Order (EO) 11990 (Protection of Wetlands), and EO 11988 (Floodplain Management). Issues associated with increases in stormwater flows from the project area into undeveloped canyon areas or from soil disturbance to undeveloped canyon bottoms are identified with respect to suggested mitigation for protecting floodplain and wetland values and preventing potential contaminant migration.

1.0 PROPOSED ACTION

The proposed OWR Project will result in the D&D of several structures and foundations in the bottom of Los Alamos Canyon. LANL proposes to D&D the OWR, a 24-ft-high (7.3-m) stainless steel cylinder with an 8-ft diameter surrounded by high-density concrete, and its associated structure, Building TA-2-1. In addition, there are three concrete slabs, one manhole, three small storage sheds, the boiler house, the blower house, the stack and all utility poles, light poles, fences, culverts, parking lots, debris catchers, bridges, rock catcher fences and trash. Decontamination of the Omega Facilities will be nonradiological and radiological. In some circumstances, the contamination could be mixed. The two-story, 17,761-ft^2 (1,650-m^2) building was constructed in 1943. The east end of the building was constructed of wood. The west end of the building was constructed of concrete blocks and houses the OWR. The exact methods by which the D&D will be accomplished have not yet been determined, but are likely to include the use of cranes, large trucks, impact drills, and saws to remove the concrete portions of the building.

After the Omega facilities are demolished, the streambed is proposed to be returned to its original condition. Depending on the levels of contamination found during the D&D activities, the core of the reactor could be removed in pieces after contamination is fixed; or the core could be capped and left until the contamination levels are acceptable for removal.

2.0 ENVIRONMENTAL BASELINE

2.1 Regional Description

2.1.1 Location within the State

LANL and the associated residential areas of Los Alamos and White Rock are located in Los Alamos County, north-central New Mexico, approximately 60 mi (100 km) north-northeast of Albuquerque and 25 mi (40 km) northwest of Santa Fe (Figure 1). The 28,654-acre (11,596-ha) LANL site is situated on the Pajarito Plateau. This plateau is a series of finger-like mesas separated by deep east-to-west-oriented canyons cut by intermittent streams. Mesa tops range in elevation from approximately 7,800 ft (2,400 m) on the flanks of the Jemez Mountains to about 6,200 ft (1,900 m) at their eastern termination above the Rio Grande.

Most LANL and community developments are confined to mesa tops. The surrounding land is largely undeveloped. Large tracts of land north, west, and south of the LANL site are held by the Santa Fe National Forest, Bureau of Land Management, Bandelier National Monument, General Services Administration, and Los Alamos County. The Pueblo of San Ildefonso borders LANL to the east.

2.1.2 Geologic Setting

Most of the finger-like mesas in the Los Alamos area are formed from Bandelier Tuff, which is composed of ash fall, ash fall pumice, and rhyolite tuff. The tuff, ranging from nonwelded to welded, is more than 1,000 ft (300 m) thick in the western part of the plateau and thins to about 260 ft (80 m) eastward above the Rio Grande. It was deposited after major eruptions in the Jemez Mountains' volcanic center about 1.2 to 1.6 million years ago.

On the western part of the Pajarito Plateau, the Bandelier Tuff overlaps onto the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains. The tuff is underlain by the conglomerate of the Puye Formation in the central plateau and near the Rio Grande. Chino Mesa basalts interfinger with the conglomerate along the river. These formations overlay the sediments of the Santa Fe Group, which extend across the Rio Grande Valley and are more than 3,300 ft (1,000 m) thick. LANL is bordered on the east by the Rio Grande, within the Rio Grande rift. Because the rift is slowly widening, the area experiences frequent minor seismic disturbances.

Surface water in the Los Alamos area occurs primarily as short-lived or intermittent reaches of streams. Perennial springs on the flanks of the Jemez Mountains supply base flow into the upper reaches of some canyons, but the volume is insufficient to maintain surface flows across the LANL site before they are depleted by evaporation, transpiration, and infiltration. Runoff from heavy thunderstorms or heavy snowmelt reaches the Rio Grande several times a year in some drainages. Effluents from sanitary sewage, industrial waste treatment plants, and cooling-tower blowdown enter some canyons at rates sufficient to maintain surface flows for varying distances.

Groundwater in the Los Alamos area occurs in three forms: (1) water in shallow alluvium in canyons, (2) perched water (a body of groundwater above a less permeable layer that is separated from the underlying main body of groundwater by an unsaturated zone), and (3) the main aquifer of the Los Alamos area. Ephemeral and interrupted streams have filled some parts of canyon bottoms with alluvium that ranges from less than 3 ft (1 m) to as much as 100 ft (30 m) in thickness. Runoff in canyon streams percolates through the alluvium until its downward movement is impeded by layers of weathered tuff and volcanic sediment that are less permeable than the alluvium. This process creates shallow bodies of perched groundwater that move downgradient within the alluvium. As water in the alluvium moves down the canyon, it is depleted by evapotranspiration and movement into underlying volcanics (Purtymun et al., 1977). The chemical quality of the perched alluvial groundwaters shows the effects of discharges from LANL.

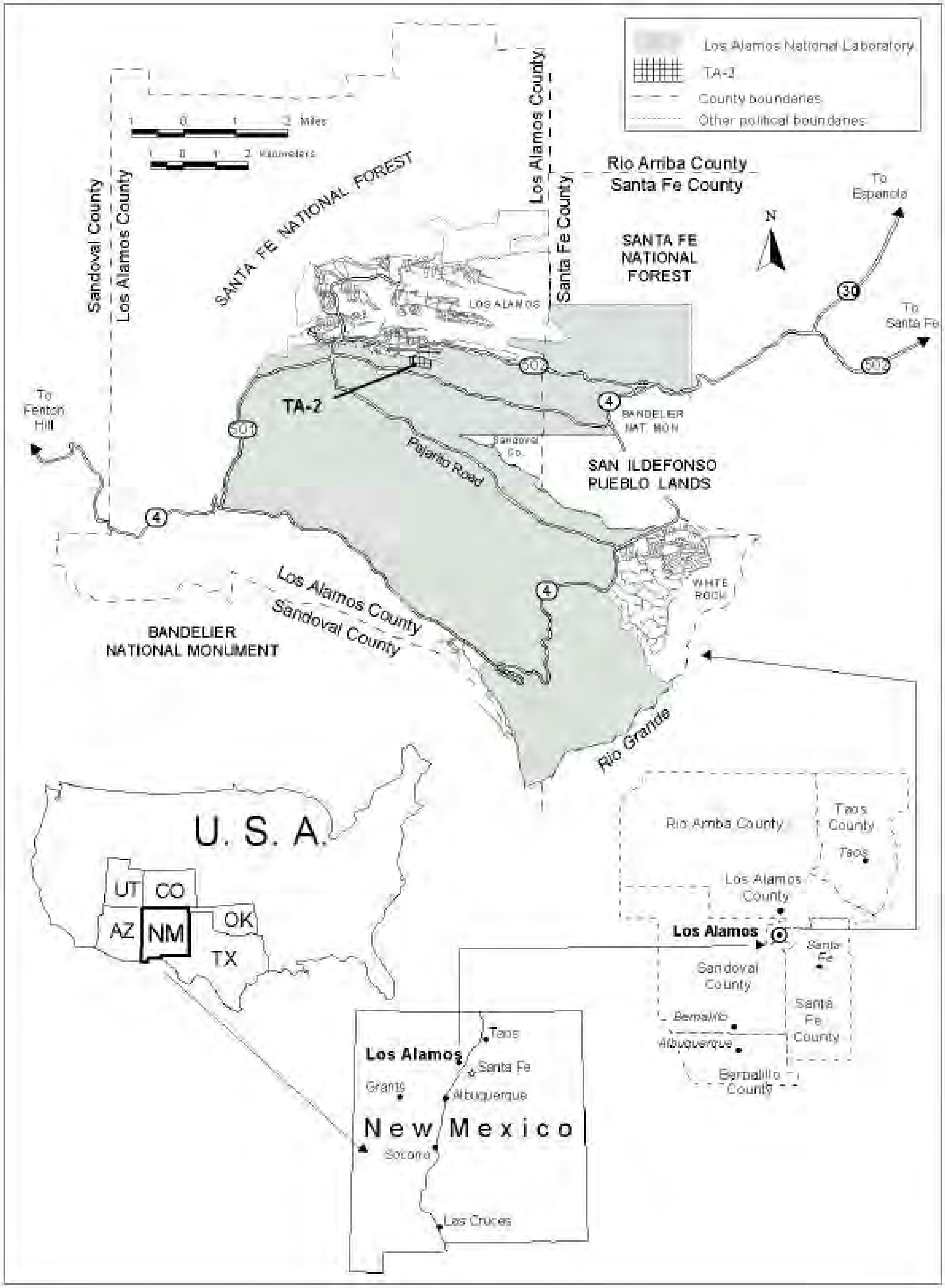

Figure 1. Location of Los Alamos National Laboratory.

In portions of Pueblo, Los Alamos, and Sandia canyons, perched groundwater occurs beneath the alluvium at intermediate depths within the lower part of the Bandelier Tuff and within the underlying conglomerates and basalts. Perched groundwater has been found at depths of about 120 ft (37 m) in the midreach of Pueblo Canyon to about 450 ft (137 m) in Sandia Canyon near the eastern boundary of LANL. This intermediate-depth perched water discharges at several springs in the area of Basalt Spring in Los Alamos Canyon. These intermediate-depth groundwaters are formed in part by recharge from the overlying perched alluvial groundwaters and show evidence of radioactive and inorganic contamination from LANL operations.

Perched water may also occur within the Bandelier Tuff in the western portion of LANL, just east of the Jemez Mountains. The source of this perched water might be infiltration from streams discharging from the mouths of canyons along the mountain front and underflow of recharge from the Jemez Mountains. Industrial discharges from LANL operations may also contribute to perched groundwater in the western portion of LANL. Perched groundwater in the Tschicoma Formation is the source of water supply for the ski area located just west of the LANL boundary in the Jemez Mountains.

The main aquifer of the Los Alamos area is the only aquifer in the area capable of serving as a municipal water supply. The surface of the aquifer rises westward from the Rio Grande within the Tesuque Formation (part of the Santa Fe Group) into the lower part of the Puye Formation beneath the central and western part of the plateau. Depth to the main aquifer is about 1,000 ft (300 m) beneath the mesa tops in the central part of the plateau. The main aquifer is separated from alluvial and perched waters by about 350 to 620 ft (110 to 190 m) of tuff and volcanic sediments with low (less than 10 percent) moisture content.

Water in the main aquifer is under artesian conditions under the eastern part of the Pajarito Plateau near the Rio Grande (Purtymun and Johnson 1974). The source of recharge to the aquifer is presently uncertain. Early research studies concluded that major recharge to the main aquifer is probably from the Jemez Mountains to the west because the piezometric surface slopes downward to the east, suggesting easterly groundwater flow beneath the Pajarito Plateau. However, the small amount of recharge available from the Jemez Mountains relative to water supply pumping quantities, along with differences in isotopic and trace element composition, appear to rule this out. Further, isotopic and chemical composition of some waters from wells near the Rio Grande suggest that the source of water underlying the eastern part of the Pajarito Plateau may be the Sangre de Cristo Mountains (Blake et al., 1995).

Groundwater flow along the Rio Grande rift from the north is another possible recharge source. The main aquifer discharges into the Rio Grande through springs in White Rock Canyon. The 11.5-mi (18.5-km) reach of the river in White Rock Canyon between Otowi Bridge and the mouth of Rito de los Frijoles receives an estimated 4,300 to 5,500 acre-ft (5.3 to 6.8 × 10^6 m^3) annually from the aquifer.

2.1.3 Topographic Setting

LANL and its surrounding environments encompass a wide range of environmental conditions. This is attributed in part to the prominent elevational gradient in the east-west direction. This is also attributable to the complex, local topography that is found throughout much of the region.

The spectacular scenery that is a trademark of the Los Alamos area is largely a result of the prominent elevational gradient of the region. The difference between its lowest elevation in the eastern extremities and its highest elevation on the western boundaries represents a change of approximately 5,146 vertical feet (1,568 m). At the lowest point along the Rio Grande, the elevation is approximately 5,350 ft (1,631 m) above mean sea level. At the opposite elevational extreme, the Sierra de los Valles, which is part of the more extensive Jemez Mountains, forms a continuous backdrop to the landscapes of the study region. The tallest mountain peaks in the Sierra include Pajarito Mountain at 10,441 ft (3,182 m), Cerro Rubio at 10,449 ft (3,185 m), and Caballo Mountain at 10,496 ft (3,199 m).

In addition to the prominent elevational gradient, the Los Alamos region is also topographically complex. Within Los Alamos County, there are three main physiographic systems (Nyhan et al., 1978). From east to west, these systems are the White Rock Canyon, the Pajarito Plateau, and the Sierra de los Valles. White Rock Canyon is 6,200 ft (1,890 m) above mean sea level. This rugged canyon is approximately 1 mi (1.6 km) wide and extends to a depth of nearly 900 ft (275 m). White Rock Canyon occupies about 5 percent of Los Alamos County. The Pajarito Plateau is the largest of the three physiographic systems, occupying nearly 65 percent of Los Alamos County. The Pajarito Plateau is a broad piedmont that slopes gently to the east and southeast. At a more localized scale, the Pajarito Plateau is also topographically complex. The surface of the plateau is dissected into narrow mesas by a series of east-west-trending canyons. Above 7,800 ft (2,377 m), the Sierra de los Valles rises to the western extremity of the study region. These mountains occupy approximately 30 percent of Los Alamos County. The Sierra is also dissected into regularly spaced erosional features, although these canyons in the mountains are not so prominent as the canyons on the Pajarito Plateau.

2.1.4 Weather and Climate

Los Alamos has a temperate, semiarid mountain climate. However, its climate is strongly influenced by elevation, and large temperature and precipitation differences are observed in the area because of the topography.

Los Alamos has four distinct seasons. Winters are generally mild, but occasionally winter storms produce large amounts of snow and below-freezing temperatures. Spring is the windiest season of the year. Summer is the rainy season in Los Alamos, when afternoon thunderstorms and associated hail and lightning are common. Fall marks the end of the rainy season and a return to drier, cooler, and calmer weather. The climate statistics discussed below summarize analyses given in Bowen (1990 and 1992).

Several factors influence the temperature in Los Alamos. An elevation of 7,400 ft (2,256 m) helps to counter its southerly location, making for milder summers than nearby locations with lower elevations. The sloping nature of the Pajarito Plateau causes cold-air drainage, making the coolest air settle into the valley. The Sangre de Cristo

Mountains to the east act as a barrier to arctic air masses affecting the central and eastern United States. The temperature does occasionally drop well below freezing, however. Another factor affecting the temperature in Los Alamos is the lack of moisture in the atmosphere. With less moisture, there is less cloud cover, which allows a significant amount of solar heating during the daytime and radiative cooling during the nighttime. This heating and cooling often causes a wide range of daily temperature.

Winter temperatures range from 30°F to 50°F (-1°C to 10°C) during the daytime to 15°F to 25°F (-9°C to -4°C) during the nighttime. The record low temperature recorded in Los Alamos (as of 1992) is -18°F (-28°C). Winter is usually not particularly windy, so extreme wind chills are uncommon at Los Alamos. Summer temperatures range from 70°F to 88°F (21°C to 31°C) during the daytime to 50°F to 59°F (10°C to 15°C) during the nighttime. Temperatures occasionally will break 90°F (32°C). The highest temperature ever recorded (as of 1992) in Los Alamos is 95°F (35°C).

The average annual precipitation in Los Alamos is 18.73 in. (47.57 cm). The average snowfall for a year is 58.9 in. (149.6 cm). Freezing rain and sleet are rare at Los Alamos. Winter precipitation in Los Alamos is often caused by storms entering the United States from the Pacific Ocean, or by cyclones forming or intensifying in the lee of the Rocky Mountains. When these storms cause upslope flow over Los Alamos, large snowfalls can occur. The snow is usually a dry, fluffy powder with an average equivalent water-to-snowfall ratio of 1:20.

The summer rainy season accounts for 48 percent of the annual precipitation. During the July–September period, orographic thunderstorms form when moist air from the Gulf of Mexico and the Pacific Ocean moves up the sides of the Jemez Mountains. These thunderstorms can bring large downpours, but sometimes they only cause strong winds and lightning. Hail frequently occurs from these rainy-season thunderstorms.

Winds in Los Alamos are also affected by the complex topography, particularly in the absence of a large-scale disturbance. There is often a distinct daily cycle of the winds around Los Alamos. During the daytime, upslope flow can produce a southeasterly wind on the plateau. In the evening, as the mountain slopes and plateau cool, the flow moves downslope, causing light westerly and northwesterly flow. Cyclones moving through the area disturb and override the cycle. Flow within the canyons of the Pajarito Plateau can be quite varied and complex.

2.1.5 Plant Communities

The Pajarito Plateau, including the Los Alamos area, is biologically diverse. This diversity of ecosystems is due partly to the dramatic 5,000-ft (1,500-m) elevation gradient from the Rio Grande on the east to the Jemez Mountains 12 mi (20 km) to the west, and partly to the many steep canyons that dissect the area. Five major vegetative cover types are found in Los Alamos County: juniper (*Juniperus monosperma* [Engelm.] Sarg.)-savanna, piñon (*Pinus edulis* Engelm.)-juniper, ponderosa pine (*Pinus ponderosa* P. & C. Lawson), mixed conifer, and spruce-fir. The juniper-savanna community is found along the Rio Grande on the eastern border of the plateau and extends upward on the south-facing sides of canyons at elevations between 5,600 to 6,200 ft (1,700 to 1,900 m). The piñon-juniper cover type, generally in the 6,200- to 6,900-ft (1,900- to 2,100-m) elevation range, covers large portions of the mesa tops and north-facing slopes at the lower elevations. Ponderosa pines are found in the western portion of the plateau in the 6,900- to 7,500-ft (2,100- to 2,300-m) elevation range. These three cover types predominate, each occupying roughly one-third of the LANL site. The mixed conifer cover type, at an elevation of 7,500 to 9,500 ft (2,300 to 2,900 m), overlaps the ponderosa pine community in the deeper canyons and on north-facing slopes and extends from the higher mesas onto the slopes of the Jemez Mountains. Spruce-fir is at higher elevations of 9,500 to 10,500 ft (2,900 to 3,200 m). Twenty-seven wetlands and several riparian areas enrich the diversity of plants and animals found on LANL lands.

2.1.6 Post-fire Plant Communities

In May 2000, the Cerro Grande Fire burned over 43,000 ac (17,200 ha) of forest on and around LANL. Most of the habitat damage occurred on Forest Service property to the west and north of LANL. An assessment of fire-induced vegetation mortality was made by the Burned Area Emergency Rehabilitation Team (BAER 2000) and is discussed for threatened and endangered species in the Wildfire Hazard Reduction Plan Biological Assessment (Haarmann and Loftin 2001). Some vegetation was burned in floodplains, but not in wetlands.

2.1.7 Pre- and Post-fire Hydrology

McLin (1992) modeled all major 100-year floodplains for LANL using US Army Corps of Engineers Hydrologic Engineering Center HEC-1 and HEC-2 computer based models. These data represent pre-fire flow rates for all of the floodplains on LANL. Post-fire maps and modeling are being created and will be completed by September 2001 (McLin, pers. comm.). However, an estimate of the flows for every canyon post-fire is roughly a magnitude of ten greater than the pre-fire model data (McLin, pers. comm.). Best available information estimates the post-fire 100-year, 6-hour flood event to cover the canyon bottom at least one foot high, canyon wall to canyon wall.

3.0 PROJECT DESCRIPTION

3.1 Goals and Objectives of the OWR D&D Plan

The overall goals of the OWR D&D are to

1) protect the public, LANL workers, facilities, and the environment from contamination and flood debris,
2) minimize impacts to cultural and natural resources while conducting a clean up of the OWR location, and
3) improve forest health and wildlife habitat through decreasing the likelihood of contaminant release.

The above goals will be accomplished through the following specific objectives:

1) Fix or remove sources of contamination at the OWR.
2) Remove a majority, if not all, of the structures of the OWR so that the debris can not be transported down the canyon in a flood event.
3) Limit the environmental impacts of the D&D as much as possible during the clean up.

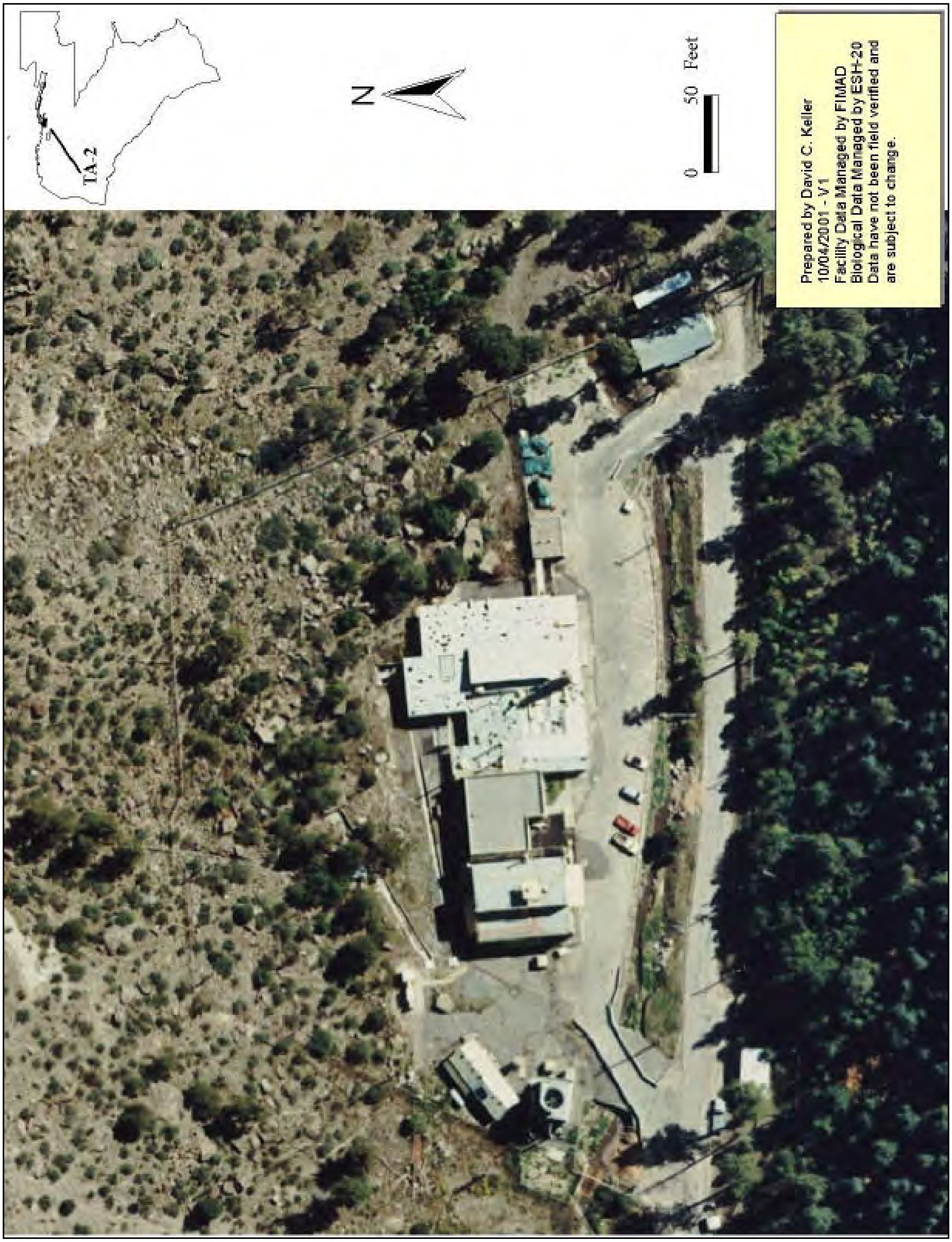

Figure 2. Omega West Reactor D&D Project Area.

3.2 End-State Conditions

The return of the OWR location to near preoccupation conditions and the removal of as much contamination as possible are the desired results of this project.

4.0 DESCRIPTION AND EFFECTS ON FLOODPLAINS AND WETLANDS

Pursuant to EO 11988, Floodplain Management, each federal agency is required, when conducting activities in a floodplain, to take actions to reduce the risk of flood damage; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Title 10 CFR Part 1022.4 defines a flood or flooding as "…a temporary condition of partial or complete inundation of normally dry land areas from....the unusual and rapid accumulation of runoff of surface waters..." Title 10 CFR Part 1022.4 identifies floodplains that must be considered in a floodplain assessment as the base floodplain and the critical-action floodplain. The base floodplain is the area inundated by a flood having a 1.0 percent chance of occurrence in any given year (referred to as the 100-year floodplain). The critical-action floodplain is the area inundated by a flood having a 0.2 percent chance of occurrence in any given year (referred to as the 500-year floodplain). Critical action is defined as any activity for which even a slight chance of flooding would be too great. Such actions could include the storage of highly volatile, toxic, or water-reactive materials.

Pursuant to EO 11990, Protection of Wetlands, each federal agency is to avoid, to the extent practicable, the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands if a practicable alternative exists. DOE 10 CFR Section 1022.4(v) states "Wetlands means those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mudflats, and natural ponds."

According to 10 CFR 1022.12(a)(2), a floodplain/wetland assessment is required to discuss the positive and negative, direct and indirect, and long- and short-term effects of the proposed action on the floodplain and/or wetlands. In addition, the effects on lives and property and on natural and beneficial values of floodplains must be evaluated. For actions taken in wetlands, the assessment should evaluate the effects of the proposed action on the survival, quality, and natural and beneficial values of the wetlands. If the US Department of Energy (DOE) finds no practicable alternative to locating activities in floodplains or wetlands, DOE will design or modify its actions to minimize potential harm to or in the floodplains and wetlands. The floodplains and wetlands that are assessed herein are those areas in canyons or drainages that are seasonally inundated with perennial or intermittent streams from runoff during 100-year floods.

4.1 General

Wetland functions are naturally occurring characteristics of wetlands such as food web production; general, nesting, resting, or spawning habitat; sediment retention; erosion prevention; flood and runoff storage; retention and future release; groundwater discharge, or recharge; land nutrient retention and removal. Wetland values are ascribed by society based on perception of significance and include water quality improvement, aesthetic or scenic value, experiential value, and educational or training value. These values often reflect concerns regarding economic values; strategic locations; and in arid regions, location relative to other landscape features. Thus, two wetlands with similar size and shape could serve the same function but have different values to society. For example, a wetland that retains or changes flood flow timing of a flood high in the mountains might not be considered as valuable as one of similar size that retains or changes flood flow timing of a flood near a developed community. Wetlands were addressed in the LANL Site-Wide Environmental Impact Statement as follows (DOE 1999):

> "Wetlands in the general LANL region provide habitat for reptiles, amphibians, and invertebrates and potentially contribute to the overall habitat requirements of the peregrine falcon, Mexican spotted owl, southwestern willow flycatcher, and spotted bat. Wetlands also provide habitat, food, and water for many common species such as deer, elk, small mammals, and many migratory birds and bats. The majority of the wetlands in the LANL region are associated with canyon stream channels or are present on mountains or mesas as isolated meadows containing ponds or marshes, often in association with springs."

Presence or absence of floodplains and wetlands in the project area of Los Alamos Canyon have been assessed using Flood Hazard Boundary Maps for Los Alamos County (DHUD 1987), geographic information system (GIS) data sets, including the National Wetlands Inventory from the US Fish and Wildlife Service (USFWS), University of California (UC) internal data sets, on-site surveys, and previously developed floodplain modeling (McLin 1992). Proposed uses for each of the canyons being evaluated for the OWR Project are discussed, and specific information on floodplains, tract wetlands, and adjoining or nearby wetlands is provided.
Locations of floodplains and wetlands associated with, or close to, the proposed OWR Project appear below. McLin (1992) modeled all major 100-year floodplains for LANL using US Army Corps of Engineers Hydrologic Engineering Center HEC-1 and HEC-2 computer based models. Figure 3 represents those floodplains in the project area of LANL. Wetlands within LANL have been broadly mapped by the USFWS. This information is available in the National Wetlands Inventory (NWI) in a GIS-based format. This hierarchical system follows Cowardin et al. (1979), and is based entirely on aerial photography. Small wetlands, or those in steep canyons, may not be detected using this method. Additional on-site surveys and internal UC databases were also used to gather information regarding these resources. The direct and indirect (both primary and secondary) effects of the OWR D&D on floodplain and wetlands resources located in the Los Alamos Canyon project area are discussed below. Effect of proposed floodplain actions on lives and property and on natural and beneficial floodplain values is evaluated.

Clean Water Act 404 permit process requirements would limit development in wetlands without regulatory review and consensus from the Corps of Engineers.

4.2 Canyon Area Issues and Concerns

Los Alamos Canyon on LANL land is comprised primarily of mixed conifer and ponderosa pine. This canyon has been identified as core habitat for the Mexican spotted owl. Guidelines are being established in the concurrent Biological Assessment. Until the Biological Assessment, which is law-binding, is approved by the USFWS no activities should occur in this area.

This document will evaluate concerns of potential increased stormwater flows down canyon into undeveloped canyon. These concerns include a potential for impacts to floodplain and wetland values and contaminant-plume movement. Potential effects are based on areas of impervious surface during and following the D&D.

5.0 LOS ALAMOS CANYON PROJECT AREA FOR FLOODPLAINS AND WETLANDS

5.1 Description

Los Alamos Canyon is predominantly comprised of mixed conifer forest on the north-facing slope and ponderosa pine and piñon juniper on the south-facing slope. There is an ephemeral stream in the bottom of the canyon within the proposed D&D site (see Figure 3). There are wetlands of a riverine and temporarily flooded type along the edges of the stream. The wetlands fit the National Wetland Inventory classification of palustrine, shrub-scrub, broadleaf deciduous, and temporarily flooded (PSS1A). The Los Alamos Canyon weir was created during mitigation measures for the CGF. Hydrophytes, particularly cattails, are present and vegetation in general is growing well, even on ash deposits. This wetland is a site both impacted by and created because of the CGF. It will be important to monitor its progress as time goes on for the speed of its development and for its ability to act as a contaminant and ash sponge.

The 100-year floodplain covers the entire canyon bottom. There was little or no fire damage from the Cerro Grande Fire in the project area; however, the majority of the upper watershed to the west of the project area suffered 100% vegetation mortality. There is an established road the length of the canyon, which is paved to the west of the site and dirt to the east of the site.

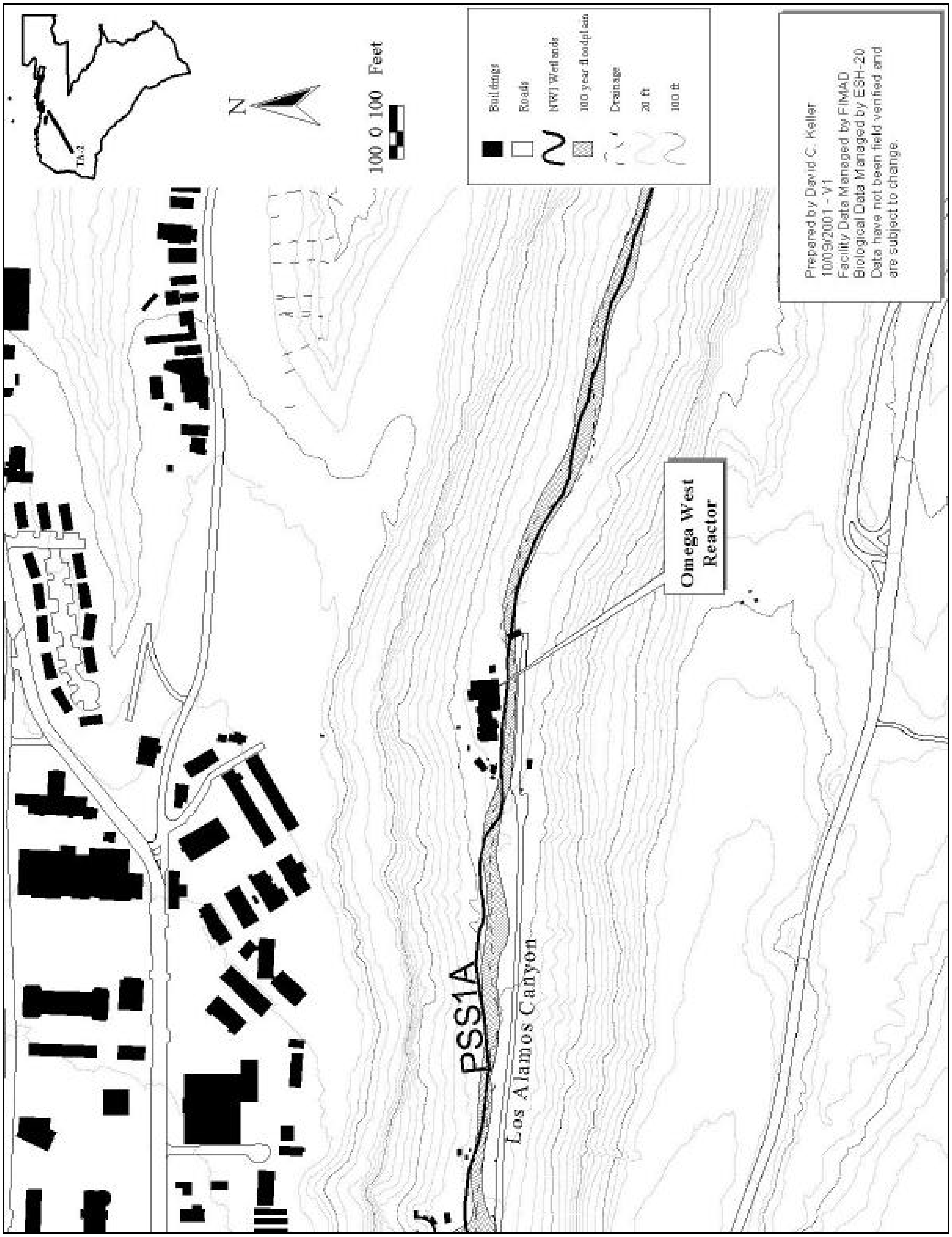

Figure 3. Location of Floodplain and Wetlands in the Project Area.

5.2 Floodplains and Wetlands Impacts from Proposed OWR D&D

Floodplains

The 100-year floodplain as described for the purpose of this project covers the length and breadth of the canyon bottom.

Wetlands

There are wetlands associated with this canyon.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon, as long as previously approved best management practices are considered for the OWR site. A possible direct effect of the OWR Project is the increase of erosion and storm water runoff. These effects are difficult to predict in a 100-year flood event based on current information.

Work conducted in Los Alamos Canyon may contribute to increased sediment movement, and there may be some retention of those sediments by the wetlands, particularly the wetland forming at the weir. Mitigation should be installed to minimize these impacts.

Secondary indirect impacts (outside of the project area) resulting from the OWR Project could result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio). Off-site floodplain values potentially impacted by the project include alteration of flood flow retention times, redistribution of sediments, and stream channel migration. Mitigation could be installed to minimize these impacts.

Off-site wetland values potentially impacted by the OWR Project include alteration of downstream food production, nesting, foraging, or resting habitat; sediment retention time changes; and loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater from exposed soils. Mitigation could be installed to minimize these impacts.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during the D&D process. These best management practices should incorporate considerations of the National Pollutant Discharge Elimination System permit program and Environmental Protection Agency requirements for a Stormwater Pollution Prevention Plan.

5.3 General Mitigation for the OWR D&D

In all cases, best management practices should be followed as per the OWR Biological Assessment (in review), the Special Environmental Analysis (DOE 2000) related to the Cerro Grande Fire, and any and all DOE and LANL best management practices for wetlands and floodplains.

All work conducted for the proposed OWR Project that involves the disturbance of soils through road building, continuous use of roads, off road vehicle use, and dragging of debris, potentially contributes to an increase in sediment movement during a 100-year storm event. This in turn can possibly increase the amount of contaminants being removed to downstream areas, particularly if soils are disturbed in canyons. Mitigation actions associated with activities in floodplains will in part depend upon best management practices already in place for potential release sites, erosion control, and post-project mitigation found in the OWR Biological Assessment and the Cerro Grande Fire Special Environmental Analysis Mitigation Plan.

In general, no debris should be left in the floodplains (e.g., canyon wall to canyon wall). This includes all debris and D&D material. Leaving debris of any kind in a drainage, stream channel, or water course, even if it only runs seasonally, may invoke a penalty under Sections 401 and/or 404 of the Clean Water Act. Be sure enough trees and other vegetation remain along channel edges to stabilize the banks.

Best management practices should be employed when working in canyon bottoms since the entire area is considered potentially contaminated. Minimizing soil disturbance and contaminant movement is desired. Following the already prescribed method of using established roads only in canyon bottoms will help with this issue.

In addition, there are mitigation measures employed by US Forest Service that aid in the prevention of increased erosion, contaminant movement, and stormwater runoff that should be considered. These suggestions are for all canyon areas, since the increase in potential erosion and movement of sedimentation into the floodplains increases with soil disturbing activities. These methods include decreasing the compounding effects of vehicle use and removal of debris. Reducing the amount of areas of bare soil simultaneously is optimal at any time of year, but particularly during the monsoon months (late June-early September). Los Alamos Canyon has severely burned headlands and may be sensitive to sedimentation during the monsoon season in particular.

5.4 Los Alamos Canyon Additional Best Management Practices

General mitigation requirements to limit erosion and preserve habitat are as follows.

- Soils should not be removed during heavy rains or when the reservoir will need to be drained.
- Soils should not be stored or stockpiled in the bottom of Los Alamos Canyon.
- Soil disturbance should be kept to an absolute minimum.
- Best management practices should be strictly adhered to and maintained. Storm water leaving the site must be near normal in rate of flow and sediment content.
- All activity areas must be bermed to prevent storm events from reaching the stream channel.

Wetlands:

- The vegetation along the stream channel should be preserved as much as possible.
- Work must not be done along the stream channel with heavy equipment while the soil is wet.
- Off road activities must be restricted as much as possible and not used when an existing road is available.
- All soils along the stream channel must be re-vegetated with native species as soon as possible, including during downtime in D&D activity.
- Any areas of wetland or soft soils must be crossed on large sheets of plywood or other such material to distribute the weight of machinery and limit soil disturbance.

Floodplains:

- There can be no storage of equipment or loose materials in the floodplain.
- There can be no vehicle maintenance or fueling with in 100 ft (30 m) of the stream channel.
- All vehicles must be in good working condition and not leaking fluids.
- All the dust produced during activities must be suppressed and not allowed to settle in the floodplain where they may be swept down stream.
- All debris must be cleaned soon after development, especially during monsoon season.

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