Remote-Handled Low-Level Waste Disposal Project Code of Record

April 2011

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Remote-Handled Low-Level Waste Disposal Project
Code of Record

April 2011

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http://www.inl.gov

Prepared for the
U.S. Department of Energy
Office of Nuclear Energy
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14517
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INL/EXT-10-20044

April 2011

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ABSTRACT

The Remote-Handled Low-Level Waste (LLW) Disposal Project addresses an anticipated shortfall in remote-handled LLW disposal capability following cessation of operations at the existing facility, which will continue until it is full or until it must be closed in preparation for final remediation of the Subsurface Disposal Area (approximately at the end of Fiscal Year 2017). Development of a new onsite disposal facility, the highest ranked alternative, will provide necessary remote-handled LLW disposal capability and will ensure continuity of operations that generate remote-handled LLW. This report documents the Code of Record for design of a new LLW disposal capability. The report is owned by the Design Authority, who can authorize revisions and exceptions. This report will be retained for the lifetime of the facility.
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<tr>
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<tr>
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</tr>
<tr>
<td>AISC</td>
<td>American Institute of Steel Construction</td>
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<td>ANSI</td>
<td>American National Standards Institute</td>
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<td>ASCE</td>
<td>American Society of Civil Engineers</td>
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<td>American Society of Heating, Refrigeration, and Air Conditioning Engineers</td>
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<td>American Welding Society</td>
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<td>CFR</td>
<td>Code of Federal Regulations</td>
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<td>Idaho Administrative Procedures Act</td>
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<td>Institute of Electrical and Electronics Engineers</td>
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<td>Steel Joist Institute</td>
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Remote-Handled Low Level Waste Disposal
Project Code of Record

1. INTRODUCTION

Remote-handled low-level waste (LLW) in the form of activated metals is generated from operations at Idaho National Laboratory’s (INL’s) Naval Reactors Facility and the Advanced Test Reactor Complex. Activated metals also are planned to be generated from new missions and from segregation and treatment (as necessary) of remote-handled scrap and waste currently stored at the Materials and Fuels Complex. Remote-handled LLW ion-exchange resins are generated from operations at the Naval Reactors Facility and Advanced Test Reactor Complex. Disposal of remote-handled LLW in the disposal vaults of the existing INL waste disposal facility is planned through the end of Fiscal Year 2017. Continued remote-handled LLW disposal capability is critical to continuing the U.S. Department of Energy (DOE) Office of Nuclear Energy, Science, and Technology and Office of Naval Reactors missions conducted at INL.

The Conceptual Design Report for the Remote-Handled Low-Level Waste Disposal Project (INL/EXT-07-12901, Idaho National Laboratory, October 2010) identifies the highest ranked alternative (i.e., development of a new onsite remote-handled LLW disposal facility) for maintaining continued, uninterrupted INL remote-handled LLW disposal capability and presents the conceptual design for construction of such a facility at INL. The disposal facility will be capable of receiving remote-handled LLW beginning in Fiscal Year 2018 and continuing through at least the end of Fiscal Year 2037. The facility will include approximately 250 precast concrete vaults. The vaults will be designed and configured to receive the remote-handled LLW in waste containers (i.e., liners) transported in shielded shipping casks from INL generators.

1.1 Conceptual Design Summary

1.1.1 Facility Layout and Components

The facility includes the concrete vaults, vault plugs, access roads, and support infrastructure. Figure 1 shows the conceptual layout for the disposal facility. The conceptual design assumed that the facility will be a stand-alone facility that does not use the services of any existing INL facilities. The facility will be sited within INL boundaries and be operated by the INL site operating contractor. Perimeter fencing will be constructed to provide protection from human and animal intrusion and to allow for proper access control.

The following major components are included with the facility:

- Vaults
- Vault plugs
- Crane
- Cask-to-vault system
- Staging and storage area
- Administration and other supporting infrastructure.

1.1.2 Vaults

Initial construction of the new remote-handled LLW disposal facility will provide up to 250 new disposal vaults that are similar to the existing Radioactive Waste Management Complex vault design. The vaults will be constructed of precast concrete cylinders (i.e., pipe sections) stacked on end and placed
within an array as shown in Figure 2. This configuration provides the ability to dispose of the desired quantity of waste within the smallest footprint possible.

Figure 1. Conceptual layout for the remote-handled low-level waste disposal facility.

Figure 2. Concrete vault layout.
1.1.3 Administrative and Other Support Infrastructure

Additional support and administrative structures and services are included in the conceptual design as follows:

- **Administration building:**
  - Office space
  - Records storage
  - Equipment storage
  - Electrical distribution

- **Maintenance enclosure:**
  - Equipment maintenance
  - Temporary cask holding area
  - Equipment decontamination
  - Equipment storage

- **Access roads:**
  - Vehicle access within facility and around vaults
  - Facility road that provides access to and from major road

- **Electrical power infrastructure**

- **Fixed communications system**

- **Combined fire/potable water system, including well and storage**

- **Sanitary sewer system, including septic and drain field**

- **Fire detection/protection system**

- **Perimeter fencing**

- **Video monitoring.**

The primary utility needed to operate the new facility will be electrical power. At the present time, a portable generator is used to power all unloading and waste placement operations at the Radioactive Waste Management Complex. Operations at the new facility will use power provided by electrical pedestals that will be located near the disposal vaults. In addition, power will be needed for support infrastructure that currently is provided by Radioactive Waste Management Complex facilities. Other power needs include the administrative building, equipment maintenance and staging, and site control and monitoring capabilities. A location near an existing power source is a benefit but not necessarily a requirement for facility siting. Other utilities, such as fire detection and protection, telecommunication, sewer, and water, also are included in the conceptual design. During final design activities, each of the occupied buildings will be designed to incorporate the applicable sustainable building and energy conservation requirements outlined in DOE Order 430.2B, “Renewable Energy and Transportation Management.” These efforts will include any Leadership in Energy and Environmental Design certification criteria that can be incorporated at the given location.

Road access allowing transport of the loaded cask vehicles must be provided. A haul route will be identified or designed that will provide for passage of anticipated cask transport loads without damaging any existing infrastructure. The truck’s turning radius, maneuverability, unloading positioning, and drive slopes also will be taken into consideration when determining the haul route alignment. The 6-acre (2.4-ha) site area will be sufficient to design appropriate road access for transporting loads and vehicles within the disposal facility.
2. REGULATIONS, EXECUTIVE ORDERS, AND DEPARTMENT OF ENERGY ORDERS

Applicable regulations, executive orders, and DOE orders are summarized in the following subsections. These regulations, executive orders, and DOE orders should be reviewed and finalized against the current INL contract prior to preliminary or final design.

2.1 Regulations

- IDAPA 58.01.01, “Rules for the Control of Air Pollution in Idaho,” Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, July 1, 2007.
- IDAPA 58.01.01.201, “Permit to Construct Required,” Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, April 11, 2006.

2.2 Department of Energy Directives


DOE Order 5400.1, “General Environmental Protection Program,” Change 1, U.S. Department of Energy, July 29, 1990. (Note: Specific paragraphs were cancelled by DOE Order 231.1, “Environmental, Safety, and Health Reporting.”)


3. DESIGN CODE OR RECORD

The Remote-Handled LLW Project design criteria for facility modifications or new construction are summarized in the following subsections. Edition dates are based on a Fiscal Year 2011 design schedule. If design is delayed, edition dates should reflect the latest current edition date at the start of preliminary or final design. This report will be reviewed and finalized at the start of preliminary or final design to assess required updates or changes.

3.1 General Design


3.2 Civil, Structural, and Architectural

• INL Welding Manual.
• American Concrete Institute (ACI) 318, “Building Code Requirements for Structural Concrete,” 2008 Edition.
• AISC 341-05, “Seismic Provisions for Structural Steel Buildings.”
3.3 Mechanical; Heating, Ventilating, and Air Conditioning; Piping

3.3.1 General

- INL Welding Manual

3.3.2 Building Service Piping

- American Society of Mechanical Engineers B31.9, “Building Service Piping.”


### 3.3.3 Tanks and Utility Distribution


### 3.3.4 Potable Water and Sewer


- Memorandum of Understanding between the Idaho Department of Environmental Quality and the Idaho Division of Building Safety Plumbing Bureau, April 2003.


### 3.3.5 Heating, Ventilating, and Air Conditioning and Ducting


### 3.4 Fire Protection

#### 3.4.1 National Fire Protection Association


3.5 Electrical

3.5.1 General Facility Electrical Codes and Standards

3.5.2 Normal Power System Codes and Standards

3.5.3 Lighting System Codes and Standards

3.5.4 Grounding System Codes and Standards

3.5.5 Lightning Protection System Codes and Standards
3.5.6 Telephone System Codes and Standards