INL/EXT-07-12901
Rev. 3

Conceptual Design Report for the Remote-Handled Low-Level Waste Disposal Project

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The INL is a U.S. Department of Energy National Laboratory
operated by Battelle Energy Alliance

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NOTE:
This document addresses the conceptual design parameters associated with a proposed onsite remote-handled low-level waste disposal facility. A new onsite facility has been identified as an alternative for providing continued remote-handled low-level waste disposal capability in support of ongoing Department of Energy missions at the Idaho site. However, a decision has not been made by the Department of Energy to develop a new onsite disposal facility. The decision, following all required analyses and evaluation of the impacts of all viable alternatives, will be made in accordance with the National Environmental Policy Act of 1969. Use of words indicating requirements or specifying intention, such as "shall" or "will," are used for the convenience of discussion or to indicate requirements or activities that are conditioned on a decision to develop a new onsite disposal facility. Such usage should not be construed to mean that a final selection of an alternative has been made.

ABSTRACT

This conceptual design report addresses development of replacement remote-handled low-level waste disposal capability for the Idaho National Laboratory. Current disposal capability at the Radioactive Waste Management Complex is planned until the facility is full or until it must be closed in preparation for final remediation (approximately at the end of Fiscal Year 2017). This conceptual design report includes key project assumptions; design options considered in development of the proposed onsite disposal facility (the highest ranked alternative for providing continued uninterrupted remote-handled low-level waste disposal capability); process and facility descriptions; safety and environmental requirements that would apply to the proposed facility; and the proposed cost and schedule for funding, design, construction, and operation of the proposed onsite disposal facility.

EXECUTIVE SUMMARY

This conceptual design report provides documentation of plans to design, construct, and operate a proposed facility for disposal of remote-handled low-level waste (LLW) at the Idaho National Laboratory. The conceptual design report was prepared in accordance with Department of Energy Order 413.3B, "Program and Project Management for Acquisition of Capital Assets." This report, coupled with other Critical Decision (CD)-1 documentation, provides information needed by the Department of Energy to make a determination to proceed with the project execution phase and establish a preliminary baseline for the proposed project. The following sections are included in the conceptual design report:

Section 1	Provides an introduction and overview of the project. It includes a description of the mission need for the Remote-Handled LLW Disposal Project; alternatives considered in developing the mission need; and identification of the highest ranked alternative to establish uninterrupted remote-handled LLW disposal capability for the Idaho National Laboratory.
Section 2	Provides background information on the project. It includes a description of project assumptions and options considered in the design; a description of the systems engineering, value management, and risk management approaches; a summary of the strategy for acquiring and funding the project; identification of anticipated staffing needs; and listing of applicable codes, standards, and regulations.
Section 3	Includes the process description for proposed facility operations.
Section 4	Summarizes the proposed conceptual facility design.
Sections 5 and 6	Provides the proposed costs and schedule for the proposed project.
Section 7	Presents information on nuclear safety, including a discussion of required safety documentation, initial assessments of the hazard classification and seismic design category for the proposed facility, and a discussion of emergency preparedness.
Section 8	Addresses safeguards and security measures applicable to the proposed remote-handled LLW disposal facility.
Section 9	Provides a list of the applicable environmental, safety, and health requirements for the proposed facility.
Section 10	Summarizes the risk management plan specifically developed for the project.
Section 11	Addresses requirements for readiness reviews required for the proposed facility prior to operational turnover.

Section 12	Identifies the requirements and approach to quality assurance throughout the project.
Section 13	Provides references.

The Remote-Handled 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 the proposed onsite disposal facility, the highest ranked alternative, would provide necessary remote-handled LLW disposal capability and would ensure continuity of operations that generate remote-handled LLW.

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ACRONYMS

ATR	Advanced Test Reactor
CD	critical decision
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CVAS	cask-to-vault adapting structure
DOE	Department of Energy
DOE-ID	Department of Energy, Idaho Operations Office
EPA	Environmental Protection Agency
FY	fiscal year
IBC	International Building Code
IDAPA	Idaho Administrative Procedures Act
INL	Idaho National Laboratory
LEED	Leadership in Energy and Environmental Design
LLW	low-level waste
LWP	laboratory-wide procedure
MFC	Materials and Fuels Complex
NEPA	National Environmental Policy Act
NRF	Naval Reactors Facility
OPC	other project costs
ORR	operational readiness review
QAP	quality assurance program
RCRA	Resource Conservation and Recovery Act
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
TEC	total estimated cost

TFR	technical and functional requirements
TPC	total project cost

Conceptual Design Report for the Remote-Handled Low-Level Waste Disposal Project

1. INTRODUCTION/PROJECT OBJECTIVES

1.1 Overview

The Idaho National Laboratory (INL), an 890-mi^2 (2,305-km^2) section of desert in southeast Idaho, was established in 1949 as the National Reactor Testing Station. Initially, the missions at INL were development of civilian and defense nuclear reactor technologies and management of spent nuclear fuel. Today, INL is a multipurpose national laboratory delivering specialized science and engineering solutions for the U.S. Department of Energy (DOE). Sponsorship of INL was formally transferred to the DOE Office of Nuclear Energy by Secretary of Energy Spencer Abraham in July 2002. The move to the Office of Nuclear Energy and designation, along with Argonne National Laboratory, as the DOE lead nuclear energy laboratory for reactor technology, supports the nation's expanding nuclear energy initiatives, placing INL at the center of work to do the following:

- Develop advanced Generation IV nuclear energy systems
- Develop nuclear energy/hydrogen coproduction technology
- Develop advanced nuclear energy fuel cycle technologies
- Provide national security answers to national infrastructure needs.

INL facilities carrying out the Office of Nuclear Energy mission are concentrated in two main complexes at the Idaho site, the Advanced Test Reactor (ATR) Complex and the Materials and Fuels Complex (MFC). In addition, INL hosts the National Nuclear Security Agency's Naval Reactors Facility (NRF). NRF supports the U.S. Navy's nuclear-powered fleet through research and development of materials and equipment, as assigned by the Office of the Deputy Administrator for Naval Reactors. Figure 1-1 presents a map of the INL highlighting the locations of the ATR, MFC, and NRF.

Remote-handled low-level waste (LLW) activated metal waste streams are generated from operations at INL's NRF and ATR Complex. Activated metals also may be generated from operations and from segregation and treatment (as necessary) of remote-handled scrap and waste currently stored at MFC. Additionally, remote-handled LLW ion-exchange resin waste streams are generated from operations at NRF and ATR. Disposal of remote-handled LLW in the disposal vaults of the existing INL waste disposal facility is planned through the end of Fiscal Year (FY) 2017. Continued remote-handled LLW disposal capability is critical to continuing DOE Office of Nuclear Energy and Office of Naval Reactors missions conducted at INL.

This document summarizes alternatives presented in the project mission need statement and the process used to identify the highest ranked alternative (i.e., development of an onsite remote-handled LLW disposal facility) to maintain continued, uninterrupted INL remote-handled LLW disposal capability and presents the conceptual design for construction of such a facility at INL. The proposed disposal facility would be capable of receiving remote-handled LLW beginning in FY 2018 and continuing through at least the end of FY 2037 (Figure 1-2). The facility initially would include approximately 250 precast concrete vaults. The vaults would be configured to receive the remote-handled LLW in waste containers (i.e., liners) transported in shielded shipping casks from INL generators.

Figure 1-1. Locations of the Advanced Test Reactor Complex, Materials and Fuels Complex, and Naval Reactors Facility at the Idaho National Laboratory.

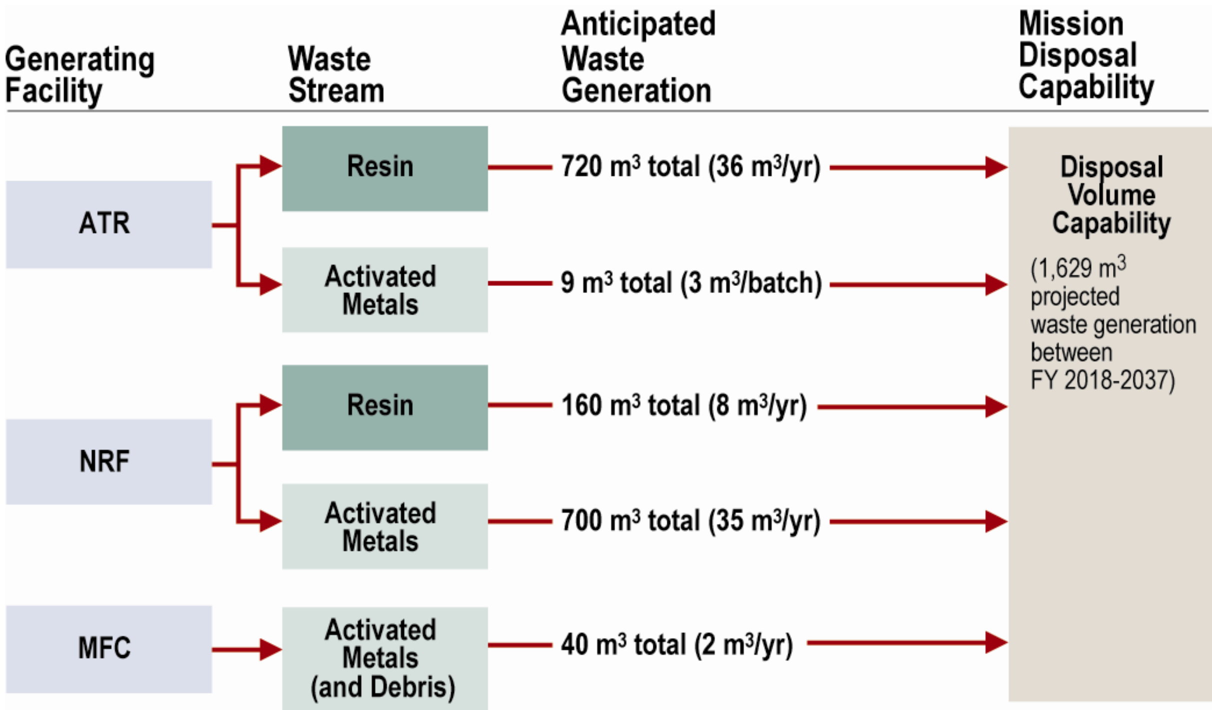


Figure 1-2. Projection of anticipated remote-handled low-level waste generation through Fiscal Year 2037.

1.2 Background

Under the Atomic Energy Act of 1954 (42 USC § 2011 et seq.), as amended, DOE is responsible for waste it generates. DOE Manual 435.1-1, "Radioactive Waste Management," provides DOE's policy for management of radioactive waste, including remote-handled LLW:

> *DOE radioactive waste shall be treated, stored, and in the case of low-level waste, disposed of at the site where the waste is generated, if practical; or at another DOE facility. If DOE capabilities are not practical or cost effective, exemptions may be approved to allow use of non-DOE facilities for the storage, treatment, or disposal of DOE radioactive waste.*

Until September 30, 2008, INL disposed of its remote-handled LLW in a disposal facility located in the Subsurface Disposal Area (SDA) at the Radioactive Waste Complex (RWMC). Continued disposal of remote-handled LLW in the SDA concrete vaults is planned until the facility is full or until it must be closed in preparation for final remediation (approximately at the end of FY 2017). Disposal of ATR remote-handled LLW ion-exchange resins in the open pit of the SDA ceased at the end of FY 2008 following closure of the open pit. This waste is currently shipped offsite for disposal. The SDA is being remediated under a Federal Facilities Agreement/Consent Order (DOE-ID 1991) between DOE, the State of Idaho, and the U.S. Environmental Protection Agency (EPA) that guides Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.) response actions at INL.

1.3 Mission Need

The continuing nuclear mission at INL, associated ongoing and planned operations, and Naval spent fuel activities at NRF require continued capability to appropriately dispose of remote-handled LLW. However, with the closure of RWMC, INL will no longer have an onsite disposal capability for remote-handled LLW. The Remote-Handled LLW Disposal Project will establish continued, uninterrupted, remote-handled LLW disposal capability. Replacement remote-handled LLW disposal capability is required by October 1, 2017.

Providing continued disposal capability for remote-handled LLW supports the Office of Nuclear Energy's mission "to lead the DOE investment in the development and exploration of advanced nuclear science and technology." Without established, viable remote-handled LLW disposal capability, ongoing and future Office of Nuclear Energy programs at INL would be adversely impacted as remote-handled LLW disposal options would need to be considered on a program-by-program basis, resulting in increased costs and schedule. The lack of remote-handled LLW disposal capability also may impede DOE's ability to initiate new programs at INL.

Remote-handled LLW disposal capability also is critical to meeting National Nuclear Security Agency's mission to "provide the United States Navy with safe, militarily effective nuclear propulsion plants and to ensure the safe and reliable operation of those plants." All spent nuclear fuel from the Navy's nuclear-powered fleet is sent to NRF for examination, processing, dry storage, and eventual shipment to a permanent geologic repository. A reliable disposal path for remote-handled LLW generated during spent nuclear fuel handling and packaging operations is essential to NRF's continued receipt and processing of Navy spent fuel to support the Naval Nuclear Propulsion Program and national security.

From waste generation projections presented in Figure 1-2, INL must have the capability to dispose of approximately 84 m^3/year of remote-handled LLW with radiation exposure levels up to 30,000 R/hour, commencing by the end of FY 2017.

1.3.1 Summary of Alternatives for Continued Idaho National Laboratory Remote-Handled Low-Level Waste Disposal Capability

As identified in the mission need statement for the project (DOE-ID 2009) and further described in the alternatives analysis (INLa), multiple alternatives have been identified for continuing INL remote-handled LLW disposal activities, including the following:

- Continued disposal at RWMC
- Disposal at Idaho CERCLA Disposal Facility
- Interim storage
- Storage for decay
- Design, construct, and operate a new onsite remote-handled LLW disposal facility
- Dispose of all remote-handled LLW offsite at the Nevada National Security Site (formerly known as the Nevada Test Site)
- Privatization of INL remote-handled LLW disposal
- No action.

1.3.2 Recommended Alternative

An alternatives analysis report (INLa) for the remote-handled LLW project was prepared to evaluate the alternatives identified in the mission need statement (DOE-ID 2009). Each alternative was assessed for its viability in providing continued, uninterrupted remote-handled LLW disposal capability. From this assessment, two potentially viable alternatives were identified (i.e., design, construct, and operate a new onsite remote-handled LLW disposal facility [onsite disposal] and dispose of all remote-handled LLW offsite [offsite disposal]). Each alternative was ranked based on its ability to meet criteria addressing cost, project risk, and complexity. The highest ranked alternative identified through the alternatives analysis is the development of a new onsite remote-handled LLW disposal facility. Of the potentially viable alternatives considered, onsite disposal of INL and tenant-generated remote-handled LLW has the lowest life-cycle cost to DOE and provides the lowest risk. Costs are reduced through avoidance of costs to develop transportation infrastructure and to conduct offsite shipments. Project risks, such as uncertainty of availability of offsite facilities, are eliminated using onsite disposal. Reliance on other activities or programs in order to achieve disposal also is minimized, reducing disposal complexity.

Offsite disposal has a higher life-cycle cost due to the number of offsite shipments that would be required and is complicated by transportation issues associated with transporting highly radioactive waste in commerce and by the infrastructure and processing changes at the generating facilities, specifically NRF, that would be required to support offsite disposal.

Through establishment of the proposed onsite remote-handled LLW disposal facility, risks associated with transport of highly radioactive waste would be reduced, life-cycle waste management costs would be minimized, and the necessary waste management infrastructure to support ongoing and future Office of Nuclear Energy and Office of Naval Reactors programs would be maintained. Development of the proposed onsite disposal facility would yield the following benefits:

- Provide for uninterrupted remote-handled LLW disposal capability, thereby minimizing potential impacts on INL and NRF operations

- Allow for continued processing of Navy fuels at NRF, enabling compliance with the Idaho Settlement Agreement commitments

- Eliminate the need for significant capital investment in major infrastructure modifications to support offsite disposal of remote-handled LLW, including, but not limited to, acquisition of a Nuclear Regulatory Commission-licensed, Department of Transportation-compliant cask system(s) for offsite transportation; facility infrastructure modifications to support the new transport system(s); and expansion of onsite interim storage capabilities to address offsite shipment campaigns

- Provide for remote-handled LLW management and disposal consistent with DOE Order 435.1, which states:

  > *DOE radioactive waste shall be treated, stored, and in the case of low-level waste, disposed of at the site where the waste is generated, if practical*

- Decrease risks associated with offsite transport of waste

- Maintain DOE control of remote-handled LLW disposal and decrease the potential for diversion or sabotage of waste

- Provide a consistent, sitewide waste management system, reducing required coordination among multiple programs to identify and implement cost-effective waste management options

- Reduce dependence on the cooperation of third parties, such as disposal site operators, states other than Idaho (shipment and disposal), and other federal agencies (e.g., Nuclear Regulatory Commission for cask certification) to the absolute minimum

- Provide the most cost-effective approach for management of remote-handled LLW, minimizing life-cycle costs to DOE.

The remainder of this conceptual design report focuses on the requirements and design of a proposed onsite remote-handled LLW disposal facility. A formal DOE decision as how to proceed with the project will be made in accordance with the requirements of National Environmental Policy Act (NEPA) (42 USC§ 4321 et seq.). Viable locations for the proposed onsite disposal facility have been identified as part of a siting study (INLd). The site with the highest score will be included as part of the NEPA process should DOE make a decision to build the proposed onsite disposal facility.

2. PROJECT BASIS

This section provides key project assumptions, describes the design process and related activities, and describes anticipated staffing requirements associated with development of the proposed onsite remote-handled LLW disposal facility, the highest ranked alternative for meeting the project mission need.

2.1 Key Project Assumptions

The following assumptions are used in the conceptual design for the proposed onsite remote-handled LLW disposal facility:

1. The facility would be government-owned and contractor-operated. DOE would provide oversight of the siting, design, construction, and operation of the facility.

2. Project schedule and cost estimates are based on identifying funding levels that would support uninterrupted project staffing and procurement through design, construction, and startup.

3. The facility would be designed with a design life of 50 years; however, the facility initially would be sized for the volume of waste expected to be disposed of over a 20-year period beginning in FY 2018 and continuing through FY 2037.

4. Waste volumes used for design purposes of initial construction are as shown in Figure 1-2.

5. The facility would be designed to accept waste with a contact exposure rate up to 30,000 R/hour

6. The conceptual design is based on the existing 55-ton cask and associated systems currently used by NRF.

7. Commercially available casks would be procured by the project and used for shipments of activated metal waste generated from ATR and MFC (for waste generated from potential new missions and from processing of remote-handled waste currently stored at the Radioactive Scrap and Waste Facility). The project would define the transport system specifications to ensure that the cask produced fully complies with all quality and safety standards for the transportation of waste onsite and has undergone all appropriate testing. Through a competitive bid process, a contract would be awarded to a commercial cask supplier who has the design experience, is experienced with the Nuclear Regulatory Commission safety and quality requirements, and has contracts with reputable fabrication vendors.

   It is assumed that the activated metals waste liners used for disposal would have a cylindrical configuration with a 3-ft (1-m) diameter and 9.3-ft (2.8-m) high maximum dimension that would fit within a commercially available shipping cask(s).

8. Vaults used for disposal of ATR and MFC-generated, activated metals waste would be sized to accept liners compatible with a commercially available cask system. Typical cask and liner handling equipment (i.e., hoisting and rigging components and a shielding bell) would be procured as part of this project. The actual liners used for packaging the remote-handled LLW for transport using a commercially available cask would be selected (or designed) and procured by the individual operating/generating facilities. Any ancillary equipment (e.g., new cask transfer and handling equipment) specifically required to interface with the liner for transport and unloading also would be procured by the project.

9. The existing NuPac 14-210L cask would be used for shipments of the ion-exchange resin waste generated from ATR. Vaults for this waste would be sized to accept the NuPac 14-210L liners

currently used at ATR. Typical cask and liner handling and transfer equipment (i.e., hoisting and rigging components and a shielding bell) would be procured for the NuPac 14-210L liners as part of this project. Typical hoisting and rigging components and any ancillary equipment specific to the liner design needed to unload the liner from the shipping cask and to place liners into the disposal vaults would be provided by the project.

10. Performance assessment characteristics of the selected site location will not result in more restrictive waste acceptance criteria for radionuclide content than the current remote-handled vault location at RWMC.
11. Facility design and operations will be within the documented safety analysis established for the disposal facility.
12. Changes to infrastructure at waste generating facilities are not included as part of the scope of this project.
13. The Remote-Handled LLW Disposal Facility Project is based on development and approval as a line item construction project per DOE Order 413.3B, "Program and Project Management for Acquisition of Capital Assets."

2.2 Conceptual Design Requirements Development

A technical and functional requirements (TFR) document (TFR-483, "Remote-Handled Low-Level Waste Disposal Facility Technical and Functional Requirements") has been developed to satisfy the need for conceptual design requirements development as detailed in DOE Order 413.3B and its implementing guides. The purpose of the TFR document is to provide the requirements basis for development of the proposed disposal facility.

2.3 Summary of Technology Needs

No new technology needs have been identified for this project. Well developed and proven technologies exist to meet requirements for disposal of remote-handled LLW.

2.4 Systems Engineering

A systems engineering approach has been incorporated into project planning to satisfy project requirements for a comprehensive systems engineering management process, as specified by DOE Order 413.3B and its implementing guides. The purpose of the systems engineering approach is to ensure that the Remote-Handled LLW Disposal Project applies the appropriate technical management program for the project to ensure optimal utilization of technical resources and optimal definition, application, integration, utilization, and documentation of those technical requirements important to achieving the mission and objectives.

2.5 Value Engineering

The systems engineering approach includes consideration of how value engineering concepts are applied during execution of the project. The project will incorporate value engineering, as required by DOE Order 430.1B, "Real Property Asset Management," and DOE Order 413.3B, as a core discipline in the implementation of the project. Beginning with planning for the project, value engineering has been incorporated through the following:

- An interdisciplinary team approach that will be used at all levels of implementation

- Cost/performance trade studies, which will use the value engineering methodology to identify potential options and to select a preferred option
- Design studies, which will consider value engineering recommendations in their decision making
- Design reviews, which will examine how effectively value engineering principles have been applied to project decisions.

Value engineering also will be applied to the functional decomposition of project requirements to ensure that all identified functions are truly required to achieve the system requirements. In the conceptual design phase, a number of alternatives to achieve project goals have been considered. In all cases, minimizing project cost (both near-term and life-cycle) while meeting project, environmental, and safety requirements was a primary discriminator in selecting the path forward. Key design options and alternative considerations are described in Section 2.7.

Following Critical Decision (CD)-1 approval and acceptance of the overall project concept and during subsequent detailed design, value engineering will be used, as applicable, to guide decisions to optimize sub-functions and sub-processes. Because the proposed design is modeled closely on existing facilities and practices, use of value engineering in this project will build on this practical experience.

2.6 Acquisition Strategy

This section summarizes key points of the acquisition strategy for this project. A stand-alone acquisition strategy (DOE-IDa) has been developed for the project that describes the business and technical management approach to achieving the Remote-Handled LLW Disposal Project objectives. The project consists of design and construction of a remote-handled LLW disposal facility, including the following major systems and components: procurement of prefabricated concrete vaults; site excavation; installation of vaults; design and construction of necessary support buildings; and procurement of a new commercially available waste shipping cask and transfer system.

2.6.1 Acquisition Management

Battelle Energy Alliance, LLC, as the management and operations contractor at INL, will act as the prime contractor for the project. The INL contract states:

> *The INL Contractor shall manage INL generated LLW and, if directed by DOE, LLW generated by other tenants (e.g., NRF) upon closure of the RWMC LLW disposal operations… LLW management includes development of on/offsite LLW disposal capability and the supporting infrastructure.*

INL has a DOE-approved procurement system with established processes for handling vendor selection, construction management, and equipment procurements. INL will have prime responsibility for technical direction and oversight of all contracts required to execute this project. INL's project management, construction management, and environmental, safety, health, and quality management systems are all proven to be effective for oversight of projects of this scale and type.

2.6.2 Business and Acquisition Approach

The INL Remote-Handled LLW Disposal Project will be implemented as a design-build project, wherein a contract will be awarded for design and construction of the new disposal facility. This approach was chosen for the project because the project has well-defined requirements based on current remote-handled LLW disposal operations at INL, the disposal facility is not complex, and there is limited risk with the design and construction phases of the project. This design-build approach also will be used for procurement of the transport cask and transfer equipment for the ATR and MFC-generated, activated metals waste. The design-build schedule is included in Figure 2-1.

Upfront planning and documentation will focus on further clarifying the disposal facility operating requirements based on the conceptual design and subsequent analyses (e.g., nuclear safety, safeguards and security, and radiological performance assessment and composite analysis) that will augment the conceptual design package in the form of a performance specification included in the design-build procurement package. Sufficient information will be provided to allow prospective contractors to prepare bids or proposals. The overall objective of completing the INL Remote-Handled LLW Disposal Project using a design-build approach is to reduce the total cost of the project and to provide uninterrupted remote-handled LLW disposal capability through a process that can be completed quicker than a traditional design-bid-build approach.

2.6.3 Acquisition Risks

In accordance with DOE guidance (DOE Guide 413.3-13), risks associated with acquisition were identified. The risks considered for selection of the acquisition strategy fall into the following categories:

- Funding and budget
- Legal and regulatory
- Location and site conditions
- Cost and schedule
- Functional
- Scope and definition
- Interfaces
- Stakeholder issues.

Specific risks and mitigation actions are identified. Criteria also are established for use in selecting a preferred acquisition strategy. The design-build approach meets the established criteria: the design is proven because it is based on an existing capability at INL; it is not complex; there are few unknowns; and the design is not unique or first-of-a-kind. Table 2-1 provides a summary of the risks by category, their mitigations, and the criteria.

2.6.4 Interfaces and Integration Requirements

To successfully provide uninterrupted disposal capacity for INL remote-handled LLW, the chosen alternative must be compatible and must interface with facilities, equipment, material handling tools, and operating procedures currently in use at RWMC. Continuing use of functional equipment and efficient processes will reduce cost, simplify, and improve safety of disposal operations and associated activities. The primary project interface with the generating facilities will be associated with the waste liners and transport casks. The project will work closely with the generating facilities to ensure compatibility between any new waste transport system(s) and the concrete disposal vaults.

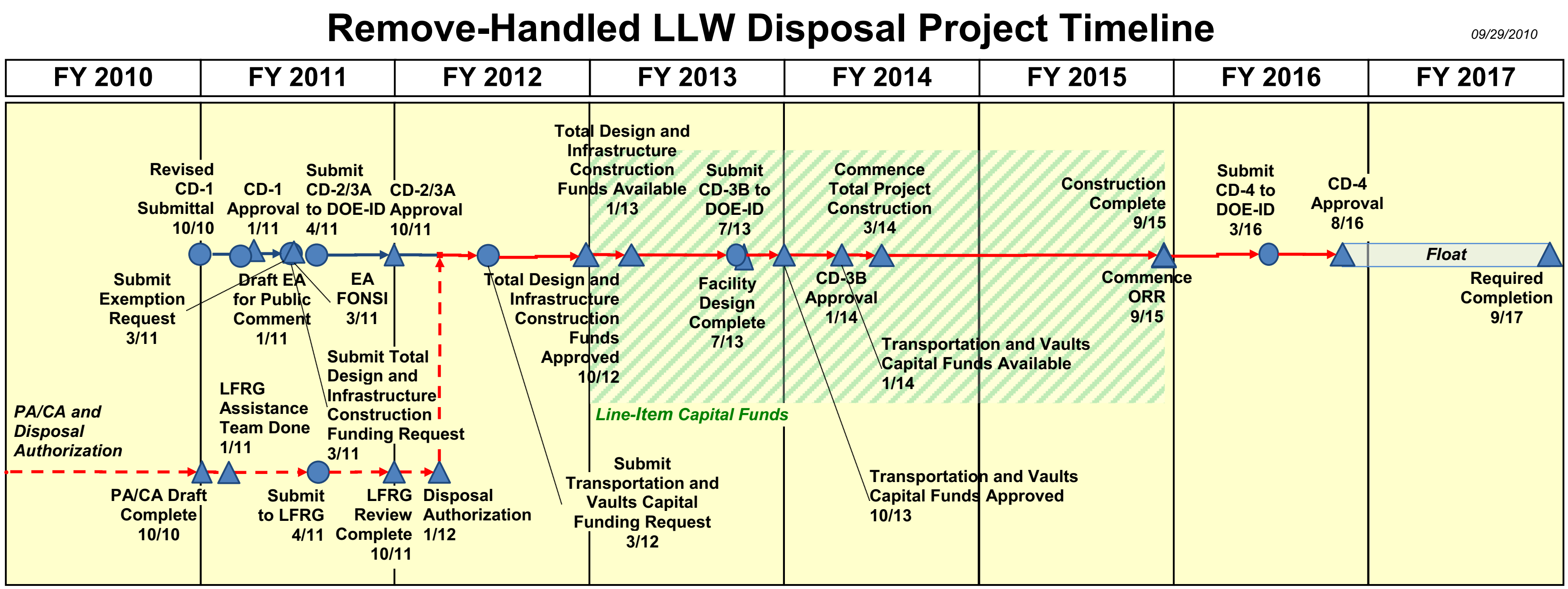


Figure 2-1. Remote-Handled Low-Level Waste Disposal Project timeline.

Table 2-1. Risk analysis for the Remote-Handled Low-Level Waste Disposal Project.

Risk Category	Risk Definition	Mitigation Action(s)	Criteria for Acquisition Strategy
Funding and Budget	If project funding is not received or is delayed during project execution (due to lack of priority or difficulty in government funding cycles), planned critical path activities may be impacted.	• Ensure clear prioritization strategy for funding • Work with DOE Headquarters for prioritization of funding • Streamline critical path activities.	• Simple delivery method approach • Contractor ability to adjust schedule to accommodate funding profile
Legal and Regulatory	If the Environmental Assessment does not result in a finding of no significant impact, then an Environmental Impact Statement is required.	• Clearly defined NEPA strategy • Defined project requirements that minimize environmental impacts • Actively employ a communication strategy to engage DOE Headquarters	• Contractor available with proven technical and regulatory capabilities to support NEPA analysis
	If a stakeholder(s) files a lawsuit against DOE, then significant delays will result.	• Clearly defined NEPA strategy with strict adherence to the NEPA process • Actively employ a communication strategy to engage the public	• Proven federal or contractor capability to communicate with stakeholders
Location and Site Condition	If the selected site for disposal facility is disqualified (after selection, during design, or after design), then significant cost and schedule impacts regarding revaluation of different sites will result.	• Rigorous and comprehensive siting study (with peer review) • Selected site of sufficient size that allows maximum flexibility of facility placement	• Technical and engineering capabilities available to integrate siting and design criteria
Cost and Schedule	If the acquisition strategy is not approved by DOE Headquarters, then significant changes to the schedule and project definition documents will be required.	• Actively employ a communication strategy to engage DOE Headquarters and the DOE Office of Engineering and Construction Management on acquisition approach	• Acceptable to DOE Headquarters and the DOE Office of Engineering and Construction Management
	If DOE determines to go commercial with the disposal facility, then significant regulatory, cost, and schedule impacts will result.	• Provide a comprehensive alternatives analysis • Full picture of commercialization options • Routine updates on commercial capabilities	• Fully consider all disposal options • Proven federal or contractor capability to prepare and present critical path schedule

Table 2-1. (continued).

Risk Category	Risk Definition	Mitigation Action(s)	Criteria for Acquisition Strategy
	If the liner technology (or any disposal technology) is considered new or a departure from existing technologies, then the acquisition strategy would need to be revisited, impacting cost and schedule.	• Provide a clear liner alternative analysis to inform DOE and support timely selection • Timely concurrence • Liner alternative established prior to design-build procurement action • Actively employ a communication strategy with the DOE Office of Engineering and Construction Management and DOE Headquarters on the liner approach	• Request for proposal based on clear requirements • Engineering capabilities available and integrated • DOE Headquarters concurrence • No technology development or research and development required
Functional	If an updated Natural Phenomena Hazard Assessment for the INL site identifies new deficiencies that require design changes, then significant cost and schedule increases will result.	• Communicate within DOE to accomplish necessary analyses • Proven design that provides protective measures from natural hazards	• Proven technical and engineering capabilities available to integrate siting and nuclear safety aspects into design criteria
Scope and Definition	If a vault liner alternative is not selected in time to support performance specification(s) scheduled completion, significant changes to the specification(s) and possible changes to contract/project execution documents may be required.	• Provide a technically sound liner alternative analysis • Alternatives considered include existing liner methods • Inform DOE Headquarters and support timely selection of alternative	• Proven liner method use • Engineering capabilities available
	If DOE Order 435.1 requirements change, then the need for additional design features at the disposal facility could result.	• DOE Idaho Operations Office close involvement with the DOE Order 435.1 revision process • Evaluate the potentially affected structures, systems, and components and communicate with DOE	• Engineering capabilities available to respond to changes
Interfaces	If CD-4 (likely all CD approvals) is not approved on schedule, then the facility may not be operational by the required date and significant programmatic impacts would be imposed on generators (MFC/ATR/NRF).	• Actively employ a communication strategy between the DOE Idaho Operations Office and DOE Headquarters on CD approach and approval	• Proven contractor capability to maintain critical path schedule

Table 2-1. (continued).

Risk Category	Risk Definition	Mitigation Action(s)	Criteria for Acquisition Strategy
Stakeholder Issues	If there is stakeholder resistance to siting and construction of a remote-handled LLW disposal facility at INL, then a protracted schedule and increased costs, resulting from activities necessary to resolve stakeholder issues, would result.	• Actively employ a communication strategy to engage the public	• Proven federal or contractor capability to communicate with stakeholders
	If the Greater-Than-Class C Environmental Impact Statement is issued, where INL is a potential disposal site, the stakeholders perception that the new onsite disposal facility will be expanded to include Greater-Than-Class C would result. This will cause significant resistance and subsequent delays.	• Monitor progress of the Greater-Than-Class C Environmental Impact Statement decisions that could affect INL • Actively employ a communication strategy to engage the public	• Proven federal or contractor capability to communicate with stakeholders

2.7 Design Options

In accordance with the requirements of DOE Order 413.3B and its implementing guides, an evaluation of design options has been performed to identify the preferred design of the proposed facility. This section provides a description of design options and processes used to arrive at selection of the design option used for the conceptual design basis in this report.

2.7.1 Design Options Set Selection

An analysis of design options for the proposed onsite disposal facility was conducted as part of conceptual design development. The design team started the analysis by evaluating the initial TFRs for the proposed facility and their ability to be achieved through various design options. The design options that could fulfill the TFRs were selected for further review. These design options were evaluated to assess cost and ease of implementation. Selected design options are incorporated into the conceptual design.

Based on the remote-handled LLW alternatives analysis (INLa) and review of the design elements of the existing disposal facility and associated operations, it was determined that the design approach for the disposal vaults in the proposed remote-handled LLW disposal facility should closely parallel that of the existing disposal vaults at RWMC. Based on this design approach, design options were identified. Design options developed for further consideration are as follows:

1. Installation of vaults versus use of boreholes (soil vaults)

2. Incorporation of system liners in addition to the vaults

3. Installation in surficial sediment versus installation in basalt formation

4. Installation of vaults that would accommodate multiple transport cask and waste liner dimensions

5. Engineered intruder barriers.

2.7.2 Evaluation of Design Options

This section describes the design options evaluated during conceptual design.

2.7.2.1 Installation of Vaults versus Use of Boreholes. One alternative design consideration is the possibility of drilling boreholes and directly inserting containers of remote-handled LLW. This method was used at RWMC before 1992 to dispose of remote-handled LLW. In 1992, the first set of concrete vaults was installed to accept remote-handled waste. Compared to using boreholes, concrete vaults offered a number of significant advantages. Use of concrete vaults allows the minimum center-to-center distance to be obtained while maintaining structural stability. This minimizes the footprint of the facility and provides increased stability. Infiltration of sidewall materials into the borehole could interfere with placement of the remote-handled LLW containers. To minimize this type of event, much greater center-to-center distances are required for boreholes than for placement of concrete vaults. By using concrete vaults, operations are both simplified and made more predictable. In view of the lessons learned from actual operations, the option of using boreholes without vaults was discarded.

2.7.2.2 Incorporation of System Liners in Addition to Vaults. On the basis of national policy and strategies for safe disposal of radioactive waste, the project will complete appropriate safety assessments and activities needed for siting, design, construction, operation, and closure of the remote-handled LLW disposal facility. As a result, the actual vault configuration will be based on these safety assessments. However, in line with recent discussion within DOE, liners will be considered as part of this project. A liner evaluation, using a systems engineering development approach, will be performed to evaluate and assess liner options. This includes the analysis of design needs and alternatives that could be incorporated into the facility configuration to ensure optimization of design and to maximize facility performance. The systems approach will include the following points of concern:

- The facility will be designed to provide adequate isolation of disposed waste for the required time periods that are applicable to the specific waste materials and characteristics and the specific site safety requirements.

- The design will minimize the need for active maintenance after closure.

- The disposal facility may include engineered barriers, which together with the emplaced medium and its surroundings, isolate the waste from humans and the environment. The engineered barriers may consist of the waste package and other human made features such as vaults, covers, linings, grouts and backfills, that are intended to prevent or delay radionuclide migration from the facility to the surroundings.

- The initial evaluations, which are primarily based on the existing vault and disposal configuration established at RWMC, indicate that there is not a need for additional liner systems within the facility configuration. However, the initial evaluation was centered primarily on the possible use of a subsurface liner and associated leachate collection system. These Resource Conservation and Recovery Act (RCRA)-type liners are a design base requirement for EPA's management of hazardous waste. They are not used for LLW disposal facilities because of the need to avoid water accumulation in the disposal unit. Use of a low permeability membrane below the disposal zone could potentially result in accumulation of water in the disposal unit. This is further supported by 10 Code of Federal Regulations (CFR) 61.51, "Disposal Site Design," criteria that states that allowing free drainage from the disposal units is actually desirable:

  > *Reducing the contact time of water with the waste by using freely-draining granular backfill should be considered. In addition, the accumulation of water in the disposal unit (the bathtub effect) must be avoided. This can normally be accomplished if the bottom of the disposal unit can drain at least as readily as water can infiltrate into the disposal unit through the cover or sides….*

An additional project liner alternative analysis that addresses the requirements established in the International Atomic Energy Agency guidance documents (IAEA, IAEA 1999, IAEA 2006) for near surface disposal of radioactive waste will be completed during development of the facility-specific final performance specification in the CD-2 timeframe. The alternatives analysis will include the following:

1. Identify potential liners that possibly include steel waste containers, synthetic high density polyethylene material that would allow some infiltration and eliminate the need for leachate collection, geochemical barrier (adsorption trap), and other covers and linings that may help prevent the migration of the radionuclides.

2. Down select from the potential alternatives and identify the liners that justify further evaluation and possible incorporation into the system development approach.

3. Evaluate the geochemical impacts to geochemical sorption traps and material sorption rates.

4. Develop a geochemical transport (hydrogeochemical) model of the vault system. This will provide a model of how the vault system should work and to assess the long-term behavior of the concrete vaults and their impact on the sorption of the underlaying materials.

5. Model the different liner alternatives to estimate waste migration concentrations and evaluate the expected radiological dose over time.

6. Complete a cost benefit analysis for the various alternatives.

The final results of the alternative analysis will be incorporated into the facility performance specifications that will be used for the design-build procurement, which will include final design and system construction activities.

2.7.2.3 Installation in Surficial Sediment versus Installation in Basalt Formations. Design consideration was given to drilling boreholes in basalt formations instead of surficial sediment. The potential for fractures in basalt either as a result of drilling or due to other influences would lead to potential fissure pathways to the aquifer, which could significantly accelerate pathways for release of contaminants to the groundwater exposure pathway. This potential accelerated release could adversely affect the total radionuclide inventory permitted for disposal by the performance assessment.

2.7.2.4 Installation of Vaults that will Accommodate Multiple Transport Cask and Waste Liner Dimensions. Design of the vaults for disposal of remote-handled LLW is greatly dependent on the size of the waste containers (liners) that would be disposed of at the facility. The vaults will be sized to accommodate the existing or planned waste liners from NRF, ATR, and MFC. The liner (waste container), cask, and transfer system for disposal of NRF activated metals and resin waste streams have been successfully used for many years. Alteration of any elements of this system would result in significant additional capital costs and possible interference with NRF operations. In addition, no such alterations are likely to have any impact on costs of design or construction of the proposed vault system or result in cost savings during operation. Therefore, the proposed vault design for disposal of the 55-ton scrap cask liners is based on the RWMC vaults, which are suitable for the liners used by NRF for transport of remote-handled LLW. These vaults are made from precast concrete. They have a circular cross section and are approximately 5 ft (1.5 m) in diameter and 20 ft (6 m) high. They can accommodate two stacked 55-ton cask liners (47-in. [119-cm] diameter × 104 in. [264. cm] high). Each liner holds approximately 90 ft^3 (3 m^3) of waste.

ATR and MFC remote-handled LLW activated metal waste streams are anticipated to be transported in a commercially available cask. The proposed design of the vaults for the ATR and MFC activated metal waste streams is similar to the design used for the 55-ton scrap cask liner vaults currently used at RWMC for NRF waste but sized to accommodate liner dimensions for a commercially available cask. The vaults would be made from precast concrete. They would have a circular cross section and would be approximately 4 ft (1.3 m) in diameter and 20 ft (6 m) high. They could accommodate two stacked cask liners (3 ft [1 m] diameter × 9.25 ft [2.8 m] high). Each liner could hold approximately 60 ft^3 (1.5 m^3) of waste. The actual liners used for packaging the remote-handled LLW for transport using a commercial available cask would be selected (or designed) and procured by the project.

The ATR ion-exchange resins will be transported in the NuPac 14-210L cask. The ATR ion-exchange resin vault also will be similar to the current design used at RWMC, but sized to accommodate the NuPac 14-210L liner. Vaults would be made from precast concrete, have a circular cross section, and would be approximately 7 ft (2.1 m) in diameter and 16 ft (4.9 m) high. They could accommodate two stacked liners (6.25 ft [1.9 m] diameter × 6.25 ft [1.9 m] high). Each liner could hold 210 ft^3 (6 m^3) of waste. However, the liners would be loaded with an average of 128 ft^3 (3.6 m^3) of waste.

2.7.2.5 Performance Assessment Required/Enhancing Barriers. The current design used at RWMC allows use of additional stainless steel barrier plates on top of the liners inside the vaults. The purpose of these barrier plates is to delay the time horizon needed for an inadvertent intruder to penetrate the disposal vaults and bring radioactive material to the surface. The timeframe available for decay is critical to establishment of the maximum concentrations and radionuclide distribution permitted for disposal by the radiological performance assessment. This additional barrier was judged to be an appropriate design feature that would allow for disposal of both a greater total inventory and broadening the characteristics of the waste permitted under the facility waste acceptance criteria. Therefore, the dimensional configuration of the conceptual design of the vaults allows for the use of such plates in the proposed disposal facility.

2.7.3 Conclusions of Design Options Evaluation

Based on this analysis and operational experience at RWMC, the proposed onsite facility design would dispose of all identified remote-handled LLW waste streams in concrete vaults, which would be placed in an unlined, sedimentary soil bed. The proposed configuration of concrete vaults is based on the RWMC vaults, which are sized to accommodate the 55-ton cask liner currently used by NRF for transport of remote-handled LLW. Vaults of similar design, but sized to accommodate the cask liner dimensions used for the ATR resins and the cask liner dimensions anticipated for the ATR and MFC activated metals, also would be installed. If future cask and liner systems identified for use differ from those described herein, the design would be modified during the final design to account for these differences. Any known differences will be described in the facility performance specification for use in the design-build procurement. The number of vaults proposed is based on the estimated waste stream generation rates anticipated from the generator facilities.

Construction of the proposed disposal facility involves installation of concrete vaults for remote-handled LLW activated metals and ion-exchange resin waste streams. However, none of the selected design features are based on characteristics unique to activated metals or ion-exchange resin waste streams, and therefore should not, in and of themselves, limit the type of remote-handled waste that could be disposed of in the facility. In accordance with DOE Order 435.1, specific waste acceptance criteria, based on the performance assessment and composite analysis, will be established for the proposed facility.

2.8 Site Selection

A site location must be selected in order to develop the highest ranked alternative identified in the alternatives analysis (INLa) at INL (i.e., operate a new onsite remote-handled LLW disposal facility [onsite disposal]). A siting study was conducted to support evaluation of the onsite disposal alternative (INLd). The study identifies candidate locations at INL and evaluates them against technical and programmatic objectives for remote-handled LLW disposal. A comprehensive analysis of siting options involves identification of appropriate site selection criteria that address regulatory, facility design, facility performance, and key project assumptions. The siting study for the Remote-Handled Low-Level Waste Project (INLd) documents systematic development of criteria, building on previous siting studies conducted at INL and unique requirements associated with the Remote-Handled LLW Disposal Project. The site selection criteria were applied to potential site locations in order to assess each site’s suitability for a remote-handled LLW disposal facility.

Development of a site location recommendation for onsite disposal at INL is subject to the requirements of DOE Order 435.1 and implementing guidance for LLW disposal facilities. The siting study considered environmental characteristics, geotechnical characteristics, and human activities. It specifically addresses the following:

- Suitability for volume of waste
- Flood plain
- Tectonic activity
- Water table fluctuation
- Access
- Wildlife
- Whether radionuclide migration pathways are predictable
- Whether erosion and surface runoff can be controlled.

Substantial data regarding site conditions are available from routine environmental monitoring, sampling and analysis, other studies, and previous siting studies for other facilities at INL (Holdren et al. 1997; Spry et al. 1989; Taylor et al. 1994; DOE-ID 1999). This body of knowledge was used to develop "must" and "want" site selection criteria that were focused on the specific needs of a remote-handled LLW disposal facility.

Previous INL siting studies provide detailed examples of the development and application of evaluation criteria and ranking strategies. Review of these previous siting studies indicates that the following five key areas are the primary contributors to the synthesis of information and requirements used for development of a comprehensive set of siting criteria:

1. Regulations
2. Key assumptions
3. Conceptual design
4. Facility performance
5. Previous siting study criteria.

The evaluation process identifies regulations, codes, and directives that may be applicable to siting such a facility or that are useful in determining specific evaluation criteria. Siting criteria derived from the five areas address requirements that are important during the operational life of the facility and requirements that give consideration to post-closure performance over longer timeframes. A thorough analysis of the five key areas is provided.

The evaluation process implements a methodology derived from the strategies used in previous siting studies. In summary, "Must" (critical features that are needed) and "Want" (important features that may enhance facility performance or reduce its effects on the environment) criteria were established and weighted based on relative significance. The five steps of the process used for this evaluation are as follows:

1. Identify criteria (both "Must" and "Want")
2. Identify candidate sites
3. Apply "Must" screening criteria to all candidate sites

4. Apply "Want" criteria to sites passing the "Must" screening

5. Rank candidate sites and recommend the most suitable site(s).

The selection of "Must" and "Want" criteria is documented, with a total of 53 criteria identified and evaluated for use. The criteria evaluation resulted in identification of four "Must" criteria and 21 "Want" criteria to be used in the siting evaluation.

An assessment of 34 candidate sites against the established criteria also was conducted. Two sites are recommended for consideration in the NEPA process. A site walk-down was conducted at the three highest-ranked sites to review site-specific conditions and verify that individual sites were appropriately recommended for further consideration through the NEPA process. The two locations that best meet the evaluation criteria are (1) near ATR and (2) west of the Idaho CERCLA Disposal Facility.

2.9 Staffing Requirements

Anticipated staffing requirements are based on current staffing for remote-handled LLW disposal operations at RWMC. It is estimated that 11 personnel will be required to support proposed disposal operations. Disposal operations are estimated to be conducted on a frequency of one to two disposal campaigns per month with a 3-day duration each. The following types of skills or functions will be needed to staff proposed remote-handled LLW disposal operations:

- Two heavy equipment operators
- Two equipment operators
- Two radiological control technicians
- Gate guard/security
- Quality control inspector
- Subject matter expert from generating facility
- Mechanic
- Shipping coordinator.

2.10 Codes, Standards, and Regulations

The following codes, standards, and regulations were evaluated during the conceptual design process and are applicable throughout the final design and construction process:

- 10 CFR 830, Subpart A, "Quality Assurance Requirements," *Code of Federal Regulations*, Office of the Federal Register, February 4, 2002.
- 10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*, Office of the Federal Register, July 11, 2007.
- 10 CFR 851, "Worker Safety and Health Program," *Code of Federal Regulations*, Office of the Federal Register, February 9, 2006.

- 29 CFR 1910, "Occupational Safety and Health Standards," *Code of Federal Regulations*, Office of the Federal Register, February 15, 2008.

- 29 CFR 1926, "Safety and Health Regulations for Construction," *Code of Federal Regulations*, Office of the Federal Register, February 15, 2008.

- ACI-318/99, "Building Code Requirements for Structural Concrete with Commentary," *American Concrete Institute*, Farmington Hills, MI.

- ANSI/ANS 2.26-2004, "Categorization of Nuclear Facility Structures, Systems and Components for Seismic Design," *American National Standards Institute/American Nuclear Society.*

- ASCE/SEI 43-05, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities," *American Society of Civil Engineers/Structural Engineering Institute.*

- ASME NQA-1-2000, "Quality Assurance Requirements for Nuclear Facility Applications," *American Society of Mechanical Engineers*, January 2000.

- ASTM Book of Standards, Volume 04.02, "Construction: Concrete and Aggregates," *American Society for Testing and Materials International*, West Conshohocken, PA.

- DOE Order 420.1B, "Facility Safety," U.S. Department of Energy, December 22, 2005.

- DOE Order 435.1, "Radioactive Waste Management," Change 1, U.S. Department of Energy, July 9, 1999.

- DOE Order 5400.1, "General Environmental Protection Program," Change 1, U.S. Department of Energy, June 29, 1990.

- DOE Order 5400.5, "Radiation Protection of the Public and the Environment," Change 2, U.S. Department of Energy, January 7, 1993.

- DOE-STD-1020-02, "Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities," U.S. Department of Energy, January 2002.

- DOE-STD-1021-93, "Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components," Change 1, U.S. Department of Energy, January 1996.

- DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," U.S. Department of Energy, December 1992 (including Change 1, September 1997).

- DOE-STD-1090-07, "Hoisting and Rigging Standard," U.S. Department of Energy, 2007.

- DOE-STD-1189-2008, "Integration of Safety into the Design Process," U.S. Department of Energy, March 2008.

- IBC, 2009, International Building Code, International Code Council.

- PCI MNL 116, "Manual for Quality Control for Plant and Production of Precast and Prestressed Concrete," 4th Edition, *Precast and Prestressed Concrete Institute*, 1999.

- PCI MNL 120, "Prestressed Concrete Institute Design Handbook for Precast and Prestressed Concrete," 6th Edition, *Precast and Prestressed Concrete Institute*, 2004.

- STD-139, "INL Engineering Standards," Idaho National Laboratory.

3. PROCESS SUMMARY

The design of the proposed remote-handled LLW facility described in this conceptual design report is similar to the design of the existing facility at RWMC. Operation of this new facility would likewise be similar to the existing operation to minimize operational costs and time delays and to maximize efficiency by using current and existing procedures, processes, and equipment.

This section describes the overall process used for disposal of remote-handled LLW at INL. Figure 3-1 shows the general process that is currently being used for remote-handled LLW disposal at RWMC. It is assumed that future waste received from each of the INL generating facilities would be received and disposed of using this same, or similar, sequence of activities. This process is the basis for development of the TFRs for the new disposal facility.

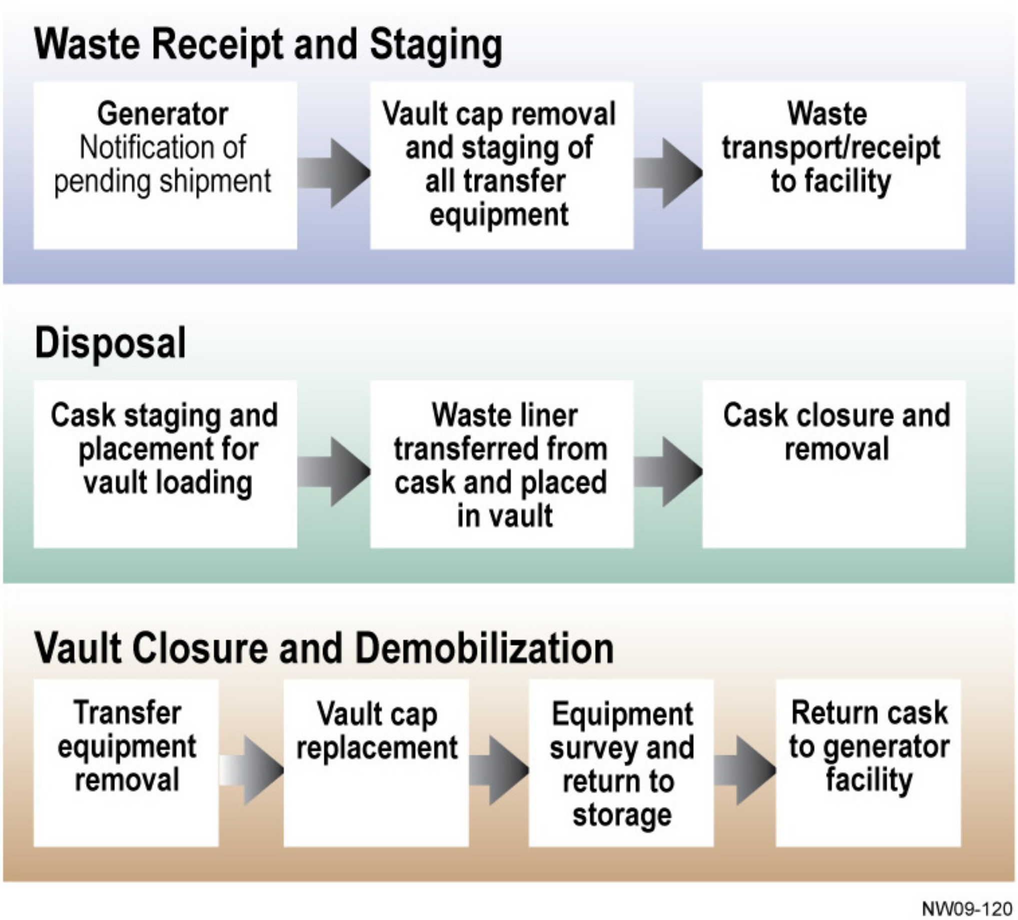


Figure 3-1. Facility process diagram.

The general sequence used for receiving and disposal of the remote-handled LLW shipments currently received at RWMC consists of the following:

1. Once waste is transported to the site, a crane is used to remove the top plug on the vault and to position the cask-to-vault adapting structure (CVAS) on top of the open vault

2. The 55-ton scrap cask is removed from the transporter and placed on the CVAS using the crane

3. Using a remote-operated hoisting system, the cask liner is unloaded from the bottom of the cask and lowered into the disposal vault

4. The cask is then closed and the hoisting system with the associated equipment is removed from the top of the vault

5. The vault is closed.

The specific operational systems and placement procedures that will be used in association with the other cask systems used for disposal of the remote-handled LLW at the proposed facility will be determined once the generating facilities identify their specific liner configurations. It is assumed that the following general operational sequence would be used for placement of the waste liners into the associated disposal vaults:

1. Once waste is transported to the site, a crane will be used to remove the top plug on the vault and prepare the vault opening for liner placement

2. Using the crane, the liner will be removed from the cask using the associated liner handling equipment and positioned over the disposal vault

3. The liner will be lowered into the disposal vault

4. The bell and transfer equipment will be removed and the vault plug replaced.

3.1 Process Description

Currently, remote-handled LLW shipments are transported from NRF to RWMC in a 55-ton scrap cask (Figure 3-2). The waste is placed in steel containers or liners, which are 47 in. (119 cm) in diameter and 104 in. (264 cm) long (Figure 3-3). Each scrap cask contains a single sealed and vented liner. Each of the existing disposal vaults at RWMC can accept two waste liners. As vaults are filled, a 2-ft (0.6-m) thick soil/gravel cover is placed over the concrete plugs and used as a working surface for the crane to allow close setup of equipment for other vaults.

This same process would be used in the new disposal facility. One difference in the conceptual design for the new facility is that it provides flexibility for the vaults to be configured to accept either two or three liners per vault. This capability would depend on the depth of the surface sediment that is present at the specific location selected for the facility, and a demonstration that the performance objectives for LLW disposal facilities under DOE Order 435.1 would be met. A three-liner vault configuration may be preferred because fewer vaults would be required, which may reduce construction costs. A three-liner vault configuration would reduce the facility footprint, which could have benefits related to land use and resource considerations.

It is anticipated that other waste packages (i.e., cask liners) would be developed and used for activated metal waste generated at ATR and MFC from new missions and from processing remote-handled scrap and waste currently stored at MFC’s Radioactive Scrap and Waste Facility. For the conceptual design, it is assumed that this waste would be unloaded and placed in disposal vaults using a method similar to that described in Figure 3-1. The actual liners used for packaging the remote-handled LLW for transport will be selected (or designed) and procured by the individual operating/generating facilities. Any ancillary equipment specifically required to interface with the liner for transport and unloading, other than the typical hoisting and rigging components, will be provided by the generating facility.

Figure 3-2. A 55-ton scrap cask used for transporting waste to the disposal facility.

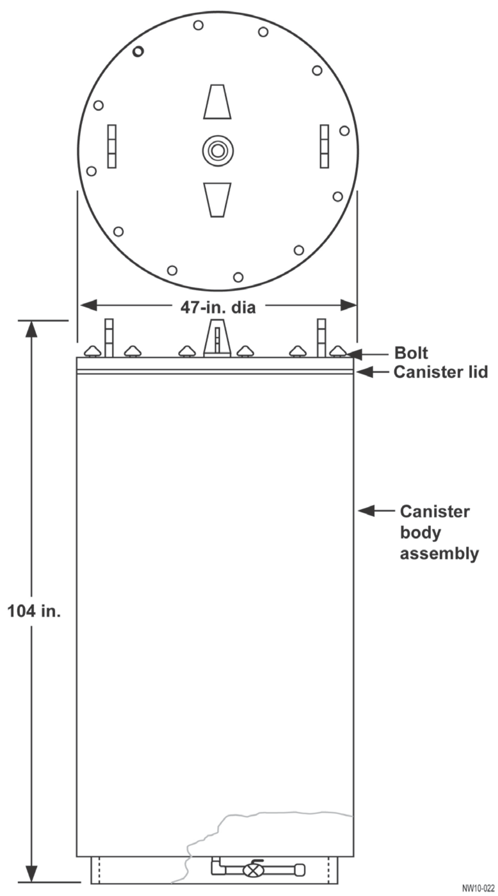


Figure 3-3. Waste liner used inside the 55-ton scrap cask.

Based on the conceptual design, the proposed remote-handled LLW disposal facility would provide approximately 247 new disposal vaults that are similar to the existing RWMC vault design. The vaults would be constructed of precast concrete cylinders (i.e., pipe sections) stacked on end and placed within an array, as shown in Figure 3-4. This configuration would provide the ability to dispose of the desired quantity of waste within the smallest footprint possible.

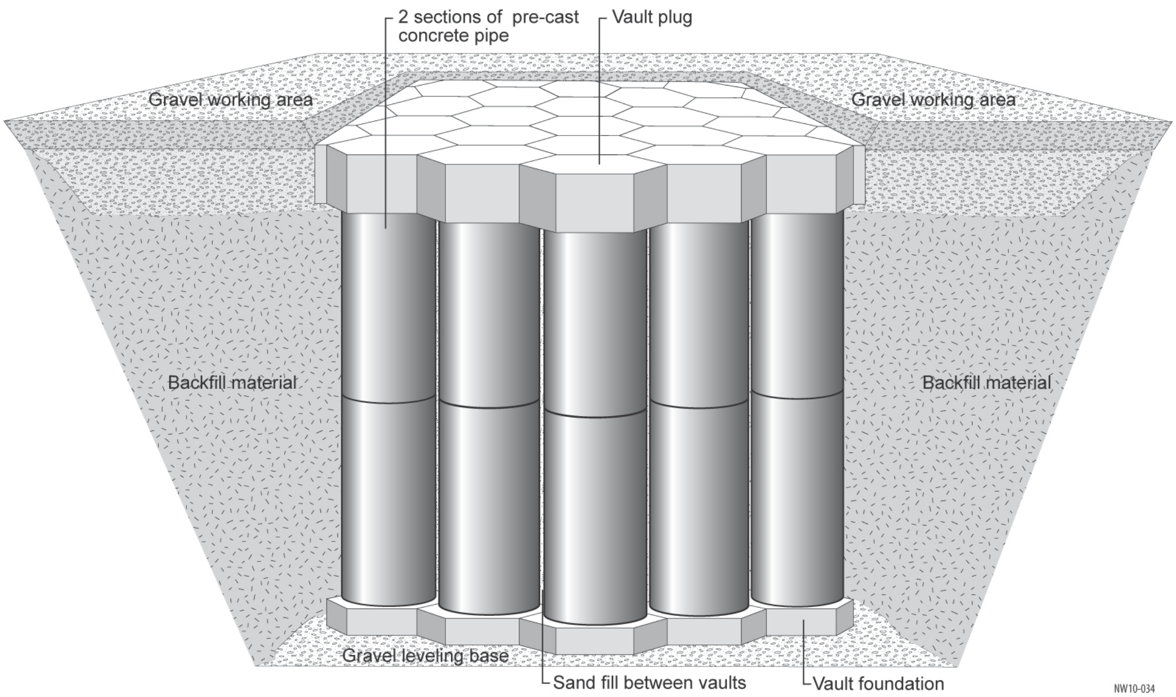


Figure 3-4. Concrete vault layout.

Specific design and operational objectives for the proposed disposal facility include the following:

1. Providing a concrete vault disposal system that can accommodate cask liners that are currently being used for waste disposal of remote-handled LLW activated metals and ion-exchange resins generated at NRF.

2. Providing a concrete vault disposal system that can accommodate cask liners that are anticipated to be used for disposal of remote-handled LLW activated metals generated at ATR and MFC.

3. Providing a concrete vault disposal system that can accommodate cask liners that currently are being used for disposal of remote-handled LLW ATR resins.

4. Accommodating cask liner placement methods currently in use at RWMC, and continuing to use the existing remote-handled loading equipment and proven waste disposal procedures for the NRF shipping cask.

5. Providing support and shielding equipment needed to unload cask liners that are anticipated to be used by ATR and MFC.

6. Providing road access that can accommodate anticipated loads from cask transport vehicles.

7. Placing cask liners into vaults while providing the appropriate level of shielding and worker protection.

8. Providing a vault/plug assembly to provide shielding, minimize entry of water into the vaults, and allow drainage of any moisture/condensate that accumulates inside the vaults.

9. Allowing access to individual vaults without disturbing adjacent vaults.

10. Providing crane access areas to support placement of waste materials into the vaults, as needed, that will support the combined weight of a loaded crane during placement. The total weight would include the crane, cask, cask-to-vault adapter components, shielding/sealing plug, and cask liners.

11. Providing shielding sufficient to reduce radiation levels on top of the vaults, when the plugs are in place, to levels specified in DOE Order 5400.5, "Radiation Protection of the Public and the Environment."

3.2 Anticipated Waste Streams

Remote-handled LLW is radioactive waste that requires shielding to protect people from radiation exposure. By definition, remote-handled LLW is low-level radioactive waste that has a radiation exposure rate at the outer surface of the container that is greater than 200 mR/hour

The remote-handled LLW activated metals waste stream will be generated at NRF, ATR, and MFC. This waste is remote-handled LLW, non-hazardous radioactive metals with external radiation fields that range from 200 mR/hour up to 30,000 R/hour. The remote-handled LLW waste stream also will include ion-exchange resins generated at NRF and ATR. A description of the anticipated waste streams from each generating facility is included in Table 3-1.

Table 3-1. Remote-handled low-level waste stream descriptions.

Waste Stream	Facility	Description
Activated Metals	ATR	ATR produces activated metals during reactor core change-out operations, approximately every 10 years. These components require an approximate 8-year decay time and currently are in storage at ATR. This waste was previously disposed of at RWMC in a cask that is no longer available for use.
	NRF	NRF primarily produces activated metals during routine operations that may contain other non-activated metal components within the limits of the waste profile. Currently, the waste is disposed of in RWMC vaults in 55-ton scrap cask liners.
	MFC	MFC produces activated metals from ongoing work and from processing of waste removed from MFC's Radioactive Scrap and Waste Facility. The majority of this waste contains incidental amounts of debris waste.
Ion-Exchange Resins	ATR	ATR produces ion-exchange resin waste during routine operations. Currently, the waste is disposed of offsite in NuPac 14-210L cask liners.
	NRF	NRF produces ion-exchange resins during routine operations. Currently, the waste is disposed of in RWMC vaults in 55-ton scrap cask liners.

The total estimated waste quantities from each of the facilities are presented in Table 3-2. These quantities are based on current waste generation information and represent the anticipated quantity of waste that would be generated at INL facilities beginning in FY 2018 and continuing through at least FY 2037. These values were used to determine the number of vaults that would initially be needed for the facility assuming that the vaults will support the disposal of two liners each.

Table 3-2. Estimated number of remote-handled low-level waste liners that would require disposal from Fiscal Year 2018 through Fiscal Year 2037 (20-year operation).

Facility	Generation Cycle	Frequency	Anticipated Volume of Waste Generated per Frequency (m^3)	Number of Liners Generated per Year	Total Number of Liners	Minimum Number of Vaults
MFC/ATR Activated Metals Cask System						
MFC Activated Metals	Continuous	Yearly	2	2	40	20
ATR Activated Metals	Periodic	Every 10 years	3	0.3	6[a]	3
	Total MFC/ATR Activated Metals Liner Disposal Capacity				**46**	**23**
55-Ton Cask System						
NRF Activated Metals	Continuous	Yearly	35	13	260	130
NRF Resins	Continuous	Yearly	8	3	60	30
	Total 55-Ton Cask Liner Disposal Capacity				**320**	**160**
ATR Resin Cask System (Nu-Pac 14-210L Liners)						
ATR Resins	Continuous	Yearly	36	6	120	60
	Total Nu-Pac Liner Disposal Capacity				**120**	**60**

a. Number of containers for ATR activated metals waste is two containers every 10 years. It is assumed that there will be one generation cycle of waste ready for disposal when the facility is first opened, with two additional generation cycles being completed over the 20-year operating timeframe, for a total of three generating cycles to be disposed of over the 20-year operating life of the facility.

4. FACILITY DESCRIPTION

The facility conceptual design (see Appendix A) provides the proposed facility layout for precast concrete disposal vaults that would be used for disposal of remote-handled LLW activated metals and ion-exchange resin waste streams starting in FY 2018. The vault configuration proposed for this facility is similar to the existing vault design and configuration. The facility includes the concrete vaults, vault plugs, access roads, and support infrastructure. Figure 4-1 shows the conceptual layout for the proposed disposal facility with the number of vaults based on the minimum number needed for the waste types and the proposed vault array configuration.

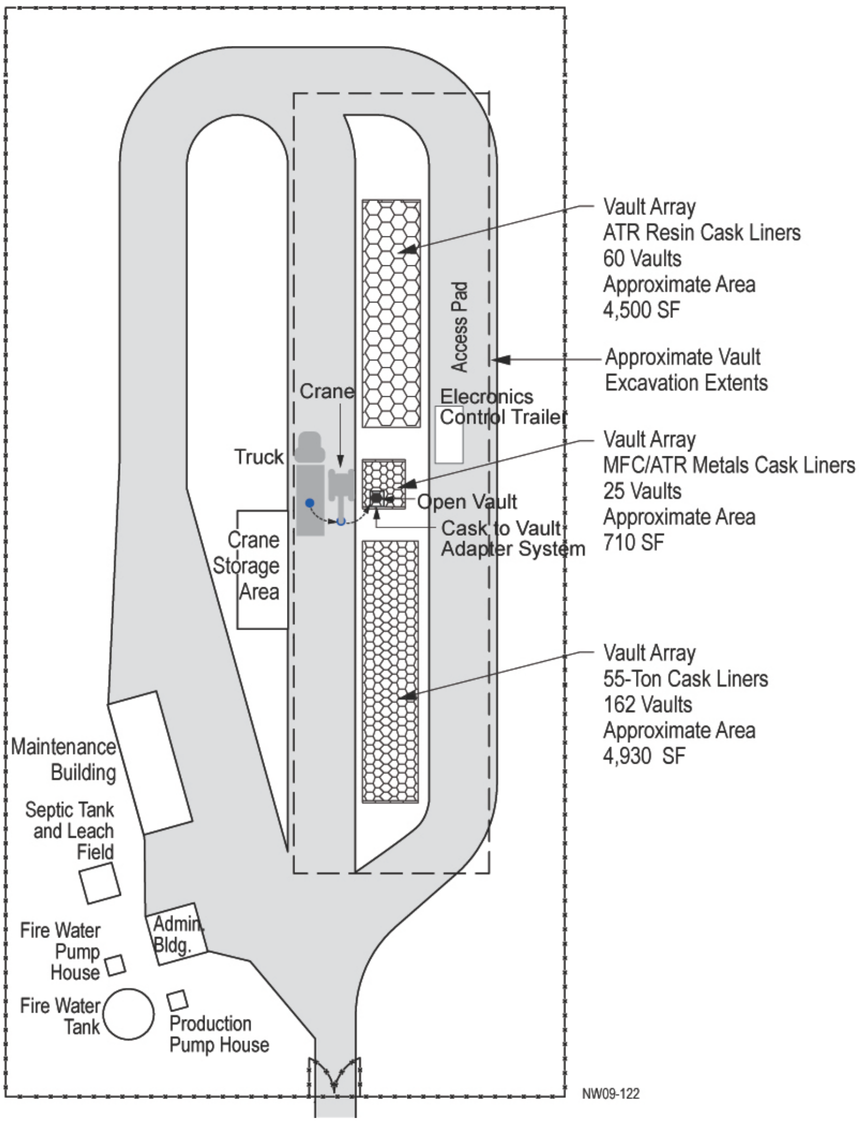


Figure 4-1. Conceptual layout for the proposed Remote-Handled Low-Level Waste Disposal Facility.

The proposed facility layout is based on the assumption that the facility would be constructed and operated as a stand-alone facility and would provide its own administration buildings and infrastructure to support disposal operations. If a site is selected that is located in the vicinity of an existing facility, then new construction of some of the infrastructure components may not be needed (i.e., the administration building). Conceptual design drawings are provided in Appendix A.

The facility would be laid out in a manner that would allow the trucks entering the disposal facility to have straight in access to the unloading area next to the disposal vaults. The crane and other miscellaneous equipment required for completion of the cask-to-vault transfer operation would be staged before arrival of the waste containers. Figure 4-2 illustrates the facility configuration with a photo showing the equipment currently staged for operation at the RWMC facility. The proposed facility would use these same methods and will set up the necessary equipment in a similar configuration.

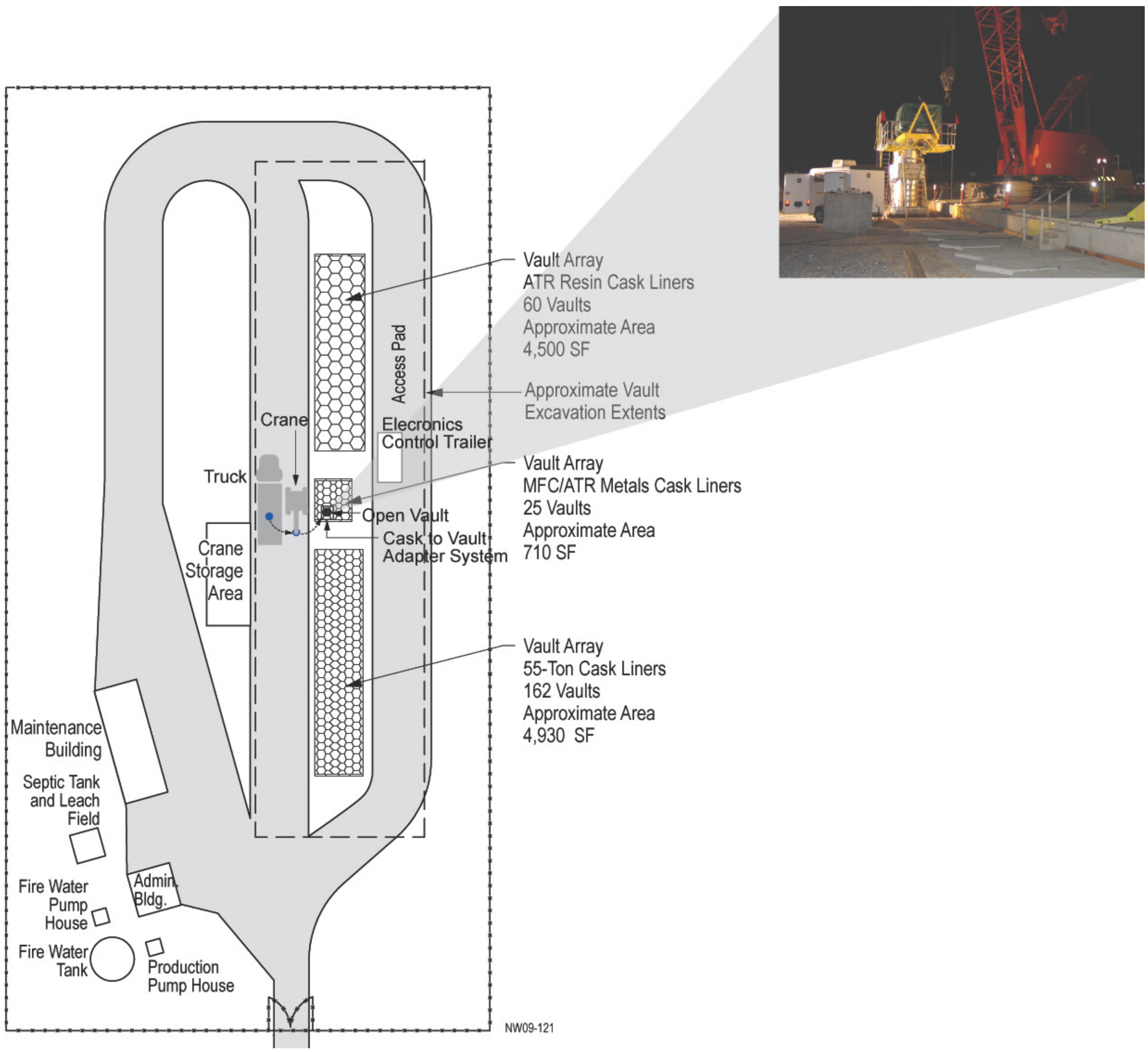


Figure 4-2. Proposed Remote-Handled Low-Level Waste Facility operational configuration.

The total number of vaults that would be constructed will depend on the depth of surficial sediment at the specific site selected for the facility and the results of the Performance Assessment and Composite Analysis. The general layout in the conceptual design shows the proposed extent of the vaults as determined using a vault depth that can accommodate the disposal of two liners per vault. In this configuration, a total of approximately 162 vaults would be designed for NRF waste; 25 vaults would be designed for the activated metals waste generated at MFC and ATR; and 60 vaults would be designed for ATR ion-exchange resins. If the selected site has sufficient surficial sediment, then three liners per vault could be accommodated and the total number of vaults would be 108 vaults for NRF waste; 17 vaults for activated metals waste generated at MFC and ATR; and 40 vaults for ATR ion-exchange resins.

4.1 Facility Boundaries

For the conceptual design, it is assumed that the proposed facility would be a stand-alone facility that does not use the services of any existing INL facilities. The facility would be sited within INL boundaries and be operated by the INL site operating contractor. Perimeter fencing would be constructed to provide protection from human and animal intrusions and to allow for proper access control.

An overall facility area for siting purposes is based on the required site-specific components and is estimated to be between 4 to 6 acres (1.6 to 2.4 ha). The total number of vaults that are proposed may change depending on the ability to support a vault depth capable of accepting three liners per vault.

4.2 Coordination of Activities between Facilities/Organizations

At the present time, generating facilities are controlled by different operating contractors. ATR and MFC are under the control of the INL contractor. NRF operations are controlled by a separate contractor, who is under contract directly with the Office of Naval Reactors. Thus, close coordination between these entities will be required to ensure that all the tasks required for waste disposal are identified and assigned to the proper organization (see Section 4.4 for details of commitments placed on the generator organizations). It is imperative that appropriate coordination and planning occur to support obtaining funding that will allow the organizations to complete their respective tasks before the planned start date of FY 2018.

Project personnel will be assigned from each of the organizations and will be identified in the project execution plan.

4.3 Facility Conceptual Design Assumptions

The following assumptions have been used in development of the proposed conceptual design:

- The new disposal facility would be a stand-alone facility and would not be located adjacent to other INL facilities that may be able to provide some operational support.

- The CVAS currently in use at RWMC for the NRF scrap cask would continue to be used for placement of the waste liners at the proposed facility.

- Cask liners currently in use at NRF would continue to be used for waste disposal, and a portion of the vaults at the future remote-handled LLW disposal facility will be sized to receive these liners. The remainder of the vaults will be sized to accommodate liners for the ATR ion-exchange resins and liners used for the activated metals generated at MFC and ATR.

- New cask-handling equipment would be procured/designed for cask liners anticipated for remote-handled LLW activated metals generated at MFC and ATR. It is assumed that a commercially available cask and liner system will be used for shipment of the activated metal waste. It is assumed that the activated metals waste liners will fit within a commercial cask, which has a cylindrical configuration with a 3-ft (1-m) diameter and 9.3-ft (2.8-m) high maximum dimension. This dimension will be used to size the vaults that will be used for disposal of activated metal waste generated at MFC and ATR. Any deviations from this assumption will be defined as the project matures. Such changes are not anticipated to change the basic design of the facility, but rather the number of vaults of a specific configuration/size that would be needed.

- The actual liners used for packaging the remote-handled LLW for transport using the new cask will be procured by the individual operating/generating facilities. Any ancillary equipment specifically required to load the generator selected liner into the new shipping cask, including typical hoisting and rigging components, will be provided by the project.

- Existing 75-in. (190-cm) diameter liners will be used for packaging and disposal of ATR resins. These liners will be transported within the NuPac 14-210L cask that currently is being used. Typical hoisting and rigging components and any ancillary equipment specific to the liner design that is needed to unload the liner from the shipping cask and to place the liners into the disposal vaults will be provided by the project.

- The vaults will be constructed using standard precast concrete pipe sections.

- The existing crane located at RWMC, as part of the NRF 55-ton cask system, would be available for use, in good condition, and would be transferred to the new disposal facility to support future operations.

4.4 Facility Components

The following major components are included with the facility:

- Vaults
- Vault plugs
- Crane
- CVAS
- Staging and storage area
- Administration and other supporting infrastructure
- Final closure cover.

The following subsections provide a description of each of these components.

4.4.1 Vaults

The vaults would be aligned vertically to allow multiple remote-handled LLW containers (one on top of the other) to be inserted in a vertical orientation. The 55-ton scrap cask vaults would be designed to interface with the existing CVAS and 55-ton scrap cask. All handling equipment, consistent with the current configuration and practices at RWMC, would be used. The 55-ton cask liners are approximately 47 in. (119 cm) in diameter and 104 in. (264 cm) high.

It is assumed that the waste generated at MFC and ATR would be transported in a commercially available cask with internal dimensions to accommodate liners that are approximately 36 in. (91 cm) in diameter and 111 in. (282 cm) high. The vaults would be designed, procured, and fabricated to interface with commercially available cask waste liners.

It is assumed that the remote-handled LLW ion-exchange resins generated at ATR would continue to be transported in the NuPac 14-210L cask. The ATR resin liners are approximately 75 in. (190 cm) in diameter and 75 in. (190 cm) high. The ATR resin vaults would be designed, procured, and fabricated to interface with the cask waste liners.

The MFC and ATR activated metals vaults and the ATR resins vaults would be configured similar to the 55-ton scrap cask vaults in regard to access and surface configuration.

Figure 4-3 provides a cross section of the proposed vault design. Each 55-ton scrap cask vault and MFC and ATR activated metals vault would be comprised of 10-ft (3-m) sections of precast concrete pipe, stacked on end, for a total interior height of either 20 or 30 ft (6 or 9 m). Each ATR resins vault would be comprised of 8-ft (2.4-m) sections of precast concrete pipe, stacked on end for a total interior height of either 16 or 24 ft (4.9 or 7.3 m). Each section would allow the space needed to place one liner, while including enough additional space to accommodate any special protection plates or other components that may be needed for specific disposal operations (e.g., 6-in. [15-cm] steel spacers). The 55-ton scrap cask vaults would have an inside diameter of 54 in. (137 cm) and an outside diameter of 65 in. (165 cm). The MFC and ATR activated metals vaults would have an inside diameter of 48 in. (122 cm) and an outside diameter of 58 in. (147 cm). ATR resins vaults would have an inside diameter of 84 in. (213 cm) and an outside diameter of 101.5 in. (258 cm). All vaults would be supported by a reinforced concrete base at least 12 in. (30 cm) thick. The vaults would be vertically arranged, side-by-side, in an array with a removable precast concrete shield plug.

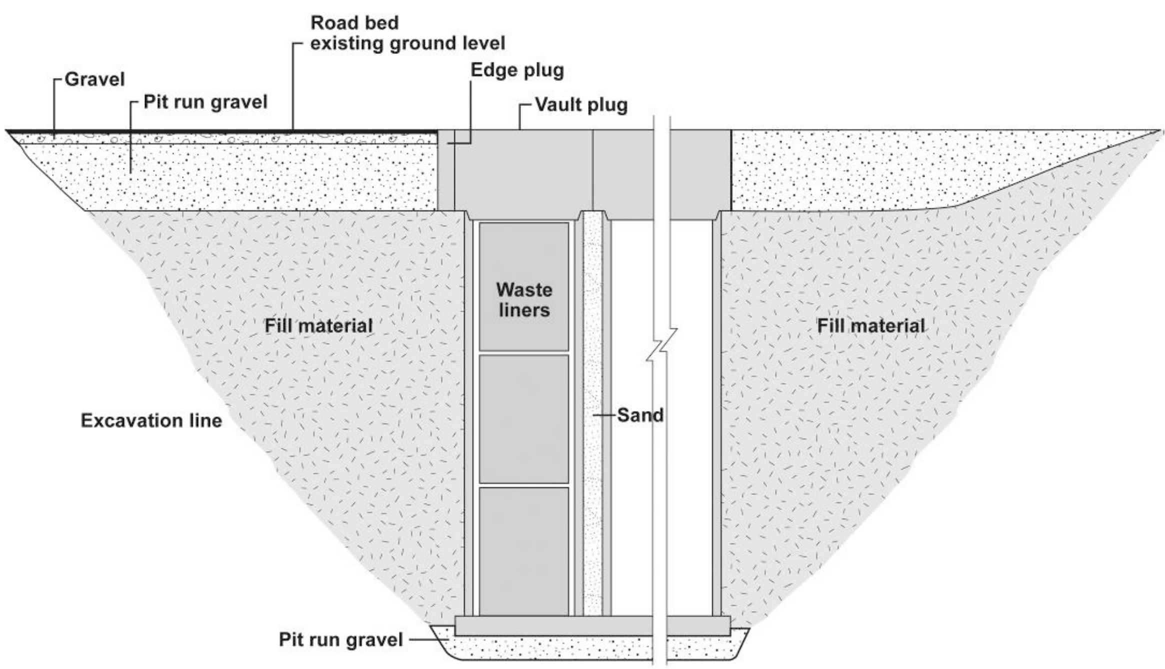


Figure 4-3. Vault profile.

The concrete base would be precast onto the end of the first section of concrete pipe. Each base section would be constructed with drain holes to prevent the accumulation of moisture within the vaults. The base sections would be set level on the bottom surface of the excavation, after which the additional pipe sections would be placed vertically on top of the base sections. Sand would be placed between the vaults as the sections are being installed to provide the stability needed to keep the vaults in place.

To support loading operations, the top surface of the vaults would be designed to support the maximum applied load. The maximum applied load will be a result of either the combined weight of the CVAS, casks, and waste liner, or it will result from the combined weight of the vault plug, crane (with load), and 2-ft (0.6-m) soil cover. These loads will vary with the different vault sizes. However, the greatest load will be used for the vault design. It should be noted that if it becomes necessary to move the crane onto the vault array to facilitate placement, the soil cover and the length of the crane tracks will allow the weight of the crane and its load to be distributed across multiple vaults.

Any additional liner systems that need to be incorporated into the facility would need to be designed around the physical and operational parameters of the vaults described in this section.

4.4.2 Vault Plug

A removable concrete plug would be set in place on top of each stacked cylinder vault. The plug will serve as a radiation shield for placed waste and also will act as a water barrier to prevent surface water from entering the concrete vaults. All plugs would be kept in place before and after the vaults are loaded. The top of the plugs will provide a working surface for all equipment needed to support the waste disposal operations. The plugs would be configured in a hexagonal shape that covers each of the cylindrical vaults.

The vault plug thickness would be based on using a standard radioactive shielding halving thickness for concrete of 2.4 in. (6 cm) and the need to reduce a radiation field level of up to 30,000 R/hour to less than 1 mR/hour. Based on these values, the vault plugs will be 5 ft (1.5 m) thick.

4.4.3 Crane

The Manitowoc 3900W, Series 2 crane currently in use at RWMC (Figure 4-4) would be disassembled, refurbished, and transported to the proposed disposal facility. This crane is a mobile, two-track crane with a total weight of 262,225 lb (118,943 kg) and a lifting capacity of approximately 140 tons (127,000 kg). If it is determined that the existing crane would not be available, a new crane with similar lifting capacity would need to be procured for the facility.

It is assumed that current lifting requirements associated with the 55-ton cask liner disposal operations are conservative as related to the lifting requirements that may be required for the new activated metals cask liner operations.

4.4.4 Cask-to-Vault Adapting Structure

The CVAS currently located at RWMC would be transferred to the proposed disposal facility. All supporting equipment and components (i.e., the hoisting platform, lifting rigging, and control trailer) also would be made available for use.

Liner handing equipment would be required for the ATR resins liner and MFC and ATR activated metals liner systems. The systems will be required to provide accurate positioning of the waste liners over the vaults and provide liner placement into the vaults. It is assumed that typical hoisting and rigging components may be used to perform these functions. These types of components will be provided to the disposal facility as part of this project. If there are any specialized liner handling mechanisms developed by the generating facilities for use with their specific liners, these components would be provided by the generating facility (if they are needed for final waste liner placement into the vaults for disposal).

Figure 4-4. Manitowoc 3900W, Series 2 crane.

Figure 4-5 shows the general setup that would be used for the NRF CVAS and 55-ton scrap cask. It is assumed that equipment needed for unloading the MFC and ATR activated metals shipping casks and the ATR ion-exchange shipping casks would use routine hoisting and rigging methods associated with top loading, shielded transfers methods, and provide the necessary radiation protection needed to allow opening and closing of the cask and disposal vaults.

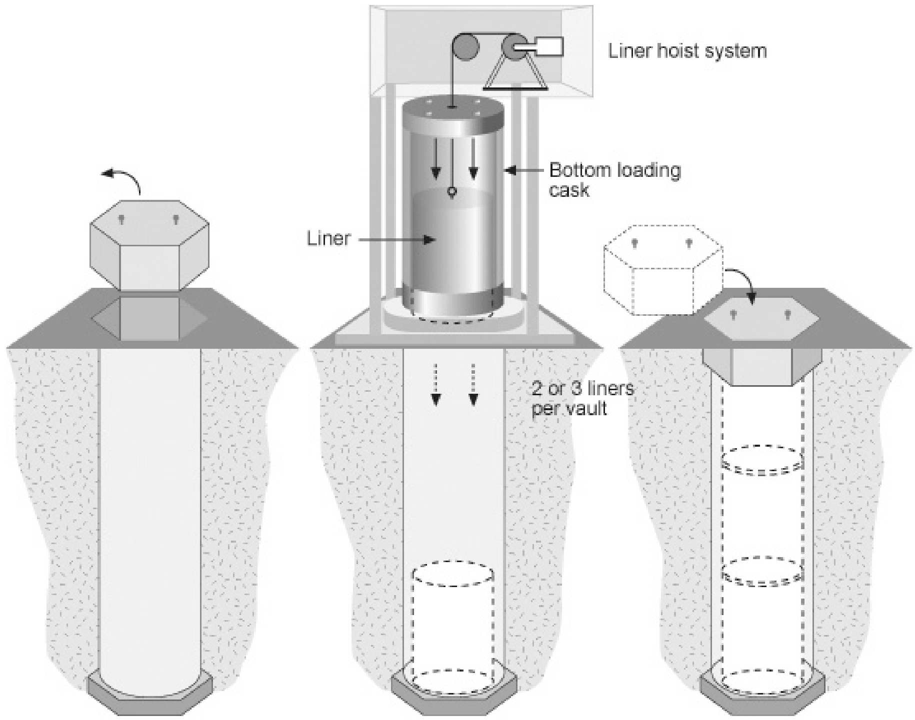


Figure 4-5. Vault disposal process with the cask-to-vault adapting structure components.

4.4.5 Staging and Storage Areas

Staging and storage pads would be provided within the facility for the operating equipment. These pads would be constructed using pit run gravel with a crushed gravel top surface. Areas would be provided for storage of the crane; the CVAS components, including the working platform; the bearing pad; the shield plug; and the electrical control trailer.

4.4.6 Administration and Other Supporting Infrastructure

Additional support and administrative structures and services are included in the proposed 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/from major road.
- Electrical power infrastructure
- Fixed communications system
- Potable water system, if needed
- Sanitary sewer system, if needed
- Fire detection/protection system
- Perimeter fencing
- Video monitoring.

If the facility is located adjacent to an existing facility, some of the services described in this section could be provided by that facility.

The primary utility that would be needed to operate the proposed facility is electrical power. At the present time, a portable generator is used to power all unloading and waste placement operations at RWMC. Operations at the proposed facility would use power provided by electrical pedestals that will be located near the disposal vaults. In addition, power would be needed for support infrastructure that is currently provided by RWMC facilities. Other power needs include the administrative building, equipment maintenance and staging, and site control and monitoring capabilities. 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 proposed 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," and DOE Order 413.3B. Appendix B provides an initial sustainability design report that identifies the Leadership in Energy and Environmental Design (LEED) certification criteria that may be applicable to design and construction of the two associated buildings. The LEED criteria are used to address the high-sustainable building principles that can be incorporated into the project.

Road access that would allow transport of the loaded cask vehicles must be provided. Figure 4-6 shows the 55-ton cask transport vehicle. A haul route will be identified or designed that would 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 would be taken into consideration when determining the haul route alignment. The 6-acre (2.4-ha) site area is assumed to be sufficient to design appropriate road access for transport loads and vehicles within the disposal facility.

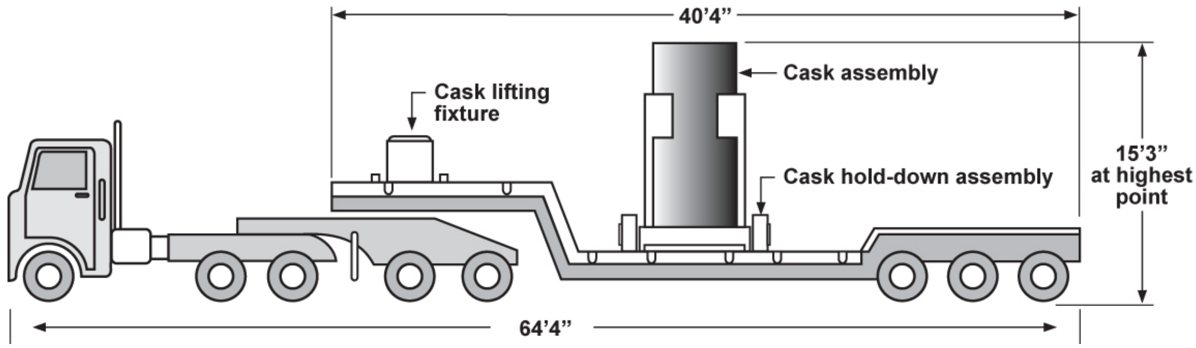


Figure 4-6. A 55-ton cask transport vehicle.

4.4.7 Final Closure Cover

At completion of the operational life of the disposal facility, a long-term protective cover will be placed over the waste disposal vaults. This final closure cover will be an evapotranspiration barrier that will cover the entire disposal facility (Figure 4-7) and protect waste material from contact with infiltration water. This barrier will include a vegetated soil layer, an underlying coarse rock layer, a low permeability layer, and grading fill material. The barrier will be configured to divert all surface water away from the storage vaults and extend beyond the boundary of the facility. The total thickness of each layer, exact dimensions, and other specifications will be determined prior to facility closure and be based on the final size and configuration of the facility. The barrier also will incorporate criteria identified in the applicable facility performance assessment.

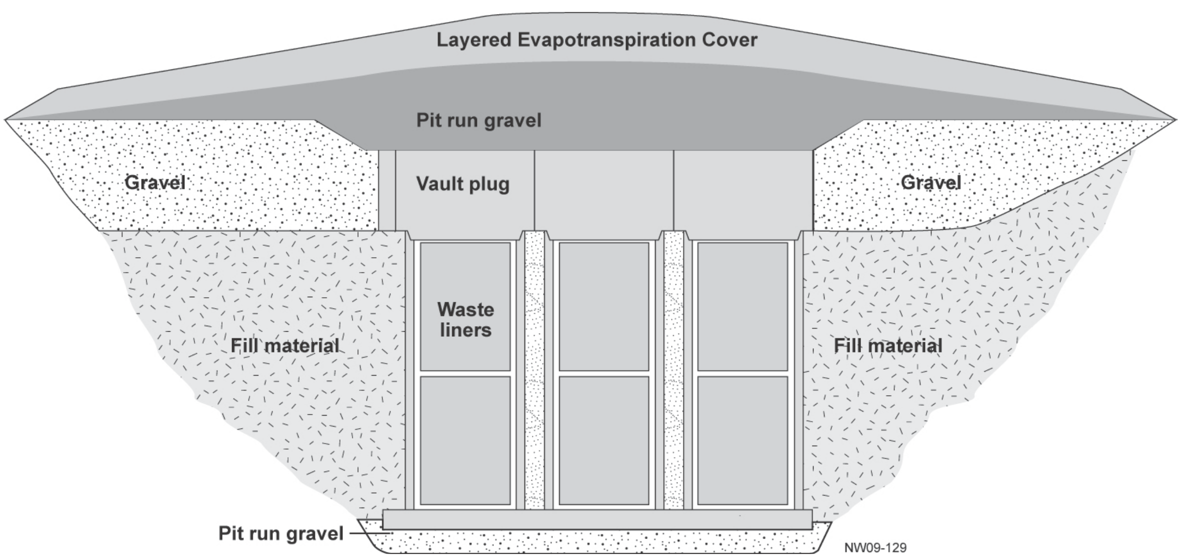


Figure 4-7. Final closure cover.

4.5 Design Approach

The design approach for this project includes utilization of a design-build approach for the proposed disposal facility. The design and construction/fabrication will be contracted to an appropriate vendor. The conceptual design and facility performance specification will be used to identify all applicable nuclear safety, security, and radiological performance requirements for the project prior to start of the final design and construction activities.

All components within the facility will be designed to the INL Architectural Engineering Standards (STD-139) and other codes and standards listed in Section 2.9. All components are standard commercial/industrial items that will be designed and fabricated to standard industrial practices.

4.5.1 Civil

Total interior vault depth would be approximately 20 ft (6 m) for vaults accepting two liners or 30 ft (9 m) for vaults accepting three liners. Excavation depths that would be required for these two configurations are approximately 29 ft (8.8 m) and 39 ft (11.8 m), respectively. The required excavation would be completed in accordance with applicable DOE and Occupational Safety and Health Administration (29 CFR 1926) requirements. All earthwork, including excavation, backfill, rock removal, compaction, and final grading, would comply with INL Engineering Standards (STD-139-1011).

Structural design of the vault system would be in accordance with criteria specified in the INL Engineering Standards (STD-139-1012) and DOE-STD-1020-02, "Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities." The design life of facility components would be 50 years.

4.5.2 Architectural

Two support structures would be required for the facility in addition to the disposal vaults: (1) an administrative building and (2) a maintenance building. The administration building would include office space, records/small equipment storage room, and an electrical/storage area with overhead door. The building would be approximately 30 ft × 30 ft (9 m × 9 m) with concrete foundations and slab on grade. The expected occupancy of the building would be 5 to 10 people for up to 16 days per month. It is expected to be unoccupied the balance of the time.

The maintenance building would be a high, open bay building that will be used for various maintenance activities and equipment storage related to the CVAS, cask, and transport system. Two overhead doors would be provided that allow the transport vehicle to pass through the building, if needed. This building would be a 30-ft × 80-ft (9-m × 18-m) pre-engineered metal building with concrete foundations and slab on grade. This building also would provide space for extra shielding components in case they are needed to support special operations.

Both buildings would be designed and inspected in accordance with International Building Code (IBC) standards and be designed in accordance with the applicable sustainable building and energy conservation requirements.

4.5.3 Structural

The proposed remote-handled LLW disposal facility has a preliminary facility Seismic Design Category of 1, based on the applicable facility hazards and in accordance with Section 4 of ANSI/ANS-2.26, "Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design." The applicable facility hazards are discussed in detail in Section 7. As stated in the standard, no limit state identification is required for Seismic Design Category 1 systems and the seismic evaluation on the facility will be performed in accordance with the IBC (2009).

This determination will be further evaluated as part of development of the preliminary documented safety analysis and any changes will be incorporated into the project TFR and performance specification. The concrete vaults and support building would be evaluated using the IBC (2009) guidance for the associated type of facilities. The administrative buildings would be planned to have an Occupancy Category of II and be configured as slab on grade buildings.

Foundations for all buildings will require a minimum frost depth of 5 ft (1.5 m). Excavation for the footings should not encounter rock formations because the facility is to be sited in an area with significant surface soil depth.

Structural analysis for the vault footings has been completed for the six possible vault configurations (i.e., NRF vaults with two or three liners, MFC and ATR activated metals vaults with two or three liners, and ATR resin vaults with two or three liners). Loads include the precast concrete pipe sections, vault plug, waste liners, CVAS components, cask, and mobile crane. The footing dimensions will need to be verified for specific configurations used during the final design activities.

As part of the final design, the remote-handled LLW vault design and construction scope of work will require a comprehensive seismic analysis to be completed in accordance with the IBC practices for a Group 1 facility.

4.5.4 Mechanical

There are no safety-significant or key mechanical systems anticipated to be involved in development of this proposed facility. The primary mechanical system is related to operation of the hoisting system associated with the working platform used to lower the waste liners into the vaults. The current system is owned by the Office of Naval Reactors and is planned to be transferred to the proposed disposal facility for use in waste placement operations. This system has been used for many years and has been proven successful in operation.

Development of the cask transfer system will need to ensure that all applicable mechanical systems are designed using the appropriate protocols; however, these design activities are the responsibility of the generating facilities and are not part of the facility design and construction activities.

Typical heating and cooling equipment would be needed for the administration and maintenance buildings. Applicable mechanical components would include commercially available heating and cooling units, as needed, for the relatively small interior spaces.

Water, sewer, and fire protection services would also be planned for the facility.

4.5.5 Fire Protection

A fire safety analysis will be performed as part of the final design. Fire detection and suppression systems would be installed based on the results of the fire-safety analysis. Fire protection for the administration and maintenance buildings will adhere to requirements of the Life-Safety Code (NFPA 101) and the International Fire Code 2003 (as adopted by the state of Idaho in the Idaho Administrative Procedures Act [IDAPA] 18, Title 01, Chapter 50). The facility will normally be considered as an unoccupied storage facility.

4.5.6 Electrical

Electrical power would be provided to the facility. Primary power usage would be for the CVAS unloading components and control trailer and the normal building power distribution for office and lighting. Perimeter and vault area lighting also would be provided.

Electrical power used in the current (i.e., RWMC) waste placement operation is provided using a portable electrical generator. Instead of using the generator, electrical pedestals will be provided near the disposal vaults. Extension cords will be supplied to connect to the working platform and electronic control trailer. Building and vault area lighting will be designed to ensure safe operations within the facility and during waste placement operations.

Power would be brought into the facility connecting to existing 13.8-kV electrical distribution lines. New pole-mounted, 13.8-kV/480 VAC three-phase transformers would be required at the facility. The 480-V power would be brought into an electrical distribution room located within the administration building. Power to all areas of the facility would be routed from this location.

The anticipated electrical load list, containing electrical load data estimates for the various processes and building services, is provided in Table 4-1.

Design of electrical systems will be governed by the National Electrical Code (NFPA 70), IEEE-STD-141, IEEE-STD-242, and DOE-HDBK-1092. Power feeds to the disposal vault area would be routed via underground, concrete-encased duct banks. The total electrical demand for the proposed facility is estimated at approximately 98 kVA.

Table 4-1. Remote-Handled Low-Level Waste Disposal Facility anticipated electrical load summary.

Administration Building	Volts	Amps
Receptacles	120	60
Lighting	120	100
Heating and cooling	208	100
Access gate	480	20
Disposal Vault Operations		
Receptacles/pedestals	480	50
Maintenance Building		
Receptacles	120 480	80 50
Lighting	120	140
Heating and cooling	208	255
Overhead doors	120	40
Perimeter and Area Lighting	120	60

4.5.7 Radiological Control

Waste disposal operations would be conducted in accordance with established radiation protection standards, limits, and program requirements for protecting individuals and the environment from ionizing radiation. These limits are established in performance objectives for LLW disposal facilities, as found in DOE Order 435.1-1. Worker protection would be provided in accordance with 10 CFR 835 and the site-specific administration control levels. The facility configuration would be designed to reduce potential worker exposure fields to less than 1 mR/hour when all components are in position on top of the disposal vaults and no waste transfer activities are in progress. Vault plugs (5-ft [1.5-m] thick) would be used to provide the shielding required for each of the disposal vaults. Worker protection for operators present during waste transfer activities would be addressed in specific operating procedures.

5. PROJECT COST

5.1 Summary of Cost Estimate

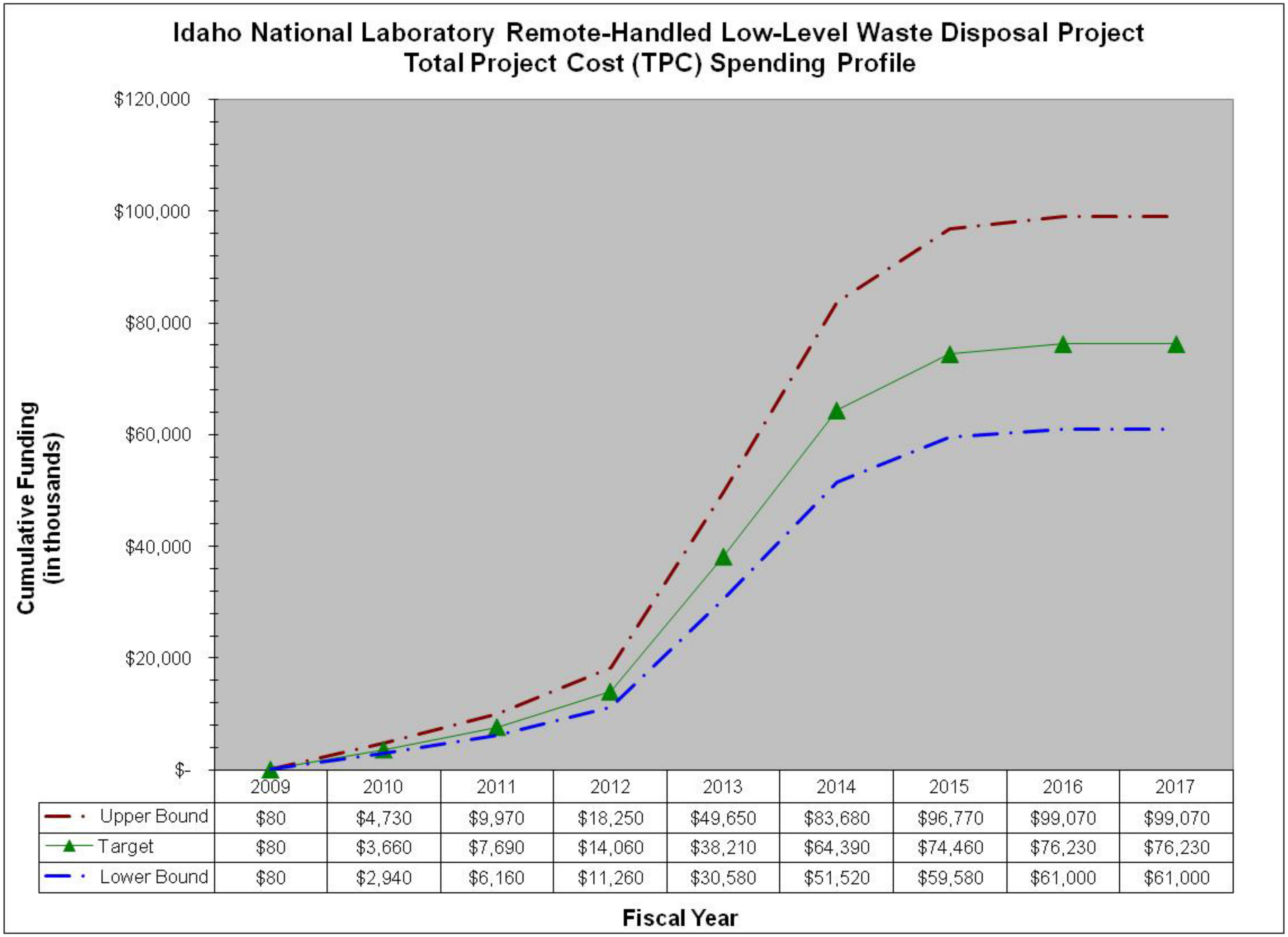
Life-cycle costs associated with development of the proposed remote-handled LLW disposal facility include design and construction of the infrastructure, design and construction of vaults, procurement of a cask for onsite transport of INL-generated remote-handled LLW, development of the disposal authorization and safety basis documentation, project management, operations and maintenance, and facility closure. Two estimates were prepared for the project. The first estimate includes costs for design and construction of the proposed remote-handled LLW disposal facility based on the design presented in this conceptual design report. The second estimate addresses operations, maintenance, and disposal facility closure following the useful life of the proposed facility. Operations and maintenance costs were based on cost information for the operation and maintenance of the remote-handled LLW disposal facility in the SDA and include facility monitoring costs. Closure costs include design and construction of a final cover for the facility and decontamination and decommissioning of all support structures. All costs were developed using FY 2010 dollars and were escalated in accordance with DOE guidance. The project estimates also include management reserve and DOE-held contingency that is assigned based on risks and uncertainty associated with individual cost elements. The cost estimate summary reports are provided in Appendix C.

The estimates for the Remote-Handled LLW Disposal Project are classified as Class 4 estimates in accordance with the Association for the Advancement of Cost Estimating International Cost Estimate Classification System. This classification is based primarily on the degree of project definition (i.e., conceptual design). The estimate range is an indication of the degree to which the final cost outcome will vary from the estimated cost. The lower estimate of the Remote-Handled LLW Disposal Project cost range was established as -20%. The upper estimate of the cost range was established as +30%. This range is consistent with the guidelines identified for the lower end of the Association for the Advancement of Cost Estimating expected accuracy range of a Class 4 estimate and is based on the design approach for the proposed disposal facility, wherein the facility will be designed substantially similar to existing disposal vaults at RWMC, and the maturity of the project.

5.2 Total Project Cost

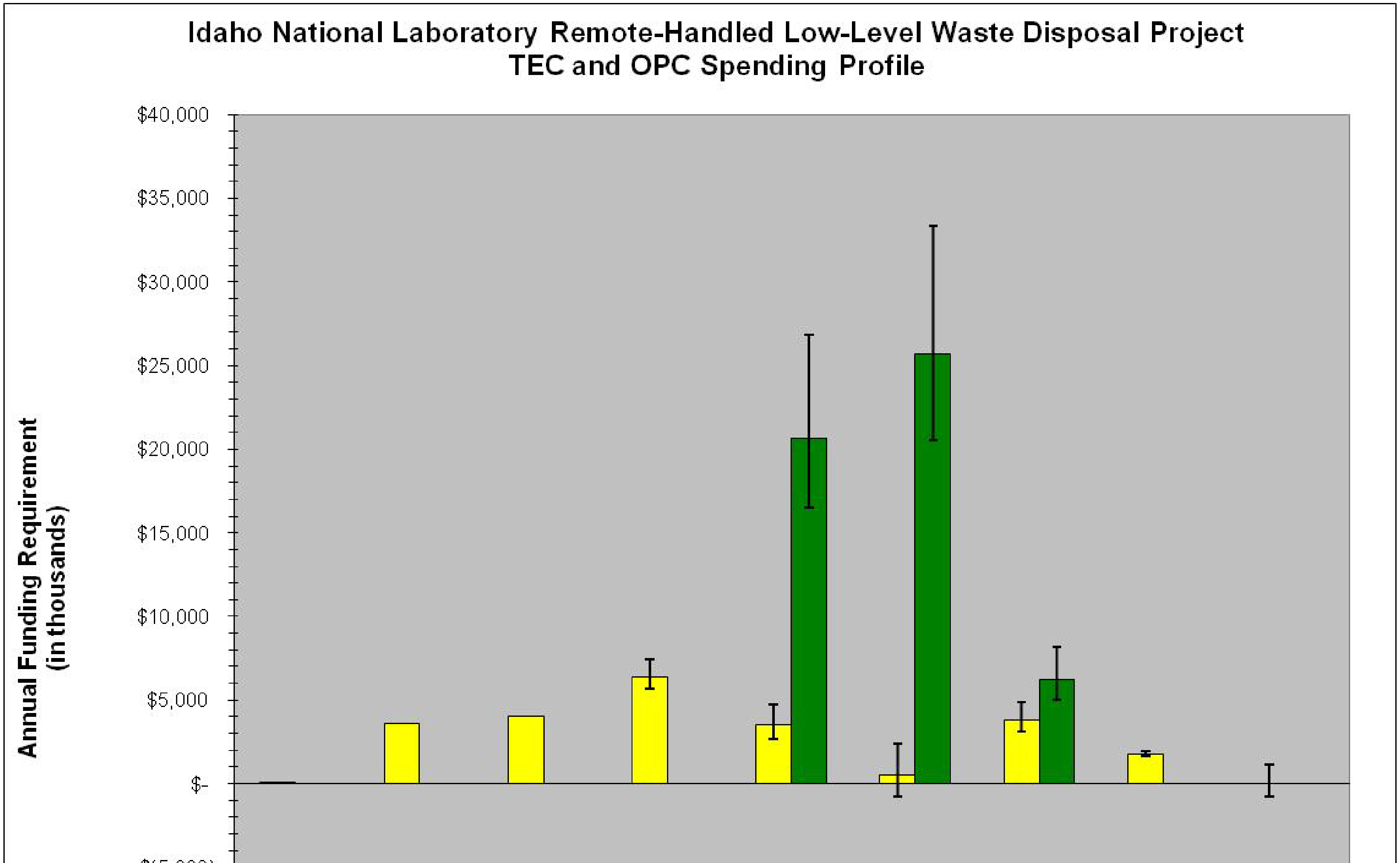
Total project cost (TPC) includes all costs associated with the project, including management reserve, to the point when the disposal facility would be turned over for routine operations. TPC includes all capital costs and operating costs associated with the project. The TPC for the design, siting, construction, and turnover to operations of a new INL remote-handled LLW disposal facility is estimated at $61.0 to $99.1M, with a target TPC of $76.2M, as shown in Figure 5-1. The TPC is composed of total estimated cost (TEC) and other project cost (OPC), which are shown in Figure 5-2.

The project TEC is estimated at $42.1 to $68.4M, with a target TEC of $52.6M. TEC includes design and construction of the proposed disposal facility using a design-build project delivery method. Included within TEC are all costs associated with the disposal vaults, required facility infrastructure, procurement of a new onsite transport cask (including ancillary cask transfer and handling equipment), and installation of monitoring wells. TEC also includes INL oversight of the design-build contractor, development of final nuclear safety documentation, and project management and reporting during the construction phase, as appropriate.



	2009	2010	2011	2012	2013	2014	2015	2016	2017
Upper Bound	$80	$4,730	$9,970	$18,250	$49,650	$83,680	$96,770	$99,070	$99,070
Target	$80	$3,660	$7,690	$14,060	$38,210	$64,390	$74,460	$76,230	$76,230
Lower Bound	$80	$2,940	$6,160	$11,260	$30,580	$51,520	$59,580	$61,000	$61,000

Figure 5-1. Idaho National Laboratory Remote-Handled Low-Level Waste Disposal Project total project costs.



	2009	2010	2011	2012	2013	2014	2015	2016	2017
OPC (in thousands)	$80	$3,580	$4,030	$6,370	$3,500	$500	$3,810	$1,770	$0
TEC (in thousands)	$0	$0	$0	$0	$20,650	$25,680	$6,260	$0	$0

Figure 5-2. Idaho National Laboratory Remote-Handled Low-Level Waste Disposal Facility total estimated costs and other project costs.

The project OPC is estimated at $18.9 to $30.7M, with a target OPC of $23.6M. OPC includes costs associated with development of the project concept; preparation of required NEPA documentation; preparation of safeguards and security documentation; development of the performance specification and request for proposal for the design-build contract for the infrastructure and the transport cask procurements; development of the request for proposal for the vault system procurement; development of the project performance baseline; development of the radiological performance assessment and composite analysis (and supporting documentation) necessary to obtain a Disposal Authorization Statement per DOE Order 435.1; relocation of equipment from RWMC to the proposed disposal facility to support operations; and development of operations procedures and operations training.

The TPC includes DOE-held contingency as described in the preliminary project execution plan (DOE-IDb) and Section 5.4 of this document.

5.3 Life-Cycle Costs

Life-cycle costs for the proposed disposal facility are the sum of the direct, indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a system or facility over its anticipated useful life span. The life-cycle costs for the proposed INL remote-handled LLW disposal facility include TPC, operations costs during the operational life of the facility (FY 2018 to FY 2037), and costs associated with closure of the disposal facility. Figure 5-3 presents the life-cycle funding requirements for the proposed disposal facility.

The total life-cycle cost for design, construction, operation, and closure of the proposed INL remote-handled LLW disposal facility is estimated at $144.2 to $234.3M, with a target of $180.2M. Operations costs are estimated at $75.3 to $122.4M, with a target cost at $94.2M. Closure costs are estimated at $7.9 to $12.8M, with a target of $9.8M.

5.4 Cost Risk Analysis

The life-cycle funding profile presented in Figure 5-3 includes a project phase initial cost-risk analysis based on the probability and consequence of the risk and uncertainty of each cost element. Table 5-1 presents the three major risk categories, type of risk, and brief description of the potential impact. A TPC management reserve of 26% (approximately $13.2M) was developed with consideration of the risks identified in the table. The project target TPC total management reserve of $13.2M is comprised of a TEC component of approximately $10.7M and an OPC component of approximately $2.5M.

In addition to INL management reserve applied to individual cost elements based on probability and consequence of associated risks and uncertainties, costs are presented as a range with a target cost and a lower (-20%) and upper (+30%) bound to account for potential changes in the basis of the project.

The cost-risk analysis is updated throughout the CD process and additional continuous quantitative cost and schedule uncertainty analyses, including future risk-based Monte Carlo cost and scheduling modeling, is performed during project execution to validate and manage the project baseline.

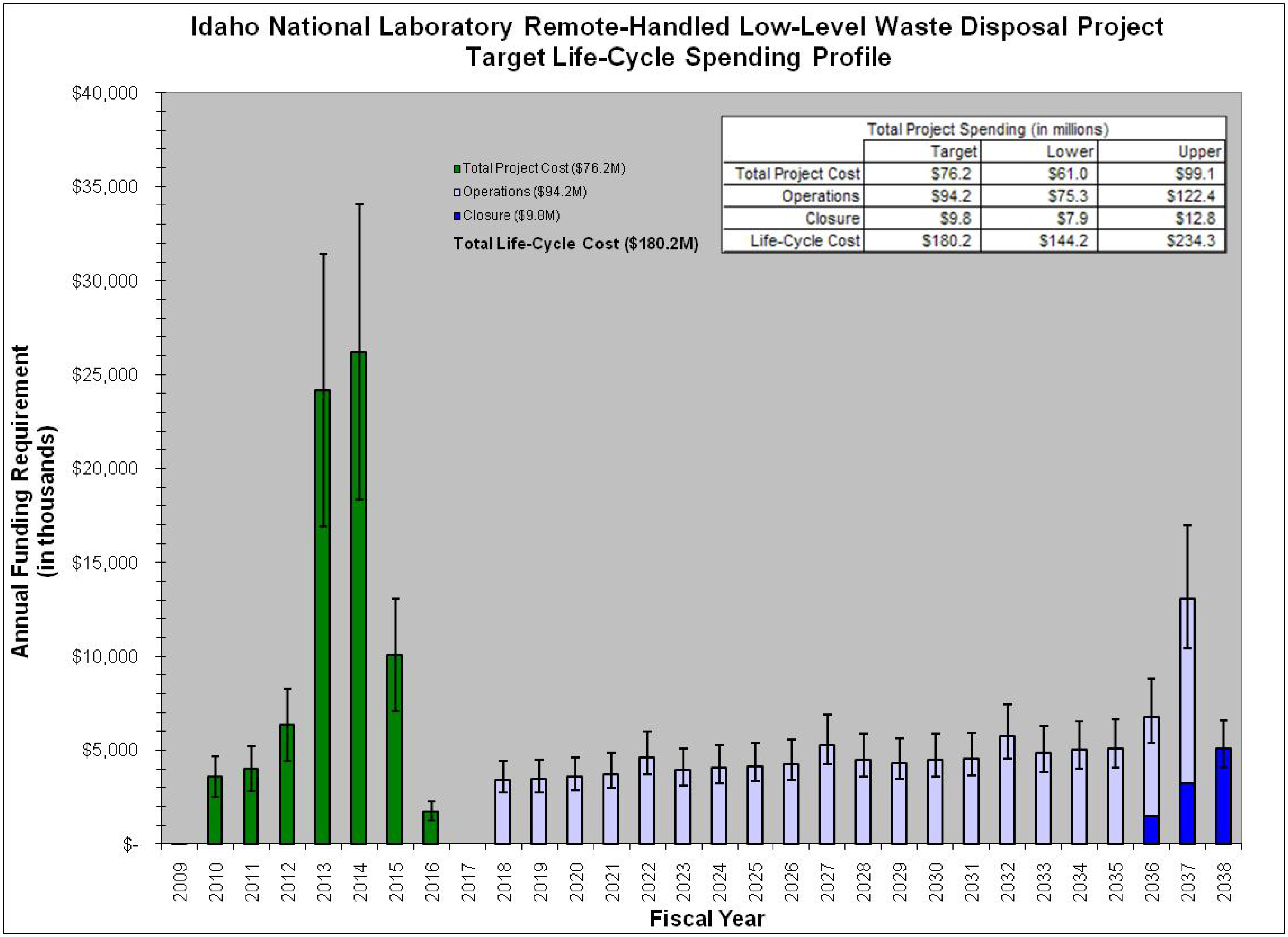


Figure 5-3. Idaho National Laboratory Remote-Handled Low-Level Waste Disposal Facility target life-cycle funding requirements.

Table 5-1 Risk analysis for management reserve based on probability, consequence, and uncertainty.

Technical Area	Risk Category	Description
Project Safety and Quality Assurance Risks Considered		
Safety Basis/ Quality Assurance Requirements	Expertise	Design/build safety basis and quality assurance requirements, not specific vendor interpretation may result in rework.
Nuclear Safety Analysis/Review	Environmental, Safety, and Health	Delay in nuclear safety documentation completion or approval.
Safety Basis	Environmental, Safety, and Health	Preliminary safety basis documentation assumptions change; new or higher rated (e.g., safety significant to safety class or defense in-depth to safety significant) structure, systems, and components may be required.
Cask Safety Designation	Environmental, Safety, and Health	Change in cask safety designation (e.g., rise from non-safety-significant to safety-class or safety-significant); contracts may have to be modified and may result in rework.
NQA-1 Quality Assurance Compliance	Expertise	Availability of architectural/engineering NQA-1 vendor may impact ability to execute multiple areas within the design/build strategy.
Design/Build Specification Risks Considered		
Performance Specification Maturity	Scope and Definition	Mature design/build performance specifications not available for contract document; changes and revisions may be required.
Performance Specification Specificity	Scope and Definition	Design/build performance specifications not specific enough for inclusion in contract documents may result in schedule delay.
Multiple Tier Subcontractors	Interfaces and Integration	Architectural/engineering contractor employs multiple subcontractors, possibly causing delays and difficulties in contract compliance (e.g., reporting, status, and training).
Construction/Operational Readiness Risks Considered		
Availability of Cask Handling Equipment	Government-Furnished Equipment Availability	Unavailability of crane currently used at the SDA may delay operations.
Availability of Construction Materials	Cost and Schedule	Availability of construction materials (e.g., concrete or steel) depends on supply and demand.
Weather Delays	Cost and Schedule	Winter work may delay weather sensitive activities. Using precast concrete for the vaults minimizes weather-sensitive work. The design-build approach increases duration of construction phase of the project, allowing avoidance of winter work.

The funding profile presented in Figure 5-3 also includes DOE-held contingency that was developed with DOE concurrence. This DOE-held contingency is estimated to be approximately $15.2M. Costs associated with risks that are dependent on government organizations to mitigate contribute to DOE-held contingency. All risk elements are captured in the risk management plan for the Remote-Handled Low-Level Waste Disposal Project (PLN-2541). Specifically, the risk-based, graded approach used to estimate contingency includes the following:

- Identifying all high or medium external risks (those risks that are dependent on government organizations to mitigate) as contributing to DOE-held contingency

- Identifying a reasonable assumed residual risk cost impact (for external risks)

- Summing the mitigation costs and the assumed residual risk cost impacts for external risks.

6. SCHEDULE

6.1 Summary Project Schedule

The life-cycle schedule for the proposed remote-handled LLW disposal facility is comprised of three phases: (1) project planning and execution (FY 2009 through FY 2017), (2) operations (FY 2018 through FY 2037), and (3) closure (FY 2036 through FY 2038).

6.1.1 Project Planning and Execution

Project planning and execution will be conducted in accordance with the requirements of DOE Order 413.3B. The timeframe for meeting CD milestones is presented in Section 6.2. A schedule of major activities that would be completed during this phase of the disposal facility life-cycle is presented in Appendix D. Project planning and execution began with development of remote-handled LLW disposal options and development of this conceptual design report and associated documentation and culminates with Acquisition Executive approval for start of operations. Disposal facility construction, involving construction of infrastructure and installation of disposal vaults, is assumed to take approximately 1.5 years, beginning in the second quarter of FY 2014.

Some of the potential critical path activities that would be conducted during project planning and execution include the following:

- Development and DOE Headquarters approval of the radiological performance assessment and composite analysis in accordance with DOE Order 435.1
- Concurrent with development of the environmental assessment, identification of a specific location for the proposed remote-handled LLW disposal facility
- Disposal facility waste acceptance criteria development
- Nuclear safety documentation (preliminary documented safety analysis and documented safety analysis) development and DOE approval
- Performance specifications and design-build requests for proposal development for the transport cask and infrastructure procurements
- Final design and request for proposal development for the vault disposal system construction.

6.1.2 Disposal Facility Operations

Disposal facility operations are proposed to commence no later than the first quarter of FY 2018 to support uninterrupted remote-handled LLW disposal capability. The facility would be constructed with sufficient capacity to support an initial 20-year operational period. Based on this capacity, the disposal facility would operate through the fourth quarter of FY 2037. The actual disposal facility operational life could be shorter or longer, dependent on the actual volume of waste disposed annually. Operations costs presented in Section 5 reflect costs for disposal campaigns at the facility, maintenance, monitoring, and maintaining the proposed facility's disposal authorization.

6.1.3 Closure

Closure activities for the proposed disposal facility would commence in FY 2036, approximately 1 year before the last receipt of remote-handled LLW at the disposal facility with decontamination and demolition planning for the aboveground structures and supporting infrastructure and final cover/cap design. Final cover/cap installation would commence in FY 2037 to the extent that final waste placement activities would not be negatively impacted. Following placement of the final waste, the cover/cap would be completed and facility decontamination and decommissioning activities would be conducted with final closure of the disposal facility completed in FY 2038 (one year following last receipt of remote-handled LLW at the disposal facility).

6.2 Project Critical Decision Timeframe

The CD timeframe for acquisition of the INL Remote-Handled LLW Disposal Project is 2009 through 2017, as shown in Table 6-1. The CD milestones support a FY 2017 project completion date. CD-0, *Establish Mission Need*, approval was obtained in July 2009. CD-1, *Approve Alternative Selection and Cost Range*, is proposed to be completed in the second quarter of FY 2011. Following CD-1 approval, the project will implement a tailored approach as reflected in Table 6-1.

Table 6-1. Key milestones.

Description	Planned Dates (A = Actual)
Approve Mission Need for transport casks, infrastructure, and vaults/wells	07/2009 A
CD-1, *Approve Alternative Selection and Cost Range*	2^{nd} Quarter FY 2011
CD-2/3A, *Approve Performance Baseline and Authorization to Execute*	1^{st} Quarter FY 2012
CD-3B, *Approve Start of Construction/Fabrication*	2^{nd} Quarter FY 2014
Complete Construction/Fabrication	4^{th} Quarter FY 2015
CD-4, *Approve Start of Operations*	4^{th} Quarter FY 2016

The project would seek approval of a tailored, combined CD-2/3A consistent with a design-build approach. A contract request for a design-bid proposal would be issued following DOE approval of CD-2/3A in the first quarter of FY 2012. The start of construction/fabrication, CD-3B, would be sought the second quarter of 2014 based on the design-build contractor's final design. CD-4 approval would be sought by the fourth quarter of FY 2016 so that remote-handled LLW disposal capabilities would be in place before the end of FY 2017, when the current disposal capability at RWMC is planned to cease.

6.3 Work Breakdown Structure

Figure 6-1 details the preliminary work breakdown structure for the proposed project through start of operations. The work breakdown structure is organized around a tailored DOE Order 413.3B CD process, wherein a design-build project delivery method is used.

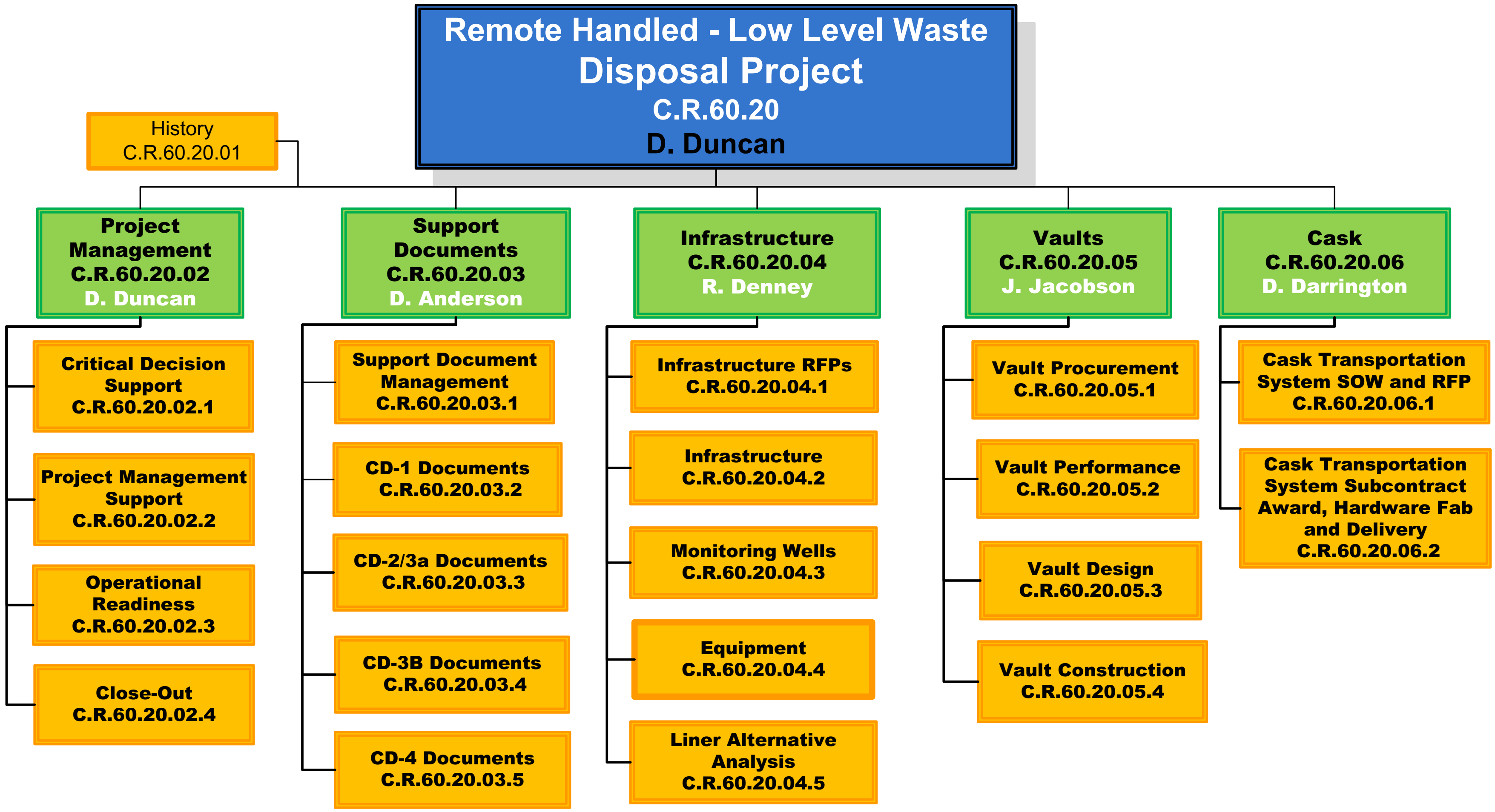


Figure 6-1. Work breakdown structure.

7. NUCLEAR SAFETY

7.1 Hazard Analysis and Classification

With respect to nuclear safety, a hazard is defined as "a source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to an operation or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation)." To identify potential facility hazards, the following were examined:

The quantity, form, and location of radioactive and hazardous materials that would be potentially releasable from the proposed remote-handled LLW disposal facility

Potential energy sources and potential initiating events that could directly result in injury to workers or lead to release of radioactive or hazardous materials.

The strategy for integrating safety into the design process is described in the safety design strategy (INLb). Based on the preliminary assessment of the anticipated remote-handled LLW waste stream, the evaluation of the design base accident scenarios, and a comparison with DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," the Remote-Handled LLW Disposal Facility Project would have an initial hazard categorization as a Hazard Category 2 nuclear facility. The preliminary hazards evaluation is described in the conceptual safety design report (INLc).

The primary driver for this determination is related to the total radionuclide inventory that would go to the facility in its entirety. However, DOE-STD-1027-92 supplemental guidance provides for facility categorization being modified in the final hazard categorization process considering (1) alternative release fractions or (2) change in material subject to an accident due to facility features that preclude bringing material together or causing harmful interaction from a common severe phenomenon (facility segmentation). These provisions will be further evaluated during development of the preliminary documented safety analysis and documented safety analysis per NS-18101, "INL Safety Analysis Process," to determine if modification to the facility hazard category is appropriate based on the facility segmentation consideration.

7.2 Safety-Class System Classification

Safety-class structures, systems, and components are hazard controls for which credit is taken, either preventive or mitigative, to meet the evaluation guidelines for offsite public. In accident cases evaluated for the remote-handled LLW disposal facility, evaluation guidelines are not challenged as unmitigated analyses. Therefore, no safety-class structures, systems, and components are identified or required for this facility.

Safety-significant structures, systems, and components are hazard controls for which credit is taken to prevent or mitigate postulated anticipated or unlikely accidents that could result in consequences to collocated or facility workers exceeding 25 rem. Radiation dose consequences from accidents evaluated in this document do not challenge 25 rem; therefore, they do not require safety-significant structures, systems, and components.

The vaults are located below ground surface, isolating contents from facility workers, and, upon failure, would not impose any risk of fatality or serious injury to workers. There are no failure scenarios for the vaults or shield plugs that result in a loss of function in an emergency that may be needed to preserve the health and safety of workers. Furthermore, in the improbable event of vault or shield plug failure, there would be no significant offsite consequences.

7.3 Seismic Design Category

Based on an initial review of the applicable facility hazards and in accordance with Section 4 of ANSI/ANS-2.26-2004, the remote-handled LLW disposal facility seismic design category will be Seismic Design Category 1. This determination is based on the assumption that failure of a vault will not cause radiological material to be brought to the surface and that it will remain in place without causing significant radiological exposure to workers, the public, or the environment. As stated in the standard, no Limit State identification is required for Seismic Design Category 1 systems, and the seismic evaluation on the facility will be performed in accordance with IBC (2009).

7.4 Emergency Preparedness

The INL Emergency Management Department plans and implements a compliant, proactive, risk-based program developed in accordance with DOE Order 151.1C, "Comprehensive Emergency Management System." The program will be used to respond to and mitigate consequences of emergencies that might arise at INL. Emergency Management's core planning and readiness assurance functions include the following:

- Determining hazards and credible events that could result in emergency situations
- Preparing for those situations through development of a trained Emergency Response Organization
- Procuring and maintaining emergency equipment and facilities
- Determining protective actions
- Developing standards and techniques for notifications, categorization/classification, consequence assessment, reentry, medical support, and program administration
- Providing timely and accurate public information
- Identifying the diverse elements involved in recovery and reentry.

Activities associated with the proposed remote-handled LLW disposal facility will be included within the framework of INL's existing Emergency Management System.

7.5 Criticality

In the conceptual design stage of the facility, preliminary evaluations indicate that the waste streams for the facility do not contain significant quantities of fissionable material to make nuclear criticality a credible accident. Further evaluation will be made on the need for criticality safety requirements (i.e., specific packaging configurations for high fissile materials) pertaining to the proposed remote-handled LLW disposal facility during development of the preliminary documented safety analysis.

8. SAFEGUARDS AND SECURITY

8.1 Safeguards

The waste streams destined for the proposed remote-handled LLW disposal facility are classified as remote-handled LLW. The waste contains little fissile material and poses minimal risk of diversion because of the inherently self-protecting configuration and characteristics (i.e., high radiation) of the waste, as packaged. Based on these factors, the proposed facility (as designed and located) would require, at most, a property protection area as security controls.

8.2 Property Protection Area

A property protection area is a security area established for protection of DOE property and will protect against damage, destruction, or theft of government-owned property. A property protection area fence (or perimeter fence) would be provided for the proposed facility that is a minimum of 8 ft (2.4 m) high with a lockable gate. The facility also would be equipped with a security system that includes remote visual capabilities and wireless alarms that can be monitored at an offsite location. This system would be comprised of a camera network that would monitor the access gate to the facility and other locations as warranted. The network signals would provide remote video surveillance and indications of when the facility gate is open and closed. The monitoring location would be determined by the INL security organization. This system would be equipped with 8 hours of backup power.

Additional access controls that may be required, as determined by INL contractor security, include the following:

- Signs prohibiting trespassing posted around the perimeter and at each entrance to the property protection area in accordance with 10 CFR 860, “Trespassing on Administration Property,” and 41 CFR 101-19.3, “Federal Property Management Regulation”

- Vehicles and personal property inspections to deter and detect unauthorized removal of government assets.

8.3 Classified Waste Considerations

Some waste component configurations received from NRF will be “classified shapes,” qualifying them as National Security Information. However, the waste streams (as received) would be self-protecting (i.e., the radiation fields presented by the unshielded materials prevent examination without protective facilities). Additionally, all materials are sealed in a waste container (or liner) before leaving the protected areas and before shipment to the remote-handled LLW disposal facility. The DOE Naval Reactors Laboratory Field Office has approved disposal of classified NRF LLW by burial at the existing INL facility based on these considerations (DOE-NR 2008). These same security measures would be continued at the proposed replacement facility.

8.4 Additional Security Considerations

Insider threats and sabotage risks are similar in nature to the current operational portfolio in place at RWMC. Therefore, the security impact of the proposed remote-handled LLW disposal facility should have minimal additional impact to the existing INL security program and should be consistent with current practices and operational risks at RWMC.

A formal review would be conducted, based on the final design and location of the facility, to determine if additional security concerns exist based on material types and quantities. This analysis would be conducted before the start of operations to ensure adequate security measures are in place and operational.

Consistent with DOE Order 420.1B, “Facility Safety,” facility design would accommodate all requirements for safeguards and security, access control, and emergency egress. Where conflict occurs between such requirements, life safety requirements have precedence. As designed, this facility would comply with the letter and intent of the order and present no risk to employees with respect to NFPA 101.

9. ENVIRONMENTAL, SAFETY, AND HEALTH REQUIREMENTS

Each of the following subsections provides a brief description of the statutes, regulations, orders, and agreements that have been identified as potentially applicable to the proposed remote-handled LLW disposal facility, as envisioned in the conceptual design. The construction and operation of the proposed remote-handled LLW disposal facility will be in compliance with the applicable environmental, safety, and health compliance requirements identified in this section.

All work at INL will be conducted in accordance with INL's DOE-approved Integrated Safety Management System and DOE Manual 450.4-1, "Integrated Safety Management System Manual." The objective of the Integrated Safety Management System is to provide a safe workplace to perform work while protecting the worker, the public, and the environment by incorporating safety into management and work practices at all levels and by addressing all types of work and all types of hazards. "Safety" encompasses safety and health, quality assurance, and the environment, including pollution prevention and waste minimization.

9.1 Department of Energy Orders

DOE facilities are regulated by DOE for LLW management, radiation protection, and safety. This section describes the key requirements that apply to the proposed remote-handled LLW disposal facility.

9.1.1 DOE Order 435.1, Radioactive Waste Management

DOE Order 435.1 establishes requirements to ensure that all DOE radioactive waste is managed in a manner that is protective of workers, public health and safety, and the environment. The requirements contained within DOE Order 435.1 directly pertain to the design of the proposed remote-handled LLW disposal facility.

The DOE Manual 435.1-1 identifies the specific requirements for the management of all radioactive waste. The specific requirements associated with management of low-level radioactive waste include the following:

1. Radioactive waste management basis—Facilities, operations, and activities will have a radioactive waste management basis consisting of the following physical and administrative controls to ensure protection of workers, public, and the environment: the performance assessment, composite analysis, disposal authorization statement, closure plan, waste acceptance requirements, and monitoring plan.

2. Waste acceptance—Waste acceptance requirements for waste storage, treatment, and disposal of LLW must include the following, at a minimum:

   – Allowable activities or concentrations of specific radionuclides

   – Acceptable waste form or container requirements that ensure the chemical and physical stability of waste under conditions that might be encountered during transportation, storage, treatment, or disposal

   – Restrictions or prohibitions on waste, materials, or containers that may adversely affect waste handlers or compromise facility or waste container performance

- LLW must contribute to and not detract from achieving long-term stability of the facility, minimizing the need for long-term active maintenance, minimizing subsidence, and minimizing contact or water with waste (void spaces within the waste and, if containers are used, between the waste and its container must be reduced to the extent possible).

- LLW must not be readily capable of detonation, explosive decomposition, or reaction at anticipated pressures and temperatures or of explosive reaction with water; pyrophoric materials contained in waste must be treated, prepared, and packaged to be nonflammable

- LLW must not contain or be capable of generating by radiolysis or biodegradation quantities of toxic gases, vapors, or fumes harmful to the public, workers, or disposal facility personnel, or harmful to the long-term structural stability of the disposal site.

3. Waste exceptions—The basis, procedure, and levels of authority required for granting exceptions to the waste acceptance requirements must be contained in each facility's waste acceptance documentation. Each exception request must be documented, including its disposition, as approved or not approved.

4. Waste generation plan—Includes life-cycle planning and conditions for generation of waste with no identified path to disposal.

5. Waste characterization—Characterization requirements for waste to ensure safe management and compliance with waste acceptance requirements of the facility receiving the waste.

6. Waste certification—A program to ensure that waste acceptance requirements of facilities receiving waste for storage, treatment, and disposal are met.

7. Waste transfer—A documented process transferring responsibility for management of the waste and ensuring availability of relevant data.

8. Packaging and transportation—Packaging and transportation requirements.

9. Site evaluation and facility design—Requirements to ensure environmental characteristics, geotechnical characteristics, and human activities are evaluated.

10. Storage and staging requirements—Includes storage prohibitions, integrity requirements, and inspection requirements.

11. Treatment—Waste will be treated, as necessary, to meet the waste acceptance requirements of the facility receiving the waste for storage or disposal.

12. Disposal—Disposal requirements for the waste.

13. Monitoring—Monitoring requirements for waste, including stored waste.

9.1.2 DOE Order 450.1, Environmental Protection Program

DOE Order 450.1, "Environmental Protection Program," ensures implementation of sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by DOE operations and by which DOE cost effectively meets or exceeds compliance with applicable environmental, public health, and resource protection laws, regulations, and DOE requirements. As required by the order, all DOE elements must ensure that the Integrated Safety Management System includes an environmental management system component that provides for public health and environmental protection, pollution prevention, and compliance with applicable environmental protection requirements.

While requirements of DOE Order 450.1 help ensure that INL meets all applicable environmental requirements, there are no specific additional environmental compliance requirements contained within DOE Order 450.1 that are not contained elsewhere in referenced regulations that directly pertain to the design, construction, and operation of the proposed remote-handled LLW disposal facility.

9.1.3 DOE Order 420.1B, Facility Safety

DOE Order 420.1B, "Facility Safety," establishes facility safety requirements for nuclear safety design, criticality safety, fire protection, natural phenomena hazards mitigation, and a system engineer program. These requirements are addressed in the preliminary hazard assessment.

9.1.4 DOE Order 5400.5, Radiation Protection of the Public and the Environment

DOE Order 5400.5, "Radiation Protection of the Public and the Environment," establishes standards and requirements for operation of DOE and DOE contractors with respect to protection of members of the public and the environment against undue risk from radiation. The objectives of the order include the following:

1. Operate facilities and conduct activities so that radiation exposures to members of the public are maintained within limits established in the order and to control radioactive contamination through management of real and personal property

2. Maintain potential exposures to members of the public as far below the limits as reasonably achievable and to have the capabilities, consistent with the types of operations conducted, to monitor routine and nonroutine releases and to assess doses to members of the public

3. Protect the environment from radioactive contamination to the extent practical.

The order sets a primary standard of 100 mrem effective dose equivalent to members of the public in a year. To the extent required by the Clean Air Act (see Section 9.3), the exposure of members of the public to radioactive materials released to the atmosphere as a consequence of routine DOE activities will not cause members of the public to receive in a year, an effective dose equivalent greater than 10 mrem.

DOE Order 5400.5 establishes radiation limits. Necessary engineering controls must be incorporated into the design to ensure that the dose limits specified in the order are met.

9.2 Spent Fuel Settlement Agreement

The Spent Fuel Settlement Agreement between DOE and the State of Idaho (DOE-ID 1995), and an associated Addendum (DOE-ID 2008), addresses receipt and storage of spent nuclear fuel at INL. INL may receive and store spent fuel for which DOE is responsible on the condition that all DOE spent fuel be removed from Idaho by January 1, 2035. Specific quantities of Naval spent nuclear fuel at INL may be received and stored for a timeframe reasonably necessary for examination, processing, and queuing for shipment to a repository or storage facility outside of Idaho. There are no compliance requirements contained within the agreement that pertain to conceptual design of a remote-handled LLW disposal facility. The Naval Nuclear Propulsion Program requires that disposal capability be available for the process of readying spent nuclear fuel for final disposition. Continued access to remote-handled LLW disposal capacity is critical to the Navy's mission and ensures provisions in the Idaho Settlement Agreement are met.

9.3 Clean Air Act

The primary objective of the Clean Air Act (42 USC 7401 et seq.) is for EPA to establish federal limits for certain air pollutants, including radionuclides, in the atmosphere to ensure basic and environmental health protection. A state develops a state implementation plan, which is a collection of regulations that the state uses to prevent air pollution. The State of Idaho has an approved state implementation plan and the regulations are found in IDAPA.

IDAPA 58.01.01.201 requires that a "permit to construct" be issued for new sources: "No owner or operator may commence construction or modification of any stationary source, facility, major facility, or major modification without first obtaining a permit to construct from DOE, which satisfies the requirements of Section 200 through 228 unless the source is exempted." Application procedures to obtain a permit to construct are identified in IDAPA 58.01.01.202.

In addition to the State of Idaho "permit to construct," the requirements of the National Emissions Standards for Hazardous Air Pollutants must be considered as potentially applicable to the project. INL is subject to 40 CFR 61.90 through 61.97 as stated, "The provisions of this subpart apply to operation of any facility owned or operated by the Department of Energy that emits any radionuclide other than radon-222 and radon-220 into the air." Section 40 CFR 61.96 states that such a facility that has the potential for an unmitigated effective dose equivalent to a member of the public greater than or equal to 0.1 mrem/year, as calculated using the method in 40 CFR Part 61 Appendix D, must submit an application to construct to EPA Region 10 and receive approval before construction begins. Potential radioactive emissions associated with the operation of the proposed remote-handled LLW disposal facility will be calculated and discussed in the NEPA documentation being prepared for this project and as described in Section 9.6. This information will be used to determine the Clean Air Act compliance requirements that must be addressed.

These requirements are based upon release of radionuclides from the operation of the facility and require submittal and approval before construction. The requirements are not directly related to the design phase of the proposed remote-handled LLW disposal facility. However, DOE Order 435.1 (Section 9.1.1) does establish requirements to ensure that all DOE radioactive waste is managed in a manner that is protective of workers, public health and safety, and the environment. The requirements contained within DOE Order 435.1 directly pertain to the design of the proposed remote-handled LLW disposal facility.

9.4 Comprehensive Environmental Response, Compensation, and Liability Act

CERCLA, commonly known as Superfund, created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites.

The CERCLA program was extended through the Superfund Amendments and Reauthorization Act of 1986 (PL 99-499). Title III of Superfund Amendments and Reauthorization Act, known as the Emergency Planning and Community Right-to-Know Act, established requirements for federal, state, and local governments; Indian Tribes; and industry regarding emergency planning and “Community Right-to-Know” reporting on hazardous and toxic chemicals.

The NEPA process and documentation will discuss the actual location of the proposed remote-handled LLW disposal facility. Location of a remote-handled LLW disposal facility within a CERCLA site could involve concerns about worker exposure during construction and increased environmental monitoring responsibilities. Therefore, avoiding any existing CERCLA sites is a criterion in the siting selection to establish a location for the remote-handled LLW disposal facility. CERCLA waste would not be disposed of at the proposed remote-handled disposal facility. Therefore, there are no CERCLA environmental-compliance requirements that pertain to the conceptual design of the proposed remote-handled LLW disposal facility.

9.5 Federal Facilities Agreement and Consent Order

The Federal Facilities Agreement/Consent Order (DOE-ID 1991) establishes a process under both the RCRA and CERCLA for evaluating past potential releases to the environment at INL, determining the risk any releases may pose to human health and the environment, and evaluating potential remedies. There are no environmental compliance requirements contained in the Federal Facilities Agreement/Consent Order that directly pertain to the design, construction, and operation of the proposed remote-handled LLW disposal facility.

9.6 National Environmental Policy Act

NEPA is the national charter for environmental planning. NEPA requires that the effects of federal actions on the environment be considered equally with economic, technical, and other factors associated with the proposed action. NEPA establishes an analytical process for federal agency decision-making. This process requires that for federal actions having the potential to significantly impact the environment, agencies must do the following:

1. Identify and analyze environmental consequences of proposed federal actions in comparable detail to economic and operational analyses

2. Assess reasonable alternatives to agency proposed actions

3. Document the environmental analysis and findings

4. Make environmental information available to public officials and citizens before agency decisions are made.

A NEPA evaluation, in the form of an environmental assessment, will be performed for the activities associated with the proposed remote-handled LLW disposal facility. The environmental assessment will evaluate the alternatives of locating a disposal facility on INL, using an offsite facility, and taking no action. The final decision will be based on the overall impacts to the environment along with other factors, such as cost and long-term performance. If the proposed activities do not significantly impact the environment, then a finding of no significant impact will be issued. The finding of no significant impact may address measures that an agency will take to reduce (mitigate) potentially significant impacts. If the environmental assessment identifies significant impacts, then an environmental impact statement will be prepared.

9.7 Department of Energy/Tribal Agreement in Principle

The DOE/Tribal Agreement (DOE 2002) defines interfaces between DOE and the Shoshone-Bannock tribes. The agreement also describes the technical and financial assistance DOE will provide the tribes. As part of the NEPA process (see Section 9.6), the Shoshone-Bannock tribes will have the opportunity to provide comments pertaining to the operation of the proposed remote-handled LLW disposal facility.

9.8 Environmental Oversight and Monitoring Agreement

The goals of this agreement are to maintain an independent, impartial, and qualified State of Idaho INL Oversight Program to assess the potential impacts of present and future DOE activities in Idaho; to assure the citizens of Idaho that all present and future DOE activities in Idaho are protective of the health and safety of Idahoans and the environment; and to communicate the findings to the Idaho citizens in a manner that provides them the opportunity to evaluate potential impacts of present and future DOE activities in Idaho.

9.9 Idaho National Laboratory Labor Terms and Conditions

The INL Site Stabilization Agreement (DOE 1991) is a collective bargaining agreement between INL employers (contractors and subcontractors) performing construction work (determined by the Owner to be covered by the Davis Bacon Act) and the Building and Construction Trades Department of the AFL-CIO, the Idaho Building and Construction Trades Council, the International Unions affiliated therewith, the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America, and the signatory local unions.

The Site Jurisdictional Agreement, also known as the INL Site Construction Jurisdictional Procedure Agreement, coupled with the Site Stabilization Agreement establish the labor terms and conditions including wages, hiring procedures, and other employment practices associated with the INL construction projects. There are no compliance requirements contained within the agreements that directly pertain to the proposed remote-handled LLW disposal facility, as envisioned in the conceptual design.

9.10 Safe Drinking Water Act/Idaho Regulations for Public Drinking Water Systems

The Safe Drinking Water Act (42 USC 300(f) et seq.) was established to protect the quality of drinking water in the United States. The law focuses on all the waters actually or potentially designated for drinking use, whether from aboveground or underground sources. The act provides for establishment of primary regulations for the protection of the public health and secondary regulations relating to taste, odor, and appearance of drinking water.

In accordance with IDAPA 58.01.08.550, public drinking water systems must conform to the rules in IDAPA 58.01.08 and “Recommendation Standards for Water Works, A Report of the Water Quality Supply Committee of the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers,” except Parts 1 and 8. A public water system is defined as a system that serves 25 people for at least 60 days per year.

The proposed remote-handled LLW disposal facility may require establishment of a public drinking water system, depending on availability of drinking water at the location that is selected. If a drinking water system is required, facility and design standards for the following elements and activities would be incorporated in compliance with IDAPA 58.01.08.550:

- Siting and construction of wells
- Disinfection
- Contaminant control and treatment
- Pumping facility
- Distribution systems
- Cross-connection control
- Operating criteria.

9.11 Water Regulations

The Clean Water Act (33 USC 1251 et seq.) establishes the basic structure for regulating discharges of pollutants into the waters of the United States. The act provides EPA the authority to implement pollution control programs (i.e., setting wastewater standards for industry). The Clean Water Act also sets water quality standards for all contaminants in surface waters. The State of Idaho has jurisdiction over the land application of wastewaters (IDAPA 58.01.17). Anyone wishing to land-apply wastewater must obtain a wastewater land application permit before constructing, modifying, or operating a wastewater land application facility in the State of Idaho.

According to TFR-483, no wastewaters from operation of the remote-handled LLW disposal facility are anticipated to be generated. However, depending on the specific location of the facility and the availability of existing sanitary facilities, a new individual subsurface disposal system or portable nondischarging wastewater system may be required. The State of Idaho has regulations and a technical guidance manual governing individual/subsurface sewage disposal (IDAPA 58.01.03). Under the Idaho program, the following applies:

- If a permanent facility is not available and installation is impractical, under IDAPA 58.01.03.005, a portable nondischarging system may be installed if it is properly maintained and of a design approved by the Director of the Idaho Department of Environmental Quality.
- If a permanent facility is determined to be required, a permit from the State of Idaho would be obtained as required under IDAPA 58.01.03.005. The permit application would address design and operating parameters for the wastewater disposal system, including the following:
  - Maximum number of persons served
  - Type of system
  - Soil description and profile, groundwater data, percolation or permeability test results, and a site evaluation report

- Nature and quantity of wastewater that the system is to receive

- Proposed operation, maintenance, and monitoring procedures to ensure the system's performance and failure detection.

9.12 Hazardous Waste Management Act/Resource Conservation and Recovery Act and Related Requirements

The Resource Conservation and Recovery Act of 1976 (42 USC § 6901 et seq.) amended the Solid Waste Act of 1965. In 1984, Congress passed the Hazardous and Solid Waste Amendments, which expanded the scope of the RCRA Program. Provisions of Subtitle C of RCRA, "Hazardous Waste Management," provide EPA and the State of Idaho authority to establish regulations for the identification and listing of hazardous waste and management standards applicable to the generation, transport, and disposal of hazardous waste. RCRA regulations are enforced by the State of Idaho through the Hazardous Waste Management Act.

Waste subject to regulation under Subtitle C of RCRA is materials that meet the definition of a hazardous waste. The waste to be disposed of in the remote-handled LLW disposal facility is remote-handled LLW only. Therefore, there are no RCRA Subtitle C hazardous waste compliance requirements that pertain to conceptual design of the proposed remote-handled LLW disposal facility.

Subtitle D of the Hazardous Waste Management Act/RCRA addresses non-hazardous solid waste. Pursuant to Subtitle D, EPA has set criteria for disposal of non-hazardous solid waste at municipal and non-municipal waste facilities. The remote-handled LLW would not be considered household or municipal waste. It could be considered non-municipal. However, under the Idaho rules that implement the federal criteria, radioactive wastes regulated under the Atomic Energy Act are excluded from regulation. Therefore, RCRA Subtitle D does not apply to this project (IDAPA 58.01.06.001.a.viii).

9.13 Pollution Prevention and Waste Minimization

Waste minimization activities should be incorporated and designed into all activities associated with the proposed remote-handled LLW disposal facility. Proper design criteria and optimization can greatly affect waste generation and are critical in pollution prevention. A strategy for the management and minimization of waste is determined by the waste management policy of DOE Order 435.1. The environmental management system component of the Integrated Safety Management System provides for the systematic planning, execution, and evaluation of the pollution prevention program. During the design of the facility, consideration should be given to construction processes and materials that will generate the least amount of waste and impacts on the environment.

10. RISK MANAGEMENT

The project risk management plan (PLN-2541) defines the scope, responsibilities, and methodology for identifying, evaluating, quantifying, and managing risks that could affect successful completion of the project. The objective of the risk management plan is to enable project success by identifying project risks, including programmatic, technical, cost, and schedule risks, and appropriate response actions to effectively manage the risks through project completion. The risk management plan has been prepared in accordance with Laboratory-wide Procedure (LWP)-7350, “Project Risk Management,” DOE Order 413.3B, and DOE Guide 413.3-7, “Risk Management Guide.” The risk management plan was prepared to support the CD process and will be modified, as required, for subsequent project phases to meet project requirements.

11. READINESS REVIEW

This section addresses operational readiness before startup of the proposed remote-handled LLW disposal facility.

11.1 Introduction

The DOE requirements for startup and restart of nuclear facilities are contained in DOE Order 425.1C, “Startup and Restart of Nuclear Facilities.” For initial startup of a new hazard category nuclear facility (i.e., the proposed remote-handled LLW disposal facility), DOE Order 425.1C specifies that DOE and the contractor must conduct an operational readiness review (ORR). An ORR is an activity that confirms that management has brought the facility to a state of readiness to commence or resume program work. The management effort for the readiness will include management self-assessment activities in preparation for ORRs. The INL process for management self-assessments is described in LWP-9903, “Performing Management Self-Assessments for Readiness,” and the INL start and restart process is described in LWP-9902, “Startup and Restart of Nuclear Facilities.” Once management concludes that readiness has been achieved, the state of readiness in independently verified by the contractor ORR and confirmed by the DOE ORR.

The ORR is intended to confirm that the facility is in a state of readiness to safely conduct operations in accordance with the safety basis and that management control programs are in place to ensure safe operations can be sustained. A foundation for readiness of the nuclear facility is an approved safety basis as defined in approved facility safety documentation, approved environmental documentation, a satisfactory safe working environment, and compliance with DOE orders and requirements. The ORR team must verify that the necessary approved requirements documentation is in place and that procedures, personnel, equipment, and systems support the approved requirements.

11.2 Plan-of-Action

Before the projected date for the ORR, the INL contractor will prepare and submit for approval an ORR plan-of-action. The plan-of-action will provide the proposed breadth of the ORR, as specified by the core requirements in DOE Order 425.1C, the prerequisites for starting the ORR, the ORR schedule, the proposed ORR Team Leader, and other information required by DOE Order 425.1C. The ORR plan-of-action will be reviewed by the Operations Office Manager, or designee, and approved or forwarded to the designated approval authorities.

11.3 Implementation Plan

The approved plan-of-action is provided to the designated ORR Team Leader. The ORR Team Leader identifies the necessary team members who will conduct the ORR. The ORR Team Leader, with the assistance of the team, develops the ORR Implementation Plan. This plan describes how the ORR will be conducted. It will include checklists, evaluation criteria, review methodology, qualification requirements for the members, reporting expectations, and other information necessary to efficiently execute and report the results of the ORR. The INL contractor’s line management will take action to bring the facility into a condition of readiness to start operations. As part of achieving readiness, management self-assessment activities are appropriate and will be included.

11.4 Contractor Operational Readiness Review

The INL contractor's line management will determine that readiness has been achieved by meeting all prerequisites specified in the ORR plan-of-action. The INL contractor ORR will be conducted and reported in accordance with the ORR Implementation Plan. When prestart findings from the contractor ORR have been resolved, the INL contractor will prepare and forward a Readiness to Proceed Memorandum to DOE-ID.

11.5 Department of Energy Operational Readiness Review

Following receipt of the Readiness to Proceed Memorandum, the DOE-ID Manager, or designee, will concur with the contractor's readiness; verify DOE-ID management readiness, including meeting DOE prerequisites in the DOE plan-of-action; and recommend to DOE Headquarters that the DOE ORR be conducted. At the direction of DOE Headquarters, the DOE ORR will be conducted. Following completion of the DOE ORR and resolution of prestart findings, DOE management recommends to the authorization authority that startup approval be granted. Following this approval for startup, CD-4 will be issued.

12. QUALITY ASSURANCE

The Quality Assurance Program (QAP) for the proposed remote-handled LLW disposal facility conceptual design must meet the minimum requirements of 10 CFR 830, "Nuclear Safety Management," DOE Order 413.3B, DOE Order 414.1C, "Quality Assurance," and the American Society of Mechanical Engineers NQA-1-2000, "Quality Assurance Requirements for Nuclear Facility Applications," as implemented using a graded approach through the applicable program areas of the DOE-ID approved INL QAP.

The INL Director of Quality Assurance is responsible for establishing, maintaining, and monitoring implementation of the overall INL QAP and for assisting the Idaho Facilities Management Program throughout the project life cycle. The INL QAP is a management system established to help the INL organization perform work correctly. The Remote-Handled LLW Disposal Project addresses each quality program area through PLN-3359, "Quality Assurance Program Plan for the Remote-Handled Low Level Waste Disposal Project."

The INL quality assurance organization is represented on the remote-handled LLW disposal facility integrated project team and has continued participation throughout all project phases. The methodology and approach used to meet various requirements are tailored appropriately (graded approach) in consideration of the complexity, cost, and risks associated with the project. PLN-2541 defines the scope, responsibilities, and methodology for identifying, assessing impacts, and managing risks that could affect successful completion of the project.

The graded approach is an essential element used in establishing quality assurance requirements and is applied through the assignment of quality levels to items and activities at the earliest time consistent with application of the appropriate controls. Using LWP-13014, "Determining Quality Levels," Quality level evaluations for both design and construction activities were completed. The Quality Level-2 activities covered under Quality Level Determination MSA-000136 include preparation of the preliminary documented safety analysis, development of the performance specification, and development of the requisite DOE Order 435.1. The Quality Level-3 conceptual design activities and construction activities for the concrete waste disposal vaults are being completed under Quality Level Determination ALL-000191.

New facilities to support the Remote-Handled LLW Disposal Project are constructed in accordance with LWP-7201, "INL Construction," the approved engineering drawings and specifications (design criteria), and national codes and standards. Before the facility startup and operational turnover phase (CD-4) of the project, the QAP plan will be revised to address specific requirements for the various facilities and operating organizations based on the criteria of American Society of Mechanical Engineers NQA-1-2000 and the INL QAP. These criteria and the phases to which they apply are listed in Table 12-1.

Table 12-1. American Society of Mechanical Engineers NQA-1-2000 criteria applicable to the proposed Remote-Handled Low-Level Waste Disposal Facility.

	Criterion	Design Phase	Construction	Facility Startup/ Operation
1.	Organization	•	•	•
2.	QAP	•	•	•
3.	Design control	•		•
4.	Procurement document control	•	•	•
5.	Instructions, procedures, and drawings	•	•	•
6.	Document control	•	•	•
7.	Control of purchased items and services	•	•	•
8.	Identification and control of items		•	•
9.	Control of special processes			•
10.	Inspection		•	•
11.	Test control	•	•	•
12.	Control of measuring and test equipment			•
13.	Handling, storage, and shipping			•
14.	Inspection, test, and operating status			•
15.	Control of nonconforming items		•	•
16.	Corrective action	•	•	•
17.	Quality assurance records	•	•	•
18.	Audits	•	•	•

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Appendix A

Conceptual Design Drawings

1 2 3 4 5 6 7 8

REV NUM	DESCRIPTION	CHK'D BY	APPV BY	DATE
A				

CONCEPTUAL ENGINEERING PLANS FOR

REMOTE HANDLED LOW LEVEL WASTE DISPOSAL FACILITY

IDAHO NATIONAL LABORATORY

INDEX OF DRAWINGS

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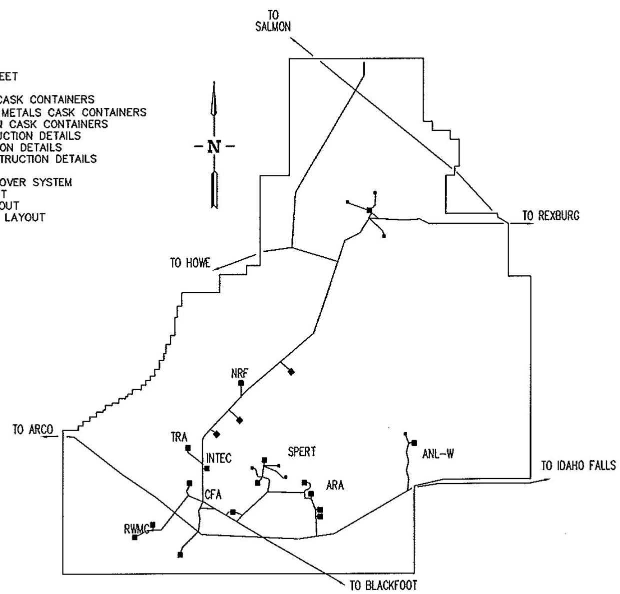
2	NW07-034	G-1	D	SITE LAYOUT PLAN
3	NW07-035	C-1	D	VAULT LAYOUT FOR 55-TON CASK CONTAINERS
4	NW07-036	C-2	D	VAULT LAYOUT FOR MFC/ATR METALS CASK CONTAINERS
5	NW07-046	C-3	D	VAULT LAYOUT FOR RTC RESIN CASK CONTAINERS
6	NW07-037	C-4	D	55 TON CASK VAULT CONSTRUCTION DETAILS
7	NW07-038	C-5	D	CNS CASK VAULT CONSTRUCTION DETAILS
8	NW07-047	C-6	D	RTC RESIN CASK VAULT CONSTRUCTION DETAILS
9	NW07-039	C-7	D	CONSTRUCTION DETAILS
10	NW10-080	C-8	D	FINAL EVAPOTRANSPIRATION COVER SYSTEM
11	NW07-040	A-1	D	MAINTENANCE BUILDING LAYOUT
12	NW07-041	A-2	D	ADMINISTRATION BUILDING LAYOUT
13	NW07-042	E-1	D	ELECTRICAL POWER PLAN AND LAYOUT
14	NW07-043	E-2	D	LIGHTING PLAN
15	NW07-044	E-3	D	PANEL SCHEDULES



IDAHO NATIONAL LABORATORY
VICINITY MAP

NOTES:

1) NEW FENCE, ADMIN. BUILDING, ALARM SYSTEM, AND SURVEILLANCE SYSTEM REQUIRED ONLY IF SITED LOCATION DOES NOT CURRENTLY HAVE THESE COMPONENTS.
2) THE CONCRETE VAULT ARRAY SIZE IS BASED ON AVAILABLE RH LLW QUANTITY AND SHIPMENT INFORMATION.
3) IT IS ASSUMED THAT ELECTRICAL POWER IS THE ONLY UTILITY THAT IS REQUIRED TO BE BROUGHT IN FROM OFF SITE. IT IS ALSO ASSUMED THAT A PRODUCTION WELL FOR POTABLE WATER, A STORAGE TANK FOR FIRE WATER AND A LEACH FIELD AND SEPTIC TANK WILL BE INSTALLED ON-SITE.
4) RADIO OR WIRELESS COMMUNICATIONS WILL BE USED FOR THE ALARM AND SURVEILLANCE SYSTEMS.

PROFESSIONAL ENGINEER
REGISTERED
7065
STATE OF IDAHO
GARY D. MECHAM

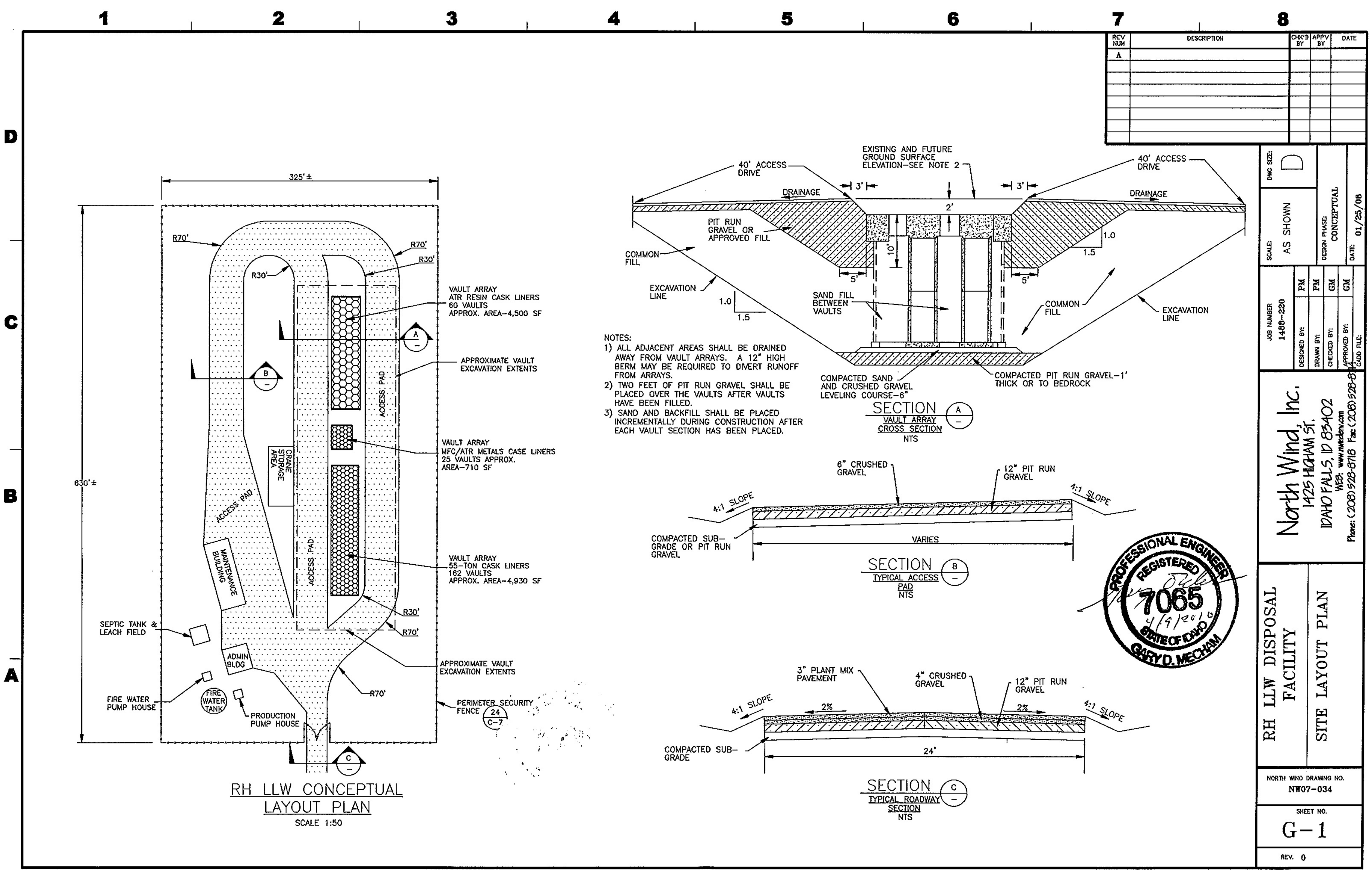
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 01/25/08
JOB NUMBER 1488
DESIGNED BY:
DRAWN BY: PM
CHECKED BY: DLM
APPROVED BY: GDM
CADD FILE:

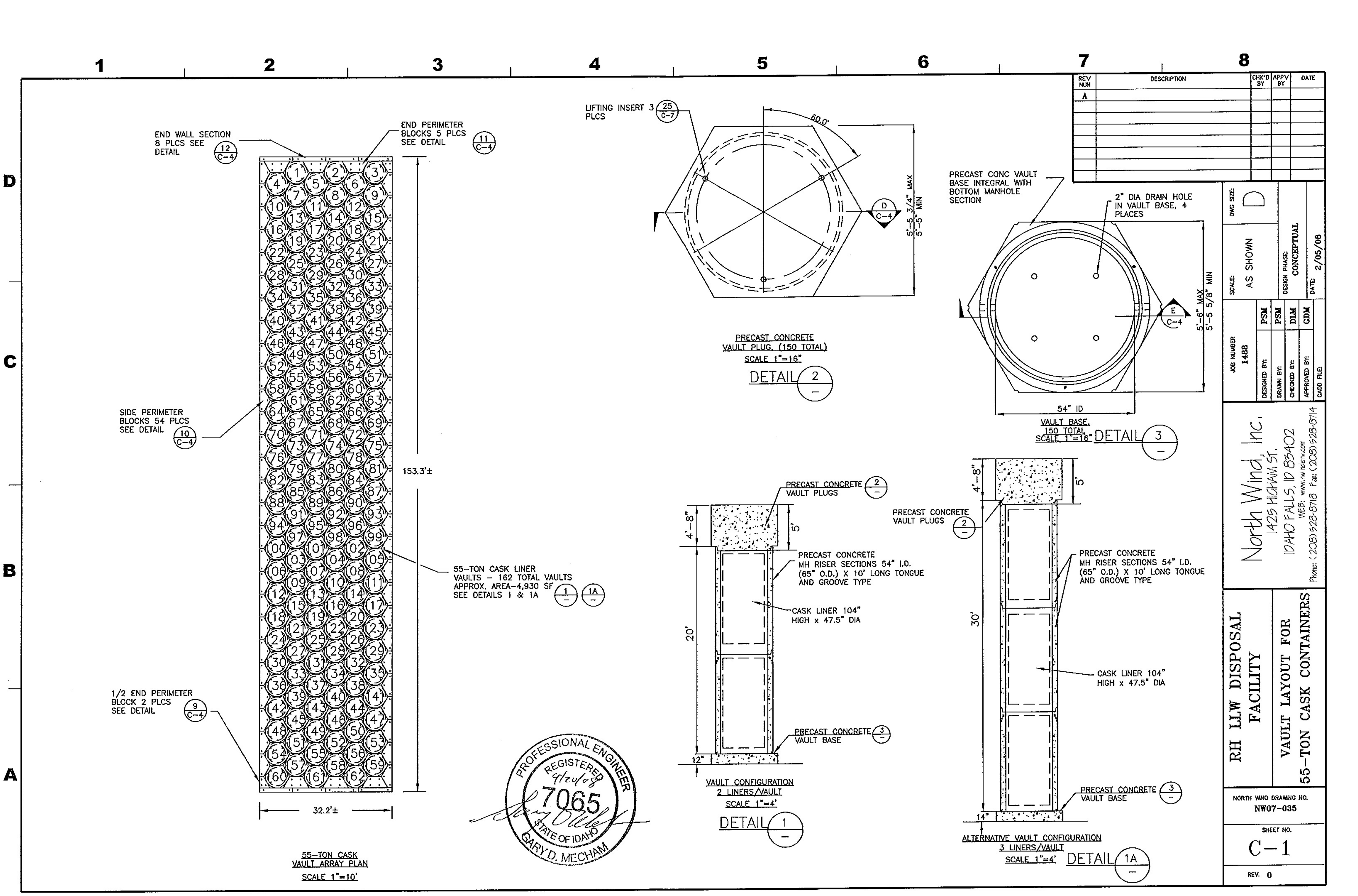
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714

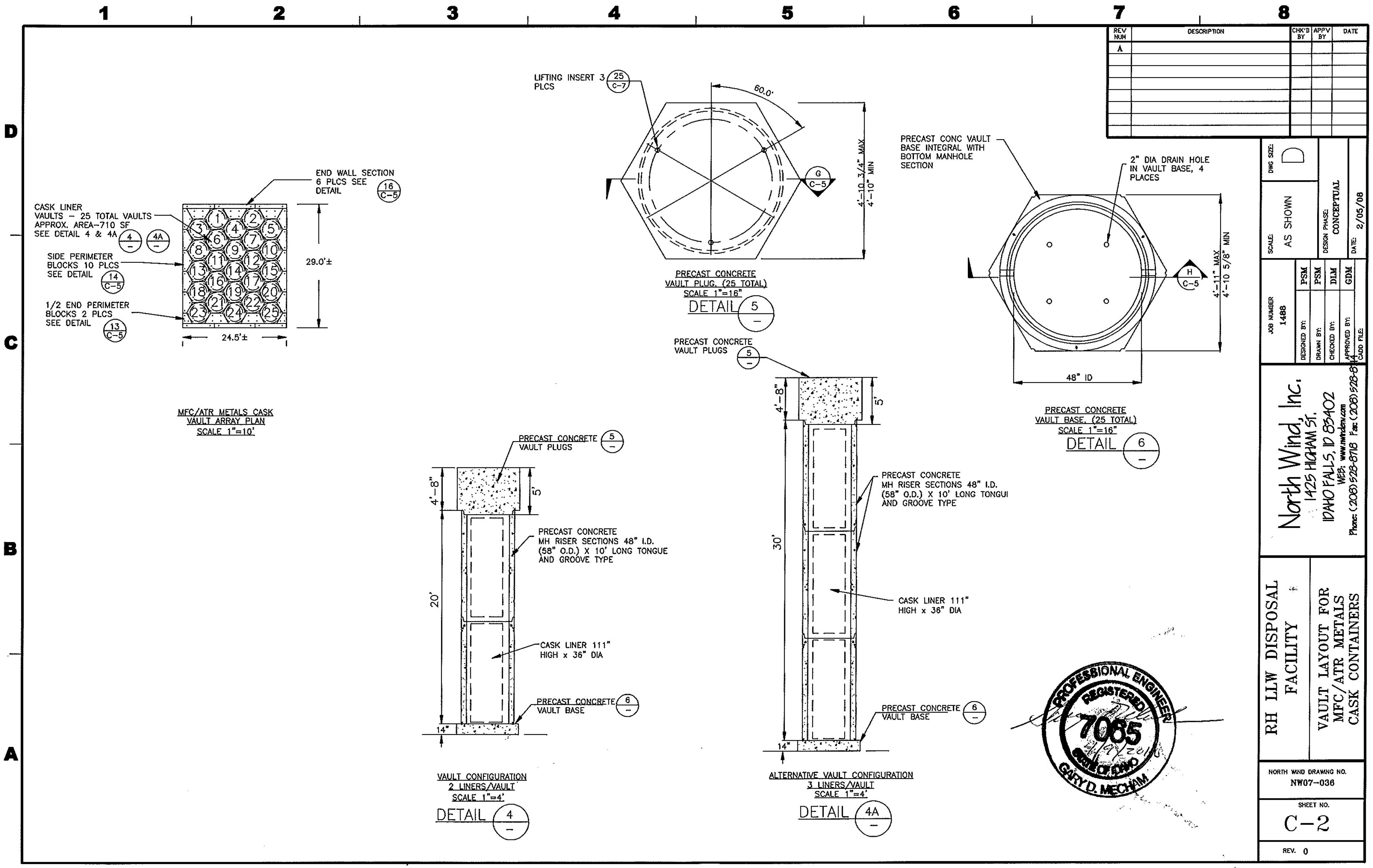
RH LLW DISPOSAL FACILITY
CONCEPTUAL DESIGN TITLE SHEET

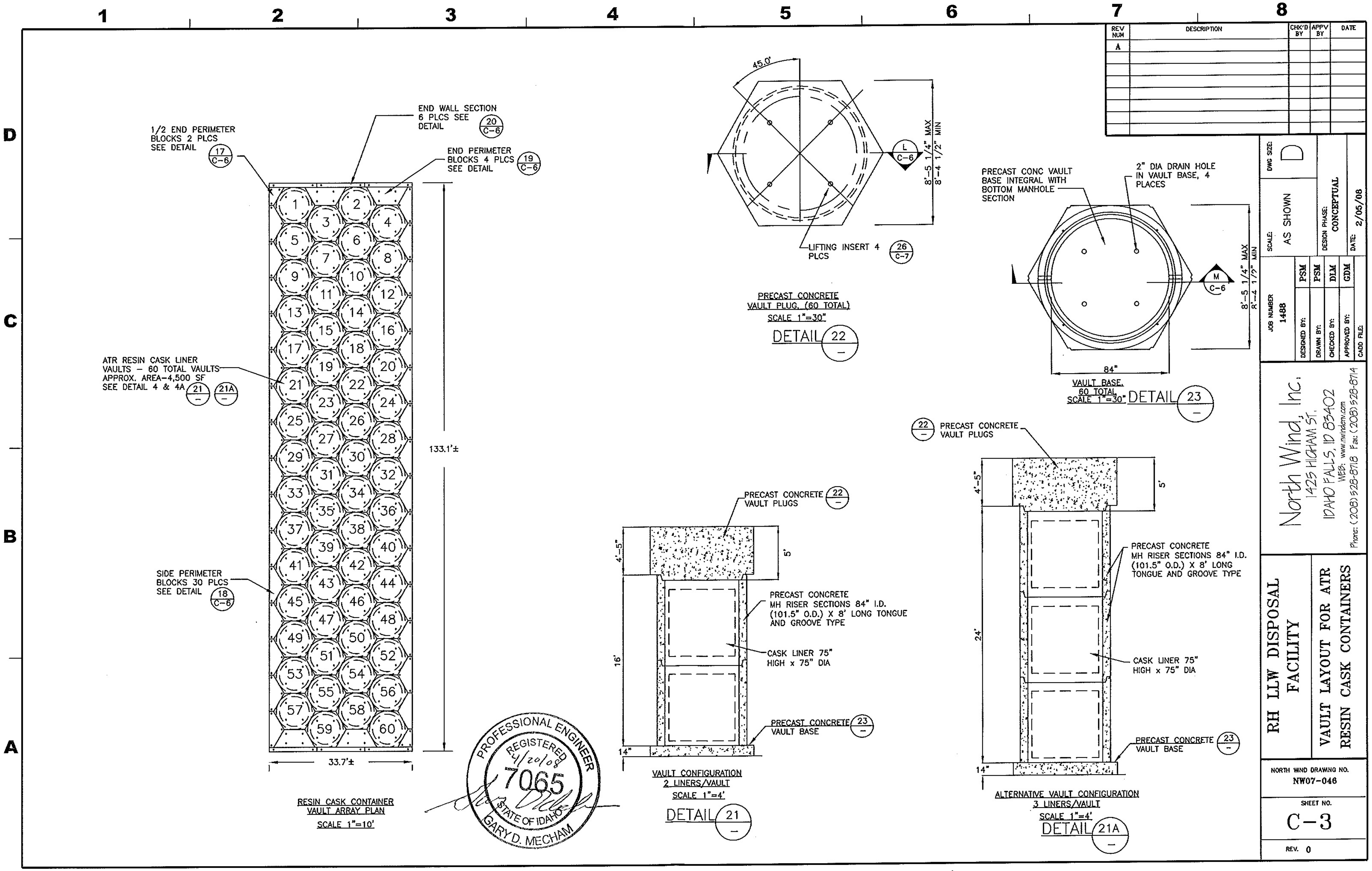
NORTH WIND DRAWING NO. NW07-033
SHEET NO. T-1
REV. 0

A-3

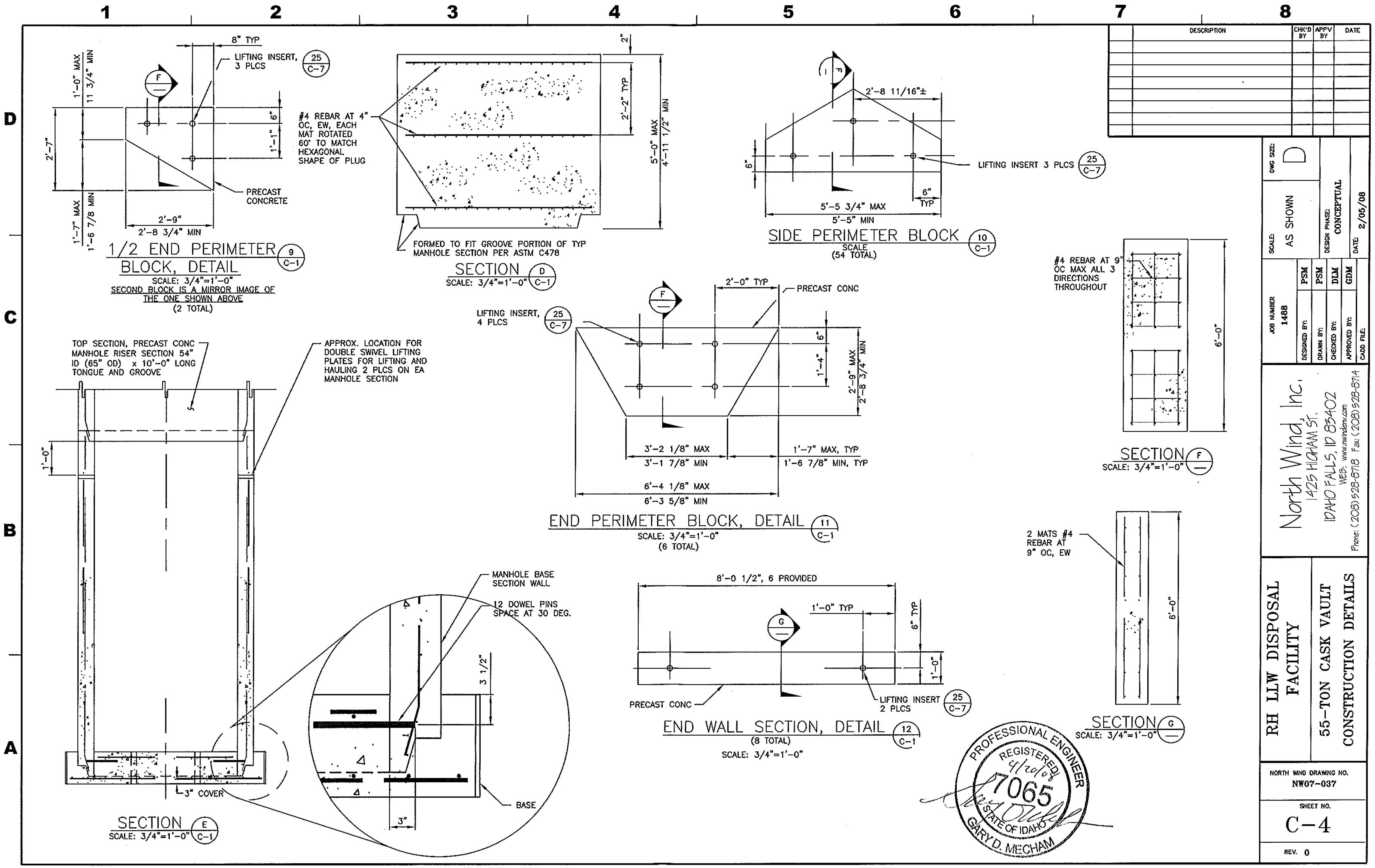

RH LLW CONCEPTUAL LAYOUT PLAN
SCALE 1:50
325'±
630'±
VAULT ARRAY ATR RESIN CASK LINERS 60 VAULTS APPROX. AREA-4,500 SF
APPROXIMATE VAULT EXCAVATION EXTENTS
VAULT ARRAY MFC/ATR METALS CASE LINERS 25 VAULTS APPROX. AREA-710 SF
VAULT ARRAY 55-TON CASK LINERS 162 VAULTS APPROX. AREA-4,930 SF
ACCESS PAD
CRANE STORAGE AREA
MAINTENANCE BUILDING
SEPTIC TANK & LEACH FIELD
ADMIN BLDG
FIRE WATER PUMP HOUSE
FIRE WATER TANK
PRODUCTION PUMP HOUSE
PERIMETER SECURITY FENCE
NOTES:
1) ALL ADJACENT AREAS SHALL BE DRAINED AWAY FROM VAULT ARRAYS. A 12" HIGH BERM MAY BE REQUIRED TO DIVERT RUNOFF FROM ARRAYS.
2) TWO FEET OF PIT RUN GRAVEL SHALL BE PLACED OVER THE VAULTS AFTER VAULTS HAVE BEEN FILLED.
3) SAND AND BACKFILL SHALL BE PLACED INCREMENTALLY DURING CONSTRUCTION AFTER EACH VAULT SECTION HAS BEEN PLACED.
EXISTING AND FUTURE GROUND SURFACE ELEVATION-SEE NOTE 2
40' ACCESS DRIVE
DRAINAGE
PIT RUN GRAVEL OR APPROVED FILL
COMMON FILL
EXCAVATION LINE
SAND FILL BETWEEN VAULTS
COMPACTED SAND AND CRUSHED GRAVEL LEVELING COURSE-6"
COMPACTED PIT RUN GRAVEL-1' THICK OR TO BEDROCK
SECTION A
VAULT ARRAY CROSS SECTION
NTS
6" CRUSHED GRAVEL
12" PIT RUN GRAVEL
4:1 SLOPE
COMPACTED SUB-GRADE OR PIT RUN GRAVEL
VARIES
SECTION B
TYPICAL ACCESS PAD
NTS
3" PLANT MIX PAVEMENT
4" CRUSHED GRAVEL
COMPACTED SUB-GRADE
24'
SECTION C
TYPICAL ROADWAY SECTION
NTS
PROFESSIONAL ENGINEER REGISTERED 7065 STATE OF IDAHO GARY D. MECHAM
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 01/25/08
JOB NUMBER 1488-220
DESIGNED BY: PM
DRAWN BY: PM
CHECKED BY: GM
APPROVED BY: GM
RH LLW DISPOSAL FACILITY
SITE LAYOUT PLAN
NORTH WIND DRAWING NO. NW07-034
SHEET NO. G-1
REV. 0


END WALL SECTION 8 PLCS SEE DETAIL 12 C-4
END PERIMETER BLOCKS 5 PLCS SEE DETAIL 11 C-4
SIDE PERIMETER BLOCKS 54 PLCS SEE DETAIL 10 C-4
1/2 END PERIMETER BLOCK 2 PLCS SEE DETAIL 9 C-4
153.3'±
32.2'±
55-TON CASK LINER VAULTS - 162 TOTAL VAULTS APPROX. AREA-4,930 SF SEE DETAILS 1 & 1A
55-TON CASK VAULT ARRAY PLAN
SCALE 1"=10'
LIFTING INSERT 3 PLCS 25 C-7
60.0°
5'-5 3/4" MAX
5'-5" MIN
D C-4
PRECAST CONCRETE VAULT PLUG, (150 TOTAL)
SCALE 1"=16"
DETAIL 2
PRECAST CONC VAULT BASE INTEGRAL WITH BOTTOM MANHOLE SECTION
2" DIA DRAIN HOLE IN VAULT BASE, 4 PLACES
5'-6" MAX
5'-5 5/8" MIN
E C-4
54" ID
VAULT BASE, 150 TOTAL
SCALE 1"=16"
DETAIL 3
PRECAST CONCRETE VAULT PLUGS 2
4'-8"
5'
PRECAST CONCRETE MH RISER SECTIONS 54" I.D. (65" O.D.) X 10' LONG TONGUE AND GROOVE TYPE
CASK LINER 104" HIGH x 47.5" DIA
20'
12"
PRECAST CONCRETE VAULT BASE 3
VAULT CONFIGURATION 2 LINERS/VAULT
SCALE 1"=4'
DETAIL 1
30'
14"
ALTERNATIVE VAULT CONFIGURATION 3 LINERS/VAULT
SCALE 1"=4'
DETAIL 1A
PROFESSIONAL ENGINEER
REGISTERED
7065
STATE OF IDAHO
GARY D. MECHAM
REV NUM
DESCRIPTION
CHK'D BY
APPV BY
DATE
A
SCALE: AS SHOWN
DWG SIZE: D
DESIGN PHASE: CONCEPTUAL
DATE: 2/05/08
JOB NUMBER 1488
DESIGNED BY: PSM
DRAWN BY: PSM
CHECKED BY: DLM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM St.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH LLW DISPOSAL FACILITY
VAULT LAYOUT FOR 55-TON CASK CONTAINERS
NORTH WIND DRAWING NO. NW07-035
SHEET NO. C-1
REV. 0

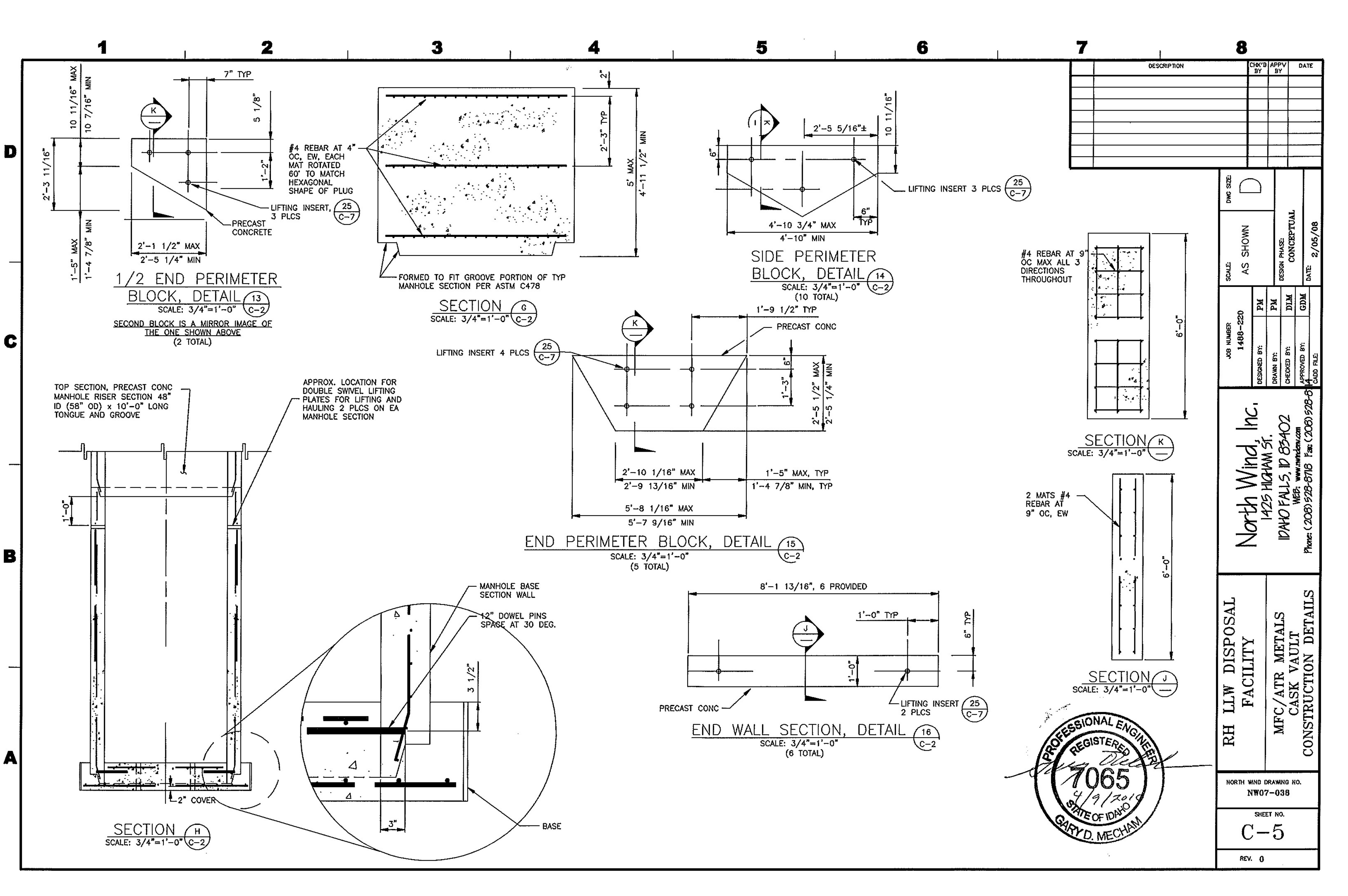

CASK LINER VAULTS – 25 TOTAL VAULTS APPROX. AREA–710 SF SEE DETAIL 4 & 4A
SIDE PERIMETER BLOCKS 10 PLCS SEE DETAIL 14 C-5
1/2 END PERIMETER BLOCKS 2 PLCS SEE DETAIL 13 C-5
END WALL SECTION 6 PLCS SEE DETAIL 16 C-5
29.0'±
24.5'±
MFC/ATR METALS CASK VAULT ARRAY PLAN
SCALE 1"=10'
LIFTING INSERT 3 PLCS 25 C-7
60.0°
4'-10 3/4" MAX
4'-10" MIN
PRECAST CONCRETE VAULT PLUG. (25 TOTAL)
SCALE 1"=16"
DETAIL 5
PRECAST CONC VAULT BASE INTEGRAL WITH BOTTOM MANHOLE SECTION
2" DIA DRAIN HOLE IN VAULT BASE, 4 PLACES
4'-11" MAX
4'-10 5/8" MIN
48" ID
PRECAST CONCRETE VAULT BASE. (25 TOTAL)
SCALE 1"=16"
DETAIL 6
PRECAST CONCRETE VAULT PLUGS
PRECAST CONCRETE MH RISER SECTIONS 48" I.D. (58" O.D.) X 10' LONG TONGUE AND GROOVE TYPE
CASK LINER 111" HIGH x 36" DIA
PRECAST CONCRETE VAULT BASE
4'-8"
5'
20'
14"
VAULT CONFIGURATION 2 LINERS/VAULT
SCALE 1"=4'
DETAIL 4
PRECAST CONCRETE MH RISER SECTIONS 48" I.D. (58" O.D.) X 10' LONG TONGUI AND GROOVE TYPE
30'
ALTERNATIVE VAULT CONFIGURATION 3 LINERS/VAULT
SCALE 1"=4'
DETAIL 4A
REV NUM
DESCRIPTION
CHK'D BY
APPV BY
DATE
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 2/05/08
JOB NUMBER 1488
DESIGNED BY: PSM
DRAWN BY: PSM
CHECKED BY: DLM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH LLW DISPOSAL FACILITY
VAULT LAYOUT FOR MFC/ATR METALS CASK CONTAINERS
NORTH WIND DRAWING NO. NW07-036
SHEET NO. C-2
REV. 0
PROFESSIONAL ENGINEER
REGISTERED
7065
STATE OF IDAHO
GARY D. MECHAM

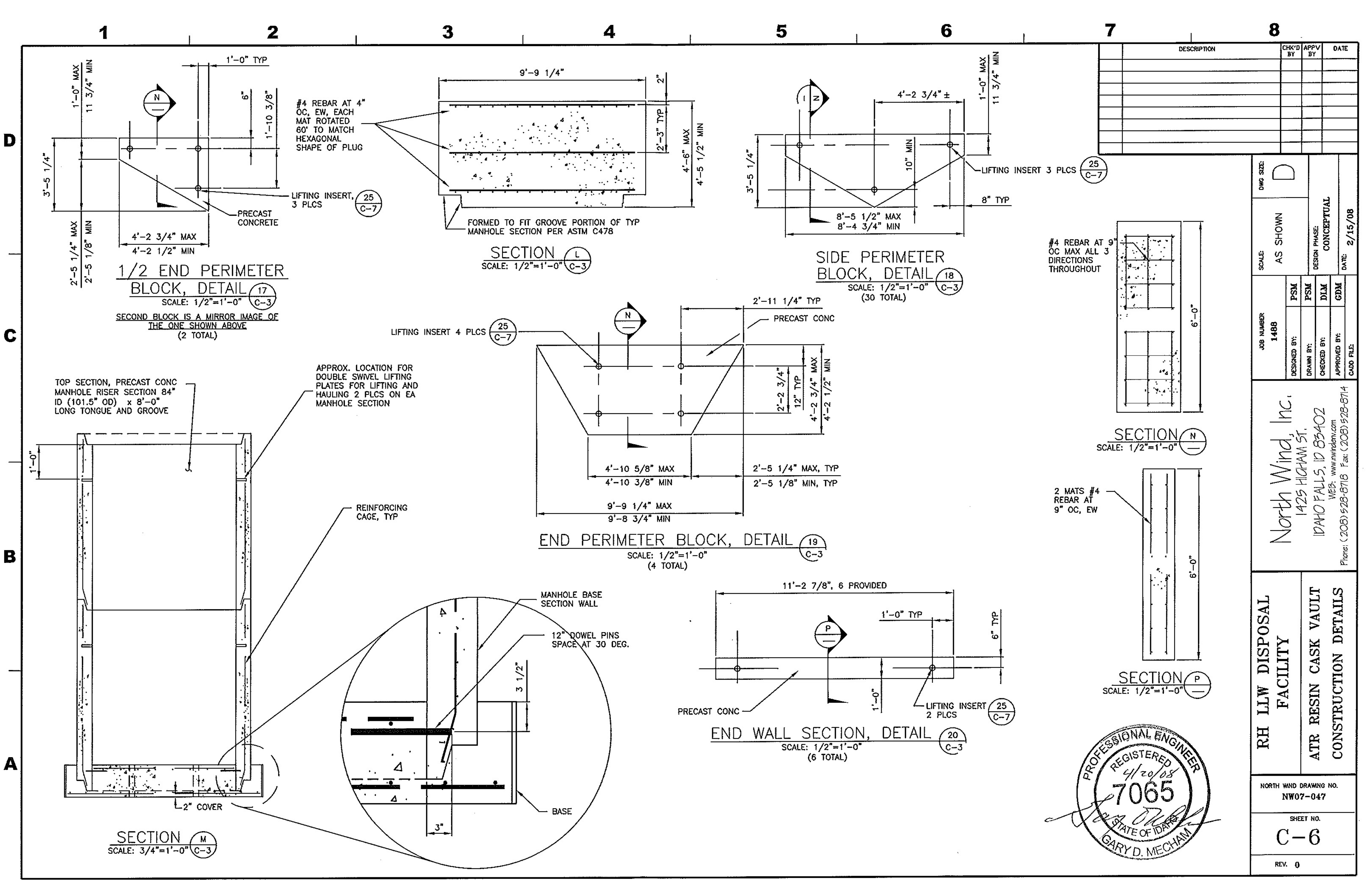


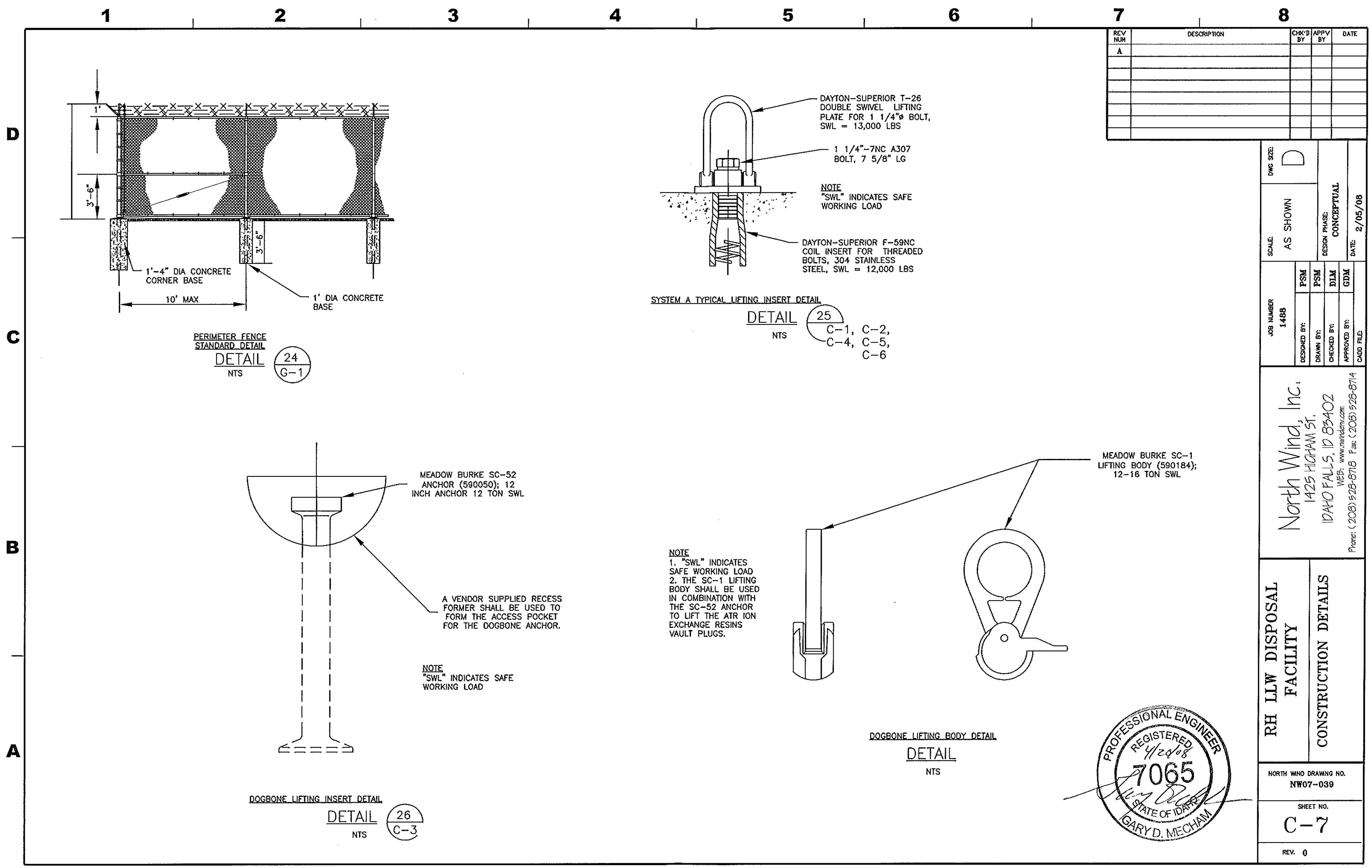
1/2 END PERIMETER BLOCKS 2 PLCS SEE DETAIL 17 C-6
END WALL SECTION 6 PLCS SEE DETAIL 20 C-6
END PERIMETER BLOCKS 4 PLCS SEE DETAIL 19 C-6
ATR RESIN CASK LINER VAULTS – 60 TOTAL VAULTS APPROX. AREA–4,500 SF SEE DETAIL 4 & 4A 21 21A
SIDE PERIMETER BLOCKS 30 PLCS SEE DETAIL 18 C-6
133.1'±
33.7'±
RESIN CASK CONTAINER VAULT ARRAY PLAN
SCALE 1"=10'
PROFESSIONAL ENGINEER
REGISTERED
4/20/08
7065
STATE OF IDAHO
GARY D. MECHAM
45.0°
8'-5 1/4" MAX
8'-4 1/2" MIN
LIFTING INSERT 4 PLCS 26 C-7
PRECAST CONCRETE VAULT PLUG, (60 TOTAL)
SCALE 1"=30"
DETAIL 22
PRECAST CONC VAULT BASE INTEGRAL WITH BOTTOM MANHOLE SECTION
2" DIA DRAIN HOLE IN VAULT BASE, 4 PLACES
84"
VAULT BASE, 60 TOTAL
SCALE 1"=30"
DETAIL 23
PRECAST CONCRETE VAULT PLUGS 22
4'-5"
5'
16'
14"
PRECAST CONCRETE MH RISER SECTIONS 84" I.D. (101.5" O.D.) X 8' LONG TONGUE AND GROOVE TYPE
CASK LINER 75" HIGH x 75" DIA
PRECAST CONCRETE VAULT BASE 23
VAULT CONFIGURATION 2 LINERS/VAULT
SCALE 1"=4'
DETAIL 21
24'
ALTERNATIVE VAULT CONFIGURATION 3 LINERS/VAULT
SCALE 1"=4'
DETAIL 21A
REV NUM
DESCRIPTION
CHK'D BY
APPV BY
DATE
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 2/05/08
JOB NUMBER 1488
DESIGNED BY: PSM
DRAWN BY: PSM
CHECKED BY: DLM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.northwind-inc.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH LLW DISPOSAL FACILITY
VAULT LAYOUT FOR ATR RESIN CASK CONTAINERS
NORTH WIND DRAWING NO. NW07-046
SHEET NO. C-3
REV. 0



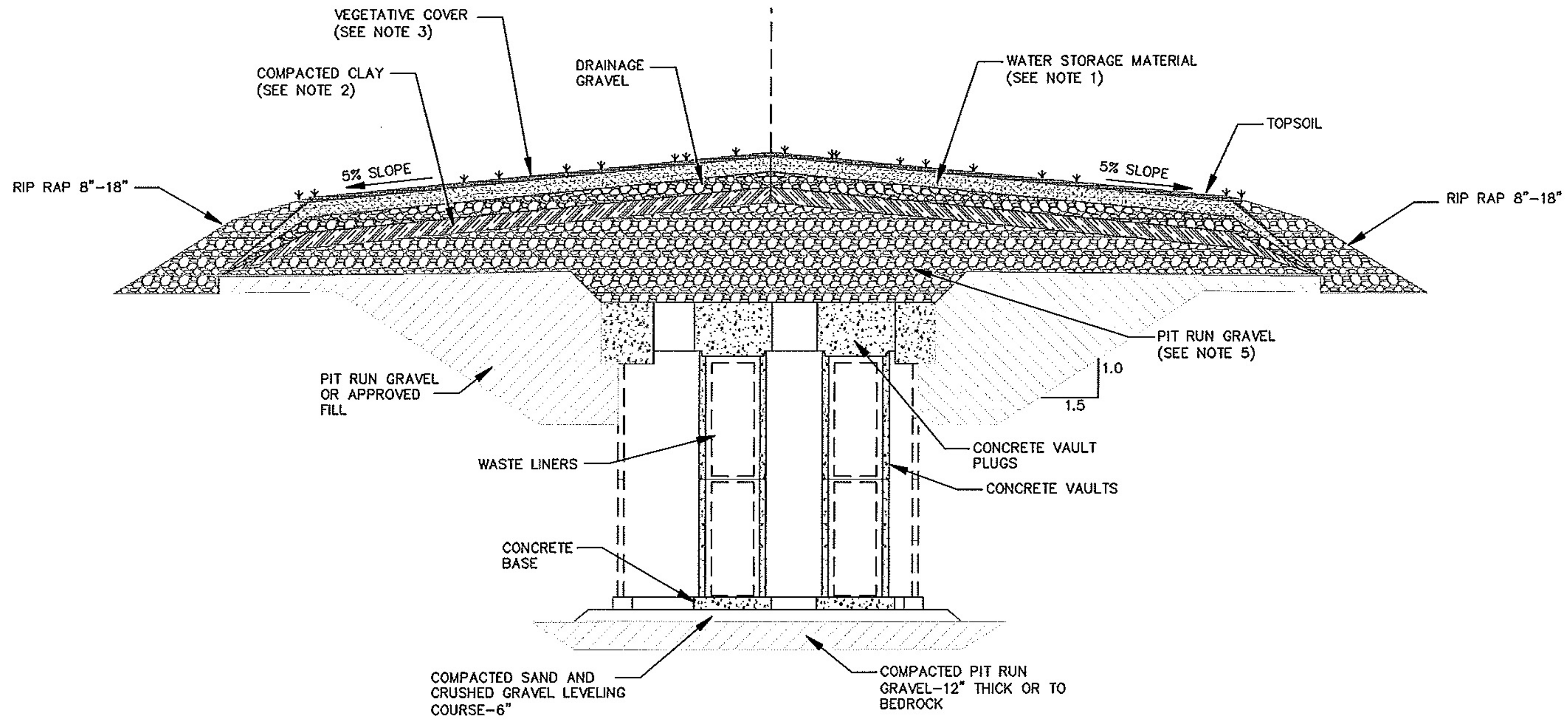
1/2 END PERIMETER BLOCK, DETAIL
SCALE: 3/4"=1'-0"
SECOND BLOCK IS A MIRROR IMAGE OF THE ONE SHOWN ABOVE
(2 TOTAL)
8" TYP
LIFTING INSERT, 3 PLCS
PRECAST CONCRETE
2'-9"
2'-8 3/4" MIN
1'-0" MAX
11 3/4" MIN
1'-7" MAX
1'-6 7/8 MIN
SECTION
SCALE: 3/4"=1'-0"
#4 REBAR AT 4" OC, EW, EACH MAT ROTATED 60° TO MATCH HEXAGONAL SHAPE OF PLUG
FORMED TO FIT GROOVE PORTION OF TYP MANHOLE SECTION PER ASTM C478
5'-0" MAX
4'-11 1/2" MIN
2'-2" TYP
SIDE PERIMETER BLOCK
SCALE
(54 TOTAL)
2'-8 11/16"±
LIFTING INSERT 3 PLCS
5'-5 3/4" MAX
5'-5" MIN
6" TYP
END PERIMETER BLOCK, DETAIL
SCALE: 3/4"=1'-0"
(6 TOTAL)
LIFTING INSERT, 4 PLCS
PRECAST CONC
2'-0" TYP
2'-9" MAX
2'-8 3/4" MIN
3'-2 1/8" MAX
3'-1 7/8" MIN
1'-7" MAX, TYP
1'-6 7/8" MIN, TYP
6'-4 1/8" MAX
6'-3 5/8" MIN
TOP SECTION, PRECAST CONC MANHOLE RISER SECTION 54" ID (65" OD) x 10'-0" LONG TONGUE AND GROOVE
APPROX. LOCATION FOR DOUBLE SWIVEL LIFTING PLATES FOR LIFTING AND HAULING 2 PLCS ON EA MANHOLE SECTION
MANHOLE BASE SECTION WALL
12 DOWEL PINS SPACE AT 30 DEG.
BASE
3" COVER
SECTION
SCALE: 3/4"=1'-0"
END WALL SECTION, DETAIL
(8 TOTAL)
SCALE: 3/4"=1'-0"
8'-0 1/2", 6 PROVIDED
1'-0" TYP
PRECAST CONC
LIFTING INSERT 2 PLCS
#4 REBAR AT 9" OC MAX ALL 3 DIRECTIONS THROUGHOUT
2 MATS #4 REBAR AT 9" OC, EW
6'-0"
SECTION
SCALE: 3/4"=1'-0"
PROFESSIONAL ENGINEER
REGISTERED
4/20/08
7065
STATE OF IDAHO
GARY D. MECHAM
DESCRIPTION
CHK'D BY
APPV BY
DATE
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 2/05/08
JOB NUMBER 1488
DESIGNED BY: PSM
DRAWN BY: PSM
CHECKED BY: DLM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH LLW DISPOSAL FACILITY
55-TON CASK VAULT CONSTRUCTION DETAILS
NORTH WIND DRAWING NO. NW07-037
SHEET NO. C-4
REV. 0


1/2 END PERIMETER BLOCK, DETAIL 13 C-2
SCALE: 3/4"=1'-0"
SECOND BLOCK IS A MIRROR IMAGE OF THE ONE SHOWN ABOVE
(2 TOTAL)
7" TYP
5 1/8"
1'-2"
10 11/16" MAX
10 7/16" MIN
2'-3 11/16"
1'-5" MAX
1'-4 7/8" MIN
2'-1 1/2" MAX
2'-5 1/4" MIN
LIFTING INSERT, 3 PLCS 25 C-7
PRECAST CONCRETE
#4 REBAR AT 4" OC, EW, EACH MAT ROTATED 60° TO MATCH HEXAGONAL SHAPE OF PLUG
FORMED TO FIT GROOVE PORTION OF TYP MANHOLE SECTION PER ASTM C478
2"
2'-3" TYP
5' MAX
4'-11 1/2" MIN
SECTION G C-2
SCALE: 3/4"=1'-0"
2'-5 5/16"±
10 11/16"
6"
LIFTING INSERT 3 PLCS 25 C-7
4'-10 3/4" MAX
4'-10" MIN
6" TYP
SIDE PERIMETER BLOCK, DETAIL 14 C-2
SCALE: 3/4"=1'-0"
(10 TOTAL)
1'-9 1/2" TYP
PRECAST CONC
LIFTING INSERT 4 PLCS 25 C-7
6"
1'-3"
2'-5 1/2" MAX
2'-5 1/4" MIN
2'-10 1/16" MAX
2'-9 13/16" MIN
1'-5" MAX, TYP
1'-4 7/8" MIN, TYP
5'-8 1/16" MAX
5'-7 9/16" MIN
END PERIMETER BLOCK, DETAIL 15 C-2
SCALE: 3/4"=1'-0"
(5 TOTAL)
TOP SECTION, PRECAST CONC MANHOLE RISER SECTION 48" ID (58" OD) x 10'-0" LONG TONGUE AND GROOVE
APPROX. LOCATION FOR DOUBLE SWIVEL LIFTING PLATES FOR LIFTING AND HAULING 2 PLCS ON EA MANHOLE SECTION
1'-0"
2" COVER
MANHOLE BASE SECTION WALL
12" DOWEL PINS SPACE AT 30 DEG.
3 1/2"
3"
BASE
SECTION H C-2
SCALE: 3/4"=1'-0"
8'-1 13/16", 6 PROVIDED
1'-0" TYP
6" TYP
1'-0"
PRECAST CONC
LIFTING INSERT 2 PLCS 25 C-7
END WALL SECTION, DETAIL 16 C-2
SCALE: 3/4"=1'-0"
(6 TOTAL)
#4 REBAR AT 9" OC MAX ALL 3 DIRECTIONS THROUGHOUT
6'-0"
SECTION K
SCALE: 3/4"=1'-0"
2 MATS #4 REBAR AT 9" OC, EW
6'-0"
SECTION J
SCALE: 3/4"=1'-0"
DESCRIPTION
CHK'D BY
APPV BY
DATE
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 2/05/08
JOB NUMBER 1488-220
DESIGNED BY: PM
DRAWN BY: PM
CHECKED BY: DLM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH LLW DISPOSAL FACILITY
MFC/ATR METALS CASK VAULT
CONSTRUCTION DETAILS
NORTH WIND DRAWING NO. NW07-038
SHEET NO. C-5
REV. 0
PROFESSIONAL ENGINEER
REGISTERED
7065
4/9/2010
STATE OF IDAHO
GARY D. MECHAM


1/2 END PERIMETER BLOCK, DETAIL 17 C-3
SCALE: 1/2"=1'-0"
SECOND BLOCK IS A MIRROR IMAGE OF THE ONE SHOWN ABOVE
(2 TOTAL)
1'-0" TYP
6"
1'-10 3/8"
1'-0" MAX
11 3/4" MIN
3'-5 1/4"
2'-5 1/4" MAX
2'-5 1/8" MIN
4'-2 3/4" MAX
4'-2 1/2" MIN
LIFTING INSERT, 3 PLCS 25 C-7
PRECAST CONCRETE
#4 REBAR AT 4" OC, EW, EACH MAT ROTATED 60° TO MATCH HEXAGONAL SHAPE OF PLUG
9'-9 1/4"
2"
2'-3" TYP
4'-6" MAX
4'-5 1/2" MIN
FORMED TO FIT GROOVE PORTION OF TYP MANHOLE SECTION PER ASTM C478
SECTION L C-3
SCALE: 1/2"=1'-0"
SIDE PERIMETER BLOCK, DETAIL 18 C-3
SCALE: 1/2"=1'-0"
(30 TOTAL)
4'-2 3/4" ±
1'-0" MAX
11 3/4" MIN
3'-5 1/4"
10" MIN
LIFTING INSERT 3 PLCS 25 C-7
8" TYP
8'-5 1/2" MAX
8'-4 3/4" MIN
#4 REBAR AT 9" OC MAX ALL 3 DIRECTIONS THROUGHOUT
6'-0"
SECTION N
SCALE: 1/2"=1'-0"
2 MATS #4 REBAR AT 9" OC, EW
SECTION P
SCALE: 1/2"=1'-0"
LIFTING INSERT 4 PLCS 25 C-7
2'-11 1/4" TYP
PRECAST CONC
2'-2 3/4"
12" TYP
4'-2 3/4" MAX
4'-2 1/2" MIN
4'-10 5/8" MAX
4'-10 3/8" MIN
2'-5 1/4" MAX, TYP
2'-5 1/8" MIN, TYP
9'-9 1/4" MAX
9'-8 3/4" MIN
END PERIMETER BLOCK, DETAIL 19 C-3
SCALE: 1/2"=1'-0"
(4 TOTAL)
TOP SECTION, PRECAST CONC MANHOLE RISER SECTION 84" ID (101.5" OD) x 8'-0" LONG TONGUE AND GROOVE
APPROX. LOCATION FOR DOUBLE SWIVEL LIFTING PLATES FOR LIFTING AND HAULING 2 PLCS ON EA MANHOLE SECTION
REINFORCING CAGE, TYP
1'-0"
2" COVER
SECTION M C-3
SCALE: 3/4"=1'-0"
MANHOLE BASE SECTION WALL
12" DOWEL PINS SPACE AT 30 DEG.
3 1/2"
3"
BASE
11'-2 7/8", 6 PROVIDED
1'-0" TYP
6" TYP
1'-0"
PRECAST CONC
LIFTING INSERT 2 PLCS 25 C-7
END WALL SECTION, DETAIL 20 C-3
SCALE: 1/2"=1'-0"
(6 TOTAL)
DESCRIPTION
CHK'D BY
APP'V BY
DATE
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 2/15/08
JOB NUMBER 1488
DESIGNED BY: PSM
DRAWN BY: PSM
CHECKED BY: DLM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.northwind-inc.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH LLW DISPOSAL FACILITY
ATR RESIN CASK VAULT CONSTRUCTION DETAILS
NORTH WIND DRAWING NO. NW07-047
SHEET NO. C-6
REV. 0
PROFESSIONAL ENGINEER
REGISTERED
4/20/08
7065
STATE OF IDAHO
GARY D. MECHAM



1'
3'-6"
3'-6"
1'-4" DIA CONCRETE CORNER BASE
10' MAX
1' DIA CONCRETE BASE
PERIMETER FENCE STANDARD DETAIL
DETAIL 24 G-1
NTS
DAYTON-SUPERIOR T-26 DOUBLE SWIVEL LIFTING PLATE FOR 1 1/4"ø BOLT, SWL = 13,000 LBS
1 1/4"-7NC A307 BOLT, 7 5/8" LG
NOTE
"SWL" INDICATES SAFE WORKING LOAD
DAYTON-SUPERIOR F-59NC COIL INSERT FOR THREADED BOLTS, 304 STAINLESS STEEL, SWL = 12,000 LBS
SYSTEM A TYPICAL LIFTING INSERT DETAIL
DETAIL 25 C-1, C-2, C-4, C-5, C-6
NTS
MEADOW BURKE SC-52 ANCHOR (590050); 12 INCH ANCHOR 12 TON SWL
A VENDOR SUPPLIED RECESS FORMER SHALL BE USED TO FORM THE ACCESS POCKET FOR THE DOGBONE ANCHOR.
NOTE
"SWL" INDICATES SAFE WORKING LOAD
DOGBONE LIFTING INSERT DETAIL
DETAIL 26 C-3
NTS
MEADOW BURKE SC-1 LIFTING BODY (590184); 12-16 TON SWL
NOTE
1. "SWL" INDICATES SAFE WORKING LOAD
2. THE SC-1 LIFTING BODY SHALL BE USED IN COMBINATION WITH THE SC-52 ANCHOR TO LIFT THE ATR ION EXCHANGE RESINS VAULT PLUGS.
DOGBONE LIFTING BODY DETAIL
DETAIL
NTS
PROFESSIONAL ENGINEER
REGISTERED
4/28/08
7065
STATE OF IDAHO
GARY D. MECHAM
REV NUM
DESCRIPTION
CHK'D BY
APP'V BY
DATE
A
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 2/05/08
JOB NUMBER 1488
DESIGNED BY: PSM
DRAWN BY: PSM
CHECKED BY: DLM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH LLW DISPOSAL FACILITY
CONSTRUCTION DETAILS
NORTH WIND DRAWING NO. NW07-039
SHEET NO. C-7
REV. 0



EVAPOTRANSPIRATION COVER
FINAL COVER SYSTEM
SCALE–NTS

NOTES:
1. THE WATER STORAGE LAYER SHALL GENERALLY CONSIST OF A MIX OF SAND, CLAY, AND SILTS THAT WILL MINIMIZE INFILTRATION OF PRECIPITATION TO THE GRAVEL DRAINAGE LAYER.
2. THE COMPACTED CLAY LAYER SHALL HAVE A HYDRAULIC CONDUCTIVITY OF LESS THAN 1.0×10^{-5} cm/sec.
3. THE VEGETATIVE COVER SHALL CONSIST OF AN APPROVED NATIVE SEED MIX.
4. ALL ADJACENT AREAS SHALL BE DRAINED AWAY FROM VAULT ARRAYS.
5. A MINIMUM OF TWO FEET OF PIT RUN GRAVEL SHALL BE PLACED OVER THE VAULTS AFTER VAULTS HAVE BEEN FILLED AND PRIOR TO PLACEMENT OF THE COVER SYSTEM.

PROFESSIONAL ENGINEER REGISTERED 7065 4/9/2010 STATE OF IDAHO GARY D. MECHAM

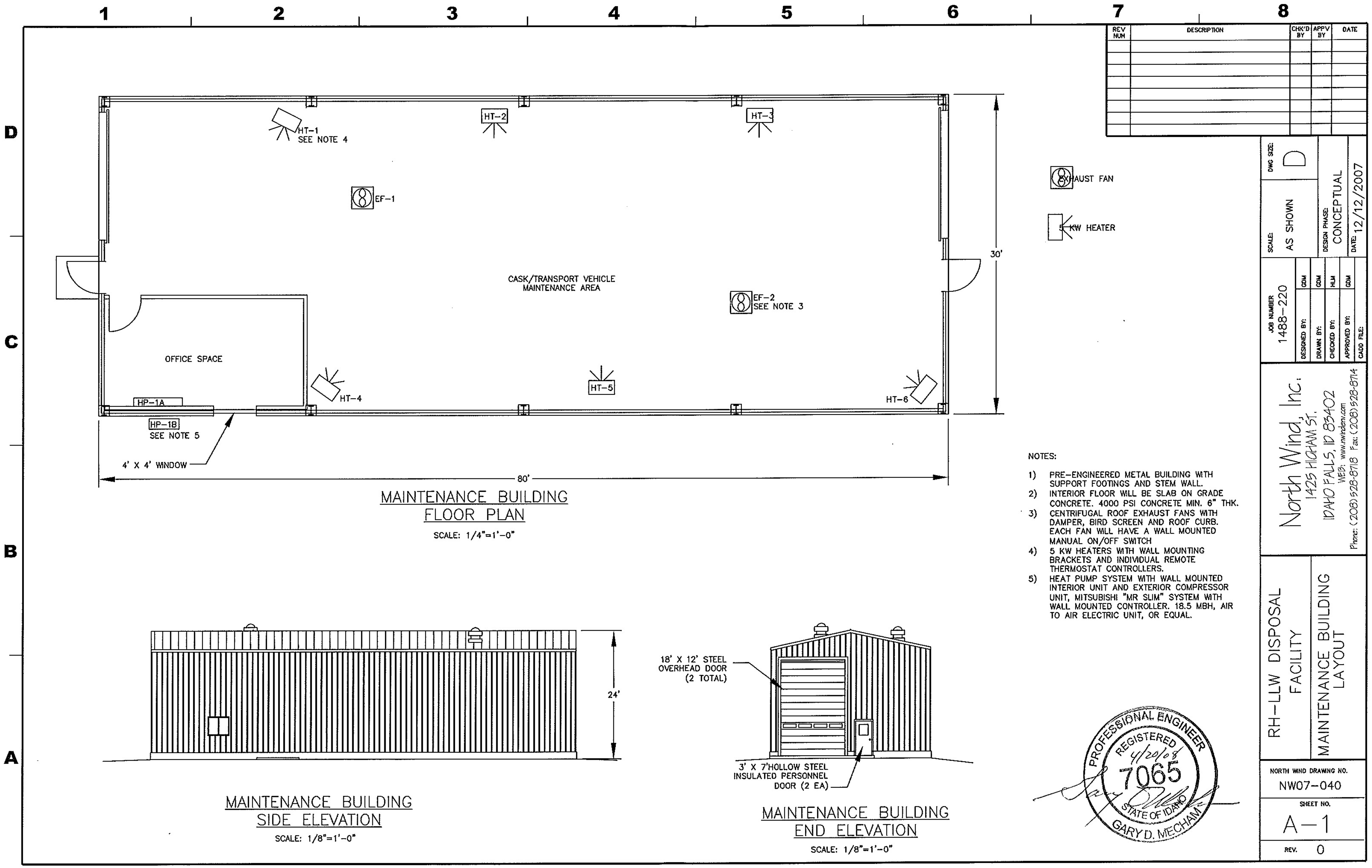
REV NUM	DESCRIPTION	CHK'D BY	APPV BY	DATE

DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 4/8/10
JOB NUMBER 10175.150
DESIGNED BY: PM
DRAWN BY: PM
CHECKED BY: GM
APPROVED BY: GM
CADD FILE:

North Wind, Inc.
1425 Higham Street
Idaho Falls, ID 83402
WEB: www.northwind.com
Phone: (208) 528-8718 Fax: (208) 528-8714

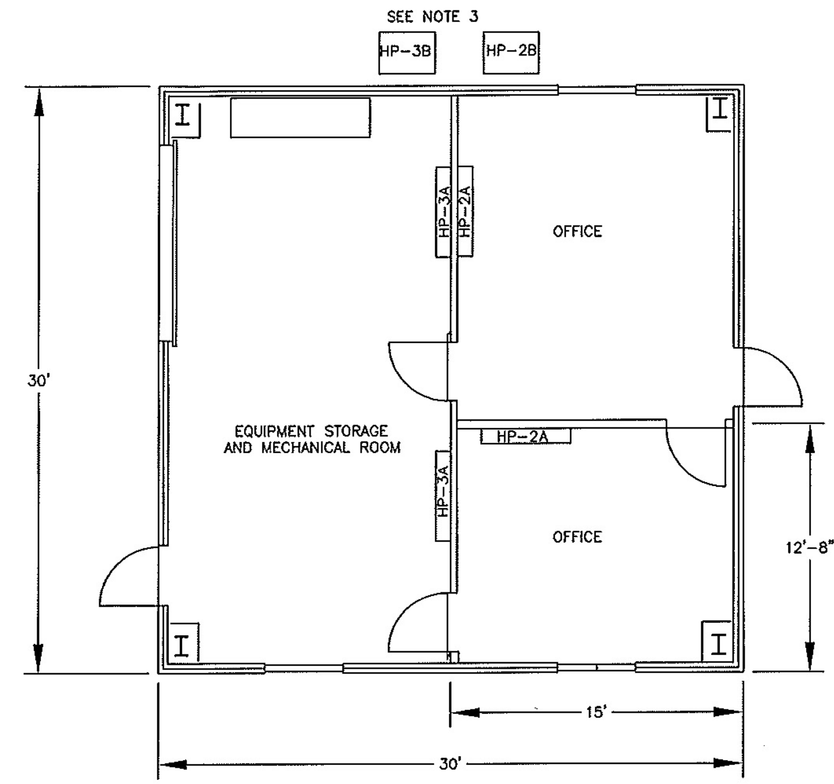
RH–LLW DISPOSAL FACILITY
FINAL EVAPOTRANSPIRATION COVER SYSTEM

NORTH WIND DRAWING NO. NW10-080
SHEET NO. C–8
REV. 0


CASK/TRANSPORT VEHICLE MAINTENANCE AREA
OFFICE SPACE
HT-1 SEE NOTE 4
HT-2
HT-3
HT-4
HT-5
HT-6
EF-1
EF-2 SEE NOTE 3
HP-1A
HP-1B SEE NOTE 5
4' X 4' WINDOW
80'
30'
EXHAUST FAN
5 KW HEATER
MAINTENANCE BUILDING FLOOR PLAN
SCALE: 1/4"=1'-0"
NOTES:
1) PRE-ENGINEERED METAL BUILDING WITH SUPPORT FOOTINGS AND STEM WALL.
2) INTERIOR FLOOR WILL BE SLAB ON GRADE CONCRETE. 4000 PSI CONCRETE MIN. 6" THK.
3) CENTRIFUGAL ROOF EXHAUST FANS WITH DAMPER, BIRD SCREEN AND ROOF CURB. EACH FAN WILL HAVE A WALL MOUNTED MANUAL ON/OFF SWITCH
4) 5 KW HEATERS WITH WALL MOUNTING BRACKETS AND INDIVIDUAL REMOTE THERMOSTAT CONTROLLERS.
5) HEAT PUMP SYSTEM WITH WALL MOUNTED INTERIOR UNIT AND EXTERIOR COMPRESSOR UNIT, MITSUBISHI "MR SLIM" SYSTEM WITH WALL MOUNTED CONTROLLER. 18.5 MBH, AIR TO AIR ELECTRIC UNIT, OR EQUAL.
24'
MAINTENANCE BUILDING SIDE ELEVATION
SCALE: 1/8"=1'-0"
18' X 12' STEEL OVERHEAD DOOR (2 TOTAL)
3' X 7'HOLLOW STEEL INSULATED PERSONNEL DOOR (2 EA)
MAINTENANCE BUILDING END ELEVATION
SCALE: 1/8"=1'-0"
PROFESSIONAL ENGINEER REGISTERED 4/20/08 7065 STATE OF IDAHO GARY D. MECHAM
REV NUM
DESCRIPTION
CHK'D BY
APPV BY
DATE
DWG SIZE: D
SCALE: AS SHOWN
DESIGN PHASE: CONCEPTUAL
DATE: 12/12/2007
JOB NUMBER 1488-220
DESIGNED BY: GDM
DRAWN BY: GDM
CHECKED BY: HLM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH-LLW DISPOSAL FACILITY
MAINTENANCE BUILDING LAYOUT
NORTH WIND DRAWING NO. NW07-040
SHEET NO. A-1
REV. 0

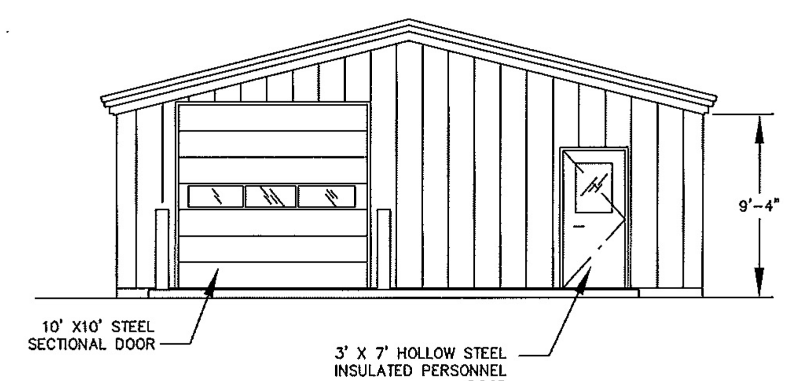
NOTES:

1) PRE-ENGINEERED METAL BUILDING WITH SUPPORT FOOTINGS AND STEM WALL.
2) INTERIOR FLOOR WILL BE SLAB ON GRADE CONCRETE. 4000 PSI CONCRETE MIN. 6" THK.
3) HEAT PUMP SYSTEMS WITH 2 EA. WALL MOUNTED INTERIOR UNITS AND 1 EA. EXTERIOR COMPRESSOR UNIT, MITSUBISHI "MR SLIM" TWO ROOM SYSTEM WITH WALL MOUNTED CONTROLLERS. 25 MBH, AIR TO AIR ELECTRIC UNIT, OR EQUAL.



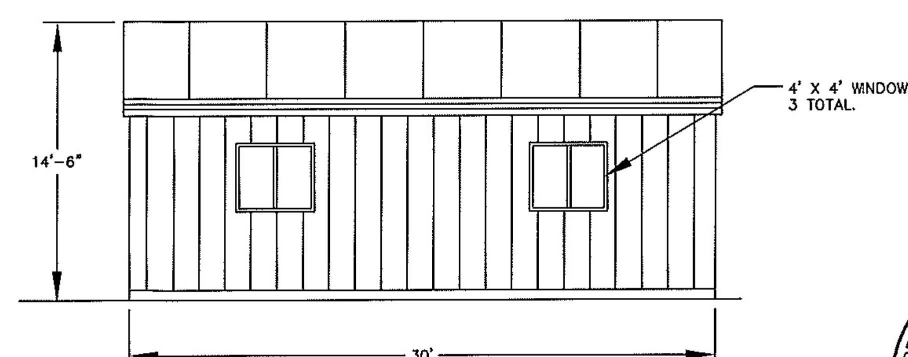
ADMINISTRATION BUILDING FLOOR PLAN

SCALE: 1/4"=1'-0"



ADMINISTRATION BUILDING END ELEVATION

SCALE: 1/4"=1'-0"



ADMINISTRATION BUILDING SIDE ELEVATION

SCALE: 1/4"=1'-0"

PROFESSIONAL ENGINEER REGISTERED 1/20/08 7065 STATE OF IDAHO GARY D. MECHAM

REV NUM	DESCRIPTION	CHK'D BY	APPV BY	DATE

DWG SIZE: D

SCALE: AS SHOWN

DESIGN PHASE: CONCEPTUAL

DATE: 1/25/2008

JOB NUMBER 1488-220

DESIGNED BY: GDM
DRAWN BY: GDM
CHECKED BY: HLM
APPROVED BY: GDM
CADD FILE:

North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714

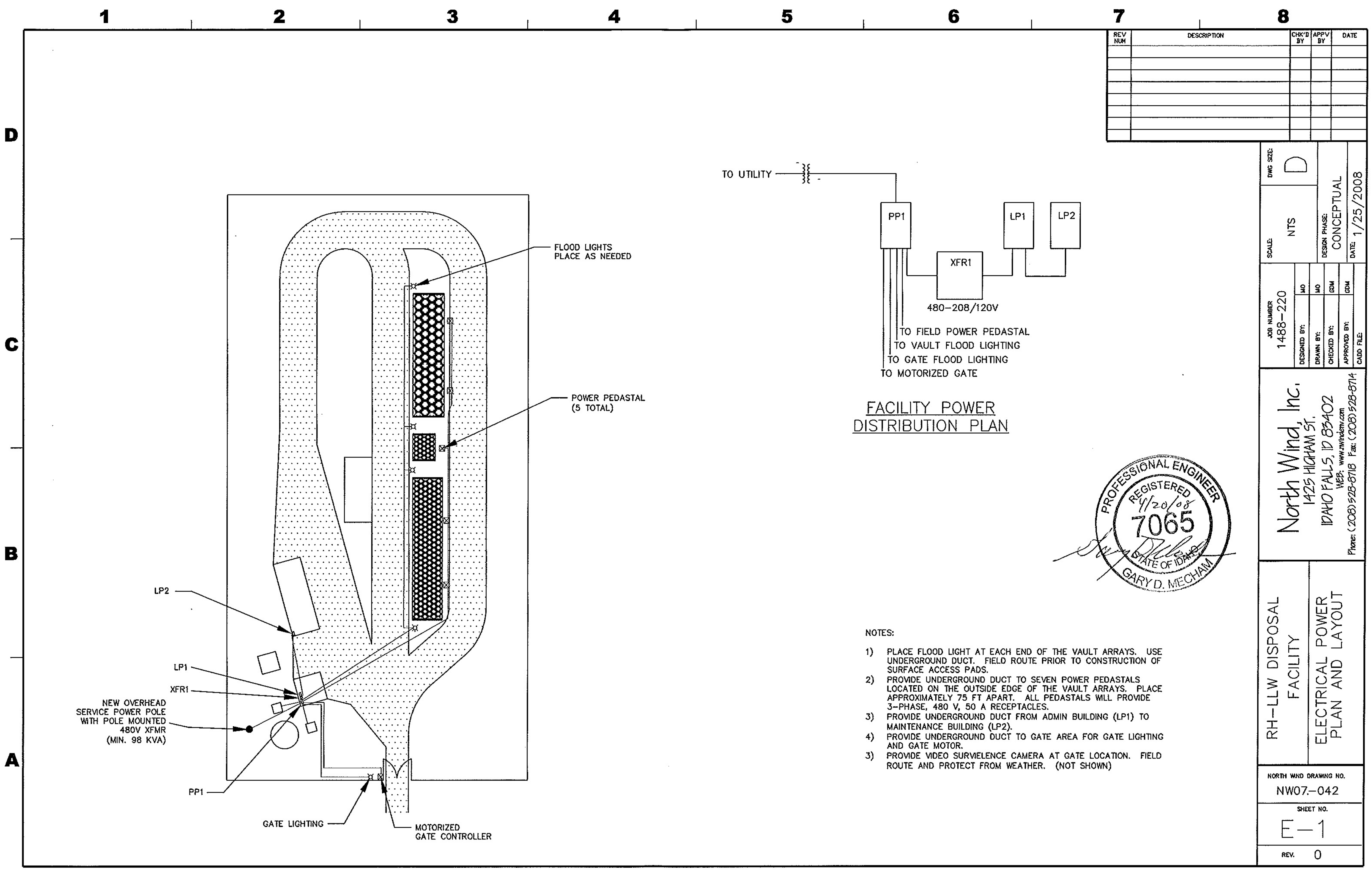
RH-LLW DISPOSAL FACILITY

ADMINISTRATION BUILDING LAYOUT

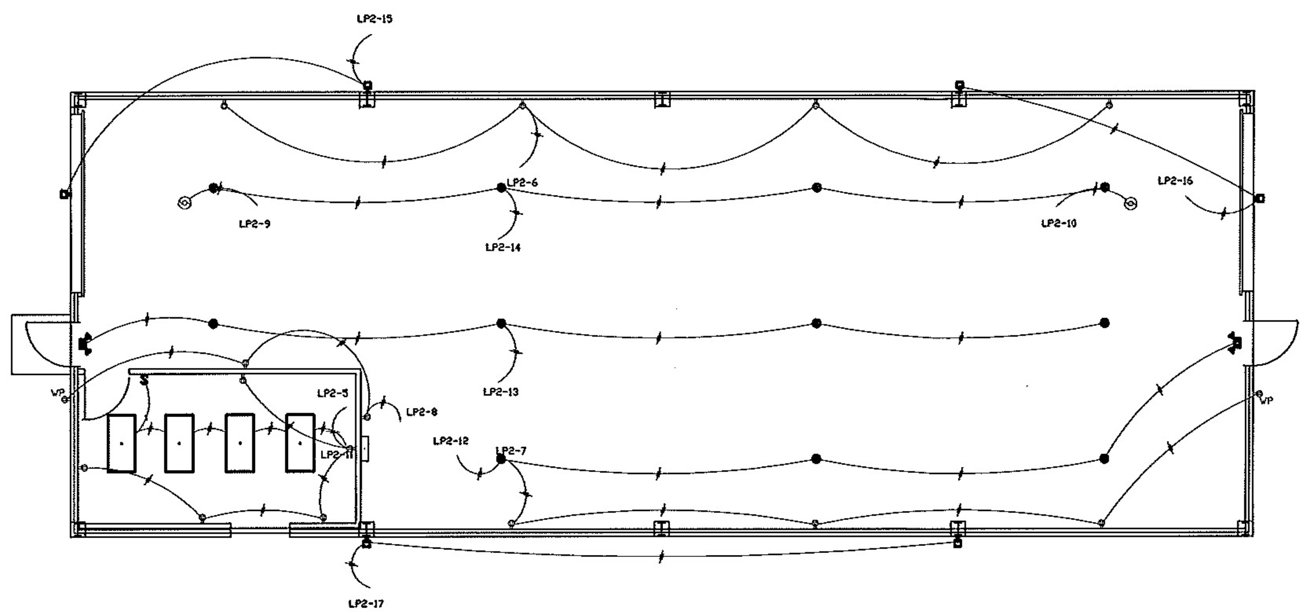
NORTH WIND DRAWING NO. NW07-041

SHEET NO. A-2

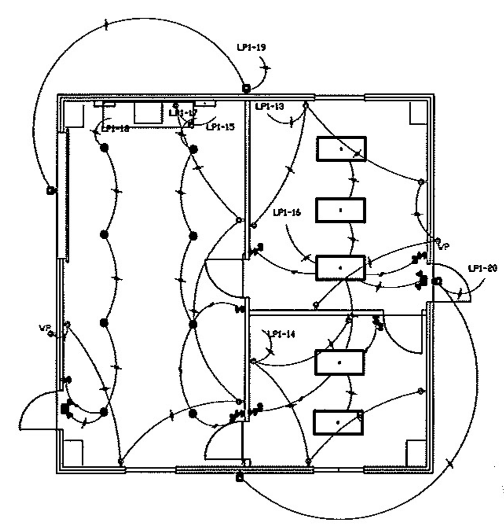
REV. 0


1
2
3
4
5
6
7
8
D
C
B
A
REV NUM
DESCRIPTION
CHK'D BY
APPV BY
DATE
FLOOD LIGHTS
PLACE AS NEEDED
POWER PEDASTAL
(5 TOTAL)
LP2
LP1
XFR1
NEW OVERHEAD
SERVICE POWER POLE
WITH POLE MOUNTED
480V XFMR
(MIN. 98 KVA)
PP1
GATE LIGHTING
MOTORIZED
GATE CONTROLLER
TO UTILITY
PP1
LP1
LP2
XFR1
480-208/120V
TO FIELD POWER PEDASTAL
TO VAULT FLOOD LIGHTING
TO GATE FLOOD LIGHTING
TO MOTORIZED GATE
FACILITY POWER
DISTRIBUTION PLAN
PROFESSIONAL ENGINEER
REGISTERED
4/20/08
7065
STATE OF IDAHO
GARY D. MECHAM
NOTES:
1) PLACE FLOOD LIGHT AT EACH END OF THE VAULT ARRAYS. USE UNDERGROUND DUCT. FIELD ROUTE PRIOR TO CONSTRUCTION OF SURFACE ACCESS PADS.
2) PROVIDE UNDERGROUND DUCT TO SEVEN POWER PEDASTALS LOCATED ON THE OUTSIDE EDGE OF THE VAULT ARRAYS. PLACE APPROXIMATELY 75 FT APART. ALL PEDASTALS WILL PROVIDE 3-PHASE, 480 V, 50 A RECEPTACLES.
3) PROVIDE UNDERGROUND DUCT FROM ADMIN BUILDING (LP1) TO MAINTENANCE BUILDING (LP2).
4) PROVIDE UNDERGROUND DUCT TO GATE AREA FOR GATE LIGHTING AND GATE MOTOR.
3) PROVIDE VIDEO SURVIELENCE CAMERA AT GATE LOCATION. FIELD ROUTE AND PROTECT FROM WEATHER. (NOT SHOWN)
DWG SIZE: D
SCALE: NTS
DESIGN PHASE: CONCEPTUAL
DATE: 1/25/2008
JOB NUMBER 1488-220
DESIGNED BY: MO
DRAWN BY: MO
CHECKED BY: GDM
APPROVED BY: GDM
CADD FILE:
North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714
RH-LLW DISPOSAL FACILITY
ELECTRICAL POWER PLAN AND LAYOUT
NORTH WIND DRAWING NO.
NW07.-042
SHEET NO.
E-1
REV. 0

REV NUM	DESCRIPTION	CHK'D BY	APPV BY	DATE



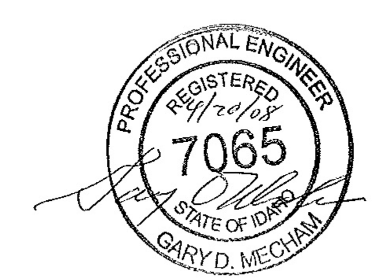
MAINTENANCE BUILDING
LIGHTING/RECEPTACLE PLAN



ADMINISTRATION BUILDING
LIGHTING/RECEPTACLE PLAN

NOTES:

1) HIGH INTENSITY DISCHARGE METAL HALIDE LIGHTS WILL BE USED FOR THE MAINTENANCE AREAS AND EQUIPMENT STORAGE AREAS.
2) ALL OFFICE SPACE LIGHTING WILL BE PROVIDED USING 2'X4' FLOURESCENT LIGHT FIXTURES.



DWG SIZE: D
SCALE: NTS
DESIGN PHASE: CONCEPTUAL
DATE: 1/25/2008
JOB NUMBER 1488-220
DESIGNED BY: MO
DRAWN BY: MO
CHECKED BY: GDM
APPROVED BY: GDM
CADD FILE:

North Wind, Inc.
1425 HIGHAM ST.
IDAHO FALLS, ID 83402
WEB: www.nwindenv.com
Phone: (208) 528-8718 Fax: (208) 528-8714

RH-LLW DISPOSAL FACILITY
LIGHTING PLAN

NORTH WIND DRAWING NO. NW07-043
SHEET NO. E-2
REV. 0

BUS: 277/480, 3PH, 4W	PP-1 PANEL SCHEDULE	MOUNTING:
MAIN: 200 BKR 200		CONDUIT:
MFG:		SUPPLY:
		FEEDER:

CKT	CIRCUIT	A	B	C	CB SIZE	CB SIZE	A	B	C	CIRCUIT	CKT
01		23000					6667			FIELD POWER PEDASTAL	02
03	XFR-1, 50 KVA		23000		150	50		6667		RECEPTACLE	04
05				23000					6667		06
07		1667				30	2000			VAULT LIGHTING	08
09	MOTORIZED GATE		1667		20	30		2000		GATE LIGHTING	10
11				1667							12
13											14
15											16
17											18
19											20
21											22
23											24
25											26
27											28
29											30
31											32
33											34
35											36
37											38
39											40
41											42
					CONNECTED LOAD		33.33	33.33	31.33	98.002 TOTAL KVA	
					AMPS PER PHASE		120.34	120.34	113.12		

FAULT CURRENT (KAIC):
BOX DIMENSIONS:

BUS: 120/208, 3PH, 4W	LP-1 PANEL SCHEDULE	MOUNTING:
MAIN: 200 BKR 200		CONDUIT:
MFG:		SUPPLY:
		FEEDER:

CKT	CIRCUIT	A	B	C	CB SIZE	CB SIZE	A	B	C	CIRCUIT	CKT
01	HP-2A-1	1555			20	20	1555			HP-2A-2	02
03			1555					1555			04
05	HP-2B-1A			1255	15	15			1255	HP-2B-2A	06
07		1255					1255				08
09	HP-2B-1B		1255		15	15		1255		HP-2B-2B	10
11				1255					1255		12
13	N OFFICE RECEPTS	900			20	20	720			S OFFICE RECEPTS	14
15	STORAGE RECEPTS		1080		20	20		350		OFFICE LIGHTS	16
17	E STORAGE LIGHTS			1600	20	20			1600	W STORAGE LIGHTS	18
19	NW EXTERIOR LIGHTS	800			20	20	800			SE EXTERIOR LIGHTS	20
21			15410								22
23	LP-2			14030	100						24
25		14900									26
27											28
29											30
31											32
33											34
35											36
37											38
39											40
41											42
					CONNECTED LOAD		23.74	22.46	22.25	68.45 TOTAL KVA	
					AMPS PER PHASE		85.70	81.08	80.32		

FAULT CURRENT (KAIC):
BOX DIMENSIONS:

BUS: 120/208, 3PH, 4W	LP-2 PANEL SCHEDULE	MOUNTING:
MAIN: 100 BKR 100		CONDUIT:
MFG:		SUPPLY:
		FEEDER:

CKT	CIRCUIT	A	B	C	CB SIZE	CB SIZE	A	B	C	CIRCUIT	CKT
01	HP-1A	1555			20	15	1255			HP-1B	02
03			1555					1255			04
05	OFFICE RECEPTS			900	20	20			720	N WALL RECEPTS	06
07	S WALL RECEPTS	720			20	20	540			EXT. OFFICE RECEPTS	08
09	W OH DOOR MOTOR		500		20	20		500		E OH DOOR MOTOR	10
11	OFFICE LIGHTS			280	20	20			1200	S BAY LIGHTS	12
13	CENTER BAY LIGHTS	1600			20	20	1600			N BAY LIGHTS	14
15	NW EXTERIOR LIGHTS		800		20	20		800		NE EXTERIOR LIGHTS	16
17	S EXTERIOR LIGHTS			800	20	20			125	EF-1	18
19	EF-2	125			20	20				SPARE	20
21	HTR-1		2500					2500		HTR-2	22
23				2500					2500		24
25	HTR-3	2500					2500			HTR-4	26
27			2500					2500			28
29	HTR-5			2500					2500	HTR-6	30
31		2500									32
33											34
35											36
37											38
39											40
41											42
					CONNECTED LOAD		14.90	15.41	14.03	44.33 TOTAL KVA	
					AMPS PER PHASE		53.77	55.63	50.63		

FAULT CURRENT (KAIC):
BOX DIMENSIONS:

REV NUM	DESCRIPTION	CHK'D BY	APPV BY	DATE

PROFESSIONAL ENGINEER
REGISTERED
4/20/08
7065
STATE OF IDAHO
GARY D. MECHAM

North Wind, Inc.
1425 Higham St.
Idaho Falls, ID 83402
Web: www.northwind...com
Phone: (208) 528-8718 Fax: (208) 528-8714

JOB NUMBER: 1488-220
DESIGNED BY: MO
DRAWN BY: MO
CHECKED BY: GDM
APPROVED BY: GDM
CADD FILE:
SCALE: 1"=120'
DWG SIZE: D
DESIGN PHASE: CONCEPTUAL
DATE: 1/25/2008

RH-LLW DISPOSAL FACILITY

PANEL SCHEDULES

NORTH WIND DRAWING NO. NW07-044
SHEET NO. E-3
REV. 0

Appendix B

Sustainability Design Report

Appendix B

Sustainability Design Report

The project was evaluated against the High Performance Sustainable Building (HPSB) principles outlined in DOE G 413.3-6, “High Performance Sustainable Building.” The majority of the proposed project facility costs are associated with the design and construction of the remote-handled LLW disposal vaults, which due to the function and purpose of these structures would not be susceptible to incorporation of the HPSB principles. The portion of the project in which the HPSB principles would apply is related to the design and construction of the administrative building and the maintenance building.

The HPSB principles address goals and configuration elements from the following five areas:

1. Employ integrated design principles
2. Optimize energy performance
3. Protect and conserve water
4. Enhance indoor environmental quality
5. Reduce environmental impact of construction materials.

The associated project buildings are envisioned to be relatively simple pre-engineered metal buildings that will be used on a periodic basis to support the waste liner disposal operations. The administrative building is estimated to have a footprint of approximately 900 ft^2 (84 m^2) and be used for a small administrative office and small equipment and records storage. The actual occupancy level for this building is expected to be very low. The maintenance building is estimated to be approximately 1,800 ft^2 (167 m^2) and will be used primarily as an equipment storage area.

To address the HPSB principles an initial review of the LEED rating system was completed. As stated in the HPSB guidance, the LEED rating system can be used to evaluate conformance with the HPSB principles. The results are shown in the attached LEED NC Checklist. Because of the low occupancy rates, small building area to project area ratio, and the probable facility location being away from urban or populated areas, it is not likely that the project buildings will be able to obtain a certification level per the LEED requirements. However, this evaluation does identify the HPSB and LEED criteria that most likely can be incorporated into the building designs in order to construct practical, energy efficient, and high performing sustainable buildings as appropriate for this project. Details on how the applicable LEED criteria would be incorporated into the building design will be evaluated and incorporated into the final design phase of the project.

LEED 2009 for New Construction and Major Renovation

Project Checklist

INL RH-LLW Disposal Facility

#######

Sustainable Sites — Possible Points: 26

Y	N	?			
6				**Sustainable Sites**	**Possible Points: 26**
Y			Prereq 1	Construction Activity Pollution Prevention	
		x	Credit 1	Site Selection	1
	x		Credit 2	Development Density and Community Connectivity	5
	x		Credit 3	Brownfield Redevelopment	1
	x		Credit 4.1	Alternative Transportation—Public Transportation Access	6
	x		Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
		x	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
	x		Credit 4.4	Alternative Transportation—Parking Capacity	2
1			Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
	x		Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
1			Credit 8	Light Pollution Reduction	1

Water Efficiency — Possible Points: 10

Y	N	?			
4				**Water Efficiency**	**Possible Points: 10**
Y			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
	x		Credit 2	Innovative Wastewater Technologies	2
	x		Credit 3	Water Use Reduction	2 to 4

Energy and Atmosphere — Possible Points: 35

Y	N	?			
13				**Energy and Atmosphere**	**Possible Points: 35**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
1			Credit 1	Optimize Energy Performance	1 to 19
7			Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
		x	Credit 4	Enhanced Refrigerant Management	2
3			Credit 5	Measurement and Verification	3
		x	Credit 6	Green Power	2

Materials and Resources — Possible Points: 14

Y	N	?			
3				**Materials and Resources**	**Possible Points: 14**
Y			Prereq 1	Storage and Collection of Recyclables	
	x		Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
	x		Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
		x	Credit 2	Construction Waste Management	1 to 2
1			Credit 3	Materials Reuse	1 to 2

Materials and Resources, Continued

Y	N	?			
1			Credit 4	Recycled Content	1 to 2
1			Credit 5	Regional Materials	1 to 2
	x		Credit 6	Rapidly Renewable Materials	1
		x	Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 15

Y	N	?			
6				**Indoor Environmental Quality**	**Possible Points: 15**
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		x	Credit 1	Outdoor Air Delivery Monitoring	1
		x	Credit 2	Increased Ventilation	1
		x	Credit 3.1	Construction IAQ Management Plan—During Construction	1
		x	Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		x	Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
		x	Credit 6.2	Controllability of Systems—Thermal Comfort	1
		x	Credit 7.1	Thermal Comfort—Design	1
		x	Credit 7.2	Thermal Comfort—Verification	1
		x	Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1

Innovation and Design Process — Possible Points: 6

Y	N	?			
1				**Innovation and Design Process**	**Possible Points: 6**
		x	Credit 1.1	Innovation in Design: Specific Title	1
		x	Credit 1.2	Innovation in Design: Specific Title	1
		x	Credit 1.3	Innovation in Design: Specific Title	1
		x	Credit 1.4	Innovation in Design: Specific Title	1
		x	Credit 1.5	Innovation in Design: Specific Title	1
1			Credit 2	LEED Accredited Professional	1

Regional Priority Credits — Possible Points: 4

Y	N	?			
				Regional Priority Credits	**Possible Points: 4**
		x	Credit 1.1	Regional Priority: Specific Credit	1
		x	Credit 1.2	Regional Priority: Specific Credit	1
		x	Credit 1.3	Regional Priority: Specific Credit	1
		x	Credit 1.4	Regional Priority: Specific Credit	1

Total — Possible Points: 110

Y	N	?		
33			**Total**	**Possible Points: 110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

Appendix C

Cost Estimate Data

TEC Summary Report

Project Name: *Remote Handled Low Level Waste Disposal Project Documentation, Construction, and Start-Up*
Project Location: *INL*
Project Number: *9A28-G3*

ESTIMATE ELEMENT	Estimate Subtotal	Escalation & Inflation *11.86%*	Management Reserve *26.67%*	TOTAL
Total Estimated Cost (TEC)	$44,142,665	$5,236,043	$13,169,176	$62,547,885

		11.86%	*26.67%*	
Total Estimated Cost (TEC)	**$44,142,665**	**$5,236,043**	**$13,169,176**	**$62,547,885**
Rounded TEC (Rounded to the nearest $ 1000)				**$62,548,000**

	Remarks
Type of Estimate: Class 4	BEA Approved Cost/Schedule Data
Estimator: R. R. Honsinger, R. L. Coumerilh	
Checked By:	
Approved By:	

BEA

09/21/2010 16:00:21

Idaho National Laboratory

Cost Estimating

Page No. 1

Project Summary Report

Project Name: *Remote Handled Low Level Waste Disposal Project Documentation, Construction, and Start-Up*
Project Location: *INL*
Estimate Number: *9A28-G3*

Client: *D. S. Duncan*
Prepared By: *R. R. Honsinger, R. L. Coumerilh*
Estimate Type: *Class 4*

Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1	Critical Decision 0/1	$1,156,661	$1,283	$30,089	2.60%	$1,188,033
1.030	.... CD-1 Approval Support FY 2009	$76,914	$0	$0	0.00%	$76,914
1.040	.... CD-1 Development and Approval Support FY 2009, FY 2010 and FY 2011	$1,079,747	$1,283	$30,089	2.78%	$1,111,119
1.040.010	.... CD-1 Development and Approval Support FY 2010	$819,844	$0	$0	0.00%	$819,844
1.040.020	.... Develop Preliminary Performance Specification FY 2010	$70,683	$0	$7,068	10.00%	$77,752
1.040.030	.... Independent Design Validation FY 2010	$98,000	$0	$9,800	10.00%	$107,800
1.040.040	.... Develop/Submit Exemption Request to OECM FY 2011	$49,362	$1,283	$5,065	10.00%	$55,710
1.040.050	.... Conceptual Safety Design Report FY 2010	$39,702	$0	$7,940	20.00%	$47,642
1.040.060	.... Procurement Costs for Subcontractor Services FY 2010	$2,156	$0	$216	10.00%	$2,372
2	Critical Decision 2/3A	$6,071,000	$162,177	$1,075,109	17.25%	$7,308,286
2.010	.... Environmental Impact Assessment FY 20010 and FY 2011	$478,284	$6,218	$48,450	10.00%	$532,952
2.010.005	.... Environmental Impact Assessment FY 2010	$239,142	$0	$23,914	10.00%	$263,056
2.010.010	.... Environmental Impact Assessment FY 2011	$239,142	$6,218	$24,536	10.00%	$269,896
2.020	.... National Environmental Policy Act (NEPA) FY 2010 and FY2011	$163,359	$4,247	$30,169	18.00%	$197,775
2.020.010	.... Prepare Draft Environmental Assessment FY 2011	$90,032	$2,341	$16,627	18.00%	$109,000
2.020.020	.... Support EA Public Participation FY 2011	$22,783	$592	$4,208	18.00%	$27,583
2.020.030	.... Prepare Final Environmental Assessment FY 2011	$10,269	$267	$1,896	18.00%	$12,432
2.020.040	.... DOE Review/Comment Incorporation for Draft EA FY 2011	$40,276	$1,047	$7,438	18.00%	$48,761
2.030	.... Develop Preliminary Documentation Safety Analysis FY 2010 and FY 2012	$634,407	$11,742	$99,139	15.34%	$745,289
2.030.010	.... Develop Final Hazard Analysis FY 2010	$78,895	$0	$11,045	14.00%	$89,940
2.030.020	.... Prepare Draft PSDR FY 2010	$182,382	$0	$25,534	14.00%	$207,916
2.030.030	.... Review and Issue PSDR FY 2010	$62,180	$0	$8,705	14.00%	$70,886
2.030.040	.... Prepare Draft PDSA FY 2012	$171,198	$8,663	$25,181	14.00%	$205,042
2.030.050	.... Review and Issue PDSA FY 2012	$60,856	$3,079	$8,951	14.00%	$72,887

Project Summary Report

Project Name: *Remote Handled Low Level Waste Disposal Project Documentation, Construction, and Start-Up*
Project Location: *INL*
Estimate Number: *9A28-G3*

Client: *D. S. Duncan*
Prepared By: *R. R. Honsinger, R. L. Coumerilh*
Estimate Type: *Class 4*

Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
2.030.060	.... Preliminary Conceptual Safety Design Report FY 2010	$78,895	$0	$19,724	25.00%	$98,619
2.040	.... Develop Preliminary Security Vulnerability Assessment Report FY 2010	$159,892	$0	$19,187	12.00%	$179,079
2.040.010	.... Compile Accountability Information FY 2010	$30,347	$0	$3,642	12.00%	$33,989
2.040.020	.... Prepare Assessment Report FY 2010	$37,069	$0	$4,448	12.00%	$41,518
2.040.030	.... Review Assessment Report FY 2010	$10,648	$0	$1,278	12.00%	$11,926
2.040.040	.... Prepare Final Security Vulnerability Assessment Report FY 2010	$81,827	$0	$9,819	12.00%	$91,647
2.050	.... Update CD-1 Project Documentation FY 2011	$135,535	$3,524	$19,468	14.00%	$158,527
2.060	.... Develop Performance Specification	$641,352	$16,675	$138,186	21.00%	$796,213
2.060.010	.... Develop Performance Specification FY 2011	$141,366	$3,676	$30,459	21.00%	$175,501
2.060.020	.... Liner Alternative Research	$499,986	$13,000	$107,727	21.00%	$620,712
2.060.020.010	.... Selection of Candidate Liner FY 2011	$499,986	$13,000	$107,727	21.00%	$620,712
2.070	.... Develop RFP, SOW, List of Bidders, Etc FY 2011	$64,726	$1,683	$14,610	22.00%	$81,019
2.080	.... Performance Baseline Validation Independent Project Review FY 2011	$145,747	$3,789	$41,870	28.00%	$191,406
2.080.010	.... Performance Baseline Validation Independent Project Review FY 2011	$70,373	$1,830	$18,051	25.00%	$90,254
2.080.020	.... Travel to Washington DC FY 2011	$5,000	$130	$1,436	28.00%	$6,566
2.080.030	.... Performance Baseline Validation Independent Project Review FY 2011	$70,373	$1,830	$22,383	31.00%	$94,586
2.090	.... CD-2/3A Project Management	$1,040,238	$24,796	$253,294	23.78%	$1,318,328
2.090.010	.... CD-2/3A Project Management FY 2010	$182,739	$0	$29,238	16.00%	$211,977
2.090.020	.... CD-2/3A Project Management FY 2011	$755,821	$19,651	$201,623	26.00%	$977,095
2.090.030	.... CD-2/3A Project Management FY 2012	$101,678	$5,145	$22,433	21.00%	$129,255
2.100	.... DOE Order 435.1 Documentation FY 2010	$636,931	$0	$89,170	14.00%	$726,102
2.100.010	.... Subcontractor Develop Draft DOE 435.1 Documentation FY 2010	$429,690	$0	$60,157	14.00%	$489,847

Project Summary Report

Project Name: *Remote Handled Low Level Waste Disposal Project Documentation, Construction, and Start-Up*
Project Location: *INL*
Estimate Number: *9A28-G3*

Client: *D. S. Duncan*
Prepared By: *R. R. Honsinger, R. L. Coumerilh*
Estimate Type: *Class 4*

Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
2.100.020	........Procurement Costs for Subcontractor Services FY 2010	$9,453	$0	$1,323	14.00%	$10,777
2.100.030	........INL Technical Input to DOE 435.1 Documentation FY 2010	$196,688	$0	$27,536	14.00%	$224,224
2.100.040	........Procurement Costs for Subcontractor Services FY 2010	$1,100	$0	$154	14.00%	$1,254
2.110	....DOE Order 435.1 Documentation FY 2011	$1,863,314	$36,936	$291,207	15.32%	$2,191,457
2.110.010	........INL Technical Input to DOE 435.1 Documentation FY 2011	$688,619	$17,904	$98,913	14.00%	$805,436
2.110.020	........INL Technical Review Draft FY 2011	$39,009	$1,014	$5,603	14.00%	$45,626
2.110.030	........INL/DOE Technical Review Draft Final FY 2011	$39,009	$1,014	$5,603	14.00%	$45,626
2.110.040	........Subcontractor Develop Draft DOE 435.1 Documentation FY 2010	$600,000	$0	$84,000	14.00%	$684,000
2.110.050	........Procurement Costs for Subcontractor Services FY 2010	$10,250	$0	$1,435	14.00%	$11,685
2.110.080	........Support DOE Headquarters LFRG Review of DOE 435.1 Documentation FY 2011	$309,347	$8,043	$60,304	19.00%	$377,694
2.110.110	........Travel to Washington DC FY 2012	$15,000	$759	$2,994	19.00%	$18,753
2.110.120	........BEA Support Comment Resolution FY 2012	$162,081	$8,201	$32,354	19.00%	$202,636
2.120	....DOE Order 435.1 Documentation FY 2012	$107,214	$52,567	$30,358	19.00%	$190,139
2.120.010	........Update DOE ORDER 435.1 Documents FY 2012	$107,214	$52,567	$30,358	19.00%	$190,139
3	Critical Decision 3A Continued	$1,114,452	$131,113	$296,337	23.79%	$1,541,902
3.010	....Update Project Documentation FY 2014	$122,355	$13,496	$21,736	16.00%	$157,586
3.020	....Issue Design-Build Procurement Request for Proposal (RFP) FY 2014	$30,097	$3,320	$6,683	20.00%	$40,100
3.030	....Evaluate and Award Design-Build Contract FY 2014	$52,804	$5,824	$7,035	12.00%	$65,664
3.040	....Support Subcontract Final Design FY 2014	$153,606	$16,943	$37,521	22.00%	$208,069
3.040.010	........Meetings BEA Input, Etc. FY 2014	$53,749	$5,929	$13,129	22.00%	$72,807
3.040.020	........Review Title II /Final Design FY 2014	$39,727	$4,382	$9,704	22.00%	$53,813
3.040.030	........Support Comment Resolution and Final Design FY 2014	$20,043	$2,211	$4,896	22.00%	$27,150
3.040.040	........Support Subcontractor Final Design FY 2014	$40,086	$4,421	$9,792	22.00%	$54,299
3.050	....Prepare Required Permits for Construction FY 2014	$53,595	$5,912	$14,282	24.00%	$73,788

Project Summary Report

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Prepared By: *R. R. Honsinger, R. L. Coumerilh*
Estimate Type: *Class 4*

Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
3.060	.... CD-3A Project Management	$438,690	$48,388	$121,769	25.00%	$608,847
3.060.010	.... CD-3A Project Management FY 2014	$438,690	$48,388	$121,769	25.00%	$608,847
3.070	.... Construction Readiness Independent Project Review FY 2015	$103,116	$14,581	$30,630	26.02%	$148,326
3.070.010	.... Support CD-3A Approval FY 2015	$100,616	$14,227	$29,859	26.00%	$144,702
3.070.020	.... Travel to Washington DC FY 2015	$2,500	$354	$770	27.00%	$3,624
3.080	.... MSA FY 2015	$160,191	$22,651	$56,681	31.00%	$239,522
4	Critical Decision 3B	$35,800,552	$4,941,470	$11,767,642	28.88%	$52,509,664
4.010	.... CD-3B Project Management	$1,408,486	$232,161	$428,771	26.13%	$2,069,417
4.010.010	.... CD-3B Project Management FY 2014	$198,355	$21,879	$59,463	27.00%	$279,697
4.010.020	.... CD-3B Project Management FY 2015	$401,710	$56,802	$119,213	26.00%	$577,725
4.010.030	.... CD-3B Project Management FY 2016	$401,710	$69,616	$122,545	26.00%	$593,872
4.010.040	.... CD-3B Project Management FY 2017	$406,710	$83,864	$127,549	26.00%	$618,123
4.020	.... Develop Final Documentation Safety Analysis FY 2014 and FY 2015	$1,491,623	$168,852	$505,221	30.43%	$2,165,696
4.020.010	.... Prepare Final DSA and Submit DSA for NE-ID Review FY 2014	$1,352,515	$149,182	$465,526	31.00%	$1,967,224
4.020.020	.... DSA NE-ID Review and Comment Resolution FY 2015	$139,108	$19,670	$39,694	25.00%	$198,472
4.030	.... Design/Build Final Design FY 2014	$1,231,266	$135,809	$328,098	24.00%	$1,695,172
4.030.010	.... Final Design-Staging, Road Improvement, Facility Upgrade	$1,231,266	$135,809	$328,098	24.00%	$1,695,172
4.030.010.010	.... Final Engineering and Design	$492,740	$54,349	$131,301	24.00%	$678,391
4.030.010.020	.... Final Design Cost Estimating	$24,782	$2,733	$6,604	24.00%	$34,119
4.030.010.030	.... Design Review	$88,294	$9,739	$23,528	24.00%	$121,561
4.030.010.040	.... Issue Drawings and Specifications	$29,057	$3,205	$7,743	24.00%	$40,004
4.030.010.050	.... Prepare Eng. Evaluation IAW LWP-10400	$39,604	$4,368	$10,553	24.00%	$54,526
4.030.010.060	.... Review Eng. Evaluation	$8,052	$888	$2,146	24.00%	$11,086
4.030.010.070	.... Approve Eng. Evaluation	$3,964	$437	$1,056	24.00%	$5,458

Project Summary Report

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Prepared By: *R. R. Honsinger, R. L. Coumerilh*
Estimate Type: *Class 4*

Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
4.030.010.080	.... Prepare for Elect. and Mech. Isolations	$46,945	$5,178	$12,510	24.00%	$64,633
4.030.010.080.010	*................ Prepare Electrical and Mechanical Isolations*	*$42,333*	*$4,669*	*$11,281*	*24.00%*	*$58,283*
4.030.010.080.020	*................ Review Electrical and Mechanical Isolations*	*$2,196*	*$242*	*$585*	*24.00%*	*$3,023*
4.030.010.080.030	*................ Approve Electrical and Mechanical Isolations*	*$2,416*	*$266*	*$644*	*24.00%*	*$3,326*
4.030.010.090	.... Seismic Analysis	$107,431	$11,850	$28,627	24.00%	$147,908
4.030.010.100	.... Civil Surveying, Environmental, Geo-technical, Historical Artifacts Surveys	$390,396	$43,061	$104,030	24.00%	$537,486
4.040	.... Construction Management (CM)	$3,660,474	$558,514	$1,307,886	31.00%	$5,526,875
4.040.010	**........ Construction Manager, Construction Engineer, and STR FY 2015**	**$1,074,706**	**$151,963**	**$380,267**	**31.00%**	**$1,606,936**
4.040.020	**........ Construction Manager, Construction Engineer, and STR FY 2016**	**$626,912**	**$108,644**	**$228,022**	**31.00%**	**$963,578**
4.040.030	**........ Safety FY 2015**	**$663,170**	**$93,772**	**$234,652**	**31.00%**	**$991,594**
4.040.040	**........ Safety FY 2016**	**$291,795**	**$50,568**	**$106,132**	**31.00%**	**$448,495**
4.040.050	**........ Subsurface Investigation Team FY 2015**	**$99,951**	**$14,133**	**$35,366**	**31.00%**	**$149,449**
4.040.060	**........ Subsurface Investigation Team FY 2016**	**$33,317**	**$5,774**	**$12,118**	**31.00%**	**$51,209**
4.040.070	**........ Quality Assurance FY 2015**	**$346,922**	**$49,055**	**$122,753**	**31.00%**	**$518,730**
4.040.080	**........ Quality Assurance FY 2016**	**$283,474**	**$49,126**	**$103,106**	**31.00%**	**$435,706**
4.040.090	**........ RadCon Support During Construction FY 2015**	**$192,860**	**$27,270**	**$68,240**	**31.00%**	**$288,371**
4.040.100	**........ RadCon Support During Start-up & Training FY 2016**	**$47,369**	**$8,209**	**$17,229**	**31.00%**	**$72,806**
4.050	.... AE Support and Oversight During Construction FY 2015	$295,017	$41,715	$84,183	25.00%	$420,915
4.060	.... Construction Project Management (PM) FY 2015 and 2016	$831,059	$129,622	$268,814	27.98%	$1,229,495
4.060.010	**........ Construction Project Management (PM) FY 2015**	**$329,775**	**$46,630**	**$105,393**	**28.00%**	**$481,799**
4.060.020	**........ Construction Project Management (PM) FY 2016**	**$266,019**	**$46,101**	**$87,393**	**28.00%**	**$399,513**
4.060.030	**........ Procurement FY 2015**	**$37,000**	**$5,232**	**$11,825**	**28.00%**	**$54,057**
4.060.040	**........ Procurement FY 2016**	**$15,000**	**$2,600**	**$4,752**	**27.00%**	**$22,351**
4.060.050	**........ Planning and Scheduling FY 2015**	**$28,605**	**$4,045**	**$9,142**	**28.00%**	**$41,792**

Project Summary Report

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Project Location: *INL*
Estimate Number: *9A28-G3*

Client: *D. S. Duncan*
Prepared By: *R. R. Honsinger, R. L. Coumerilh*
Estimate Type: *Class 4*

Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
4.060.060	**........ Planning and Scheduling FY 2016**	**$12,586**	**$2,181**	**$4,135**	**28.00%**	**$18,902**
4.060.070	**........ Prepare Construction Permits/Plans FY 2015**	**$56,061**	**$7,927**	**$17,917**	**28.00%**	**$81,905**
4.060.080	**........ Prepare Construction Permits/Plans FY 2016**	**$86,013**	**$14,906**	**$28,257**	**28.00%**	**$129,176**
4.070	**.... Site Training FY 2015**	**$40,074**	**$6,945**	**$12,695**	**27.00%**	**$59,714**
4.080	**.... Construction - Infrastructure**	**$9,676,809**	**$1,067,352**	**$3,532,246**	**32.88%**	**$14,276,408**
4.080.010	**........ Construction - Subcontracted Infrastructure FY 2014**	**$9,676,809**	**$1,067,352**	**$3,532,246**	**32.88%**	**$14,276,408**
4.080.010.010	.... General Conditions	$282,331	$31,141	$97,176	31.00%	$410,648
4.080.010.010.010	*................ General Conditions*	*$246,966*	*$27,240*	*$85,004*	*31.00%*	*$359,210*
4.080.010.010.020	*................ Testing and Inspection*	*$35,365*	*$3,901*	*$12,172*	*31.00%*	*$51,439*
4.080.010.020	.... Sitework	$2,645,272	$291,773	$881,114	30.00%	$3,818,159
4.080.010.020.010	*................ New .66 Mile Long 24 FT Wide Asphalt Road to the RH-LLW Facility*	*$797,543*	*$87,969*	*$265,654*	*30.00%*	*$1,151,166*
4.080.010.020.020	*................ Site Area Excavation 320 FT X 580FT*	*$1,535,000*	*$169,311*	*$511,293*	*30.00%*	*$2,215,604*
4.080.010.020.030	*................ New Precast Concrete Bridge Over Road Culvert Areas*	*$142,545*	*$15,723*	*$47,480*	*30.00%*	*$205,748*
4.080.010.020.040	*................ New Area Fences*	*$170,183*	*$18,771*	*$56,686*	*30.00%*	*$245,641*
4.080.010.030	.... Metal Buildings	$530,533	$58,518	$147,263	25.00%	$736,313
4.080.010.030.010	*................ Maintenance Building*	*$350,533*	*$38,664*	*$97,299*	*25.00%*	*$486,496*
4.080.010.030.020	*................ Office Building*	*$180,000*	*$19,854*	*$49,964*	*25.00%*	*$249,818*
4.080.010.040	.... Concrete	$128,635	$14,188	$32,849	23.00%	$175,673
4.080.010.040.010	*................ Utilities Concrete*	*$128,635*	*$14,188*	*$32,849*	*23.00%*	*$175,673*
4.080.010.050	.... Mechanical	$3,370,380	$371,753	$1,347,168	36.00%	$5,089,301
4.080.010.050.010	*................ Sewer System*	*$383,944*	*$42,349*	*$153,465*	*36.00%*	*$579,758*
4.080.010.050.020	*................ Fire Water System*	*$2,986,436*	*$329,404*	*$1,193,702*	*36.00%*	*$4,509,543*
4.080.010.060	.... Electrical	$2,719,658	$299,978	$1,026,676	34.00%	$4,046,313
4.080.010.060.010	*................ Security and Emergency Systems*	*$830,763*	*$91,633*	*$313,615*	*34.00%*	*$1,236,011*
4.080.010.060.020	*................ Power Line System*	*$118,044*	*$13,020*	*$44,562*	*34.00%*	*$175,625*

Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
4.080.010.060.030	*................ Power Distribution and Telecom Duct Bank and Manhole System*	*$1,557,652*	*$171,809*	*$588,017*	*34.00%*	*$2,317,477*
4.080.010.060.040	*................ Yard Lighting*	*$86,252*	*$9,514*	*$32,560*	*34.00%*	*$128,326*
4.080.010.060.050	*................ Power Distribution to Power Pedestals next to Vault Area*	*$126,948*	*$14,002*	*$47,923*	*34.00%*	*$188,873*
4.090	**.... Construction - Vaults**	**$8,089,485**	**$1,131,460**	**$2,393,315**	**25.96%**	**$11,614,260**
4.090.010	**........ Construction - Subcontracted Vaults FY 2015**	**$8,089,485**	**$1,131,460**	**$2,393,315**	**25.96%**	**$11,614,260**
4.090.010.010	.... General Conditions	$114,166	$16,143	$40,396	31.00%	$170,705
4.090.010.010.010	*................ General Conditions*	*$78,801*	*$11,142*	*$27,882*	*31.00%*	*$117,826*
4.090.010.010.020	*................ Testing and Inspection*	*$35,365*	*$5,001*	*$12,513*	*31.00%*	*$52,879*
4.090.010.020	.... Sitework	$3,192,334	$451,396	$1,093,119	30.00%	$4,736,850
4.090.010.020.010	*................ Vault Area Excavation and Fill*	*$3,192,334*	*$451,396*	*$1,093,119*	*30.00%*	*$4,736,850*
4.090.010.030	.... Concrete	$4,695,341	$663,921	$1,232,630	23.00%	$6,591,892
4.090.010.030.010	*................ Precast Concrete Vaults*	*$2,874,164*	*$406,407*	*$754,531*	*23.00%*	*$4,035,103*
4.090.010.030.020	*................ Precast Vault Perimeter Support Walls*	*$240,404*	*$33,993*	*$63,111*	*23.00%*	*$337,508*
4.090.010.030.030	*................ Deliver Precast Concrete Parts to Site*	*$54,550*	*$7,713*	*$14,321*	*23.00%*	*$76,584*
4.090.010.030.040	*................ Set Precast Vault Concrete Sections*	*$1,526,222*	*$215,808*	*$400,667*	*23.00%*	*$2,142,697*
4.090.010.040	.... Metals	$87,643	$0	$27,169	31.00%	$114,813
4.090.010.040.010	*................ Metals for Concrete Reinforcement*	*$87,643*	*$0*	*$27,169*	*31.00%*	*$114,813*
4.100	**.... 10 CFR 851 Requirements FY 2015**	**$18,126**	**$2,563**	**$6,414**	**31.00%**	**$27,103**
4.110	**.... Subcontractor Design/Build Turnover and Closeout FY 2016**	**$658,396**	**$114,100**	**$186,247**	**24.11%**	**$958,743**
4.110.010	**........ Records Disposition**	**$21,207**	**$3,675**	**$5,972**	**24.00%**	**$30,854**
4.110.020	**........ Material Disposition**	**$5,675**	**$983**	**$1,598**	**24.00%**	**$8,256**
4.110.030	**........ Complete Closeout PM Checklist**	**$17,588**	**$3,048**	**$4,953**	**24.00%**	**$25,589**
4.110.040	**........ Testing and Turnover Planning**	**$111,455**	**$19,315**	**$31,385**	**24.00%**	**$162,154**
4.110.050	**........ S. O. Testing**	**$44,337**	**$7,684**	**$12,485**	**24.00%**	**$64,506**
4.110.060	**........ Turnover Support**	**$72,268**	**$12,524**	**$21,198**	**25.00%**	**$105,990**

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Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
4.110.070	.... Facility Acceptance Review	$31,418	$5,445	$8,847	24.00%	$45,710
4.110.080	.... Turnover Coordination	$19,030	$3,298	$5,359	24.00%	$27,687
4.110.090	.... Spares	$201,400	$34,903	$56,713	24.00%	$293,015
4.110.100	.... Perform Design Verification (As-builts, Operating Procedures, etc.)	$101,698	$17,624	$28,637	24.00%	$147,960
4.110.110	.... Resolve Punchlist Items	$13,997	$2,426	$3,942	24.00%	$20,364
4.110.120	.... Project Turnover Completed Per LWP-7460	$14,473	$2,508	$4,076	24.00%	$21,057
4.110.130	.... Record Deficiency on Form 432.04	$3,850	$667	$1,084	24.00%	$5,601
4.120	.... Relocate NRF Crane, Unloading Station/Vault Fixtures for Cask Handling FY 2016	$887,913	$153,875	$239,611	23.00%	$1,281,399
4.120.005	.... Relocate Crane	$876,992	$151,983	$236,664	23.00%	$1,265,639
4.120.010	.... Procurement	$10,921	$1,893	$2,947	23.00%	$15,760
4.130	.... Purchase Transport Cask with Trailer and a Shielding Bell FY 2015	$3,720,750	$526,114	$1,316,528	31.00%	$5,563,392
4.130.010	.... Purchase Shielding Bell	$434,335	$61,415	$153,682	31.00%	$649,432
4.130.020	.... Purchase Transport Cask for ATR, MFC Waste	$2,809,000	$397,193	$993,920	31.00%	$4,200,112
4.130.030	.... Procurement	$39,555	$5,593	$13,996	31.00%	$59,145
4.130.040	.... BEA Material Handling Fee and G&A	$437,860	$61,913	$154,930	31.00%	$654,703
4.140	.... Install New Monitoring Wells FY 2016	$1,926,576	$333,876	$700,740	31.00%	$2,961,192
4.140.010	.... New Subsurface Shallow Wells	$351,000	$60,828	$127,667	31.00%	$539,495
4.140.020	.... New Subsurface Deep Wells	$762,000	$132,055	$277,157	31.00%	$1,171,212
4.140.030	.... Existing Monitoring Well with new Instruments	$50,000	$8,665	$18,186	31.00%	$76,851
4.140.040	.... New Monitoring Tubes and Instruments under Vault Floor	$184,000	$31,887	$66,925	31.00%	$282,812
4.140.050	.... CWI G&A Fee for Services Sold to BEA ie. Monitoring Wells	$579,576	$100,441	$210,805	31.00%	$890,822
4.150	.... Contractor Operational Readiness Review (CORR) FY 2016	$360,000	$62,388	$92,925	22.00%	$515,313
4.160	.... CD-4 Approve Start of Operations and Post CD-4 Closeout	$1,504,499	$276,124	$363,947	20.44%	$2,144,570

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Estimate Number: *9A28-G3*

Client: *D. S. Duncan*
Prepared By: *R. R. Honsinger, R. L. Coumerilh*
Estimate Type: *Class 4*

Level	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
4.160.010	**........ CD-4 Package Submittal to DOE-ID FY 2017**	**$7,065**	**$1,457**	**$1,704**	**20.00%**	**$10,226**
4.160.020	**........ Operations Procedures**	**$1,050,390**	**$189,110**	**$260,295**	**21.00%**	**$1,499,795**
4.160.020.010	.... Operations Procedures FY 2016	$835,278	$144,754	$205,807	21.00%	$1,185,838
4.160.020.020	.... Operations Procedures FY 2017	$215,113	$44,356	$54,488	21.00%	$313,958
4.160.030	**........ Disposal Operations Training**	**$402,620**	**$76,397**	**$91,013**	**19.00%**	**$570,030**
4.160.030.010	.... Disposal Operations Training FY 2016	$201,310	$34,887	$44,877	19.00%	$281,074
4.160.030.020	.... Disposal Operations Training FY 2017	$201,310	$41,510	$46,136	19.00%	$288,956
4.160.040	**........ Project Completion Report FY 2017**	**$26,341**	**$5,432**	**$6,355**	**20.00%**	**$38,128**
4.160.050	**........ Conduct Lessons Learned Review IAW LWP-13850 FY 2017**	**$18,082**	**$3,729**	**$4,580**	**21.00%**	**$26,391**
Total	Remote Handled Low Level Waste Disposal Project	$44,142,665	$5,236,043	$13,169,176	26.67%	$62,547,885

Summary Report

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project*
Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10
Project Location: *INL*
Project Number: *9A28-H2*

ESTIMATE ELEMENT	Estimate Subtotal	Escalation & Inflation	Management Reserve	TOTAL
		106.34%	*18.58%*	
Total Estimated Cost (TEC)	$4,060,047	$4,317,444	$1,556,736	$9,934,227
		63.15%	*17.09%*	
Other Project Cost (OPC)	$49,241,624	$31,096,215	$13,729,840	$94,067,678
		66.44%	*17.23%*	
Total Cost	**$53,301,671**	**$35,413,658**	**$15,286,576**	**$104,001,905**
Rounded Total Cost (Rounded to the nearest $ 10000)				**$104,000,000**

		Remarks
Type of Estimate:	Class 4	Updated to FY 2010 rates and revised escalation rates.
Estimator:	Baker, Julius, Honsinger	Revised yearly dates of the performance periods.
Checked By:	SNW	
Approved By:	Bruce E. Hallam	

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Idaho National Laboratory

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Project Summary Report

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10*
Project Location: *INL*
Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*
Prepared By: *Baker, Julius, Honsinger*
Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.1		RH OPERATIONS	$49,333,634	$30,974,690	$13,877,212	17.28%	$94,185,536
1.1.10	OPC	.... DISPOSAL AUTHORIZATION - FY 2018 thru FY 2037	$18,356,480	$11,786,016	$5,425,649	18.00%	$35,568,146
1.1.10.05	OPC	.... DISPOSAL AUTHORIZATION - FY 2018	$821,000	$197,003	$183,241	18.00%	$1,201,244
1.1.10.10	OPC	.... DISPOSAL AUTHORIZATION - FY 2019	$821,000	$225,507	$188,371	18.00%	$1,234,879
1.1.10.15	OPC	.... DISPOSAL AUTHORIZATION - FY 2020	$821,000	$254,810	$193,646	18.00%	$1,269,455
1.1.10.20	OPC	.... DISPOSAL AUTHORIZATION - FY 2021	$821,000	$284,932	$199,068	18.00%	$1,305,000
1.1.10.25	OPC	.... DISPOSAL AUTHORIZATION - FY 2022	$1,305,120	$502,174	$325,313	18.00%	$2,132,607
1.1.10.30	OPC	.... DISPOSAL AUTHORIZATION - FY 2023	$821,000	$347,731	$210,372	18.00%	$1,379,103
1.1.10.35	OPC	.... DISPOSAL AUTHORIZATION - FY 2024	$821,000	$380,456	$216,262	18.00%	$1,417,718
1.1.10.40	OPC	.... DISPOSAL AUTHORIZATION - FY 2025	$821,000	$414,097	$222,317	18.00%	$1,457,414
1.1.10.45	OPC	.... DISPOSAL AUTHORIZATION - FY 2026	$821,000	$448,679	$228,542	18.00%	$1,498,222
1.1.10.50	OPC	.... DISPOSAL AUTHORIZATION - FY 2027	$1,305,120	$769,767	$373,480	18.00%	$2,448,367
1.1.10.55	OPC	.... DISPOSAL AUTHORIZATION - FY 2028	$821,000	$520,777	$241,520	18.00%	$1,583,297
1.1.10.60	OPC	.... DISPOSAL AUTHORIZATION - FY 2029	$821,000	$558,347	$248,282	18.00%	$1,627,629
1.1.10.65	OPC	.... DISPOSAL AUTHORIZATION - FY 2030	$821,000	$596,968	$255,234	18.00%	$1,673,203
1.1.10.70	OPC	.... DISPOSAL AUTHORIZATION - FY 2031	$821,000	$636,671	$262,381	18.00%	$1,720,052
1.1.10.75	OPC	.... DISPOSAL AUTHORIZATION - FY 2032	$1,305,120	$1,076,980	$428,778	18.00%	$2,810,878
1.1.10.80	OPC	.... DISPOSAL AUTHORIZATION - FY 2033	$821,000	$719,444	$277,280	18.00%	$1,817,724
1.1.10.85	OPC	.... DISPOSAL AUTHORIZATION - FY 2034	$821,000	$762,576	$285,044	18.00%	$1,868,620
1.1.10.90	OPC	.... DISPOSAL AUTHORIZATION - FY 2035	$821,000	$806,916	$293,025	18.00%	$1,920,941
1.1.10.95	OPC	.... DISPOSAL AUTHORIZATION - FY 2036	$821,000	$852,498	$301,230	18.00%	$1,974,728
1.1.10.99	OPC	.... DISPOSAL AUTHORIZATION - FY 2037	$1,305,120	$1,429,680	$492,264	18.00%	$3,227,064
1.1.20	OPC	.... RH-LLW OPERATIONS - FY 2018 thru FY 2037	$20,659,275	$12,751,521	$5,349,529	16.01%	$38,760,326
1.1.20.16	OPC	.... RH-LLW OPERATIONS 27 TRANSFERS - FY 2018	$1,104,859	$265,117	$219,196	16.00%	$1,589,172
1.1.20.16.1	OPC	.... RH-LLW OPERATIONS 27 TRANSFERS - FY 2018	$588,079	$141,113	$116,671	16.00%	$845,862

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project*
Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10
Project Location: *INL*
Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*
Prepared By: *Baker, Julius, Honsinger*
Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.1.20.16.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2018	$516,780	$124,004	$102,525	16.00%	$743,309
1.1.20.17	**OPC**	**........ RH-LLW OPERATIONS 26 TRANSFERS - FY 2019**	**$1,072,025**	**$294,457**	**$218,637**	**16.00%**	**$1,585,119**
1.1.20.17.1	OPC	.... RH-LLW OPERATIONS 26 TRANSFERS - FY 2019	$574,385	$157,769	$117,145	16.00%	$849,298
1.1.20.17.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2019	$497,640	$136,689	$101,493	16.00%	$735,821
1.1.20.18	**OPC**	**........ RH-LLW OPERATIONS 26 TRANSFERS - FY 2020**	**$1,072,025**	**$332,719**	**$224,759**	**16.00%**	**$1,629,502**
1.1.20.18.1	OPC	.... RH-LLW OPERATIONS 26 TRANSFERS - FY 2020	$574,385	$178,269	$120,425	16.00%	$873,078
1.1.20.18.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2020	$497,640	$154,450	$104,334	16.00%	$756,424
1.1.20.19	**OPC**	**........ RH-LLW OPERATIONS 26 TRANSFERS - FY 2021**	**$1,104,859**	**$383,447**	**$238,129**	**16.00%**	**$1,726,435**
1.1.20.19.1	OPC	.... RH-LLW OPERATIONS 26 TRANSFERS - FY 2021	$588,079	$204,096	$126,748	16.00%	$918,923
1.1.20.19.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2021	$516,780	$179,351	$111,381	16.00%	$807,512
1.1.20.20	**OPC**	**........ RH-LLW OPERATIONS 27 TRANSFERS - FY 2022**	**$1,104,859**	**$425,119**	**$244,797**	**16.00%**	**$1,774,775**
1.1.20.20.1	OPC	.... RH-LLW OPERATIONS 27 TRANSFERS - FY 2022	$588,079	$226,277	$130,297	16.00%	$944,652
1.1.20.20.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2022	$516,780	$198,843	$114,500	16.00%	$830,122
1.1.20.21	**OPC**	**........ RH-LLW OPERATIONS 26 TRANSFERS - FY 2023**	**$1,104,859**	**$467,959**	**$251,651**	**16.00%**	**$1,824,468**
1.1.20.21.1	OPC	.... RH-LLW OPERATIONS 26 TRANSFERS - FY 2023	$588,079	$249,079	$133,945	16.00%	$971,103
1.1.20.21.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2023	$516,780	$218,880	$117,706	16.00%	$853,366
1.1.20.22	**OPC**	**........ RH-LLW OPERATIONS 26 TRANSFERS - FY 2024**	**$1,104,859**	**$511,998**	**$258,697**	**16.00%**	**$1,875,554**
1.1.20.22.1	OPC	.... RH-LLW OPERATIONS 26 TRANSFERS - FY 2024	$588,079	$272,519	$137,696	16.00%	$998,294
1.1.20.22.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2024	$516,780	$239,479	$121,001	16.00%	$877,260
1.1.20.23	**OPC**	**........ RH-LLW OPERATIONS 26 TRANSFERS - FY 2025**	**$1,104,859**	**$557,270**	**$265,941**	**16.00%**	**$1,928,069**
1.1.20.23.1	OPC	.... RH-LLW OPERATIONS 26 TRANSFERS - FY 2025	$588,079	$296,616	$141,551	16.00%	$1,026,246
1.1.20.23.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2025	$516,780	$260,654	$124,389	16.00%	$901,823

Project Summary Report

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10*
Project Location: *INL*
Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*
Prepared By: *Baker, Julius, Honsinger*
Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.1.20.24	**OPC**	**........ RH-LLW OPERATIONS 27 TRANSFERS - FY 2026**	**$1,104,859**	**$603,809**	**$273,387**	**16.00%**	**$1,982,055**
1.1.20.24.1	OPC	.... RH-LLW OPERATIONS 27 TRANSFERS - FY 2026	$588,079	$321,387	$145,515	16.00%	$1,054,981
1.1.20.24.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2026	$516,780	$282,422	$127,872	16.00%	$927,074
1.1.20.25	**OPC**	**........ RH-LLW OPERATIONS 26 TRANSFERS - FY 2027**	**$1,104,859**	**$651,652**	**$281,042**	**16.00%**	**$2,037,553**
1.1.20.25.1	OPC	.... RH-LLW OPERATIONS 26 TRANSFERS - FY 2027	$588,079	$346,852	$149,589	16.00%	$1,084,520
1.1.20.25.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2027	$516,780	$304,800	$131,453	16.00%	$953,033
1.1.20.26	**OPC**	**........ RH-LLW OPERATIONS 26 TRANSFERS - FY 2028**	**$1,104,859**	**$700,834**	**$288,911**	**16.00%**	**$2,094,604**
1.1.20.26.1	OPC	.... RH-LLW OPERATIONS 26 TRANSFERS - FY 2028	$588,079	$373,030	$153,777	16.00%	$1,114,887
1.1.20.26.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2028	$516,780	$327,804	$135,133	16.00%	$979,717
1.1.20.27	**OPC**	**........ RH-LLW OPERATIONS 22 TRANSFERS - FY 2029**	**$940,688**	**$639,744**	**$252,869**	**16.00%**	**$1,833,302**
1.1.20.27.1	OPC	.... RH-LLW OPERATIONS 22 TRANSFERS - FY 2029	$519,608	$353,376	$139,677	16.00%	$1,012,661
1.1.20.27.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2029	$421,080	$286,369	$113,192	16.00%	$820,640
1.1.20.28	**OPC**	**........ RH-LLW OPERATIONS 23 TRANSFERS - FY 2030**	**$973,522**	**$707,871**	**$269,023**	**16.00%**	**$1,950,416**
1.1.20.28.1		.... RH-LLW OPERATIONS 23 TRANSFERS - FY 2030	$533,302	$387,777	$147,373	16.00%	$1,068,452
1.1.20.28.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2030	$440,220	$320,094	$121,650	16.00%	$881,965
1.1.20.29	**OPC**	**........ RH-LLW OPERATIONS 22 TRANSFERS - FY 2031**	**$940,688**	**$729,488**	**$267,228**	**16.00%**	**$1,937,404**
1.1.20.29.1	OPC	.... RH-LLW OPERATIONS 22 TRANSFERS - FY 2031	$519,608	$402,947	$147,609	16.00%	$1,070,164
1.1.20.29.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2031	$421,080	$326,540	$119,619	16.00%	$867,240
1.1.20.30	**OPC**	**........ RH-LLW OPERATIONS 22 TRANSFERS - FY 2032**	**$940,688**	**$776,252**	**$274,710**	**16.00%**	**$1,991,651**
1.1.20.30.1	OPC	.... RH-LLW OPERATIONS 22 TRANSFERS - FY 2032	$519,608	$428,779	$151,742	16.00%	$1,100,129
1.1.20.30.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2032	$421,080	$347,474	$122,969	16.00%	$891,522
1.1.20.31	**OPC**	**........ RH-LLW OPERATIONS 22 TRANSFERS - FY 2033**	**$940,688**	**$824,327**	**$282,402**	**16.00%**	**$2,047,417**

Project Summary Report

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10*
Project Location: *INL*
Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*
Prepared By: *Baker, Julius, Honsinger*
Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.1.20.31.1	OPC	.... RH-LLW OPERATIONS 22 TRANSFERS - FY 2033	$519,608	$455,334	$155,991	16.00%	$1,130,932
1.1.20.31.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2033	$421,080	$368,993	$126,412	16.00%	$916,485
1.1.20.32	**OPC**	**........ RH-LLW OPERATIONS 23 TRANSFERS - FY 2034**	**$973,522**	**$904,245**	**$300,443**	**16.00%**	**$2,178,210**
1.1.20.32.1	OPC	.... RH-LLW OPERATIONS 23 TRANSFERS - FY 2034	$533,302	$495,352	$164,585	16.00%	$1,193,239
1.1.20.32.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2034	$440,220	$408,893	$135,858	16.00%	$984,971
1.1.20.33	**OPC**	**........ RH-LLW OPERATIONS 22 TRANSFERS - FY 2035**	**$940,688**	**$924,551**	**$298,438**	**16.00%**	**$2,163,678**
1.1.20.33.1	OPC	.... RH-LLW OPERATIONS 22 TRANSFERS - FY 2035	$519,608	$510,695	$164,848	16.00%	$1,195,151
1.1.20.33.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2035	$421,080	$413,857	$133,590	16.00%	$968,527
1.1.20.34	**OPC**	**........ RH-LLW OPERATIONS 22 TRANSFERS - FY 2036**	**$940,688**	**$976,778**	**$306,795**	**16.00%**	**$2,224,261**
1.1.20.34.1	OPC	.... RH-LLW OPERATIONS 22 TRANSFERS - FY 2036	$519,608	$539,543	$169,464	16.00%	$1,228,615
1.1.20.34.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2036	$421,080	$437,235	$137,330	16.00%	$995,645
1.1.20.35	**OPC**	**........ RH-LLW OPERATIONS 23 TRANSFERS - FY 2037**	**$973,522**	**$1,066,435**	**$326,393**	**16.00%**	**$2,366,351**
1.1.20.35.1	OPC	.... RH-LLW OPERATIONS 23 TRANSFERS - FY 2037	$533,302	$584,201	$178,800	16.00%	$1,296,303
1.1.20.35.2	OPC	.... RH-LLW FACILITY SETUP/TAKE DOWN BEFORE AND AFTER LLW DELIVERY FY 2037	$440,220	$482,235	$147,593	16.00%	$1,070,047
1.1.20.50	**OPC**	**........ BEA Material Handling Fee and G&A Charges FY 2037**	**$6,800**	**$7,449**	**$6,081**	**42.68%**	**$20,330**
1.1.20.50.1	OPC	.... BEA Material Handling Fee and G&A Charges	$6,800	$7,449	$6,081	42.68%	$20,330
1.1.30	**OPC**	**.... OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2018 to FY 2037**	**$8,601,300**	**$5,439,660**	**$2,667,782**	**19.00%**	**$16,708,742**
1.1.30.16	**OPC**	**........ OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2018**	**$430,065**	**$103,196**	**$101,320**	**19.00%**	**$634,581**
1.1.30.17	**OPC**	**........ OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2019**	**$430,065**	**$118,128**	**$104,157**	**19.00%**	**$652,349**
1.1.30.18	**OPC**	**........ OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2020**	**$430,065**	**$133,477**	**$107,073**	**19.00%**	**$670,615**

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10*
Project Location: *INL*
Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*
Prepared By: *Baker, Julius, Honsinger*
Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.1.30.19	OPC	.... OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2021	$430,065	$149,256	$110,071	19.00%	$689,392
1.1.30.20	OPC	.... OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2022	$430,065	$165,477	$113,153	19.00%	$708,695
1.1.30.21	OPC	.... OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2023	$430,065	$182,152	$116,321	19.00%	$728,539
1.1.30.22	OPC	.... OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2024	$430,065	$199,294	$119,578	19.00%	$748,938
1.1.30.23	OPC	.... OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2025	$430,065	$216,917	$122,926	19.00%	$769,908
1.1.30.24	OPC	.... OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2026	$430,065	$235,032	$126,368	19.00%	$791,466
1.1.30.25	OPC	.... OPERATIONS MANAGEMENT - LLW DISPOSAL - FY 2027	$430,065	$253,655	$129,907	19.00%	$813,627
1.1.30.26	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2028	$430,065	$272,799	$133,544	19.00%	$836,408
1.1.30.27	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2029	$430,065	$292,479	$137,283	19.00%	$859,828
1.1.30.28	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2030	$430,065	$312,710	$141,127	19.00%	$883,903
1.1.30.29	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2031	$430,065	$333,508	$145,079	19.00%	$908,652
1.1.30.30	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2032	$430,065	$354,888	$149,141	19.00%	$934,094
1.1.30.31	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2033	$430,065	$376,867	$153,317	19.00%	$960,249
1.1.30.32	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2034	$430,065	$399,461	$157,610	19.00%	$987,136
1.1.30.33	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2035	$430,065	$422,688	$162,023	19.00%	$1,014,776
1.1.30.34	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2036	$430,065	$446,565	$166,560	19.00%	$1,043,189
1.1.30.35	OPC	.... OPERATIONS MANAGEMENT- LLW DISPOSAL - FY 2037	$430,065	$471,110	$171,223	19.00%	$1,072,399
1.1.40	OPC	.... MONITORING WELLS	$1,716,579	$997,493	$434,251	16.00%	$3,148,323
1.1.40.1	OPC	.... SAMPLE MONITORING WELLS FY 2015 TO 2020	$348,370	$95,688	$71,049	16.00%	$515,107
1.1.40.2	OPC	.... SAMPLE MONITORING WELLS FY 2021 TO 2025	$217,731	$100,898	$50,981	16.00%	$369,609
1.1.40.3	OPC	.... SAMPLE MONITORING WELLS FY 2026 TO 2030	$217,731	$148,075	$58,529	16.00%	$424,335
1.1.40.4	OPC	.... SAMPLE MONITORING WELLS FY 2031 TO 2036	$261,277	$256,795	$82,892	16.00%	$600,964

Project Summary Report

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10*

Project Location: *INL*

Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*

Prepared By: *Baker, Julius, Honsinger*

Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.1.40.5	OPC	.... CWI G&A Fee for Services Sold to BEA	$671,470	$396,037	$170,801	16.00%	$1,238,308
1.2		RH LLW FACILITY CLOSURE	$3,968,037	$4,438,968	$1,409,364	16.76%	$9,816,369
1.2.10		.... Construction Management (CM) - FY 2038	$363,308	$419,298	$162,471	20.76%	$945,078
1.2.10.1		.... Provide CM Oversight/Support during Field Execution - Level of Effort (LOE)	$163,452	$188,642	$77,461	22.00%	$429,555
1.2.10.2	Baker	.... Provide ESHQ Oversight/Support during Field Execution - LOE	$69,391	$80,085	$32,885	22.00%	$182,361
1.2.10.3	Baker	.... Perform Subsurface Investigations Prior to Excavations	$37,892	$43,732	$12,244	15.00%	$93,867
1.2.10.4	5.02.2.2.7	.... RadCon Support During Construction	$92,573	$106,839	$39,882	20.00%	$239,295
1.2.20		.... Design FY 2036	$650,851	$675,822	$186,779	14.08%	$1,513,452
1.2.20.1		.... Preliminary Engineering and Design	$84,770	$88,023	$24,191	14.00%	$196,984
1.2.20.2	Baker	.... Prepare Class 2 Preliminary Cost Estimate	$25,616	$26,599	$8,354	16.00%	$60,570
1.2.20.3		.... Final Design-Demolition and Vault Cap	$540,465	$561,200	$154,233	14.00%	$1,255,898
1.2.20.3.1		.... Final Engineering and Design	$245,432	$254,849	$70,039	14.00%	$570,320
1.2.20.3.2		.... Final Design Cost Estimating	$24,117	$25,042	$6,882	14.00%	$56,041
1.2.20.3.3		.... Design Review	$82,256	$85,412	$23,473	14.00%	$191,141
1.2.20.3.4		.... Issue Drawings and Specifications	$27,860	$28,928	$7,950	14.00%	$64,738
1.2.20.3.5		.... Prepare Eng. Evaluation IAW LWP-10400	$19,802	$20,562	$5,651	14.00%	$46,015
1.2.20.3.6		.... Review Eng. Evaluation	$7,890	$8,193	$2,252	14.00%	$18,335
1.2.20.3.7		.... Approve Eng. Evaluation	$2,485	$2,581	$709	14.00%	$5,776
1.2.20.3.8		.... Prepare for Elect. and Mech. Isolations	$46,844	$48,641	$13,368	14.00%	$108,852
1.2.20.3.8.1		*................ Prepare Electrical and Mechanical Isolations*	*$42,333*	*$43,957*	*$12,081*	*14.00%*	*$98,371*
1.2.20.3.8.2		*................ Review Electrical and Mechanical Isolations*	*$2,164*	*$2,247*	*$617*	*14.00%*	*$5,028*
1.2.20.3.8.3		*................ Approve Electrical and Mechanical Isolations*	*$2,347*	*$2,437*	*$670*	*14.00%*	*$5,454*

Project Summary Report

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10*
Project Location: *INL*
Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*
Prepared By: *Baker, Julius, Honsinger*
Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.2.20.3.9		.... Closing Civil Surveying, Environmental, Geo-technical, Surveys	$83,779	$86,993	$23,908	14.00%	$194,680
1.2.30		.... Quality Assurance	$27,324	$31,412	$12,335	21.00%	$71,071
1.2.30.1		.... Prepare Project Inspection Plan FY 2037	$2,095	$2,295	$922	21.00%	$5,313
1.2.30.2		.... Provide Quality Inspections During Construction Until FY 2038	$25,229	$29,117	$11,413	21.00%	$65,758
1.2.40	5.02.2.8	.... Construction Project Management (PM) FY 2037 and 2038	$291,768	$333,416	$111,127	17.78%	$736,311
1.2.40.10	5.02.2.8.1	.... Construction Project Management During Design (PM) FY 2037	$26,250	$28,755	$9,901	18.00%	$64,905
1.2.40.15	5.02.2.8.1	.... Construction Project Management During Construction/Demolition 2038	$157,498	$181,770	$61,068	18.00%	$400,336
1.2.40.20		.... Provide Procurement Support - LOE FY 2037	$15,900	$17,417	$5,331	16.00%	$38,648
1.2.40.25		.... Provide Procurement Support - LOE FY 2038	$15,900	$18,350	$5,480	16.00%	$39,730
1.2.40.30	5.02.2.8.4	.... Planning and Scheduling FY 2037	$13,730	$15,041	$5,179	18.00%	$33,950
1.2.40.35	5.02.2.8.5	.... Prepare Construction Permits/Plans FY 2038	$48,104	$55,517	$18,652	18.00%	$122,273
1.2.40.40	5.02.2.8.4	.... Planning and Scheduling FY 2038	$13,730	$15,846	$5,324	18.00%	$34,901
1.2.40.45	Baker	.... Prepare Davis Bacon Determination Documents FY 2037	$656	$719	$193	14.00%	$1,568
1.2.50		.... AE Support During Construction FY 2037 and 2038	$94,195	$106,295	$44,108	22.00%	$244,597
1.2.50.10	Baker	.... Provide AE Field Support/Oversight during Construction - FY 2037	$41,188	$45,119	$18,988	22.00%	$105,295
1.2.50.20	Baker	.... Provide AE Field Support/Oversight during Construction - FY 2038	$41,188	$47,536	$19,519	22.00%	$108,243
1.2.50.30	Baker	.... Provide Complex Engineering Support - LOE FY 2038	$8,338	$9,623	$3,951	22.00%	$21,911
1.2.50.40	Baker	.... Prepare Facility As-Built Drawings and Incorporate into EDMS FY 2038	$3,481	$4,017	$1,650	22.00%	$9,148
1.2.60		.... Construction FY 2037 AND 2038	$2,099,298	$2,363,424	$892,544	20.00%	$5,355,266
1.2.60.05		.... Construction - Subcontracted	$94,024	$102,998	$39,405	20.00%	$236,427

Project Summary Report

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10*
Project Location: *INL*
Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*
Prepared By: *Baker, Julius, Honsinger*
Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.2.60.05.1		.... General Conditions FY 2037	$94,024	$102,998	$39,405	20.00%	$236,427
1.2.60.10		**........ Construction Support FY 2038**	**$85,707**	**$98,915**	**$36,924**	**20.00%**	**$221,546**
1.2.60.10.1	Baker	.... Provide Facility LOTO Support to the Subcontractor	$11,554	$13,335	$4,978	20.00%	$29,866
1.2.60.10.2	Baker	.... Prepare WOs	$74,153	$85,580	$31,947	20.00%	$191,680
1.2.60.15	**Baker**	**........ Site Training - Subcontractor FY 2038**	**$4,000**	**$4,616**	**$1,723**	**20.00%**	**$10,340**
1.2.60.20	**Radford**	**........ 10 CFR 851 Requirements FY 2038**	**$4,000**	**$4,616**	**$1,723**	**20.00%**	**$10,340**
1.2.60.25	**5.02.2.3.2**	**........ Sitework FY 2037 and 2038**	**$1,186,181**	**$1,315,101**	**$500,256**	**20.00%**	**$3,001,538**
1.2.60.25.10		.... First Half Vault Area Fill and Leveling FY 2037	$55,182	$60,449	$23,126	20.00%	$138,757
1.2.60.25.20		.... First Half Vault Area Cap Fill FY 2037	$193,719	$212,208	$81,185	20.00%	$487,112
1.2.60.25.30		.... Second Half Vault Area Fill and Leveling FY 2038	$55,182	$63,686	$23,774	20.00%	$142,642
1.2.60.25.35		.... Second Half Vault Area Cap FY 2038	$212,609	$245,375	$91,597	20.00%	$549,581
1.2.60.25.40		.... Vault Area Fill Stock Piling FY 2037	$618,512	$677,543	$259,211	20.00%	$1,555,265
1.2.60.25.45		.... Area Fences to Remain	$0	$0	$0	0.00%	$0
1.2.60.25.50		.... Fire Water and Sewer System Fill Stock Piling FY 2037	$47,578	$52,119	$19,939	20.00%	$119,636
1.2.60.25.55		.... Buildings and Foundation Fill Stock Piling FY 2037	$3,398	$3,723	$1,424	20.00%	$8,545
1.2.60.30	**5.02.2.3.3**	**........ Demolition Metal Buildings FY 2038**	**$104,582**	**$120,699**	**$45,056**	**20.00%**	**$270,337**
1.2.60.30.1		.... Demolition of Maintenance Building FY 2038	$76,335	$88,099	$32,887	20.00%	$197,320
1.2.60.30.2		.... Demolition of Office Building FY 2038	$28,247	$32,600	$12,169	20.00%	$73,016
1.2.60.35	**5.02.2.3.4**	**........ Concrete Demolition FY 2038**	**$46,075**	**$53,176**	**$19,850**	**20.00%**	**$119,101**
1.2.60.35.1		.... Utilities Concrete Demolition FY 2038	$2,227	$2,570	$959	20.00%	$5,757
1.2.60.35.2		.... Remove Wastes Materials from Site FY 2038	$43,848	$50,606	$18,891	20.00%	$113,344
1.2.60.40	**5.02.2.3.6**	**........ Mechanical**	**$122,276**	**$141,121**	**$52,679**	**20.00%**	**$316,076**
1.2.60.40.1		.... Demolition Sewer System FY 2038	$28,921	$33,378	$12,460	20.00%	$74,758
1.2.60.40.2		.... Fire Water System Demolition FY 2038	$93,356	$107,743	$40,220	20.00%	$241,318
1.2.60.45	**5.02.2.3.7**	**........ Electrical**	**$228,294**	**$263,477**	**$98,354**	**20.00%**	**$590,125**
1.2.60.45.1		.... Demolition Security and Emergency Systems FY 2038	$18,673	$21,550	$8,045	20.00%	$48,267

Project Summary Report

Project Name: *Remote-Handled Low Level Waste (RH LLW) Disposal Project Operations, Disposal and Close-Out Activities FY 2018 - FY 2038, Rev.04-16-10*
Project Location: *INL*
Estimate Number: *9A28-H2*

Client: *D. L. Anderson, L. A. Harvego*
Prepared By: *Baker, Julius, Honsinger*
Estimate Type: *Class 4*

Level	Group	Description	Estimate Subtotal	Escalation & Inflation	Management Reserve MR	MR %	TOTAL
1.2.60.45.2		.... Demolition of Power Line System FY 2038	$17,552	$20,257	$7,562	20.00%	$45,370
1.2.60.45.3		.... Demolition Power Distribution and Telecom Duct Bank and Manhole System FY 2038	$181,576	$209,560	$78,227	20.00%	$469,363
1.2.60.45.4		.... Demolition of Yard Lighting FY 2038	$8,386	$9,678	$3,613	20.00%	$21,677
1.2.60.45.5		.... Demolition of Power Distribution to Power Pedestals next to Vault Area FY 2038	$2,107	$2,432	$908	20.00%	$5,448
1.2.60.50	**5.02.3**	**........ Disposition NRF Crane, Unloading Station/Vault Fixture for Cask Handling FY 2038**	**$112,300**	**$129,607**	**$48,381**	**20.00%**	**$290,288**
1.2.60.50.1	5.02.3	.... Disposition NRF Crane, Unloading Station/Vault Fixture for Cask Handling FY 2038	$112,300	$129,607	$48,381	20.00%	$290,288
1.2.60.55	**5.2.2.7**	**........ Project Turnover and Closeout FY 2038**	**$111,859**	**$129,098**	**$48,191**	**20.00%**	**$289,148**
1.2.60.55.10	5.2.2.7.01	.... Records Disposition	$16,250	$18,755	$7,001	20.00%	$42,006
1.2.60.55.15	5.2.2.7.02	.... Material Disposition	$4,472	$5,162	$1,927	20.00%	$11,561
1.2.60.55.20	5.2.2.7.03	.... Complete Closeout PM Checklist	$13,125	$15,148	$5,654	20.00%	$33,927
1.2.60.55.25	5.2.2.7.04	.... Testing and Turnover Planning	$28,229	$32,579	$12,162	20.00%	$72,969
1.2.60.55.30	5.2.2.7.05	.... S. O. Testing	$16,287	$18,797	$7,017	20.00%	$42,102
1.2.60.55.40	5.2.2.7.07	.... Facility Acceptance Review	$4,392	$5,069	$1,892	20.00%	$11,354
1.2.60.55.45	5.2.2.7.11	.... Perform Design Verification (As-builts, Operating Procedures, etc.)	$23,419	$27,028	$10,089	20.00%	$60,537
1.2.60.55.50	5.2.2.7.12	.... Resolve Punchlist Items	$1,715	$1,979	$739	20.00%	$4,432
1.2.60.55.55	5.2.2.7.13	.... Project Turnover Completed Per LWP-7460	$3,584	$4,137	$1,544	20.00%	$9,265
1.2.60.55.60	5.2.2.7.14	.... Record Deficiency on Form 432.04	$385	$444	$166	20.00%	$995
1.2.70	**OPC**	**.... PROJECT MANAGEMENT (PM) - LLW DISPOSAL - FY 2038**	**$441,293**	**$509,301**	**$0**	**0.00%**	**$950,594**
Total		**RH LLW Operations, Disposal Authorization, and Close-Out Activities**	**$53,301,671**	**$35,413,658**	**$15,286,576**	**17.23%**	**$104,001,905**

Appendix D

Project Planning and Execution Schedule

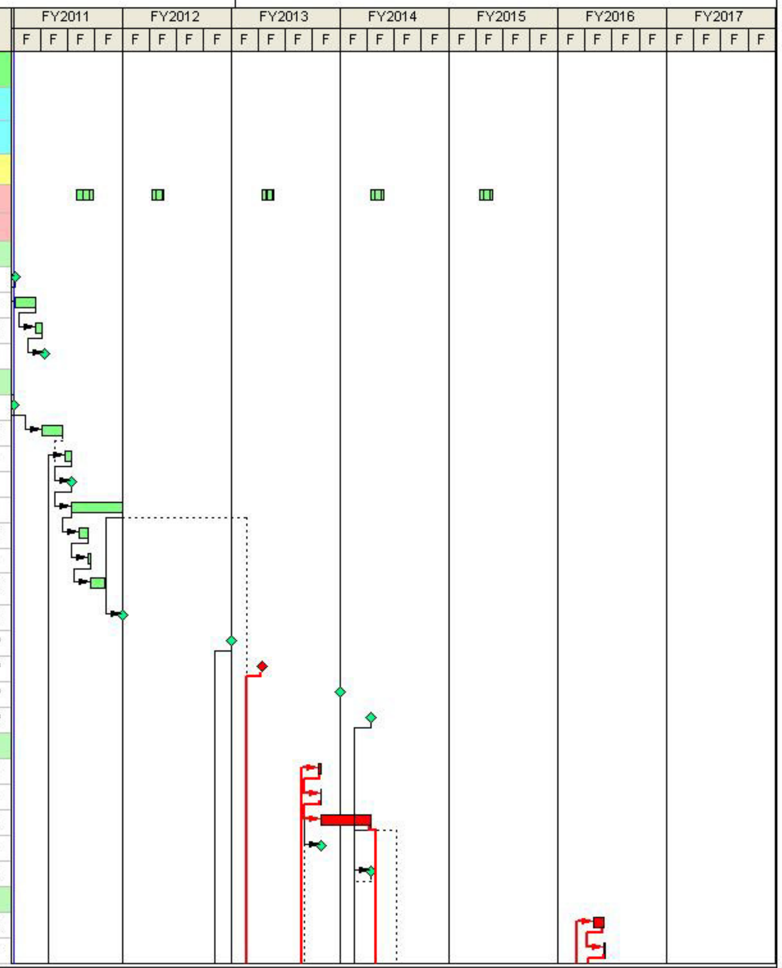
Remaining Level of Effort | Critical Remai...
Actual Level of Effort | Milestone
Actual Work | Critical Milesto...
Remaining Work

RHLLW Project Schedule

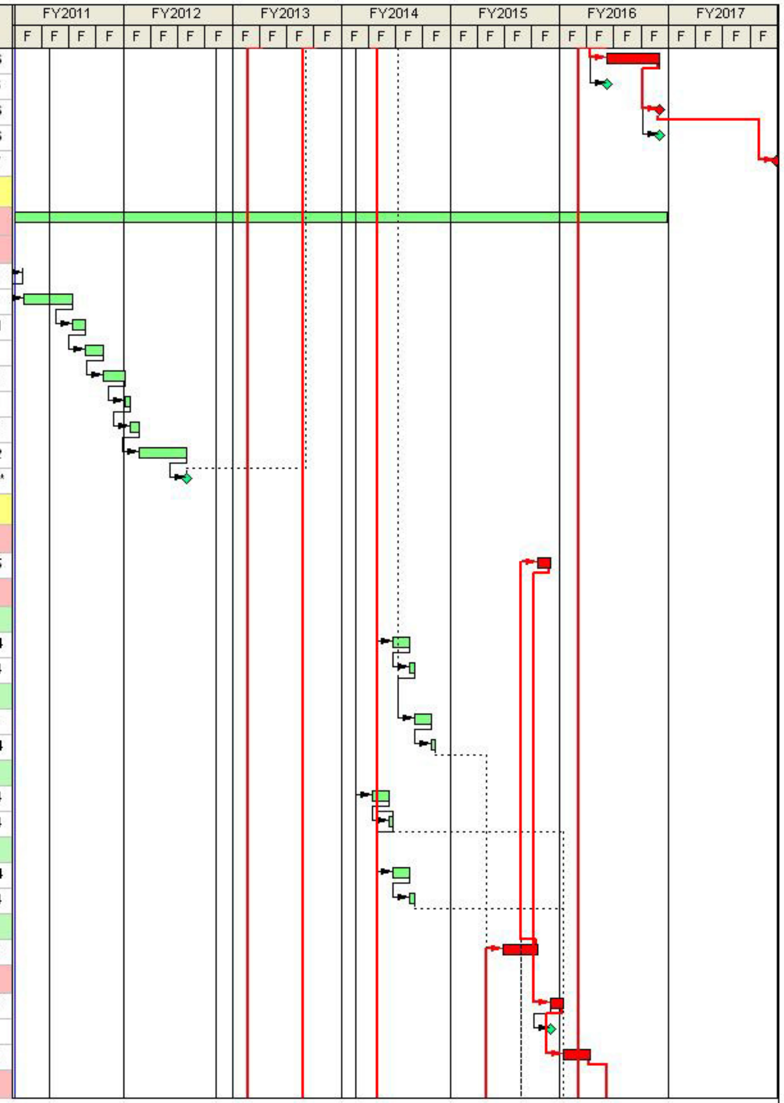
Run Date = 07-Oct-10 09:53

Data Date = 01-Oct-10

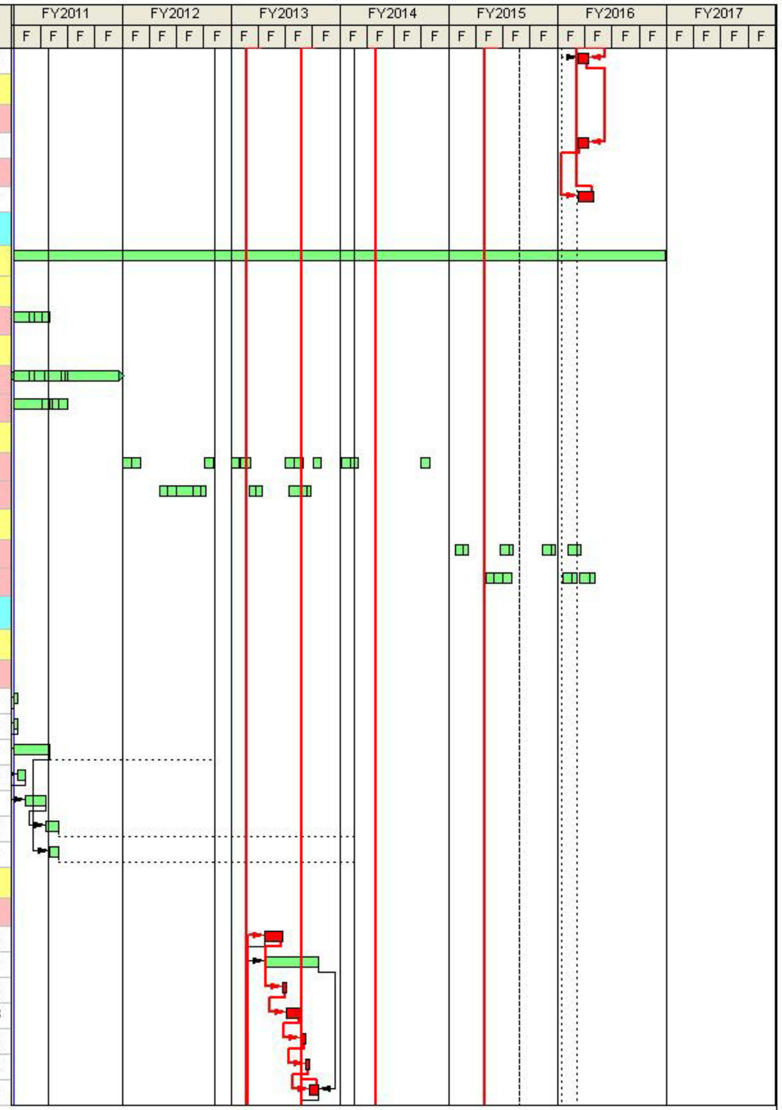
Activity ID	Activity Name	Rem Dur	Start	Finish
Remote Handled Low Level Waste Disposal Facility				
History				
Project Management				
Critical Decision Support				
Project Data Sheet Updates				
CD Package Assembly and Comment Resolution				
CD-1 Package Assembly and Comment Resolution				
RH4590	BEA Revised CD-1 Package Submittal	0d	07-Oct-10*	
RH4600	DOE Review/ Comment Incorporation	48d	07-Oct-10	16-Dec-10
RH4610	Transmit Final CD-1 Package to DOE	5d	16-Dec-10	03-Jan-11
RH4620	CD-1 Approval by DOE/ ESAAB	0d		13-Jan-11
CD-2/3A Package Assembly and Comment Resolution				
RH2250	Start RHLLW Project for FY11	0d	01-Oct-10	
RH4060	Perform Cost Estimate Update for CD-2/ 3A Submittal	50d	04-Jan-11	15-Mar-11
RH715	Complete CD-2/3A Package	15d	22-Mar-11	12-Apr-11
RH717	Issue CD-2/3A Package to DOE-ID	0d	12-Apr-11	
RH719	DOE Review/ Approval of CD-2/3A Package	120d	13-Apr-11	03-Oct-11
RH4440	Independent Project Review (IPR) Preparations	20d	11-May-11	09-Jun-11
RH4450	Perform/ Support Independent Project Review (IPR)	5d	09-Jun-11	16-Jun-11
RH4460	Perform IPR Close-Out	35d	16-Jun-11	05-Aug-11
RH4630	CD-2/3A Approved by DOE/ ESAAB	0d		03-Oct-11
RH2970	Infrastructure Construction Funds Approved	0d		01-Oct-12*
RH3010	Infrastructure Construction Funds Available	0d		14-Jan-13*
RH4770	Transportation and Vaults Construction Funds Approved	0d		01-Oct-13*
RH4780	Transportation and Vaults Construction Funds Available	0d		13-Jan-14*
CD-3B Package Assembly and Comment Resolution				
RH1360	Complete CD-3B Package	5d	22-Jul-13	29-Jul-13
RH1370	Issue CD-3B Package to DOE-ID	2d	29-Jul-13	31-Jul-13
RH1380	DOE Review/ Approval of CD-3B Package	110d	31-Jul-13	13-Jan-14
RH4640	CD-3B Package Issued to DOE	0d		31-Jul-13
RH4650	CD-3B Approved by DOE/ ESAAB	0d		13-Jan-14
CD-4 Package Assembly and Comment Resolution				
RH1400	Complete CD-4 Package	25d	28-Jan-16	03-Mar-16
RH1410	Issue CD-4 Package to DOE-ID	2d	03-Mar-16	08-Mar-16



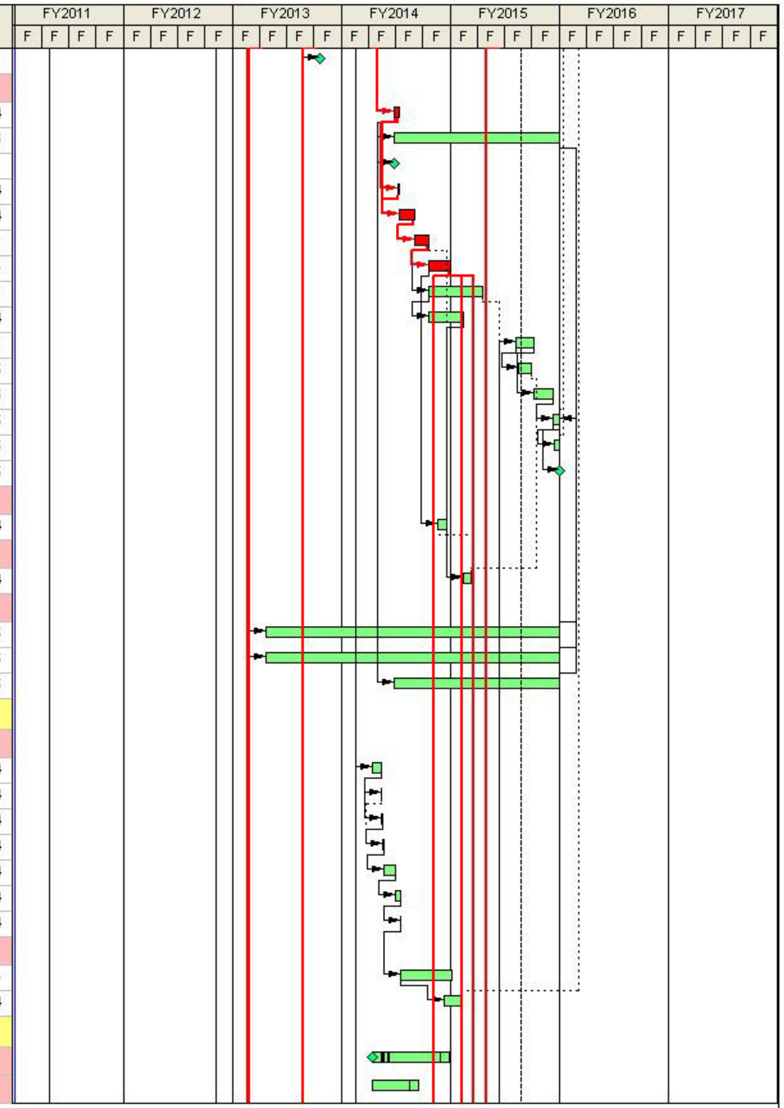
Activity ID	Activity Name	Rem Dur	Start	Finish
RH1420	DOE Review/ Approval of CD-4 Package	128d	08-Mar-16	31-Aug-16
RH4700	CD-4 Package Issued to DOE	0d		08-Mar-16
RH3000	RHLLW Project Complete	0d		31-Aug-16
RH4710	CD-4 Approved by DOE/ESAAB	0d		31-Aug-16
RH3860	RHLLW Project Required Completion	0d		28-Sep-17
Project Management Support				
Project Management Support				
EVMS Certification				
RH1750	Submit Formal Certification Request to OECM	1d	29-Oct-10'	29-Oct-10
RH1740	Perform Mock Interviews/ Certification Preparations	112d	01-Nov-10	15-Apr-11
RH1730	Perform Internal Review	29d	15-Apr-11	26-May-11
RH1125	OECM Readiness Assessment (M01)	42d	26-May-11'	26-Jul-11
RH1131	On-Site Review (M02)	51d	27-Jul-11	06-Oct-11
RH1135	OECM Review of Corrective Action Plans (M03)	11d	06-Oct-11	24-Oct-11
RH1145	OECM Review of Corrective Action Plans Objective Evidence (M04)	21d	24-Oct-11	22-Nov-11
RH1141	OECM Baseline Validation for RHLLW	108d	22-Nov-11	01-May-12
RH1151	OECM Issues Letter of EVMS Certification (M05)	0d		01-May-12'
PP- Operational Readiness				
PP- Personnel Training/ Qualification				
RH740	PP- Training Plan, Personnel Training, and Qualification	30d	20-Jul-15	31-Aug-15
PP- Operations and Maintenance Procedures				
Operations Plan				
RH500	PP- Prepare the Operations Plan for CD-4	40d	24-Mar-14	19-May-14
RH2120	PP- Review/ Incorporate Comments to Operations Plan for CD-4	10d	19-May-14	03-Jun-14
Maintenance Plan				
RH2150	PP- Prepare the Maintenance Plan for CD-4	40d	03-Jun-14	30-Jul-14
RH2160	PP- Review/ Incorporate Comments to Maintenance Plan for CD-4	10d	30-Jul-14	13-Aug-14
Checkout, Testing, and Commissioning Plan				
RH2210	PP- Prepare the Checkout, Testing, and Commissioning Plan for CD-4	40d	13-Jan-14	10-Mar-14
RH2220	PP- Review/ Incorporate Comments to Checkout, Testing, and Com...	10d	10-Mar-14	24-Mar-14
Project Transition to Operations Plan				
RH2230	PP- Prepare the Transition to Operations Plan for CD-4	40d	24-Mar-14	19-May-14
RH2240	PP- Review/ Incorporate Comments to Tranistion to Operations Pla...	10d	19-May-14	03-Jun-14
Operations and Maintenance Procedures				
RH750	PP- Operations and Maintenance Procedures (10 Procedures)	80d	27-Mar-15	20-Jul-15
PP- Operational Readiness Review				
RH3580	PP- Management Self Assessment	30d	31-Aug-15	13-Oct-15
RH4690	Commence MSA/ ORR Activities	0d	31-Aug-15	
RH760	PP- Operational Readiness Review	60d	13-Oct-15	14-Jan-16
PP- Operations Turnover				



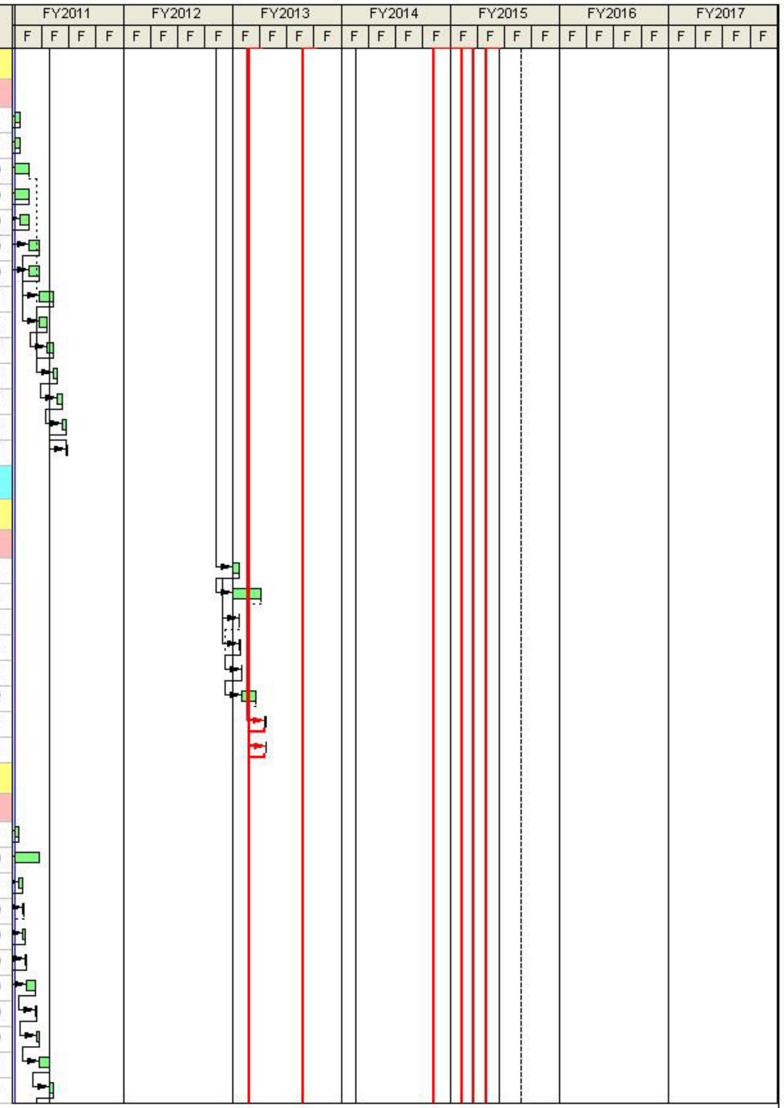
Activity ID	Activity Name	Rem Dur	Start	Finish
RH770	PP- Operations Turnover	20d	09-Dec-15	14-Jan-16
	PP- Close-Out			
	PP- Close-Out Plan			
RH780	PP- Close-Out Plan	20d	09-Dec-15	14-Jan-16
	PP- Close-Out Report			
RH790	PP- Prepare Close-Out Report	30d	09-Dec-15	28-Jan-16
	Support Documents			
	Support Document Management			
	CD-1 Documents			
	413.3 Documents Close-Out (CD-1)			
	CD-2/3A Documents			
	435.1 & NEPA Documents (CD-2/3A)			
	413.3 Documents (CD-2/3A)			
	PP- CD-3B Documents			
	PP- 435.1 & NEPA Documents (CD-3B)			
	PP- 413.3 Documents (CD-3B)			
	PP- CD-4 Documents			
	PP- 413.3 Documents (CD-4)			
	PP-435.1 & NEPA Documents (CD-4)			
	Infrastructure			
	Infrastructure RFPs			
	Performance Specifications			
RH910	Complete Performance Spec. Requirements Rolldown in DOORS	10d	01-Oct-10	14-Oct-10
RH3610	Draft Performance Specification FDD	10d	01-Oct-10	14-Oct-10
RH3890	Develop Draft RFP for Subcontractor	80d	01-Oct-10	01-Feb-11
RH3620	IPT Review Performance Specification, FDD, and DOORS Input	20d	15-Oct-10	11-Nov-10
RH3640	Draft Performance Specification	40d	12-Nov-10	18-Jan-11
RH3650	Review/ Incorporate Comments- Performance Specification for RFP...	30d	18-Jan-11	01-Mar-11
RH3900	Develop Draft RFP for Crane and Wells Contractor	20d	01-Feb-11	01-Mar-11
	PP- Infrastructure			
	PP- Infrastructure Design			
RH3520	PP- Design Infrastructure to 90%	40d	23-Jan-13	20-Mar-13
RH4380	PP-Subcontract Management Activities During Design	125d	23-Jan-13	22-Jul-13
RH3530	PP-90% Design Review for Infrastructure	10d	20-Mar-13	03-Apr-13
RH3540	PP-Complete Final Design for Infrastructure	35d	03-Apr-13	22-May-13
RH3550	PP-Final Design Review	10d	23-May-13	06-Jun-13
RH3560	PP-Incorporate Comments for Final Design	10d	07-Jun-13	20-Jun-13
RH3570	PP-Issue Drawings/ Specs for Construction	20d	21-Jun-13	22-Jul-13



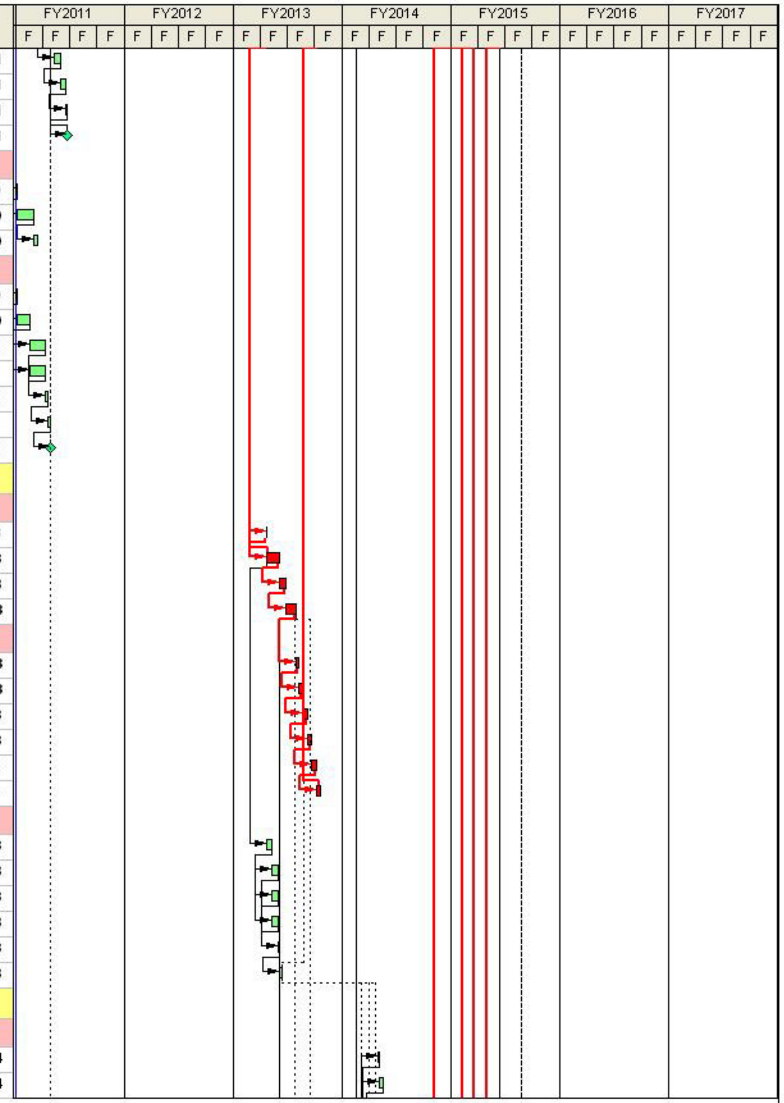
Activity ID	Activity Name	Rem Dur	Start	Finish
RH4660	Facility Design Complete	0d		22-Jul-13
PP- Infrastructure Construction				
RH930	PP-Subcontractor Mobilize to Site	10d	28-Mar-14	11-Apr-14
RH4370	PP-Subcontract Management Activities During Construction	381d	28-Mar-14	30-Sep-15
RH4670	Commence Total Project Construction	0d	28-Mar-14	
RH3430	PP-INL Specific Training	5d	07-Apr-14	11-Apr-14
RH3440	PP-Develop Access Road	35d	11-Apr-14	03-Jun-14
RH3450	PP-Develop Site Area/ Clearing and Grubbing	35d	03-Jun-14	22-Jul-14
RH3460	PP-Excavate Hole for Vaults	50d	22-Jul-14	01-Oct-14
RH3470	PP-Building Construction	120d	22-Jul-14	16-Jan-15
RH4360	PP- Install Utilities/ Instrumentation	80d	22-Jul-14	12-Nov-14
RH3490	PP-Final Site Grading and Landscaping	42d	08-May-15	08-Jul-15
RH3480	PP-Fence Installation	30d	18-May-15	30-Jun-15
RH3500	PP-Final Road and Site Paving	45d	08-Jul-15	11-Sep-15
RH3510	PP-Punchlist/ Demobilize Subcontractor	14d	11-Sep-15	30-Sep-15
RH4350	PP- Subcontractor Turnover and Close-Out	11d	15-Sep-15	30-Sep-15
RH4680	Construction Complete	0d		30-Sep-15
PP- Liner Subcontractor				
RH940	PP-Liner Subcontractor Activities	20d	19-Aug-14	17-Sep-14
PP- BEA Retained Utilities Tie-ins				
RH960	PP-BEA Utilities Tie-Ins	20d	12-Nov-14	11-Dec-14
PP- Infrastructure Subcontract Management				
RH970	PP-Infrastructure- Subcontract Management	678d	23-Jan-13	30-Sep-15
RH4240	PP- BEA Construction Management	678d	23-Jan-13	30-Sep-15
RH3870	PP-Infrastructure- Ops Support During Construction	381d	28-Mar-14	30-Sep-15
PP- Monitoring Wells				
PP- Establish Well Subcontractor				
RH3080	PP-Refresh RFP for Monitoring Well Contractor	20d	13-Jan-14	10-Feb-14
RH3090	PP-Identify Potential Monitoring Well Contractors	2d	10-Feb-14	12-Feb-14
RH3100	PP-Review/Incorporate Comments for RFP for Monitoring Well Cont...	5d	10-Feb-14	14-Feb-14
RH3110	PP-Issue RFP to Qualified Bidders/ Pre-Bid Meeting	2d	14-Feb-14	18-Feb-14
RH3120	PP-Vendors Develop Bids/ Submit to BEA	30d	18-Feb-14	01-Apr-14
RH3130	PP-BEA Review Bids/ Select Monitoring Well Contractor	10d	01-Apr-14	15-Apr-14
RH3140	PP-Issue Notice to Proceed to Monitoring Well Contractor	1d	15-Apr-14	16-Apr-14
PP- Monitoring Well Installation/ Testing				
RH3150	PP-Mobilize to Site/ Drill 3 Monitoring Wells	120d	16-Apr-14	07-Oct-14
RH3160	PP-Establish Monitoring Well Baselines	40d	09-Sep-14	04-Nov-14
PP- Equipment				
PP- Crane Refurbishment and Transfer				
PP- Equipment Procurement				



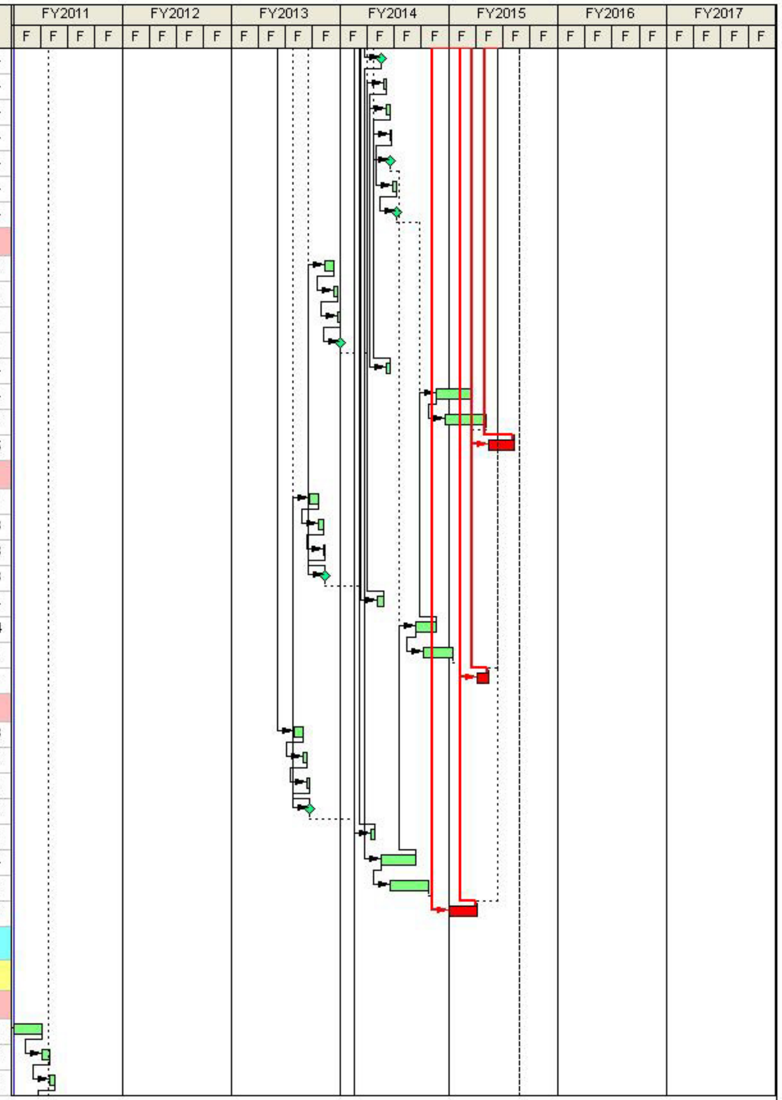
Activity ID	Activity Name	Rem Dur	Start	Finish
Liner Alternatives Analyses				
Liner Alternatives Analyses				
RH2280	Collect Technical Performance Information for Existing Systems	15d	01-Oct-10	21-Oct-10
RH3730	Develop Conceptual Designs Utilizing New Materials and Technologi...	15d	01-Oct-10	21-Oct-10
RH3740	Collect Existing Physical Data	35d	01-Oct-10	18-Nov-10
RH3770	Develop Hydrogeochemical Model	35d	01-Oct-10	18-Nov-10
RH3750	Develop Alternatives Analysis Pro/Con Table with Measurement Cri...	20d	21-Oct-10	18-Nov-10
RH3760	Develop Alternatives Analysis Report Outline w/ Alternatives Descri...	20d	18-Nov-10	21-Dec-10
RH3780	Run HCG Model with Existing Data on Alluvial Materials and Potential...	20d	18-Nov-10	21-Dec-10
RH3790	Run PA on Alternatives	30d	21-Dec-10	08-Feb-11
RH3800	Perform Cost Estimate on Liner Alternatives	15d	21-Dec-10	18-Jan-11
RH3810	Update AA Pro/Con Table	15d	18-Jan-11	08-Feb-11
RH3820	Complete Draft AA Report	10d	08-Feb-11	22-Feb-11
RH3830	Complete AA Report Review	10d	22-Feb-11	08-Mar-11
RH3840	Incorporate Comments into AA Report	10d	08-Mar-11	22-Mar-11
RH3850	Issue Report	5d	22-Mar-11	29-Mar-11
Vaults				
PP- Vault Procurement				
PP- Procurement (RFP/Contract)				
RH590	PP-Refresh RFP for Design/Build Contractor	15d	02-Oct-12	23-Oct-12
RH4070	PP- BEA Perform Cost Estimate Update to Support RFP Process	60d	02-Oct-12	03-Jan-13
RH2290	PP-Identify Potential Contractors	2d	23-Oct-12	25-Oct-12
RH2300	PP-Review/Incorporate Comments for RFP for Design/Build Contrac...	5d	23-Oct-12	29-Oct-12
RH2310	PP-Issue RFP to Qualified Bidders/ Pre-Bid Meeting	2d	30-Oct-12	31-Oct-12
RH2320	PP-Vendors Develop Bids/ Submit to BEA	30d	31-Oct-12	17-Dec-12
RH2330	PP-BEA Review Bids/ Select Contractor	5d	15-Jan-13	21-Jan-13
RH2340	PP-Issue Notice to Proceed to Contractor	1d	21-Jan-13	22-Jan-13
Vault Performance				
Geotechnical Testing				
RH600	Develop Statement of Work for Geotechnical Testing	10d	01-Oct-10	14-Oct-10
RH4470	Complete Seismic Evaluations for RHLLW	58d	01-Oct-10	23-Dec-10
RH2350	Develop RFP for Geotechnical Testing	10d	15-Oct-10	28-Oct-10
RH2360	Identify Potential Contractors for Geotechnical Testing	2d	29-Oct-10	01-Nov-10
RH2370	Review/Incorporate Comments for RFP for Geotechnical Testing	5d	29-Oct-10	04-Nov-10
RH2380	Issue RFP to Qualified Bidders/ Pre-Bid Meeting	2d	04-Nov-10	09-Nov-10
RH2390	Vendors Develop Bids/ Submit to BEA	20d	09-Nov-10	09-Dec-10
RH2400	BEA Review Bids/ Select Contractor for Geotechnical Testing	5d	09-Dec-10	15-Dec-10
RH2410	Issue Notice to Proceed to Contractor for Geotechnical Testing	5d	15-Dec-10	23-Dec-10
RH2420	Perform Geotechnical Fieldwork	20d	23-Dec-10	27-Jan-11
RH2430	Perform Geotechnical Laboratory Testing	10d	27-Jan-11	10-Feb-11



Activity ID	Activity Name	Rem Dur	Start	Finish
RH2440	Prepare Draft Geotechnical Report	15d	10-Feb-11	03-Mar-11
RH2450	BEA Review Draft Geotechnical Report	10d	03-Mar-11	17-Mar-11
RH4050	Incorporate Comments for Draft Geotechnical Report	3d	17-Mar-11	22-Mar-11
RH2460	Acceptance of Final Geotechnical Report	0d		22-Mar-11
Criticality/Shielding Analysis				
RH610	Issue Work Request for Nuclear Safety to Perform Criticality/ Shield...	5d	01-Oct-10	07-Oct-10
RH2470	NSA- Perform Criticality/Shielding Analysis	37d	07-Oct-10	01-Dec-10
RH3980	BEA Review of Criticality Analysis	10d	02-Dec-10	15-Dec-10
Vault Performance Specification				
RH620	Planning Session to Define Project Requirements	5d	01-Oct-10	07-Oct-10
RH2480	Engineering Analysis/Design for Vaults	30d	07-Oct-10	18-Nov-10
RH2490	Develop Specifications for Vaults	30d	18-Nov-10	11-Jan-11
RH2500	Develop Drawings (15 Drawings) for Vaults	30d	18-Nov-10	11-Jan-11
RH2510	BEA Review of Performance Specification for Vaults	5d	11-Jan-11	18-Jan-11
RH2520	Incorporate Comments for Performance Specification for Vaults	5d	18-Jan-11	25-Jan-11
RH2530	Issue Performance Specification for Vaults	0d		25-Jan-11
PP- Vault Design				
PP- Vault Design Reviews				
RH630	PP-Kickoff Meeting with Design-Build Contactor (at INL)	1d	22-Jan-13	23-Jan-13
RH2980	PP-Design Vaults to 90%	30d	23-Jan-13	06-Mar-13
RH2550	PP-90% Design Review	15d	06-Mar-13	27-Mar-13
RH2990	PP-Complete Final Design for Vaults	25d	28-Mar-13	01-May-13
PP- Final Design Report				
RH640	PP-Final Design Review	5d	01-May-13	08-May-13
RH2560	PP-Incorporate Comments for Final Design	10d	09-May-13	22-May-13
RH2570	PP-Draft Final Design Review Report	10d	23-May-13	06-Jun-13
RH2580	PP-Review Draft Final Design Review Report	10d	07-Jun-13	20-Jun-13
RH2590	PP-Incorporate Comments for Final Design Review Report	10d	21-Jun-13	08-Jul-13
RH2600	PP-Issue Final Design Review Report	10d	08-Jul-13	22-Jul-13
PP- Design Compliance Test Plan				
RH650	PP-BEA Develop Compliance Testing Criteria for Vaults	10d	23-Jan-13	06-Feb-13
RH2610	PP-Develop Plan to Test First Unit (55-Ton Cask System Vaults)	15d	06-Feb-13	27-Feb-13
RH2620	PP-Develop Plan to Test First Unit (MFC/ATR Activated Metals Cask ...	15d	06-Feb-13	27-Feb-13
RH2630	PP-Develop Plan to Test First Unit (ATR Resin Cask System Vaults)	15d	06-Feb-13	27-Feb-13
RH2640	PP-BEA Final Review of Vaults Test Plans	5d	28-Feb-13	06-Mar-13
RH2650	PP-Incorporate Comments for Vaults Test Plans	5d	06-Mar-13	13-Mar-13
PP- Vault Construction				
PP- First Units Compliance Tests				
RH2710	PP-Test the First ATR Resin Cask System Vaults	5d	28-Jan-14	03-Feb-14
RH2720	PP-BEA Review/ Approve Test Results from ATR Resin Cask Syste...	10d	03-Feb-14	17-Feb-14



Activity ID	Activity Name	Rem Dur	Start	Finish
RH2730	PP-BEA Approve Fabrication for Remaining ATR Resin Cask System ...	0d		17-Feb-14
RH2680	PP-Test the First MFC/ATR Activated Metals Cask System Vault	5d	25-Feb-14	03-Mar-14
RH2690	PP-BEA Review/ Approve Test Results from MFC/ATR Activated Met...	10d	03-Mar-14	17-Mar-14
RH660	PP-Test the First 55-Ton Cask System Vault	5d	17-Mar-14	24-Mar-14
RH2700	PP-BEA Approve Fabrication for Remaining MFC/ATR Activated Metal...	0d		17-Mar-14
RH2660	PP-BEA Review/ Approve Test Results from 55-Ton Cask System Va...	10d	25-Mar-14	07-Apr-14
RH2670	PP-BEA Approve Fabrication for Remaining 55-Ton Cask System Va...	0d		07-Apr-14
PP- 55-Ton Cask System Vaults Construction				
RH670	PP-Develop/Submit Fabrication Drawings	20d	12-Aug-13	10-Sep-13
RH2790	PP-BEA Review Fabrication Drawings	10d	10-Sep-13	24-Sep-13
RH2740	PP-Incorporate Comments for Fabrication Drawings	5d	24-Sep-13	01-Oct-13
RH2750	PP-BEA Approve Fabrication Drawings	0d		01-Oct-13
RH2780	PP-Fabricate First 55-Ton Cask System Vaults	10d	03-Mar-14	17-Mar-14
RH2820	PP-Fabricate Remaining 55-Ton Cask System Vaults	80d	20-Aug-14	15-Dec-14
RH2850	PP-Ship/ Receive 55-Ton Cask System Vaults	90d	18-Sep-14	02-Feb-15
RH2880	PP-Install/ Backfill 55-Ton Cask System Vaults	60d	13-Feb-15	08-May-15
PP- MFC/ATR Activated Metals Cask System Vaults Construction				
RH2890	PP-Develop/Submit Fabrication Drawings	20d	21-Jun-13	22-Jul-13
RH2900	PP-BEA Review Fabrication Drawings	10d	22-Jul-13	05-Aug-13
RH2910	PP-Incorporate Comments for Fabrication Drawings	5d	05-Aug-13	12-Aug-13
RH2920	PP-BEA Approve Fabrication Drawings	0d		12-Aug-13
RH2770	PP-Fabricate First MFC/ATR Activated Metals Cask System Vaults	15d	03-Feb-14	24-Feb-14
RH2810	PP-Fabricate Remaining MFC/ATR Activated Metals Cask System Va...	50d	10-Jun-14	20-Aug-14
RH2840	PP-Ship/ Receive MFC/ATR Activated Metals Cask System Vaults	70d	09-Jul-14	16-Oct-14
RH2870	PP-Install/ Backfill MFC/ATR Activated Metals Cask System Vaults	30d	02-Jan-15	13-Feb-15
PP- ATR Resin Cask System Vaults Construction				
RH2930	PP-Develop/Submit Fabrication Drawings	20d	01-May-13	30-May-13
RH2940	PP-BEA Review Fabrication Drawings	10d	30-May-13	13-Jun-13
RH2950	PP-Incorporate Comments for Fabrication Drawings	5d	13-Jun-13	20-Jun-13
RH2960	PP-BEA Approve Fabrication Drawings	0d		20-Jun-13
RH2760	PP-Fabricate First ATR Resin Cask System Vaults	10d	14-Jan-14	27-Jan-14
RH2800	PP-Fabricate Remaining ATR Resin Cask System Vaults	80d	17-Feb-14	10-Jun-14
RH2830	PP-Ship/ Receive ATR Resin Cask System Vaults	90d	17-Mar-14	23-Jul-14
RH2860	PP-Install/ Backfill ATR Resin Cask System Vaults	60d	01-Oct-14	02-Jan-15
Cask				
Cask Transportation System SOW and RFP				
RFP/ SOW for Transportation System				
RH800	Draft SOW and RFP for Transportation System	60d	01-Oct-10	04-Jan-11
RH1260	Internal Review and Comment of SOW / RFP	20d	04-Jan-11	01-Feb-11
RH1270	Incorporate Comments to SOW / RFP	10d	01-Feb-11	15-Feb-11



Activity ID	Activity Name	Rem Dur	Start	Finish
RH1280	Finalize SOW / RFP-Ready for Release	10d	15-Feb-11	01-Mar-11
PP- Cask Transportation System Subcontract Award, Hardware Fabrication and D...				
PP- Subcontract for Cask Transportation System Design / Fab				
RH820	PP-Award Subcontract for Cask Trans. System Design/ Fab/ Delivery	65d	13-Jan-14	11-Apr-14
PP- Cask System Final Design				
RH830	PP-Cask System Final Design	90d	11-Apr-14	19-Aug-14
PP- First Unit Fabrication/ Completion				
RH840	PP-First Unit Fabrication	90d	19-Aug-14	02-Jan-15
PP- Ancillary Equipment Design / Fab				
RH850	PP- Ancillary Equipment Design/ Fabrication	90d	11-Apr-14	19-Aug-14
PP- Transportation System Fitup				
RH860	PP- Transportation System Fitup	20d	02-Jan-15	30-Jan-15
PP- Transportation System / Ancillary Equip Hardware Delivery				
RH870	PP- Transportation System/ Ancillary Equip. Delivery	20d	30-Jan-15	27-Feb-15