DOE/EA-0843
June 1994

ENVIRONMENTAL ASSESSMENT
IDAHO NATIONAL ENGINEERING LABORATORY
LOW-LEVEL AND MIXED WASTE PROCESSING

Prepared for the
U.S. DEPARTMENT OF ENERGY
Office of Environmental Restoration and Waste Management

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PREFACE

In response to public comments, DOE is now proposing only a portion of the proposed actions analyzed in this Environmental Assessment (EA). The following provides information about the modified proposed action.

DOE initially prepared a draft EA to assess the environmental impacts of a previous proposal. The previous proposal was to (1) provide treatment, in compliance with the Resource Conservation and Recovery Act, by production-scale incineration of mixed low-level waste (MLLW) at the Idaho National Engineering Laboratory (INEL) Waste Experimental Reduction Facility (WERF); (2) reduce the volume of INEL-generated low-level waste (LLW) through sizing, compaction, stabilization, and incineration at WERF; and (3) use commercial offsite facilities for supplemental LLW volume reduction (incineration).

DOE is now proposing not to incinerate MLLW or LLW at WERF at this time. Onsite sizing, compaction, and stabilization of INEL-generated LLW for volume reduction as discussed in the EA are still being proposed. Incineration of LLW at an offsite commercial (non-DOE) facility is also still proposed. Under the modified proposal, incineration of MLLW and LLW at WERF will not occur unless and until such a decision is made in the Record of Decision, based on the Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement (SNF and INEL EIS).

The original proposed action, referred to as the "proposal" in the body of this EA, is an alternative to the current, modified proposal. In addition, the EA evaluates five other alternative actions: no action, alternative MLLW treatment and WERF operations for LLW only, LLW disposal without volume reduction and storage only for MLLW, the construction and operation of a new MLLW incinerator and continued WERF operations for LLW, and treatment of MLLW at another DOE MLLW incinerator and continued WERF LLW operations.

The EA includes analysis of the environmental impacts of the current modified proposal. The EA analyzes the impacts of (1) LLW sizing, compaction, and stabilization at INEL; (2) offsite treatment (by incineration at the Scientific Ecology Group, Inc. facility in Oak Ridge, Tennessee or a alternative, non-DOE, commercial facility) and return of the ash to INEL prior to disposal at INEL; and (3) the continued storage of untreated MLLW at INEL. The portions of the current proposed action at INEL would occur in an existing previously developed area and would not affect wetlands, floodplains, rare or endangered species or their habitat, or archaeological resources. Significant construction would not be required, and there are no significant socioeconomic impacts since the workforce is already in place.

Because incineration activities at WERF will not occur unless and until such a decision is made in the Record of Decision for the SNF and INEL EIS, the incinerator-based atmospheric emissions from the WERF of radionuclides, criteria pollutants, or organic or metallic carcinogens would not occur. Sizing, compaction, and stabilization activities would involve only INEL generated LLW, and there would be no associated organic or metallic carcinogen atmospheric emissions. The sizing and compaction room ventilation air would be filtered by two baghouses in series and a high-efficiency particulate air filter, which have a combined particulate removal efficiency of 99.99 percent. The

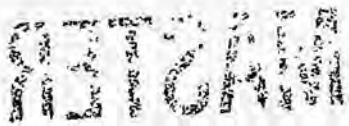
National Emission Standards for Hazardous Air Pollutants standard for radiation emissions under 40 Code of Federal Regulations (CFR) Part 61 is 10 mrem. The INEL has established and operational site limit of 0.1 mrem. The emissions projected for sizing, compacting, and stabilizing operations would result in radiation effective dose equivalents which are well below the 0.1 mrem operational limit. Sizing, compacting, and stabilizing activities at WERF would result in less than 0.0001 latent cancer fatalities per year from radiological releases to the affected population of 160,120 persons.

Section 4.2 of the EA discusses the impacts expected from the shipment of INEL LLW (to and from INEL) for offsite volume reduction. These associated actions may result in radiological exposures to truck drivers and the public from incident-free operations and accidents. The maximum cumulative radiological health risk to transportation workers from incident-free shipping over a 20-year campaign is 0.09 fatalities; for the public under this same campaign of shipments, the incident-free risk is 0.8 fatalities. An additional 0.8 excess fatalities would result to workers from accidents.

Proposed offsite incineration of INEL LLW would be conducted at a private (non-DOE) facility subject to air emission standards. The source terms (i.e., the amount and types of materials to be incinerated) are provided in the EA for the WERF incinerator, as are the associated impacts of normal operations and accidents. The incremental impacts of proposed offsite incineration of INEL LLW are expected to be similar. The radiological exposures (estimated to be 1.1 mrem) associated with incineration of LLW would be approximately 1/500 and 1/5000 of the DOE limits for workers (500 mrem/yr for non-radiation workers and 5000 mrem/yr for radiation workers, respectively) and 1/100 (estimated to be .096 mrem) of the permissible dose to a maximally exposed member of the public (10 mrem/yr) (EA Section 4.1.1.1). These exposures would result in a lifetime risk of contracting fatal cancer for an individual exposed for 70 years of less than 1 in 10,000. Non-radiological chemical impacts from organic or metallic carcinogens would not occur since MLLW would not be incinerated.

Because incineration activities at WERF would not occur, the accidents associated with incinerator operations at INEL would not occur. Accidents associated with compactor operations are discussed in the EA. A compactor fire would not have significant worker or public health impacts because the high-efficiency particulate air filters are located external to the compactor building. The details of the bounding compactor accident are in Section 4.3.4 of the EA.

Under the modified proposal, DOE will not incinerate MLLW or LLW at WERF unless and until such decisions are made in the Record of Decision based on analyses in the SNF and INEL EIS. This SNF and INEL EIS will discuss overall INEL waste management activities, programs, and projects proposed for INEL. The SNF and INEL EIS is scheduled to be issued to the public in draft in June 1994; the final EIS is scheduled to be issued in April 1995, and the Record of Decision in June 1995. However, the modified proposal concerning LLW is needed for the current and anticipated inventory of LLW regardless of whether any future decision is made in the Record of Decision to incinerate LLW and MLLW at WERF. The proposal would not necessitate, or otherwise influence, any future decision to incinerate either LLW or MLLW at WERF. Also, the proposed offsite incineration of LLW would be geographically separate from, and would primarily affect different workers and different populations than, any future incineration at WERF.



The modified proposal is not encompassed within the classes of actions that normally require an EA or an environmental impact statement under DOE's National Environmental Policy Act Implementing Procedure, 40 CFR Subpart D, Appendices C and D. Therefore, in accordance with 40 CFR 1021.400, DOE has prepared this EA, as modified by this preface, to determine whether to prepare an EIS for the current proposal or to issue a finding of no significant impact.

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FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

AAC	acceptable ambient concentration
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ACGIH	American Conference of Government Industrial Hygienists
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DRE	destruction removal efficiency
EA	Environmental Assessment
EDE	effective dose equivalent
EIS	Environmental Impact Statement
EM	Office of Environmental Restoration and Waste Management
EPA	Environmental Protection Agency
ER&WM	environmental restoration and waste management
FR	Federal Register
HCl	hydrochloric acid
HEPA	high-efficiency particulate air
IDAPA	Idaho Administrative Procedures Act
IDEQ	State of Idaho Department of Environmental Quality
IDLH	immediately dangerous to life and health
INEL	Idaho National Engineering Laboratory
LANL	Los Alamos National Laboratory
LDR	land disposal restriction
LLW	low-level waste

MEI	maximally exposed individual
MLLW	mixed low-level waste
NCI	National Cancer Institute
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NIC	Notice of intended change
NIOSH	National Institute of Occupational Safety and Health
NO_x	nitrogen oxides
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NSB	nearest site boundary
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Act
PEIS	Programmatic Environmental Impact Statement
PEL	permissible exposure limit
RCRA	Resource Conservation and Recovery Act
RFP	Rocky Flats Plant
RWMC	Radioactive Waste Management Complex
SO_2	sulfur dioxide
SRS	Savannah River Site
STEL	short-term exposure limit
TAN	Test Area North
TLV	threshold limit value

TSCA	Toxic Substances Control Act
TWA	time-weighted average
USFWS	U.S. Fish and Wildlife Service
WAC	waste acceptance criteria
WERF	Waste Experimental Reduction Facility

ENVIRONMENTAL ASSESSMENT IDAHO NATIONAL ENGINEERING LABORATORY LOW-LEVEL AND MIXED WASTE PROCESSING

1. INTRODUCTION

This Environmental Assessment (EA) has been prepared by the U.S. Department of Energy (DOE) to identify and evaluate the potential environmental impacts of a proposed action to expand mixed low-level waste (MLLW) (waste materials containing both low-level radioactive and hazardous constituents) treatment operations at the Idaho National Engineering Laboratory (INEL) Waste Experimental Reduction Facility (WERF), and to use commercial facilities for supplemental low-level waste (LLW) volume reduction. The proposed action would enable DOE to provide effective long-term management of INEL MLLW and LLW using methods that are technically and environmentally sound and responsive to regulatory and policy requirements.

The EA was prepared in accordance with the requirements of the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality regulations [40 Code of Federal Regulations (CFR) 1500-1508] and DOE NEPA regulations [10 CFR 1021]. It will aid in determining if a "finding of no significant impact" should be issued or an Environmental Impact Statement (EIS) should be prepared prior to decisionmaking regarding implementation of the proposed action.

1.1 Background

The INEL is a DOE nuclear research and defense program facility located near Idaho Falls, Idaho (Figure 1). It was established in 1949 for constructing, testing, and operating nuclear facilities. Current INEL activities include reactor operations, treatment and storage of reactor fuel and radioactive waste, and environmental restoration.

The INEL generates LLW and MLLW while performing energy, defense, and environmental restoration missions. Prior to 1982, LLW and MLLW were disposed of directly by shallow land burial at the INEL Radioactive Waste Management Complex (RWMC). In 1982, WERF was established to develop and demonstrate LLW volume reduction and stabilization processes.

WERF is a Resource Conservation and Recovery Act (RCRA) interim status facility located in a decontaminated and decommissioned building formerly occupied by the Power Burst Facility nuclear reactor (see Figure 1). The proposed mission of WERF is to develop and apply safe, efficient, production-scale methods for volume reduction and stabilization of LLW and MLLW. Volume reduction is accomplished by compaction, metal size reduction, and incineration with ash stabilization. Waste processing support components include a waste storage building and asphalt pads, liquid waste blending and feed equipment, waste repackaging areas, and administrative support facilities. WERF began metal sizing operations in 1982, LLW incineration in 1984, and LLW compaction and ash stabilization in 1987. Most of the waste processed at WERF is LLW; however,

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ARA	Auxiliary Reactor Area
ANL-W	Argonne National Laboratory - West
CFA	Central Facilities Area
EBR I	Experimental Breeder Reactor I
EBR II	Experimental Breeder Reactor II
ICPP	Idaho Chemical Processing Plant
IET	Initial Engineering Test
LOFT	Loss-of-Fluid Test (Facility)
MWSF	Mixed Waste Storage Facility
NRF	Naval Reactor Facility
PBF	Power Burst Facility
PREPP	Process Experimental Pilot Plant
RWMC	Radioactive Waste Management Complex
STF	Security Training Facility
TAN	Test Area North
TRA	Test Reactor Area
TREAT	Transient Reactor Test (Facility)
WEDF	Waste Engineering Development Facility
WERF	Waste Experimental Reduction Facility
WRRTF	Water Reactor Research Test Facility
ZPPR	Zero Power Physics Reactor

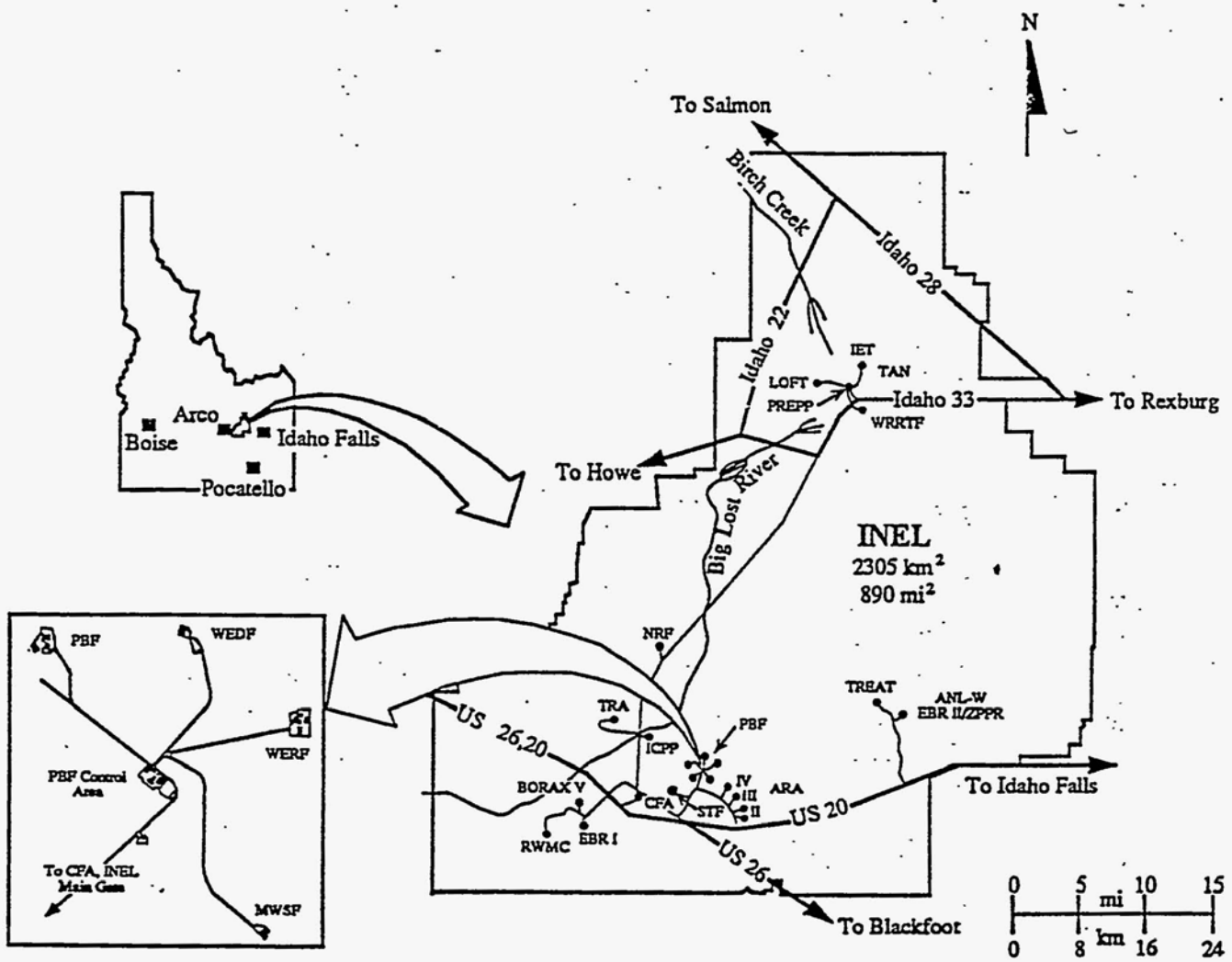

Figure 1. INEL and facility locations.

eight MLLW incineration campaigns were performed during 1989 and 1990. The MLLW campaigns were conducted using solid waste feedstocks that exhibited reactive and/or toxic metal characteristics identified in the Environmental Protection Agency (EPA) Hazardous Waste Categories D003 through D011 (40 CFR 261.23-24). The campaigns treated approximately 26 m^3 of WERF flyash from previous campaigns, 11 m^3 of waste from the Mixed Waste Storage Facility, and 28 m^3 of classified waste from offsite. These campaigns were conducted efficiently and there were no unusual events or system upsets.

A WERF waste stream flow diagram is shown in Figure 2, and the facility layout is depicted in Figure 3. Prior to sending waste to WERF, waste generators provide required data on waste characteristics to verify compliance with appropriate waste acceptance criteria (WAC). The WAC prescribe specific requirements to ensure proper waste management and protection of health, safety, and the environment. With regard to radioactivity, WERF can accept only contact-handled waste. The waste packages can be handled directly by workers and do not require special shielding or remote handling. Waste that meets the WAC is transported to WERF in metal or wooden boxes, cardboard boxes loaded into cargo containers, or metal drums. The waste containers are stored on asphalt pads or inside the WERF waste storage building, depending on the waste form, packaging, and designated treatment or volume reduction process.

Waste compaction and sizing are performed in the sizing/compaction building on LLW only. Solid LLW is compacted in a 180,000-kg hydraulic press resulting in volume reductions of approximately 5:1. Containers of bagged, compactible LLW are transported from storage by forklift to the compactor area where the waste is transferred to metal compaction boxes and compacted. Full boxes are removed from the compactor by forklift, a lid is installed and locked in place, and the box is removed for transport to and disposal at RWMC.

Metallic waste requiring size reduction is transferred from storage into the sizing area. Coated materials are stripped and the metal is cut into smaller pieces using plasma-arc, air-arc, and oxy-acetylene cutting systems. After sizing, the waste is repackaged in approved waste disposal containers. Sizing results in typical volume reductions of 5:1.

Solid incinerable waste is bagged by the generators, packaged in cardboard boxes, and placed in cargo containers for transportation to WERF. At WERF, waste boxes are transported from cargo containers to the WERF incinerator area on pallets. The incineration process includes evaluating each box by radiographic inspection, weighing, and radiation monitoring. The boxes are then burned in a dual-chambered, controlled-air incinerator. Bottom ash is collected for stabilization or direct disposal, and fly ash is collected from the offgas filtration system for stabilization.

Liquid waste is pumped into the incinerator through injection nozzles designed to provide high-efficiency combustion by atomizing waste into fine droplets. Liquid waste that cannot be pumped through injection nozzles may be absorbed onto combustible media in boxes prior to incineration.

Residues from incineration (fly ash, bottom ash, and sizing facility baghouse dust) are stabilized in cement by pouring cement and water into drums that are partially filled with ash. The drums are tumbled to mix the contents, cured, and sealed for transport and disposal. Incineration results in typical waste volume reduction ratios of 200:1 (incineration only) or 70:1 if the ash is stabilized.

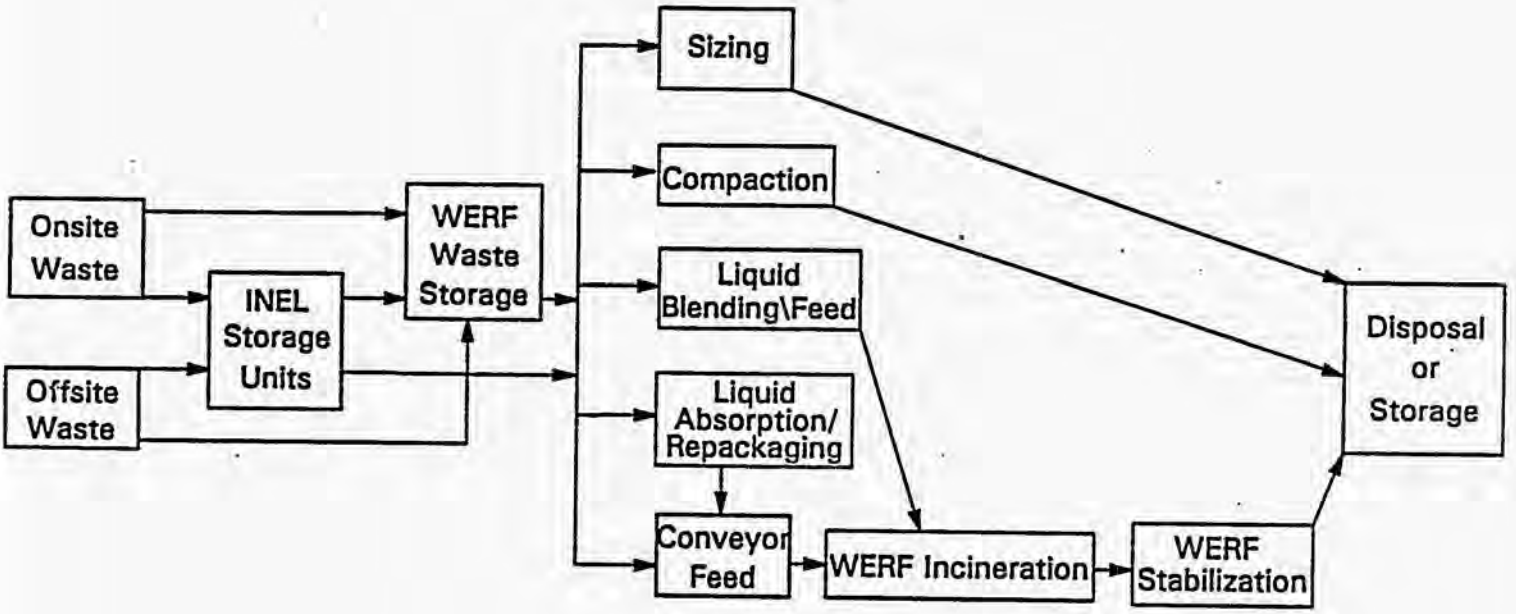

Figure 2. WERF waste stream flow diagram.

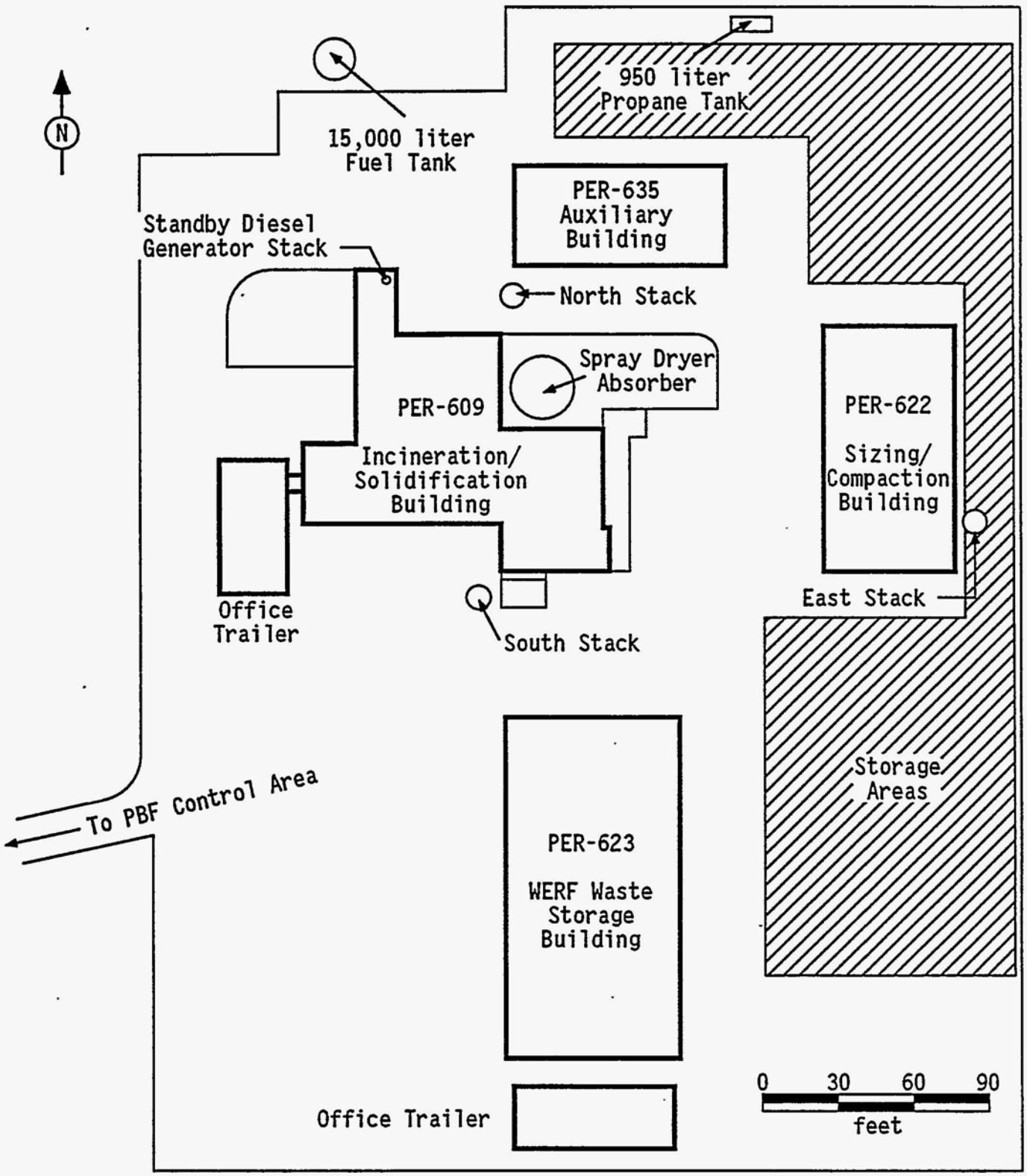

Figure 3. Layout of WERF facilities (approximate scale).

WERF has been an essential component of INEL's waste management program since 1982. For example, in 1988, 1989, and 1990, WERF processed 3,000 m^3; 2,700 m^3; and 3,200 m^3; respectively, of solid LLW, and reduced the total volume by an average of 10:1 (DOE, 1988). WERF operations were suspended in February 1991 to upgrade safety documentation, operating procedures, and management systems.

1.2 Purpose of Agency Action

The purpose of the proposed DOE action is to provide RCRA compliant treatment capability for INEL MLLW and to reduce the volume of LLW before disposal. The action would reduce the volume and toxicity of MLLW and comply with RCRA regulations (40 CFR 268) and Idaho Hazardous Waste Management Act requirements. In addition, the action would support continued compliance with the following DOE Order 5820.2A requirement: "Waste treatment techniques such as incineration, shredding, compaction, and solidification or other RCRA approved treatments to reduce volume and provide more stable waste forms shall be implemented as necessary to meet [disposal facility] performance requirements." The proposed action would also aid DOE in fulfilling its responsibility for providing long-term management of MLLW and LLW using methods that are technically and environmentally sound.

1.3 Need for Agency Action

DOE needs to treat MLLW to comply with RCRA requirements for storage and disposal, and to provide support for ongoing INEL activities that generate MLLW. DOE also needs LLW volume reduction support to supplement existing treatment capabilities and to provide technologies not presently available at the INEL (e.g., metal melting and decontamination). Both parts of the proposed action would support compliance with DOE Order 5820.2A requirements for waste volume reduction and stabilization.

Disposal of MLLW is constrained because of a shortage of treatment facilities and disposal sites. To dispose of MLLW in accordance with RCRA land disposal restrictions (LDRs), the hazardous constituents must be treated unless the disposal site(s) can demonstrate to EPA that migration of hazardous constituents in the untreated waste will not occur. No site has been approved for disposal of MLLW without treatment. Certain types of MLLW must be incinerated to comply with the EPA's technology-based treatment standards (40 CFR 268).

MLLW is currently stored at various INEL facilities. The current inventory includes approximately 72 m^3 of incinerable MLLW. Approximately 60 days of production-scale incineration at WERF would be required to treat the existing inventory of MLLW. Based on LDR requirements, this waste may be stored solely for the purpose of accumulating quantities sufficient to facilitate treatment. Currently, WERF is the only operable DOE facility capable of incinerating INEL MLLW; commercial incineration of INEL MLLW is not available. Future INEL activities are expected to generate approximately 48 m^3 of incinerable MLLW each year. Treatment capacities must be available for this newly generated MLLW.

WERF operations were suspended in February 1991 to upgrade safety documentation, operating procedures, and management systems. The documentation is being revised to reflect actual WERF configurations and to comply with recently issued DOE orders. The documentation and facility operational readiness will be evaluated and approved by DOE and contractor oversight teams before waste reduction operations are resumed. A large inventory of LLW requiring volume reduction has accumulated since WERF operations were suspended. The accumulating inventory of LLW needing volume reduction has prompted the INEL to review alternatives for managing this waste. The LLW is presently stored outside WERF on asphalt pads and at generator sites in plywood boxes or cargo containers. Storage space at WERF is limited and is near capacity. Expeditious LLW processing and disposal would minimize the risk of waste storage container deterioration and radiological releases, and maintain as low as reasonably achievable radiation fields and worker doses at WERF. Volume reduction is also needed to comply with the RWMC WAC (DOE, 1991a) and to conserve LLW disposal space. The proposed action would facilitate volume reduction of the accumulated LLW inventory and newly generated LLW at WERF or at commercial facilities. LLW volume reduction operations would continue at WERF during approximately 200 days each year. After treatment of the existing MLLW inventory, approximately 40 days per year would be used for MLLW treatment based on current generation rates.

Table 1 shows the inventory (through September 1993) and INEL generation rates for waste requiring volume reduction/treatment processes. Future generation rates may be less because of waste minimization and pollution prevention efforts.

1.4 Scope of the EA

This EA identifies and evaluates the potential environmental impacts of expanding MLLW treatment operations at WERF from demonstration-level activities to production-scale campaigns. It also evaluates the potential environmental impacts of using commercial facilities for supplemental LLW volume reduction. The proposed action would expedite processing of the INEL LLW inventory, provide treatment capabilities not available at WERF (e.g., metal decontamination and melting), and provide a means for complying with RCRA regulations for MLLW. The WERF incinerator restart and resumption of previous LLW compaction, sizing, and incineration/stabilization operations are considered to be routine, ongoing activities (the no action alternative) separate from the proposed action.

Table 1. Inventory of LLW and MLLW through September 1993, and INEL generation rates.

Type of waste	Waste inventory (m^3)	Generation (m^3/month)
Compactable LLW	2,000	113
Incinerable LLW	5,000	142
Sizable LLW	2,500	85
Total LLW	9,500	340
Incinerable MLLW	72	4

The impact analysis in Section 4 assumes that WERF would operate at full capacity incinerating MLLW with the maximum allowable concentration of radionuclides. Because MLLW includes both hazardous and LLW components, the impact of incinerating LLW is bounded by this analysis. The INEL ships its nonradioactive hazardous waste offsite for treatment and disposal and has no plans to treat nonradioactive hazardous waste at WERF. Cumulative impacts of full-scale LLW compaction and sizing are also evaluated.

Commercial incineration alternatives for MLLW were investigated, but were not considered viable because permit or WAC constraints would prohibit the few existing commercial treatment facilities from accepting INEL MLLW. Potentially viable alternatives to the proposed action include:

- No action (continue to store INEL-generated MLLW and use WERF to incinerate, compact, and size LLW)
- Treat MLLW by methods other than incineration and continue use of WERF to incinerate, compact, and size LLW
- Dispose of LLW without volume reduction and continue to store MLLW
- Construct and operate a new MLLW incinerator and continue to incinerate, compact, and size LLW at WERF
- Treat MLLW at another DOE incinerator and continue to incinerate, compact, and size LLW at WERF.

1.5 EA Justification

In determining the appropriate level of NEPA documentation for the proposed action, DOE reviewed NEPA implementing regulations in 10 CFR 1021 that identify actions normally requiring an EA (but not necessarily an EIS), and actions normally requiring an EIS. Section 1021.400(d) states, "if a DOE proposal is not encompassed within the classes of actions listed in the appendices to Subpart D, or if there are extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal, DOE shall either: 1) prepare an EA and, on the basis of that EA, determine whether to prepare an EIS or a "finding of no significant impact"; or 2) prepare an EIS and record of decision."

The following Subpart D classes of actions were carefully considered for applicability to the proposed action:

- Appendix C, "Classes of actions that normally require EAs but not necessarily EISs" [C15. Siting, construction (or expansion), and operation of research and development incinerators/nonhazardous waste incinerators].

- Appendix D "Classes of actions that normally require EISs" (D12. Siting, construction and operation of incinerators other than research and development incinerators for nonhazardous waste).

The proposed action does not clearly fit either of the Subpart D typical classes of actions. The proposed action does not involve a research and development/nonhazardous waste incinerator, or siting/construction of an incinerator. Furthermore, the following extraordinary circumstances may affect the environmental significance of the proposed action:

- The proposed action would take place at existing facilities and would not include construction activities; therefore, there would be no construction impacts.

- WERF has routinely incinerated LLW since 1982 and completed eight MLLW campaigns in 1989-1990, with no significant adverse environmental effects. The proposed action would be similar to past routine operations and is not expected to cause adverse environmental effects.

- The existing inventory of incinerable MLLW is less than 2% of the total incinerable waste inventory. The incinerable MLLW generation rate is less than 3% of the incinerable LLW generation rate. Although WERF incineration will continue to operate year round (240 days), MLLW incineration would require a maximum of 60 days to reduce the current inventory and approximately 40 days per year after reduction of current inventory.

The proposed action is not encompassed within the classes of actions listed in the appendices to Subpart D, and there are extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal. Accordingly, DOE prepared this EA. On the basis of the EA, DOE will determine whether to prepare an EIS or to issue a "finding of no significant impact."

1.6 Relationship to Other NEPA Reviews

On October 22, 1990, DOE announced (55 FR 42633-8) that its Office of Environmental Restoration and Waste Management (EM) intends to prepare a Programmatic EIS (PEIS) on its proposed Integrated Environmental Restoration and Waste Management Program (ER&WM). This program is expected to provide a broad, systematic approach to addressing waste management practices. The EM PEIS will discuss a range of alternatives for existing and proposed activities and will address DOE complex-wide issues associated with long-term ER&WM policies and practices.

In addition to the PEIS, DOE has issued a Notice of Intent to prepare an EIS addressing existing and proposed INEL ER&WM activities (57 FR 45773). The INEL ER&WM EIS will evaluate a range of alternatives regarding INEL waste management and treatment. The INEL ER&WM EIS will include the cumulative impacts of past, present, proposed, and reasonably foreseeable INEL activities. The Notice of Intent explains that the NEPA documentation and decision for the proposed WERF operations/commercial LLW volume reduction (as well as other proposed actions) are expected to precede completion of the ER&WM EIS process. It also explains

that WERF activities (either the proposed action or alternatives) will be assessed as part of the baseline/no action alternative (including any decontamination or phase-out of treatment at the WERF incinerator).

There is an immediate need for the proposed action described in this EA to meet current and near-term waste treatment and management needs at INEL. This action will be required regardless of how DOE decides to meet long-term INEL waste treatment needs pursuant to the INEL ER&WM EIS, and regardless of how DOE decides to implement long-term department-wide waste management programs pursuant to the PEIS. Furthermore, the WERF incinerator is an existing facility that has treated both LLW and MLLW (on an experimental basis). The proposed supplemental LLW volume reduction would occur in operating commercial facilities, and would not require a large capital investment or commitment of resources.

The proposed action at WERF does not include processing LLW or MLLW from sources other than INEL, with the exception of very limited quantities (<5 m^3/yr) explained further in this document. The use of WERF as a regional incinerator to process LLW or MLLW from non-INEL sources, such as other DOE facilities, is not within the scope of the proposed action. Such an action (if proposed or as an alternative) would be addressed in the EM PEIS, the INEL ER&WM EIS, and/or other appropriate NEPA documentation.

2. PROPOSED ACTION AND ALTERNATIVES

The following sections describe the proposed action and alternatives to the proposed action. The proposed action includes expanding the MLLW processing capability at WERF from the current demonstration-level activities to production-scale treatment and using commercial offsite facilities for supplemental LLW volume reduction.

2.1 Proposed MLLW Incineration

Treatments identified for MLLW at WERF include incineration and stabilization using existing facilities and procedures. Repackaging of waste form one container to another may also be performed to facilitate solid or liquid incineration. The primary sources of MLLW for treatment are INEL facilities and programs, although limited quantities (<5 m^3/yr) of offsite waste may be received and treated. Treatment of offsite waste would be considered nonroutine. The waste would have to comply with the storage facility and WERF WAC developed to ensure compatibility with WERF material storage, handling, and processing capabilities and environmental, health, and safety requirements.

The proposed action would allow DOE to incinerate MLLW containing characteristic hazardous constituents and to dispose of the resulting ash at RWMC as LLW. Ash samples from characteristic MLLW incineration would be analyzed to ensure compliance with RCRA requirements before disposal. If the ash did not qualify for direct disposal as LLW, it would be stabilized and reevaluated for disposal or stored as MLLW.

MLLW containing RCRA listed hazardous constituents would also be treated and the resulting ash would be delisted or placed in storage until MLLW disposal facilities are developed or until future regulations allow disposal. The proposed treatment would comply with EPA's technology-based treatment standards (40 CFR 268).

Under the proposed action, the existing liquid waste injection system would be upgraded to: a) meet the requirements of the National Fire Protection Association for flammable liquid handling (NFPA 30-1990) as defined in 29 CFR 1910.106, and b) allow for the injection of atomized aqueous (low heat value) waste into the WERF lower combustion chamber. This upgrade would enhance safety and liquid waste feed controls so the thermal capacity of the incinerator (5 million BTU/hr) or the RCRA hydrochloric acid (HCl) emission limit of 1.8 kg/hr would not be exceeded. This limit is independent of offgas moisture content. HCl emissions would be controlled by adjusting the feed rate of chlorinated compounds to the incinerator. After the proposed facility modification documentation and upgrades are completed, a trial burn would be conducted to meet RCRA Part B permitting requirements and to verify compliance with emission standards established by the State of Idaho Permit to Construct.

To support proposed operations, some waste may need to be repackaged from drums into other containers (e.g., cardboard boxes) in order to be fed into the incinerator. Liquid wastes may be blended into other drums in order to adjust the heating value of the waste. Fugitive emissions from repackaging operations would be exhausted through HEPA filters to the existing incinerator stack.

2.2 Proposed Commercial LLW Treatment

The proposed action includes using licensed and permitted commercial LLW treatment facilities for supplemental LLW volume reduction. To implement this part of the action, INEL would award one or more contracts for LLW transportation, processing (e.g., compacting, incinerating, sizing, melting, decontaminating, stabilizing), and returning processed waste materials to the INEL. The contract(s) would establish specific INEL and commercial vendor responsibilities and treatment standards. It is anticipated that a portion of the accumulated inventory and a portion of the newly generated LLW would be processed at commercial facilities. The actual distribution of waste between WERF and commercial processing facilities has not been determined. However, the impact analyses in Section 4 assume full-scale WERF operations that would conservatively bound processing all newly generated INEL LLW and MLLW at WERF. Transportation impact analyses conservatively bound transporting all of the LLW to commercial facilities.

Proposed commercial processing would include the following activities:

- INEL personnel would load packaged waste into commercial shipping containers
- The waste would be transported to the processing facility by a commercial vendor
- At the commercial facility, the waste would be inspected and surveyed to verify the waste properties
- The waste would then be processed for volume reduction (processing of ash may also be required in order to meet RCRA/contractual treatment standards)
- The processed LLW (e.g., ash, compacted waste) would be packaged, characterized, and returned to INEL for disposal in accordance with the RWMC WAC.

Licensed commercial carriers would provide transportation, and the commercial transporter or processor would provide waste transportation containers. Prior to loading the LLW, containers would be inspected for damage and surveyed for radiation and contamination. Noncompliant containers would be rejected and returned to the vendor. Waste would be transferred to acceptable containers at WERF or other appropriate staging areas by INEL personnel using established procedures, equipment, and monitoring. If contamination is detected during loading, the container would be decontaminated prior to shipment. On the day of the shipment, the container exterior would again be inspected for damage, surveyed for radiation and contamination, and placarded according to U.S. Department of Transportation requirements. Before departure, documentation would be reviewed for completeness and accuracy and blocking, bracing, and tie-downs would be inspected for appropriate application. Transportation would be conducted in accordance with applicable U.S. Department of Transportation, Nuclear Regulatory Commission (NRC), DOE, and EPA regulations and the requirements of the states and local jurisdictions through which the waste would be transported.

Transporting LLW is a routine activity. Approximately two million shipments of non-DOE radioactive materials are made each year in the United States (Wolfe, 1984). Between 162 and 180 shipments would be required to transport all of INEL's projected LLW inventory (through September 1993) to a commercial processing facility (depending on load weight limits). Between 70 and 78 additional shipments would be required each year if all of the expected future LLW is transported to commercial processors. The proposed shipments would constitute a small increase in the total number of U.S. commercial shipments.

The commercial facility would be responsible for complying with applicable environmental regulatory requirements. Treatment operations would be required to be conducted in accordance with NRC, EPA, host state, and other pertinent licenses, permits, statutes, and regulations. Prior to awarding a contract(s), the vendor(s) would be required to furnish evidence of state and federal permits for their processing operations. INEL personnel would audit the vendor(s) for environmental, quality, health, and safety compliance prior to awarding the contract(s), and periodically during the life of the contract(s).

LLW incinerator bottom ash is a potential RCRA characteristic hazardous waste because of the presence of heavy metals. The commercial vendor would provide secondary ash treatment if necessary, and certify that the final waste form meets the EPA's Toxicity Characteristic Leaching Procedure criteria. The final waste would then be returned to INEL for verification of the commercial processor's certification and disposal at the RWMC in accordance with DOE Order 5820.2A requirements.

The commercial vendor may take ownership and be responsible for some waste processing residues such as baghouse fly ash, scrubber effluent, and final filtration components. Vendors retaining these materials would be required to provide treatment and/or disposal in accordance with NRC, state, and EPA requirements. The vendors' compliance with applicable requirements would be verified by periodic audits performed by INEL management and environmental oversight organizations. Audits would be performed as specified in DOE Order 5480.1B, EPA's Environmental Auditing Policy Statement (51 FR 25004), and INEL Standard Operating Procedures.

If waste that does not comply with the vendor's WAC is shipped to the vendor, it would be sorted, repackaged, and returned to INEL. Waste examination and analysis activities at the vendor's facility would be required to comply with their permits and licenses and would also be verified by periodic audits.

2.3 WERF Facilities and Incineration Process

The WERF complex includes: 1) the main WERF building, which houses the waste incineration, waste stabilization, and facility support operations and offices; 2) the sizing building, which houses size reduction and waste compaction operations; 3) the auxiliary building, which is used for tool and equipment storage; and 4) the WERF waste storage building, which would store MLLW when operations commence. The layout of WERF facilities is shown in Figure 3.

Generators (on or off the INEL site) must ship their MLLW to an INEL waste storage facility prior to the wastes being delivered to WERF for incineration. The WAC for the storage unit must be met prior to shipment. Prior to acceptance at WERF, generator waste data forms, shipping records and manifests, characterization reports, and certification statements are reviewed by WERF personnel. Incinerable waste must meet specifications for package weight, dimensions, total chloride, total fluoride, ash content, heating value, type of package, and viscosity. Items such as pressurized containers, gaseous waste, pyrophorics, explosives, reactive materials, asbestos, incompatible chemicals in the same container, active etiologic agents, polychlorinated biphenyls $\geq$ 50 ppm, and beryllium from sources identified in 40 CFR 61 are excluded by the WERF WAC.

The WERF incinerator has three burners. Two burners (one each in the lower and upper combustion chambers) use fuel oil to preheat the incinerator and provide auxiliary heat as necessary. The third burner (in the lower chamber) is a liquid-waste burner for contaminated fuel oil and other high-heat-value waste. The liquid-waste burner is connected to a drum feed/blending unit used to blend various liquid wastes or to consolidate small volumes to obtain waste with characteristics suitable for incineration.

Solid waste, packaged in cardboard boxes, is fed into the incinerator through a triple door chute system above the lower combustion chamber. During incineration, the lower chamber is controlled to restrict the amount of air available for combustion, resulting in a slow, rolling burn that releases volatile gases but minimizes particulate carryover. Volatile gases released in the lower chamber enter the upper chamber where an auxiliary burner and combustion air blowers supply supplemental heat and excess air (90 to 120% in excess of the stoichiometric requirement) to ensure complete combustion. Liquid waste is fed to the incinerator liquid waste burner through piping connected to the liquid waste blending and feed unit.

Particulate emissions from controlled-air incinerators are much lower than those from other technologies. Low gas velocities in the lower chamber and complete combustion in the upper chamber result in low particulate carryover. A controlled-air incinerator was selected for WERF because of its inherent particulate-control feature. Because most of the radionuclides in INEL LLW and MLLW are in particulate form, this feature helps limit radiological releases to the environment.

To protect the air pollution control system, hot combustion gases undergo a three-stage cooling process prior to filtration. After leaving the upper combustion chamber, the offgas is cooled by mixing with dilution air drawn from within the incinerator room. The gases then flow through a shell and tube heat exchanger and are further cooled. A second stream of dilution air from the WERF basement is mixed with the gas exiting the heat exchanger to cool the exhaust to less than 260°C before entering the pollution control equipment. The WERF incinerator uses a baghouse, prefilter, and high-efficiency particulate air (HEPA) filter system for air pollution control. The system is designed to minimize particulate and metal emissions. Gaseous pollutants are controlled by limiting the feed rate of contributing constituents in the waste feed. Filtered offgas is monitored for oxygen, combustible gas, carbon monoxide, radioactivity, and opacity.

The flyash from waste incineration is periodically transferred from the baghouse to collection hoppers. It is loaded into drums and transported to the WERF stabilization room where it is stabilized with Portland cement. Incinerator bottom ash typically does not require stabilization. Ash would be disposed of at RWMC, or stored in an existing INEL RCRA interim status or permitted RCRA storage facility until it can be transported to a MLLW disposal facility.

The stabilization unit can effectively stabilize a wide variety of wastes. In addition to fly ash, stabilization may also be used as the EPA technology-based treatment standard to treat certain MLLW. Thermoplastic stabilization processes, other than Portland cement (e.g., sulfur polymer cement), are being evaluated for potential future applications. These processes may be applied if they meet appropriate performance criteria.

Solid and liquid MLLW is generated from INEL operations, maintenance, and decontamination and decommissioning activities. Incinerable MLLW is primarily absorbent materials contaminated with hazardous wastes (e.g., spent solvents, aqueous wastes, organic liquids, suspended or dissolved metals, or paint chips). A more detailed discussion of the radioactive and hazardous constituents in the waste is presented in Section 4.

Non-INEL wastes that may be processed at WERF include limited quantities (< 5 m^3/yr) of special-case wastes that cannot be treated at the generation sites or at commercial facilities. Receipt and treatment of offsite waste is a nonroutine activity and would be subject to the same criteria for acceptance at WERF as INEL waste.

2.4 Alternatives to the Proposed Action

This section includes descriptions of the alternatives to the proposed action. The advantages and disadvantages of the alternatives are addressed in Section 4.4.

2.4.1 No Action Alternative

The no action alternative is to continue storing INEL MLLW at INEL and routinely process LLW at WERF. Production-scale treatment of MLLW would not be performed at WERF. Therefore, existing and future generated INEL MLLW (and small quantities of offsite-generated MLLW) would require continued storage.

Through September 1993, approximately 9,500 m^3 of LLW would be stored outside in plywood boxes and cargo containers. Depending on staffing levels, volume reduction treatment of this inventory would require 3 to 5 years. After the inventory is processed, the newly generated LLW would be treated as sufficient quantities are accumulated. The existing storage areas for LLW would provide adequate space for waste accumulation for treatment.

2.4.2 Treat MLLW by Methods Other Than Incineration and Continue Use of WERF to Incinerate, Compact, and Size LLW

Incineration is EPA's technology-based treatment standard for most of the MLLW included in the proposed action. Technologies other than incineration may be used if the EPA determines that the technologies achieve an equivalent level of treatment, as addressed in 40 CFR 268.42(a). Information must be submitted to the EPA regional administrator demonstrating that each treatment method would be in compliance with federal, state, and local requirements, and would be protective of human health and the environment. Stabilization and biological or chemical treatments are potential alternatives to incineration; however, extensive research and development would be required to demonstrate that these technologies would meet EPA criteria as defined in 40 CFR 268.43(b).

As described in Section 2.4.1, reduction of the existing inventories of LLW would not begin until WERF resumes operations. The existing inventory is estimated to require 3 to 5 years for processing through WERF (depending on staffing levels).

2.4.3 Dispose of LLW Without Volume Reduction and Continue to Store MLLW

This alternative would require continued storage of MLLW, as described in Section 2.4.1, the no action alternative. This alternative would require existing inventories of LLW and newly generated LLW to be disposed of at RWMC without volume reduction or stabilization. Considering the projected LLW inventory of 9,500 m^3 and the current LLW generation rate, the disposal capacity for the RWMC would be reached in 5 to 7 years. Newly generated waste would be packaged at the generator's facility and shipped directly to RWMC for disposal in the Subsurface Disposal Area.

2.4.4 Construct and Operate a New MLLW Incinerator and Continue to Incinerate, Compact, and Size LLW at WERF

This alternative would involve constructing an additional incinerator to provide production-scale treatment of INEL MLLW. The incinerator would treat characteristic and listed hazardous constituents in MLLW. The stabilized ash from characteristic MLLW would be disposed of at RWMC as LLW. The ash from listed MLLW incineration would be delisted or stored in an existing RCRA interim status or permitted storage facility until it could be transported to a MLLW disposal facility. Construction of a new incinerator would allow MLLW to be treated concurrently with WERF LLW processing. MLLW would continue to be stored until the incinerator is operational. After the incinerator is operational, MLLW would be stored for a short time until sufficient quantities are accumulated for incineration; no long-term storage of MLLW would be necessary after the incinerator is operational. The incinerator would require an approved RCRA Part B Permit, including a trial burn, before MLLW treatment operations commence.

2.4.5 Treat MLLW at Another DOE Incinerator and Continue to Incinerate, Compact, and Size LLW at WERF

In addition to WERF, DOE has several existing or planned radioactive waste incinerators at defense program sites throughout the U.S. that could potentially be used for processing some wastes proposed for WERF. Incinerators are located at the Rocky Flats Plant (RFP) in Colorado, Los Alamos National Laboratory (LANL) in New Mexico, and Oak Ridge Reservation (ORR) in Tennessee. Currently, WERF and the Toxic Substance Control Act (TSCA) incinerator at the ORR K-25 site are the only operable incinerators in the DOE system capable of treating many forms of MLLW. The RFP and LANL incinerators are not presently operating. The Savannah River Site (SRS) in South Carolina is planning a new hazardous and mixed waste incinerator. The ORR incinerator is not suitable for beta/gamma-contaminated wastes and is scheduled to operate at or near capacity for onsite wastes. The designated missions and RCRA permits for other DOE incinerators generally prohibit receiving and treating INEL generated wastes.

3. AFFECTED ENVIRONMENT

3.1 Physical Environment

INEL is located in southeastern Idaho at the foot of the Lost River, Lemhi, and Beaverhead mountain ranges along the edge of the Eastern Snake River Plain. The topography is generally flat to gently rolling, with elevations ranging from 1,585 m in the northeast to 1,451 m in the southwest. WERF, in the southcentral portion of INEL, is located on a gently rolling basalt plain with an elevation of approximately 1,506 m.

Mountain ranges to the west channel prevailing westerly winds into a southwesterly pattern across INEL. Northeasterly winds also are common as a result of cold air draining from, and channeling by, higher terrain north of the INEL.

The area surrounding INEL is classified as a Prevention of Significant Deterioration Class II area, designated under the Clean Air Act as an area with reasonably or moderately good air quality while still allowing moderate industrial growth. Craters of the Moon Wilderness Area, which is 49 km from INEL, is classified as a Prevention of Significant Deterioration Class I area, and is the nearest area to INEL where additional degradation of local air quality is severely restricted.

A summary description of the geology, soils, seismology, hydrology, water resources, air quality, meteorology, and climate of the INEL area can be found in Berry and Petty (1990).

3.2 Ecology

The Eastern Snake River Plain is a shrub-steppe biotic community. INEL vegetation is representative of a cool desert ecosystem. The Big Lost River and associated playas provide limited aquatic habitat during some years (Bowman et al., 1984).

There are no known species listed as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS) (50 CFR 17.11, 17.12) residing year-round on the INEL and no known critical habitats (Reynolds et al., 1986; Lobdell, 1992). Preliminary national wetlands inventory maps indicate the possible presence of several small excavated wetlands within 1.6 km of WERF. None of these wetland areas are located within the WERF boundary and no impacts are anticipated as a result of existing or proposed WERF operations.

The USFWS has determined that the bald eagle is the only animal observed on the INEL that is listed as endangered. Bald eagles winter on or near portions of the INEL. The ferruginous hawk, long-billed curlew, Townsend's big-eared bat, loggerhead shrike, and pygmy rabbit may be found on the INEL and are candidates for the proposed list of threatened and endangered species (Lobdell, 1992). In addition, the merlin, osprey, Swainsons hawk, burrowing owl, whitefaced ibis, and bobcat are listed as species of special concern in Idaho (Moseley and Groves, 1992). One plant species known to exist on the INEL, the painted milkvetch, is a candidate for the list of threatened and endangered species (Lobdell, 1992). Other plant species listed as sensitive by the U.S. Forest Service

and/or Bureau of Land Management include the Lemhi milkvetch, plains milkvetch, thistle milkvetch, wing-seed evening primrose, nipple cactus, large-flowered Gymnosteris, spreading gilia, king's bladderpod, and tree-like Oxytheca (Lobdell, 1992). None of the endangered, threatened, or sensitive species have been observed near WERF.

3.3 Socioeconomics and Cultural Resources

There are no permanent residents at INEL. Communities near INEL include Idaho Falls, Blackfoot, Pocatello, Arco, and Atomic City with 1990 populations of 43,929, 9,646, 46,080, 1,016, and 25, respectively (U.S. Department of Commerce, 1990). The nearest community to WERF is Atomic City, located approximately 12.7 km to the south.

The work force at INEL varies depending on the levels of construction and research being conducted at each facility. In May 1992, INEL employed approximately 8,383 persons at the site. There are approximately 44 people working at WERF. Other employees work at Idaho Falls facilities, for a total INEL work force of approximately 12,451.

Intensive archaeological surveys of all areas within the Power Burst Facility perimeter fence and in a 100-m wide zone surrounding the facility fence have demonstrated that the area is archaeologically sensitive. These surveys, conducted in 1984 and 1985 (Reed et al., 1987), resulted in the recording of 48 prehistoric resources that are potentially eligible to the National Register of Historic Places (NRHP). Impacts to these sensitive resources that would result from proposed INEL projects must be mitigated by additional data collection in advance of all ground disturbing activity. Two significant archaeological resources are located in the vicinity (100-m radius) of WERF. The resources included scattered prehistoric stone tools and fragments that are indicative of short-term, prehistoric hunting activities. In addition, WERF's scientific historical significance for its contributions to the U.S. Nuclear Program will require evaluation if scheduled for renovation or demolition. Other facilities within the Power Burst Facility complex may also be NRHP eligible.

The proposed action is in an existing facility and does not include any soil disturbing activities. Impacts to known archaeological resources are not anticipated. However, should the proposed action appear to threaten any resource, either historic or prehistoric, it is DOE policy to temporarily halt activities and contact the INEL Cultural Resource Management Office to assess the resource. Depending on the potential significance of the resource, the State Historic Preservation Office and, if applicable, the Shoshone-Bannock Tribe may be consulted to determine a suitable mitigation plan.

3.4 Land Use

INEL was established in 1949 for nuclear energy research and defense support activities. INEL consists of approximately 2,305 km^2, mostly in Butte County but also extending into Bingham, Bonneville, Jefferson, and Clark counties. WERF lies entirely within Butte County. Since 1982, WERF has been dedicated to developing, demonstrating, and implementing LLW and MLLW volume reduction techniques. The proposed action is consistent with existing WERF and INEL land uses.

3.5 Background Radiation

Radiation in the vicinity of INEL consists of natural background radiation from cosmic, terrestrial, and internal body sources. Additional background sources of radiation are nuclear weapons test fallout, consumer and industrial products, and building materials. These sources result in an estimated total effective dose equivalent (EDE) to an average member of the public residing in the vicinity of INEL of 350 mrem/yr (DOE, 1991b). The INEL added a potential 1.0E-03 mrem/yr (0.0003%) to the total background EDE (DOE, 1991b). The background collective EDE (population dose) within an 80-km radius of the INEL operations center is approximately 4.24E+04 person-rem/yr (DOE, 1991b). INEL operations added a calculated 4.0E-02 person-rem/yr in 1990 (0.00009%) to the estimated total collective EDE (DOE, 1991b). A hypothetical offsite resident near the INEL boundary received an average 5.4E-02 mrem per year for the period of 1980 to 1989 (DOE, 1991c).