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Analysis of Alternatives for Immobilized Low-Activity Waste Disposal

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Abstract: This report presents a study of alternative disposal system architectures and implementation strategies to provide onsite near-surface disposal capacity to receive the immobilized low-activity waste produced by the private vendors. The analysis shows that a flexible unit strategy that provides a suite of design solutions tailored to the characteristics of the immobilized low-activity waste will provide a disposal system that best meets the program goals of reducing the environmental, health, and safety impacts; meeting the schedule milestones; and minimizing the life-cycle cost of the program.

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**ANALYSIS OF ALTERNATIVES FOR
IMMOBILIZED LOW-ACTIVITY
WASTE DISPOSAL**

September 1997

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Prepared for

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Richland, Washington

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DECISION ANALYSIS SUMMARY

On September 25, 1996, the U.S. Department of Energy awarded two contracts for the privatization of radioactive waste treatment services for the Tank Waste Remediation System (TWRS) at the Hanford Site near Richland, Washington. The privatization schedule requires the vendor to begin treatment of low-activity waste in 2002. The TWRS Environmental Impact Statement Record of Decision states that the low-activity waste will be immobilized and disposed of onsite in near-surface disposal facilities.

This report presents a study of alternative disposal system architectures and implementation strategies to provide onsite near-surface disposal capacity to receive the immobilized low-activity waste (ILAW) produced by the private vendors. The analysis shows that a flexible waste strategy that provides a suite of design solutions tailored to the characteristics of the ILAW will provide a disposal system that best meets the program goals of reducing the environmental, health, and safety impacts; meeting the schedule milestones; and minimizing the life-cycle cost of the program.

The first activities required to implement the selected strategy will include conceptual design of the disposal site infrastructure and the remote-handled mixed waste disposal unit. The completion of these conceptual designs will make a complete suite of design solutions available for ILAW disposal architecture selections to be made at a later date.

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ACRONYMS AND ABBREVIATIONS

AGA	Alternatives Generation Analysis
ALARA	As Low As Reasonably Achievable
CERCLA	<i>Comprehensive Environmental Response, Compensation and Liability Act of 1980</i>
CFR	Code of Federal Regulations
CH	Contact Handled
DOE	U.S. Department of Energy
DST	Double-shell tank
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
ETP	Effluent Treatment Facility
EPA	U.S. Environmental Protection Agency
BRDF	Environmental Restoration Disposal Facility
FR	Federal Register
FSAR	Final Safety Analysis Report
HWIR	Hazardous Waste Identification Rule
HPT	Health Physics Technician
ILAW	Immobilized low-activity waste
IPA	Interim Performance Assessment
LAW	Low-activity waste
LLW	Low-level waste
MW	Mixed Waste
MYWP	Multi-Year Work Plan
NMW	Non-Mixed Waste
NRC	U.S. Nuclear Regulatory Commission
PA	Performance Assessment
PPTB	Privatization Process Technical Baseline
PUREX	Plutonium-Uranium Extraction Plant

ACRONYMS AND ABBREVIATIONS (CONTINUED)

RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RFP	Privatization Request for Proposals
RH	Remote Handled
ROD	Record of Decision
ROM	Rough Order of Magnitude
SST	Single-shell tank
TEDF	Treated Effluent Discharge Facility
Tri-Party Agreement	<i>Hanford Federal Facility Agreement and Consent Order</i>
TWRS	Tank Waste Remediation System
WAC	<i>Washington Administrative Code</i>
WHC	Westinghouse Hanford Company

ANALYSIS OF ALTERNATIVES FOR IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL

1.0 INTRODUCTION

This report presents descriptions and analysis of alternative system architectures for performing the immobilized low-activity waste (ILAW) disposal function. A discussion of programmatic uncertainties and their impacts on the disposal system requirements is also presented. An implementation strategy for cost-effectively responding to changing requirements and programmatic uncertainties is proposed.

1.1 BACKGROUND

In September 1996, the U.S. Department of Energy (DOE) awarded two contracts to privatize the treatment and immobilization of Hanford Site tank waste. The Tank Waste Remediation System (TWRS) privatization strategy is described in the privatization Request for Proposals (DOE-RL 1996a). Under the TWRS privatization Initiative, pretreatment, radionuclide separations, and immobilization will be performed in two phases by private contractors for the U.S. Department of Energy. In Phase IA of privatization, vendors were selected to establish the technical, operational, regulatory, and financial elements of the privatized services program. In Phase IB, the selected vendor(s) will perform demonstration scale treatment of 6 percent to 13 percent of Hanford Site tank waste in facilities that are developed, financed, permitted, constructed, owned, operated, and deactivated by the vendor. Phase II would continue privatized treatment of the remainder of the tank waste at higher throughput rates in full-scale facilities.

The TWRS Environmental Impact Statement (TWRS EIS) (DOE 1996) states that all ILAW packages will be disposed in engineered near surface disposal facilities located at the Hanford Site. The disposal facilities will be covered with a surface protective barrier during closure to inhibit moisture infiltration, minimize transport of contaminants to the ground water, and mitigate intrusion from plants, animals and humans. Monitoring will continue for at least 10 years during the post closure care period.

1.2 OVERVIEW

The mission of the TWRS ILAW disposal project is to receive, transport, store, and dispose of treated low-activity tank waste in a safe and environmentally sound manner. It

includes monitoring, closure, and post closure monitoring of the disposal facility. Disposal shall be in a near-surface facility on the Hanford site.

The ILAW disposal program schedule shows disposal capacity to be required beginning in 2005 when the ILAW storage vaults are filled to capacity. The required disposal capacity for the maximum order quantity in Phase I (ending in 2011) is 13,200 packages. The total required disposal system capacity is projected to be 98,200 packages, with ILAW package receipt to be completed by 2025. Table 1-1 summarized the disposal program mission requirements.

Table 1-1. Summary Mission Requirements.

Item	Phase I	Phase II	Total
Hot Operations Start Date	12/31/02	1/3/12	12/31/02
Hot Operations End Date	12/30/11	7/31/25	7/31/25
Post-closure Monitoring Start			8/1/25
Post-closure Monitoring End			4/28/34
Nominal Waste Package Count	13,200	85,000	98,200
Nominal Package Receipt Rate	4 per day	17 per day	
Peak Package Receipt Rate	9 per day	27 per day	
Nominal Waste Package Size	1.2 m x 1.2 m x 1.8 m = 2.59 m ³		

The primary goals of the ILAW disposal program (Armstrong et al. 1994) are as follows:

- Protect public and worker health and safety
- Minimize capital costs
- Minimize operating costs
- Meet or beat privatization and *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1996) schedule milestones
- Minimize environmental impacts
- Enable future use options.

The objective of this study is to select a disposal architecture and implementation strategy that minimizes the risk of not achieving these programmatic goals. This study was performed prior to the release of the final Performance Assessment (PA) or Final Safety Analysis Report (FSAR) for ILAW disposal. The conclusions of this study could be affected by the results of the PA or FSAR.

1.3 ARCHITECTURE ALTERNATIVES

Architecture alternatives for disposal of ILAW were developed by reviewing the existing source documents described in Section 2.3. Surveys of existing radwaste disposal units were also consulted to determine the common features of ILAW disposal facilities (Han et al. 1997, Gerton et al. 1995, Templeton et al. 1994). These studies confirmed the decision of the TWRIS EIS that the disposal site should be a near-surface facility on the Hanford Site. Alternatives that did not meet the basic constraints of onsite and near-surface were not considered in this analysis. Table 1-2 summarizes the ILAW disposal architectures that were developed and analyzed in this study.

1.3.1 Site Location for Immobilized Low-Activity Waste Disposal Facility

The location of the ILAW disposal facility will be on 90 acres of uncontaminated, vacant land in 200 East Area and southwest of PUREX (Shord 1995, Reidel et al. 1995). This disposal site location was part of the TWRIS complex layout that ranked the highest and had the most desirable features. DOE has concurred with the recommended site location (Rutherford 1997). Figures 1-1 and 1-2 depict the ILAW disposal site location plan and a preconceptual site plan (based on the option that would use the largest land area) of the proposed disposal location.

Table 1-2. Summary of Immobilized Low-Activity Waste Disposal Alternatives.
(2 Sheets)

Alternative	Description
Baseline Option 1A	Use shielded and lined underground concrete vaults for disposal of remote-handled mixed waste. Based on Interim Performance Assessment. Capacity of the baseline is 60,000 packages.
Adjusted baseline Option 1B	Baseline concept adjusted to meet the required disposal capacity of 98,200 packages and throughput of 27 packages per day.
RH-MW vaults Option 2A	Use shielded and lined concrete vaults for disposal of remote-handled mixed waste. Based on French facility at Centre de l'Aube.
RH-LLW vaults Option 2B	Use shielded concrete vaults for disposal of remote-handled non-mixed waste. Based on French facility at Centre de l'Aube. Requires declassified waste.

Table 1-2. Summary of Immobilized Low-Activity Waste Disposal Alternatives
(2 Sheets)

Alternative	Description
CH-MW trenches Option 2C	Use unshielded lined trench for disposal of contact-handled mixed waste. Based on Hanford Mixed Waste Disposal Trench in 200 West Area. Requires dose rate below 200 mR/h.
CH-LLW trenches Option 2D	Use unshielded lined disposal trench for disposal of contact-handled non-mixed waste. Based on Hanford Site solid waste disposal trench in 200 West Area. Requires dose rate below 200 mR/h.
Single-Shell Tanks Option 3	Modify cleaned out SSTs for disposal of 75 percent of the LLAW packages.
Canyon Buildings Internal Option 4A	Use grout vaults for disposal of LLAW to 2005. Use decommissioned canyon buildings (T, U, B, PUREX) for disposal of 23,300 RH packages. Requires delayed waste for canyon building disposal. Defers near-term need for new disposal facilities.
Canyon Buildings - Internal and External Option 4B	Use decommissioned canyon buildings (T, U, B, PUREX plants) for disposal of 23,300 RH and all CH packages. Requires delayed RH waste. Defers near-term need for new disposal units.
Expanded Internon Storage Option 5	Use additional storage buildings for contact-handled waste until disposal authorization is obtained and disposal capacity is available. Defers near-term need for new disposal units.
Shielded Overpacks RH-MW Option 6A	Use disposable shielded concrete overpacks for remote-handled LLAW. Dispose in mixed waste trench similar to concept 2C. Requires increased disposal capacity due to overpack volume.
Shielded Overpacks RH-LLW Option 6B	Use disposable shielded concrete overpacks for remote-handled LLAW. Dispose in non mixed trench similar to concept 2D. Requires delayed waste and increased disposal capacity due to overpack volume.

CH = Contact Handled

LLAW = Immobilized Low-Activity Waste

LLW = Low-Level Waste

MW = mixed Waste

RH = Remote Handled

SST = Single-shell tanks

Figure 1-1. Immobilized Low-Activity Waste Disposal Location Plan.

Figure 1-2. Preconceptual Immobilized Low-Activity Waste Disposal Site Plan.

1.4 CONCLUSIONS

This analysis shows that the minimum-risk implementation strategy for ILAW disposal is the flexible unit alternative. The flexible unit alternative provides a suite of disposal unit design solutions that meet the requirements dictated by the characteristics of the different ILAW waste types that may be received from the tank waste treatment vendors. The strategy provides a series of manageable subprojects that: (1) provide the disposal system infrastructure, (2) deploy multiple modular disposal units tailored to specific ILAW waste types, and (3) construct surface barrier closure systems to prevent intrusion by water, humans, plants and animals. The strategy provides ILAW disposal capacity on a just-in-time schedule, with the flexibility to adjust the number and types of modular disposal units based on operating experience and/or changes in the requirements for ILAW disposal.

1.5 RECOMMENDATIONS

Due to the uncertainties surrounding the characteristics of the ILAW packages, the flexible unit strategy should be selected for implementation. The next activity required to support this strategy would be conceptual design of the disposal system infrastructure and the remote-handled mixed waste disposal unit. Conceptual design of this unit would provide information needed to validate both Options 2A and 2B. Design information for existing facilities is sufficient to serve as a conceptual design basis for the other two types of disposal unit (Options 2C, and 2D) that may be deployed under this strategy. Conceptual design of a remote-handled mixed waste disposal unit will complete the suite of design solutions required to implement the strategy.

1.6 IMMOBILIZED LOW-ACTIVITY DISPOSAL ARCHITECTURE DECISION

This document does not contain a decision on the ILAW disposal system architecture. A decision board was convened in early May 1997. The decision plan for this activity (Peterson 1997) states that DOE concurrence on the decision will be requested by September 30, 1997.

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2.0 PROBLEM STATEMENT

This section describes the problem statement for this analysis, including the objectives of the analysis, key issues identified during the analysis, the source documents used for the analysis, and the approach used to develop the analysis.

2.1 OBJECTIVES

The problem statement for this study is: What type of engineered near-surface disposal facility and implementation strategy would minimize the programmatic risks of the ILAW disposal program?

The objectives of the analysis are twofold. First, select an implementation strategy that minimizes the risk of not achieving the primary programmatic goals. Second, select an architecture for the disposal system that fits within the implementation strategy.

2.2 KEY ISSUES

This section describes the key issues that have been identified during the course of this analysis. The course of action that will be taken during deployment of the ILAW disposal facilities depends on the resolution of these issues.

2.2.1 Waste Package Dose Rate

Previous studies addressing ILAW disposal have all been predicated on the assumption that the ILAW would be remote handled and disposed in shielded below ground vaults (Eiholzer 1995, Mitchell 1995, Mann et al. 1996). Analysis of the retrieval sequence, feed batch compositions, waste package specifications, and shielding calculations indicate that this may not be necessary for all of the ILAW. The likelihood that remote handling and shielded facilities may not be required for a significant fraction of the ILAW provides an opportunity for substantial cost savings over the life of the disposal program.

2.2.2 Hazardous Waste Regulatory Status

Under current environmental regulations, Hanford tank waste and the residues from its treatment (e.g., the ILAW product) fall under the purview of the *Resource Conservation and Recovery Act of 1976* (RCRA). The privatization contracts provide incentives for production of ILAW that is not regulated as a RCRA waste. Additionally, the U.S. Environmental Protection Agency (EPA) has proposed new rules (EPA 1995) that would allow listed wastes

to exit RCRA after treatment to below specified concentration limits. The possibility that the ILAW product may not be subject to RCRA requirements provides an opportunity for additional cost savings over the life of the disposal program.

2.2.3 Disposal Authorization Schedule

The *Tank Waste Remediation System Fiscal Year 1997 Multi-Year Work Plan* (Wilson 1996) shows additional disposal capacity becoming available in 2005 or about 1 year before available interim storage space at the retrofitted grout vaults will have been filled. Draft DOE Order 435.1, *Radioactive Waste Management*, which will replace DOE Order 5820.2A, requires that the program receive a disposal authorization statement based on an approved PA and composite analysis for each disposal facility prior to start of construction. The changing requirements for disposal authorization and required approvals could adversely impact the implementation schedule for ILAW disposal, and could result in the need for additional interim storage facilities.

2.3 SCOPE AND BASIS

The scope of this analysis is the ILAW Disposal System, architecture element 1.8.2 of the TWRS systems engineering database. This architecture performs function 4.2.4.2.4, *Dispose of Immobilized Low-Activity Waste*.

The technical basis for this study is derived from the TWRS EIS and the upper-level performance requirements described in the following related documents: *Disposal Facility Data For The Interim Performance Assessment* (Eiholzer 1995), *TWRS Privatization Request for Proposals (RFP)* (DOE-RL 1996a), *TWRS Privatization Contracts* (DOE-RL 1996b), *Tank Waste Remediation System Fiscal Year 1997 Multi-Year Work Plan* (Wilson 1996) and *Tank Waste Remediation System Privatization Process Technical Baseline* (Orme 1996). These source documents are described in more detail in the following subsections.

2.3.1 Disposal Facility Data For The Interim Performance Assessment

The *Disposal Facility Data For The Interim Performance Assessment* (Eiholzer 1995) constitutes the technical basis for the ILAW disposal facility cost estimates in the fiscal year (FY) 1997 multi-year program plan. This document provides initial estimates and enabling assumptions on the ILAW package size and two disposal unit concepts for the interim performance assessment (IPA) (Mann et al. 1996). The concepts were based on configuration studies by Mitchell (1995) and assumptions regarding waste form and volume.

The technical basis presented in the document is significantly different from the privatization basis. For the IPA concept, the basis was 6,804 canisters, each 2 m x 2 m x 8 m

and made of carbon steel. The containers were to be placed in underground concrete vaults with remote handling equipment, radiation shielding, and surface protective barrier. RCRA liner and leachate collection systems were not included in the cost estimates. The units described in this concept meet the requirements for disposal of remote-handled non-mixed waste.

2.3.2 Tank Waste Remediation System Privatization Request for Proposals

The *TWRS Privatization Request for Proposals (RFP)* (DOE-RL 1996a) identifies the services that DOE will provide to the low-activity waste (LAW) treatment contractors and key ILAW product requirements for Phase I privatization. These requirements were subsequently written into the Phase IA contracts for the private vendors (DOE-RL, 1996b). Throughout this report, all references to requirements in the RFP also refer to requirements in the privatization contracts. The specifications in the RFP and the contracts provide the primary requirements for this disposal system analysis. A fundamental assumption of this study is that the ILAW product will meet or exceed the requirements of the product specifications.

The ILAW product specification in the RFP requires sealing the ILAW in steel packages. The nominal dimensions of the package are 1.8 m long x 1.2 m high x 1.2 m wide, and it can weigh no more than 10,000 kg. The maximum allowable surface dose rate is 1,000 mrem/h, and the average cesium concentration can be no more than 3 Ci/m³. The allowable surface contamination on the package is limited to levels that are considered clean and free of contamination. The waste packages must meet requirements for shallow land disposal in the state of Washington. The package must be able to support 50,000 kg, resulting in a stacking limit of six packages high unless additional administrative controls are in place. Information on the amount of ILAW, number of ILAW packages and the disposal unit requirements were not identified in the Phase I specifications.

2.3.3 Tank Waste Remediation System Fiscal Year 1997 Multi-Year Work Plan

The *Tank Waste Remediation System Fiscal Year 1997 Multi-Year Work Plan* (Wilson 1996) is based on construction of three underground modules between 2004 and 2020 for disposal of ILAW as remote-handled mixed waste. The modules were to be concrete vaults (18 vaults each module) and based on the concept of Biholzer (1995). The modules would be backfilled, sealed, and covered with a protective barrier at the time of closure.

2.3.4 Tank Waste Remediation System Privatization Process Technical Baseline

The *TWRS Privatization Process Technical Baseline (PPTB)* (Orme 1996) provides the process flow diagrams and mass balance for the TWRS treatment concept under the privatization initiative. It estimates 13,200 packages of ILAW for Phase I and about 85,000

packages of ILAW for Phase II. These projections are based on the product specifications for Phase I and a standard set of assumptions regarding waste loading, waste form density, package fill fraction, and tank inventory (Brown 1996). The PPTB provides the basis for the disposal system capacity (98,200 packages) and the peak throughput requirements of nine packages per day for Phase I and 27 packages per day for Phase II.

2.3.5 Hanford Low-Level Tank Waste Interim Performance Assessment

The IPA (Mann et al. 1996) provides an analysis of the potential impacts of ILAW disposal on the general public, inadvertent intruders, groundwater, surface water, and air resources. The IPA concludes that wastes meeting the privatization product specifications, if disposed beneath a surface barrier that performs similarly to the Hanford Barrier (Myers and Durandau 1994), can meet all performance objectives found in DOE Order 5820.2A and 10 CFR 61 for protection of human health and the environment. Additional sensitivity studies were performed that concluded that the presence or absence of an engineered disposal structure has a negligible effect on the long term disposal system performance. These findings show that the engineered disposal structure need not perform any long-term containment functions, as long as the waste form meets the specifications and the closure barrier performs as designed.

2.4 IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL SYSTEM

The TWRS Final Environmental Impact Statement (DOE 1996) and TWRS Record of Decision (DOE 1997) establish that the ILAW "will be prepared for future onsite disposal in existing grout vaults and similarly designed near surface disposal facilities." The grout vaults will be initially used for interim storage to allow for a proper performance assessment of the ILAW disposal system and better determination of the disposal facility performance requirements.

The logic for ILAW storage and disposal is shown in Figure 2-1. Treated and immobilized LAW from Phase I production is received from the vendor in 2002 and emplaced in the retrofitted grout vaults for interim storage until 2005 when the additional storage and disposal vaults are available. The interim storage alternatives generation and analysis (Burbank 1996), design requirements (Burbank 1997) and DOE guidance provide technical and programmatic direction for planned use of the grout vaults for interim storage of ILAW.

This AGA and subsequent work cover the treated and immobilized LAW during Phase IB and Phase II. During this time period (2005 to 2025) ILAW is received from the vendor(s) and emplaced in authorized disposal units. Additional interim storage units may be constructed for some ILAW packages until authorized disposal units are constructed. All interim-stored waste will be retrieved for transport to the authorized disposal units.

Figure 2-1. Immobilized Low-Activity Waste Storage and Disposal Logic

Alternately, the waste stored in the grout vaults could be left in place and the vaults closed as a disposal unit, saving the cost of retrieval and transportation to the main disposal site. A performance assessment and composite analysis will be prepared to verify the appropriateness of the site selection and disposal unit design.

After disposal authorization, the filled disposal units will be backfilled with soil, sand or gravel to eliminate void space and a concrete roof added to enclose each shielded vault that contains remote-handled waste. At closure, a protective barrier will be constructed over the disposal units to inhibit moisture infiltration, minimize transport of contaminants to the ground water, and mitigate the effects of intrusion from plants, animals, and humans.

2.5 PROGRAMMATIC RISK MINIMIZATION

Programmatic risk is the probability that one or more program goals will not be met by the implementation strategy. The primary goals of the ILAW disposal program are as follows:

- ♦ Protect public and worker health and safety
- ♦ Minimize capital costs
- ♦ Minimize operating costs
- ♦ Meet or beat privatization and Tri-Party Agreement schedule milestones
- ♦ Minimize environmental impacts
- ♦ Enable future use options.

The measures used to evaluate these goals are as follows:

- ♦ Public/worker exposure (man-rems)
- ♦ Total capital cost (constant-year dollars)
- ♦ Total operating cost (constant-year dollars)
- ♦ Time-phased implementation schedule (years)
- ♦ Total land area permanently allocated to waste disposal (hectares)
- ♦ Total waste volume/source term (cubic meters/curies).

For all alternatives, the total waste volume and source term is assumed to be the same; i.e., the waste to be disposed is the same as that described in the Privatization Process Technical Baseline (PPTB) (Orme 1996) for all cases. Similarly, the DOE and stakeholders have agreed, through the Hanford Future Site Uses Working Group (DOE 1992), that the future use of the 200 Area central plateau will be for waste management, thus all on-site alternatives are consistent with this use of the land.

The higher-risk aspects of the existing programmatic strategy for implementation of the ILAW disposal system are as follows:

- Current plans are to construct three large capacity disposal modules between 2004 and 2020 and dispose of all ILAW as remote-handled mixed waste. This entails a large early commitment of resources and little flexibility to adjust to changing requirements.
- The current concept has no provisions for less expensive disposal units for low dose rate ILAW packages that can be contact handled.
- The current concept has no provisions for less expensive disposal units for delisted ILAW packages that can be classified as non-mixed waste.

The risks posed by the current strategy could be mitigated by implementing a strategy that provides a suite of smaller capacity design solutions, each tailored to the characteristics and requirements of a particular ILAW waste type as shown in Table 2-1. This would provide a flexible disposal architecture with the ability to quickly adjust to changes in the mix of waste types being produced or changing requirements for disposal of ILAW. The smaller size of a disposal unit under this strategy would avoid committing a large amount of resources for a single disposal architecture, thus allowing lower cost architectures to be deployed as needed to meet the requirements applicable to the ILAW being produced. This strategy would enable the disposal program to meet its mission while minimizing the life-cycle cost of the disposal system. Section 7.0 of this report provides additional details on the proposed implementation strategy for the ILAW disposal system.

Table 2-1. Design Requirements by Immobilized Low-Activity Waste Type.

Design Requirement	RH-MW	RH-LLW	CH-MW	CH-LLW
Remote Handling Equipment (Crane)	X	X		
Concrete Radiation Shielding	X	X		
Remote Video Monitoring and Inspection	X	X		
RCRA Double Liner System	X		X	
RCRA Leachate Collection System	X		X	
Contact Handling Equipment (Forklift)			X	X
Engineered Surface Closure Barrier	X	X	X	X

CH = Contact handled

LLW = Low-level waste

MW = Mixed waste

RCRA = Resource Conservation and Recovery Act of 1976

RH = Remote handled.

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3.0 CONSTRAINTS AND ASSUMPTIONS

This section describes the constraints and assumptions that define the framework of this analysis.

3.1 CONSTRAINTS

Constraints are requirements that are imposed on the system by outside agencies and are beyond control of design, construction, and operating organizations. The key constraints that drive the ILAW disposal system come from the Code of Federal Regulations (CFR), the Washington Administrative Code (WAC), and DOE Orders. In addition there are guidelines and specifications that establish engineering requirements deemed necessary for safe design, construction and operation of the system. The technical basis of the design concepts that were developed and analyzed in this study are derived directly from the requirements and guidelines established in these orders, regulations, codes, and agreements.

Table 3-1 lists the primary constraints for the ILAW disposal system. It is based on the Hanford Site 1996 RDD-100 data base, *TWRS Functions and Requirements* (WHC 1996) and subsequent review of the regulations. A comprehensive review of the regulations applicable to ILAW disposal is summarized in Appendix B. Results of the requirements review were used as a screening tool to develop new concepts and eliminate some concepts from consideration.

Table 3-1. Key Constraints For Immobilized Low-Activity Waste Disposal Facility.
(3 Sheets)

Document Identifier	Title
10 CFR 20	Standards for Protection Against Radiation
10 CFR 61	Licensing Requirements for Land Disposal of Radioactive Waste
10 CFR 830	Nuclear Safety Management
10 CFR 834 (draft)	Radiation Protection of Public and the Environment
10 CFR 835	Occupational Radiation Protection
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 61	National Emission Standards for Hazardous Pollutants
40 CFR 260	Hazardous Waste Management System

Table 3-1. Key Constraints For Immobilized Low-Activity Waste Disposal Facility.
(3 Sheets)

Document Identifier	Title
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 193 (draft)	Environmental Radiation Protection Standards for the Management, Storage and Disposal of Low-Level Radioactive Waste
DOE Order 435.1 (draft)	Radioactive Waste Management
DOE Order 5400.1	General Environmental Protection Program
DOE Order 5400.5	Radiation Protection of the Public and Environment
DOE Order 5480.11*	Worker Radiological Safety: Hanford Site Radiological Control Manual
DOE 5480.19	Conduct of Operation Requirements for DOE Facilities
DOE Order 5480.20A	Personnel Selection, Qualification, and Training for DOE Nuclear Facilities
DOE Order 5480.21	Unreviewed Safety Question
DOE Order 5480.22	Technical Safety Requirements
DOE Order 5480.23	Nuclear Safety Analysis Reports
DOE Order 5480.28	Natural Phenomena Hazards Mitigation
DOE Order 5480.4	Environmental Protection, Safety, and Health Protection
DOE Order 5480.7A/RLID5480.7	Fire Protection
DOE Order 5483.1A*	Occupational Safety and Health Program for DOE Contractors at Government Owned Contractor Operated Facilities
DOE Order 5820.2A	Radioactive Waste Management
DOE Order 6430.1A	General Design Criteria
Secretary of Energy Notice 35-91	Nuclear Safety Policy
NFPA 70 (1996)	National Electrical Code
NFPA 101 (1997)	Life Safety Code
UBC (1997)	Uniform Building Code

Table 3-1. Key Constraints For Immobilized Low-Activity Waste Disposal Facility.
(3 Sheets)

Document Identifier	Title
Tri-Party Agreement (1996)	<i>Hanford Federal Facility Agreement and Consent Order, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and the U.S. Department of Energy, Olympia, Washington.</i>
WAC 173-303	Dangerous Waste Management
WAC 173-460	Controls for New Sources of Toxic Air Pollutants
WAC 173-475	Ambient Air Quality Standards for Carbon Monoxide, Ozone and Nitrogen
WAC 173-490	Emission Standards and Controls for Sources Emitting Volatile Organic Compounds
WAC 246-220	Radiation Protection - General Provisions
WAC 246-247	Radiation Protection Air Emission
WAC 296-24	General Safety and Health Standards
WAC 296-62	Occupational Health Standards
HSRCM-1	Hanford Site Radiological Control Manual
WHC-SD-ETF-WAC-001	Effluent Treatment Facility Waste Acceptance Criteria
WHC-SD-W049-ICD-001, Rev 2	200 Area Treated Effluent Disposal Facility Interface Control Document
WHC-SD-GN-DGS-30011	Shielding Criteria

* DOE Order has been canceled but contractor is required to comply.

3.2 ASSUMPTIONS

Assumptions were made for areas where limited information is available and the required analysis has not been completed. The main assumptions used in this analysis and the rationale behind them are described below.

3.2.1 Immobilized Low-Activity Waste Product Specifications

The first assumption is that the Phase I contractors will meet or exceed all technical specifications for the ILAW product and package as defined in the RFP (DOE-RL 1996a) and the Phase IA contracts (DOE-RL 1996b). There are no specifications available for Phase II at

this time, so the Phase I specifications are assumed to also apply to all Phase II product. Changes in the Phase II specifications would impact the current ILAW disposal design basis (e.g., minimum waste loading, package size, maximum dose rate, delisting of waste, etc.).

This assumption is key to the analysis of alternative disposal system architectures, primarily because it is the cornerstone of the Interim Performance Assessment finding that the only significant engineered features of the disposal system are the waste form and the closure cover. Since a waste form that meets the privatization product specification will also meet the disposal facility performance objectives when emplaced beneath a closure cover similar in construction to the Hanford Barrier, the disposal facility is not required to perform a long-term containment function. For this analysis, all alternatives have the same waste form specifications and closure cover design. Thus, they would all be expected to meet the disposal system performance objectives required by DOE Order 5820.2A and 10 CFR 61.

3.2.2 Amount of Immobilized Low-Activity Waste

The second assumption is that the current ILAW product waste loading assumptions will produce about 13,200 packages for Phase I and about 85,000 packages for Phase II (Brown 1996, Orme 1996). This provides the basis for the disposal system capacity requirement of 98,200 packages. The rationale for the assumed waste loading was to keep the alternatives analysis basis consistent with the Privatization Process Technical Baseline (Orme 1996).

Under the worst case assumptions for waste loading and package size, the contractually allowed package count could be up to 165,000. The design approach should therefore be flexible enough to handle potentially large changes in the expected number of ILAW packages over the life of the disposal program.

3.2.3 Radioactive Waste Regulatory Status

The last major assumption is that the recent U.S. Nuclear Regulatory Commission (NRC) determination that ILAW is "incidental waste" (NRC 1997) will remain valid. This classification removes the waste from the high level waste disposal licensing authority of the NRC (currently based on double-shell tank [DST] waste classification) and permits disposal of ILAW from both single-shell tanks (SST) and DSTs under DOE requirements in shallow land disposal facilities. DOE Order 5820.2A, Chapter 3 contains DOE policy and requirements for management of low-activity waste.

Petersen (1996) provided the technical basis to support the NRC determination to classify treated and immobilized waste as incidental waste. Key radionuclides considered for removal were ¹³⁷Cs, ⁹⁰Sr, TRU, ⁹⁹Tc, ⁷⁵Se, ¹⁴C, ¹²⁹I, ³H, ¹¹⁴Sn, and the uranium isotopes. These radionuclides are of interest because they represent 99.9 percent of the waste tank curie inventory, are specifically identified in 10 CFR Part 61, or are potential detractors to disposal

system performance because they (or their daughter products) may exceed dose limits for a short term intruder scenario (100 mrem/yr) or a long term drinking water scenario (4 mrem/yr).

The ^{137}Cs content of unprocessed LAW represents the largest opportunity to meet the "technically and economically practical" criteria of incidental waste. For most of the remaining radionuclides it is technically feasible but very costly to remove them. For the others, there is no demonstrated commercial scale technology, making it technically unfeasible to remove them. If efficient removal of ^{137}Cs from alkaline aqueous wastes is accomplished, the incidental waste criteria can be met without need to remove additional soluble radionuclides.

The NRC incidental waste determination may be re-evaluated if any of the following factors are found to differ significantly from the analysis in Petersen (1996):

- The radionuclide inventory in the tanks is found to be significantly higher than or different from that described in the technical basis report.
- The LAW fraction is not vitrified, or the final waste form volume is significantly different from the projections of the technical basis report, or
- Changes in the final ILAW disposal site or site characterization parameters that adversely affect the conclusions of the final performance assessment.

3.3 UNCERTAINTIES

Uncertainties are identified where insufficient information exists to perform a required analysis. The main uncertainties identified in this analysis are described in the following sections.

3.3.1 Waste Package Dose Rate

The first key uncertainty that drives the design requirements is the radiation dose rate distribution of the ILAW packages. The RFP product specification allows a maximum surface dose rate of 1000 mrem/h. There is no specified minimum dose rate. This level of gamma radiation requires remote handling, shielding, and administrative controls to meet As Low As Reasonably Achievable (ALARA) exposure levels and to protect the health and safety of workers. Designing the radiation protection of the entire disposal system based on the assumption that all ILAW packages will have the maximum allowable dose rate is overly conservative and expensive.

Preliminary analysis of the Phase I retrieval sequence, feed batch compositions, and discussions with the treatment vendors show that a significant fraction (currently estimated to be from 25 percent to 40 percent product packages are expected to be lower dose rate and contact-handled waste (<200 mrem/h). The number of contact-handleable packages will depend primarily on the retrieved waste type and efficiency of the separation process for ¹³⁷Cs and other radionuclides. For some feed batches, cesium removal efficiencies of only 95 percent may be sufficient to produce contact-handled ILAW, while other batches could require removal efficiencies up to 99.9 percent to meet the minimum product specifications. A high separation efficiency will minimize the number of ILAW packages that require remote handling and gamma shielding at the disposal unit.

3.3.2 Hazardous Waste Regulatory Status

A second key uncertainty that drives the design requirements is the regulatory status of the ILAW product. Under the current U.S. Environment Protection Agency (EPA) "mixture" and "derived-from" rules, the ILAW would continue to be managed as a *Resource Conservation and Recovery Act of 1976 (RCRA)* regulated mixed (hazardous and radioactive) waste, because it is derived from tank waste that contains listed hazardous constituents. Although the vitrification process would result in a product that is compliant with the land disposal restrictions, the ILAW disposal facility would still have to meet the requirements of a RCRA Class I hazardous waste landfill, including double liners, leachate collection systems, and closure/post-closure monitoring systems.

Two possibilities could provide relief from the requirements of RCRA for the disposal facility. First, the privatization vendors have been asked to propose methods to provide non-RCRA regulated final waste products. Under the current regulations this could be achieved by petitioning the EPA to delist the ILAW product. The design requirements for disposal of a delisted waste form would be considerably less stringent than for mixed waste.

The second avenue for exiting RCRA lies in the proposed Hazardous Waste Identification Rule (HWIR) (EPA 1995). If promulgated, the HWIR would revise the "mixture" and "derived-from" rules and develop risk-based exit levels for listed constituents in hazardous waste treatment residues. Based on the initial proposed rule, ILAW product should be able to exit the RCRA rules under HWIR, and could therefore be managed as ordinary low-level waste during storage, disposal, and closure operations.

If one of these avenues for exiting RCRA is successfully completed, the design requirements would be less stringent and less costly than those found in a facility that incorporates the RCRA disposal unit design features.

3.3.3 Disposal Authorization

The last key uncertainty is based on draft DOE Order 435.1, *Radioactive Waste Management*. When implemented, this order will replace DOE Order 5820.2A. The main impact on ILAW disposal will be in the following areas:

- Stronger emphasis on overall waste management (e.g., planning document for waste from generation through disposal)
- Requirements on interim storage will be more restrictive
- Requires approval of performance assessment and composite analysis before obtaining a disposal authorization statement (needed to start construction).

The draft DOE Order 435.1 is not final yet and is still subject to change. The primary impact of the changing requirements for disposal authorization would be potential schedule delays while authorization documents are prepared, leading to a need for additional interim storage facilities to meet the schedule and capacity requirements to support the privatization contractors.

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4.0 DECISION CRITERIA

This section describes the decision criteria that were used to differentiate between the types of ILAW disposal units and implementation strategy. They can be grouped into the major categories of cost, flexibility, schedule, risk, environmental impact, operability, maintainability, safety, radiation exposure, and public acceptance.

These criteria represent a mixture of quantitative and qualitative factors. Some of the criteria, such as cost and schedule, represent directly measurable variables. Other performance measures, such as operability and maintainability, are more dependent on the judgement of experienced engineers and operations personnel.

4.1 COST

Total life-cycle costs were developed for each alternative. For the purposes of this analysis, all costs were indexed to constant 2002 dollars. Cost summaries for each alternative are presented throughout Section 5.0, and cost estimate details are presented in Appendix A.

4.1.1 Capital Cost

Capital costs for newly developed concepts were estimated by using unit rate parametric methods applied to excavation, concrete, and steel quantities developed from preconceptual facility layouts, along with vendor quotations for major equipment items. All construction cost estimates include a minimum 30 percent contingency. Costs for existing facilities and concepts that are presently in use on the Hanford Site (e.g., liner/leachate collection systems and closure barriers) were based on historical cost data.

Capital costs were evaluated objectively based on construction cost estimates developed by ICF Kaiser Engineering Hanford and Fluor Daniel Northwest. These estimates were at a rough order of magnitude level of accuracy due to the limited amount of detailed design data. Capital cost estimates presented in this analysis are for construction only. There is no allowance for project management or indirect costs. Alternatives with lower capital cost received higher scores.

4.1.2 Operating Cost

Life-cycle operating costs were developed based on preliminary time and motion studies and operations scenarios based on the required throughput for both Phase I and Phase II production rates. Operating crew size was based on peak throughput requirements. Labor

rates were based on Hanford organizational labor rates indexed to year 2002. Strategies with lower operating cost received higher rankings.

4.2 FLEXIBILITY

The flexibility of a disposal unit to perform multiple waste disposal functions was evaluated under this category. The strategies and options with the ability to meet minimum requirements for disposal of multiple waste types and on the ease of retrieval of waste packages were scored higher.

4.2.1 Multiple Waste Types

Flexibility of the facility to handle multiple waste types such as remote-handled mixed waste, remote-handled non-mixed waste, contact-handled mixed waste, and contact-handled non-mixed waste was evaluated under this category. Strategies and options with the ability to meet multiple requirements were scored higher.

4.2.2 Waste Retrieval

Retrievability was evaluated subjectively based on the estimated ease of reentering the facility for package retrieval. Strategies that provided easy retrievability were scored higher.

4.3 SCHEDULE

The ability of an option to meet critical schedule milestones was considered under this category. The options were objectively evaluated on their ability to meet the 1997 Multi-Year Work Plan (MYWP) schedule (Wilson 1996) and Tri-Party Agreement (Ecology et al. 1996) milestone M-90-10.

4.3.1 Multi-Year Work Plan Milestones

The FY 1997 MYWP schedule identifies a 3.5 year operating life of the ILAW Interim Storage Facility (retrofitted grout vaults between 2002 and 2005) and shows that the first ILAW disposal module shall be constructed by September 2004. This criterion was used to compliment the go/no-go test to meet Tri-Party Agreement milestone M-90-10.

4.3.2 Tri Party Agreement Milestone

The Tri-Party Agreement provides the legally enforceable milestones for TWRS. It is the primary schedule driver for new ILAW disposal facility. A disposal facility is needed by December 2005 because the ILAW interim storage capacity of the grout vaults will have been used. This criterion was a go/no-go test to determine if it was possible to implement an option that initiates hot disposal operations by December 2005.

4.4 ENVIRONMENTAL IMPACT

The environmental impacts of the ILAW disposal system can be assessed by amount of land usage and secondary waste generation.

4.4.1 Land Usage

The amount of land used for construction of new ILAW disposal facilities was evaluated under this category. Options with smaller land requirements scored higher. Only land use within the TWRS disposal program was considered. Use of land that is already committed to other cleanup programs (e.g., inside and around canyon buildings, or in empty tanks) was not considered to be used by the TWRS disposal program.

4.4.2 Secondary Waste Generation

Contaminated waste from construction and operation of the disposal facilities were evaluated subjectively under this category. Options with the potential to generate less secondary waste scored higher.

4.5 OPERATION, MAINTENANCE, AND SAFETY

The options were subjectively evaluated from a daily operations standpoint under this category. The category was further subdivided into subcategories of operability, maintainability, safety, and radiation exposure.

4.5.1 Operability

Operability was evaluated subjectively based on the estimated complexity of procedures that would be used during the daily operations. Options with fewer pieces of equipment and simpler operating procedures scored higher.

4.5.2 Maintainability

Maintainability was evaluated subjectively based on the estimated complexity of the equipment needed to support the disposal facility. Equipment accessibility, zone entry, and contact versus remote maintenance were important considerations in this evaluation category. Options with fewer moving parts, easy contact maintenance access, and off-the-shelf equipment scored higher.

4.5.3 Safety

Worker lives/lost time accidents during construction, disposal and potential retrieval operations were evaluated subjectively. Options with the fewest and least hazardous safety risks were scored highest.

4.5.4 Radiation Exposure

Worker radiation exposure was evaluated objectively based on estimates of time and proximity to radiation sources during disposal and potential retrieval operations. Potential public exposure to radionuclides via the air, surface, and groundwater pathways is evaluated by the Interim Performance Assessment, which shows that the public dose commitment is insensitive to the disposal architecture. Options that had lower estimated exposures for personnel were scored highest.

4.6 PUBLIC ACCEPTANCE

This criterion considered the acceptability of an option relative to expressed stakeholder values and concerns. The level of public acceptance to an option is measured against a subjective set of values as described in various position papers prepared by the Hanford Advisory Board, other stakeholder groups and guidance decision groups (Armstrong et al, 1994, Keeney and von Winterfeld 1996). The performance measures were selected to bound and consolidate the various stakeholder values. Table 4-1 summarizes the key stakeholder values and assessment that are considered in this analysis.

Table 4-1. Stakeholder Values.

End objective	Study performance measure
Protect Public/Worker Health and Safety	Assessed in safety and environmental performance measures
Protect environment	Assessed in safety and environmental performance measures
Enable future use options to occur	Assessed in safety and environmental performance measures
Protect the Columbia River	Assessed by environmental performance measures
Ensure compliance	Assessed by environmental and regulatory performance measures
Reduce costs	Directly assessed by cost data for the alternatives
Enhance technology development	Assessed by operability, maintainability and risk performance measures
Capture economical development locally	Not assessed
Protect rights of Native American Indians	Assessed by environmental performance measures

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5.0 DESCRIPTION OF ALTERNATIVES

The disposal system architectures analyzed in this study are the baseline, flexible unit approach, SST usage, existing facilities, and shielded disposable overpacks. An analysis of extended interim storage facilities is also included. Previously rejected disposal alternatives and those that do not meet the basic constraints of near-surface and onsite were not reconsidered.

The first alternative considered is the baseline approach, which reflects the concept that provides the basis for the cost estimates in the FY 1997 MYWP. The technical basis for this concept is not the same as the privatization basis; it is carried through the analysis as a point of reference only. For this study, an adjusted baseline was developed that more closely matches the privatization basis. This adjusted baseline was used in the evaluation of alternative architectures.

The flexible unit approach alternative resulted from a detailed review of ILAW disposal requirements (See Appendix B). This approach establishes design requirements based on the characteristics of the different wastes types that may be produced during immobilization of the tank wastes. Design features of the disposal units are tailored to meet only the specific requirements for a particular waste type.

The next alternative proposes to use the emptied SSTs as disposal units for ILAW waste packages. It resulted from input to FY 1997 Hanford Site Technology Coordination group. This alternative does not meet the near-term schedule requirements but may be suitable for outyear implementation.

The fourth alternative is to use existing facilities such as the canyon buildings for final disposal of the ILAW packages. This alternative does not meet the near-term schedule requirements but may be suitable for outyear implementation.

The fifth alternative is to extend interim storage of contact-handled ILAW packages in regulated facilities until disposal authorization is obtained (draft DOE Order 435.1) and disposal units are constructed. This alternative would be used to provide the required near-term capacity until outyear alternatives could be implemented.

The final alternative is to use disposable shielded overpacks for remote-handled waste packages and dispose of the overpacked waste in a contact-handled disposal facility similar to those described in the flexible unit approach.

Options that were rejected by the TWRS EIS (DOE 1996) or those that did not meet key requirements of the RPP (DOE-RL 1996a) are summarized in Section 5.7. They were not considered further in this analysis.

5.1 BASELINE WASTE DISPOSAL CONCEPT

The baseline waste disposal concept and the baseline concept as adjusted to account for capacity and throughput discrepancies are described in the following sections.

5.1.1 Option 1A - Baseline Disposal Concept

The disposal concept that forms the technical baseline for the MYWP is the underground concrete vault. It is based on the preliminary disposal facility concept that Eiholzer (1995) developed for the interim performance assessment (Mann et al. 1996).

The MYWP planning is based on construction of three large underground disposal modules (18 concrete vaults each module, 54 vaults total) between 2004 and 2020 for disposal of all ILAW as remote-handled non-mixed waste (Wilson 1996). The vaults and modules would be backfilled, sealed and covered with a protective barrier at the time of closure. The following description is from Eiholzer (1995).

Two disposal facility concepts were developed for the interim performance assessment. They were based on the configuration studies by Mitchell (1995). The initial concept contained 42 vault bays (31,000 m² vault floor area and 36,000 m² total floor area) for disposal of the preliminary 2 m x 2 m x 8 m (large) ILAW containers. The facility would contain remote handling equipment, shielding walls, and a surface barrier with a moisture diverter and water conditioning layer.

The second concept is a variation of the initial concept. It was selected as the baseline concept for ILAW disposal based on the interim performance assessment due to its larger size and additional features. Figure 5-1 shows the disposal facility concept. Figure 5-2 shows a cross section view.

The unit contained 54 vault bays (40,000 m² vault floor area and 86,500 m² total floor area), additional backfill between vault groups, and a multi-sloped bottom pad. The additional backfill would help to keep moisture away from the waste containers and provide a stronger soil column to prevent subsidence. The multi-slope bottom pad improves drainage.

The technical and cost baseline for the FY 1997 MYWP is to design and construct this type of facility as three modules of 18 vaults each for disposal of all ILAW as remote-handled waste. The vaults would be made from reinforced concrete.

For this concept, the bottom pad of the disposal facility would be 246 m x 351.5 m x 0.76 m (86,500 m³). The individual vault bay pads would be 38 m x 19.5 m x 0.76 m (740 m³). The outer bay walls would be 2 m thick and 9 m tall. The interior bay walls would be 1 m thick and 9 m tall. There would be openings into each bay from the center aisle,

Figure 5-2. Cross Section of Baseline Disposal Facility Concept.

For Phase I, the analysis assumes the ILAW packages are transported by truck to the disposal vault from treatment or interim storage facilities. A manually controlled remotely operated crane would move the packages from the transporter to their disposal position in the vault bays. The package marker information would be checked against the waste manifest during transfer. For Phase II, the operating costs were based on automated remote operations and transport via rail from a close-coupled treatment facility due to the higher throughput requirements.

The operations and control building would include systems for remote viewing, controlling access to the active portion, alarm displays, communications, a dedicated computer for storage of records, personnel training area, and standard office building equipment. Maintenance of the crane and other failed equipment would be performed in a low radiation zone of the disposal facility or at a designated maintenance facility in the 200 East Area, assumed to be shared with the vitrification plant.

The closure cover or surface protective barrier consists of multi-layer cover consisting of soil, sand and rock about 4.6 m thick. It will be placed over the ILAW disposal units at closure. A moisture conditioning layer has been proposed to potentially reduce glass corrosion. This would increase the total thickness of the barrier up to 6 m (Mann et al. 1996). Details on the surface protective barrier are given in the design basis document for the *Hanford Site Barrier Program* (Myers and Duranceau 1994) and the *Interim Performance Assessment* (Mann et al. 1996).

Table 5-1 summarizes the estimated construction costs for this facility as found in the FY 1997 MYWP planning baseline. The total estimated cost for construction and closure of the facility is \$393 million (includes \$66 million for infrastructure items such as site work, roads, buildings, fences, utilities, power water, sewer, transport equipment). The construction cost of one module is \$96 million. All costs are escalated to 2002. See Appendix A, Table A-3 for details.

Table 5-1. Summary of Estimated Costs For Design, Construction, and Closure of the Baseline Immobilized Low-Activity Waste Disposal Facility (Option 1A).^a

Disposal unit	Construction \$ million	Infrastructure \$ million	Closure \$ million	Total \$ million
Module 1 09/04	96	66	13	175
Module 2 09/15	96	0	13	109
Module 3 09/20	96	0	13	109
Total	288	66	39	393

^a The capacity basis for these costs is 60,000 packages.

5.1.2 Option 1B - Adjusted Baseline

The cost estimate for the Option 1A Baseline was based on incomplete information regarding the privatization initiative and was built using factored cost estimating methods. Several design features (e.g. RCRA liner and leachate collection system) were sketchy or omitted completely. Subsequent analysis of this concept (Biholzer 1996) against the privatization specifications shows that the capacity of this option is nominally 60,000 ILAW packages. The required capacity is 98,200 packages.

For comparative purposes, the construction costs for the disposal units and closure for Option 1A have been adjusted to the larger required capacity. Adjustments were based on the capacity ratio for the two options. Infrastructure costs were not adjusted since they should be largely independent of the facility capacity. Table 5-2 reflects the adjusted construction costs for a facility comparable to Option 1A, but with the required capacity of 98,200 ILAW packages.

Table 5-2. Summary of Estimated Costs For Construction and Closure of the Adjusted Baseline Immobilized Low-Activity Waste Disposal Facility (Option 1B).^a

Disposal unit	Construction \$ million	Infrastructure \$ million	Closure \$ million	Total \$ million
Module 1 09/04	159	66	22	247
Module 2 09/15	159	0	22	181
Module 3 09/20	159	0	22	181
Total	477	66	66	609

^aThe capacity basis for these costs is 98,200 packages.

Operating cost estimates for the Baseline concept were obtained from the FY97 MYWP, and are shown in Table 5-3. The basis for the Baseline operating cost estimate is presented in Appendix A, Tables A-1 and A-2. The operating costs for the Adjusted Baseline were derived from the Baseline costs by multiplying by the throughput ratio. The Adjusted Baseline operating costs are shown in Table 5-4.

Table 5-3. Estimated Operating Costs for Immobilized Low-Activity Waste Storage and Disposal Based on 1997 Multi-Year Work Plan Baseline (Option 1A).

Mode	Operational preparation \$ million	Hot operation \$ million	Facility deactivation \$ million	Long term monitoring \$ million	Total cost \$ million
Phase I Remote-handled ILAW Disposal ^a (12,520 containers)	4.0	38.7	2.0	-	44.8
Phase II Remote-handled ILAW Disposal ^b (83,200 containers)	5.3	76.3	-	5.9	87.4
Total	9.3	115.0	2.0	5.9	132.2

^aProduction rate is:

5.4 packages per day (27 packages per 5 day week)

12 year duration (2 yr pre-operation, 9 yr operation, 1 yr deactivation)

3 shift, 1 grout vault storage/disposal operation at a time, 5 days/week

(1.8 package/shift x 3 shifts/day x 5 days/week = 27 packages/week), manual control of remote operations.

^bProduction rate is:

16.8 packages per day (118 packages per 7 day week)

16 year duration (2 yr pre-operation, 14 yr operation, no deactivation), plus 9 year long term monitoring

5 shifts (4 + training shift), 1 module disposal operation at a time

(3 total), 7 days/week (5.6 package/shift x 3 shifts/day x 7 days/week = 118 packages/week), automatic control of remote operations.

Table 5-4. Estimated Operating Costs for Immobilized Low-Activity Waste Storage and Disposal Based on 1997 Multi-Year Work Plan as Adjusted for Throughput (Option 1B).

Mode	Operational preparation \$ million	Hot operation \$ million	Facility deactivation \$ million	Long term monitoring \$ million	Total cost \$ million
Phase I Remote-handled ILAW Disposal ^a (12,520 containers)	9.4	90.4	4.8	-	104.6
Phase II Remote-handled ILAW Disposal ^b (83,200 containers)	8.4	122.0	-	9.5	139.9
Total	17.8	212.4	4.8	9.5	244.5

ILAW = Immobilized low-activity waste

^aBased on Table 5-3 and adjusted for throughput ratio of 2.33 for Phase I. Production rate is 9 packages per day (63 packages per 7 day week), manually controlled remote operations.

^bBased on Table 5-3 and adjusted for throughput ratio of 1.60 for Phase II. Production rate is 27 packages per day (189 packages per 7 day week), automatically controlled remote operations.

5.2 FLEXIBLE UNIT APPROACH

The flexible unit approach alternative resulted from a detailed review of ILAW disposal requirements (WHC 1996). It is based on the expectation that pretreatment processes for SST and DST wastes and regulatory delisting will result in waste forms that are subject to fewer constraints, which allows for construction of simpler disposal units. See Appendix B for the detailed assessment of the disposal system design requirements.

For the flexible unit approach, a disposal unit size of 5,040 packages in an array 10 packages wide x 84 long x 6 high was chosen on the basis of providing capacity to hold approximately four years of Phase I production in a cost effective manner. The unit size was selected to provide a flexible system without the need for committing large capital expenditures for facilities that may not be needed or used for several years. For Phase II, the approach provides for multiple units operating concurrently to more easily handle the expected throughput of up to 27 packages per day. See Appendix A, Section A2.1, for descriptions of the components included in each of the flexible unit concepts.

5.2.1 Option 2A - Remote-Handled Mixed Waste Disposal Vaults

This option is an engineered vault system conceptually based on the French facility managed by ANDRA at Centre de l'Aube for LAW disposal and the premise that all of the projected 98,200 packages will require disposal as remote-handled mixed waste. It assumes that the existing grout vaults will be retrofitted and used for interim storage of ILAW. The current schedule shows permanent disposal capacity becoming available in 2005 or about one year before storage space at existing grout vaults is filled.

The number of remote-handled mixed waste disposal units can not be firmly established at this time due to incomplete ILAW product performance specifications and regulatory issues on land disposal restrictions for treated dangerous waste. For the purpose of this analysis, it was assumed that each disposal unit would have a capacity for about 5,040 packages of ILAW, for a maximum 19 disposal units. Further study of feed staging plans and private contractor process flow diagrams is required to determine the actual number of remote-handled mixed waste packages that will be produced.

The engineered system features include remote handling, shielding for gamma radiation protection of operating and maintenance personnel, double liner and leachate collection system, moisture drainage or accumulation monitor, and surface closure barrier. The concept is shown in Figure 5-3.

The disposal unit would be a concrete vault divided into six cells. Each cell would have concrete walls and floors. A mobile roof with bridge crane would be used for addition and retrieval of packages and would provide protection from the environment. After a cell is filled, a temporary roof would be placed over the cell, allowing retrieval of the waste packages until authorization for disposal is received.

The facility would have a double liner and leachate collection system for compliance with RCRA regulations. A surface protective barrier over the units would be constructed at closure. The design, operation, and closure would comply with regulatory requirements for near surface disposal of mixed waste, DOE Orders, and NRC regulations for designated incidental waste not exceeding NRC Class C.

During operations, the ILAW packages (1.8 m x 1.2 m x 1.2 m) would be removed from the shielded transport container, moved to the disposal vault, and stacked up to six high (7.2 m) by the bridge crane. During this operation the package marker information would be checked against the waste manifest.

Sufficient spacing between packages (10 cm) would be provided to allow for subsequent package identification checks, retrieval, and addition of filler material. The crane would be remotely operated and controlled from an operations building at the disposal site. A local backup control panel would be available at each vault for manual crane operation.

Figure 5-3 Remote-Handled Mixed Waste Disposal Facility Concept

After a vault cell is filled with waste packages, a new cell would be activated. A temporary metal roof would be placed over the filled cell to protect the waste packages from weather and animals. A moisture monitor, double liner, and leachate collection system will be used to check and measure for run-on and/or potential release of radioactive and other contaminants from the vault bays. Monitoring of the filled vault cells would continue until closure.

A storm water control system would be used to collect and divert run-off. Contaminated or potentially contaminated storm water and leachate would require disposal at the Effluent Treatment Facility (ETF). Uncontaminated storm water and leachate would be disposed at the Treated Effluent Disposal Facility.

At closure, the temporary metal roof system would be removed and the cells would be backfilled with soil, sand, or gravel. A reinforced concrete roof would be poured on top of the backfill. The disposal unit would then be backfilled to grade and a surface protective barrier system placed over the vaults to prevent intrusion and minimize water infiltration into the disposal facility. Figure 5-4 shows a cross section of a closed disposal unit.

The operations and control building would include systems such as a control room, monitors for remote viewing, access controls to the active portion, alarm displays, communications, a dedicated computer for storage of records, a personnel training area, and standard office building equipment.

Maintenance of the cranes, trucks, and other mechanical equipment would be performed in a low radiation zone at the disposal unit or at the disposal site equipment maintenance facility.

Figure S-4. Cross Section of Closed Immobilized Low-Activity Waste Disposal Unit for Remote-Handled Mixed Waste.

Table 5-5 summarizes the capital cost estimates for this type of disposal facility. The total estimated cost for construction and closure of 18 of these type of disposal units is \$554.5 million, including \$24.4 million for infrastructure items and \$47.5 million for closure. The construction cost for one disposal unit is \$25.4 million. See Appendix A, Tables A-4, A-5, and A-6 for details.

Table 5-5. Summary of Estimated Capital Costs For Disposal of Remote-Handled Mixed Waste (Option 2A).

Disposal unit	Construction \$ million	Infrastructure ^a \$ million	Site closure ^b \$ million	Total \$ million
Module 1	\$25.4	24.4	2.5	52.3
Additional 18 modules based on disposal of remaining ILAW as RH MW	457.2	0	45.0	502.2
Total	482.6	24.4	47.5	554.5

CH MW = Contact-handled mixed waste

ILAW = Immobilized low-activity waste

RH MW = Remote-handled mixed waste

^aThe infrastructure is a one time cost for construction of any of the disposal units for the flexible alternative options.

^bUnit and site closure costs are a one time cost. They are the same for any of the units for the flexible alternative options.

Table 5-6 summarizes the estimated operating costs for this facility. The total cost for operational preparation, hot operations, deactivation and long-term monitoring is \$408.1 million. See Appendix A, Table A-7 and Table A-8 for details.

Table 5-6. Estimated Operating Costs for Disposal Of Remote-Handled Mixed Waste (Option 2A).

Mode	Operational preparation \$ million	Hot operation \$ million	Facility deactivation \$ million	Long term monitoring \$ million	Total cost \$ million
Phase I ^a (13,200 containers)	6.4	63.4	3.2	-	73.0
Phase II ^b (85,000 containers)	18.5	266.6	9.3	40.7	335.1
Total	24.9	330.0	12.5	40.7	408.1

^aPhase I Disposal Bases:

12 year duration (2 yr pre-operation, 9 yr operation, 1 yr deactivation)
 peak production 9 containers per day (63 containers per 7 day week)
 peak production of 13 containers per day based on 5 day week
 1 container per trailer and 2 trailers per shift based on 3.25 hr/trailer turnaround
 3 shift, 2 vault disposal operation handles 12 containers per day and
 60 containers per 5 day week (2 containers/shift/vault x 3 shifts/day x 2 vaults x
 5 day/week = 60 containers/week).

^bPhase II Disposal Bases:

17 year duration (2 yr pre-operation, 14 yr operation, 1 yr deactivation) plus
 9 yr long term monitoring
 peak production 27 containers per day (189 containers per 7 day week)
 1 container per trailer and 2 trailers per shift based on 3.25 hr/trailer turnaround
 5 shifts (4 + training shift), 4 vault disposal operation handles 24 containers per
 day and 168 containers per 7 day week (2 containers/shift/vault x 3 shifts/day
 x 4 vaults x 7 day/week = 168 containers/week).

5.3.2 Option 2B - Remote-Handled Non-Mixed Waste Disposal Vaults

This alternative is based on the premise that not all of the ILAW packages require disposal as remote handle mixed waste due to delisting of vitrified LAW. A shielded unit or vault facility would be required for disposal of ILAW packages that meet performance specifications for remote-handled non mixed waste. The engineered system features include remote handling, shielding for gamma radiation protection of operating and maintenance personnel, moisture accumulation monitor or drainage in filled sections, and surface protective barrier.

This concept is identical to the mobile crane and vault system described in Section 5.2.1 except there is no requirement for a double liner and leachate collection system (see Figure 5-5).

Table 5-7 summarizes the capital cost estimates for a remote-handled non-mixed waste disposal facility. The total estimated capital cost for construction and closure of 19 disposal units is \$495.6 million. The construction cost for one disposal unit is \$22.3 million. See Appendix A, Tables A-4, A-5, and A-6 for details.

Table 5-7. Summary of Estimated Capital Costs For Disposal of Remote-Handled Non-Mixed Waste (Option 2B).

Disposal unit	Construction \$ million	Infrastructure ^a \$ million	Site closure ^b \$ million	Total \$ million
Module 1	22.3	24.4	2.5	49.2
Additional 18 units for disposal of remaining ILAW as RH MW	401.4	0	45.0	446.4
Total	423.7	24.4	47.5	495.6

ILAW = Immobilized low-activity waste

RH MW = Remote-handled mixed waste

^aThe infrastructure is one-time cost for construction of any of the disposal units for the flexible alternative options.

^bUnit and site closure costs are a one-time cost. They are the same for any of the units for flexible alternative options.

Table 5-8 summarizes the estimated operating costs for this facility. The total cost for operational preparation, hot operations, deactivation and long-term monitoring is \$403.1 million. See Appendix A, Table A-7 and Table A-8 for details.

Figure 5-5 Remote-Handled Non-Mixed Waste Disposal Facility Concept

Table 5-8. Estimated Operating Costs for Disposal Of Remote-Handled Non-Mixed Waste (Option 2B).

Mode	Operational preparation \$ million	Hot operation \$ million	Facility deactivation \$ million	Long term monitoring \$ million	Total cost \$ million
Phase I ^a (13,200 containers)	6.4	63.4	3.2	-	73.0
Phase II ^b (85,000 containers)	18.5	266.6	9.3	40.7	335.1
Total	24.9	330.0	12.5	40.7	408.1

^aPhase I Disposal Bases:

12 year duration (2 yr pre-operation, 9 yr operation, 1 yr deactivation)
 Peak production 9 containers per day (63 containers per 7 day week)
 Peak production of 13 containers per day based on 5 day week
 1 container per trailer and 2 trailers per shift based on 3.25 hr/trailer turnaround
 3 shift, 2 vault disposal operation handles 12 containers per day and
 60 containers per 5 day week (2 containers/shift/vault x 3 shifts/day x 2
 vaults x 5 day/week = 60 containers/week)

^bPhase II Disposal Bases:

17 year duration (2 yr pre-operation, 14 yr operation, 1 yr deactivation) plus
 9 year long term monitoring
 Peak production 27 containers per day (189 containers per 7 day week)
 1 container per trailer and 2 trailers per shift based on 3.25 hr/trailer turnaround
 5 shifts (4 + training shift), 4 vault disposal operation handles 24 containers per
 day and 168 containers per 7 day week (2 containers/shift/vault x 3 shifts/day x
 4 vaults x 7 day/week = 168 containers/week)

5.2.3 Option 2C - Contact-Handled Mixed Waste Disposal Trenches

This alternative is based on the premise that not all of the ILAW requires disposal as remote-handled waste. Contact-handled waste could result from efficient removal of radionuclides during treatment or low concentrations of radionuclides in the feed. A double lined trench with leachate collection would be required for disposal of ILAW that falls under the RCRA mixed waste rules. The design, operation, and closure shall comply with regulatory requirements for near surface disposal of mixed waste, DOE Orders, and NRC designated incidental waste not exceeding NRC Class C.

The concept is shown in Figure 5-6. It is similar to the existing mixed waste disposal trenches in the 200 West area of Hanford. Cost estimates were derived from project W-025, the Solid Waste program's Radioactive Mixed Waste burial trenches. The concept includes double liners and a leachate collection system for compliance with RCRA mixed waste disposal requirements. Additional design features such as a concrete pad under the disposal zone could be required, depending on the results of the performance assessment.

The ILAW packages would be removed from the transport vehicle, moved to the disposal position, and stacked up to six high by fork lift. During this operation the package identification would be checked against the waste manifest.

A storm water control system would be used to collect and divert run-off. Contaminated or potentially contaminated storm water and leachate would require disposal at the Effluent Treatment Facility (ETF). Uncontaminated storm water and leachate would be disposed at the Treated Effluent Disposal Facility.

Sufficient spacing (10 cm) between packages will be provided to allow for subsequent package identification checks, retrieval, and/or addition of backfill material. A surface protective barrier similar to the other options will be added at closure.

Table 5-9 summarizes the estimated construction costs for this type of disposal unit. The total estimated cost for construction and closure of 19 of these type disposal units is \$159.3 million. The construction cost for one disposal unit is \$4.6 million. See Appendix A, Tables A-4, A-5, and A-6 for details.

Table 5-9. Summary of Estimated Capital Costs For Disposal of Contact-Handled Mixed Waste (Option 2C).

Disposal unit	Construction \$ million	Infrastructure ^a \$ million	Site closure ^b \$ million	Total \$ million
Module 1	4.6	24.4	2.5	31.5
Additional 18 units for disposal of remaining ILAW as CH NM	82.8	0	45.0	127.8
Total	87.4	24.4	47.5	159.3

CH NM = Contact-handled non-mixed waste

ILAW = Immobilized low-activity waste

^aThe infrastructure is one-time cost for construction of any of the disposal units for the flexible alternative options.

^bUnit and site closure costs are a one-time cost. They are the same for any of the units for the flexible alternative options.

Figure 5.6 Contact-Handled Mixed Waste Disposal Facility Concept

Table 5-10 summarizes the estimated operating costs for this facility. The total cost for operational preparation, hot operations, deactivation and long-term monitoring is \$217.3 million. See Appendix A, Table A-9 and Table A-10 for details.

Table 5-10. Estimated Operating Costs for Disposal of Contact-Handled Mixed Waste (Option 2C).

Mode	Operational preparation \$ million	Hot operation \$ million	Facility deactivation \$ million	Long term monitoring \$ million	Total cost \$ million
Phase I ^a (13,200 containers)	5.1	51.9	2.6	-	59.6
Phase II ^b (85,000 containers)	8.1	127.6	4.1	17.9	157.7
Total	13.2	179.5	6.7	17.9	217.3

^aPhase I Disposal Bases:

12 year duration (2 year pre-operation, 9 year operation, 1 year deactivation)

Peak production 9 containers per day (63 containers per 7 day week)

Peak production of 13 containers per day based on 5 day week

2 package per trailer and 2 trailers per shift based on 3.5 hr/trailer turnaround

3 shifts, 1 disposal unit handles 12 containers per day and 60 containers per 5

day week (4 containers/shift/vault x 3 shifts/day x 1 unit x 5 day/week = 60 containers/week)

^bPhase II Disposal Bases:

17 year duration (2 year preoperation, 14 year operation, 1 year deactivation)

plus 9 year long term monitoring

Peak production 27 containers per day (189 containers per 7 day week)

Peak production of 37 containers per day based on 5 day week

2 containers per trailer and 2 trailers per shift based on 3.5 hr/trailer turnaround

3 shifts, 3 unit disposal operation provides for disposal of 36 containers per day

and 180 containers per 5 day week (4 containers/shift/unit x 3 shifts/day x 3

units x 5 day/week = 180 containers/week)

5.2.4 Option 2D - Contact-Handled Non-Mixed Waste Disposal Trenches

This alternative is based on the premise that not all of the ILAW product requires disposal as remote-handled waste and mixed waste due to increased removal of radionuclides and destiking of vitrified LAW. The solid waste trench facility would permit disposal of ILAW that meet performance specifications for contact-handled non mixed waste. The design, operation, and closure shall comply with near surface disposal regulatory requirements for non mixed waste, DOE Orders, and NRC designated incidental waste not exceeding NRC Class C.

The concept is shown in Figure 5-7. It is similar to the existing solid waste disposal trenches in the 200 West area of Hanford. There is no requirement for liners and leachate collection system. Performance assessment results may require a concrete pad under the waste disposal zone.

Sufficient spacing between packages will be allowed for package identification checks, retrieval, and/or addition of backfill material. A surface protective barrier will be added at closure.

Table 5-11 summarizes the preliminary estimated costs for this disposal facility. The total estimated cost for construction and closure of 18 units is \$96.6 million, including \$24.4 million for infrastructure items. The construction cost for one disposal unit is \$1.3 million. See Appendix A, Tables A-4, A-5, and A-6 for details.

Table 5-12 summarizes the estimated operating costs for this facility. The total cost for operational preparation, hot operations, deactivation, and long-term monitoring is \$217.3 million. See Appendix A, Table A-9 and Table A-10 for details.

Figure 5.7 Contact-Handled Non-Mixed Waste Disposal Facility Concept

Table 5-11. Summary of Estimated Capital Costs For Disposal of Contact-Handled Non-Mixed Waste (Option 2D).

Disposal unit	Construction \$ million	Infrastructure ^a \$ million	Site closure ^b \$ million	Total \$ million
Module 1	1.3	24.4	2.5	28.2
Additional 18 units for disposal of remaining ILAW as CH NM	23.4	0	45.0	68.4
Total	24.7	24.4	47.5	96.6

ILAW = Immobilized low-activity waste

CH NM = Contact-handled non-mixed waste

^a Infrastructure is one time cost for construction of any of the units for the flexible alternative options.

^b Unit and site closure costs are a one time cost. They are the same for any of the flexible alternative options.

Table 5-12. Estimated Operating Costs for Disposal of Contact-Handled Non-Mixed Waste (Option 2D).

Model	Operational preparation \$ million	Hot operation \$ million	Facility deactivation \$ million	Long term monitoring \$ million	Total cost \$ million
Phase I ^a (13,200 containers)	5.1	51.9	2.6	-	59.6
Phase II ^b (85,000 containers)	8.1	127.6	4.1	17.9	157.7
Total	13.2	179.5	6.7	17.9	217.3

^a Phase I Disposal Bases:

12 year duration (2 yr pre-operation, 9 yr operation, 1 yr deactivation)
 peak production 9 containers per day (63 containers per 7 day week)
 peak production of 13 containers per day based on 5 day week
 2 package per trailer and 2 trailers per shift based on 3.5 hr/trailer turnaround
 3 shifts, 1 disposal unit handles 12 containers per day and 60 containers per
 5 day week
 $(4 \text{ containers/shift/vault} \times 3 \text{ shifts/day} \times 1 \text{ unit} \times 5 \text{ day/week} = 60 \text{ containers/week})$

^b Phase II Disposal Bases:

17 year duration (2 yr pre-operation, 14 yr operation, 1 yr deactivation) plus
 9 yr term monitoring
 Peak production 27 containers per day (189 containers per 7 day week)
 Peak production of 37 containers per day based on 5 day week
 2 containers per trailer and 2 trailers per shift based on 3.5 hr/trailer turnaround
 3 shifts, 3 unit disposal operation provides for disposal of 36 containers per day
 and 180 containers per 5 day week $(4 \text{ containers/shift/unit} \times 3 \text{ shifts/day} \times 3 \text{ units} \times 5 \text{ day/week} = 180 \text{ containers/week})$.

5.3 OPTION 3 - SINGLE SHELL TANKS DISPOSAL

This alternative is based on the concept of using cleaned out SSTs as disposal units for the ILAW packages. The schedule for this option requires that a substantial amount of the ILAW be placed in regulated interim storage facilities to allow time for waste retrieval, tank inspection, tank modifications, and disposal authorization. Tank inspection and secondary waste retrieval may require enlarging the dome opening of several tanks to remove in-tank equipment such as thermocouples, air lift circulators, salt well screens, and other items. The additional clean out work is estimated to require at least one year per tank to complete.

The regulatory status of the cleaned tanks is uncertain. They may be regulated under *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA) or RCRA. If used for disposal of ILAW, the SSTs would not meet the requirements for mixed waste since there is no double liner or leachate collection system in place.

After tank clean out, enlarging the dome opening of all the 100 series tanks to 365 cm to 1,460 cm (12 ft to 48 ft) or larger would be needed for addition of remote handling equipment to insert and position ILAW packages inside the tanks. At this time, waste retrieval planning does not include enlarging the tank dome openings, or disposal of contaminated in-tank equipment and other debris.

Figure 5-8 shows the arrangement of ILAW packages in empty tanks of various sizes. Table 5-13 summarizes the estimated ILAW disposal capacity of the 100 series SSTs. Results show there is space available for disposal of about 75 percent of the projected 98,200 ILAW packages. Additional units would be required for disposal of the remaining 23,000 packages. The 28 DSTs could provide most of the additional disposal capacity (28 tanks x 792 packages/tank = 22,176 packages). The capacity of 200 series SSTs is about 16 ILAW packages per tank and too low for further consideration.

Table 5-14 summarizes the SST retrieval schedule. The schedule shows AX Tank Farm (first tank completed in February 2004 and last tank completed in February 2008), A Tank Farm (first tank completed in April 2004, last tank completed in October 2016), and C Tank Farm (first tank completed in May 2012, last tank completed in July 2018) are the first three tank farms to be available for ILAW disposal (Penwell 1996). An additional year or longer must be added to these projected completion dates to allow for tank inspection, secondary clean out, and addition of a large opening in the domes for ILAW disposal. This schedule does not meet the near-term requirements for ILAW disposal. Therefore, additional interim storage would be required (see Option 5) to provide the near-term capacity needed to support the private vendor production schedule.

Figure 5-8. Arrangement of Immobilized Low-Activity Waste Packages in an Empty Tank.

DISPOSAL OF ILAW PACKAGES IN EMPTY SST's **TANK HEIGHT (DEPTH) LIMITS STACKING HEIGHT**

180" = 500K GAL. = 15FT. → ONLY CAN STACK 3 HIGH
 270" = 750K GAL. = 22.5FT. → ONLY CAN STACK 5 HIGH
 360" = 1000K GAL. = 30FT. → ONLY CAN STACK 6 HIGH
 (limited by box spec.)

Table 5-13. Capacity of 100 Series Single-Shell Tanks for Immobilized Low-Activity Waste Disposal Packages.

Tank Form	Tank Count by Capacity			Packages (LAW)
	1,000 kgal	750 kgal	500 kgal	
A	6			4,752
AX	4			3,168
B			12	4,752
BX			12	4,752
BY		12		7,920
C			12	4,752
S		12		7,920
SX	15			11,880
T			12	4,752
TX		18		11,880
TY		6		3,960
U			12	4,752
Total tanks	25	48	60	-
Packages/tank	792*	660*	396*	-
Total packages	19,800	31,680	23,760	75,240

LAW = Immobilized low-activity waste

*Based on stacking height of 6 LAW packages (7.2 m)

*Based on stacking height of 5 LAW packages (6.0 m)

*Based on stacking height of 3 LAW packages (3.6 m).

Table 5-14. Availability of 100 Series Single-Shell Tanks for Potential Disposal of Immobilized Low-Activity Waste.

Tank form	Projected retrieval completion date*		Tanks available for ILAW disposal	Total packages
	First tank	Last tank		
A	04/04	10/16	6	4,752
AX	02/04	06/08	4	3,168
B	07/14	02/18	12	4,752
BX	10/14	12/18	12	4,752
BY	07/16	12/19	12	7,920
C	03/04	06/16	12	4,752
S	05/12	07/18	12	7,920
SX	12/04	05/20	15	11,880
T	11/17	07/19	12	4,752
TX	08/12	12/18	18	11,880
TY	01/17	01/18	6	3,960
U	09/07	09/19	12	4,752
Total	-	-	133	75,240

ILAW = Immobilized low-activity waste

*Based on Penwell 1996.

Table 5-15 summarizes the estimated capital costs for addition of a 365 cm (12 ft) or 1,460 cm (48 ft) opening to domes of the 100 series SSTs. The estimates are based on rough order of magnitude cost estimates from 1990 for one tank and escalated to 2002. The estimated capital cost for addition of a large opening to 133 SSTs would range from about \$1,330 million to \$6,110 million. See Appendix A, Tables A-11 and A-12 for details. Additional funds would be needed for procurement and installation of a portable crane/manipulator system(s) to lower, position and stack the ILAW packages inside the tanks and other remote systems for inspection and monitoring purposes.

Since the capital costs for this option are prohibitively high, an operating cost estimate was not prepared. For purposes of the evaluation, operating costs were assumed to be at least as high as for Option 2A, remote-handled mixed waste.

Table 5-15. Summary of Rough Order Magnitude Capital Cost for Addition of a Large Opening to Domes of 100 Series Single-Shell Tanks (Option 3).

Tank farm	Tanks available for ILAW disposal	ROM capital cost \$ million		Preliminary disposal cost \$1,000/package
		12 ft opening*	48 ft opening*	
A	6	60	280	12 - 60
AX	4	40	180	12 - 60
B	12	120	550	25 - 115
BX	12	120	550	25 - 115
BY	12	120	550	15 - 65
C	12	120	550	25 - 115
S	12	120	550	15 - 70
SX	15	150	690	12 - 60
T	12	120	550	25 - 115
TX	18	180	830	15 - 70
TY	6	60	280	15 - 70
U	12	120	550	25 - 115
Total	133	1,330	6,110	20 - 80

ILAW = Immobilized low-activity waste

* Based on ROM from 1990 estimate for one tank and escalated to 2002 using a factor of 1.46 for composite materials and labor.

5.4 OPTION 4 - EXISTING CANYON BUILDINGS

This alternative is based on the premise that surplus main processing facilities in the 200 Area (B Plant, T Plant, U Plant and Plutonium Uranium Extraction Facility) of the Hanford Site may be usable for disposal of remote and contact-handled ILAW.

A Canyon Task Team from the U.S. Department of Energy, Richland Operations Office, U.S. Environmental Protection Agency and State of Washington Department of Ecology conducted a series of workshops to identify an approach for long-term disposition of the main processing facilities in the 200 Area (DOE-RL 1997). Two of the proposed six disposal alternatives are potentially applicable to ILAW disposal based on the feasibility study (FS) for disposition of U Plant. They are Entombment with Internal Waste Disposal (FS alternative 3, AGA Option 4A) and Entombment with Internal and External Waste Disposal (FS alternative 4, AGA Option 4B). Both alternatives are discussed below for potential ILAW disposal at the B, T, U, and PUREX Plants.

The Canyon Task Team concluded that the CERCLA regulatory process is the appropriate decision making process for disposition of the main processing facilities. RCRA requirements for disposal of mixed waste inside the canyon buildings would be revisited once the canyon disposition decision has been made. The delisting of ILAW would simplify the regulations for disposal of CERCLA waste and RCRA tank waste at these facilities. Entombment with disposal of waste will require expedited regulatory decision making to meet the schedules for remediation of both past practice and tank wastes.

5.4.1 Option 4A - Canyon Buildings Entombment with Internal Waste Disposal

The Entombment with Internal Waste Disposal alternative calls for disposal of Hanford Site remediation waste inside the canyon facilities followed by in situ entombment of the waste filled facilities, as shown in Figure 5-9. The envisioned end state is an entombed waste disposal facility containing selected facility legacy waste, plus approved waste from other Hanford Site cleanup projects only on the inside of the entombed facility.

The earlier AGA on interim storage of remote-handled ILAW packages (Burbank 1996) showed that a total of 18,600 packages could be placed on the canyon decks of B, T, U, and PUREX Plants and 4,670 packages could be placed in the process cells and storage gallery of the PUREX Plant. The available clearance under the existing cranes limited the stacking height to 4 or 5 high on the canyon decks. Table 5-16 summarizes the potential disposal capacity inside each of the canyon buildings and based on interim storage of ILAW by Burbank (1996).

Figure 5-9. Canyon Building Enticement with Internal Waste Disposal.

The canyon deck disposal concept uses a modular steel floor system about 0.9 m high to raise the ILAW packages above the cover block lifting bails and spread the load evenly across the canyon deck. The ILAW container transport vehicle would enter the buildings directly through the existing rail tunnel or the packages could be transloaded to a rail car for entry into the buildings. Packages would be handled by the existing canyon cranes. At PUREX, removing the main bridge crane from service and using the auxiliary crane for package handling would increase the available capacity. Using the auxiliary crane would allow stacking of packages six high and would increase the canyon deck disposal capacity by 50% (equivalent to 2,130 additional ILAW packages).

Table 5-16. Summary of Potential Remote-Handled Immobilized Low-Activity Waste Disposal Inside Canyon Buildings.

Description	Capacity RH-ILAW package count ^a	Package stacking height ^c	Facility section size
PUREX Canyon Deck ^a	4,260	4	8.4 m x 248 m
PUREX Storage Gallery	2,700	5	19.5 m x 232 m
PUREX Process Cells ^b	1,970	6	4.3 m x 264 m
U Plant Canyon Deck ^a	4,800	5	11.3 m x 244 m
T Plant Canyon Deck ^a	4,800	5	11.3 m x 244 m
B Plant Canyon Deck ^a	4,800	5	11.3 m x 244 m
Total	23,330	-	16,000 m ²

ILAW = Immobilized low-activity waste

PUREX = Plutonium-uranium extraction

RH = Remote handled

^a Based on addition of modular steel floor system about 0.9 m high to raise the packages above the cover block lifting bails and spread the load evenly across the canyon deck.

^b Requires removal of cover blocks and disposal of contaminated process equipment.

^c Based on interim storage information in Burbank (1996). Assumes space availability of designated building sections for ILAW packages.

The PUREX storage gallery has capacity for disposal of an estimated 2,700 packages of ILAW. It is a clean area located on the lower level of PUREX. Access would be from the existing annex building loading dock, through the aqueous make up area to the elevator and down to the lower level. ILAW package handling would be via remotely operated automated guided vehicles similar in concept to a forklift. The annex loading dock and aqueous make up

area would be modified to allow remote handling of the ILAW packages by the automatic guided vehicles. Packages would be transported to the loading dock by truck trailer.

The 12 PUREX process cells have capacity for disposal of about 1,970 ILAW packages. The cells are contaminated and contain process equipment. The cover blocks and all process equipment must be removed before the cells could be used for disposal of ILAW. The ILAW packages would be packaged into new carbon steel cell liners (82 new liners each containing 24 ILAW packages) for placement in the cells using the existing canyon crane. The packages would be transported by truck trailer transport and would enter the buildings directly through the existing rail tunnel or the packages could be transloaded to a rail car for entry into the buildings. There is not enough room in the process cells or operating galleries of T, U, or B Plant to make those areas suitable for ILAW package disposal.

Table 5-17 summarizes the estimated capital costs for construction, infrastructure, and closure for this alternative. The total construction cost is \$65.1 million. See Appendix A, Table A-14 for details.

Table 5-17. Summary of Estimated Costs For Construction and Closure of Four Canyon Buildings for Disposal of Immobilized Low-Activity Waste and Other Waste Based on Fiscal Year 1997 Phase I Feasibility Study for 221-U Facility.*

Option	Construction \$ M	Infrastructure \$ M	Closure \$M	Total \$ M
4A - Internal Waste Disposal	65.1	0	0	65.1

* Source of information is DOE-RL 1997 for 221-U. Costs escalated to 2002 assuming similar costs for disposition of other canyon buildings.

Table 5-18 summarizes the estimated operating costs for the 4 canyon buildings with internal waste disposal including 23,330 ILAW containers. The total cost for operational preparation, hot operations, deactivation and long-term monitoring is \$147 million. See Appendix A, Table A-19 for details.

Table 5-18. Summary of Estimated Operating Costs For Disposition of Four Canyon Buildings Based on Internal Waste Disposal (Option 4A).

Option	Operational preparation \$ M	Hot operation \$ M	Deactivation \$ M	Subtotal \$ M	Grand total \$ M
4A (23,330 ILAW Containers)	117.8 ^a		0	117.8 ^a	146.8
	1.9 ^b	26.3 ^b	0.8 ^b	29.0 ^b	

ILAW = Immobilized low-activity waste

^a Source of information is DOE-RL 1997 for 221-U. Costs extrapolated to 2002 assuming similar costs for disposition of other canyon buildings.

^b Source of information is Table A-19. Costs reduced to 24% of full capacity operating crew cost based on disposal of 23,330 remote-handled ILAW containers inside of canyon buildings. No cost included for use of available management and operating support personnel assigned to canyon building disposal.

5.4.2 Option 4B - Canyon Buildings Entombment with Internal and External Waste Disposal

The Entombment with Internal and External Waste Disposal alternative calls for disposal of Hanford Site remediation wastes inside and around the outside of the canyon buildings followed by in situ entombment (Figure 5-10). Remote-handled ILAW packages would be placed inside the buildings and contact-handled ILAW packages would be placed along the outside wall of the buildings.

Plans for external waste placement would be to achieve regulatory compliance by using a double-liner leachate collection system and provision for ground water monitoring. The external waste materials and clean fill form the base for the protective barrier that would cover the waste filled facilities. The envisioned end-state is an entombed waste disposal complex containing selected facility legacy waste, plus approved waste from other Hanford Site cleanup located both on the inside and outside of the buildings.

Option 4A described the disposal of remote-handled ILAW packages inside the B, T, U, and PUREX Plants and showed that 23,300 remote-handled ILAW packages could be disposed inside the canyon buildings. Internal disposal of remote-handled waste would precede or proceed in parallel with contact-handled waste disposal outside the buildings.

Contact-handled ILAW packages would be transported by truck trailer to the canyon buildings for off loading and placement by forklifts. The packages would be placed along the one or both exterior walls and stacked 6 high to a distance of about 40 m from both exterior walls. This stacking arrangement leaves a 5 m thickness of protective barrier cover over the last ILAW package based on the proposed 1:3 slope of the protective barrier over the canyon building. This exterior arrangement provides for placement of about 96,000 packages of contact-handled ILAW based on a 50 percent availability of the space along the exterior walls of the canyon buildings. Table 5-19 summarizes the total package count information for the canyon building disposal alternative.

Table 5-20 summarizes the estimated capital costs for construction, infrastructure, and closure for this alternative. The total construction cost is \$189 million. See Appendix A, Table A-14 for details.

Table 5-21 summarizes the estimated operating costs for the 4 canyon buildings with internal disposal of 23,330 remote-handled containers and external disposal of 74,900 (98,200 - 23,300 = 74,900) contact-handled containers. The total cost for operational preparation, hot operations, deactivation and long-term monitoring is \$293 million. See Table A-19 for details.

Figure 5-10. Canyon Buildings Envelopment with Internal and External Waste Disposal.

Table 5-19. Summary of Potential Immobilized Low-Activity Waste Disposal Inside and Outside Canyon Buildings.

Building	Interior disposal		Exterior disposal	
	Section size ^a	Capacity RH-ILAW package count ^a	Section size (both sides of canyon)	Capacity CH-ILAW package count ^b
PUREX Plant	8.4 m x 248 m	4,260	306 m x 80 m	57,600
	19.5 m x 232 m	2,700		
	4.3 m x 264 m	1,970		
B Plant	11.3 m x 244 m	4,800	247 m x 80 m	44,800
T Plant	11.3 m x 244 m	4,800	247 m x 80 m	44,800
U Plant	11.3 m x 244 m	4,800	247 m x 80 m	44,800
Total	16,000 m ²	23,330	84,000 m ²	192,000

CH-ILAW = Contact-handled immobilized low-activity waste

PUREX = Plutonium-uranium extraction

RH-ILAW = Remote-handled immobilized low-activity waste

^a See Table 5-16 for additional details. Assumes space availability of designated internal building sections for ILAW packages.

^b Based on removal of all canyon building protrusions and unrestricted space availability on both long sides of the exterior canyon walls.

Table 5-20. Summary of Estimated Capital Costs for Canyon Buildings With Internal and External Disposal (Option 4B).^a

Option	Construction \$ M	Infrastructure \$ M	Closure \$ M	Total \$ M
4B - Internal and External Waste Disposal	105.4	0	83.2	188.6

^a Source of information is DOE-RL 1997 for 221-U. Costs escalated to 2002 assuming similar costs for disposition of other canyon buildings.

Table 5-21. Summary of Estimated Operating Costs For Disposition of Four Canyon Buildings Based on Internal and External Waste Disposal (Option 4B).

Option	Operational preparation \$ M	Hot operation \$ M	Deactivation \$ M	Subtotal \$ M	Grand total \$ M
4B (98,200 ILAW Containers)	155.7 ^a		14.4 ^a	170.1 ^a	292.5
	7.8 ^{b,c}	111.0 ^{b,c}	3.6 ^{b,c}	122.4 ^{b,c}	

^a Source of information is DOE-RL 1997 for 221-U and Table A-19. Costs extrapolated to 2002 assuming similar costs for disposition of other canyon buildings.

^b Source of information is Table A-19. Costs reduced to 24 percent of operating crew cost based on disposal of 23,330 remote-handled ILAW containers inside of canyon buildings. No cost included for use of available management and operating support personnel assigned to canyon building disposal.

^c Source of information is Table A-19. Cost is sum of 76 percent of operating crew cost for external disposal of contact-handled ILAW and 24 percent of crew cost for internal disposal of remote-handled ILAW. No cost included for use of available management and operating support personnel assigned to canyon building disposal.

5.5 OPTION 5 - EXPANDED INTERIM STORAGE

This alternative is based on extended storage of the ILAW packages due to potential delay of obtaining a DOE disposal authorization statement beyond 2002 and/or no additional disposal units available by 2005. It assumes that a significant amount of ILAW product is contact-handled due to low dose rates from low radionuclide concentration in the retrieved tank waste or efficient removal of radionuclides during pretreatment.

The contact-handled ILAW packages would be placed into extended interim storage facilities such as above ground concrete pads or pre-engineered metal buildings. Cost estimates were based on a unit storage size of 5,040 packages. The units would comply with requirements for interim storage of contact-handled mixed waste. There is insufficient information at this time to determine the amount of contact-handled ILAW that may be received.

The ILAW packages would be removed from the transport vehicle and moved to the storage position by forklift. The operation is similar to disposal of contact-handled ILAW except aisles are provided between rows of packages to meet the inspection requirements for mixed waste storage.

The storage concept would position packages in 5 rows of 2 packages wide, 64 packages long, and 6 packages high by fork lift or mobile crane. Three meter wide aisles would be provided between rows, resulting in floor dimensions of about 40 m x 100 m for interim storage of 5,040 packages. The floor area would be covered by pre-engineered metal buildings.

After approved disposal units become available, the packages would be retrieved and transported to disposal using the same resources that were used for transporting them to the interim storage unit.

Two interim storage units for contact-handled ILAW plus the groud vaults would be required to store all of the Phase I packages. The estimated capital cost for construction of two above ground metal storage buildings and ancillary equipment is about \$9.6 million based on historical costs for Project W-112, Enhanced Radioactive and Mixed Waste Storage, escalated to year 2002.

Table 5-22. Summary of Estimated Costs For Construction and Closure of Units for Interim Storage of Contact-Handled Mixed Immobilized Low-Activity Waste Containers Based on Project W-112.

Option	Capital ^a \$ M	Infrastructure ^b \$ M	Closure \$ M	Total \$ M
1st unit 5,040 containers	3.2	3.2	0	6.4
2nd unit 5,040 containers	3.2	0	0	3.2
Total	6.4	3.2	0	9.6

^a Source of information is Table A-21

^b Source of information is Table A-22.

Table 5-23. Estimated Operating Costs for Immobilized Low-Activity Waste Storage Based on Preliminary Operating Sequence for Container Transportation.^a

Unit	Operational preparation \$	Hot operation \$ M	Short term monitoring \$ M	Facility deactivation \$ M	Total cost \$ M
1 5,040 Containers	5.1	51.9 (in) 51.9 (out)	11.2	2.6	117.1
2 5,040 Containers	0	51.9 (in) 51.9 (out)		2.6	112.0
Total 10,080 Containers	5.1	207.6	11.2	5.2	229.1

^a Source of information is Tables A-9 and A-10 for one unit.

5.6 OPTION 6 - SHIELDED DISPOSABLE OVERPACKS

This alternative is based on construction of a shielded disposal overpack for packages of ILAW that have a dose rate greater than 200 mrem/h. The shielding would reduce the surface dose rate to less than 200 mrem/h and permit disposal of the ILAW as contact-handled waste. The overpack would be made from steel or concrete.

Preliminary radiation dose rate calculations showed that 46 cm (18 in.) of concrete or 8.3 cm (3.3 in.) of steel shielding are required for full time personnel access to the active areas based on the maximum surface dose rate of 1,000 mrem/h per package (Murkowski 1996). Figure 5-11 shows the disposal overpack concepts. Table 5-24 summarizes the estimated costs for the shielded disposable overpacks. The estimated cost of 93,000 overpacks is \$302 million for concrete and \$834 million for steel. The individual overpack cost is \$4662 for concrete and \$8218 for steel. Costs are based on fabricator quotations for a lot size of 5040 overpacks.

The larger package size for concrete overpacks (12 m³ versus 2.6 m³) would require the disposal units to be about 4.6 times larger (and 4.6 times more expensive) for disposal of the same number of contact-handled packages. Even so, the total capital cost for concrete overpacks would be less than for steel.

Table 5-24. Summary of Capital Cost Estimate for Disposable Overpacks.

Material of construction	Mass of one overpack, kg	Cost ^{a,b} \$K		
		1 overpack	5,040 overpacks ^c	93,000 overpacks
Concrete	12,000	4.7	23.7	302,000
Steel	19,650	8.2	41.3	834,000

^a Requires larger contact-handled disposal facility than Options 2C and 2D due to larger volume of disposal container

^b Assumes Immobilized Low-Activity Waste container is 1.6 cm (5/8 in.) thick steel.

^c See Appendix A, Table A-23 for estimate details.

Figure 5-11. Disposable Overpack Concepts.

5.7 REJECTED IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL OPTIONS

Several disposal options including those proposed by the public were evaluated by DOE and Washington State Department of Ecology (Ecology) or Westinghouse Hanford Company (WHC). The following sections describe these rejected options. They have not been considered further in this analysis.

5.7.1 Options Rejected by the Tank Waste Remediation System Environmental Impact Statement

The following options were considered but rejected as inappropriate for waste disposal by DOE and Ecology in the TWRS EIS. The criteria of technical viability, maturity of technology, and protection of human health and the environment were used to screen the following alternatives out of consideration.

- Seabed Disposal, space disposal, deep hole disposal, ice sheet disposal, and island disposal
- Geologic disposal of tank contents, tanks, equipment, and contaminated soil
- Rock melting or injecting the waste into a deep mined cavity;
- Transmutation
- Grouting the retired canyon facilities with hot grout
- Disposing of glass logs in grout vaults and allowing solids in tanks to decay.

Additional details on the evaluation of these technologies can be found in Appendix C of the TWRS EIS, and in the supporting data package (WHC 1995).

5.7.2 Additional Rejected Disposal Options

Two additional disposal alternatives were proposed following the completion of TWRS EIS and Record of Decision (ROD). These alternatives recommend using the Environmental Restoration Disposal Facility (ERDF) and the bulk disposal of glass cullet in single-shell tanks (SST).

The ERDF is a RCRA compliant land fill authorized under CERCLA. All waste placed in ERDF must meet the ERDF Waste Acceptance Criteria (BHI 1995). The waste acceptance criteria for ERDF states that it may not be used for disposal of non-CERCLA waste such as ILAW.

The disposal alternative of adding ILAW cullet to retrieved SSTs as engineered fill material does not comply with the product specifications in the TWRs privatization RFP (DOE-RL 1996).

6.0 ALTERNATIVES EVALUATION

This section presents an evaluation of each of the alternatives described in Section 5.0 in relation to the evaluation criteria established in Section 4.0.

The alternatives analysis was performed by engineering staff familiar with the project. The evaluation method was based on well established decision analysis techniques (Kepner and Tregoe 1981) to apply the decision criteria to the alternatives. Each option was ranked from 1 to 10 for technical criteria. Individual rankings were averaged to arrive at a composite consensus ranking for the options. The maximum possible score was 140 points. Table 6-5 in Section 6.6 presents the composite scores.

6.1 COST

Total life-cycle costs for each alternative were developed. For the purposes of this analysis, all costs were indexed to constant 2002 dollars. Table 6-1 summarizes the estimated life-cycle cost for construction and operation of the baseline and alternative disposal units. Appendix A provides additional details for capital and operating cost estimates.

The flexible unit option, consisting of a combination of options 2A, 2B, 2C, and 2D, will have a variable total cost depending on the number of contact-handled, remote-handled, mixed, and non-mixed waste disposal facilities that are constructed. Figure 6-1 shows the estimated range of costs for the flexible unit option compared with the MYWP baseline costs for construction and operation of the ILAW disposal facilities.

6.1.1 Capital Cost

Capital costs were evaluated objectively based on capital cost estimates developed by ICF Kaiser Engineers Hanford and Fluor Daniel Northwest. These estimates were at a rough order of magnitude level of accuracy due to the limited amount of detailed design data. Capital cost estimates of the alternatives are for construction only. Alternatives with lower capital cost received better rankings.

The architectures with the lowest capital cost are the contact-handled alternatives. The next lowest capital costs are for the canyon building alternatives. The new remote-handled vaults are next, followed by the adjusted baseline concept and shielded overpack. Disposal in the SSTs has the highest capital cost of any option.

Table 6-1. Capital, Operating, and Life-Cycle Cost Summary.

Option	Construction cost, \$ million	Operating cost, \$ million	Total life- cycle cost, \$ million	Life-cycle cost \$/m ³
Option 1A MYWP Baseline ^a	393	132	525	3,365
Option 1B Adjusted MYWP baseline	609	245	854	3,344
Option 2A ^c RH MW disposal	555	408	963	3,772
Option 2B RH NMW disposal	496	408	904	3,541
Option 2C CH MW disposal	159	217	376	1,473
Option 2D CH NMW disposal	97	217	314	1,230
Option 3 ^{aa} SSTs disposal	> 1,330	> 408	> 1,738	> 6,807
Option 4A ^{ab} Canyons - Internal	65	147	212	3,513
Option 4B ^{ba} Canyons - Internal and External	189	293	482	1,895
Option 5 Extended Interim Storage	10	229	239	9,119
Option 6A ^c Overpacked RH MW	914	217	1,131	4,430
Option 6B Overpacked RH NMW	641	217	858	3,360

CH = Contact-handled

MW = Mixed waste

NMW = Non-mixed waste

RH = Remote-handled

SST = Single-shell tank

^a Does not provide required capacity^b Does not meet near-term schedule requirements^c Meets design requirements for all waste types.

Figure 6-1. Total Life-Cycle Cost Versus Remote-Handled Fraction

6.1.2 Operating Cost

Life-cycle operating costs were developed based on preliminary time and motion studies and operations scenarios based on the required throughput for both Phase I and Phase II production rates. Strategies with lower operating cost received higher rankings.

Operating costs are lowest for contact-handled alternatives. Disposal inside the canyon buildings is next, followed by the adjusted baseline concept. The remote-handled alternatives are next, followed by use of the external and internal portions of the canyons. Operating costs for the SST option were not developed due to the extremely high capital costs, but they are expected to be at least as high as the remote-handled options.

6.2 FLEXIBILITY

The flexibility of a disposal unit to perform multiple waste disposal functions was evaluated under this category. The strategies and options with the ability to meet minimum requirements for disposal of multiple waste types and on the ease of retrieval of waste packages were scored higher.

6.2.1 Multiple Waste Types

Flexibility of the facility to handle multiple waste types such as remote-handled mixed waste, remote-handled non mixed waste, contact-handled mixed waste and contact-handled non mixed waste was evaluated under this category. Strategies and options with the ability to meet multiple requirements were scored higher. Options 2A, 4B, and 5A scored highest in this category.

6.2.2 Waste Retrieval

Retrievability was evaluated subjectively based on the estimated ease of reentering the facility for package retrieval. Strategies that provided easy retrievability were scored higher. Options 3 and 4A scored poorly for this criterion.

6.3 SCHEDULE

The ability of a option to meet critical schedule milestones was considered under this category. The options were objectively evaluated to meet the 1997 MYWP schedule (Wilson 1996) and Tri-Party Agreement (Ecology et al. 1996) milestone M-90-10. Alternatives 3, 4A, and 4B could not meet one or more schedule milestones.

6.3.1 Multi-Year Work Plan Milestones

The FY 1997 MYWP schedule identifies a 3.5 year operating life of the ILAW Interim Storage Facility (retrofitted grout vaults between 2002 and 2005) and shows that the first ILAW disposal module shall be constructed by September 2004. This criterion was used to compliment the go/no-go test to meet Tri-Party Agreement milestone M-90-10. Near-term schedule requirements are not met by alternatives 3, 4A, and 4B.

6.3.2 Tri-Party Agreement Milestone

The Tri-Party Agreement provides the legally enforceable milestones for TWRS. It is the primary schedule driver for new ILAW disposal facility. A disposal facility is needed by December 2005 because the ILAW interim storage capacity of the grout vaults will have been used. This criterion was a go/no-go test to determine if it was possible to implement a option that initiates hot disposal operations by December 2005. Near-term schedule requirements are not met by alternatives 3, 4A, and 4B.

6.3.3 Privatization Schedule

The ability to meet the requirements of the privatization schedule were evaluated under this criterion. Options 3, 4A, and 4B cannot meet the near-term privatization schedule. Concerns about the ability of the baseline alternatives to meet the privatization schedule also resulted in a lower score for Options 1A and 1B.

6.4 ENVIRONMENTAL IMPACT

The environmental impacts of the ILAW disposal system can be assessed by amount of land usage and secondary waste generation.

6.4.1 Land Usage

The amount of land used for disposal of ILAW was evaluated under this category. Options with smaller land requirements scored higher. Table 6-2 shows the estimated land usage for each option.

Table 6-2. Land Use Estimates.

Option	Land use, hectares
Option 1A MYWP Baseline ^a	13
Option 1B Adjusted MYWP baseline	21
Option 2A RH MW disposal	24
Option 2B RH NMW disposal	24
Option 2C CH MW disposal	36
Option 2D CH NMW disposal	36
Option 3 ^b SSTs disposal	12
Option 4A ^c Canyons - Internal	28
Option 4B Canyons - Internal and External	0
Option 5 ^d Extended Interim Storage	4
Option 6A Overpacked RH MW	87
Option 6B Overpacked RH NMW	87

CH NMW = Contact-handled non-mixed waste

MYWP = Multi-year work plan

RH NMW = Remote-handled non-mixed waste

SST = Single-shell tank

^aCapacity is only 60,000 packages

^bCapacity is only 23,300 packages

^cCapacity is only 75,240 packages

^dCapacity is only 1,080 packages.

6.4.2 Secondary Waste Generation

Contaminated waste from construction and operation of the disposal facilities were evaluated subjectively under this category. Options with lower secondary waste score higher. Option 3 scored the worst for this category.

6.5 OPERATION, MAINTENANCE, AND SAFETY

The alternatives were evaluated with respect to daily operations under this category. The category was further subdivided into subcategories of operability, maintainability, safety, and radiation exposure.

6.5.1 Operability

Operability was evaluated subjectively based on the estimated complexity of procedures that would be used during the daily operations. Options with fewer pieces of equipment and simpler operating procedures scored higher. Options 2C, 2D, 5A and 5B scored well due to the simplicity of forklift operations. Options 3, 4A, and 4B scored poorly due to the difficulty of remote operations in a contaminated environment.

6.5.2 Maintainability

Maintainability was evaluated subjectively based on the estimated complexity of the equipment needed to support the disposal facility. Equipment accessibility, zone entry, and contact versus remote maintenance were important considerations in this evaluation category. Options with fewer moving parts, easy contact maintenance access, and off-the-shelf equipment scored higher. Options 3, 4A, and 4B scored poorly.

6.5.3 Safety

Worker lives/lost time accidents during construction, disposal and potential retrieval operations were evaluated subjectively. Options judged to have the fewest and least hazardous safety risks were scored highest. Options 3, 4A, and 4B scored poorly.

6.5.4 Radiation Exposure

Preliminary radiation exposure estimates were developed for transporting remote and contact-handled ILAW containers from the Verification Building to positions in storage or disposal units. The time estimates were based on information from the Project W-465

preliminary operating sequence block diagram for transporting ILAW containers and other estimates for an operating facility. The radiation dose rates were based on preliminary packaging information for transporting ILAW containers (Field 1997).

The results are summarized in Table 6-3 for remote-handled waste and Table 6-4 for contact-handled waste. The operating sequence, container handling method, time to perform the steps, amount of shielding, and number of personnel have not been optimized at this time. They will be the subject of a future study.

The radiation exposure results for remote-handled waste results show that the truck driver and health physics technician (HPT) are the capacity limiting positions based on preliminary staffing levels, manual remote operation and a 1,000 mrem/yr exposure limit (Table 6-3). The 1,000 mrem/yr exposure limit does not impact the Phase I and Phase II disposal based on the average production rate of containers. The radiation exposure at the HPT position will limit disposal operations to about 80 percent of the Phase II peak disposal rate (8,400 containers per year). Their short work interval during container transport permits sharing of HPTs among the 4 disposal units during Phase II. See Table A-24 for details.

The estimated exposure burden is 10 man-mrem per remote-handled container.

Table 6-3. Radiation Exposure Estimate for Transporting Remote-Handled Immobilized Low-Activity Waste Containers to Disposal Based on Transportation Requirements.

Description	Truck driver	Process operator	Health physics technician	Millwright	Crane operator
Exposure per 1 container trailer, mrem	2.6	2.3	1.4	0.8	0.8
Exposure per person at capacity, mrem/yr	1,280	570	720	420	420
Exposure per container man mrem	10				
No. containers disposed at 1,000 mrem/yr limit based on:	-	-	-	-	-
- 3 shifts and 2 disposal units	2,340	5,260	2,090	3,540	7,080
- 5 Shifts and 4 disposal units	9,770	17,500	6,970	23,600	29,500
Phase I production rate, containers/yr	1,470 average and 3,800 peak				
Phase II production rate, containers/yr	6,400 average and 8,400 peak				

The contact-handled waste disposal results are summarized in Table 6-4. The process operator and HPT are the capacity limiting positions based on 1,000 mrem/yr exposure. The process operator position limits disposal to about 50 percent of the Phase I peak rate (3,000 containers per year), about 50 percent of the Phase II average rate (6,400 containers per year) and about 30 percent of the Phase II peak rate (9,000 containers per year). The HPT position limits disposal to about 80 percent of the Phase I peak rate, 80 percent of the Phase II average rate and about 60 percent of the Phase II peak rate. See Table A-25 for details.

The estimated exposure burden is 5 man-mrem per contact-handled container.

Table 6-4. Radiation Exposure Estimate for Transporting Contact-Handled Immobilized Low-Activity Waste Containers to Storage or Disposal Based on Transportation Requirements.

Description	Truck driver	Process operator	Health physics technician	Millwright	Forklift operator
Exposure per 2 container trailer, mrem	2.3	3.7	2.4	0.0	2.2
Exposure per person at capacity, mrem/yr	1,170	1,860	1,200	0	1,080
Exposure per container man mrem	5				
No. containers disposed at 1000 mrem/yr limit Based on:	-	-	-	-	-
- 3 Shifts and 2 disposal units	3,420	1,620	2,500	-	3,710
- 5 shifts and 4 disposal units	10,260	3,230	5,000	-	11,120
Phase I production rate, containers/yr	1,470 average and 3,000 peak				
Phase II production rate, containers/yr	6,400 average and 9,000 peak				

The initial radiation exposure findings infer that transportation shielding and manual type operations could impact the ability of disposal operation to meet the required throughput due to radiation exposure. A combination of additional shielding, shorter task times, and remote operating methods may be needed for the disposal operation to achieve and maintain peak throughputs. Shielding, operational requirements, and personnel will be part of a future study on optimization of the disposal unit operation.

6.6 SUMMARY AND CONCLUSIONS

The evaluation results matrix summarizing the rankings of all alternatives against all criteria is shown in Table 6-5. The results show that alternatives 2C (contact-handled mixed waste trenches) and 2D (contact-handled non-mixed waste trenches) received the best overall score. For alternatives that were able to meet design requirements for all waste types, Options 2A (remote-handled mixed waste vaults) and 6A (overpacked remote-handled mixed waste in trenches) scored the best.

Table 6-5. Summary Evaluation Matrix.

Evaluation Criteria	Option 1A: Baseline *	Option 1B: Adjusted Baseline	Option 2A: RH MW Disposal Vaults *	Option 2B: RH MW Disposal Vaults	Option 2C: CH MW Disposal Trenches	Option 2D: CH NIMW Disposal Trenches	Option 3: Dispose in Empty SSTs **	Option 4A: Canyons - Internal **	Option 4B: Canyons, Internal and External **	Option 5: Extended Interim Storage	Option 6A: Overpacked RH MW *	Option 6B: Overpacked RH NIMW
A. COST												
A.1 Capital Cost	6	4	4	5	9	10	1	5	5	8	3	5
A.2 Operating Cost	8	7	4	4	9	10	1	4	2	3	10	10
A.3 Life Cycle Cost Profile	7	6	4	5	9	10	1	5	4	4	2	5
B. FLEXIBILITY												
B.1 Ability to dispose multiple waste types	4	4	9	5	6	3	4	4	6	2	5	3
B.2 Retrievability	9	9	9	9	10	10	2	5	7	10	10	10
C. SCHEDULE												
C.1 Meets TPA milestones	10	10	10	10	10	10	0	3	3	7	10	10
C.2 Meets MYPP milestones	10	10	10	10	10	10	0	3	3	7	10	10
C.3 Supports Privatization schedule	8	8	10	10	10	10	0	2	2	7	10	10
D. ENVIRONMENTAL IMPACTS												
D.1 Land Usage	8	7	7	7	8	8	8	6	9	4	2	2
D.2 Secondary Waste Generation	10	10	9	10	10	10	1	5	5	8	6	8
E. OPERATIONS/MAINTENANCE/SAFETY												
E.1 Operability	7	7	7	8	9	10	2	5	5	9	8	10
E.2 Maintainability	8	8	7	7	9	10	3	4	5	9	9	10
E.3 Safety	7	7	8	8	9	9	3	4	5	8	9	9
E.4 Radiation exposure	9	9	7	8	8	9	4	7	6	7	10	10
TOTAL SCORE	108	104	105	106	123	126	30	62	67	93	107	112

Notes

- 1) Does not provide required capacity
- 2) Does not meet near term schedule requirements
- 3) Meets design requirements for all waste types

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7.6 IMPLEMENTATION STRATEGY

There are large uncertainties surrounding the final waste form characteristics and the associated design requirements for the disposal system. These uncertainties make the selection of a single preferred disposal system architecture difficult. To provide the lowest cost and most flexible disposal system, a suite of design solutions should be available for deployment on a "just-in-time" basis.

The number of design solutions required to meet all contingencies depends on the number of uncertainties. As the issues and uncertainties are resolved, certain solutions would no longer be needed. At this time, three key uncertainties lead to a suite of six different design solutions. Figure 7-1 shows the design solutions and the decision tree for selecting the proper solution based on the answer to each of the uncertainties.

The first and most important question from a cost standpoint is the radiation dose rate of the waste package. If it is over 200 mrem/h, remote handling and shielded facilities are required. Below 200 mrem/h, the packages can be contact handled. Initial analysis of the Phase I feed staging plans indicate that a significant fraction (roughly 35 percent) of the Phase I product could be contact handled. Analysis of the cesium content of the tanks shows that the SSTs (to be treated in Phase II) have less cesium than the DSTs (to be treated in Phase I) indicating that an even larger fraction of the Phase II product could be contact handled. Further analysis of feed batch composition and the private contractor flowsheets is required to determine how much of the Phase I and Phase II product would be expected to be contact handled. Providing some contact-handled facilities to complement the remote operated shielded vaults would decrease the construction and operating costs for the overall disposal system.

The second important question is whether or not the product has exited RCRA through delisting or some other exit mechanism. If the product is a regulated hazardous waste under RCRA, several requirements (e.g., double liner, leachate collection systems) for storage and disposal facilities are imposed. Exiting RCRA would allow cost savings due to the removal of these design requirements.

Finally, the process of obtaining a disposal authorization decision from DOE-HQ hinges on completion and approval of the disposal performance assessment and composite analysis reports (draft DOE Order 435.1). If authorization to perform a disposal action has not been obtained before the start of waste treatment, extended interim storage facilities would be needed. In the case of remote-handled waste, the distinction between storage and disposal is immaterial since a shielded vault would be used in either case. For contact-handled waste, the requirements (monitoring, inspections, aisle space) for a storage facility are sufficiently different from a disposal facility that they are depicted separately in Figure 7-1.

Figure 7-1. Immobilized Low-Activity Waste Disposal Decision Tree.

Issue #1 Consent
 Control of Waste

Issue #2 RCRA
 Delisting Petition

Issue #3 Disposal Site
 Performance Assessment

Drawn: WSL-LWP

The available design solutions would be deployed on a "just-in-time" basis through a series of construction projects scheduled at roughly three year intervals. This schedule provides enough lead time to obtain funding for the projects while avoiding the commitment of too many resources toward a particular design solution. The initial project would provide the disposal site infrastructure and the first additional disposal unit. Subsequent disposal units would be constructed as needed to keep up with production rates. The last project would decommission the operations buildings and construct the final closure barrier over the disposal site. Figure 7-2 depicts one example of the available disposal capacity and production rates as a function of time using this approach.

This approach also allows the addition of additional design solutions to the strategy as they become available in the outyears, such as Option 3, SSTs and Option 4, Canyon Buildings. When these alternatives become available, they can be reassessed to determine their suitability for deployment within the TWRS disposal strategy.

To implement this strategy, the ILAW disposal program will need to develop conceptual designs of each element of the strategy. Design media for CH-MW and CH-NMW already exist at Hanford. While a design is also available for RH-MW (the grout vaults), it is not optimized for packaged waste, and improvements could be made to this concept. All alternatives that provide new disposal facilities will need infrastructure support, and disposal authorization can not be obtained without a closure plan for the facility. Therefore, the high-priority actions to implement this strategy should be:

- Develop conceptual designs for disposal site infrastructure, RH vaults, and surface barrier closure systems.
- Examine the near-term processing schemes to determine how much CH waste should be expected during Phase I.
- Review and evaluate private contractor flowsheets to determine whether the ILAW will be mixed waste or not.

Figure 7-2. Storage/Disposal Capacity Versus Production.

8.0 OPEN ISSUES AND ACTIONS

Three open issues were identified in this study. This section summarizes the issues and identifies the required action.

1. **Cesium Content of Treated Waste (Package Dose Rate):** The maximum surface dose rate requirement is less than 1,000 mrem/h for each ILAW package based on the Phase I RFP. A gamma radiation dose rate of 1,000 mrem/h requires remote handling, shielding (maximum 46 cm concrete) and administrative controls to meet ALARA exposure levels for workers and the public. The current disposal unit design objectives for personnel radiation protection are based on handling all of the projected 98,200 packages as the maximum credible source term. This position is overly conservative and expensive.

Required Action: Develop a reliable radiation source term that can be used to understand the dose rate distribution for the projected ILAW packages by performing a tank by tank type engineering study of the waste retrieval sequence and privatization cesium separation efficiency. Use the results to establish the types, numbers, and need dates of ILAW disposal units.

2. **Hazardous Waste Regulatory Status (Delisting of Treated Waste):** Under the current EPA "mixture" and "derived-from" rules, the ILAW would continue to be managed as a RCRA regulated mixed hazardous/radioactive waste, because it is derived from tank waste that contains listed hazardous constituents. Although the vitrification process would result in a product that is compliant with the land disposal restrictions, the ILAW disposal facility would still have to meet the requirements of a RCRA Class I hazardous waste landfill, including double liners, leachate collection systems, and closure/post-closure monitoring.

Required Action: Two possible strategies could be used to obtain relief from the requirements of RCRA for the disposal units. First, the privatization vendors have been asked to propose methods to provide non-RCRA regulated final waste products. Under the current regulations, this could be achieved by petitioning the EPA to delist the ILAW product. Although the delisted ILAW would continue to be subject to certain RCRA regulations, the design requirements for the disposal facility would be considerably less stringent.

The second avenue for exiting RCRA lies in the proposed HWIR. If promulgated, the HWIR would revise the "mixture" and "derived-from" rules and develop risk-based exit levels for listed constituents in hazardous waste treatment residues. Based on the initial proposal, the ILAW product should be able to exit the RCRA rules under HWIR, and would therefore be regulated as ordinary low-level waste during storage, disposal, and closure operations.

3. **Disposal Authorization Statement:** When implemented DOE Order 435.1 (draft), *Radioactive Waste Management* will replace DOE Order 5820.2A. This new provision will impact ILAW disposal in the following areas:

- Stronger emphasis on overall waste management such as planning documentation from waste generation to disposal
- Requirements on interim storage will be more restrictive
- Requires obtaining a disposal authorization statement based on approved performance assessment and composite analysis for a specific disposal facility before starting construction.

Required Action: Two groups of actions are needed. The first group action is to select the specific ILAW disposal site, develop ILAW disposal strategy, determine type of ILAW disposal units (based on the engineering study identified in Issue #1), and develop preliminary conceptual design of the units for the performance assessment. The second is to complete composite analysis of all sources of all radioactive material which may interact with the disposal facility. Approval of these reports is needed to obtain a disposal authorization statement to start construction of the disposal units.

If authorization for disposal has not been obtained, extended interim storage facilities would be needed.

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APPENDIX A

COST ESTIMATING DATA

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APPENDIX A

COST ESTIMATING DATA

This appendix describes the basis for preparing the life-cycle cost estimates for the baseline and alternatives for disposal of immobilized low-activity waste (ILAW) containers.

A1.0 BASELINE PLANNING CASE

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Table A-1. Summary of Operating Staff Requirements for Baseline Immobilized Low-Activity Waste Container Disposal Based on 1997 Multi-Year Program Plan (Option 1A).

Position	Type	Day Shift	Three Shifts		Five Shifts	
All Waste Remote Handled			1 Module Phase I		1 Module Phase II	
Facility Manager	M	1		1		1
Clerk	G	0.5		0.5		0.5
Plant Engineer	E	1	2.5	1	2.5	1
Technical Support Manager	M	1		1		1
Clerk	G	0.5		0.5		0.5
Planner/Scheduler	P	0.25		0.25		0.25
Budget Analyst	P	0.25		0.25		0.25
Training Coordinator	G	0.5		1		1
Trainer	P	0.5		1		1
Procedure Writer	P	0.5		0.5		0.5
Electrical Engineer	E	0.5		1		1
Env. Compl. Engineer	E	0.5		0.5		0.5
I&C Engineer	E	0.5		0.5		0.5
Mechanical Engineer	E	0.5		1		1
QA Engineer	E	0.5		0.5		0.5
QC Inspector	T	0.5	6.5	1.5	9.5	2.5
Production Manager	M	1		2		3
Document Clerk	G	1		1		1
Maintenance PIC	P	1		1		1
O&M Planner	P	0.5		1		1
Instrument Tech	T	1		2		2
Electricians	C	2		2		2
Mechanical crafts	C	2		2		2
Process Operators	R	1		3		5
HPTs	T	0.5		3		5
Power Operators	R	1		3		5
Crane Operators	R	2		3		5
Truck Drivers, HD	C	2	15	3	26	5
		24	24	38	38	50
	M	3		4		5
	E	0.5		4.5		4.5
	S	0		0		0
	P	3		4		4
	T	2		8.5		9.5
	C	8		7		9
	R	4		9		15
	L	0		0		0
	G	2.5		3		3
		24		38		50
	W7	8.5		12.5		13.5
	W8	10		18		24
	W9	4.5		9.5		12.5
		24		38		50

Table A-2. Summary of Staff Requirements and Costs for Baseline Immobilized Low-Activity Waste Container Disposal Based on 1997 Multi-Year Program Plan (Option 1A).

Table A-2 Summary of Staff Requirements and Costs for Baseline LAW Container Disposal Based on 1997 MYPP (Option 1A)													
Schedule Activity Number				S1W05000 Operations Preparations for Phase 1 Facilities									
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	2	24	1	7,400	595	2	6/1/00	5/31/02	
E000	73000	010	1	Engineers	2.25	24	1	8,325	568	2	6/1/00	5/31/02	
S000	73000	010	1	Scientists	0	24	1	0	0	2	6/1/00	5/31/02	
P000	73000	010	1	Professionals	2	24	1	7,400	505	2	6/1/00	5/31/02	
T000	73000	060	1	Technicians	3.25	24	1	12,025	630	2	6/1/00	5/31/02	
C000	73000	060	1	Crafts	3.5	24	1	12,950	678	2	6/1/00	5/31/02	
R000	73000	060	1	Operators	4.5	24	1	16,650	872	2	6/1/00	5/31/02	
L000	73000	060	1	Laborers	0	24	1	0	0	2	6/1/00	5/31/02	
G000	73000	000	1	Clerical	1.5	24	1	5,550	178	2	6/1/00	5/31/02	
	73000	140	1	Office Supplies	19	24	2		10	2	6/1/00	5/31/02	
	73000	190	1	Computer HW/SW	19	24	2		48	2	6/1/00	5/31/02	
	73000	210	1	Onsite Training	16	24	2		24	2	6/1/00	5/31/02	
	73000	400	1	MPR		24	4		4	2	6/1/00	5/31/02	
								70,300	4,020				
Schedule Activity Number				S1W05005 Hot Operations for Phase 1 Facilities (3 shift ops)									
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	4	108	1	66,600	4,541	0	6/1/02	5/31/11	
E000	73000	010	1	Engineers	4.5	108	1	74,925	5,108	0	6/1/02	5/31/11	
S000	73000	010	1	Scientists	0	108	1	0	0	0	6/1/02	5/31/11	
P000	73000	010	1	Professionals	4	108	1	66,600	4,541	0	6/1/02	5/31/11	
T000	73000	060	1	Technicians	8.5	108	1	108,225	5,867	0	6/1/02	5/31/11	
C000	73000	060	1	Crafts	7	108	1	118,550	6,103	0	6/1/02	5/31/11	
R000	73000	060	1	Operators	9	108	1	149,850	7,846	0	6/1/02	5/31/11	
L000	73000	060	1	Laborers	0	108	1	0	0	0	6/1/02	5/31/11	
G000	73000	000	1	Clerical	3	108	1	48,950	1,608	0	6/1/02	5/31/11	
	73000	140	1	Office Supplies	38	108	2		88	0	6/1/02	5/31/11	
	73000	190	1	Computer HW/SW	38	108	2		430	0	6/1/02	5/31/11	
	73000	210	1	Onsite Training	38	108	2		215	0	6/1/02	5/31/11	
	73000	220	1	Electricity		108	3		878	0	6/1/02	5/31/11	
	73000	410	1	Laundry Service	22.5	108	3		508	0	6/1/02	5/31/11	
	73000	480	1	Vehicle Maint		108	3		585	0	6/1/02	5/31/11	
	73000	100	1	Mails & Equip		108	3		565	0	6/1/02	5/31/11	
	73000	400	1	MPR		108	4		76	0	6/1/02	5/31/11	
								832,700	38,635				

Table A-2 Summary of Staff Requirements and Costs for Baseline HAW Container Disposal Based on 1987 MYPP (Option 1A)													
Schedule Activity Number				S1W06020 Deactivation of Phase 1 Facilities									
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	2	12	1	5,700	252	3	6/1/11	5/31/12	
E000	73000	010	1	Engineers	2.25	12	1	4,163	284	3	6/1/11	5/31/12	
S000	73000	010	1	Scientists	0	12	1	0	0	3	6/1/11	5/31/12	
P000	73000	010	1	Professionals	2	12	1	3,700	252	3	6/1/11	5/31/12	
T000	73000	060	1	Technicians	3.25	12	1	6,013	316	3	6/1/11	5/31/12	
C000	73000	060	1	Crafts	3.5	12	1	6,475	339	3	6/1/11	5/31/12	
R000	73000	060	1	Operators	4.5	12	1	9,326	436	3	6/1/11	5/31/12	
L000	73000	060	1	Laborers	0	12	1	0	0	3	6/1/11	5/31/12	
G000	73000	060	1	Clerical	1.5	12	1	2,775	69	3	6/1/11	5/31/12	
	73000	210	1	Onsite Training	19	12	2		12	3	6/1/11	5/31/12	
	73000	220	1	Electricity		12	3		25	3	6/1/11	5/31/12	
	73000	410	1	Laundry Service	11.25	12	3		28	3	6/1/11	5/31/12	
	73000	4C0	1	MPR		12	4		0	3	6/1/11	5/31/12	
								35,150	2,033				
Schedule Activity Number				S1W06025 Operations Preparations for Phase 2 Facilities									
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	2.5	24	1	9,250	631	2	5/1/09	4/30/11	
E000	73000	010	1	Engineers	2.25	24	1	8,325	568	2	5/1/09	4/30/11	
S000	73000	010	1	Scientists	0	24	1	0	0	2	5/1/09	4/30/11	
P000	73000	010	1	Professionals	2	24	1	7,400	508	2	5/1/09	4/30/11	
T000	73000	060	1	Technicians	4.75	24	1	17,375	920	2	5/1/09	4/30/11	
C000	73000	060	1	Crafts	4.5	24	1	16,660	872	2	5/1/09	4/30/11	
R000	73000	060	1	Operators	7.5	24	1	27,780	1,463	2	5/1/09	4/30/11	
L000	73000	060	1	Laborers	0	24	1	0	0	2	5/1/09	4/30/11	
G000	73000	060	1	Clerical	1.5	24	1	5,660	179	2	5/1/09	4/30/11	
	73000	140	1	Office Supplies	25	24	2		19	2	5/1/09	4/30/11	
	73000	190	1	Computer HW/SW	25	24	2		63	2	5/1/09	4/30/11	
	73000	210	1	Onsite Training	25	24	2		31	2	5/1/09	4/30/11	
	73000	4C0	1	MPR		24	4		5	2	5/1/09	4/30/11	
								\$2,500	5,238				

Table A-2 Summary of Staff Requirements and Costs for Baseline (LAW Container Disposal) Based on 1997 MYPP (Option 1A)															
Schedule Activity Number				STW08030	Hot Operations for Phase 2 Facilities (4+T shift ops)										
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L		
M000	73000	010	1	Managers	5	164	1	126,417	8,619	0	5/1/11	12/31/24			
E000	73000	010	1	Engineers	4.5	164	1	113,775	7,757	0	5/1/11	12/31/24			
S000	73000	010	1	Scientists	0	164	1	0	0	0	5/1/11	12/31/24			
P000	73000	010	1	Professionals	4	164	1	101,133	6,885	0	5/1/11	12/31/24			
T000	73000	060	1	Technicians	9.5	164	1	240,182	12,576	0	5/1/11	12/31/24			
C000	73000	080	1	Crafts	9	164	1	227,550	11,915	0	5/1/11	12/31/24			
R000	73000	080	1	Operators	16	164	1	379,260	19,858	0	5/1/11	12/31/24			
L000	73000	080	1	Laborers	0	164	1	0	0	0	5/1/11	12/31/24			
G000	73000	000	1	Clerical	3	164	1	75,850	2,439	0	5/1/11	12/31/24			
	73000	140	1	Office Supplies	50	164	2		172	0	5/1/11	12/31/24			
	73000	190	1	Computer HW/SW	50	164	2		858	0	5/1/11	12/31/24			
	73000	200	1	Onsite Training	50	164	2		428	0	5/1/11	12/31/24			
	73000	220	1	Electricity		164	3		1,373	0	5/1/11	12/31/24			
	73000	400	1	Laundry Service	33.5	164	3		1,150	0	5/1/11	12/31/24			
	73000	4F0	1	Vehicle Maint		164	3		858	0	5/1/11	12/31/24			
	73000	100	1	Mails & Equip		164	3		858	0	5/1/11	12/31/24			
	73000	4C0	1	MPR		164	4		132	0	5/1/11	12/31/24			
								1,284,187	75,880						
Schedule Activity Number				STW05035	Perform Long Term Monitoring of LAW S&O Facilities										
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L		
M000	73000	010	1	Managers	0.75	105	1	12,141	828	0	1/1/25	9/30/33			
E000	73000	010	1	Engineers	0.875	105	1	14,164	968	0	1/1/25	9/30/33			
S000	73000	010	1	Scientists	0	105	1	0	0	0	1/1/25	9/30/33			
P000	73000	010	1	Professionals	0.75	105	1	12,141	828	0	1/1/25	9/30/33			
T000	73000	060	1	Technicians	0.5	105	1	8,094	424	0	1/1/25	9/30/33			
C000	73000	080	1	Crafts	1.5	105	1	24,281	1,271	0	1/1/25	9/30/33			
R000	73000	080	1	Operators	1	105	1	18,188	848	0	1/1/25	9/30/33			
L000	73000	080	1	Laborers	0	105	1	0	0	0	1/1/25	9/30/33			
G000	73000	000	1	Clerical	0.625	105	1	10,117	325	0	1/1/25	9/30/33			
	73000	140	1	Office Supplies	8	105	2		14	0	1/1/25	9/30/33			
	73000	190	1	Computer HW/SW	8	105	2		66	0	1/1/25	9/30/33			
	73000	200	1	Onsite Training	8	105	2		33	0	1/1/25	9/30/33			
	73000	220	1	Electricity		105	3		55	0	1/1/25	9/30/33			
	73000	400	1	Laundry Service	3	105	3		85	0	1/1/25	9/30/33			
	73000	100	1	Mails & Equip		105	3		27	0	1/1/25	9/30/33			
	73000	4C0	1	MPR		105	4		7	0	1/1/25	9/30/33			
								97,125	5,758						

Table A-2 Summary of Staff Requirements and Costs for Baseline ILW Container Disposal, Based on 1997 NYPP (Option 1A)

Notes:

- 1) Staffing estimate based on attached staffing chart. Assume one FTE is equivalent to 1850 hrs
- 2) CE140 - Office supplies based on \$200 per FTE + 25.6% for G&A and escalation.
CE190 - Computer hardware and software based on \$1000 per FTE + 25.6% for G&A and escalation.
CE240 - Onsite training based on \$500 per FTE + 25.6% for G&A and escalation.
- 3) The following costs are assumed bases of VRCOM estimates. Actual estimates will be generated following design studies in FY 1995.
These costs apply only after hot start as costs prior to hot start are assumed to be covered by the project.
CE 220 - BPA electricity \$20K per shift per year + 25.6% for G&A and escalation.
CE400 - Laundry service based on \$2K per bargaining unit FTE + 25.6% for G&A and escalation.
CE4PD - Transportation (trucks) \$50K per year per vehicle + 25.6% for G&A and escalation.
CE100 - Materials and equipment (spare parts) \$50K per year + 25.6% for G&A and escalation.
- 4) MPR based on 7.0 % of Cost Elements 100, 140, and 190.

Table A-3. Summary of Estimated Capital Cost Details For Design, Construction and Closure of Baseline Immobilized Low Activity Waste Disposal Based on Fiscal Year 1997 Multi-Year Work Plan (Option 1A).

Activity	Module 1 \$ million	Module 2 \$ million	Module 3 \$ million
Prepare Preliminary Title I Design	1.7 ^a		
Prepare Detailed Title II design	9.4 ^a		
Site Prep/Mobilize Construction Forces	20.6 ^a	0.3 ^a	-
Construction	130 ^b	96	96
Closure	13	13	13

^a Sum of these costs (\$32 million) plus below amount used to develop infrastructure cost of Table 5-1.

^b Difference between module 1 and other modules (\$130 million - \$96 million = \$34 million) added to above sum (\$32 million) to develop \$66 million total infrastructure cost of Table 5-1.

A2.0 ALTERNATIVE PLANNING CASES

**A2.1 DESIGN BASIS FOR ESTIMATE--IMMOBILIZED LOW-ACTIVITY
WASTE DISPOSAL COST ESTIMATES (OPTIONS 2A, 2B, 2C, AND 2D)**

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A2.1 DESIGN BASIS FOR ESTIMATE--IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL COST ESTIMATES (OPTIONS 2A, 2B, 2C, AND 2D)

DESIGN BASIS FOR ESTIMATE ILAW Disposal Cost Estimates

1.0 Scope of Work

FDNW shall prepare three (3) cost estimates for the ILAW Disposal project. Cost estimates shall be structured to provide easy identification of major subsystems in each estimate. Each estimate shall be a stand-alone module that can be combined with other modules to establish the total capital cost for a variety of possible disposal facility configurations.

The estimates that will be prepared are as follow:

- A) Disposal Project Infrastructure
- B) Modular Disposal Units
 - Remote Handled Mixed Waste
 - Remote Handled Non-mixed Waste
 - Contact Handled Mixed Waste
 - Contact Handled Non-mixed Waste
- C) Final Closure and Cap
 - Prototype Hanford Barrier
 - Alternative 1 of Modified Hanford Barrier
 - Alternative 2 of Modified Hanford Barrier

2.0 Description of Work

This section describes the minimum required elements of the total project and which estimate they will fall into. Additional elements that may be deemed necessary by FDNW may be included upon discussion with SESC.

2.1 Infrastructure

This estimate will include all elements of the project infrastructure that would be common to all configurations. Specific elements to be included in this estimate are:

- Site clear and grub
- Cut and fill to rough grade
- Perimeter fencing and signs
- Site drainage/storm water control
- Site lighting
- Roadways
- Utilities
 - Electrical
 - Potable water
 - Fire water
 - Sanitary sewer
 - Telecommunications
- Operations building
 - Control room
 - Change/locker room
 - Records storage room

- Training room
- Administrative/office space
- Maintenance building
 - Truck/forklift maintenance
 - Crane maintenance
- Security/access control
- Transport vehicles

Design basis for estimating Infrastructure is as follows:

Site area is 90 acres. Location is southwest of PEREX between 4th street and 1st street. Perimeter fencing shall be 8 feet high. Drainage ditches shall control run-on and runoff of rainwater to and from the disposal site. Site lighting shall be provided for roadways, parking lots, and fence line. Lighting for the disposal modules shall be provided by the individual modules (see section 2.2). A paved central roadway (10 meters wide) and perimeter roads (8 meters wide) shall provide access to both ends of each disposal unit. Gravel roads shall provide access around and into each disposal unit. The infrastructure will provide upgrades to First street from the disposal site entrance to the east fence line of the 200 East area.

Utilities shall be provided to the site and within the site. The project shall supply 13.8 KV electrical power transmission lines from the nearest available switch gear to the disposal site substation. The infrastructure shall include 480V power distribution to infrastructure-provided buildings. Electrical distribution to the disposal modules shall be provided by the individual modules (see section 2.2).

Potable water and fire water supply piping shall be provided to the disposal site distribution manifold. Water distribution piping to infrastructure-supplied buildings shall be included in the infrastructure estimate. Water distribution to the disposal modules shall be provided by the individual modules. Sanitary sewage disposal shall be provided by the disposal site infrastructure.

Telecommunications services to the disposal site and within the operations and maintenance buildings shall be provided by infrastructure. Telecommunications shall include telephone, local area computer network (LAN), and emergency response communications systems.

The disposal site infrastructure shall provide a central operations building consisting of control room, change/locker room, records storage room, training room, and administrative office space. Operations schedule will be 3 shifts per day, 7 days per week. Estimated maximum single-shift occupancy is 25 managerial, engineering, professional and general office workers, and 30 technicians, craftsmen and operators. Total occupancy is estimated at 40 management, engineering, professional and general office, and 140 technicians, craftsmen and operators.

A maintenance building shall be provided by the infrastructure for servicing major equipment such as forklifts, trucks and cranes.

Security and access control shall be provided by guard houses at each active entrance/exit gate to the disposal site.

The disposal infrastructure shall provide 15 flatbed tractor-trailer trucks for transportation of waste packages from the treatment contractor site to the disposal site. This additional transportation capability will be required in 2010.

2.2 Modular Disposal Units

The estimate for the modular disposal units shall provide capital costs for construction of a single disposal unit for each of the four disposal unit concepts.

Design features common to all concepts:

The disposal units will be constructed in the cleared and graded area provided by the infrastructure estimate. Utilities specific to the disposal unit such as telecommunications, electrical and water distribution shall be supplied by the disposal module. Distribution run lengths for utility services shall be based on distances reflective of the average (median) location of a disposal unit.

Treated waste will be received from the treatment contractor in a package. The package size is 1.8 meters wide by 1.2 meters high by 1.2 meters deep and includes all appurtenances required for handling by overhead crane or forklift. Maximum package weight is 10,000 kg. Remote handled waste has a dose rate up to 1000 mRem/hr. The maximum dose rate for contact handled waste is 200 mRem/hr.

Concept 1: Remote Handled Mixed Waste

The disposal unit shall consist of a shielded concrete vaults divided into 6 cells located adjacent to one another, with common walls separating the vault cells. Each cell holds 840 packages in an array 10 wide by 6 high by 14 deep for a total disposal unit capacity of 5040 packages. The packages shall be separated by not less than 0.1 meter in both horizontal directions. An access roadway runs the length of the vault on one side. Internal dimensions of each cell is 19 meters square. Vault side walls are 0.65 meter thick; intermediate walls are 0.45 meter thick. All walls are 8 meters tall. The floor slab is 1 meter thick.

The disposal unit and access roadway are straddled by a mobile gantry/bridge crane building riding on rails that run the length of the disposal unit. The gantry building is positioned over the working cell of the disposal vault and normally does not move until the cell is filled. The packages are removed from the truck and placed in the disposal cell by a remotely operated bridge crane mounted in the gantry building. The bridge crane is controlled from the operations building.

When a cell is filled, a temporary metal roof is placed over the cell to prevent rainwater intrusion. The gantry building is then moved over to the next cell. When all cells have been filled and a disposal decision has been made, the cells will be closed by removing the temporary metal roofs and back filling the disposal array with an inert filler material such as graded sand, and covered with a 0.5 meter thick reinforced concrete roof slab. When all cells have been closed, the gantry crane building is dismantled and removed.

Beneath the disposal unit is a double liner/leachate collection system. The design basis for the liner and leachate collection system shall be the same as Project W-025, Low Level Mixed Waste disposal trenches. The liner system consists of the following layers (from bottom to top):

- Undisturbed subgrade (bottom-most layer)
- Secondary compacted admix (bentonite clay/soil) 1 meter thick
- Secondary HDPE liner
- Secondary geonet
- Geotextile Type B
- Secondary gravel drainage layer 0.3 meter thick
- Geotextile Type B
- Primary compacted admix (bentonite clay/soil) 0.5 meter thick
- Primary HDPE liner
- Primary geonet
- Geotextile Type B
- Primary drainage gravel layer 0.3 meter thick
- Geotextile Type A
- Operations layer (graded soil/gravel) 1 meter thick (top layer)

Concept 2: Remote Handled Non-mixed Waste

This concept is identical to Concept 1 with the exception that the double liner and leachate collection system is not required.

Concept 3: Contact Handled Mixed Waste

The disposal unit is an open trench with side slopes of 3H:1V. The disposal capacity of the module shall be nominally 5040 packages, arranged in an array 10 wide by 6 high by 84 rows deep. The packages shall be separated by not less than 0.1 meter in both horizontal directions. This provides a nominal disposal array size of 20 meters wide by 110 meters long by 7.2 meters tall. The disposal unit shall have a double liner/leachate collection system as described for Concept 1.

Packages will be handled by manually operated forklift with shielded cab. The disposal unit cost estimate will include two forklifts. When the unit has been filled and a disposal decision has been made, the waste package array will be back filled with an inert, porous filler material such as sand or gravel.

Concept 4: Contact Handled Non-mixed Waste

This concept is the same as concept 3 with the exception that the double liner and leachate collection system is not required.

2.3 Final Closure and Cap

At closure inert filler material (sand or gravel) will be added to the spaces around waste containers, a reinforced concrete roof slab added to the vaults, surface protective earthen barrier placed over the disposal units and surface markers installed. The barrier will inhibit infiltration of water and intrusion by plants, animals and humans into the waste. Disturbed land will be recontoured to conform with the surrounding terrain and revegetated with locally derived native plant species consistent with Site-wide biological mitigation plans. The surface markers will identify location of the disposal units.

The estimate shall provide capital costs for addition of sand filler, addition of 0.5 m thick reinforced concrete roof slabs to the vaults, construction of the protective barrier over each disposal unit or groups of disposal units, and addition of markers.

There are 3 barrier concepts at this time. Specific elements to be included in this estimate are:

- Excavate/procure materials
- Transport materials
- Remove temporary metal roof of vaults and dispose
- Add required amounts of sand filler
- Install reinforced concrete roof slab on vaults
- Add barrier materials and slope as needed
- Recontour disturbed land areas
- Revegetate with native plant species
- Procure and install surface markers

The baseline barrier is the prototype Hanford Surface Barrier. It is about 4.4 m deep, 2 m overhang, and has a vertical wall encircling each disposal unit. The alternative barriers use the same surface barrier and overhang but different sub layers. The sub layers are used for water diversion and water conditioning.

The barriers are summarized below. The bold letters are common features.

Baseline: Hanford Surface Barrier

- 1.0 m Silt Loam/Admix Gravel Mix
- 1.0 m Silt Loam
- 0.15 m Sand Filter
- 0.30 m Gravel Filter
- 1.8 m Fractured Basalt Riprap
- 0.30 m Drainage Gravel
- 0.15 m Asphaltic Concrete Coated w Fluid-Applied Asphalt
- 2.0 m Barrier Overhang Beyond Sides of Each Disposal Unit
- 0.15 m Vertical Ring Asphaltic Concrete Coated w Fluid-Applied Asphalt to Encircle Each Unit

Alternative 1 Modified Hanford Barrier

This alternative uses new moisture diversion barrier concept. The horizontal barrier is sand and sloping gravel. The vertical barrier is ring of gravel.

- 1.0 m Silt Loam/Admix Gravel Mix
- 1.0 m Silt Loam
- 0.15 m Sand Filter
- 0.30 m Gravel Filter
- 1.5 m Fractured Basalt Riprap
- 0.5 m Sand at Center of Unit(s); 0.9 m at Outer Edge of Overhang
- 0.4 m Gravel Moisture Diverter at Center - 3 % Slope to Outer Edge of Overhang
- 2.0 m Barrier Overhang Beyond Sides of Each Unit
- 1.0 m Vertical Ring of Gravel to Encircle Each Unit

Alternative 2 Modified Hanford Barrier

This alternative uses a larger moisture diverter system than Alternative 1 and a layer of crushed glass (frit) for water conditioning. The vertical barrier is the same as Alternative 1.

- 1.0 m Silt Loam/Admix Gravel Mix
- 1.0 m Silt Loam
- 0.15 m Sand Filter
- 0.30 m Gravel Filter
- 1.5 m Fractured Basalt Riprap
- 0.5 m Sand at Center of Unit; 0.9 m at Outer Edge of Overhang
- 0.5 m Gravel Moisture Diverter - 3 % Slope to Outer Edge of Overhang
- 0.4 m Glass Frit Water-Conditioning at Center - 3 % Slope to Outer Edge of Overhang
- 2.0 m Barrier Overhang Beyond Sides of Each Unit
- 1.0 m Vertical Ring of Gravel to Encircle Each Unit

22-141 50 SHEETS
22-142 100 SHEETS
22-143 200 SHEETS
22-144 300 SHEETS

CONTACT HANDLED WASTE TRENCH

ACCESS ROAD

22 143 30 SHEETS
22 142 150 SHEETS
22 144 200 SHEETS

REMOTE HANDLED WASTE VAULT

22-141: 50 SHEETS
 22-142: 100 SHEETS
 22-143: 200 SHEETS

Golden Age Club

Cross section of closed RH-MW
1LW disposal unit

**INTERIM
PERFORMANCE
ASSESSMENT**
TYPICAL BARRIER CROSS-SECTION
FIGURE 7

Figure 7. Example Hanford Barrier.

FLUOR DANIEL HONOLULU, INC.
 LOCKHEED MARTIN HAWAII CORP.
 JOB NO. 24675AA2/P30001
 FILE NO. 24675AA2

1987 - INTERACTIVE ESTIMATION
 LLW DISPOSAL ALT. - INFRASTRUCTURE
 PLANTING ESTIMATE
 FROM 02 - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

PAGE 3 OF 4
 DATE 06/05/91 17:42:42
 BY CBL/KLR/DMM

WBS DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT MONEY	DOB TOTAL	ESCALATION % TOTAL	WBS TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
110401 SITEWORK	1844233	424972	1393205	14.86	504213	1497434	23 1114552
110402 UTILITIES	1437129	242441	1493420	14.86	251441	1947369	21 421474
114401 FACILITIES, STAGING, & EQUIPMENT	2421745	1714510	1277706	14.86	1474235	1295325	10 3443504
114402 UTILITIES BYN AND LMS	111010	24410	130600	14.86	19420	130180	10 34479
PROJECT TOTAL	13,488,125	2,410,553	14,495,730	14.86	3,451,910	10,944,330	23 5,516,564

HNF-SD-TWR-AQA-004
 Rev. D

FLUOR DANIEL NORTHWEST, INC.
LOCKHEED MARTIN HAMFORD CORP.
JOB NO. 84672AA2/03H101
FILE NO. 24472AA2

"* EST - INTERACTIVE ESTIMATING *"
LAW DISPOSAL ALT. - INFRASTRUCTURE
PLANNING ESTIMATEIMATE
P03HWR43 - ESTIMATE BASIS SHEET

PAGE 2 OF 8
DATE 16/06/91 13.47.34
BY COL/KLR/BNH

1. ESTIMATE PURPOSE

THIS ESTIMATE WILL BE USED FOR A SCOPING STUDY.

2. ESTIMATE TECHNICAL BASIS

- A. THIS ESTIMATE HAS BEEN PREPARED FOR THE LAW DISPOSAL PROJECT AS REQUESTED BY LOCKHEED MARTIN HAMFORD CORP.
B. A DESCRIPTION OF THE TECHNICAL SCOPE OF WORK MAY BE FOUND IN THE FOLLOWING REFERENCE DOCUMENTS:
LETTER OF INSTRUCTION (LOI) ILMD-912416
SCOPE OF WORK (SOW) LAW DISPOSAL COST ESTIMATES DATED APRIL 3, 1993
REQUEST FOR ESTIMATE DATED MARCH 26, 1993
C. WORK SCOPE NOT INCLUDED IN THIS ESTIMATE. THIS ESTIMATE IS CONSTRUCTION ONLY AND DOES NOT INCLUDE COST FOR DEFINITIVE DESIGN, OR EARLY BUILDING CONSTRUCTION.

3. ESTIMATE METHODOLOGY

A. DIRECT COSTS:

THIS ESTIMATE USES PRIMARILY A PARAMETRIC METHODOLOGY WITH SOME BOTTOMS-UP TECHNIQUE CONSTRUCTION LABOR, MATERIAL AND EQUIPMENT UNITS HAVE BEEN ESTIMATED BASED UPON ONE OF MORE OF THE FOLLOWING STANDARD COMMERCIAL ESTIMATING RESOURCES, PUBLISHED ESTIMATING MANUALS/DATABASES: F.W. HUBBARD'S STANDARD & S. HARRIS RICHARDSON'S STANDARD PLANT CONSTRUCTION ESTIMATING STANDARDS & NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION, INC. (NECA) MANUAL OF LABOR UNITS & ELECTRICAL RESOURCES, INC. ELECTRICAL ESTIMATING PRICE AND LABOR MANUAL THE UNITS MAY HAVE BEEN FACTORED/ADJUSTED BY THE ESTIMATOR AS APPROPRIATE TO REFLECT INFLUENCES BY CONTRACT, WORK SITE, OR OTHER IDENTIFIED PROJECT OR SPECIAL CONDITIONS.

B. DIRECT COST FACTORS

- (1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 8%.
(2) CONTRACT ADMINISTRATION FACTOR OF 18.01 HAS BEEN APPLIED TO THE DIRECT CONTRACT VALUE WHICH INCLUDES COSTS FOR BID PACKAGE PREPARATION, CONTRACT MANAGEMENT & ADMINISTRATION AND PROJECT MANAGEMENT & PLANNING SUPPORT

C. INDIRECT COSTS

FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AND THE FOLLOWING PERCENTAGES: LABOR = 30-40%, EQUIPMENT USE = 10%, MATERIAL = 30-40%. SUBCONTRACT = 10-15%, AND EQUIPMENT = 10%, AND ARE REFLECTED IN THE "OHLF/BAT" COLUMN OF THE ESTIMATE DETAIL REPORT.

D. RATES

FLUOR DANIEL NORTHWEST LABOR RATES ARE BASED UPON THE FLUOR DANIEL FEDERAL OPERATIONS (FDFO) DISCLOSURE STATEMENT AND APPROVED PROVISIONAL BILLING RATES. FOR ESTIMATING PURPOSES, AVERAGE RATES BY OPERATIONS CODE HAVE BEEN DEVELOPED BASED UPON RECENT COST HISTORY.

HNR-SD-TWR-AQA-004
REV. 0

FLUOR DANIEL NORTHWEST INC
LOCKHEED MARTIN HAMFORD CORP
JOB NO 14474AA3/P3P301
FILE NO 8461EAA2

" EST - INTERACTIVE ESTIMATING "
[LAW DEEPSEAL RLY - INFRASTRUCTURE
PLANNING ESTIMATE
P00006] ESTIMATE BASIS SHEET

PAGE 1 OF 1
DATE 16/05/71 11 41 AM
BY COL/KLR/DKR

4 ESCALATION

=====

ESCALATION PERCENTAGES WERE CALCULATED FROM THE JANUARY 1971 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDEXES FOR THE CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE ACQUISITION" PM 10

5 CONTINGENCY

=====

A CONTINGENCY ANALYSIS HAS BEEN PERFORMED AND IS DOCUMENTED IN P00006 REPORT OF THIS ESTIMATE

6 REMARKS

=====

MAJOR ASSUMPTIONS WHICH HAVE BEEN MADE IN THE PREPARATION OF THIS ESTIMATE ARE AS FOLLOWS

- A) ASSUME NO CONTAMINATED SOIL WILL BE ENCOUNTERED DURING CLEAR & GRUB AND EXCAVATION
- B) DISTANCES FOR UTILITY TIE INS ARE THE ESTIMATOR'S BEST GUESSES
- C) THIS ESTIMATE IS NOT A TYPE OR TWO ESTIMATE THIS ESTIMATE IS TO SHOW THE CONSTRUCTION ONLY COST FOR THE INFRASTRUCTURE PORTION OF THE PROJECT

HNF-SD-TWR-A-GA-004
Rev 0

PLUOR DANIEL MATHWESZ, INC
 60 CHERRY HAVEN HAMPDEN CORP
 JOB NO 2015A01/P1401
 FILE NO 21675A02

-- FIRST INTERACTIVE ESTIMATING --
 PLAM DISPOSAL A/C - INTERSTRUCTURE
 PLAMING ESTIMATE
 FORMED - FOR COST CODE ACCOUNT SUMMARY

PAGE 15 OF 8
 DATE 04/05/19 11 42 52
 BY COL/CLB/DEM

COST CODE/USE	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT MOUNT	SUB TOTAL	ESTIMATE TOTAL	SUB TOTAL	CONTINGENCY TOTAL	TOTAL COST/USE
400	IMPROVEMENTS TO LAND							
310001	NETWORK	2413533	457504	2871037	10 80	428607	3120644	30
	TOTAL 400 IMPROVEMENTS TO LAND	2413533	457504	2871037	10 80	428607	3120644	30
500	BUILDINGS							
320001	FACILITIES, SYSTEMS & EQUIPMENT	3382730	479902	4088632	14 80	597174	4685806	30
	TOTAL 500 BUILDINGS	3382730	479902	4088632	14 80	597174	4685806	30
600	UTILITIES							
310001	SYSTEMS	422740	15468	503160	14 80	74622	577780	30
310002	UTILITIES	1433137	261341	1695440	14 80	251344	1946784	30
310003	FACILITIES, SYSTEMS, & EQUIPMENT	314000	89806	374400	14 80	54633	429033	30
310002	UTILITIES DYN AND LMSI	110000	24400	134400	14 80	19400	153800	30
	TOTAL 600 UTILITIES	2079277	428234	2507511	14 80	102215	2609726	30
700	HEAVY MOBILE EQUIPMENT							
330001	FACILITIES, SYSTEMS, & EQUIPMENT	5091540	1488802	6580342	14 80	1022413	7602755	30
	TOTAL 700 HEAVY MOBILE EQUIPMENT	5091540	1488802	6580342	14 80	1022413	7602755	30
PROJECT TOTAL		2,413,533	457,504	2,871,037	14 80	597,174	3,468,111	30
11, 818, 115								

HN-SD-TWR-AGA-004
 Rev. D

FLOOR DANIEL NORTHWEST. INC
LOCKERED MARVIN MARFORD CORP
JOB NO 24675AA2/DINKO1
FILE NO 24675AA2

++ BEST - INTERACTIVE ESTIMATING ++
TEAM DISPOSAL AET. - INFRASTRUCTURE
PLANNING ESTIMATE
FORNAGE - ESTIMATE SUMMARY BY CSJ DIVISION

PAGE 4 OF 6
DATE 04/03/97 11 43.03
BY CDA/TEB/DEM

CSI	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT HOURS	SUB TOTAL	RECALCULATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
CONSTRUCTION								
02	ITEMWORK	3393073	598035	2799059	14.86	561561	4240636	30 1702192
18	EQUIPMENT	8191598	1481864	6480362	14.86	1022413	1701715	30 2179925
13	SPECIAL CONSTRUCTION	3181734	435053	4416683	14.86	577178	4618859	30 1384758
14	ELECTRICAL	1538612	281893	1816505	14.86	234355	2481920	30 417185
TOTAL CONSTRUCTION			1,410,597		2,451,412		5,475,358	
		11,810,125		16,436,718	14.86		18,948,134	25 24,421,640
PROJECT TOTAL								
			1,410,597		2,451,412		5,475,358	
		11,810,125		16,436,718	14.86		18,948,134	25 24,421,640

INF-SD-TWR-AGA-004
Rev. 0

PHOTO DANIEL NORTHWEST, INC.
LOCKHEED MARTIN HAWFORD CORP.
JOB NO. 2401522/PJMK01
FILE NO. 2401522

** TEST - INTERACTIVE ESTIMATING **
LLAN DISPOSAL ALT. - IMPROSTRUCTIVE
PLANNING ESTIMATE
POMN002 - CONTINGENCY ANALYSIS BASIS SHEET

PAGE 2 OF 4
DATE 06/08/91 11:47:45
BY COL/KLA/BKM

Revised 3/25/91 10:14

1. DEFINITION OF CONTINGENCY AS PROVIDED BY DOE

CONTINGENCY COVERS COSTS THAT MAY RESULT FROM INCOMPLETE DESIGN, UNFORSEEN AND UNPREDICTABLE CONDITIONS, OR UNCERTAINTIES WITHIN THE DEFINED PROJECT SCOPE. THE AMOUNT OF CONTINGENCY WILL DEPEND ON THE STATUS OF DESIGN, PROCUREMENT, AND CONSTRUCTION; AND THE COMPLEXITY AND UNCERTAINTIES OF THE COMPONENT PARTS OF THE PROJECT. CONTINGENCY IS NOT TO BE USED TO AVOID MAKING AN ACCURATE ASSESSMENT OF EXPECTED COST (OFFICE OF WASTE MANAGEMENT ISN-361 COST AND SCHEDULE GUIDE).

2. CONTINGENCY ALLOWANCE GUIDELINES

THE DOE GUIDELINE CONTINGENCY ALLOWANCE FOR A...
PLANNING ESTIMATE - STANDARD + 30% - 10%

3. METHODOLOGY

CONTINGENCY IS EVALUATED AT THE LOWEST WORK BREAKDOWN STRUCTURE (WBS) LEVEL WITHIN THE COST ESTIMATE DETAILS. IT IS SUMMARIZED AT UPPER WBS LEVELS AND REPORTED ON THE SUMMARY REPORTS.

3. ANALYSIS

AN ASSESSMENT OF DESIGN MATURITY, WORK COMPLEXITY AND PROJECT UNCERTAINTIES HAS BEEN PERFORMED. AN EXPLANATION OF THIS ASSESSMENT AND CONTINGENCY RATES WHICH HAVE BEEN ADDED TO THE COST OF WORK ARE AS FOLLOWS.

WBS 32041 SITEWORK - A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME

WBS 32042 UTILITIES - A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO UNKNOWN CONCERNING DISTANCE TO TIE-INS

WBS 32043 FACILITIES, SYSTEMS & EQUIPMENT - A CONTINGENCY OF 30% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME

WBS 33040 UTILITIES DIB AND LMSI - A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO AN ALLOWANCE HAS BEEN USED TO DETERMINE THE COST.

HNF-SD-TWR-AQA-004
REV. 0

FLOOD DAM: EC NORTHWEST, INC.
 LOCKHEED MARTIN HANFORD CORP.
 JOB NO. 24618AA2/DJMK03
 FILE NO. 24618AA2

^^ ISEP - INTERACTIVE ESTIMATING ^^
 ILAW DISPOSAL ALZ. - INFRASTRUCTURE
 PLANNING ESTIMATES
 CONTRACT : CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

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 DATE 06/05/97 13 43 13
 BY CBL/MEL/DKM

NO	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	TOTAL	OTHER COSTS	SUB TOTAL
-----	-----	-----	-----	-----	-----	-----
121041	PIPEWORK	2151233	10 00	2366322	0	2366322
121042	UTILITIES	1425127	10 00	1567634	0	1567634
121043	FACILITIES, SYSTEMS, & EQUIPMENT	2492765	10 00	2742040	0	2742040
121044	UTILITIES BYM AND LMS	310400	10 00	341440	0	341440

PROJECT TOTAL		13,040,126		2,610,593	0	2,610,593

HM-FSD-TWR-AQA-004
 Rev. 0

FLYNN DAHILL ROBT & SONS, INC.
LOCKHEED MARTIN HARTFORD CORP.
JOB NO. 34670AA/34670J
FILE NO. 34670AA2

** EST. - INTERACTIVE ESTIMATING **
LAW DISPOSAL ALT. - JMWAASTRECHURCH
PLANLINE ESTIMATE
FORMER - ESTIMATE DETAIL BY WOE / COST CODE

PAGE 1
DATE 04/05/97 11:41:23
BY CUC/SLA/DMH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	ON&P / S & I	TOTAL DOLLARS
320401	SITENWORK										
320401.01	SITENWORK										
320401.0100003	4" X 4" CLEAR & GRUB	400	4	4	0	0	0	0	0	0	4
320401.0200004	CLEAR & GRUB - 1/2	400	50000 CY	0	0	0	0	43500	0	3600	13850
320401.0200005	HAUL OFF WASTE	400	25000 CY	0	0	0	0	100000	0	15000	115000
SUBTOTAL	SITENWORK			0	0	0	0	143,500	0	24,600	168,100
TOTAL	COST CODE 40002			0	0	0	0	143,500	0	24,600	168,100
	WBS 320401										
	REGULATION 14.041 - CONTINGENCY		30.00 %								50,430
320401.02	SITENWORK										
320401.0200016	ROUGH GRADE / SITE DRAINAGE	400	0	0	0	0	0	0	0	0	0
320401.0200017	BALANCE CUT & FILL	400	72000 CY	0	0	0	0	72000	0	10800	82800
320401.0200020	ROUGH GRADING & DRAINAGE	400	42000 CY	0	0	0	0	42000	0	9000	51000
SUBTOTAL	SITENWORK			0	0	0	0	72,000	0	11,800	83,800
TOTAL	COST CODE 40002			0	0	0	0	72,000	0	11,800	83,800
	WBS 320401										
	REGULATION 14.041 - CONTINGENCY		30.00 %								25,140
320401.03	SITENWORK										
320401.0300003	PERIMETER FENCING & SIGN	400	0	0	0	0	0	0	0	0	0
320401.0300007	1" CHAIN LINK W/2 STRANDED	400	120 LF	0	0	0	0	12000	0	1000	13000
320401.0300014	BARBED WIRE	400	2 BA	0	0	0	0	200	0	100	300
320401.0300015	30' WEL GATE	400	10 BA	0	0	0	0	1000	0	1000	2000
SUBTOTAL	SITENWORK			0	0	0	0	13,200	0	2,100	15,300

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PERSON DANIEL NORTHWEST, INC
LOCKHEED MALIBU HARBOR COOP
JOB NO 24675322/PJNK01
FILE NO 44876A01

-- TEST - INTERACTIVE ESTIMATING --

JEAN WISDOMAL AGT - INFRASTRUCTURE

PAUSHING ESTIMATE

FORMERED - ESTIMATE DETAIL BY WBS / COST CODE

PAGE

DATE

BY

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COG/MGR/0211

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	AMOUNT	LABOR	USAGE	MATERIAL	SUB- CONTRACT	SUBMIT MENT	OFAP / B E T	TOTAL DOLLARS
TOTAL	COST CODE 4502 WBS 310041 [EXCALCATION 14 142 - CONTINGENCY 14 40 2]			0	0	0	0	140.750	0	54.113	274,463
310041 35	ELECTRICAL										
310041 3510420	100 10 PNEUM - 2" PVC	4151	1000 LP	1215	45334	0	42342	0	0	15949	123421
	4 1/2" 1/2" 1/2" CONDUCTORS										
310041 3510421	100 10 PNEUM W/ARM AND	4151	10 00	551	30471	0	114520	0	0	41000	345559
	10" ROUND TAPERED STEEL POLE										
310041 3510422	CONCRETE POLE BASE -	4151	70 BA	551	21014	0	7140	0	0	11375	19812
	2" DIA X 5' CONCRETE										
310041 3510423	TRENCING 2" BACKFILL	4151	1000 LP	95	1425	0	11700	0	0	4052	23101
	1" X 2"										
SUBTOTAL	ELECTRICAL			2,190	100,229	0	101,130	0	0	114,020	401,412
	SALES TAX 8.00%						14621	0	0		14621
	ONAP (000 HOURS ONLY)								0	3756	3756
TOTAL	COST CODE 41511 WBS 310041 [EXCALCATION 14 142 - CONTINGENCY 14 40 2]			2,190	100,229	0	115,029	0	0	120,772	421,790
TOTAL WBS 310041 BITEMOR				2,190	100,229	0	115,029	0	0	120,772	421,790

HNFS-SD-TWR-AQA-004
Rev. 0

FLORIAN DANIEL NORTHWEST, INC.
 ENGINEER HANFORD HANFORD CORP.
 JOB NO. 84470002/HANF01
 FILE NO. 44470002

** EST - INTERACTIVE ESTIMATING **
 PLAN DISPOSAL ALT. - INFRASTRUCTURE
 PLANNING ESTIMATE
 FORM 200 - ESTIMATE DETAIL BY MBS / COST CODE

PAGE 1
 DATE 06/06/97 11:12:29
 BY COL/KLR/DKM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / & L	TOTAL DOLLARS
220000	UTILITIES										
220002.01	SEWERWORK										
220002.0200135	PIPE MATTER	600	0	0	0	0	0	0	0	0	0
220002.0200140	12" FIRE WATER RING COMPLETION INCLUDES: 2K & OF, PIPING, VALVES, FITTINGS, PUMP, HY- DRANTS, BEDDING, LOCATE TAPS	400	2500 LF	4	4	0	0	181500	0	18120	216420
220002.0200142	8 TESTING	400	0	0	0	0	0	0	0	0	0
SUBTOTAL	SEWERWORK			0	0	0	0	181500	0	18120	216420
TOTAL	COST CODE 60000 MBS 220002 ESCALATION 10.00% - CONTINGENCY 20.00%			0	0	0	0	181500	0	18120	216420
220002.03	SEWERWORK										
220002.0200152	SEWAGE WATER	400	0	0	0	0	0	0	0	0	0
220002.0200153	6" POTABLE WATERLINE COM- PLETION: INCLUDES: 2K & OF PIPING, SIDE SERVICE, BACK- FLOW PREVENTION, LOCATE TAPS	400	2300 LF	0	0	0	0	167500	0	24375	146875
220002.0200156	6 TESTING	400	0	0	0	0	0	0	0	0	0
SUBTOTAL	SEWERWORK			0	0	0	0	167500	0	24375	146875
TOTAL	COST CODE 40000 MBS 220002 ESCALATION 10.00% - CONTINGENCY 20.00%			0	0	0	0	167500	0	24375	146875
220002.02	SEWERWORK										
220002.0200166	SEWAGE WATER	400	0	0	0	0	0	0	0	0	0
220002.0200168	PRESSURIZED SANITARY SEWER SYSTEM COMPLETE. INCLUDES:	400	1.15	0	0	0	0	280000	0	40000	320000

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 REV. 0

FLOOR DANIEL NORTHWEST, INC.
LOCKHEED WALTER BARNFORD CORP.
JOB NO. 216752A1/FIN001
FILE NO. 216752A1

*** TEST & INTERACTIVE ESTIMATING ***
TEAM DISCREETAL ALTY. - INTERSTRUCTURAL
PLANNING ESTIMATE

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DATE 04/05/97 13:43:29
BY CDE/MLB/BNH

Partners - ESTIMATE SUBMIT BY HQ / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	PHOTO / E & T	TOTAL DOLLARS
120002.020017	WATERLINE, MANHOLE, SEPTIC/ POURING TANKS, DRAINPISTONS, PUMPS, VALVES, CONTROLS, ELECTRICAL & TESTING	400	0	0	0	0	0	0	0	0	0
SUBTOTAL	STEELWORK			0	0	0	100,000	0	0	0	100,000
TOTAL	COST CODE 10442 M02 210002 100000000 14.00% - CONTINGENCY 10.00 %			0	0	0	100,000	0	0	0	100,000
120002.10	ELECTRICAL										
120002.1000100	COMMUNICATION ALIGNMENT LAN / TELEPHONE	4104	1 LB	0	0	0	100,000	0	0	0	100,000
SUBTOTAL	ELECTRICAL			0	0	0	100,000	0	0	0	100,000
TOTAL	COST CODE 11014 M02 210002 100000000 14.00% - CONTINGENCY 10.00 %			0	0	0	100,000	0	0	0	100,000
120002.10	ELECTRICAL										
120002.1000100	1 - 2" PVC DUCT BANK - PP ENCLOSURE, MACH & CO, COBOL, FORM, CWP, BACKFILL, EYDIN	4100	2000 LF	1100	40121	0	12512	0	0	0	17110
120002.1000100	MANHOLE INSTALLATION	4101	5 JOB	0	1000	0	10000	0	0	0	10000
120002.1000100	1" EPP GROUND L/C ON 15W	4102	12000 LF	2100	40000	0	10000	0	0	0	10000
120002.1000100	1" 15KV TERN	4103	10 EA	0	100	0	100	0	0	0	100
120002.1000100	EXISTING EPP GROUND ALIGNMENT WAS SPACED FOR 11.1 KV 4 TO 6 METER MORE	4104	2 EA	0	1000	0	10000	0	0	0	10000
120002.1000100	1" 15KV DUCT CW GROUND	4105	240 LF	0	100	0	100	0	0	0	100
120002.1000100	CADWELD PLATE	4106	4 EA	0	100	0	100	0	0	0	100
120002.1000100	CADWELD	4107	22 EA	0	100	0	100	0	0	0	100
120002.1000100	1" 15KV 1" Spine Rod	4108	10 EA	0	100	0	100	0	0	0	100
120002.1000100	1" 15KV W/TER	4109	2 EA	0	100	0	10000	0	0	0	10000
120002.1000100	2" 15KV EPP GROUND, 1PR 4M DIA FILLER DAD MOUNTED 750 KVA	4110	1 EA	0	100	0	10000	0	0	0	10000
120002.1000100	1" 15KV METAL CLAD SWGR 2-1100 AMP 000V N/PP MAIN	4111	1 EA	0	100	0	10000	0	0	0	10000

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REV. 0

BLUON DANIEL NORTHWEST, INC.
 LOCKHART WALTER HANFORD CORP.
 JOB NO. B4618AA/09/001
 FIG# NO. 14452AA

** BEST - INTERACTIVE ESTIMATING **
 LEAN DISPOSAL ALT. - INFRASTRUCTURE
 PLANNING ESTIMATE
 FORMER - ESTIMATE DETAIL BY MBE / COST CODE

PAGE 4 7
 DATE 06/01/01 13:43:33
 BY COL/MLR/DMK

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LADDER	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP. RENT	CHAP / B & I	TOTAL DOLLARS
	1-1100 AMP TIS										
	2-100 AMP 4 0-550 AMP TRUV										
SUBTOTAL	ELECTRICAL			1,193	72,123	0	172,676	2,400	0	137,523	484,543
	SALES TAX 1.0% *						22760		0		23760
	ORLE IDR MARKUPS ONLY									5128	5698
TOTAL	COST CODE 41516			1,193	72,123	0	172,641	2,400	0	146,521	514,496
	MBE 324042										
	12% CONTINGENCY 14.8% * CONTINGENCY 20.90 %										
TOTAL MBE 324042 UTILITIES				1,193	72,123	0	172,641	2,400	0	146,521	514,496

HNF-SD-TWR-AQA-004
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-- 1985 - INTERACTIVE ESTIMATING --									
CLAM SPECIAL AGA - INTERACTIVE									
FORWARD - MATERIALS ONLY BY WDA / COST CODE									
ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MARKETS	LABOR	SUB. CONTRACT	EQUIP. MEET	CHAP. / 0 & 1	TOTAL DOLLARS
310000	FACILITIES, SYSTEMS, & EQUIPMENT								
320002.11	EQUIPMENT	710	0	0	0	0	0	0	0
320002.110000	HEAVY MOBILE EQUIPMENT								
320002.110000	PERIPHERAL TRANSDUCER	714	15 EA	0	0	125000	0	0	187500
320002.110000	400 WP, 14 SPEND, DAY CAM	714	15 EA	0	0	100000	0	0	150000
320002.110000	TRANSDUCER TRANSDUCER	714	15 EA	0	0	100000	0	0	150000
320002.110000	WITH BRUSHING (ALLOW)								
320002.110000	EQUIPMENT								
320002.110000	SALES TAX 4.00 %								
320002.110000	ONAF LON MARKETS DREV								
TOTAL									
320002.110000	RECREATION 10.101 - CONFERENCE	30.00 %	0	0	0	4,455,000	0	1,237,500	5,791,500
320002.110000	SPECIAL CONSTRUCTION								
320002.110000	BUILDINGS & FACILITIES								
320002.110000	ARMED, 1000-W/ CONTROL RM.	501	0	0	0	0	0	0	0
320002.110000	CHARGE RM. ECT. - FROM RM	501	1 LE	0	0	250000	0	0	250000
320002.110000	200 SUPPLY FACILITY	501	1 LE	0	0	100000	0	0	100000
320002.110000	MAINTENANCE FACILITY FROM	501	1 LE	0	0	100000	0	0	100000
320002.110000	SECURITY GUARD STATION	501	2 EA	0	0	50000	0	0	100000
320002.110000	REPAIR SHOP/STAGE PRIS FROM								
320002.110000	N.I.G. INC.								
320002.110000	MATERIAL ACCOUNTABILITY AND	501	1 LE	0	0	120000	0	0	120000
320002.110000	REACTIVITY SYSTEM								
320002.110000	SPECIAL CONSTRUCTION								
320002.110000	COST CODE 1000								
320002.110000	RECREATION 10.101 - CONFERENCE	30.00 %	0	0	0	2,981,500	0	0	2,981,500
320002.110000	ELECTRICAL								

FLUOR DANFORS NORTHWEST, INC
 10000000 NORTHWEST CORP
 400 90 44470000/000000
 FILE NO 24470000

11 TEST - INTERACTIVE ESTIMATING **
 11000 010000000000 - INFRASTRUCTURE
 PLANNING ESTIMATES

PAGE 1
 DATE 08/05/97 12 40 32
 BY CBL/KLR/DSH

FORMER - ESTIMATE DETAILS BY HSE / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	ONAP / B & I	TOTAL DOLLARS
121001.1610001	670 4H PSEDER - 2" PVC 4 1/2" THIN CONDUCTORS	6154	1600 LF	743	9254	0	4700	0	0	7146	15152
121001.1610001	3 - 2" PVC DUCT BANK - PP INCLUDES EACH 8X6, COMC. FORM, CMD, BACKFILL, EYELH	6154	2900 LF	1193	12000	0	14228	0	0	14126	126440
121001.1610001	3 - 4" PVC DUCT BANK - PP INCLUDES EACH 8X6, COMC. FORM, CMD, BACKFILL, EYELH	6154	210 LF	142	5477	0	1023	0	0	1042	14646
121001.1610001	MANHOLE INSTALLATION	6154	5 JOB	10	3041	0	15004	0	0	7219	15141
121001.1611129	24/8 THIN 1/2" COPPER 400	6154	12000 LF	133	12437	0	19090	0	0	13714	44190
121001.1611129	500 THIN 1/2" COPPER 400	6154	1000 LF	47	2553	0	5579	0	0	1253	12146
121001.1610001	24/8 THIN 1/2" COPPER 400	6154	8 EA	6	229	0	24	0	0	101	254
121001.1610001	500 THIN 1/2" COPPER 400	6154	16 EA	16	410	0	112	0	0	388	1011
121001.1610001	1300 THIN 1/2" COPPER 400	6154	16 EA	163	4116	0	27002	0	0	14462	43230
121001.1610001	34' ROUND TAPERED STEEL POLE	6154	16 EA	126	4101	0	1400	0	0	2594	1019
121001.1610001	CONCRETE POLE BASE - 2' DIA x 8' CONCRETE	6154	1600 LF	10	544	0	2100	0	0	1010	1010
121001.1610001	TRENCHING & BACKFILL 6" x 24"	6154	1600 LF	10	544	0	2100	0	0	1010	1010
SUBTOTAL	ELECTRICAL			2,143		0		0	0	87,117	
	SALES TAX 8.01%				117,749		57,793		0		167,359
	ONAP (ON MANHOLE ONLY)						7000		0		7000
TOTAL	COST CODE 6154 HSE 120000		2,143		117,749	0	107,776	0	0	91,910	316,535
	RECAPITULATION HSE - CONFIRMATION		2,143		117,749	0	107,776	0	0	91,910	316,535
TOTAL HSE 120000 FACILITIES, SYSTEMS, & EQUIPMENT			2,143		117,749	0	107,776	0	0	91,910	316,535

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FLWOB DANIEL NORTHWEST, INC
 400 HOBBS MARTIN HANFORD CORP
 JOB NO 2475432/211001
 FILE NO 2475432

** 1997 - INTERACTIVE ESTIMATING **
 BLAH DISPOSDAL ALT. - INTERACTIVE
 PLANNING ESTIMATE
 PDMMR40 - EXTRACTED DETAILS BY WBS / COST CODE

PNB 20
 DATE 04/05/97 11 43 33
 BY COL/KLR/DMM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	DM&P / S & T	TOTAL DOLLARS
330002	UTILITIES SUP AND LMT										
330002 15 330002.1501004	ELECTRICAL COMMUNICATION ALLOWANCE LAMP / TELEPHONE DESIGN / ENGINEERING	6100	1 LS	0	0	0	0	\$0.00	0	\$0.00	\$0.00
SUBTOTAL	ELECTRICAL			0	0	0	0	\$0.00	0	\$0.00	\$0.00
TOTAL	COST CODE 61016 NBS 330002 (RECALCULATION 14 164 - CONTINGENCY 20 04 1)			0	0	0	0	\$0.00	0	\$0.00	\$0.00
330002 16 330002.1604004	ELECTRICAL UTILITIES TEST, INSPECTION, & CORRECT ELECTRICAL IS BY ALLOWANCE	6150	1 RS	0	0	0	0	\$0.00	0	\$0.00	\$0.00
SUBTOTAL	ELECTRICAL			0	0	0	0	\$0.00	0	\$0.00	\$0.00
TOTAL	COST CODE 61516 NBS 330002 (RECALCULATION 14 164 - CONTINGENCY 20 04 1)			0	0	0	0	\$0.00	0	\$0.00	\$0.00
TOTAL NBS 330002 UTILITIES SUP AND LMT				0	0	0	0	\$0.00	0	\$0.00	\$0.00

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FLUOR DANIEL NORTHWEST, INC
 LOCKHEED MARTIN WASHINGTON CORP
 JOB NO 24170002/010001
 TITLE NO 24170002

** TEST - INTERACTIVE ESTIMATING **
 PLAN DISPOSAL ACT - INFRASTRUCTURE
 PLANNING ESTIMATE
 FORMS - ESTIMATE DETAIL BY NO / COST CODE

PAGE 1 11
 DATE 08/01/97 13 43 34
 BY CCL/KLR/DKM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- RENT	OVER- / D & I	TOTAL DOLLARS
REPORT TOTAL				7,016	258 171		5,051,957	1,966,919	2,673,766		13,486,125

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Table A-5. Estimated Construction Costs for Disposal of Remote and Contact-Handled Immobilized Low-Activity Waste (Options 2A, 2B, 2C and 2D).

Note: The above estimate was developed based on June 1997 dollars. It was escalated to September 30, 2002, by using a multiplier of 1.16 based on information from FDHC on composite labor and materials.

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FLOOR DANIEL NORTHWEST, INC.
LOCKHEED MARTIN HANFORD CORP
JOB NO. 34475812/P35K01
FILE NO. 34475811

** TEST - INTERACTIVE ESTIMATING **
LEAN DISPOSAL ALY - CONCEPTS
PLANNING ESTIMATE
PDHNR01 - PROJECT COST SUMMARY

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DATE 06/06/97 12:44 43
BY COL/KLR/DKH

CODE	DESCRIPTION	RECALCULATED TOTAL COST	CONTINGENCY %	TOTAL	TOTAL DOLLARS
PDHNR	FLOOR DANIEL NORTHWEST (ADJUSTED TO MEET BOX 3150 4)	41,374,404	10	45,511,844	51,590,000
PROJECT TOTAL		41,374,404	10	45,511,844	51,590,000

DRAFT

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TYPE OF ESTIMATE	PLANNING ESTIMATE	JUNE 5, 1997	REMARKS
PDHNR LEAD ESTIMATOR	COL	ESTIMATING MANAGER	CONSTRUCTION ONLY
PROJECT MANAGER			
CLIENT			

(ROUNDED/ADJUSTED TO THE NEAREST * 10,000 / 100,000 * - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING)

FLUKE DANIEL MORTHWEST, INC.
 LOCKWOOD HARTIN HAMFORD CORP
 JOB NO. 24475892/25041
 FILE NO. 24475892

== EST - [INTERACTIVE ESTIMATING] ==
 LEAN DIFFERENTIAL ALG. - CONCEPTS
 PLANNING ESTIMATE
 FORMER - NOSE BREAKDOWN STRUCTURE (FMS) SUMMARY

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 DATE 05/05/77 17:04:50
 BY EDL/ECR/DEN

NBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT MCHRT	888 TOTAL	ESCALATION % TOTAL	888 TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
211001	SITE WORK	445030	83447	528476	14.14	78544	407221	30
211002	ARMIX LINER	443006	303114	303114	14.14	152209	117644	30
211003	GEOSYNTHETIC LINER	499310	31977	511310	14.14	84381	427029	30
211004	ACCESS GRAVEL ROAD	3075	1704	1704	14.14	360	1343	30
211005	LEACHATE SYSTEM	248533	34245	312778	14.14	58937	391715	30
211006	ELEC. SERVICE & LIGHTING	526312	98140	614452	14.14	92738	714817	30
211007	CONCRETE WASTE VAULTS	424016	746197	\$010202	14.14	746197	275377	30
211008	CASTLE/BRIDGE CRANE	117344	74046	493350	14.14	70954	574094	30
211011	CONSTRUCTION FORCES	1204255	756171	3962326	14.14	548150	4611421	30
SUBTOTAL 211 CONCEPT 21		14224713	2434103	17057626	14.14	2514764	19552420	30
222001	SITEWORK	385049	12155	459497	14.14	47901	626110	30
222002	ACCESS GRAVEL ROAD	3075	1704	1704	14.14	1602	1243	30
222003	ELEC. SERVICE & LIGHTING	424016	746197	600814	14.14	85759	676573	30
222004	CONCRETE WASTE VAULTS	424016	746197	301301	14.14	746197	574094	30
222005	CASTLE/BRIDGE CRANE	427794	713448	4962389	14.14	713448	574094	30
222011	CONSTRUCTION FORCES	1244203	747387	3914291	14.14	541402	4455693	30
SUBTOTAL 222 CONCEPT 22		17044050	7494204	74953194	14.14	4972043	11112280	30
233001	SITE WORK	312335	73467	455403	14.14	47673	523975	30
233002	ARMIX LINER	443006	148114	457422	14.14	152209	212459	30
233003	GEOSYNTHETIC LINER	499310	31977	501310	14.14	84381	417129	30
233004	ACCESS GRAVEL ROAD	3075	1704	1704	14.14	360	1343	30
233005	LEACHATE SYSTEM	248533	34245	312778	14.14	58937	391715	30
233006	ELEC. SERVICE & LIGHTING	526312	98140	614452	14.14	92738	714817	30
233007	CONCRETE WASTE VAULTS	424016	746197	301301	14.14	746197	574094	30
233011	CONSTRUCTION FORCES	11177	14134	41525	14.14	13158	21160	30
SUBTOTAL 233 CONCEPT 23		2830773	484424	3124793	14.14	461444	3533759	30
244001	SITE WORK	312335	44404	406553	14.14	40473	447126	30
244002	ACCESS GRAVEL ROAD	1486	1704	1704	14.14	360	1343	30
244003	ELEC. SERVICE & LIGHTING	110460	24746	111726	14.14	15504	350726	30
244004	CONCRETE WASTE VAULTS	154480	44872	213352	14.14	42136	124480	30
244011	CONSTRUCTION FORCES	2224	1629	3953	14.14	3817	4492	30
SUBTOTAL 244 CONCEPT 24		738105	140250	878355	14.14	124443	1404420	30

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FLUOR DANIEL NORTHWEST, INC.
 LOCKHART MATTIE HAMPDEN CORP.
 JOB NO. 5478AB3/PIHMOE
 FILE NO. 54175AB2

*** EST - INTERACTIVE ESTIMATING ***
 TEAM DIAMONAL AGT, + CONCEPT
 PLANNING ESTIMATE
 PDHHA01 - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

PAGE 3 OF 14
 DATE 04/25/97 12 14 58
 BY CBL/SLR/DNE

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT MONEY	SUB TOTAL	MECHANISM TOTAL	EXP TOTAL	CONTINGENCY TOTAL	TOTAL DOLLARS
SUMTOTAL 22	FIXED PRICE CONSTRUCTION	10954921	5761005	14018526	14 10	5352350	41370876	50590662
SUMTOTAL 3	CONSTRUCTION	10954921	5761005	14018526	14 10	5352350	41370876	50590662
PROJECT TOTAL		10,954,921	5,761,005	14,018,526	14 10	5,352,350	41,370,876	50,590,662

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1. ESTIMATE PURPOSE

THIS ESTIMATE WILL BE USED FOR A SCOPING STUDY.

2. ESTIMATE TECHNICAL BASIS

- A. THIS ESTIMATE HAS BEEN PREPARED FOR THE ILAW DISPOSAL PROJECT AS REQUESTED BY LOCKWOOD MARTIN WAMPORD CORP.
- B. A DESCRIPTION OF THE TECHNICAL SCOPE OF WORK MAY BE FOUND IN THE FOLLOWING REFERENCE DOCUMENTS:
LETTER OF INSTRUCTION (LOI) LANCHE-7584
SCOPE OF WORK (SOW) ILAW DISPOSAL COST ESTIMATES DATED APRIL 3, 1997
- C. REQUEST FOR ESTIMATE DATED MARCH 26, 1997
- D. WORK SCOPE NOT INCLUDED IN THIS ESTIMATE. THIS ESTIMATE IS CONSTRUCTION ONLY AND DOES NOT INCLUDE COST FOR DEFINITIVE DESIGN, OR E&I DURING CONSTRUCTION.

3. ESTIMATE METHODOLOGY

A. DIRECT COSTS:

THIS ESTIMATE USES PRIMARILY A PARAMETRIC METHODOLOGY WITH SOME BOTTOM-UP TECHNIQUES. CONSTRUCTION LABOR, MATERIAL AND EQUIPMENT UNITS HAVE BEEN ESTIMATED BASED UPON ONE OR MORE OF THE FOLLOWING STANDARD COMMERCIAL ESTIMATING RESOURCES, PUBLISHED ESTIMATING HANDBOOKS/DATABASES: THE SOURCE DATABASES V.A.S. PRICES, THE RICHARDSON'S PROCESS PLANT CONSTRUCTION ESTIMATING STANDARDS, NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION, THE (NEMA) MANUAL OF LABOR UNITS, ELECTRICAL RESOURCES, INC. ELECTRICAL ESTIMATING PRICE AND LABOR MANUAL (LAMP 04999). THE UNITS MAY HAVE BEEN FACTORED/ADJUSTED BY THE ESTIMATOR AS APPROPRIATE TO REFLECT INFLUENCES BY CONTRACT, WORK SITE, OR OTHER IDENTIFIED PROJECT OR SPECIAL CONDITIONS.

B. DIRECT COST FACTORS

- (1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 1%.
- (2) * (FOR OVERPAID MATERIALS) AN ESTIMATED FACTOR OF 15% HAS BEEN APPLIED TO TOTAL FORM CONSTRUCTION CRAFT LABOR COST FOR GENERAL CONDITIONS AND A FACTOR OF 23.1% HAS BEEN APPLIED TO TOTAL FORM CONSTRUCTION COST FOR TECHNICAL SERVICES.
- (3) CONSUMABLES ARE ESTIMATED AT 3.3% OF DIRECT MATERIAL AND EQUIPMENT COSTS.
- (4) SPECIAL WORK PROCEDURE (SWP) FACTORS ARE APPLIED AGAINST DIRECT LABOR FOR ACTUAL TIME LOST DUE TO THE PERSONNEL PROTECTIVE EQUIPMENT AND PROCEDURES. THE RATES WHICH HAVE BEEN APPLIED ARE AS FOLLOWS:
* PROTECTIVE CLOTHING FACTOR HAS BEEN APPLIED = 25%
- (5) PREMIUM PAY
OVERTIME REQUIREMENTS AND SHIFT DIFFERENTIAL PAY FOR CRAFT LABOR ARE WHICH NEGOTIATED UNDER THE WAMPORD SITE STABILIZATION AGREEMENT.
- (6) GENERAL FOREMAN FACTOR OF 7% HAS BEEN APPLIED TO DIRECT CRAFT LABOR COSTS.
- (7) CONTRACT ADMINISTRATION FACTOR OF 11% HAS BEEN APPLIED TO THE DIRECT CONTRACT VALUE WHICH INCLUDES COSTS FOR BID PACKAGE PREPARATION, CONTRACT MANAGEMENT & ADMINISTRATION AND PROJECT MANAGEMENT & PLANNING SUPPORT.

C. INDIRECT COSTS

PERCENT PRICE CONTRACTOR OVERHEAD, PROFIT, RISK AND INFLUENCE COSTS HAVE BEEN APPLIED ARE THE FOLLOWING PERCENTAGES:
LABOR = 30-40%, EQUIPMENT USE = 10%, MATERIAL = 30-40%, SUBCONTRACT = 20-10%, AND EQUIPMENT = 10%, AND ARE REFLECTED IN THE "ORAL/BI" COLUMN OF THE ESTIMATE DETAIL REPORT.

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Rev. 0

FLUOR DANIEL NORTHWEST, INC.
LOCKHEED MARTIN HANFORD CORP
JOB NO. 24475A82/PHK41
FILE NO. 24475A82

* EST - INTERACTIVE ESTIMATING *
114W DISPOSAL KIT - CONCEPT
PLANNING ESTIMATE
PENDING - ROUTINE BASIS SHEET

PAGE 8 OF 10
DATE 06/05/97 17:46:11
BY CGL/KLR/PKS

4. NOTES

- (1) FLUOR DANIEL NORTHWEST LABOR RATES ARE BASED UPON THE FLUOR DANIEL FEDERAL OPERATIONS (FEDO) DISCLOSURE STATEMENT AND APPROVED PROVISIONAL BILLING RATES. FOR ESTIMATING PURPOSES, AVERAGE RATES BY OPERATIONS CODE HAVE BEEN DEVELOPED BASED UPON RECENT COST HISTORY.
- (2) FLUOR DANIEL NORTHWEST SERVICES (CONSTRUCTION CRAFT LABOR) RATES ARE THOSE LISTED IN APPENDIX A TO THE HANFORD SITE STABILIZATION AGREEMENT.
- (3) FPH & PHMC SUBCONTRACTOR STANDARD LABOR RATES ARE THOSE LISTED IN THE FINANCIAL DATA SYSTEM (FDS) POST 3211 REPORT ORGANIZATION RATES PLUS ADBR88.

5. ESCALATION

NO ESCALATION HAS BEEN APPLIED TO THIS ESTIMATE AS REQUESTED BY THE CLIENT.

6. CONTINGENCY

CONTINGENCY PERCENTAGES WERE CALCULATED FROM THE JANUARY 1997 UPDATE OF THE ECONOMIC ESCALATION PRICE INDICES FOR DOE CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE ACQUISITION" FH-61.

7. REMARKS

- MAJOR ASSUMPTIONS WHICH HAVE BEEN MADE IN THE PREPARATION OF THIS ESTIMATE ARE AS FOLLOWS:
- A.) ASSUME NO CONTAMINATED SOIL WILL BE ENCOUNTERED DURING EXCAVATION.
 - B.) 400 D3331L, D3331L, D3331L & D3331L ARE FOR CONSTRUCTION FORCEWORK THAT WILL TAKE PLACE DURING THE WASTE PLACEMENT PHASE OF THIS PROJECT.
 - C.) THIS ESTIMATE IS NOT A FDC DL THE ESTIMATE. THIS ESTIMATE IS TO SHOW THE CONSTRUCTION COST FOR FOUR DIFFERENT CONCEPTS OF TANK WASTE DISPOSAL. EACH CONCEPT SHOWS THE COST OF ONE UNIT AND IS TOTALLED AT THE THIRD LEVEL OF THE HSB.
 - D.) THIS ESTIMATE ASSUMES A FIXED PRICE CONTRACT TO DO THE INITIAL CONSTRUCTION AND ASSUMES THE PRICE OF THAT CONTRACT TO EXCEED \$,000,000.00. MARK-UPS HAVE BEEN APPLIED ACCORDINGLY.
 - E.) TANKW LINEAR AND LEACHATE COSTS HAVE BEEN TAKEN FROM THEIR COST ROUTINE# INEM334C (W-025) AND LAND DISPOSAL FACILITY.

ENF-SD-TWR-AGA-004
Rev. 0

FLORIDA POWER & LIGHT, INC.
LOCKWOOD MARTIN WAMPOLD CORP.
308 RD. 24674832777K01
FILE NO. 24675AB2

1101 - INTERACTIVE ESTIMATING 11
PLAN DISPOSAL ALT. - COMPOSITE
PLANNING ESTIMATE
FORMER - DDB COST CODE ACCOUNT SUMMARY

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DATE 06/09/97 12:14:10
BY CBL/MLK/BAK

COST CODE/MSG	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT MGNST	EST TOTAL	DEGRADATION % TOTAL	EST TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS		

400 IMPROVEMENTS TO LAND										
311001	SITE WORK	445018	12167	628705	14.84	73561	459271	20	112313	78462
311002	ADVICE LINDER	445018	142114	1034420	10.84	112329	1136649	20	352336	162441
311003	GEOSTRUCTURE LINDER	445018	31352	541314	10.84	60385	607613	20	204348	86801
311004	ACCESS GRAVEL ROAD	9015	1101	10731	20.84	1107	10818	20	2716	14098
311005	SITEWORK	361018	12115	457475	20.84	47503	615680	20	157637	48305
311006	ACCESS GRAVEL ROAD	9015	1765	10731	20.84	1407	12347	20	3125	14098
311007	SITE WORK	313318	72407	455403	14.84	47473	513976	20	158323	67339
311008	ADVICE LINDER	445018	142114	1034420	14.84	112329	1136649	20	352336	162441
311009	GEOSTRUCTURE LINDER	445018	31352	541314	14.84	60385	607613	20	204348	86801
311010	ACCESS GRAVEL ROAD	9015	2123	17209	14.84	2563	19746	20	5930	14098
311011	SITE WORK	312518	44107	408783	14.84	40473	447428	20	140228	60764
311012	ACCESS GRAVEL ROAD	9015	2123	17209	14.84	2563	19746	20	5930	14098
TOTAL 400 IMPROVEMENTS TO LAND		1242119	64954	518970	14.84	74032	506213	20	196286	161898

501 BUILDINGS										
311006	BLDG. SERVICE & LIGHTING	4968	134	5002	14.84	737	5739	20	2031	813
311008	BLDG. SERVICE & LIGHTING	4968	134	5002	14.84	737	5739	20	2031	813
TOTAL 501 BUILDINGS		9936	268	10004	14.84	1474	11478	20	4062	1626

550 OTHER STRUCTURES										
311007	CONCRETE MAST TABLE	402405	15129	501923	14.84	50505	548183	20	172664	741691
311011	CONSTRUCTION FORCES	207604	63356	130760	14.84	49151	139934	20	113746	499700
311012	CONCRETE MAST TABLE	422409	13429	404838	14.84	40505	445343	20	172664	741691
311013	CONSTRUCTION FORCES	407604	43356	130760	14.84	49151	139934	20	113746	499700
TOTAL 550 OTHER STRUCTURES		1094228	288126	1645384	14.84	247458	1892602	20	679884	2467182

600 UTILITIES										
311006	ELEC. SERVICE & LIGHTING	49161	31053	518914	14.84	87379	673393	20	135079	114439
311008	ELEC. SERVICE & LIGHTING	49161	31053	518914	14.84	87379	673393	20	135079	114439

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FLUOR DANIEL NORTHWEST, INC.
 LICENSED MARTIN HANFORD CORP.
 JOB NO. 6417182/PJ1841
 FILE NO. 2418422

1* INET - INTERACTIVE ESTIMATING **
 15AN DIALOGAL RLT - CONCEPT
 PLANNING ESTIMATE
 PM0004 - B0Y COST CODE ACCOUNT SUMMARY

PAGE 1 OF 10
 DATE 05/05/93 17:55:12
 BY GDL/XBR/DXB

COST CODE/NAE	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTE MOHMT	SUB TOTAL	EXCULATION TOTAL	SUB TOTAL	CONTINGENCE TOTAL	TOTAL DOLLARS		
121004	ELEC. SERVICE & LIGHTING	262077	47380	289457	14.16	44501	24356	65794	41742	
124044	ELEC. SERVICE & LIGHTING	316940	20144	121224	14.16	29640	14444	30143	184031	
TOTAL 104	UTILITIES	1182459	254262	1416721	14.16	210752	384540	29	240407	3214677
106	SPECIAL EQUIP/PROCESS SYSTEMS									
121001	WEACHATE SYSTEM	206533	54303	31278	14.16	50337	393715	30	114114	511829
121104	ELEC. SERVICE & LIGHTING	25379	4773	30163	14.16	4482	34845	29	4923	41474
121105	WEACHATE SYSTEM	206533	54303	31278	14.16	50337	393715	30	114114	511829
123004	ELEC. SERVICE & LIGHTING	25379	4773	30163	14.16	4482	34845	29	4923	41574
TOTAL 106	SPECIAL EQUIP/PROCESS SYSTEMS	42344	110426	745102	14.16	110438	844730	29	24040	1204046
110	HAVE MOBILE EQUIPMENT									
121901	CANTRY/BRIDGE CRANE	417704	706444	4943354	14.16	717554	5700904	29	1714231	1411174
122901	CANTRY/BRIDGE CRANE	417704	706444	4943354	14.16	717554	5700904	29	1714231	1411174
123901	FORKLIFTS	234449	44473	243952	14.16	42136	375806	29	57766	423331
124001	FORKLIFTS	234449	44473	243952	14.16	42136	375806	29	57766	423331
TOTAL 110	HAVE MOBILE EQUIPMENT	822109	1104424	10978004	14.16	1357304	12071104	29	361804	13049114
010	DEMOLITION									
121311	CONSTRUCTION FORCE	510171	125120	455231	14.16	57374	752667	30	125409	970497
122311	CONSTRUCTION FORCE	490114	115813	404652	14.16	50344	444404	30	245040	945844
123311	CONSTRUCTION FORCE	11479	14916	41895	14.16	17165	141744	30	10321	122214
124311	CONSTRUCTION FORCE	12326	7679	29956	14.16	5737	45393	30	10368	59640
TOTAL 010	DEMOLITION	1124955	265428	1330433	14.16	204626	1597119	30	479136	2078215
PROJECT TOTAL		30,056,921	5,961,404	24,424,524	14.16	41,370,636	36	57,550,468		

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** INFO - INTERACTIVE ESTIMATING **
 CLEAN DISPOSAL ALX. - CONCEPT
 PLANNING ESTIMATOR
 FORMS - RATIONALITY SUBMITTY BY ALL DISPOSITION

PAGE 4 OF 10
DATE 06/07/97 12.56.21
BY COL/ELB/DEN

CASE	DESCRIPTION	ESTIMATE COMPTOTAL	COMPLETED MONEY	808 TOTAL	ESCALATION % TOTAL	808 TOTAL	COMPLETION % TOTAL	TOTAL DOLLARS	
*****	*****	*****	*****	*****	*****	*****	*****	*****	
COMPLETION									
02	ESTIMATE	4341330	1316395	7675105	14.15	1170489	5048750	14	2734639
03	COMPLETION	11762408	2348554	14111034	14.16	2018474	14217903	14	4846310
07	HOTSPOTS AND THERMAL	979442	219794	1198256	14.16	178165	1216116	14	412811
08	ESTIMATE	4940	129	5169	14.16	121	5019	14	224
11	ESTIMATE	1023245	1640121	1441360	14.16	1559189	1205218	14	1615951
12	ESTIMATE	4436	1169	11309	14.16	1164	10538	14	4018
16	ESTIMATE	1440709	145162	143162	14.16	14484	131706	14	2911345
18	ESTIMATE	1440709	145162	143162	14.16	141723	1314779	14	2917725
TOTAL COMPLETION			6,144,405			6,362,186		11,171,874	
		14,568,972		14,914,526	14.15		11,171,874	14	51,529,542

TOTAL COMPLETION			5,964,405			5,352,354		11,213,764	
		14,454,121		16,016,526	14.15		11,213,764	14	51,529,542

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FLOOR DANIEL MOUTHWEST, INC.
LOCKHEED MARTIN HAMPDEN CORP.
JOB NO. 1411002/03000
FILE NO. 1417000

-- COST - INTERACTIVE ESTIMATING --
1417 DISPOSEL ALT. : CONCEPT
PLANNING ESTIMATE
FORMT04 - CONTINGENCY ANALYSIS BASIS SHEET

PAGE 4 OF 14
DATE 04/05/97 13:04:20
BY COL/KLR/DKH

REVISED 3/25/97 14-14

1. DEFINITION OF CONTINGENCY AS PROVIDED BY DOE

CONTINGENCY COVERS COSTS THAT MAY RESULT FROM INCOMPLETE DESIGN, UNFORESEEN AND UNPREDICTABLE CONDITIONS, OR UNCERTAINTIES WITHIN THE DEFINED PROJECT SCOPE. THE AMOUNT OF CONTINGENCY WILL DEPEND ON THE STATUS OF DESIGN, PROCUREMENT, AND CONSTRUCTION, AND THE COMPLEXITY AND UNCERTAINTY OF THE CONCEPT PARTS OF THE PROJECT. CONTINGENCY IS NOT TO BE USED TO AVOID MAKING AN ACCURATE ASSESSMENT OF EXPECTED COST (OFFICE OF WASTE MANAGEMENT (OWM-14) COST AND SCHEDULE GUIDE)
2. CONTINGENCY ALLOWANCE GUIDELINES

THE DOE GUIDELINE CONTINGENCY ALLOWANCE FOR A...
+ PLANNING ESTIMATE - STANDARD - 10% - 30%
2. METHODOLOGY

CONTINGENCY IS EVALUATED AT THE LOWEST WORK BREAKDOWN STRUCTURE (WBS) LEVEL WITHIN THE COST ESTIMATE DETAILS. IT IS SUMMARIZED AT UPPER THE LEVELS AND REPORTED ON THE SUMMARY REPORTS.
3. ANALYSIS

AN ASSESSMENT OF DESIGN MATURITY, WORK COMPLEXITY AND PROJECT UNCERTAINTIES HAS BEEN PERFORMED. AN EXPLANATION OF THIS ASSESSMENT AND CONTINGENCY RATES WHICH HAVE BEEN ADDED TO THE COST OF WORK ARE AS FOLLOWS:

WBS 1111 CONCEPT #1 - AN AVERAGE CONTINGENCY OF 10% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME.

WBS 1122 CONCEPT #2 - AN AVERAGE CONTINGENCY OF 30% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME.

WBS 1177 CONCEPT #3 - AN AVERAGE CONTINGENCY OF 30% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME.

WBS 1124 CONCEPT #4 - AN AVERAGE CONTINGENCY OF 25% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME.

HNF-SD-TWR-AQA-004
REV. 0

PAUGE DAWIDT ROBERTSON, INC.
 6000 WOOD HARTIN HAMPDEN COAST.
 JOB NO. 2417222/230001
 FILE NO. 2417222

++ INERT - INTERACTIVE ESTIMATING ++
 IBM D14000AL RPT. - CONCEPT
 PLANNING ESTIMATE
 2000007 - CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

PAGE 10 OF 30
 DATE 06/06/97 12.55.13
 BY COL/KLR/BSH

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT SUBTOTAL	OTHER COSTS	SUB TOTAL
1000000	*****	*****	*****	*****	*****
211001	SITE WORK	443034	11.00	43007	53947
211002	ADMIN LINES	842146	10.00	162114	102114
211003	GEOTECHNETIC LINER	499110	10.00	51990	11990
211004	ACCESS GRAVEL ROAD	9015	10.00	1700	1700
211005	LEACHATE SYSTEM	510173	10.00	64345	574518
211006	ELEC. SERVICE & LIGHTING	525119	10.00	98366	10160
211007	CONCRETE WASTE VAULTS	4910919	10.00	791203	791203
211008	GENTRY/BRIDGE CRANE	4179244	10.00	785446	785446
211011	CONSTRUCTION FORCES	1090155	10.00	101014	101014
212001	SITEWORK	345042	10.00	71355	71355
212002	ACCESS GRAVEL ROAD	9015	10.00	1700	1700
212006	ELEC. SERVICE & LIGHTING	491041	10.00	91050	91050
212007	CONCRETE WASTE VAULTS	4210115	10.00	791207	791207
212008	GENTRY/BRIDGE CRANE	4179244	10.00	785446	785446
212011	CONSTRUCTION FORCES	1146903	10.00	101014	101014
213001	SITE WORK	343194	10.00	71047	71047
213002	ADMIN LINES	842146	10.00	162114	102114
213003	GEOTECHNETIC LINER	499110	10.00	51990	11990
213004	ACCESS GRAVEL ROAD	10015	10.00	1700	1700
213005	LEACHATE SYSTEM	510173	10.00	64345	574518
213006	ELEC. SERVICE & LIGHTING	525119	10.00	98366	10160
213009	FORALIFE	219080	10.00	14039	14039
213011	CONSTRUCTION FORCES	78579	10.00	101014	101014
220001	SITE WORK	343194	10.00	64345	64345
220004	ACCESS GRAVEL ROAD	10015	10.00	1700	1700
220006	ELEC. SERVICE & LIGHTING	510060	10.00	24940	24940
220009	FORALIFE	106080	10.00	101014	101014
220011	CONSTRUCTION FORCES	32224	10.00	101014	101014

PROJECT TOTAL		10,056,721	1,201,890	0	1,843,606

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FLOR DANIEL NORTHWEST, INC.
 LOCKHEED MARTIN HANFORD CORP.
 JOB NO. 2167002/P1N001
 FILE NO. 24175022

** BBS - INTERACTIVE ESTIMATING **
 1140 2167002L1L - CONCRETE
 PLANNING B1114002
 FORMWORK - ESTIMATE DETAIL BY WBS / COST CODE

PH00 1
 DATE 06/05/97 11:55:41
 BY COL/KLR/DKT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURL	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- RENT	OKAY / B * 1	TOTAL DOLLARS
221001	SITE WORK										
221001.42	SITEWORK										
221001.420002	REMOVE & DEMORE	460	1 LB	0	0	0	0	14000	0	4504	14504
221001.420003	TEST PILL (ALLIUM)	460	1 LB	0	0	0	0	14000	0	4504	14504
221001.420004	SURVEY & STAKEING	460	1 LB	0	0	0	0	15000	0	11004	16204
221001.420005	MASS EXCAVATION	460	149195 CY	0	0	0	0	211434	0	31724	242158
221001.420006	FINISH GRADING	460	42414 SY	0	0	0	0	21004	0	4214	10314
221001.420010	WATER FOR CONSTRUCTION	460	1104 MG	0	0	0	0	11004	0	1004	14240
<hr/>											
SUBTOTAL	SITEWORK			0	0	0	0	141,930	0	50,012	445,038
<hr/>											
TOTAL	COST CODE 4600 WBS 221001 (RESCALATION 14.16% + CONTINGENT 37.00 %)			0	0	0	0	141,930	0	50,012	445,038
<hr/>											
TOTAL WBS 221001 SITE WORK				0	0	0	0	141,930	0	50,012	445,038

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FLORA DUNNELL MORTHWELL, INC.
LOCKWOOD MARTIN TAPFORD CORP.
JOB NO. 24675AB2/DUNNELL
FILE NO. 24675AB2

** TEST - INTERACTIVE ESTIMATING **
ILAW DISTRICTAL ALT. - COMMERCE
PLANNING ESTIMATE
PREPARED - ESTIMATE DETAIL BY BNS / COST CODE

PAGE 1
DATE 04/05/97 12:15:50
BY DGL/KLR/DMM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	BOUTP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	CHAP / B & C	TOTAL DOLLARS
221402	ADMIN LINER										
221402.42	STEWORX										
221402.4240002	PREPARE & STOCKPILE ADMIN (INCLUDES TEST FILL)	444	28918 CY	0	0	0	0	533449	0	84021	613430
221402.4240004	PLACE SECONDARY ADMIN	444	15436 CY	0	0	0	0	17914	0	11698	19482
221402.4240005	PLACE PRIMARY ADMIN	444	3412 CY	0	0	0	0	7110	0	1017	8177
221402.4240006	FINE GRADE SECONDARY ADMIN	444	14334 SF	0	0	0	0	24276	0	1114	24410
221402.4240007	FINE GRADE PRIMARY ADMIN	444	31750 SF	0	0	0	0	5463	0	765	5824
221402.4240008	SECONDARY GRAVEL W/SUMP	444	1114 CY	0	0	0	0	14944	0	1012	11754
221402.4240010	PRIMARY GRAVEL W/SUMP	444	1442 CY	0	0	0	0	12344	0	1312	13924
221402.4240012	OPERATIONS LAYER - 4INCH	444	1340 CY	0	0	0	0	15050	0	2218	17104
221402.4240014	OPERATIONS LAYER - 6INCH	444	3740 CY	0	0	0	0	18540	0	1276	19795
	& GENERAL FILL										
SUBTOTAL	STEWORX			0	0	0	0	149,810	0	112,476	162,286
TOTAL	COST CODE 44002 MSJ 221402 (EXCLUDED) 14.14% - CONTINGENCY 14.40 %		0	0	0	0	0	149,810	0	112,476	162,286
TOTAL FOR 221402 ADMIN LINER			0	0	0	0	0	149,810	0	112,476	162,286

HNF-SD-TWR-AGA-004
REV. D

FLUGER DANIEL NORTHWEST, INC.
 LOCKHEED MARTIN HANFORD CORP.
 JOB NO. 14675AR2/138841
 FILE NO. 84675AR2

== TEST - INTERACTIVE ESTIMATING ==
 LAM DISPOSEAL ALT. - CONCEPT
 SUMMARY ESTIMATE
 FORMER - ESTIMATE DETAIL BY WBS / COST CODE

PAGE \ 3
 DATE 06/05/17 12:51:51
 BY CBL/ALL/DAH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- RENT	DEAF / B L I	TOTAL DOLLARS
321003	GEOSYNTHETIC LINER										
321003.00	SITENWORK										
321003.070000	SECONDARY HDPE FLOOR LINER	450	116643 SF	5	0	0	0	62136	0	3166	71240
321003.070000	SECONDARY HDPE FLOOR LINER	450	36131 SF	5	0	0	0	11241	0	1152	14205
321003.020000	SECONDARY GEOTEXTILE	450	125876 SF	2	0	0	0	101216	0	15161	139367
321003.020000	SECONDARY GEOTEXTILE TP-B	450	45171 SF	0	0	0	0	19561	0	2533	22101
321003.020000	SECONDARY GEOTEXTILE	450	25139 SF	0	0	0	0	1605	0	1258	3001
321003.030000	PRIMARY HDPE FLOOR LINER	450	120102 SF	0	0	0	0	37046	0	8157	87903
321003.030000	PRIMARY HDPE FLOOR LINER	450	31191 SF	0	0	0	0	15079	0	2164	17123
321003.030000	PRIMARY GEOTEXTILE	450	118143 SF	0	0	0	0	101017	0	15153	116120
321003.030000	PRIMARY GEOTEXTILE TP-B	450	40164 SF	0	0	0	0	12179	0	1124	13006
321003.030000	PRIMARY GEOTEXTILE TP-A	450	36131 SF	0	0	0	0	1079	0	1162	8162
321003.020000	PRIMARY GEOTEXTILE	450	37193 SF	2	0	0	0	11153	0	1474	12632
321003.020000	HDPE PLANT STOCK	450	15 SF	0	0	0	0	549	0	84	634
321003.020000	HDPE TRUCK STAGING AREA	450	10953 SF	0	0	0	0	5051	0	199	6021
321003.030000	GEOTEXTILE STAGING AREA	450	10953 SF	0	0	0	0	1028	0	452	2467
321003.020000	PAVE P&H HDPE TYPE III	450	140 SF	0	0	0	0	1384	0	202	1546
321003.020000	LOCATE LINE HDPE TYPE II	450	140 SF	0	0	0	0	240	0	26	266
SUBTOTAL	SITENWORK			0	0	0	0	425,492	0	62,016	487,508
TOTAL	COST CODE 44003 WBS 101003 INSULATION 14.164 + CONTINGENCY 30.00 %			0	0	0	0	425,492	0	62,226	487,718
TOTAL WBS 121403	GEOSYNTHETIC LINER			0	0	0	0	425,492	0	62,126	487,618

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 Rev. 0

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FLUGR DANIEL MOUTHURST, INC.
 LOCATED MARTIN HANFORD CORP.
 JOB NO. 8447442/219X01
 FILE NO. 24475542

** EST - INTERMEDIATE ESTIMATING **
 PLAN DISPOSED ALT. + CONCEPTS
 PLANNING ESTIMATE
 FORMNO1 - ESTIMATE DETAIL AT WBS / COST CODE

PAGE 1
 DATE 06/15/97 11:55:52
 BY CGL/SLR/WHY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WPMHOURS	LABOR	EQUIP	MATERIAL	SUB-CONTRACT	REQUISITION	CHARGE	TOTAL
											DOLLARS
121404	ACCESS GRAVEL ROAD										
121404.01	BITSPOKE										
121404.020002	SECAFRIZON	100	450 GT	0	0	0	0	1200	0	100	1200
121404.030010	FINE GRADING	400	755 01	0	1	0	0	400	0	400	400
121404.040004	4" CRUSHED ROCK	400	300 YDM	0	1	0	0	400	0	700	400
121404.010000	GRUBBY	400	1 12	0	0	0	0	0	0	120	120
121404.020010	MATERIAL FOR CONSTRUCTION	400	45 WD	0	0	0	0	200	0	10	200
SUBTOTAL	BITSPOKE			0	1	0	0	7,101	0	1,100	8,201
TOTAL	COST CODE 4012			0	1	0	0	7,101	0	1,100	8,201
	WBS 121404				1	0	0	0	0		
	121404.01 - CONSTRUCTION		45.00	0							
TOTAL WBS 121404 ACCESS GRAVEL ROAD				0	1	0	0	7,101	0	1,100	8,201

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FLUOR DANIEL NORTHWEST, INC.
 LICENSED WASTE HANDLING CORP.
 JOB NO. 6475202/732801
 FILE NO. 2161582

"" TEST - INTERACTIVE ESTIMATING ""
 ILAW DISPOSAL ALT. - CONCEPTS
 PLANNING ESTIMATE
 PERMR00 - ESTIMATE DETAIL BY MDS / COST CODE

PAGE 1 5
 DATE 06/05/97 11:55:12
 BY COL/KLR/DKN

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP. RENT	CHAF / 0 4 3	TOTAL DOLLARS
721001	LEACHATE SYSTEM										
321005.01	CONCRETE										
321005.0300007	GRADE & SCREENS SOO	700	451 SF	7	147	0	73	0	0	54	172
321005.0300004	FORM SOO	100	175 LF	14	214	0	112	0	0	164	209
321005.0300006	FORM WALLS	700	111 SF	8	1491	0	814	0	0	161	4182
321005.0300008	FORM CURBS	700	43 LF	1	213	0	43	0	0	71	233
321005.0300010	FORM STAIRS & WALKWAY	700	81 SF	31	393	0	18	0	0	121	488
321005.0300011	KEY JOINTS	700	54 LF	3	60	0	29	0	0	23	142
321005.0300013	STEEL & OIL	700	1201 SF	14	640	0	242	0	0	261	1147
321005.0300014	CONCRETE SOO	100	11 LF	14	549	0	73	0	0	201	1279
321005.0300015	CONCRETE WALL	700	1 LF	3	342	0	449	0	0	101	847
321005.0300020	CONCRETE CURBS, STAIRS & WALKWAY	700	4 LF	4	107	0	230	0	0	91	428
321005.0300022	CURING	700	1461 SF	15	345	0	14	0	0	112	430
321005.0300023	REBAR	700	2528 LBS	34	813	0	796	0	0	177	2048
321005.0300026	WELDED WIRE MESH	700	204 SF	0	0	0	0	10	0	11	41
321005.0300028	WATER STOP	700	81 LF	0	0	0	0	430	0	74	564
321005.0300034	ANCHOR BOLTS (ALLOH)	700	1 LB	4	140	0	180	0	0	71	211
321005.0300037	PIPE (ALUMINUM)	700	1 LF	4	144	0	180	0	0	81	246
321005.0300038	FRONEL FINISH	700	649 SF	13	343	0	0	0	0	149	454
SUBTOTAL	CONCRETE			250		0		560		2,241	
	SALES TAX 8.00 %				6,743		3,739				11,239
	CHAF (OW MARKUP ONLY)						543				543
TOTAL	COST CODE 70003			250		0		560		1,431	
	WSP 721001				4,743		4,032				24,733
	ESCALATION 14.44% + CONTINGENCY 20.00 %										
321005.03	FINISHES										
321005.0300002	CONCRETE COATING EPC (ALLOH)	700	1 LB	0	0	0	0	1540	0	225	1125
321005.0300004	PAINTING MISC. METALS (ALLOH)	700	1 LB	0	4	0	0	1600	0	275	1728
SUBTOTAL	FINISHES			0		0		3,900		450	
TOTAL	COST CODE 70004			0		0		3,900		450	
	WSP 121005				0		0				3,430

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 Rev. 0

FLOOR BAY/70 NORTHWEST, INC.
 LOCKHEED MARTIN HANFORD CORP.
 JOB NO. 1107091/PIR01
 FILE NO. 0417042

44 10PT - INTERACTIVE ESTIMATING 44
 PLAM DISPOSAL ABT. / COMCBYTS
 PLASDING ESTIMATE

PAUSE 1 6
 DATE 06/05/91 12:55:54
 BY CDE/KUN/DNH

FORMED - ESTIMATE DETAIL BY HOS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUR-CONTRACT	EQUIP-HOURLY	ORIG / B & I	TOTAL DOLLARS
ESCALATION 14 104 - CONTINGENCY 10.00 11											
311005.11	MECHANICAL										
311006.1500000	10" HDPE PIPE	700	10 LF	0	0	0	0	2500	0	175	2475
311007.1500000	4" HDPE PIPE	700	220 LF	0	0	0	0	1300	0	194	1794
311008.1500000	4" HDPE DRIP PIPE	700	1240 LF	0	0	0	0	10400	0	1132	12532
311009.1500000	4" HDPE PIPE	700	1000 LF	0	0	0	0	6000	0	300	6300
311010.1500000	3" HDPE PIPE	700	110 LF	0	0	0	0	1830	0	220	1750
311011.1500000	2" HDPE PIPE	700	120 LF	0	0	0	0	2100	0	115	2415
311012.1500000	1-1/2" HDPE PIPE	700	240 LF	0	0	0	0	1740	0	254	1994
311013.1500000	4" HDPE FITTING	700	50 EA	1	0	0	0	1350	0	167	4317
311014.1500000	1" PVC PIPE	700	120 LF	0	0	0	0	2100	0	115	2415
311015.1500000	EST BUTTERFLY	700	10 EA	0	0	0	0	1500	0	125	1725
311016.1500000	4" EST PIPE	700	10 LF	0	0	0	0	1350	0	243	1593
311017.1500000	3" EST PIPE	700	10 LF	0	0	0	0	180	0	27	207
311018.1500000	EST 30 DND ELBOWS	100	1 EA	0	0	0	0	105	0	120	220
311019.1500000	TURNING MOTOR	700	1 EA	0	0	0	0	2700	0	175	2875
311020.1500000	1-1/2" CHECK VALVE	700	2 EA	1	0	0	0	100	0	20	220
311021.1500000	SOLENOID DRAIN VALVE	700	1 EA	1	0	0	0	175	0	41	216
311022.1500000	VACUUM RELEASE VALVE	700	1 EA	0	0	0	0	484	0	68	552
311023.1500000	TRANSFER DND 100 VALVE	100	1 EA	0	0	0	0	254	0	69	323
311024.1500000	1" CHECK VALVE	100	1 EA	0	0	0	0	404	0	50	454
311025.1500000	STORAGE TANK 6" DIA X 25'	700	1 EA	2	0	0	0	20404	0	3100	23504
311026.1500000	W/INTERER & INSULATION										
311027.1500000	SLOPE RISER PUMPS	100	1 EA	0	0	0	0	4504	0	475	5179
311028.1500000	VERTICAL RISER PUMP	100	1 EA	0	0	0	0	14004	0	2700	17604
311029.1500000	PIPE SUPPORTS	100	1 EA	0	0	0	0	700	0	75	775
311030.1500000	STORAGE TANK TRANSFER PUMP	100	2 EA	0	0	0	0	5400	0	144	5544
311031.1500000	4" DIA W/ RISER	100	1 EA	0	0	0	0	204	0	45	249
311032.1500000	4" DIA W/ RISER W/STEP	100	2 LF	0	0	0	0	1544	0	214	1758
311033.1500000	EST CABLE	700	1 LF	0	0	0	0	500	0	75	575
311034.1500000	PIPE INSULATION & JACKETS	100	400 LF	0	0	0	0	1400	0	460	3460
311035.1500000	GRABBER TANK TRUCK	100	1 EA	0	0	0	0	14000	0	2100	16100
	GRP, SHELLE, SEV, 4000 GAL.										
SUBTOTAL	MECHANICAL			0	0	0	0	235,040	0	35,243	270,283
TOTAL	COST CODE 11000			0	0	0	0	235,040	0	35,244	270,284
	ESCALATION 14 104 - CONTINGENCY 10.00 11										

HNFSID-TWR-AGA-004
 Rev. 0

FLORIAN WAMTEL NORTHWEST, INC.
 10000000 WASTING KANFORD CORP.
 JOB NO. 842222/212K41
 FILE NO. 842222

** 1000 - INTERACTIVE ESTIMATING **
 11AM DISPOSED 127. 1 COMPTON
 PLANNING ESTIMATE
 PSHW040 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 1 2
 DATE 04/05/97 12:05:36
 BY CDE/MCE/BNH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURLS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	SUB- MATERIAL	OTHER / E & T	TOTAL DOLLARS

TOTAL NO. 221001	LABORATE SYSTEM			250		0		238,645		12,662	251,307
					6,743		4,092				108,533

HNF-SD-TWR-A-GA-004
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A-67

FLUOR DANIEL MONTWEST, INC.
 LOCKHEED MARTIN HAMPSHIRE CORP.
 JOB NO. 1427443/79201
 FILE NO. 1427443

EST - INTERACTIVE ESTIMATING
 LEAN DISPOSAL AGT. - CONCEPT
 PLANNING ESTIMATE

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 BY CDM/KWK/DKH

EDPMR04 - ESTIMATE DETAIL BY MDS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANHOORS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	CHAP / B P 1	TOTAL DOLLARS
221006	ELCT. SERVICE & LIGHTING										
221006.12	SPECIAL CONSTRUCTION										
221006.120000	CONTRACT BLDG. (CONTRACT)	601	100 SF	0	0	0	4	1320	0	100	1320
	SUBTOTAL SPECIAL CONSTRUCTION			0	0	0	4	1320	0	100	1320
	TOTAL	COST CODE 6012 MDS 221006 (ESCALATION 14.34% - CONVERGENCE 10.00%)		0	0	0	4	1320	0	100	1320
221006.20	ELECTRICAL										
221006.201020	TERMINING & BACKFILL 6" x 20"	6100	2100 LF	21	815	0	1000	0	0	1520	6100
221006.201030	HANDHOLES INSTALLATION	6100	5 000	00	1000	0	1000	0	0	7100	2000
221006.201040	4" PVC RIGID DUC & PO DUCT W/ COMMUNICATION CABLE	6100	2100 LF	400	12100	0	5200	0	0	10100	11000
221006.201050	CONNECT COMMUNICATION TO CARTY BUILDING	6100	1 000	10	100	0	010	0	0	400	1000
	REMOVE CONTROL BOX ON SIDE OF BLDG										
221006.201060	COMMUNICATION T-BOXES FOR CAPTAY BUILDING	6100	4 EA	10	100	0	1000	0	0	1000	1010
	REMOVE SIA LOCATIONS										
	SUBTOTAL ELECTRICAL			2110	10100	0	7500	0	0	4020	10100
	SALES TAX 4.10 %										402
	CHAP (FOR MAKEUP ONLY)									2400	2400
	TOTAL	COST CODE 6106 MDS 221006 (ESCALATION 14.34% - CONVERGENCE 10.00%)		2110	10100	0	8100	0	0	4260	10100
221006.21	ELECTRICAL										
221006.211010	670.4N FIBER 11/12" PVC	6100	2700 LF	120	11700	0	10000	0	0	8000	10000
	4 1/2" THRU CONDUCTORS										
221006.211020	1000 4N FIBER - 11/12" PVC RIGID	6100	2700 LF	1200	41000	0	11000	0	0	40000	10000
	4 1/2" MCW THRU CONDUCTORS										
221006.211030	TERMINING & BACKFILL 6" x 20" LTD	6100	2700 LF	27	100	0	510	0	0	1000	6000

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POWER DANIEL NORTHWEST, INC
 60413820 MARTIN HANFORD CORP
 000 NO 14413820/03X001
 FILE NO 14475582

*** EST - INTERACTIVE ESTIMATING ***
 11AM DISPOSAL ALL - CONCEPT
 PLUMBING ESTIMATE
 FORM101 - ESTIMATE DETAIL BY WBS / COST CODE

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 DATE 04/05/97 13 55 57
 BY CDE/KLN/DKK

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EDDP USAGE	MATERIAL	SUB-CONTRACT	BOU11- MEET	CHG1 / B & I	TOTAL DOLLARS
221406 1610235	TRENCHING & BACKFILL 4" x 24"	6150	2300 LF	22	135	0	1994	0	0	1530	5355
221004 1814001	WATERLINE INSTALLATION	6150	5 JOB	80	2101	0	15040	0	0	3161	25084
221006 1611992	WATERLINE INSTALLATION	6150	1 JOB	54	174	0	1200	0	0	439	2499
221006 1631194	125M LPS LIGHT W/ARM AND 30" ROUND TAPERED STEEL POLE	6150	10 EA	235	6479	0	10474	0	0	1801	94813
221006 1434011	CONCRETE POLE BASE - 2'-0" DIA x 3' JOIST/CH	6150	10 EA	152	6162	0	1075	0	0	4419	9887
221006 1641113	100/3 HD PU/SH 600V NIB WP N/100A ARC SCOP	6150	6 EA	41	1742	0	5029	0	0	2748	9410
221006 1431002	CONNECT 400V POWER TO GANTERY BUILDING ASSOCI CONTRACT BOX ON SIDE OF ROAD	6150	1 JOB	1	259	0	626	0	0	348	1292
SUBTOTAL ELECTRICAL					2,131	77,517	142,534	0	0	85,207	360,725
SALES TAX @ 6.1							17334	0	0	6	13074
CHG1 (ON HANFORD ONLY)								0	0	4851	4851
TOTAL COST CODE 41515					2,134	77,517	144,368	0	0	91,768	374,713
RECALCULATION 14 465 - CONTINGENCY 25 04 11											
221004 16	ELECTRICAL										
221004 1611002	0 75" ORS CONDUIT	1016	29 LF	4	145	0	51	0	0	81	214
221004 1611212	3/4" ORS TERMINATION WITH INS BUSHING & 2 LOCKWUTS	1040	12 EA	0	250	0	46	0	0	134	179
221004 1611262	3/4" WP ORS TERMINATION W/ INS BUSHING, 1 LOCKWUT, & 2 SEALING LOCOUT	1040	14 EA	4	145	0	24	0	0	64	239
221006 1610002	3/4" PVC CL4 ORC	7040	470 LF	24	171	0	894	0	0	679	2345
221006 1611002	3/4" PVC CL4 900 BLEND	7040	12 EA	10	163	0	182	0	0	214	703
221004 1611045	TRENCH & BACKFILL 1" x 3'	7040	10 LF	0	100	0	10	0	0	141	621
221004 1617354	1 x 1/2" INEMA JR PAINTIGHT SURE COVER ENCLOSURE	1040	1 EA	2	71	0	42	0	0	54	109
221006 1621300	1/4" KXHM 1/2 COPPER 600V	7040	560 LF	2	71	0	39	0	0	45	157
221006 1621249	1/4" KXHM 1/2 COPPER 600V	7040	1260 LF	6	211	0	114	0	0	114	470
221006 1621310	1/4" KXHM 1/2 COPPER 600V	7040	10 LF	0	31	0	9	0	0	3	44
221006 1621311	1/4" KXHM 1/2 COPPER 600V	7040	190 LF	1	38	0	18	0	0	18	74
221006 1622904	1 LAMP REC PLUMB PINT 1"x1"	7040	1 EA	1	24	0	54	0	0	37	123
221006 1431011	WP 5" W/300 Speeder T-y-Pile	7040	1 EA	0	4	0	0	0	0	4	12

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BY CDE/LEE/PSH

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FLOOR DASHES NORTHWEST. INC.
 LOCKWOOD MARTIN HANFORD CORP.
 JOB NO. 244-9888/21KX01
 FILE NO. 24475ABJ

** TEST - INTERACTIVE ESTIMATING **
 TEAM DISPOSAL ADT. - CONCEPTS
 PLANNING ESTIMATING

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 DATE 04/05/97 12:56:40
 BY GBL/BLR/DHR

FORWARD : ESTIMATE DETAIL BY MBE / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP DOLLAR	MATERIAL	SUB-CONTRACT	EQUIP-HOUR	CHRG / D & B	TOTAL DOLLAR
	INSCALATION 14.14% + CONTINGENCY 20.00 %										
<hr/>											
TOTAL MBE 311006 ELEC. SERVICE & LIGHTING					1.150	4	246.106	4.120	0	145.313	524.519
					121.476						

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FLW08 SANJEL NORTHWEST, INC
 10046880 MARTIN MARFORD CORP.
 JOB NO. 24416A81/THK01
 FILE NO. 24475A82

** 1007 - INTERACTIVE ESTIMATING **
 ILAW DISPOSAL ACT. - CONCRETE
 TLA0100 ESTIMATE

PAGE 1 12
 DATE 06/06/97 12 56.01
 BY CDL/KLR/DRM

FORM148 - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURES	LABOR	EQUIP DRADE	MATERIAL	SUB- CONTRACT	EQUIP. WBS	UNIT / M & I	TOTAL DOLLARS
211007	CONCRETE WASTE VAULTS										
211007.03	CONCRETE										
211007 010000	CONCRETE FLAG ON GRADE	560	4840 CY	0	0	0	2175000	0	324700	2504104	
211007 010000	CONCRETE EXISTING WALLS	560	1880 CT	0	0	0	1180400	0	174500	1148160	
211007 010000	CONCRETE EXISTING WALLS	560	970 CY	0	0	0	308800	0	43000	351120	
SUBTOTAL CONCRETE				0	0	0	3,573,200	0	551,000	4,224,185	
TOTAL COST CODE 56003				0	0	0	3,573,200	0	551,000	4,224,185	
WBS 211007											
ESTABLISHMENT 14 401 - CONTINGENCY 30.00 11											
TOTAL WBS 211007 CONCRETE WASTE VAULTS				0	0	0	3,573,200	0	551,000	4,224,185	

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FLUOR DANIEL NORTHWEST, INC.
 LOCKHEED HARTZMAN WAMPOLD CORP.
 TOS NO. 84478412/PJPR11
 PTLB NO. 24415451

++ IXST - INTERACTIVE ESTIMATING ++
 PLAN DISPOSAL ACT. - CONCEPTS
 PLANNING ESTIMATE
 FPMR9999 - ESTIMATE RETAIL BY WBS / COST CODE

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 DATE 06/03/97 12:56:01
 BY CBL/KLR/DBH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- MENT	CHAP / B & J	TOTAL DOLLARS
121000	CANTRY/BRIDGE CRANE										
121000.11	EQUIPMENT										
121000.1100042	2P FOR CANTRY/BRIDGE CRANE	710	1 EA	0	0	0	0	3575000	0	536250	4112250
	W/REINFORCED ENCLOSURE & REMOTE CAPABILITY										
121000.1100044	CRANE RAILS	710	225 LF	0	0	0	0	87914	0	6491	84405
	SUBTOTAL EQUIPMENT				0	0	0	3,612,264	0	541,841	4,154,105
TOTAL	COST CODE 71011 WBS 121000 120000000 14.66% - CONTINGENCY 20.00 %				0	0	0	3,612,264	0	541,841	4,154,105
TOTAL WBS 121000 CANTRY/BRIDGE CRANE					0	0	0	3,612,264	0	541,841	4,154,105

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FLUOR DANIEL NORTHWEST, INC.
 LOCKWOOD MARINE HANDRED CORP.
 JOB NO. 3442822/23K61
 FILE NO. 34632822

*** TEST - INTERACTIVE ESTIMATING ***
 LEAD DISPOSAL ACT. - COMMODITY
 PLANNING ESTIMATE
 DEMURRAGE + ESTIMATE DETAIL BY WBS / COST CODE

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 DATE 04/04/77 11:56:12
 BY CBL/WLB/DH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MARKHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	GRAB / B	TOTAL DOLLARS
321111	CONSTRUCTION FORCE										
321111.02	SITING										
321111.020001	GRAB FILL ALL TOIDS 4 FAULTS	150	7250 CY	9784	144105	0	214900	0	0	1502	440597
SUBTOTAL	SITING			5,784		0		0		7,592	
	CONSUMABLES 3.20 %				344,105		314,900		0		659,005
	SW 35.00 %			2924	44434		5691				5051
	GENERAL FOREMAN 7.00 %			346	57397						4416
	GENERAL REQUIREMENTS 15.00 %			1263	23384						17397
	SALES TAX 8.00 %						17827		0		24894
	ORIG (ON MARKUPS ONLY)									810	17423
TOTAL	COST CODE 01003 HDB 121311 (REGULATION 14.44 - COMMODITY 30.40 %)			9,108	386,034	0	340,414	0	0	8,422	516,667
321111.02	SITING										
321111.020101	DEMOLITION ROOF	010	294 00	1784	61367	0	0	0	0	0	62367
321111.020102	DISMANTLE AND REMOVE CRANE (ASSEMBLY 14 MAN CRANE APPROX. 2 FLOORS)	010	1 00	6401	108004	0	0	0	0	0	108004
321111.020103	DISMANTLE AND REMOVE BRANCHES PUMPING SYSTEM, TANK & MOTOR CONTROL BLDG., CAP & RANDOM PIPING	010	1 00	604	23190	0	0	0	0	0	23190
321111.020104	DISMANTLE AND REMOVE UNIT CONTROL SYSTEM	010	1 00	604	19050	0	0	0	0	0	19050
SUBTOTAL	SITING			8,644	213,427	0	0	0	0	0	332,427
	CONSUMABLES 3.20 %						3977		0		3977
	SW 35.00 %			3160	108144						108144
	GENERAL FOREMAN 7.00 %			617	29524						29524
	GENERAL REQUIREMENTS 15.00 %			2220	37645						47645
	SALES TAX 8.00 %						789		0		789
	ORIG (ON MARKUPS ONLY)									373	373
TOTAL	COST CODE 11002 HDB 121311			14,724	511,196	0	30,799	0	0	377	542,373

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BLUON DANIEL NORTHWEST, INC.
 BOSTONED MARTIN HARTFORD CONF.
 JOB NO. 2467883/PJRK01
 FILE NO. 2467883

== 1987 - INTERACTIVE ESTIMATING ==

BLAN DISPOSED ALT. - COMMENTS

PLANNING BASELINE

JOBHAB1 - ESTIMATE DETAIL BY WBS / COST CODE

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BY CBL/KMR/PRH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	DEAD / S & T	TOTAL DOLLARS
	ESCALATION 14.44% - CONTINGENCY	34.00 01									
311311.00	CONCRETE										
311311.000002	CONCRETE CLOSURE 6'x6'	550	1.44 CF	02044	1764.96	0	107459	0	0	14276	1317831
	4 VALVES										
SUBTOTAL	CONCRETE			21.248	695.495	0	107459	0	0	14276	1,147,851
	CONSUMABLES 3.20 %						497,184				22262
	SW 35.00%			1744	243495		28242				215193
	GENERAL FOREMAN 7.00 %			2102	65743						65743
	GENERAL REQUIREMENTS 15.00 %			4420	150739						150739
	SALES TAX 0.00 %						34411		0		34411
	CHRG 10% MARKUP ONLY									1983	1983
TOTAL	COST CODE 56403			36.999		0		0	0	14,369	1,578,491
	WBS 311311				1,193,672		164,859		0		1,358,531
	ESCALATION 14.44% - CONTINGENCY	30.00 31									
311311.47	MOISTURE AND THERMAL										
311311.4700003	STRUCTURAL STEEL & S&P JOIST	150	96 TON	1720	64134	0	115960	0	0	4092	179164
	TEMP. ROOF SUPPORT										
	4 VALVES										
322311.0100004	STANDING BEAM ROOF	560	294 SQ	2152	11859	0	102900	0	0	3609	118362
	4 VALVES										
SUBTOTAL	MOISTURE AND THERMAL			4,050	143,894	0	216,100	0	0	7,634	367,118
	CONSUMABLES 3.20 %						495				495
	SW 35.00%			1428	49534		495				49534
	GENERAL FOREMAN 7.00 %			345	12413						12413
	GENERAL REQUIREMENTS 15.00 %			884	30704						30704
	SALES TAX 0.00 %						17811		0		17811
	CHRG 10% MARKUP ONLY									782	782
TOTAL	COST CODE 56003			36,399		0		0	0	4,416	404,971
	WBS 322311				237,890		240,454		0		478,344
	ESCALATION 14.44% - CONTINGENCY	30.00 40									
TOTAL WBS 322311 CONSTRUCTION PORCHES				61,468		0	916,424	0	0	31,475	2,208,254
					2,216,359				0		2,216,359

ENR-SD-TWR-AGA-004
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FLUCK DANIEL MOUTHWEST, INC.
 LOCKWOOD MARTIN HAMFORD CORP.
 JOB NO. 8467842/PJNKD
 FILE NO. 24473822

== TEST - INTERACTIVE ESTIMATING ==
 FILE 0140584.LBT - COMMENTS
 PLANNING ESTIMATE
 FORMS01 - ESTIMATE DETAIL BY M&S / COST CODE

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 BY COL/KLR/DKH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	BOBIP WEARS	NATURAL	SUB-CONTRACT	EQUIP-RENT	OVER / M & I	TOTAL DOLLARS
322001	SITWORK										
322001.01	SITWORK										
322001.020002	MOB & REMOBE	450	1 LB	0	0	0	0	30000	0	4500	34500
322001.020004	SURVEY & MARKING	450	1 LB	0	0	0	0	96000	0	14250	46250
322001.030006	MASS EXCAVATION	450	100646 CY	0	0	0	0	123800	0	12671	14679
322001.020008	P/WB GRADING	450	47416 SY	0	0	0	0	28000	0	4236	7236
322001.020010	WATER FOR CONSTRUCTION	450	3100 MG	0	0	0	0	12400	0	1400	1400
322001.020012	OPERATIONS LAYER - GRASS	450	4100 CY	0	0	0	0	85000	0	2258	17500
322001.020014	OPERATIONS LAYER - GRASS & GENERAL FILL	450	1700 CY	0	0	0	0	48000	0	3236	51736
SUBTOTAL	SITWORK			0	0	0	0	324,854	0	50,220	375,074
TOTAL	COST CODE 45002 M&S 322001 (RECALCULATION 14.84% + CONTINGENCY 10.00%)			0	0	0	0	324,854	0	50,220	375,074
TOTAL M&S 322001 SITWORK				0	0	0	0	324,854	0	50,220	375,074

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 Rev. 0

FLUOR DANIEL NORTHWEST, INC.
LOCKHEED MARTIN WANKFORD CORP.
JOB NO. 24475AB2/03HX01
FILE NO. 24475AB2

-- TEST - INTERACTIVE ESTIMATING --
LAW DISPOSAL AET. - CONCEPTS
PLANNING ESTIMATE
FEMBR14 - ESTIMATE DETAIL BY WBS / COST CODE

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DATE 06/05/97 12:44:45
BY CDE/36A/03H

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WARRANTY	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	COMMIT- MENT	DEBIT / D A T	TOTAL DOLLARS
222001	ACCESS GRAVEL ROAD										
222004.02	SITING										
222004.0200001	EXCAVATION	400	400 CY	0	0	4	4	1200	4	1200	1200
222004.0200004	PILE GRADIENT	400	15% BY	0	0	4	4	500	4	500	500
222004.0200004	1" CRUSHED ROCK	400	100 TON	0	0	4	4	1100	4	1100	1100
222004.0200004	ADJUST	400	1.00	0	0	4	4	400	4	400	400
222004.0200011	WATER FOR CONSTRUCTION	400	1% HQ	0	0	0	0	210	0	210	210
SUBTOTAL	SITING				0	0	0	7.001	0	1,104	9,071
TOTAL	COST CODE 40001				0	0	0	7.001	0	1,104	9,071
	WBS 222004				0	0	0	7.001	0	1,104	9,071
	RESERVATION 14.04% - CONTINGENCY 10.04% PI										
TOTAL WBS 222004 ACCESS GRAVEL ROAD					0	0	0	7.001	0	1,104	9,071

HN-SU-TWR-A0A-004
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FLUOR DANIEL NORTHWEST, INC.
 LOCUSHEED MARTIN HAMFORD CORP.
 JOB NO. 246704827222001
 FILE NO. 24673482

** EST - INTERACTIVE ESTIMATING **
 ELAN DISPOSAL ALY. - CONCEPT
 PLANNING ESTIMATE
 SUMMARY - EQUIPMENT DETAIL BY MNR / COST CODE

DATE 06/06/97 13:44:06
 BY CBL/KLR/DKM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP. HOURS	CHGR / S & L	TOTAL DOLLARS
312404	ELC. SERVICE & WIRING										
312404.16	ELECTRICAL										
312404.1610016	TRENCHING & BACKFILL 6" X 24"	4140	2200 LF	23	121	0	2090	0	4	1830	5355
312404.1614011	MANHOLE INSTALLATION	6100	5 JOBS	80	1503	0	15000	0	0	7143	25014
312404.1615010	4" PVC RIG. GR. & SO DUCT W/ COMMUNICATION CABLE	5100	2300 LF	598	32454	0	52390	0	0	34148	119518
312404.1616012	CONNECT COMMUNICATION TO DARTBY BUILDING	6100	1 JOBS	11	581	0	524	0	0	142	1647
	ASSUME CONTROL BOX ON SIDE OF BLDG										
312404.1616012	COMMUNICATION T-BOX'S FOR DARTBY BUILDING	5100	5 EA	91	1404	0	3782	0	0	2994	10173
	ASSUME SIX LOCATIONS										
SUBTOTAL	ELECTRICAL			1.110	40,983	0	76,946 6422	0	0	96,227	161,784 4022
	SALES TAX 8.0% & GSEP (ON MANHOLE CBLT)								0	2409	2409
TOTAL	COST CODE 4140 M3 232016 (SCALATION 14.04% - CONTINGENCY 10.00%)			1.124	40,210	0	81,304	0	0	48,634	170,220
312404.16	ELECTRICAL										
312404.1614011	6" W/2" THIN CONDUCTORS	5140	2300 LF	325	18794	0	10535	0	0	6931	21261
312404.1614015	100A 14 TRENCH 4" PVC GR 4 1050 NCM THIN CONDUCTORS	6140	2300 LF	1232	49746	0	71649	0	0	46481	102420
312404.1616016	TRENCHING & BACKFILL 4" X 24" LTR	4150	2700 LF	27	940	0	1520	0	4	1794	6284
312404.1616020	TRENCHING & BACKFILL 6" X 24"	4160	2300 LF	23	834	0	5080	0	4	1534	5355
312404.1616401	MANHOLE INSTALLATION	4150	5 JOBS	80	2903	0	15040	0	0	7143	25044
312404.1616402	MANHOLE INSTALLATION	4150	5 JOBS	80	871	0	7210	0	4	897	2499
312404.16169101	100A 100A 100A 100A 100A 10" ROUND TRENCH STEEL POLE	4150	11 EA	239	4873	0	34432	0	4	15461	54413
312404.1616403	CONCRETE POLE BASE 2' DIA X 5' BORTURE	4150	10 EA	142	5163	0	1075	0	4	2413	9467
312404.16161169	100/3 MD PU/2M 640V 30R SW W/100A ARC RUPET	4150	4 EA	40	1742	0	1028	0	4	2708	9474

HN-SD-TWR-AQA-004
 Rev. 0

FLORIAN HANSEN NORTHWEST, INC.
 LOCKHEED MARTIN HANFORD CORP.
 JOB NO. 24473422/23H001
 FILE NO. 34473422

-- 1967 - INTERACTIVE ESTIMATING --
 ILAW DISPOSAL APT. - CONCEPTS
 PLANNING ESTIMATE
 NUMBER - ESTIMATE DETAIL BY MGR / COST CODE

PROP # 32
 DATE 06/05/97 12:56:07
 BY CDE/KLR/DKH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUM- CONTRACT	EQUIP- MENT	GRAND TOTAL	TOTAL DOLLARS
932000-144600	CONSTRUCT 450V POWER TO GARAGE BUILDING REMOVE CONTROL BOX ON SIDE OF BLDG	4150	1 JOB	1	100	0	526	0	0	526	1202
<hr/>											
EVSUTOTAL	ELECTRICAL			2,336		0		0	0	91,209	208,725
	SALES TAX 4.80 %				71,587		142,921		0		11489
	CHRG FOR MANHOURS ONLY						11434		0		4971
<hr/>											
TOTAL	COST CODE 41514			2,336		0		0	0	91,750	328,735
	WBS 122001				71,587		142,925		0		
	INSTALLATION 14.16% + CONTINGENCY 30.00 %										
<hr/>											
TOTAL WBS 122001 ELEC. SERVICE & LIGHTING				2,336		0		0	0	142,416	494,451
					141,878		226,574		0		

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DATE 06/01/97 12:54:07
BY CDL/ELE/DXH

COUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MATERIALS	LABOR	EQUIP. COST	MATERIAL CONTRACT	EQUIP. REPT	CHG / M & C	TOTAL DOLLARS
122067	CONCRETE WASTE PAULIS									
122067.03	CONCRETE									
122067.0396082	CONCRETE SLAB OR CRACK	850	4860 CY	\$	\$	\$	\$ 2178000	0	\$10700	\$204700
122067.0396084	CONCRETE RESUME/FIN WALLS	850	1084 CY	\$	\$	\$	1170000	0	17800	134800
122067.0396086	CONCRETE PARTITION WALLS	850	450 CY	\$	\$	\$	105500	0	4000	70333
SUBTOTAL	CONCRETE			\$	\$	\$	3,673,000	0	\$51,000	4,224,000
TOTAL	COST CODE 13963 NEW 122067 13963/LATON 14.014 - COMPLETION			\$	\$	\$	3,673,000	0	\$51,000	4,224,000
TOTAL WBS 13967 CONCRETE WASTE PAULIS				\$	\$	\$	3,673,000	0	\$51,000	4,224,000

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FLUOR DANIEL NORTHWEST, INC.
 LOCKHEED MAXIM HANCOCK CORP.
 JOB NO. 34678AB2/PJMSF2
 FILE NO. 34618AB2

PP LEAT - INTERACTIVE ESTIMATING **
 11th DISTRICT APT. - CONCRETE
 PLANNING ESTIMATE
 FORMER - ESTIMATE DETAIL BY MBE / COST CODE

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 DATE 04/25/97 12:56:05
 BY CBL/KUP/DKH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- HUNT	OH&P / B & I	TOTAL DOLLARS
322000	CRANEY/BRIDGE CRANE										
322000.12	EQUIPMENT										
322000.120002	20 TON CRANEY/BRIDGE CRANE	710	1 CR	0	0	0	0	3676000	0	634330	4132930
	MATERIALS ENCLOSURE &										
	REMOVE CAPABILITY										
322000.120004	CRANE RAIL	710	200 LF	0	0	0	0	57960	0	1696	66656
SUBTOTAL	EQPMENT							3,632,960	0	564,996	4,197,956
TOTAL	EQUIP CODE 71011							3,632,960	0	564,996	4,197,956
	WBS 122000										
	(CALCULATION 14.042 - CONTINGENCY 10.08 1)										
TOTAL WBS 122000	CRANEY/BRIDGE CRANE							3,632,960	0	564,996	4,197,956

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PAUSE DANIEL NORTHWEST, INC.
 LOCKWOOD MARTIN WARFORD CORP.
 JOB NO. 2457822/FW1001
 FILE NO. 04070000

4. 101T - INTERACTIVE ESTIMATING **
 LAM DESPOTIAL ALT. - CONCEPTS
 PLANNING ESTIMATING

PAUSE 7.22
 DATE 04/06/97 12:16:00
 BY CBL/KLR/BKE

EDHHEK - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HOURS	LABOR	EQUIP HOURS	MATERIAL	SUB- CONTRACT	EQUIP- HOURS	WELD / S & I	TOTAL DOLLARS
122311	CONSTRUCTION FORCES										
122311.02	STEELWORK										
122311.020007	GRAB RAIL ALL VOLUME 1 VAULTS	050	7700 CY	5710	124100	0	210000	0	0	2592	400000
SUBTOTAL	STEELWORK			5,704	124,100	0	210,000	0	0	2,592	400,000
	CONSUMABLES 1.10 %										400,000
	SW 35.00%			2024	64430						64430
	GENERAL FOREMAN 1.00 %			886	17301						17301
	GENERAL REQUIREMENTS 15.00 %			1283	39190						39190
	SALES TAX 0.00 %						27020		0		27020
	OVER (OF MARKUPS OMT)									010	010
TOTAL	COST CODE 55002 WBS 122311 (RECALCULATION 14.16% - CONTINGENCY 10.00 %)			8,600	100,430	0	200,010	0	0	0,612	950,000
122311.02	STEELWORK										
122311.020012	SWO TBM ROOF 6 VAULTS	010	294 00	1764	41301	0	0	0	0	0	41301
122311.020014	DIAMETERS AND REMOTE CRANE (ASSUME 10 MAN CREW APPROX. 2 MONTHS)	010	1 20	6000	20000	0	0	0	0	0	20000
122311.020016	DIAMETERS AND REMOTE UNIT LIGHTING SYSTEM	010	1 20	900	10000	0	0	0	0	0	10000
SUBTOTAL	STEELWORK			8,264	101,301	0	0	0	0	0	101,301
	CONSUMABLES 1.10 %										101,301
	SW 35.00%			2392	101232						101232
	GENERAL FOREMAN 1.00 %			714	27332						27332
	GENERAL REQUIREMENTS 15.00 %			1790	62610						62610
	SALES TAX 0.00 %						710		0		710
	OVER (OF MARKUPS OMT)									100	100
TOTAL	COST CODE 51002 WBS 122311 (RECALCULATION 14.06% - CONTINGENCY 10.00 %)			12,710	400,430	0	0,000	0	0	1,010	400,000
122311.03	CONCRETE										

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FLUOR DANIEL NORTHWEST, INC.
 LOCKHEED MARTIN HANFORD CORP.
 JOB NO. 14493225/P328891
 FILE NO. 14493225

"* INET - INTERACTIVE ESTIMATING *"
 LEAN DISPOSAL ALT. - CONCRETE
 PLANNING ESTIMATE

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 DATE 08/05/97 12:58:10
 BY CBL/KML/DKH

FORMR00 - 007 (MATERIAL, BY WBS / COST CODE)

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	GROUP USAGE	MATERIAL	SPR- CONTRACT	ROUT- MENT	ORIG / B E I	TOTAL DOLLARS
122111.010504	CONCRETE CLOSURE SLAB 6 VAULTS	550	1869 CY	2244	424696	4	407159	0	0	14216	117851
SUBTOTAL	CONCRETE			22.44	685.695	4	407.459	0	0	14.216	1.117.851
	CONSUMABLES 3.50 %						22242				22242
	SWP 15.00%			7106	341493						347493
	GENERAL FOREMAN 7.00 %			2193	45743						45743
	GENERAL REQUIREMENTS 15.00 %			4070	150719						150719
	SALES TAX 1.00 %						34911		1		34911
	ORIG IDB MARKUPS ONLY									1481	1481
TOTAL	COST CODE 55001			40.459	0	0	144.659	0	0	14.869	1.444.659
	WBS 122111				1.209.421				0		1.209.421
	RECALCULATION 14.44% - CONTINGENCY	10.00 %									
122111.070000	MOISTURE AND THERMAL										
122111.070001	STRUCTURAL STEEL & OH) JOIST	550	84 TON	1720	44114	0	110240	0	0	4032	122166
	TEMP. ROOF STRUCTURE										
122111.070002	1 VAULT	550	194 CY	2359	41250	0	102940	0	0	1602	110352
	STANDARD SCAM FOOT										
	1 VAULT										
SUBTOTAL	MOISTURE AND THERMAL			4.010	343.944	0	210.240	0	0	7.634	167.118
	CONSUMABLES 3.50 %						4547				4547
	SWP 15.00%			1428	49591						49591
	GENERAL FOREMAN 7.00 %			348	12413						12413
	GENERAL REQUIREMENTS 15.00 %			684	10164						10164
	SALES TAX 1.00 %						17611		0		17611
	ORIG IDB MARKUPS ONLY									782	782
TOTAL	COST CODE 55001			6.777	0	0	240.454	0	0	8.426	494.731
	WBS 122111				230.169				0		230.169
	RECALCULATION 14.44% - CONTINGENCY	10.00 %									
TOTAL P&E 122111 CONSTRUCTION FORCES				67.051	0	0	955.619	0	0	27.149	2.166.502
					2.177.135				0		2.177.135

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PAUGH DANIEL NORTHWEST, INC.
 LOCKWOOD HARTING HANDED COAF.
 JOB NO. 24475AB2/73WHL
 FILE NO. 3435AB2

** TEST - INTERACTIVE ESTIMATING **
 TEAM DISPOSAL NLT - COMPLETED
 PLANNING ESTIMATE

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 BY CBL/ELZ/DW

FORWARD - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP RENT	OVER / \$	TOTAL DOLLARS
31300	SITE WORK										
323101.42	SITING WORK										
223401.4240002	MOORE A. BONGHON	458	1 LS	0	0	0	0	30000	4	1500	34504
223401.4240003	MOORE FILL (ALLOM)	459	1 LS	0	0	0	0	30000	4	1500	34504
313401.4240004	SURVEY & STAKEING	460	1 LS	0	0	0	0	30000	4	1500	34504
323401.4240004	MADE EXCAVATION	461	124179 CT	0	0	0	0	151840	4	23474	181814
323401.4240004	FINE GRADING	462	42431 CT	0	0	0	0	21094	4	4214	22118
323101.4240010	WATER FOR CONSTRUCTION	463	3108 MC	0	0	0	0	12404	4	1169	14269
SUBTOTAL	SITING WORK			0	0	0	0	333,336	4	50,400	383,736
TOTAL	COST CODE 44002			0	0	0	0	333,336	4	50,400	383,736
	WBS 323001										
	180000000 14.140 - CONTINGENT		10.00	11							
TOTAL WBS 323001 SITE WORK				0	0	0	0	333,336	0	50,400	383,736

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REV. 0

FLUOR DANIEL NORTHWEST, INC.
LOCKHEED MARTIN WAMFORD CORP.
JOB NO. 2449242/23M001
PTCR NO. 24652423

-- 1985 - INTERACTIVE ESTIMATING --
PLAN BUDGETAL AL7 - CORRESPOND
PLANNING ESTIMATE
FORMER + ESTIMATE DETAIL BY MGR / COST CODE

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DATE 01/02/87 17:54:17
BY CDE/ELG/DBM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	AMOUNTS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	GRAP / B & I	TOTAL COSTS
121001	ADMIN LINDER										
121001.01	ATTENDANCE										
121001.020001	PREPARE & STOCKPILE ADMIN (INCLUDES TEST FILL)	100	20714 CY	0	0	0	0	523400	0	00011	523401
121001.020004	PLACE SECONDARY ADMIN	100	10000 CY	0	0	0	0	77510	0	11001	77511
121001.020005	PLACE PRIMARY ADMIN	100	10000 CY	0	0	0	0	71100	0	10001	71101
121001.020006	FILL GRADE SECONDARY ADMIN	100	10000 SF	0	0	0	0	11220	0	11001	11221
121001.020007	FILL GRADE PRIMARY ADMIN	100	10000 SF	0	0	0	0	5400	0	750	5401
121001.020008	SECONDARY GRAVEL W/SPONGE	100	10000 CY	0	0	0	0	10700	0	10001	10701
121001.020009	PRIMARY GRAVEL W/SPONGE	100	10000 CY	0	0	0	0	22500	0	22001	22501
121001.020010	OPERATIONS LAYER - SAND	100	10000 CY	0	0	0	0	10400	0	23001	10401
121001.020011	OPERATIONS LAYER - GRAVEL	100	10000 CY	0	0	0	0	40500	0	72001	40501
121001.020012	4 CORNER FILL										
QUANTITY	ATTENDANCE			0	0	0	0	742,120	0	122,470	
TOTAL	COST CODE 40002 MGR 121001 (ESCALATION 14.16% - CONTINGENCY 20.00 %)			0	0	0	0	742,120	0	122,470	862,390
TOTAL FOR 121001 ADMIN LINDER				0	0	0	0	742,120	0	122,470	862,390

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REV. 0

PLANT DAMIRE, NORTHWEST, INC.
 LOCKWOOD HARTIN HANFORD CORP.
 JOB NO. 34678AB2/P34678AB2
 FILE NO. 34678AB2

^^ EST - INTERACTIVE ESTIMATED ^^
 LAM DISPOSAL AGT. - CONCEPTS
 PLANNING ESTIMATE
 F0000000 - ESTIMATE DETAIL BY WBS / COST CODE

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 DATE 05/05/97 12:14:10
 BY CBL/KMR/DMH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- HOURS	CHAP / B & I	TOTAL DOLLARS
323003	GEOSYNTHETIC LINER										
323003.02	SITEMARK										
323003.020001	SECONDARY HDPE SLOPE LINER	460	124503 SF		0	0	0	02039	0	9305	71340
323003.020002	SECONDARY HDPE FLOOR LINER	460	35796 SF		0	0	0	12241	0	1852	14240
323003.020003	SECONDARY GEOCOMPOSITE	460	125070 SF		0	0	0	106314	0	15547	122257
323003.020004	SECONDARY GEOTEXTILE TP-A	460	46171 SF		0	0	0	19551	0	2933	22481
323003.020005	SECONDARY GEOMET	460	20690 SF		0	0	0	8607	0	1291	1099
323003.020006	PRIMARY HDPE SLOPE LINER	460	120502 SF		0	0	0	55046	0	8857	61943
323003.020007	PRIMARY HDPE FLOOR LINER	460	11385 SF		0	0	0	25079	0	2261	17533
323003.020008	PRIMARY GEOCOMPOSITE	460	110443 SF		0	0	0	141417	0	45135	114170
323003.020009	PRIMARY GEOTEXTILE TP-B	460	40566 SF		0	0	0	15170	0	1424	1396
323003.020010	PRIMARY GEOTEXTILE TP-A	460	35438 SF		0	0	0	7044	0	1742	4458
323003.020011	PRIMARY GEOMET	460	37125 SF		0	0	0	11153	0	1474	12433
323003.020012	HDPE FLAT STOCK	460	11 SF		0	0	0	566	0	04	144
323003.020013	HDPE TRUCK STAGING AREA	460	10063 SF		0	0	0	14031	0	140	4821
323003.020014	GEOTEXTILE STAGING AREA	460	10053 SF		0	0	0	3014	0	461	1460
323003.020015	TANK PAD HDPE TYPE IIS	460	140 SF		0	0	0	1344	0	702	1548
323003.020016	LEACHATE RIDGE HDPE TYPE IIS	460	160 SF		0	0	0	240	0	31	278
SUBTOTAL	SITEMARK				0	0	0	435,492	0	63,126	100,116
TOTAL	COST CODE 46002				0	0	0	435,492	0	63,126	100,116
	WBS 323003				0	0	0	435,492	0	63,126	100,116
	DESCRIPTION 11.049 - CONTINGENCY (0.04 %)				0	0	0	0	0	0	0
TOTAL WBS 323003 GEOSYNTHETIC LINER					0	0	0	435,492	0	63,126	100,116

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FLUGER DANIEL NORTHWEST, INC.
LOCKHEED MARTIN HARTFORD CORP.
JOB NO. 3428A82/PINK41
FILE NO. 3428A82

== TEST - INTERACTIVE ESTIMATING ==
LOW DISPOSAL ALT. - CONCEPTS
PLANNING ESTIMATE
POWERED - ESTIMATE DETAIL BY MRS / COST CODE

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DATE 06/06/97 12:06:13
BY CBL/KLP/DKK

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MARKUP	LABOR	EQUIP CHARGE	MATERIAL	SUB- CONTRACT	EQUIP- HOUR	CHGS / B + I	TOTAL DOLLARS
122001	ACCESS GRAVEL ROAD										
122001.40	SITING										
122001.1220001	EXCAVATION	400	400 CY	0	0	0	1000	0	0	0	4000
122001.1220001	PINE GRADING	400	1155 CY	0	0	0	1000	0	0	0	11550
122001.1220001	CRUSHED ROCK	400	400 YD	0	0	0	1000	0	0	0	4000
122001.1220001	CURB	400	1 LS	0	0	0	1000	0	0	0	1000
122001.1220001	WATER FOR CONSTRUCTION	400	75 MB	0	0	0	100	0	0	0	7500
SUBTOTAL	122001						12,000			0	12,000
TOTAL	COST CODE 122001						12,000			0	12,000
	MRS 122001										
	RESERVATION 12,000 - CONTINGENCY 10.00 %										
TOTAL MRS 122001 ACCESS GRAVEL ROAD							12,000			0	12,000

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REV. 0

FLOOR DRAIN NORTHWEST, INC.
 LOCKHEED MARTIN HAWKINS CORP.
 400 NO. 24675A82/23R02
 FISCAL NO. 24675A82

** TEST - INTERACTIVE ESTIMATING **
 ILAW DISTOAL ABT. - COMBUST
 PLANNING ESTIMATE
 FURNISH - ESTIMATE DETAIL BY WBS / COST CODE

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 DATE 01/05/97 11:50:11
 BY CDE/HGS/DHW

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-HOURLY	CHRG / G & C	TOTAL DOLLARS
223405	LOCARATE SYSTEM										
223405.010000	CONCRETE										
223405.010002	GRADE & SCHEDULE BOG	101	459 SF	7	287	0	12	0	0	84	373
223405.010004	FORM SDC	101	171 LF	24	174	0	171	0	0	164	709
223405.010006	FORM WALLS	104	416 SF	10	240	0	816	0	4	385	4192
223405.010008	FORM CURB	104	13 LF	0	23	0	42	0	0	77	137
223405.010010	FORM STAIRS & WALKWAY	101	60 SF	11	293	0	30	4	4	112	435
223405.010012	SET JOINTS	104	90 LF	3	60	0	28	4	4	33	142
223405.010014	STAIR & GIL	104	2300 SF	24	440	0	242	4	4	205	1147
223405.010016	CONCRETE SDC	101	13 CY	10	249	0	718	4	4	295	1278
223405.010018	CONCRETE WALL	100	8 CY	9	243	0	440	0	4	205	857
223405.010020	CONCRETE CURB, STAIRS & WALKWAY	100	4 CY	4	101	0	220	0	0	38	425
223405.010022	CURING	104	1457 SF	15	349	0	38	0	0	128	498
223405.010024	REBAR	100	2520 LBS	20	187	0	705	0	0	477	2062
223405.010026	WELDED WIRE MESH	100	280 SF	0	6	0	0	70	0	11	81
223405.010028	WATER STOP	100	90 LF	0	6	0	0	150	0	74	564
223405.010030	ANCHOR BOLTS (ALLOW)	100	1 LB	6	166	0	100	0	0	74	216
223405.010032	PIPE SUBSTIT	100	1 LB	6	166	0	100	0	0	82	215
223405.010034	PROMET FIBER	104	459 SF	13	149	0	0	0	0	108	464
SUBTOTAL	CONCRETE			260		0	3,769	540		3,347	14,133
	SALES TAX 8.40 %				4,143		103		0		103
	CHRG (CH MANUFACTURE ONLY)									90	90
TOTAL	COST CODE 73003 WBS 223405 (RECALCULATION 10.00% - CONTINGENCY 20.40 %)			260		0	4,038	540		3,337	14,183
223405.02	FINISHES										
223405.020002	CONCRETE COATING SDC (ALLOW)	100	1 LB	0	0	0	0	1500	0	124	1724
223405.020004	PAINTING HSG, METALS (ALLOW)	100	1 LB	0	0	0	0	1500	0	124	1724
SUBTOTAL	FINISHES			0		0	0	3,000		248	3,450
TOTAL	COST CODE 73005 WBS 223405			0		0	0	3,000		450	3,450

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FLORIAN BARTLE NORTHWEST, INC
LOCKWOOD MARTIN WAMFORD CORP
JOB NO. 14175492/170001
PAGE NO. 14175492

*** 14175492 - INTERACTIVE ESTIMATION ***
ILAW DISPOSAL AND CONTINGENCY
PLANTING NORTHWEST
FORMER - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 14
DATE 04/06/17 12 56 16
BY CBL/ELH/PKX

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- HOURS	CHG / S I	TOTAL DOLLARS
RELOCATION 14 141 - CONTINGENCY 10 00 11											
123005 15	MECHANICAL										
123005 1500002 1" WDP PIPE		700	20 LF	4	0	0	0	1500	0	195	1015
123005 1500004 4" WDP PIPE		700	20 LF	0	0	0	0	1100	0	155	1755
123005 1500005 4" WDP TRAP PIPE		700	100 LF	4	0	0	0	10500	0	1100	11100
123005 1500007 4" WDP PIPE		700	200 LF	0	0	0	0	6000	0	800	6800
123005 1500009 1" WDP PIPE		700	100 LF	0	0	0	0	1000	0	130	1130
123005 1500010 1" WDP PIPE		700	400 LF	0	0	0	0	2100	0	215	2315
123005 1500012 1.1/1" WDP TRAP		700	10 LF	0	0	0	0	1700	0	205	1905
123005 1500014 MISC WDP FITTINGS		700	50 EA	0	0	0	0	1700	0	160	1860
123005 1500016 1" PVC PIPE		700	400 LF	0	0	0	0	1100	0	115	1215
123005 1500018 2" SUT PIPE		700	20 LF	0	0	0	0	1500	0	225	1725
123005 1500020 2" SUT PIPE		700	10 LF	0	0	0	0	1350	0	205	1555
123005 1500022 2" SUT PIPE		700	10 LF	0	0	0	0	1100	0	20	1120
123005 1500024 2" SUT PIPE		700	10 LF	0	0	0	0	1100	0	120	1220
123005 1500026 2" SUT PIPE		700	10 LF	0	0	0	0	1100	0	175	1275
123005 1500028 1.1/1" CHECK VALVE		700	1 EA	0	0	0	0	600	0	0	600
123005 1500030 2" SUT PIPE		700	10 LF	0	0	0	0	1100	0	11	1111
123005 1500032 2" SUT PIPE		700	10 LF	0	0	0	0	1100	0	60	1160
123005 1500034 2" SUT PIPE		700	10 LF	0	0	0	0	1100	0	53	1153
123005 1500036 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	50	1150
123005 1500038 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	1000	2100
123005 1500040 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500042 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500044 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500046 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500048 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500050 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500052 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500054 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500056 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500058 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500060 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500062 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500064 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500066 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500068 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500070 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500072 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500074 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500076 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500078 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500080 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500082 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500084 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500086 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500088 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500090 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500092 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500094 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500096 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500098 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500100 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500102 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500104 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500106 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500108 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500110 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500112 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500114 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500116 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500118 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500120 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500122 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500124 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500126 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500128 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500130 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500132 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500134 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500136 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500138 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500140 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500142 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500144 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500146 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500148 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500150 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500152 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500154 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500156 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500158 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500160 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500162 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500164 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500166 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500168 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500170 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500172 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500174 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500176 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500178 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500180 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500182 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500184 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500186 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500188 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500190 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500192 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500194 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500196 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500198 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500200 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500202 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500204 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500206 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500208 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500210 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500212 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500214 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500216 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500218 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500220 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100
123005 1500222 1" SUT PIPE		700	10 LF	0	0	0	0	1100	0	0	1100

TECHNICAL NORTHWEST, INC.
LOCKHART MARTIN HANFORD CORP.
JOB NO. 10000000000000000000
FILE NO. 10000000000000000000

== EST - INTERACTIVE ESTIMATION ==
PLAN BUDGETAL ALY. - CONCEPT
PLANNED BUDGET
FORMER - ESTIMATE DETAIL BY WBS / COST CODE

PAGE \ 20
DATE 04/08/97 10:16:13
BY GBL/KLR/DKE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP WEAR	MATERIAL	SUB- CONTRACT	EQUIP- RENT	SHOP / B & I	TOTAL DOLLARS

TOTAL WBS 100000 LEACHMAN SYSTEM			250		4,742	0	1,872	232,446	0	14,052	300,612

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FLUKE DANIEL NORTHWEST, INC.
60CKK810 HARTMAN HANFORD CORP.
JOB NO. 14475882/23K01
FILE NO. 34675882

== 100% - INTERACTIVE ESTIMATING ==
CLAW DISPOSAL A/LT. / COMPOSITE
PLANNING ESTIMATE

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DATE 04/04/97 12:56:14
BY CDE/KLR/DHM

***** - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANDBOYS	LABOR	BOILER USAGE	MATERIAL	SUB- CONTRACT	BOILER- RENT	CHRG / H & B	TOTAL DOLLARS
222006	ELEC. SERVICE & LIGHTING										
222006.12	SPECIAL CONSTRUCTION										
222006.120002	CONTROL BLDG. (COMPLETED)	401	101.47	0	0	0	4350	0	0	610	4360
SUBTOTAL	SPECIAL CONSTRUCTION			0	0	0	4,350	0	0	610	4,960
TOTAL	COST CODE 50113 WBS 222006 ESTIMATION 14.161 - CONTINGENCY 30.00 11			0	0	0	4,350	0	0	610	4,960
222006.14	ELECTRICAL										
222006.140101	LTO 1/2" FEEDER - 1-1/2" WFC 4 11/4" THRU CONDUCTIONS	4150	2700 LB	125	1124	0	10635	0	0	1972	31261
222006.140103	100A 4M FEEDER - 1" PVC GND 4 1/2" MCW THRU CONDUCTIONS	4150	1500 LB	737	10921	0	44740	0	0	10000	100728
222006.140104	FRENCHING & BACKFILL 6" x 12" LTO	4150	2700 LB	27	100	0	3510	0	0	1796	6784
222006.140105	FRENCHING & BACKFILL 6" x 12" LTO	4150	1500 LB	15	544	0	1950	0	0	900	3492
222006.141401	HANDHOLE INSTALLATION	4150	5 JOB	80	2303	0	15000	0	0	1161	25464
222006.142402	HANDHOLE INSTALLATION	4150	3 JOB	24	171	0	1200	0	0	820	2395
222006.143401	13M LPS LIGHT W/ARM AND 10' ABOVE TAPESIDE ATTEL POLE	4150	10 EA	120	8473	0	10479	0	0	15041	34413
222006.143403	CONCRETE POLE BASE - 3 DIA x 4' HIGH	4150	10 EA	142	6160	0	1450	0	0	2010	9460
SUBTOTAL	ELECTRICAL			1,449	59,841	0	111,107	0	0	66,460	239,410
	SALES TAX 9.00 % CHRG (ON HANDBOYS CHRG)						1004		0	2561	1561
TOTAL	COST CODE 50113 WBS 222006 ESTIMATION 14.161 - CONTINGENCY 30.00 9)			1,449	59,841	0	120,213	0	0	71,491	252,476
222006.16	ELECTRICAL										
222006.161101	3/4" GND CONDUIT	7060	80 LB	1	145	0	80	0	0	21	266
222006.161122	3/4" GND TERMINATION WITH 100 BUSHING & 2 LOCKWUTS	7060	42 EA	4	770	0	14	4	0	124	470
222006.161123	7/4" W/ GND TERMINATION W/ 100 BUSHING, 1 LOCKWUT, &	7060	16 EA	4	145	0	24	1	0	61	230

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COUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MINIMUMS	LABOR	EQUIP DSPACE	MATERIAL	CONTRACT	EQUIP- MENT	HAZ / M & I	TOTAL DOLLARS
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
	1 SEALING LOCKWUT										
121000.1015002	3/4" PVC Cld CRG	7060	470 LP	24	471	0	408	0	0	870	2241
122000.1015002	3/4" PVC Cld 300 ELRON	7060	32 EA	10	343	0	182	0	0	210	743
121000.1015002	THRMCH & ANCHORFL 2" X 3"	7060	10 LP	1	294	0	08	0	0	348	538
122000.1015002	0 N 4H1 RSHA 1R SHINTIGHT	7060	2 EA	1	71	0	62	0	0	54	210
	SCREEN COVER ENCLOSURE										
121000.1015100	314 XMM 1/2 C CONFER 600V	7060	540 LP	2	73	0	39	0	0	48	157
121000.1015100	312 XMM 1/2 C CONFER 600V	7060	1200 LP	4	210	0	110	0	0	134	175
121000.1015100	310 XMM 1/2 C CONFER 600V	7060	80 LP	4	0	0	7	0	0	3	11
121000.1015100	31 XMM 1/2 C CONFER 600V	7060	100 LP	1	36	0	10	0	0	22	70
121000.1015000	2 LAMP RZC FLUO 415W 1' x 6"	7060	1 EA	1	0	0	60	0	0	37	123
121000.1015000	0P 1u M/30u Spec'd 1w/1p	7060	2 EA	0	0	0	2	0	0	4	11
121000.1015000	PHOTO CBL 375W - CNE WARD	7060	1 EA	1	26	0	10	0	0	31	47
121000.1015000	DupSpecncp200A 7/box/1000 OFI	7060	1 EA	1	20	0	19	0	0	32	71
121000.1015000	FACTORY ASSEMBLED 1017-00	7060	1 EA	0	717	0	600	0	0	198	1747
	PANELBOARD 1 PHASE 240T MCR										
	150A - 1IP										
121000.1015000	FACTORY ASSEMBLED 1017-00	7060	1 EA	10	313	0	1300	0	0	465	2313
	PANELBOARD 2 PHASE 150T MCR										
	150A - 1IP										
121000.1015000	7.5 EVA JMT 400-340/1	7060	1 EA	0	109	0	442	0	0	220	743
122000.1015000	MAG START 240T 1P 3000A 1	7060	3 EA	1	119	0	423	0	0	400	643
	SIZE 0 2HP										
121000.1015000	MAG START 400V 1P RSHA 5	7060	1 EA	2	73	0	321	0	0	181	555
	SIZE 1 10HP										
122000.1015000	STARTER ACCESSORY KIT -	7060	4 EA	10	501	0	810	0	0	654	1961
	1000H CONTROL KITS, H-C-A,										
	AUX CONTACTS, 1RD 1000H										
122000.1015000	HEATSHUT SWITCH FOR MAGN	7060	4 JOB	5	133	0	65	0	0	91	241
	MOUNTING MOTOR CONTROL										
121000.1015000	400V 6-10 HP MOTOR	7060	4 EA	7	234	0	53	0	0	121	431
	CONNECTION										
121000.1015000	PANFIBRATES	7060	12 EA	0	39	0	30	0	0	53	144
121000.1015000	HEAT TRACE IMMEDIATE	7060	1 EA	1	16	0	130	0	0	74	241
121000.1015000	HEAT TRACE CABLE	7060	500 LP	10	1412	0	2800	0	0	1563	5133
121000.1015000	ALARM BEACON	7060	1 EA	0	39	0	316	0	0	124	424
121000.1015000	2KX24X6 RSHA 240TIGHT	7060	3 EA	1	38	0	705	0	0	120	421
	ENCLOSURE										
121000.1015000	1" CUT K-O.	7060	25 EA	0	200	0	0	0	0	130	400
121000.1015000	2" CUT K-O.	7060	4 EA	0	145	0	72	0	0	75	322
121000.1015000	ON-OFF SWITCH	7060	1 EA	1	36	0	31	0	0	24	81
121000.1015000	INDICATING LIGHTS	7060	12 EA	1	300	0	557	0	0	512	1509

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FLUOR DANIEL WORTHINGTON, INC.
LOCKWOOD HARTT HANFORD CORP.
JOB NO. 54475852/P3WRE1
FILE NO. 24478801

PLANNING - INTERACTIVE ESTIMATING
ECON DISPOSAL ALT. - CONCEPT
PLANNING ESTIMATE
***** - ESTIMATE DETAILS BY MGR / COST CODE

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DATE 06/06/97 12:56:20
BY CDB/KLR/DKH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANMOURE	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- RENT	CHRG / B & I	TOTAL DOLLARS
121005.1614210	INSTALL LEVEL INDICATOR	7450	2 EA	3	103	0	50	0	0	40	313
121005.1614243	CORRECT FLOW SWITCH	7450	3 EA	3	103	0	60	0	0	40	317
121005.1614314	CORRECT LEVEL KITE	7450	2 EA	2	73	0	40	0	0	45	130
121005.1614317	CORRECT SOLVENT VALVE	7450	1 EA	1	14	0	20	0	0	22	18
<hr/>											
SUBTOTAL	ELECTRICAL			918		0			0	9,943	
	SALES TAX 8.00 %				7,622		7,791		0		20,259
	CHRG (ON MARKOPS ONLY)						774		0		719
										113	113
<hr/>											
TOTAL	COST CODE 70114			918		0			0	7,264	
	NBS 323045				7,611		10,513		0		25,349
	RESCALATION 14.54% - CONTINGENCY		20.00 %								
<hr/>											
TOTAL HAS 121016 BLOC. SERVICE & BIGHTIME				1,458		0			0	27,924	
					17,462		110,527		0		217,439

HNF-SD-TWR-AQA-004
REV. 0

FEUER DANIEL NORTHWEST, INC.
 LOCKHEED MARTIN HANFORD CORP.
 JOB NO. 24610AB2/P3HK02
 TITLE NO. 24675AB2

** 1987 - INTERACTIVE ESTIMATING **
 PLAN: STANDARD EST. - CONCRETE
 PLANNING ESTIMATE
 ZOOMX01 - ESTIMATE DETAIL BY WBS / COST CODE

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 DATE 04/03/97 12:56:24
 BY CBL/KLR/DK

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP DEAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
321403	FORKLIFTS										
321403.11	EQUIPMENT										
321403.1100003	WASTE PACKAGE FORKLIFT	714	2 EA	0	0	0	110040	0	0	51040	221404
SUBTOTAL	EQUIPMENT			0	0	0		0	0	51,040	
	SALES TAX 8.40 %						178,440		0		221,404
	OH&P (ON MARKUPS ONLY)						13600		0		13600
										4040	4040
TOTAL	COST CODE 71011			0	0	0		0	0	10,080	
	WBS 121007				0		103,440		0		228,444
	(RESCALATION 14.084 - CONTINGENCY 31.80 %)										
TOTAL WBS 321403 FORKLIFTS				0	0	0	103,440	0	0	55,084	235,444

HNF-SD-TWR-AQA-004
 Rev. 0

PLANE David L. NORTHWEST, INC.
 LOCKWOOD MARTIN HAMFORD CORP.
 JOB NO. 24471822/238881
 FILE NO. 84615122

"" 1889 - INTERACTIVE BATHING ""
 (EAM DISPERAL ALT. - CONCEPTS
 PLANNING ESTIMATE
 FORMER - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 1 35
 DATE 06/09/99 11:44:10
 BY COL/KLR/DMR

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- RENT	DMR / M & J	TOTAL DOLLARS
123311	CONSTRUCTION FORCES										
123311.02	SITENOTE										
123311.020001	DISMANTLE AND REMOVE LEACHATE PUMPING SYSTEM, TANK & NOISE CONTROL BLDG., CAP & ABRANDON PIPING	810	1 LS	400	23140	0	0	0	0	0	23140
123311.020004	DISMANTLE AND REMOVE WET LIGHTING SYSTEM	810	1 LS	500	39050	0	0	0	0	0	39050
SUBTOTAL	SITENOTE			1,100	42,240	0	0	0	0	0	42,240
	CONSUMABLES 3.28 %						1251				1251
	SWP 35.00%			385	14701						14701
	GENERAL FOREMAN 7.00 %			103	3993						3993
	GENERAL REQUIREMENTS 16.00 %			238	9153						9153
	SALLES TAX 0.00 %						148				148
	OH&P (ON MAREPS ONLY)									51	51
TOTAL	COST CODE 81002 WBS 123311 (ESCALATION 14.40% + CONTINGENCY 33.00 %)			1,827	74,161	0	1,459	0	0	51	74,674
TOTAL WBS 123311 CONSTRUCTION FORCES				1,827	74,161	0	1,459	0	0	51	74,674

BNF-SD-TWR-AGA-004
 Rev. 0

FLUSS DAMIEL NORTHWEST, INC.
 60CLH880 MARTIN HAMFORD CORP.
 JOB NO. 24675A82/FINK01
 FILE NO. 24675A82

** EST - INTERACTIVE ESTIMATING **
 11A DISTRIAL APT. - CONCEPTS
 PLANNING ESTIMATE

PAGE 4 30
 DATE 06/05/91 10:56:52
 BY COL/KLR/DKH

TOTEN101 - ESTIMATE DETAIL BY HRS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	Labor	EQUIP HOURS	MATERIALS	SUB-CONTRACT	EQUIP-RENT	ONAS / B & I	TOTAL DOLLARS
324001	SITE WORK										
324001.02	SITEWORK										
324001.0201002	MOB & DEMOB	440	1 LB	0	1	0	0	10000	0	4500	31500
324001.0201004	SURVEY & STAKING	440	1 LB	0	1	0	0	75000	0	11250	81250
324001.0204006	MASS EXCAVATION	440	73061 CY	0	4	0	0	48128	0	32124	101150
324001.0204008	FIRE GRADING	440	64136 SY	0	1	0	0	20096	0	4111	32210
324001.0204010	MAKER FOR CONSTRUCTION	440	3300 MC	0	4	0	0	12400	0	1160	11200
324001.0204012	OPERATIONS LAYER - BARE	440	4300 CY	0	1	0	0	15000	0	2100	13100
324001.0204014	OPERATIONS LAYER - BLOPS & GENERAL FILL	440	9700 CY	0	4	0	0	40500	0	7175	55775
GRAND TOTAL	SITEWORK			5	0	0	0	297,172	0	44,103	342,553
TOTAL	COST CODE 44002			0	0	0	0	297,172	0	44,103	342,553
	RES 324001				0		0		0		
	(EXCAVATION 14.85% - CONTINGENCY	30.00 %									
TOTAL RES 324001 SITE WORK				1	0	0	0	297,172	0	44,103	342,553

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 Rev. 0

FLUOR DANIEL NORTHWEST, INC.
 LOCKRIDGE MARINE HARBOR CORP.
 JOB NO. 84670462/PAKED
 FILE NO. 84670462

*** TEST - INTERACTIVE ESTIMATING ***
 1545 DISPOSAL APT. - CONCRETE
 PLASTERING ESTIMATE
 P000001 - ESTIMATE DETAIL BY M00 / COST CODE

PAGE 33
 DATE 05/06/93 10:46:23
 BY COL/TLR/DKR

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- HOUR	ONMP / B & B	TOTAL DOLLARS
121004	ACCESS GRAVEL ROAD										
121004.02	SITEMARK										
121004.0200002	RECAVATION	410	600 CY	0	\$	0	\$	1440	0	210	2070
121004.0200004	FINE GRAVING	410	1450 SY	0	\$	0	\$	1451	0	144	1286
121004.0200006	6" CRUSHED ROCK	410	400 TON	0	\$	0	\$	8350	0	1310	9910
121004.0200008	SHORTY	410	1 LS	0	\$	0	\$	1040	0	110	1150
121004.0200010	WATER FOR CONSTRUCTION	410	75 MG	0	\$	0	\$	275	0	16	821
SUBTOTAL	SITEMARK				\$	\$	\$	12,596	0	1,890	14,486
TOTAL	COST CODE 10042 WBS 121004 121004.0200002 - 121004.0200010				\$	\$	\$	12,596	0	1,890	14,486
TOTAL WBS 121004 ACCESS GRAVEL ROAD					\$	\$	\$	12,596	0	1,890	14,486

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FLUOR DANIEL NORTHWEST, INC.
 1401 HESTER STREET HANFORD CORP.
 JOB NO. 8467882/PSHX01
 FILE NO. 2467882

++ 1867 - INTERACTIVE ESTIMATING ++
 SLAP DISPOSAL AND CONCEPTS
 PLANNING ESTIMATE
 FORM101 - ESTIMATE DETAIL BY MBS / COST CODE

PAGE 10
 DATE 04/05/91 12:56:24
 BY GDL/KLR/DKE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP DEDUCT	MATERIAL	SUB-CONTRACT	EQUIP-RENT	OH+P / B & T	TOTAL DOLLARS
324404	ELEC. SERVICE & LIGHTING										
324404.14	ELECTRICAL										
324404.1410124	LTC 1/4 FEEDER - 1-1/2" PVC	6110	2704 LF	126	11144	0	10525	0	4	1212	11241
	4 11/0 THWN CONDUCTORS										
324404.1410224	WRENCHING & BACKFILL	6150	2704 LF	27	880	0	3510	0	4	1796	6266
	4" X 24" STD										
324404.1414902	WARDHOLE INSTALLATION	6150	2 JOE	24	371	0	1240	0	4	812	2196
324404.1434102	15W LFS LIGHT W/ARM AND	6150	12 EA	239	6473	0	30459	0	9	11661	56917
	10" ADJUST TAPWORM STEEL FOLT										
324404.1434131	CONCRETE PILE BASE -	6250	14 EA	142	5157	0	1115	0	4	2819	5467
	2" DIA X 5' CONCRETE										
SUBTOTAL	ELECTRICAL			757		0		0		10,614	
	SALTS TAX 8.00 %				27,471		47,619		4		106,134
	OH&P (OH MANHOURS COST)						3849		4		5499
										1523	1523
TOTAL	COST CODE 61516			757	27,471	0	51,428	0	0	11,559	
	MBS 324404										
	RESCALATION 14.45% + CONTINGENCE			29,490							110,469
TOTAL MBS 324404 ELEC. SERVICE & LIGHTING				757	27,471	0	51,428	0	0	11,559	110,469

HNF-SD-TWR-AGA-004
 REV. 0

FLUOR DANIEL & NORTHWEST, INC.
 1000000 MARTIN HANCOCK CORP.
 JOB NO. 2467502/P30000
 FILE NO. 2467502

== EST - INTERACTIVE ESTIMATING ==
 TEAM DISPOSAL RCT. - CONCEPT
 PLANNING ESTIMATE
 SUMMARY - ESTIMATE DETAIL BY QRS / COST CODE

PAGE 1 34
 DATE 04/09/97 12:44:24
 BY COL/KLR/DXB

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- RENT	CHGP F B L	TOTAL DOLLARS
124000	FORKLIFT#										
124000-11	EQUIPMENT										
124000-110000	HAUTE PACKAGE FORKLIFT	710	1 EA	4	0	0	170600	0	0	11000	221000
SUBTOTAL	EQUIPMENT			4	0	0		0	0	11000	
	SALES TAX 5.00 %						170,600				221,040
	CHGP (ON MARKING COST)						13600				13600
										4000	4000
TOTAL	COST CODE 11011			4	0	0		0	0	55,000	
	WBS 714000						170,600		0		220,640
	DEPRECIATION 14.06% - CONTINGENCY 10.00 %										
TOTAL WBS 124000 FORKLIFT#				4	0	0	170,600	0	0	55,000	220,640

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WAGEHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-RENT	GRAND TOTAL	TOTAL DOLLARS
324711	CONSTRUCTION FORCE										
324231.02	STTWORK										
324311.0200402	DISMANTLE AND REMOVE UNIT LIGHTING SYSTEM	414	1.12	304	13050	0	0	0	4	4	13054
SUBTOTAL	STTWORK			304	13050	0	0	0	4	4	13054
	CONSUMABLES 3.20 %						40				13094
	EMP 15.00 %			456	4461						409
	GENERAL FOREMAN 1.64 %			49	3000						4461
	GENERAL SUPERVISORS 25.40 %			108	4127						4461
	SALTS TAX 4.00						40		4	4	4127
	SUP FOR WAREHOUSE ONLY									22	4149
TOTAL	COST CODE 03042			870		0		0		22	
	WBS 12(21)				11,445		464				38,334
	(SCALATION 34.86) - CONTINGENCY 30.40 %										
TOTAL WBS 12(21) CONSTRUCTION FORCE				870		0	464	0		22	
					11,445		464		0		38,334

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**Table A-6. Estimated Closure Costs for Disposal of Remote and Contact-Handled
Immoblized Low-Activity Waste (Options 2A, 2B, 2C, and 2D).**

Note: The above estimate was developed based on June 1997 dollars. It was escalated to September 30, 2002, by using a multiplier of 1.16 based on information from FDHC on composite labor and materials.

FLDR DANIEL NORTHWEST, INC
 LOCKWOOD MARTIN MARSHED CORP
 JOB NO 1447202/92H01
 FILE NO 1467202

1001 - INTERACTIVE ESTIMATING
 ICAW DISPOSAL AIT - CLOSURE & CAP
 PLANNING ESTIMATE
 PDH001 - PROJECT COST SUMMARY

PAGE 1 OF 1
 DATE 06/06/97 BY 144.0P
 BY COL/KLR/DMH

EST	DESCRIPTION	REGULATED TOTAL COST	CONTINGENCY %	TOTAL	TOTAL DOLLARS
PDH0	FLDR DANIEL NORTHWEST	5,400,000	10	1,560,000	7,200,000
	(ADJUSTED TO NEST DOE 5104 1)				
PROJECT TOTAL		5,400,000	10	1,560,000	7,200,000

DRAFT

HNF-SD-TWR-AQA-004
 Rev. 0

TYPE OF ESTIMATE	PLANNING ESTIMATE	DATE 6. 1997	REMARKS
PDH0 LEAD ESTIMATOR	COL	ESTIMATING MANAGER	CONSTRUCTION ONLY
PROJECT MANAGER			
CLIENT			

(ROUNDED/ADJUSTED TO THE NEAREST * 10,000 / 100,000 - - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING)

FROM DANIEL NORTHVIEW, INC
LOCEREND MARTIN SHAFORD CORP
JOB NO 81473AC2/738K01
FILE NO 24676AC2

** 100% - INTERACTIVE ESTIMATING **
ILAW DTEPDEAL ALI - CLOSURE & CHG
PLANNING ESTIMATES
POWERS - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

PAGE 1 OF 2
DATE 04/05/97 03:44:17
BY CDE/MLB/DRE

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION WQWMT	SUB TOTAL	RECALCULATE %	RECALCULATE TOTAL	SUB TOTAL	CONFIDENCE %	CONFIDENCE TOTAL	TOTAL DOLLARS
31601	PROTOTYPE ONE UNIT	1460123	243354	1564175	14.05	247994	1511471	30	573441	2444912
31902	ALTERNATE B1 ONE UNIT	3289933	246344	1460072	14.04	233533	1747312	30	516841	2323504
32503	ALTERNATE B2 ONE UNIT	3293998	242971	1456047	14.04	244993	1902150	30	510445	2472607
PROJECT TOTAL		4,308,148	771,473	4,876,321	14.04	724,421	5,400,942	30	1,500,783	7,208,225

ENF-SID-TWR-AQA-004
Rev. 0

1. ESTIMATE PURPOSES

THIS ESTIMATE WILL BE USED FOR A SCOPING STUDY.

2. ESTIMATE TECHNICAL BASIS

- *****
A. THIS ESTIMATE HAS BEEN PREPARED FOR THE ILAW DISPOSAL PROJECT AS REQUESTED BY LOCKHEED MARTIN HANFORD CORP.
B. A DESCRIPTION OF THE TECHNICAL SCOPE OF WORK MAY BE FOUND IN THE FOLLOWING REFERENCE DOCUMENTS:
LETTER OF INSTRUCTION (LOI) FLHMC-9701436
SCOPE OF WORK (SOW) ILAW DISPOSAL COST ESTIMATES DATED APRIL 1, 1997
REQUEST FOR ESTIMATE DATED MARCH 28, 1997
C. WORK SCOPE NOT INCLUDED IN THIS ESTIMATE. THIS ESTIMATE IS CONSTRUCTION ONLY AND DOES NOT INCLUDE COST FOR DEFINITIVE DESIGN, OR BIL BUILDING CONSTRUCTION.

3. ESTIMATE METHODOLOGY

A. DIRECT COSTS:

THIS ESTIMATE USES PRIMARILY A PARAMETRIC METHODOLOGY WITH SOME BOTTOMS-UP TECHNIQUE. CONSTRUCTION LABOR, MATERIAL AND EQUIPMENT UNITS HAVE BEEN ESTIMATED BASED UPON ONE OR MORE OF THE FOLLOWING STANDARD COMMERCIAL ESTIMATING RESOURCES: PUBLISHED ESTIMATING MANUALS/DATABASES; TIM MOUNT DATABASES V.R.S. MEANS; RICHARDSON'S PROCESS PLANT CONSTRUCTION ESTIMATING STANDARDS; NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION, INC. (NECA) MANUAL OF LABOR UNITS; ELECTRICAL RESOURCES, INC. ELECTRICAL ESTIMATING PRICE AND LABOR MANUAL (ELIAR 90000). THE UNITS MAY HAVE BEEN FACTORED/ADJUSTED BY THE ESTIMATOR AS APPROPRIATE TO REFLECT INFLUENCES BY CONTRACT, WORK SITE, OR OTHER IDENTIFIED PROJECT OR SPECIAL CONDITIONS.

B. DIRECT COST FACTORS

- (1) SALES TAX WAS WHEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 11.
(2) CONTRACT ADMINISTRATION FACTOR OF 14.1% HAS BEEN APPLIED TO THE DIRECT CONTRACT VALUE WHICH INCLUDES COSTS FOR BID PACKAGE PREPARATION, CONTRACT MANAGEMENT & ADMINISTRATION AND PROJECT MANAGEMENT & PLANNING SUPPORT

C. INDIRECT COSTS

FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AS THE FOLLOWING PERCENTAGES:
SUBCONTRACT - 10%, AND ARE REFLECTED IN THE
"OVER/BL" COLUMN OF THE ESTIMATE DETAIL REPORT.

D. RATES

FLUOR DANIEL NORTHWEST LABOR RATES ARE BASED UPON THE FLUOR DANIEL FEDERAL OPERATIONS (FDO) DISCLOSURE STATEMENT AND APPROVED PROVISIONAL BILLING RATES. FOR ESTIMATING PURPOSES, AVERAGE RATES BY OPERATIONS CODE HAVE BEEN DEVELOPED BASED UPON RECENT COST HISTORY.

HNRF-SD-TWR-AGA-004
REV. 0

FLUGR DANIEL MORFESS, INC.
LOCUSSED MARTIN HANFORD CORP.
JOB NO. 24172400/130001
FILE NO. 24678402

^^ INET - INTERACTIVE ESTIMATING ^^
PLAN DISPOSAL SLT - CLOSURE & CAP
PLANNING ESTIMATE
FORMA02 - ESTIMATE BASIC SHEET

PAGE 4 OF 1
DATE 01/04/97 11:01:16
BY CDE/KLR/DEN

4. ESCALATION

ESCALATION PERCENTAGES WERE CALCULATED FROM THE JANUARY 1997 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDICES FOR THE
CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE ACQUISITION" FM-SD.

5. CONTINGENCY

A CONTINGENCY ANALYSIS HAS BEEN PERFORMED AND IS DOCUMENTED IN F00006 REPORT OF THIS ESTIMATE.

6. REMARKS

- *****
MAJOR ASSUMPTIONS WHICH HAVE BEEN MADE IN THE PREPARATION OF THIS ESTIMATE ARE AS FOLLOWS:
- A.1 ASSUME NO CONTAMINATED SOIL WILL BE ENCOUNTERED DURING BACKFILL OR PLACEMENT OF BARRIER
SOIL FOUNDATION.
 - B.1 UNIT PRICE COSTS USED IN THIS ESTIMATE HAVE BEEN TAKEN FROM FAIR COST ESTIMATE 1997 (W-742)
PROTOTYPE SURFACE BARRIER.
 - C.1 ASSUME ADEQUATE SUPPLIES OF RAW MATERIALS WITH WHICH TO BUILD THE SURFACE BARRIER CAN BE
FOUND AND MINED ON OR NEAR THE SITE.
 - D.1 THIS ESTIMATE IS NOT A TPC OR TFC ESTIMATE. THIS ESTIMATE IS TO GROW THE CONSTRUCTION
UNIT COST FOR THE BACKFILL AND CLOSURE CAP OF ONE DISPOSAL UNIT USING THREE DIFFERENT
TYPES OF BARRIERS.
 - E.1 ASSUME THE BARRIER SYSTEM SHALL EXTEND ONLY TWO METERS PAST THE OUTER EDGE OF THE HAZARDOUS
PACKAGE AREA. FOR DIRECTION OF CLIENT.

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FLOR DANIEL NORTHWEST, INC.
LOCKWOOD MARTIN SAFFORD CORP.
JOB NO. E4619AC1/PINE41
FILE NO. L4619AC1

** BEST - INTERACTIVE ESTIMATING **
LAND DISPOSAL A&T - CLOSURE & CAP
PLANNED ESTIMATE
FORWARD - BOD COST CODE ACCOUNT SUMMARY

PHASE 1 OF 1
DATE 06/04/97 07:44:26
BY CGL/KLN/DKH

COST CODE/MSG	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MGNMT	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONSTRUCTION %	CONSTRUCTION TOTAL	TOTAL DOLLARS

460 IMPROVEMENTS TO LAND										
125001	PROTOTYPE ONE UNIT	1400100	361264	1468135	14.04	241296	1513471	10	572441	2484912
125002	ALTERNATE #1 ONE UNIT	1500000	248343	1554019	14.04	218213	1702312	10	516176	2123504
125003	ALTERNATE #2 ONE UNIT	1700000	261011	1858067	14.04	248032	1902155	10	578444	2472607
TOTAL 460 IMPROVEMENTS TO LAND		4600100	870618	4974321	14.04	707531	5681852	10	1667061	7348913

PROJECT TOTAL		4,104,618	731,873	4,876,321	14.16	724,631	5,440,942	70	1,440,213	7,281,225
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HNF-SD-TWR-A-GA-004
REV. 0

THOMAS DANIEL NORTHWEST, INC.
 LOCKWOOD MARTIN HAMFORD CORP.
 JOB NO. 24475AC2/P3KK01
 FILE NO. 24475AC2

** EST - INTERACTIVE ESTIMATING **
 11AM DISPOSAL ALT - CLOSURE & CAP
 PLANNING ESTIMATE
 FORWARDS - ESTIMATE SUMMARY BY CSI DIVISION

PAGE 44 OF 8
 DATE 06/04/97 07:04:35
 BY CBL/KLR/DKH

CSI DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT PERCENT	SUB TOTAL	SCHEMATION 1 TOTAL	SUB TOTAL	CONTINGENCY 2 TOTAL	TOTAL DOLLARS
CONSTRUCTION							
12 SITEWORK	1294448	701673	1074221	14.06	724621	5400942	30 1468213
TOTAL CONSTRUCTION	4,104,648	771,473	4,876,121	14.06	724,621	5,600,942	30 7,241,235
PROJECT TOTAL	4,104,648	771,473	4,876,121	14.06	724,621	5,600,942	30 7,241,235

HNF-SD-TWR-AGA-004
 Rev. 0

FLUOR DANIEL NORTHWEST, INC.
LOCKHEED MARTIN HANFORD CORP.
JOB NO. 24675AC2/31WB93
FILE NO. 24675AC2

== TEST - INTERACTIVE ESTIMATING ==
PLAN DISPOSAL ALT : CLOSURE & CAP
PLANNING ESTIMATE
FORMER - CONTINGENCY ANALYSIS BASIS SHEET

PAGE 7 OF 8
DATE 04/04/97 11:01:47
BY COL/KLX/DLM

Revised 1/25/97 14:24

1. DEFINITION OF CONTINGENCY AS PROVIDED BY DOE

"CONTINGENCY" COVERS COSTS THAT MAY RESULT FROM INCOMPLETE DESIGN, UNFORESEEN AND UNASSOCIATED CONDITIONS, OR UNCERTAINTIES WITHIN THE DEFINED PROJECT SCOPE. THE AMOUNT OF CONTINGENCY WILL DEPEND ON THE STATUS OF DESIGN, PROCUREMENT, AND CONSTRUCTION, AND THE COMPLEXITY AND UNCERTAINTIES OF THE COMPONENT PARTS OF THE PROJECT. CONTINGENCY IS NOT TO BE USED TO AVOID MAKING AN ACCURATE ASSESSMENT OF EXPECTED COST (OFFICE OF WASTE MANAGEMENT (EM-30) COST AND SCHEDULE GUIDE).

2. CONTINGENCY ALLOWANCE GUIDELINES

THE DOE GUIDELINE CONTINGENCY ALLOWANCE FOR A...
PLANNED ESTIMATE - STANDARD = 20% - 34%

3. METHODOLOGY

CONTINGENCY IS EVALUATED AT THE LOWEST WORK BREAKDOWN STRUCTURE (WBS) LEVEL WITHIN THE COST ESTIMATE DETAILS. IT IS SUMMARIZED AT UPPER WBS LEVELS AND REPORTED ON THE SUMMARY REPORTS

3. ANALYSIS

AN ASSESSMENT OF DESIGN MATURITY, WORK COMPLEXITY AND PROJECT UNCERTAINTIES HAS BEEN PERFORMED. AN EXPLANATION OF THIS ASSESSMENT AND CONTINGENCY RATES WHICH HAVE BEEN ADDED TO THE COST OF WORK ARE AS FOLLOWS:

WBS 1325001 PROTOTYPE ONE UNIT - A CONTINGENCY OF 30% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME.

WBS 133000 ALTERNATE #1 ONE UNIT - A CONTINGENCY OF 30% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME

WBS 1328003 ALTERNATE #2 ONE UNIT - A CONTINGENCY OF 30% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME

4

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FLUOR DANIEL NORTHWEST, INC.
 LOCKHEED MARTIN WAREHOUSE CORP.
 JDS NO. 14612AC1/0YHKO
 FILE NO. 14612AC2

"* LESS - INTERACTIVE ESTIMATED *"
 LEAN DISPOSAL ACT - CLOSURE & CAP
 LEARNING ESTIMATE
 PDH&DS - CONSTRUCTION MANAGEMENT/OWNER COST SUMMARY

PAGE 1 OF 6
 DATE 04/04/97 07:44:14
 BY CBL/KBL/DKW

NR	DESCRIPTION	ESTIMATE	CONSTRUCTION MANAGEMENT		OTHER	SUB
		SUBTOTAL	%	TOTAL	COSTS	TOTAL
315001	PAIDOTYPE ONE UNIT	1000000	11.14	243354	0	243354
315002	ALTERNATE 11 ONE UNIT	1300000	11.14	246248	0	246248
315003	ALTERNATE 12 ONE UNIT	1200000	11.14	242071	0	242071
PROJECT TOTAL		4,300,000		731,673	0	731,673

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PLANS 041111 NORTHWEST, LWC,
LOCKHEED MARTIN MANFORD CORP.
JOB NO. 24478AC2/P3H01
FILE NO. 84678AC2

++ JOB - INTERACTIVE ESTIMATING ++
PLAN DISPOSAL ALT - CLOSURE & CAP
PLANNING ESTIMATE
FORMER - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 1
DATE 06/05/97 07:04-54
BY COL/KLR/DKH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WASMCODE	LABOR	BOUP UNITS	MATERIAL	SUB- CONTRACT	REQUI- REMENT	ONCE / B & C	TOTAL DOLLARS
316401	PROTOTYPE ONE UNIT										
316401.02	SITINGWORK										
316401.020001	BACKFILL ONE TRENCH	400	40000 CY	0	0	0	0	0	0	32500	101000
316401.020004	SOIL FOUNDATION	400	8500 CY	0	0	0	0	0	0	2100	16000
316401.020006	SURFACE BARRIER PROTOTYPE	400	3100 SF	0	0	0	0	0	0	15117	1160100
316401.020008	ENTRIGATION - NATURAL PLANTS	400	150000 SF	0	0	0	0	0	0	10700	120750
SUBTOTAL	SITINGWORK			0	0	0	2,218,100	0	0	107,116	2,440,000
TOTAL	COST CODE 4402 WBS 316401 RECALCULATION 14,467 - CONTINUANCE			0	0	0	2,218,100	0	0	107,116	2,440,000
TOTAL WBS 316401 PROTOTYPE ONE UNIT				0	0	0	2,218,100	0	0	107,116	2,440,000

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A-113

FLUOR DANIEL NORTHWEST, INC.
 DOWNSHED MARTIN HANFORD CORP.,
 JOB NO. 14470AC2/EDME1
 FILE NO. 3467EAC2

++ NEW - INTERACTIVE ESTIMATING ++
 PLAN DISTOAL ALT - CLOSURE & CAP
 PLANNING ESTIMATE
 FORMER - ESTIMATE DETAIL BY WBS / COST CODE

FROM 1
 DATE 06/06/97 07:41:54
 BY 001/MLB/DHM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- HOURS	GRP / B & I	TOTAL DOLLARS
325003	ALTERNATE #2 ONE UNIT										
325003.01	SITEWORK										
325003.0201002	BACKFILL ONE TRENCH	140	1000.00	0	0	0	0	30004	0	13204	193508
325003.0200004	SOIL FOUNDATION	140	2145.00	0	0	0	0	14314	0	3119	14410
325003.0200004	EMERGENCY BARRIER ALT. 12	140	22867.00	0	0	0	0	1002856	0	150410	1151214
325003.0200004	REVEGETATION & NATURAL PLANTS	140	15000.00	0	0	0	0	100000	0	14760	220760
SUBTOTAL	SITEWORK			0	0	0	0	1,812,131	0	191,025	2,233,894
TOTAL	COST CODE 46002			0	0	0	0	1,212,171	0	141,025	1,393,196
	WBS 325003										
	RECALCULATION 14.64% - COMPLETION		30.06	11							
TOTAL WBS 325003 ALTERNATE #2 ONE UNIT				0	0	0	0	1,212,171	0	141,025	1,393,196

HNFS-SD-TWR-AGA-004
 REV. 0

ELUCR DAWILL BONTENEST, INC.
 LOCKHEED MARTIN HANFORD CORP.
 JOA NO. 14578AC2/23MR01
 FILE NO. 24578AC2

++ JNET - INTERACTIVE ESTIMATING ++
 TONY DISPOSAL ALT - CLOSURE & CAP
 PLANNING ESTIMATE
 FORMER - BITEMATE DETAIL BY HRS / COST CODE

PAGE \ 4
 DATE 06/06/97 07:44:54
 BY COL/KLR/DKH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANFORDS	LAPCA	EQUIP CODE	SUB- HOURS	CONTRACT	EQUIP- HRS	CHART / B & I	TOTAL DOLLARS

REPORT TOTAL				0		0	3,569.260	0	525,188		4,104,448

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Table A-7. Summary of Estimated Staff Requirements for Remote-Handled Immobilized Low-Activity Waste Container Disposal Phase I and Phase II (Options 2A and 2B).

Position	Type	Phase I	Three Shifts 2 Disposal Units	Phase II	Five Shifts 4 Disposal Units
Remote Handled Waste					
Facility Manager	M		1		1
Clerk	G		0.5		1
Plant Engineer	E		1	2.5	1
					3
Technical Support Manager	M		1		1
Clerk	G		0.6		1
Planner/Scheduler	P		0.25		1
Budget Analyst	P		0.25		1
Training Coordinator	G		1		1
Trainer	P		1		1
Procedure Writer	P		0.5		1
Electrical Engineer	E		1		1
Env. Compl. Engineer	E		0.5		1
I&C Engineer	E		0.5		1
Mechanical Engineer	E		1		4
ESH&Q Engineer	E		1		1
QC Inspector	T		3	11.6	6
					20
Production Manager	M		1		1
Shift Supervisor	M		3		10
Document Clerk	G		1		2
Maintenance PIC	P		1		5
O&M Planner	P		1		5
Instrument Tech	T		2		2
Electricians	C		2		4
Mechanical crafts	C		6		10
Millwrights	C		3		20
Process Operators	R		6		20
HPTs	T		3		10
Power Operators	R		3		5
Crane Operators	R		6		25
Truck Drivers, HD	C		6		25
Fordlift Drivers	C		0	44	0
			58	58	167
					187
Managers	M		6		13
Engineers	E		6		31
Professionals	P		4		14
Technicians	T		8		17
Crafts	C		17		59
Operators	R		15		50
Clerks	G		3		6
			58		167
Exempt	W7		15		38
Bargaining Unit	W8		32		109
Non exemption bargaining	W9		11		22
			58		167

Table A-8. Summary of Estimated Staff Requirements and Costs for Remote-Handled Immobilized Low-Activity Waste Container Disposal Phase I and Phase II (Options 2A and 2B).

Table A-8. Summary of Estimated Staff Requirements and Costs for Remote-Handled ILAW Container Disposal Phase I and Phase II (Option 2A and 2B)														
II Operations Preparations for Phase 1 Remote-Handled ILAW Disposal Facilities														
Schedule Activity Number					Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
JC	OC	CE	FT											
M000	73000	010	1		Managers	3	24	1	11,100	792	2	8/1/00	5/31/02	
E000	73000	010	1		Engineers	2.6	24	1	9,250	690	2	8/1/00	5/31/02	
S000	73000	010	1		Scientists	0	24	1	0	0	2	8/1/00	5/31/02	
P000	73000	010	1		Professionals	2	24	1	7,400	528	2	8/1/00	5/31/02	
T000	73000	060	1		Technicians	4	24	1	14,800	827	2	8/1/00	5/31/02	
C000	73000	060	1		Crafts	8.5	24	1	31,450	1,757	2	8/1/00	5/31/02	
R000	73000	060	1		Operators	7.5	24	1	27,750	1,550	2	8/1/00	5/31/02	
L000	73000	060	1		Laborers	0	24	1	0	0	2	8/1/00	5/31/02	
G000	73000	000	1		Clerical	1.5	24	1	5,550	189	2	8/1/00	5/31/02	
	73000	140	1		Office Supplies	29	24	2		15	2	8/1/00	5/31/02	
	73000	180	1		Computer HW/SW	29	24	2		73	2	8/1/00	5/31/02	
	73000	210	1		Onsite Training	29	24	2		38	2	8/1/00	5/31/02	
	73000	400	1		MFR		24	2		6	2	8/1/00	5/31/02	
									107,300	6,432	28			
Not Operations for Phase 1 Remote-Handled ILAW Disposal (3 shifts, 2 units, 5 day/wk)														
Schedule Activity Number					Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
JC	OC	CE	FT											
M000	73000	010	1		Managers	6	108	1	99,300	7,128	0	8/1/02	5/31/11	
E000	73000	010	1		Engineers	5	108	1	33,250	5,938	0	8/1/02	5/31/11	
S000	73000	010	1		Scientists	0	108	1	0	0	0	8/1/02	5/31/11	
P000	73000	010	1		Professionals	4	108	1	86,500	4,751	0	8/1/02	5/31/11	
T000	73000	060	1		Technicians	8	108	1	133,200	7,442	0	8/1/02	5/31/11	
C000	73000	060	1		Crafts	17	108	1	283,050	15,814	0	8/1/02	5/31/11	
R000	73000	060	1		Operators	15	108	1	249,750	13,854	0	8/1/02	5/31/11	
L000	73000	060	1		Laborers	0	108	1	0	0	0	8/1/02	5/31/11	
G000	73000	000	1		Clerical	3	108	1	49,950	1,871	0	8/1/02	5/31/11	
	73000	140	1		Office Supplies	58	108	2		131	0	8/1/02	5/31/11	
	73000	180	1		Computer HW/SW	58	108	2		656	0	8/1/02	5/31/11	
	73000	210	1		Onsite Training	58	108	2		328	0	8/1/02	5/31/11	
	73000	220	1		Electricity		108	3		678	0	8/1/02	5/31/11	
	73000	410	1		Laundry Service	40	108	3		904	0	8/1/02	5/31/11	
	73000	420	1		Vehicle Maint		108	3		3,391	0	8/1/02	5/31/11	
	73000	100	1		Mails & Equip		108	3		595	0	8/1/02	5/31/11	
	73000	400	1		MFR		108	2		95	0	8/1/02	5/31/11	
									985,700	63,444				
Deactivation of Phase 1 Remote-Handled ILAW Disposal Facilities														
Schedule Activity Number					Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L

Table A-4 Summary of Estimated Staff Requirements and Costs for Remote Handled (LAW Containment) Disposal Phase I and Phase II (Option 2A and 2B)													
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	3	12	1	3,550	886	3	6/1/11	5/31/12	
E000	73000	010	1	Engineers	2.5	12	1	4,625	330	3	6/1/11	5/31/12	
S000	73000	010	1	Scientists	0	12	1	0	0	2	6/1/11	5/31/12	
P000	73000	010	1	Professionals	2	12	1	3,700	284	3	6/1/11	5/31/12	
T000	73000	080	1	Technicians	4	12	1	7,400	413	3	6/1/11	5/31/12	
C000	73000	090	1	Crafts	8.5	12	1	15,725	879	3	6/1/11	5/31/12	
R000	73000	090	1	Operators	7.5	12	1	13,875	775	3	6/1/11	5/31/12	
L000	73000	080	1	Laborers	0	12	1	0	0	3	6/1/11	5/31/12	
G000	73000	000	1	Clerical	1.5	12	1	2,775	93	3	6/1/11	5/31/12	
	73000	210	1	Onsite Training	28	12	2		18	3	6/1/11	5/31/12	
	73000	220	1	Electricity		12	3		25	3	6/1/11	5/31/12	
	73000	410	1	Laundry Service	20	12	3		50	3	6/1/11	5/31/12	
	73000	4C0	1	MFR		12	2		0	3	6/1/11	5/31/12	
								53,650	3,243				
Schedule Activity Number Operations Preparations for Phase 2 Remote Handled LAW Disposal Facilities													
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	6.5	24	1	24,050	1,716	2	5/1/09	4/30/11	
E000	73000	010	1	Engineers	4.5	24	1	16,850	1,188	2	5/1/09	4/30/11	
S000	73000	010	1	Scientists	0	24	1	0	0	2	5/1/09	4/30/11	
P000	73000	010	1	Professionals	7	24	1	25,800	1,847	2	5/1/09	4/30/11	
T000	73000	080	1	Technicians	9.5	24	1	31,450	1,757	2	5/1/09	4/30/11	
C000	73000	080	1	Crafts	28.5	24	1	108,150	8,088	2	5/1/09	4/30/11	
R000	73000	090	1	Operators	25	24	1	82,500	5,168	2	5/1/09	4/30/11	
L000	73000	080	1	Laborers	0	24	1	0	0	2	5/1/09	4/30/11	
G000	73000	000	1	Clerical	2.5	24	1	9,250	310	2	5/1/09	4/30/11	
	73000	140	1	Office Supplies	83.5	24	2		42	2	5/1/09	4/30/11	
	73000	190	1	Computer HW/BW	83.5	24	2		210	2	5/1/09	4/30/11	
	73000	210	1	Onsite Training	83.5	24	2		105	2	5/1/09	4/30/11	
	73000	4C0	1	MFR		24	2		18	2	5/1/09	4/30/11	
								308,950	18,458				

Table A-5 Summary of Estimated Staff Requirements and Costs for Remote Handled ILAW Container Disposal Phase I and Phase II (Option 2A and 2B)												
II Hot Operations for Phase 2 Remote Handled ILAW Disposal (4+T shifts, 4 units, 7 day/wk)												
Schedule Activity Number	JC	OC	CE	PT	Description	FTEs	Months	Note	MH	\$K	Curve	D/L
M000	73000	010	1		Managers	13	184	1	328,883	23,445	0	5/1/11 12/31/24
E000	73000	010	1		Engineers	9	184	1	227,550	18,231	0	5/1/11 12/31/24
S000	73000	010	1		Scientists	0	184	1	0	0	0	5/1/11 12/31/24
P000	73000	010	1		Professionals	14	184	1	363,867	25,248	0	5/1/11 12/31/24
T000	73000	060	1		Technicians	17	184	1	429,817	24,914	0	5/1/11 12/31/24
C000	73000	060	1		Crafts	59	184	1	1,461,717	83,342	0	5/1/11 12/31/24
R000	73000	060	1		Operators	50	184	1	1,264,187	70,629	0	5/1/11 12/31/24
L000	73000	060	1		Laborers	0	184	1	0	0	0	5/1/11 12/31/24
G000	73000	000	1		Clerical	8	184	1	126,417	4,230	0	5/1/11 12/31/24
	73000	140	1		Office Supplies	167	184	2		87	0	5/1/11 12/31/24
	73000	150	1		Computer HW/SW	167	184	2		2,887	0	5/1/11 12/31/24
	73000	210	1		Onsite Training	167	184	2		1,433	0	5/1/11 12/31/24
	73000	220	1		Electricity		184	3		1,373	0	5/1/11 12/31/24
	73000	410	1		Laundry Service	126	184	3		4,326	0	5/1/11 12/31/24
	73000	460	1		Vehicle Maint		184	3		10,299	0	5/1/11 12/31/24
	73000	100	1		Meds & Equip		184	3		868	0	5/1/11 12/31/24
	73000	400	1		MPR		184	2		265	0	5/1/11 12/31/24
									4,222,317	268,618		

Table A-5 Summary of Estimated Staff Requirements and Costs for Remote Handled ILAW Container Disposal Phase I and Phase II (Options 2A and 2B)													
II													
Deactivation of Phase 2 Remote Handled ILAW Disposal Facilities													
Schedule Activity Number	JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish
M000	73000	010	1		Managers	6.3	12	1	12,025	858	3	1/1/25	12/31/25
S000	73000	010	1		Engineers	4.5	12	1	8,325	594	3	1/1/25	12/31/25
P000	73000	010	1		Scientists	0	12	1	0	0	3	1/1/25	12/31/25
T000	73000	010	1		Professionals	7	12	1	12,850	824	3	1/1/25	12/31/25
C000	73000	080	1		Technicians	8.5	12	1	15,725	879	3	1/1/25	12/31/25
R000	73000	080	1		Crafts	29.5	12	1	54,575	3,049	3	1/1/25	12/31/25
L000	73000	080	1		Operators	25	12	1	46,250	2,584	3	1/1/25	12/31/25
G000	73000	080	1		Laborers	0	12	1	0	0	3	1/1/25	12/31/25
	73000	000	1		Chemical	2.5	12	1	4,825	155	3	1/1/25	12/31/25
	73000	210	1		Onsite Training	83.5	12	2		52	3	1/1/25	12/31/25
	73000	220	1		Electricity		12	3		25	3	1/1/25	12/31/25
	73000	410	1		Laundry Service	83	12	3		158	3	1/1/25	12/31/25
	73000	400	1		MPR		12	2		0	3	1/1/25	12/31/25
									154,475	8,278			
Perform Long Term Monitoring Remote Handled ILAW Disposal Facilities													
Schedule Activity Number	JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish
E000	73000	010	1		Managers	0.75	105	1	12,141	968	0	1/1/25	9/30/33
S000	73000	010	1		Engineers	0.875	105	1	14,164	1,010	0	1/1/25	8/30/33
P000	73000	010	1		Scientists	0	105	1	0	0	0	1/1/25	8/30/33
T000	73000	010	1		Professionals	0.75	105	1	12,141	968	0	1/1/25	9/30/33
C000	73000	080	1		Technicians	0.5	105	1	8,094	452	0	1/1/25	9/30/33
R000	73000	080	1		Crafts	1.6	105	1	24,281	1,367	0	1/1/25	9/30/33
L000	73000	080	1		Operators	1	105	1	16,188	904	0	1/1/25	9/30/33
G000	73000	080	1		Laborers	0	105	1	0	0	0	1/1/25	9/30/33
	73000	000	1		Chemical	0.825	105	1	10,117	359	0	1/1/25	9/30/33
	73000	140	1		Office Supplies	8	105	2		13	0	1/1/25	9/30/33
	73000	190	1		Computer HW/SW	8	105	2		0	0	1/1/25	9/30/33
	73000	210	1		Onsite Training	8	105	2		33	0	1/1/25	9/30/33
	73000	220	1		Electricity		105	3		55	0	1/1/25	9/30/33
	73000	410	1		Laundry Service	3	105	3		88	0	1/1/25	9/30/33
	73000	100	1		Mails & Equip		105	3		27	0	1/1/25	9/30/33
	73000	400	1		MPR		105	2		3	0	1/1/25	9/30/33
									97,125	5,992			

Table A-8. Summary of Estimated Staff Requirements and Costs for Remote Handled (LAW) Container Disposal Phase I and Phase II (Option 2A and 2B)

Notes

1) Staffing estimate based on attached staffing chart. Assume one FTE is equivalent to 1850 hrs.

2) CE 140- Office supplies based on \$200 per FTE + 28.8% G&A and escalation

CE190 - Computer hardware and software based on \$1000 per FTE + 25.6% G&A and escalation

CE2LD - Onsite training based on \$500 per FTE + 25.6% G&A and escalation

3) The following costs are assumed bases of VROM estimates. Actual estimates will be generated following design studies in FY 1998.

These costs apply only after hot start as costs prior to hot start are assumed to be covered by the project.

OE 220 - BPA electricity \$20K per shift per year + 25 B% G&A and escalation

CE4LD - Laundry service based on \$2K per bargaining unit FTE +25.5% G&A and escalation

CEAPD- Transportation (truck maintenance) \$50K per year per vehicle + 25.6% G&A and depreciation

CE100 - Materials and equipment (spare parts) \$50K per year + 25 G% GBA and escalation

4) MRP based on 70% of Cost Elements 100, 140 and 180

Table A-9. Summary of Estimated Staff Requirements for Contact-Handled Immobilized Low-Activity Waste Storage and Disposal Phase I and Phase II (Options 2C and 2D).

Position	Type	Phase I	Three Shifts 1 Storage Unit	Phase II	Three Shifts 3 Disposal Units
Contact Handled Waste					
Facility Manager	M		1		1
Clerk	G		0.5		0.5
Plant Engineer	E		1	2.5	1
Technical Support Manager	M		1		1
Clerk	G		0.5		0.5
Planner/Scheduler	P		0.25		0.25
Budget Analyst	P		0.25		0.25
Training Coordinator	G		1		1
Trainer	P		1		1
Procedure Writer	P		0.5		0.5
Electrical Engineer	E		1		1
Env. Compl. Engineer	E		0.5		0.5
I&C Engineer	E		0.5		0.5
Mechanical Engineer	E		1		1
ESH&Q Engineer	E		1		1
QC Inspector	T		3	12	3
Production Manager	M		1		1
Shift Supervisor	M		3		3
Document Clerk	G		1		1
Maintenance PIC	P		1		2
O&M Planner	P		1		3
Instrument Tech	T		2		2
Electricians	C		2		2
Mechanical crafts	C		3		6
Process Operators	R		3		6
HPTs	T		3		6
Power Operators	R		3		3
Crane Operators	R		0		0
Truck Drivers, HD	C		4		12
Forklift Drivers	C		4	31	12
			45	45	73
Managers	M		6		6
Engineers	E		5		5
Professional	P		4		7
Technicians	T		8		11
Crafts	C		13		32
Operators	R		8		9
Clerks	G		3		3
			45		73
Exempt	W7		15		18
Bargaining Unit	W8		18		41
Non exemption bargaining	W9		11		14
			45		73

Table A-10. Summary of Estimated Staff Requirements and Costs for Contact-Handled Immobilized Low-Activity Waste Container Storage and Disposal Phase I and Phase II (Options 2C and 2D).

Table A-10. Summary of Estimated Staff Requirements and Costs for Contact-Handled LHW Container Storage and Disposal Phase I and Phase II (Options 2C and 2D)													
Schedule Activity Number				Operations Preparations for Phase I Contact-Handled LHW Storage Facilities									
JC	QC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	3	24	1	11,100	782	2	6/1/00	5/31/02	
E000	73000	010	1	Engineers	2.5	24	1	8,250	980	2	6/1/00	5/31/02	
P000	73000	010	1	Scientists	0	24	1	0	0	2	6/1/00	5/31/02	
Y000	73000	010	1	Professional	2	24	1	7,400	528	2	6/1/00	5/31/02	
Z000	73000	020	1	Technicians	4	24	1	14,800	827	2	6/1/00	5/31/02	
R000	73000	060	1	Crafts	6.5	24	1	24,050	1,344	2	6/1/00	5/31/02	
L000	73000	060	1	Operators	9	24	1	11,100	820	2	6/1/00	5/31/02	
O000	73000	060	1	Laborers	0	24	1	0	0	2	6/1/00	5/31/02	
	73000	090	1	Clerical	1.5	24	1	5,550	348	2	6/1/00	5/31/02	
	73000	140	1	Office Supplies	23.5	24	2		11	2	6/1/00	5/31/02	
	73000	190	1	Computer HW/SW	22.3	24	2		57	2	6/1/00	5/31/02	
	73000	210	1	Office Heating	22.5	24	2		29	2	6/1/00	5/31/02	
	73000	400	1	MFR		24	2		8	2	6/1/00	5/31/02	
								\$3,250	\$,069				
Schedule Activity Number				Hot Operations for Phase I Contact-Handled LHW Storage (3 shifts, 1 unit, 5 day/week)									
JC	QC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	3	108	1	99,000	7,128	0	6/1/02	5/31/11	
E000	73000	010	1	Engineers	3	108	1	\$3,250	3,330	0	6/1/02	5/31/11	
P000	73000	010	1	Scientists	0	108	1	0	0	0	6/1/02	5/31/11	
Y000	73000	010	1	Professional	4	108	1	65,600	4,794	0	6/1/02	5/31/11	
Z000	73000	020	1	Technicians	3	108	1	198,200	7,442	0	6/1/02	5/31/11	
R000	73000	060	1	Crafts	13	108	1	218,450	12,093	0	6/1/02	5/31/11	
L000	73000	060	1	Operators	9	108	1	99,000	5,681	0	6/1/02	5/31/11	
O000	73000	060	1	Laborers	0	108	1	0	0	0	6/1/02	5/31/11	
	73000	090	1	Clerical	3	108	1	49,950	1,671	0	6/1/02	5/31/11	
	73000	140	1	Office Supplies	45	108	2		142	0	6/1/02	5/31/11	
	73000	190	1	Computer HW/SW	45	108	2		369	0	6/1/02	5/31/11	
	73000	210	1	Office Training	45	108	2		234	0	6/1/02	5/31/11	
	73000	220	1	Electricity		108	2		678	0	6/1/02	5/31/11	
	73000	410	1	Laundry Service	27	108	2		610	0	6/1/02	5/31/11	
	73000	4P0	1	Vehicle Maint		108	2		4,322	0	6/1/02	5/31/11	
	73000	100	1	Mails & Equip		108	2		665	0	6/1/02	5/31/11	
	73000	400	1	MFR		108	2		82	0	6/1/02	5/31/11	
								740,360	\$1,625				

Table A-16 Summary of Estimated Staff Requirements and Costs for Contact Handled ILAW Container Storage and Disposal Phase I and Phase II
(Options 2C and 2D)

Schedule Activity Number				Deactivation of Phase 1 Contact Handled ILAW Storage Facilities											
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	OL		
5000	73000	010	1	Managers	3	12	1	5,560	398	3	6/1/11	5/31/12			
5001	73000	010	1	Engineers	2.6	12	1	4,625	330	3	6/1/11	5/31/12			
6000	73000	010	1	Scientists	0	12	1	0	0	3	6/1/11	6/31/12			
7000	73000	010	1	Professionals	2	12	1	3,700	264	3	6/1/11	5/31/12			
8000	73000	080	1	Technicians	4	12	1	7,400	413	3	6/1/11	5/31/12			
9000	73000	080	1	Crafts	6.5	12	1	12,026	872	3	6/1/11	5/31/12			
L000	73000	080	1	Operators	3	12	1	5,550	310	3	6/1/11	6/31/12			
G000	73000	060	1	Laborers	0	12	1	0	0	3	6/1/11	6/30/12			
	73000	000	1	Clerical	1.5	12	1	2,775	83	3	6/1/11	5/31/12			
	73000	210	1	Onsite Training	22.5	12	2		14	3	6/1/11	6/31/12			
	73000	220	1	Electricity		12	3		25	3	6/1/11	5/31/12			
	73000	410	1	Laundry Service	13.5	12	3		34	3	6/1/11	5/31/12			
	73000	400	1	MPR		12	2		0	3	6/1/11	5/31/12			
								41,825	2,561						

Table A-16 Summary of Estimated Staff Requirements and Costs for Contract Handled LAW Container Storage and Disposal Phase I and Phase II (Options 2C and 2D)

Schedule Activity Number													
Perform Monitoring of Phase I LAW Storage Facilities													
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000													
E000	73000	010	1	Managers	1.6	106	1	24,291	1,732	0	1/1/25	9/30/33	
S000	73000	010	1	Engineers	1.25	106	1	20,234	1,443	0	1/1/25	9/30/33	
P000	73000	010	1	Scientists	0	106	1	0	0	0	1/1/25	9/30/33	
T000	73000	010	1	Professionals	1	106	1	16,148	1,185	0	1/1/25	9/30/33	
C000	73000	080	1	Technicians	2	106	1	32,376	1,808	0	1/1/25	9/30/33	
R000	73000	060	1	Crafts	3.25	106	1	62,808	2,089	0	1/1/25	9/30/33	
L000	73000	060	1	Operators	1.5	106	1	24,281	1,357	0	1/1/25	9/30/33	
G000	73000	080	1	Laborers	0	105	1	0	0	0	1/1/25	9/30/33	
	73000	008	1	Clerical	0.75	105	1	12,141	406	0	1/1/25	9/30/33	
	73000	140	1	Office Supplies	11.25	105	2		26	0	1/1/25	9/30/33	
	73000	190	1	Computer HW/SW	11.25	105	2		0	0	1/1/25	9/30/33	
	73000	210	1	Onsite Training	11.25	105	2		62	0	1/1/25	9/30/33	
	73000	220	1	Electricity		105	3		56	0	1/1/25	9/30/33	
	73000	410	1	Laundry Service	8.75	105	3		148	0	1/1/25	9/30/33	
	73000	100	1	Mails & Equip		105	3		27	0	1/1/25	9/30/33	
	73000	400	1	MFR		105	2		4	0	1/1/25	9/30/33	
								182,109	11,182				
Schedule Activity Number													
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000													
E000	73000	010	1	Managers	3	24	1	11,160	782	2	5/1/09	4/30/11	
S000	73000	010	1	Engineers	2.5	24	1	9,283	660	2	5/1/09	4/30/11	
P000	73000	010	1	Scientists	0	24	1	0	0	2	5/1/09	4/30/11	
T000	73000	010	1	Professionals	3.5	24	1	12,350	824	2	5/1/09	4/30/11	
C000	73000	060	1	Technicians	5.5	24	1	20,350	1,137	2	5/1/09	4/30/11	
R000	73000	060	1	Crafts	18	24	1	68,200	3,908	2	5/1/09	4/30/11	
L000	73000	060	1	Operators	4.5	24	1	16,650	930	2	5/1/09	4/30/11	
G000	73000	080	1	Laborers	0	24	1	0	0	2	5/1/09	4/30/11	
	73000	008	1	Clerical	1.5	24	1	5,550	185	2	5/1/09	4/30/11	
	73000	140	1	Office Supplies	36.5	24	2		18	2	5/1/09	4/30/11	
	73000	190	1	Computer HW/SW	36.5	24	2		92	2	5/1/09	4/30/11	
	73000	210	1	Onsite Training	36.5	24	2		46	2	5/1/09	4/30/11	
	73000	400	1	MFR		24	2		8	2	5/1/09	4/30/11	
								135,050	8,089				

Table A-10 Summary of Estimated Staff Requirements and Costs for Contact Handled ILAW Container Storage and Disposal Phase I and Phase II (Options 2C and 2D)

Schedule Activity Number													
JC	OC	CE	FT	\$1W08030	Hot Operations for Phase 2 Contact Handled Disposal (3 shifts, 3 units, 8 day/wk)								
				Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
E000	73000	010	1	Managers	6	184	1	151,700	10,821	0	5/1/11	12/31/24	
S000	73000	010	1	Engineers	5	184	1	129,417	9,017	0	5/1/11	12/31/24	
P000	73000	010	1	Scientists	0	184	1	0	0	0	5/1/11	12/31/24	
T000	73000	010	1	Professionals	7	184	1	176,883	12,824	0	5/1/11	12/31/24	
C000	73000	060	1	Technicians	11	184	1	278,117	15,538	0	5/1/11	12/31/24	
R000	73000	060	1	Crafts	32	184	1	808,087	45,203	0	5/1/11	12/31/24	
L000	73000	080	1	Operators	9	184	1	227,550	12,713	0	5/1/11	12/31/24	
G000	73000	080	1	Laborers	0	184	1	0	0	0	5/1/11	12/31/24	
	73000	000	1	Clerical	3	184	1	75,850	2,538	0	5/1/11	12/31/24	
	73000	140	1	Office Supplies	73	184	2		261	0	5/1/11	12/31/24	
	73000	190	1	Computer HW/SW	73	184	2		1,253	0	5/1/11	12/31/24	
	73000	210	1	Onsite Training	73	184	2		627	0	5/1/11	12/31/24	
	73000	220	1	Electricity		184	3		1,973	0	5/1/11	12/31/24	
	73000	4L0	1	Laundry Service	52	184	3		1,785	0	5/1/11	12/31/24	
	73000	4P0	1	Vehicle Maint		184	3		12,874	0	5/1/11	12/31/24	
	73000	100	1	Mats & Equip		184	3		858	0	5/1/11	12/31/24	
	73000	4C0	1	MPR		184	2		185	0	5/1/11	12/31/24	
								1,645,683	127,841				
Schedule Activity Number													
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
E000	73000	010	1	Managers	3	12	1	5,550	398	3	1/1/25	12/31/25	
S000	73000	010	1	Engineers	2.5	12	1	4,825	330	3	1/1/25	12/31/25	
P000	73000	010	1	Scientists	0	12	1	0	0	3	1/1/25	12/31/25	
T000	73000	010	1	Professionals	3.5	12	1	8,475	482	3	1/1/25	12/31/25	
C000	73000	060	1	Technicians	5.5	12	1	10,175	568	3	1/1/25	12/31/25	
R000	73000	060	1	Crafts	16	12	1	28,600	1,694	3	1/1/25	12/31/25	
L000	73000	080	1	Operators	4.5	12	1	8,325	465	3	1/1/25	12/31/25	
G000	73000	080	1	Laborers	0	12	1	0	0	3	1/1/25	12/31/25	
	73000	000	1	Clerical	1.8	12	1	2,776	93	3	1/1/25	12/31/25	
	73000	210	1	Onsite Training	38.5	12	2		23	3	1/1/25	12/31/25	
	73000	220	1	Electricity		12	3		25	3	1/1/25	12/31/25	
	73000	4L0	1	Laundry Service	26	12	3		51	3	1/1/25	12/31/25	
	73000	4C0	1	MPR		12	2		0	3	1/1/25	12/31/25	
								67,525	4,097				

Table A-10 Summary of Estimated Staff Requirements and Costs for Contact Handled LAW Container Storage and Disposal Phase I and Phase II (Options 2C and 2D)

Schedule Activity Number													
Perform Long Term Monitoring Contact Handled LAW Disposal Facilities													
JC					FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	OC	CE	FT	Description									
E000	73000	010	1	Managers	1.5	105	1	24,261	1,732	0	1/1/25	8/30/33	
S000	73000	010	1	Engineers	1.26	105	1	20,234	1,443	0	1/1/25	8/30/33	
P000	73000	010	1	Scientists	0	105	1	0	0	0	1/1/25	8/30/33	
T000	73000	010	1	Professionals	1.75	105	1	28,328	2,021	0	1/1/25	8/30/33	
C000	73000	060	1	Technicians	2.75	105	1	44,516	2,487	0	1/1/25	8/30/33	
R000	73000	060	1	Crafts	8	105	1	129,500	7,236	0	1/1/25	8/30/33	
L000	73000	060	1	Operators	2.26	105	1	36,422	2,038	0	1/1/25	8/30/33	
G000	73000	060	1	Laborers	0	105	1	0	0	0	1/1/25	8/30/33	
	73000	000	1	Clerical	0.75	105	1	12,141	408	0	1/1/25	8/30/33	
	73000	140	1	Office Supplies	18.25	105	2		40	0	1/1/25	8/30/33	
	73000	190	1	Computer HW/RSW	18.25	105	2		1	0	1/1/25	8/30/33	
	73000	210	1	Onsite Training	18.25	105	2		100	0	1/1/25	8/30/33	
	73000	220	1	Electricity		105	3		55	0	1/1/25	8/30/33	
	73000	410	1	Laundry Service	13	105	3		238	0	1/1/25	8/30/33	
	73000	190	1	Mails & Equip		105	3		27	0	1/1/25	8/30/33	
	73000	4C0	1	MPR		105	2		5	0	1/1/25	8/30/33	
								285,422	17,879				
Notes													
1) Staffing estimate based on attached staffing chart. Assume one FTE is equivalent to 1950 hrs.													
2) CE140 - Office supplies based on \$200 per FTE + 25.6% G&A and escalation													
CE190 - Computer hardware and software based on \$1000 per FTE + 25.6% G&A and escalation													
CE210 - Onsite training based on \$500 per FTE + 25.6% G&A and escalation													
3) The following costs are estimated based on VROM estimates. Actual estimates will be generated following design studies in FY 1986.													
These costs apply only after hot start as costs prior to hot start are assumed to be covered by the project.													
CE 220 - EPA electricity \$20K per shift per year + 25.6% G&A and escalation													
CE410 - Laundry service based on \$2K per bargaining unit FTE + 25.6% G&A and escalation													
CE490 - Transportation (truck maintenance) \$50K per year per vehicle + 25.6% G&A and escalation													
CE100 - Materials and equipment (spare parts) \$50K per year + 25.6% G&A and escalation													
4) MPR based on 7.0% of Cost Elements 100, 140 and 190													

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A2.2 SINGLE-SHELL TANKS (OPTION 3)

Table A-11. Summary of Estimated Construction Costs for Addition of One 12-Foot Diameter Opening to the Center of a Single-Shell Tank Based on Diamond Wire Cutting Technology (Option 3).

Note: The above estimate was developed based on August 1990 dollars. For Table 5-8, demolition cost was escalated to September 30, 2002, by using multipliers of 1.26 (based on 3.3 percent per year to June 1997) and 1.16. Both escalators were based on composite labor and materials information from FDHC. See Figures A-1 through A-4 for technique.

COST CODE	DESCRIPTION	ESTIMATE TOTAL COST	COUNT/PERCENT %	TOTAL	TOTAL DOLLARS
000	ENGINEERING	1,540,000	50	770,000	2,310,000
B10	DEMOLITION	4,760,000	50	2,380,000	7,690,000
INCLUDED TO NEXT CODE \$100.00					

PROJECT TOTAL		4,300,000	50	2,150,000	6,450,000

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TYPE OF ESTIMATE	ALTERNATE ENGINEERING BIDDING	DATE	AUGUST 15, 1990	REMARKS: 12" DIAMETER HOLE ALTERNATIVE
ARCHITECT	KAISER ENGINEERS	CHECK		
ENGINEER				
OPERATING CONTRACTOR				

316161

CLOUNDING/ADJUSTED TO THE HIGHEST * 10,000 / 100,000 * - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING

LINE DESCRIPTION	ESTIMATE SUBTOTAL	ON-SITE IMPERECTS	SUB TOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL ESTIMATE
110000 DEFENSIVE DESIGN	952900	0	952900	0.00	0	952900	952900
SUBTOTAL 11 DEFENSIVE DESIGN	952900	0	952900	0.00	0	952900	952900
120000 R/I DURING CONSTRUCTION	476450	0	476450	0.00	0	476450	476450
SUBTOTAL 12 R/I DURING CONSTRUCTION	476450	0	476450	0.00	0	476450	476450
SUBTOTAL 3 ENGINEERING	1429350	0	1429350	0.00	0	1429350	1429350
310000 TEMPORARY FACILITIES	411805	0	411805	0.00	0	411805	411805
310001 EARTHWORK	103396	0	103396	0.00	0	103396	103396
310002 CONCRETE REMOVAL	124674	0	124674	0.00	0	124674	124674
310003 MECHANICAL REMOVAL	216071	0	216071	0.00	0	216071	216071
310004 ELECTRICAL REMOVAL	79884	0	79884	0.00	0	79884	79884
310010 REMOVAL - BASE ASSUMPTION	5364007	0	5364007	0.00	0	5364007	5364007
310020 NOT DISPOSAL FEES	384726	0	384726	0.00	0	384726	384726
SUBTOTAL 31 OF CONSTRUCTION	4764443	0	4764443	0.00	0	4764443	4764443
330000 WASTEWATER MANAGEMENT	114240	0	114240	0.00	0	114240	114240
SUBTOTAL 3 CONSTRUCTION	4878683	0	4878683	0.00	0	4878683	4878683
PROJECT TOTAL	6,306,233	0	6,306,233	0.00	0	6,306,233	6,306,233

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1. DOCUMENTS AND ORDINANCES

 DOCUMENTS: NONE

ORDINANCES: SELECTED REFERENCE DUES OF EXISTING FACILITIES ONLY.

2. MATERIAL PRICES

 UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL.

3. LABOR RATES

 CURRENT KERNED BASE RATES AS ISSUED BY KEN LISTEN # 13, REV. 0, DATED 3-1-90; INCLUDE FRINGE BENEFITS,
 LABOR INSURANCE, TAXES AND TRAVEL DUES WHERE APPLICABLE.

4. GENERAL REQUIREMENTS/TECHNICAL SERVICES

 4.1 QUOTE CONSTRUCTION FORCES GENERAL REQUIREMENTS AND TECHNICAL SERVICES COSTS ARE INCLUDED AS A COMPOSITE
 PERCENTAGE BASED ON THE KEN ESTIMATING FACTOR/BILLING SCHEDULE REVISION 10 DATED JANUARY 02, 1990. THE TOTAL
 COMPOSITE PERCENTAGE APPLIED TO QUOTE CONSTRUCTION FORCES LABOR FOR THIS PROJECT IS 72 IN 70% FOR SHOP WORK
 AND 102 IN 100% FOR FIELD WORK WHICH IS REFLECTED IN THE "SHOP / F" IN COLUMN OF THE ESTIMATE SHEET.

5. ESCALATION

 NO ESCALATION IS INCLUDED IN THE ESTIMATE.

6. ROUNDING - LINE ITEMS:

 U.S. DEPARTMENT OF ENERGY - DOE ORDER 5100.4 PAGE J-2 SUBPARAGRAPH (M), REQUIRES ROUNDING OF A COST ESTIMATE
 IN \$10,000 FOR ITEM COST AND \$100,000 FOR TOTAL COST. REFERENCE: DOE 5100.4, FIGURE 1-19, DATED 10-31-86.

7. REMARKS

- 1.2 AS OF DECEMBER 1, 1997, QUALITY SUPPLY AND SAFETY FOR CONSTRUCTION FORCES ARE INCLUDED IN THE COST OF LABOR.
- 2.1 ESTIMATE IS A PRELIMINARY ESTIMATE FOR ONE TANK WITH A 40" DIAMETER HOLE CUT THROUGH THE CONCRETE DOME. ESTIMATE IS INCLUSIVE AND COSTS COULD BE POTENTIALLY REDUCED BY REUSE OF ADDITIONAL TANKS. NO ATTEMPT WAS MADE TO EVALUATE THE AMMUNITION OF THESE COSTS IN OTHER WORK.
- 3.1 ESTIMATE ASSUMES ALL DEMOLITION, INCLUDING EXCAVATION TO BE PERFORMED WITHIN BLACK BOX GREENHOUSE PROVIDED BY OTHERS. ESTIMATE ASSUMES THE FOLLOWING EQUIPMENT AND FACILITIES WILL BE AVAILABLE IN-SIDE OF THIS FACILITY:
1. A 2-5 TON OVERHEAD BRIDGE CRANE WITH AN EXTENSION BOOM EXTENDING THROUGH AN AIRLOCK INTO A TRUCK LOADING BAY.
 2. A PERSONNEL AIRLOCK WITH INTERCONNECTING PORTABLE OCEAN AND CHANGE FACILITIES.
 3. AN EQUIPMENT AND MATERIAL AIRLOCK APPROX 20' X 20' X 14' HIGH.
 4. A LOADING AREA ADJACENT TO EQUIPMENT AIR LOCK APPROX 20' X 40' X 14' HIGH.
 5. AN OVERHEAD COLD WATER SPRAY MIST SYSTEM.
 6. UTILITY POWER AND WATER FOR SMALL APPLICATIONS.
 7. TEMPORARY LIGHTING.
 8. VENTILATING AIR W/ FILTER SYSTEM AND FACILITIES FOR HEPA VAC & FLEX SUCTION TO SECONDARY CONTAINMENT GREENHOUSES, DECONTAMINATION FACILITIES IN GREENHOUSE SYSTEM.
 9. HEATING AND COOLING EQUIPMENT FOR MAKE-UP AIR UNITS.
 10. BREATHING AIR SYSTEM INCLUDING COMPRESSOR/STORAGE & DISTRIBUTION SYSTEM.
- 4.1 ESTIMATE DOES NOT INCLUDE DEMOLITION OF ANY ABOVE GROUND FACILITIES OR PIT JUMPERS. ESTIMATE INCLUDES AN ALLOWANCE FOR REMOVAL OF PIPES IN PIT.
- 5.1 ESTIMATE ASSUMES CUTTING AND CORE DRILLING OPERATIONS TO BE PERFORMED WITHIN SECONDARY GREENHOUSES.
- 6.1 ESTIMATE ASSUMES MAXIMUM PRACTICAL USE OF SHIELDING TO REDUCE RADIATION EXPOSURE TO PERSONNEL.
- 7.1 DISPOSAL COSTS FOR REMATERIALS HAVE BEEN CALCULATED AT THE CURRENT USE BURIAL CHARGES.
- 8.1 ESTIMATE BASED UPON WIRE MESH CONCRETE CURING TECHNOLOGY TO CUT CONCRETE. ESTIMATE BASED ON CASTING AND REMOVING W/ CONCRETE DOME IN SECTIONS APPROX 4' X 8' X 3'.
- 9.1 ESTIMATE DOES NOT INCLUDE DECONTAMINATION AND OR REMOVAL OF TANKS & THEIR CONTENTS; BACKFILLING OF TANK INTERIORS OR TANKS.
- 10.1 ESTIMATE ASSUMES BACKFILL OF EXCAVATED AREA WILL BE FREE OF CONTAMINATION AND COVER AND MACHINE BACKFILL WILL BE ALLOWED.
- 11.1 ESTIMATE DESIGN BASED ON 20 PER CENT OF DIRECT CONSTRUCTION COST.
- 12.1 1/4 DURING CONSTRUCTION BASED ON 10 PER CENT OF DIRECT CONSTRUCTION COST.
- 13.1 ESTIMATE BASED ON 2 YEAR JOB DURATION.
- 14.1 ESTIMATE BASED ON 10%.
- 15.1 ESTIMATE A BASED ON ABOVE ASSUMPTIONS EXCEPT:
1. USE OF A 30' DIA CRANES TO PROVIDE CLEARANCE FOR AN AVERAGE OF ONE CONCRETE PIT & ONE SHIP PIT PER TANK.
 2. CUTTING A 12' DIA HOLE IN TOP OF TANK.
 3. AMMUNITION OF PIPING AND RIGGING, ETC ASSUME AVERAGE (NOT WORST CASE) SCENARIO TO BE EXPECTED.

FLUOR DANIEL NORTHWEST, INC.
 LOCKHEED MARTIN HARTFORD CORP.
 JOB NO. 56679AA3/PJHMG1
 FILE NO. 34578AF

" INTERACTIVE ESTIMATING "
 ILAW DISPOSAL ACT. INFRASTRUCTURE
 PLANNING ESTIMATE
 PENN004 - 80% COST CODE ACCOUNT SUMMARY

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 BY CDM/KUN/DKH

COST CODE/NAME	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT MOMENT	SUM TOTAL	RECALCULATION % TOTAL	RED TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS		
=====										
450	IMPROVEMENTS TO LAND									
120001	SITEMARK	2439532	463504	2001037	14.84	428607	3220444	34	936194	4326838
TOTAL 450 IMPROVEMENTS TO LAND		2439532	463504	2001037	14.84	428607	3220444	34	936194	4326838
501	BUILDINGS									
320002	FACILITIES, SYSTEMS, & EQUIPMENT	3239125	525452	6414612	14.84	102174	4416359	30	1304161	6000617
TOTAL 501 BUILDINGS		3239125	525452	6414612	14.84	102174	4416359	30	1304161	6000617
600	UTILITIES									
320001	SITEMARK	422706	77488	502148	14.84	74622	576799	26	105258	592148
310002	UTILITIES	1197157	261201	1458358	14.84	261341	1947767	26	451474	2030643
310003	FACILITIES, SYSTEMS, & EQUIPMENT	110535	59485	274820	14.84	59513	434553	26	109211	321664
310004	UTILITIES O&M AND L&I	110104	20610	130714	14.84	19420	150109	26	109210	180120
TOTAL 600 UTILITIES		2239162	128334	2700698	14.84	102210	3199912	26	723703	2922699
710	HEAVY MOBILE EQUIPMENT									
320003	FACILITIES, SYSTEMS, & EQUIPMENT	5751108	1000000	6751108	14.84	1022413	7773521	34	3330815	10273520
TOTAL 710 HEAVY MOBILE EQUIPMENT		5751108	1000000	6751108	14.84	1022413	7773521	34	3330815	10273520
PROJECT TOTAL		13,044,125	2,510,502	16,424,718	14.84	2,151,012	18,246,130	28	9,475,664	24,423,612

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FLOOR DANIEL NORTHWEST, INC.
 LOCKHEED MARTIN HAMPDEN CORP.
 JOB NO. 8415A07/P3HK01
 FILE NO. 84175A02

** 1987 - INTERACTIVE ESTIMATING **
 ILAW DISPOSAL ALI. - INFRASTRUCTURE
 PLANNING ESTIMATE
 FORWARDS - ESTIMATE SUMMARY BY CSE DIVISION

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 BY CDM/ELP/OKK

Q31	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCT NOMIN	CSE TOTAL	DECAUTION E TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
CONSTRUCTION								
01	WTEWORK	1101023	600004	1720668	14.00	541569	10	1302192
11	BOULDERING	1701640	1000002	4000102	14.00	1030113	10	3174016
12	SPECIAL CONSTRUCTION	1302730	635797	1000000	14.00	972174	10	1300000
14	ERECTORAL	1510162	247103	2110065	14.00	270255	10	437745
TOTAL CONSTRUCTION		13,106,125	2,416,503	16,494,738	14.00	2,451,412	10	24,423,480
PROJECT TOTAL								
		13,106,125	2,416,503	16,494,738	14.00	2,451,412	10	24,423,480

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PSUDR DANIEL HORTENWEST, INC.
LOCKHEED HARTIS HARTFORD CORP.
JOB NO. 24478A2/PSH001
PAGE NO. 24478A2

++ BEST - INTERACTIVE ESTIMATING ++
ISAN DISPOSAL ACT. - INFRASTRUCTURE
PLANNING ESTIMATE
FORMULA - CONTINGENCY ANALYSIS BASIC SHEET

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BY CDE/KLE/DKR

REVISION 3/16/97 24.34

1. DEFINITION OF CONTINGENCY AS PROVIDED BY DOE

"CONTINGENCY COVERS COSTS THAT MAY RESULT FROM INCOMPLETE DESIGN, UNFORESEEN AND UNPREDICTABLE CONDITIONS, OR UNCERTAINTIES WITHIN THE DEFINED PROJECT SCOPE. THE AMOUNT OF CONTINGENCY WILL DEPEND ON THE STATUS OF DESIGN, PROCUREMENT, AND CONSTRUCTION, AND THE COMPLEXITY AND UNCERTAINTIES OF THE COMPONENT PARTS OF THE PROJECT. CONTINGENCY IS NOT TO BE USED TO AVOID MAKING AN ACCURATE ASSESSMENT OF EXPECTED COST" (OFFICE OF WASTE MANAGEMENT (EN-10) COST AND SCHEDULE GUIDE),

2. CONTINGENCY ALLOWANCE GUIDELINES

THE DOE GUIDELINE CONTINGENCY ALLOWANCE FOR ALL
PLANNING ESTIMATE - STANDARD = 25% - 10%

3. METHODOLOGY

CONTINGENCY IS EVALUATED AT THE LOWEST WORK BREAKDOWN STRUCTURE (WBS) LEVEL WITHIN THE COST ESTIMATE DETAILS. IT IS SUMMARIZED AT UPPER WBS LEVELS AND REPORTED ON THE SUMMARY REPORTS.

4. ANALYSIS

AN ASSESSMENT OF DESIGN MATURITY, WORK COMPLEXITY AND PROJECT UNCERTAINTIES HAS BEEN PERFORMED. AN EXPLANATION OF THIS ASSESSMENT AND CONTINGENCY RATES WHICH HAVE BEEN ADDED TO THE COST OF WORK ARE AS FOLLOWS.

WBS 120001 SITEWORK - A CONTINGENCY OF 25% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME

WBS 120002 UTILITIES - A CONTINGENCY OF 25% HAS BEEN APPLIED DUE TO UNKNOWN CONCERNING DISTANCES TO TIE-INS

WBS 120003 FACILITIES, SYSTEMS & EQUIPMENT - A CONTINGENCY OF 10% HAS BEEN APPLIED DUE TO A LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME

WBS 120002 UTILITIES DTH AND LKSI - A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO AN ALLOWANCE HAS BEEN USED TO DETERMINE THE COST.

11

ENF-SD-TWR-ACA-004
REV. 0

FLUOR DANIEL NORTHWEST, INC.
 LOCKERBEE MARTIN HARTFORD CORP.
 FOR NO. 2467002/PTW001
 FILE NO. 2467002

1987 - INTERACTIVE ESTIMATING
 LEAN DISPOSAL ACT. - INFRASTRUCTURE
 PLANNING ESTIMATE
 ESTIMATE DETAIL BY M&E / COST CODE

PROB 1
 DATE 06/05/97 13:41:23
 BY CUL/XLR/GRH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANDOURS	LABOR	EQUIP USAGE	MATERIAL	MOD- CONTRACT	EQUIP- HOURS	OVER- / \$ & 1	TOTAL DOLLARS
120001	SITEMOIL										
120001.02	SITEMOIL										
120001.020000	SITE CLEAN & GRUB	450	0	0	0	0	0	0	0	0	0
120001.020000	CLEAR & GRUB - 25	450	10000 CY	0	0	0	0	61525	0	61525	72000
120001.020000	HAUL OFF WASTE	450	25000 CY	0	0	0	0	100000	0	100000	115000
SUBTOTAL	SITEMOIL			0	0	0	0	161,525	0	24,525	146,050
TOTAL	COST CODE 4502 M&E 120001 (ESCALATION 10.3%) - CONTINGENCY		10.00 \$1	0	0	0	0	161,525	0	24,525	146,050
120001.02	SITEMOIL										
120001.020000	ROUGH GRADE / SITE DRAINAGE	450	0	0	0	0	0	0	0	0	0
120001.020000	BALANCE CUP & FILL	450	72000 CY	0	0	0	0	72000	0	100000	43000
120001.020000	TRAVERSE ST	450	435000 CY	0	0	0	0	65240	0	9000	75140
SUBTOTAL	SITEMOIL			0	0	0	0	72,000	0	114,701	240,041
TOTAL	COST CODE 4502 M&E 120001 (ESCALATION 10.3%) - CONTINGENCY		20.00 \$1	0	0	0	0	72,000	0	114,701	240,041
120001.02	SITEMOIL										
120001.020000	BRICKLAY PAVING & CURBS	450	0	0	0	0	0	0	0	0	0
120001.020000	7" CHAIN LINK W/3 STRANDS	450	8200 LF	0	0	0	0	82000	0	10000	11000
120001.020000	BARBED WIRE	450	2 EA	0	0	0	0	100	0	100	200
120001.020000	STONE	450	82 EA	0	0	0	0	8200	0	1000	1000
SUBTOTAL	SITEMOIL			0	0	0	0	117,000	0	20,000	147,000

HNF-SD-TWR-AQA-004
 Rev. 0

FLUOR DANIEL NORTHWEST, INC.
LOCKHEED HARTWIG HANFORD CORP.
JOB NO. Z4470AAJ291MK01
FILE NO. Z4412AAJ

** COST + INTERACTIVE ESTIMATING **
PLAN 012200AL ALT. : IMPROVEMENTS
PLANNING ESTIMATES
F0000000 - ESTIMATE BUILT BY WSC / COST CODE

PAGE 1
DATE 05/05/97 13:43:25
BY CCL/KAR/ODH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANMOVER	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- HOUR	SHIP / B & I	TOTAL DOLLARS
TOTAL	COST CODE 40002 NBS J20001 /ESCALATION 24.86% - CONTINGENCY 21.10 %			0	0	0	143,440	0	20,040		163,440
J20001.02	STATIONWORK ***** CENTRAL + PERIMETER ROADS *****	400	0	0	0	0	0	0	0	0	0
J20001.02000005	LINE GRADING	410	30300 SF	0	0	0	12843	0	1800		13023
J20001.02000010	6" CRUSHED ROCK	410	19160 TON	0	0	0	149240	0	3135		152375
J20001.02000012	4" ASPHALT	410	4775 TON	0	0	0	217120	0	31510		272690
J20001.02000014	WATER FOR CONSTRUCTION	410	1805 MG	0	0	0	10530	0	1810		12130
J20001.02000016	SORTING	410	1 LB	0	0	0	1540	0	316		1725
J20001.02000018	STRIKING	410	1 LB	0	0	0	2000	0	300		2300
SUBTOTAL	STATIONWORK			0	0	0	401,440	0	40,040		441,440
TOTAL	COST CODE 40002 NBS J20001 /ESCALATION 24.86% - CONTINGENCY 21.10 %			0	0	0	143,442	0	20,040		163,482
J20001.02	STATIONWORK ***** UPGRADE FIRST STREET *****	410	0	0	0	0	0	0	0	0	0
J20001.02000010	113C ASPHALT CUTTING & REMOVAL	410	19000 SF	0	0	0	11250	0	1610		12860
J20001.02000012	6" CRUSHED ROCK	410	4440 TON	0	0	0	11000	0	1630		12630
J20001.02000014	4" CRUSHED ROCK	410	9400 TON	0	0	0	54400	0	1910		56310
J20001.02000016	1 1/2" X 6" ASPHALT WIDENING	410	475 TON	0	0	0	23540	0	4215		27755
J20001.02000018	TACK COAT	410	1120 GALL	0	0	0	3943	0	520		4463
J20001.02000020	PATCH & PRELEVEL	410	1 LB	0	0	0	0	0	710		710
J20001.02000022	3" 4L-0 ASPHALT	410	1376 TON	0	0	0	13240	0	11410		14550
J20001.02000024	SPREADER ROCK	410	2641 TON	0	0	0	13400	0	4013		17413
J20001.02000026	STRIKING	410	20000 LB	0	0	0	4000	0	800		4800
J20001.02000028	SORTING	410	1 LB	0	0	0	10000	0	1000		11000
SUBTOTAL	STATIONWORK			0	0	0	263,733	0	40,460		304,193

HNF-SD-TWR-AQA-004
Rev. 0

FLUOR DANIEL NORTHWEST, INC.
LOCKWOOD MARTIN HANFORD CORP.
JOB NO. 34673A2/POHNOJ
PAGE NO. 24673A2

PP TEST - INTERACTIVE ESTIMATING PP
[CAN DISPOSAL ACT. - INFRASTRUCTURE
PLANNING ESTIMATE
PDMH01 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 5
DATE 01/05/97 11:13:26
BY CDL/KLR/DKE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MATERIALS	LABOR	EQUIP CHARGE	MATERIAL CONTRACT	SUB-CONTRACT	EQUIP-LEASE	CHAF / S & I	TOTAL DOLLARS
TOTAL	COST CODE 45001 WBS 320001 14.561 - CONTINGENCY 32.00 1)		0	0	0	0	269,733			10,469	310,193
320001.01	SITWORK										
320001.0200000	***** PARKING LOT *****	450	0	0	0	0	0	0	0	0	0
320001.0200100	PILE GRADING	450	4450 LF	0	0	0	0	2225	0	324	3349
320001.0200102	6" CRUSHED ROCK	450	1550 TON	0	0	0	0	20540	0	3375	25975
320001.0200144	2" CL-6 ASPHALT	450	500 TON	0	0	0	0	20000	0	1000	23000
320001.0200180	STRIPING & SIGNS	450	1 LS	0	0	0	0	1000	0	150	1150
320001.0200200	PARKING ROWS	450	100 EA	0	0	0	0	4000	0	600	4600
320001.0200310	WATER FOR CONSTRUCTION	450	1 LB	0	0	0	0	2000	0	200	2200
320001.0200312	MAINTENANCE SHOP LAY-DOWN YARD OFFICES & GATES (ALLON)	450	1 LB	0	0	0	0	20000	0	4500	24500
320001.0200314	MAINTENANCE SHOP PARTIAL AREA FOR TRACTOR/TRANSPORTER & MISC EQUIPMENT (ALLON)	450	1 LB	0	0	0	0	20000	0	4500	24500
SUBTOTAL	SITWORK			0	0	0	111,725		0	10,759	129,484
TOTAL	COST CODE 45002 WBS 320001 14.561 - CONTINGENCY 32.00 1)		0	0	0	0	111,725		0	10,759	129,484
320001.02	SITWORK										
320001.0200000	***** GRAVEL & HYDROSEED STABILIZATION *****	450	0	0	0	0	0	0	0	0	0
320001.0200100	PILE GRADING	450	6100 LF	0	0	0	0	24750	0	3511	29261
320001.0200120	3" CRUSHED ROCK	450	12000 TON	0	0	0	0	180000	0	27000	207000
320001.0200126	WATER FOR CONSTRUCTION	450	2000 AC	0	0	0	0	17000	0	2550	19550
320001.0200128	HYDROSEED (ALLON)	450	24 ACR	0	0	0	0	21000	0	4050	25050
SUBTOTAL	SITWORK		0	0	0	0	209,730		0	30,322	270,052

FIN-SD-TWR-AGA-004
REV. 0

FLUOR DANIEL NORTHWEST, INC.
LOCKHART MARTIN HANFORD CORP.
608 N. 144TH AVE / D30K02
WILE 20. 244784A3

"* ESTY - INTERACTIVE ESTIMATING *"
ILAW DISPOSAL ALT. - INFRASTRUCTURE
PLANNING ESTIMATE
FORM 600 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 1 4
DATE 05/05/97 12:43:20
BY COL/KLR/BNH

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- RENT	OVER / B & T	TOTAL DOLLARS
TOTAL	COST CODE 41010 WBS 120001 ESCALATION 14.45% - CONTINGENCY 10.00 %			0	4	0	240,750	0	0	26,113	276,863
320401.14	ELECTRICAL										
320401.1410074	170 1/2 FEEDER - 2" PVC 4 12/0 THHN CONDUCTORS	6150	900 LF	1316	46334	0	23542	0	0	35945	135011
320401.1431101	12IN LBS LIGHT W/ARM AND 30" ROUNDED TAPERED STEEL POST	6150	70 EA	931	25471	0	118521	0	0	41640	215590
320401.1434131	CONCRETE PILE BASE - 20" DIA X 1' 30" DEPTH	6150	70 EA	551	21065	0	7368	0	0	11375	35012
320401.1434141	TRENCHING & BACKFILL 4" X 24"	6150	9000 LF	90	1429	4	13100	0	0	6052	21111
SUBTOTAL	ELECTRICAL			2,790	106,399	0	185,120	0	0	114,976	402,475
	SALES TAX 8.00 % OVER 100 MANHOURS DEDT						14493	0	0	5796	14491
TOTAL	COST CODE 41010 WBS 120001 ESCALATION 14.45% - CONTINGENCY 20.00 %			2,790	106,399	0	199,613	0	0	120,772	422,700
TOTAL WBS 320401 NETWORK				2,790	106,399	0	199,613	0	0	119,190	2,050,233

HNF-SD-TWR-AGA-004
REV. 0

FLUOR DANIEL NORTHWEST, INC.
 LOCKHEED MARKS BARROW CORP.
 JOB NO. 2407AA173NR02
 FILE NO. 2407EAB2

** TEST - INTERACTIVE ESTIMATING **
 SPAN DISCREPANCY - INFRASTRUCTURE
 PLANNING ESTIMATE
 FORWARDED - ESTIMATE DETAIL BY WBS / COST CODE

FROM 5
 DATE 04/06/97 13:43:28
 BY CDE/KEN/DKE

ACCOUNT #NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURLS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP. HOURS	CHGP / B & I	TOTAL DOLLARS
120002	UTILITIES										
120002.02	SITWORK										
120002.0200101	***** FIRE WATER *****	600	0	0	0	0	0	0	0	0	0
120002.0200102	1" FIRE WATER LINE COMPLETE : INCLUDES: EX & BP, PIPING, VALVES, FITTINGS, PIPS, HY- DRANTS, BEDDING, LOCATE TAPES	400	1000 LF	0	0	0	0	10750	0	20125	210425
120002.0200102	& TESTING	600	0	0	0	0	0	0	0	0	0
	SUBTOTAL SITWORK			0	0	0	0	107,500	0	20,125	210,625
TOTAL	COST CODE 60002 WBS 120002 (ESCALATION 10.00% : CONTINGENCY 30.00%)			0	0	0	0	107,500	0	20,125	210,625
120002.02	SITWORK										
120002.0200102	***** SANITARY WATER *****	600	0	0	0	0	0	0	0	0	0
120002.0200102	4" POTABLE WATERLINE COM- PLETE: INCLUDES EX & BP PIPING, EXISE SERVICE, BACK- FLOW PREVENTION, LOCATE TAPES	600	2500 LF	0	0	0	0	16250	0	28375	160875
120002.0200102	& TESTING	600	0	0	0	0	0	0	0	0	0
	SUBTOTAL SITWORK			0	0	0	0	162,500	0	28,375	180,875
TOTAL	COST CODE 60002 WBS 120002 (ESCALATION 10.00% : CONTINGENCY 30.00%)			0	0	0	0	162,500	0	28,375	180,875
120002.02	SITWORK										
120002.0200102	***** SANITARY SEWER *****	600	0	0	0	0	0	0	0	0	0
120002.0200102	PRESSURIZED SANITARY SEWER SYSTEM COMPLETE: INCLUDES:	600	1 LG	0	0	0	0	30000	0	45000	305000

HNF-SD-TWR-AGA-004
 REV. 0

FLORIAN DANIEL NORTHQUEST, INC.
LOCKBOXED HARTIN BANYARD CORP.
FOR MO. 34470222/200002
FILE NO. 34470222

[illegible][illegible]

登入時間: 04/05/17 13:43:29
 用戶名: CDE/HLR/ADMIN

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MARKUP	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP. HOURS	OMAP / E & J	TOTAL DOLLARS
120001.1200178	MAINLINE, MANHOLES, SEPTIC/ DRAINING TANKS, DRAINPIEDLIES, PUMPS, VALVES, CONTROLS, ELECTRICAL & TESTING	499	*	0	0	0	0	0	*	*	\$
AUSTOTAL	SEWERWORK			0	0	0	160.000		*	16.000	245.000
TOTAL	COST CODE 40902 WBS 320042 ISCALATION 14.0% - CONTINGENCY			0	0	0	160.000		*	45.000	245.000
120002.16	ELECTRICAL										
120002.1611002	COMMUNICATION ALARMANCE LAN / TELEPHONE	6100	1 EA	0	0	0	150000	*	15000	115000	
AUSTOTAL	ELECTRICAL			0	0	0	150.000		*	15.000	165.000
TOTAL	COST CODE 12018 WBS 320042 ISCALATION 14.0% - CONTINGENCY			0	0	0	150.000		*	15.000	165.000
120002.16	ELECTRICAL										
120002.1614051	1 - 2" PVC BUCT BANK - PP INCLUDES: WACK RNC, CONC, FORM, CWP, BACKFILL, STEEL	6150	2000 LF	3395	43721	*	12572	*	*	24917	67910
120002.1614051	MANHOLE INSTALLATION	6150	5 JOB	10	3000	*	15000	*	0	7210	28267
120002.1612515	#1 6PR GRND 1/2 CU 15KV	6150	10000 LF	210	4210	*	16244	*	0	2820	34484
120002.1612515	#2 15KV TRNK	6150	12 BA	24	914	0	610	0	*	731	1759
120002.1612515	EXISTING ONE STATION ASSEMBLY MAX SPACR POS 15.4 KV	6150	2 BA	40	1820	0	42200	0	*	20412	71141
120002.1614051	#1 2" 6PR CU STRD	6150	200 LF	3	114	0	171	0	*	124	349
120002.1614051	GROUNDED PLATE	6150	4 BA	4	132	0	30	0	*	73	269
120002.1614051	CADWELD	6150	2.2 BA	5	119	0	221	*	*	254	878
120002.1614051	1/2"x 1/2" Grnd Rod	6150	10 BA	6	210	0	100	0	*	135	472
120002.1614051	TYPE I EXN NUTAPS	6150	2 BA	52	3585	0	24000	24000	*	16300	23087
120002.1614051	217/410V SECONDARY, 2PH 4M OIL FIELDED PAD MOUNTED T50 KVA	6150	1 BA	100	3960	0	14100	*	*	6001	20295

HNF-SD-TWR-AGA-004
Rev. 0

PAUL & DAWSON NORTHWEST, INC.
 LOCKMEED MARTIN HARBOR COMB.
 JOB NO. 4475812/P18K01
 FILE NO. 2461441

** COST - INTERACTIVE ESTIMATING **
 BAAH DISPOSAL ALT. - INFRASTRUCTURE
 PLANNING ESTIMATE
 POWER44 - ESTIMATE DETAIL BY WBS / COST CODE

PROJ 4 7
 DATE 06/05/99 13:43:11
 BY CUL/MLG/DMM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	BOBILT- MENT	CHART / B I	TOTAL DOLLARS
	1-120# AMP TIE										
	2-950 AMP & 4-820 AMP PROV										
SUBTOTAL	ELECTRICAL			1,093	12,122	0	211,835	2,400	0	157,823	414,111
	SALES TAX 8.04 %						23744		0		23744
	CHRT 10% HARKOFF ONLY								0	8836	8836
TOTAL	COST CODE 61616			1,093	12,122	0	233,579	2,400	0	166,659	510,524
	WBS 224042										
	RECALCULATION 14.44% - CONTINGENCY 20.00 %										
TOTAL WBS 329022 UTILITIES				1,093	12,122	0	233,579	2,400	0	166,659	510,524

HN-SD-TWR-AGA-004
 Rev. 0

FLORIDA POWER & LIGHTS, INC.
4000000 MARTIN HANFORD CORP.
JOB NO. 14478A2/270001
FILE NO. 14478A2

** TEST - INTERACTIVE ESTIMATING **
PLAN DISPOSAL ALT. - INFRASTRUCTURE
PLANTING ESTIMATE
FORMER - ESTIMATE DETAIL BY MBE / COST CODE

PAGE 4
DATE 04/05/97 11 43 11
BY CDA/SLM/BNM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MARKDOWN	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-RENT	ONAP / B & I	TOTAL DOLLARS
310001	FACILITIES, SYSTEMS, & EQUIPMENT										
310001.11	EQUIPMENT										
310001.110002	HEAVY MOWER EQUIPMENT	710	0	0	0	0	0	0	0	0	0
310001.110004	TRAILER/BLADE TRACTION	710	15 SH	0	0	0	1125000	0	0	337500	1462500
310001.110006	TRANSPORTER TRAILERS WITH SWELDRING ALLOW	710	15 SH	0	0	0	1000000	0	0	900000	1900000
SUBTOTAL	EQUIPMENT										
							4,125,000	0	0	1,237,500	5,362,500
							210000			30000	240000
TOTAL	COST CODE 71011 MBE 310001 INCREASION 14.85% + CONTINGENCY		14.40 %				4,455,000	0	0	1,267,500	5,722,500
310001.12	SPECIAL CONSTRUCTION										
310001.120001	BUILDINGS & FACILITIES	540	0	0	0	0	0	0	0	0	0
310001.120004	ADMIN. BLDG. W/ CONTROL RM... CHANGE RM, ECT. - FROM REN SIS SUPPORT FACILITY	540	1 LF	0	0	0	0	150000	0	225750	1710750
310001.120006	MAINTENANCE FACILITY - FROM REN 5407 MAINTENANCE SHOP	540	1 LF	0	0	0	0	120000	0	180000	1417500
310001.120008	SECURITY GUARD STATION (VENOR SUECARTY PRICE FROM E.I.G. INC.)	540	2 SH	0	0	0	0	45000	0	90750	761250
310001.120010	ENTERING ACCOUNTABILITY AND TRACIBILITY SYSTEM (ALLOW)	540	1 LF	0	0	0	0	120000	0	180000	139000
SUBTOTAL	SPECIAL CONSTRUCTION										
							2,943,500	0	0	442,225	3,385,725
TOTAL	COST CODE 5011 MBE 310001 INCREASION 14.14% + CONTINGENCY		30.00 %				2,943,500	0	0	442,225	3,385,725
310001.14	ELECTRICAL										

HNFSID-TWR-AGA-004

Rev. 0

FLUOR DANIEL NORTHWEST, INC
LOCKHEED MARTIN HANFORD CORP.
JOB NO. 64475AA2/PSA001
FILE NO 64475AA2

*** EST - INTERACTIVE ESTIMATING ***
PLAN DISPOSAL ALT. - INFRASTRUCTURE
PLANING ESTIMATE

***** ESTIMATE DETAIL BY WBS / COST CODE

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DATE 05/05/93 13:43:32
BY CDM/KLR/DKM

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- MENT	OVER / S & I	TOTAL DOLLARS
320003.1610026	17G 14 FEEDER - 2" PVC 4 12/0 THHN COPPERWIRE	6150	1000 LF	243	3218	0	1708	0	0	3140	25128
320003.1610051	3 - 2" PVC DUCT BANK - PP INCLUDES: MACH ETC, COME, FORM, CMO, BACKFILL, STABIL	6150	1200 LF	1828	72016	0	16320	0	0	34120	126410
320003.1610071	3 - 4" PVC DUCT BANK - PP INCLUDES: MACH ETC, COME, FORM, CMO, BACKFILL, STABIL	6150	300 LF	144	5617	0	1035	0	0	3042	10846
320003.1610081	MANHOLE INSTALLATION	6150	1 JOE	10	3042	0	16000	0	0	7210	23287
320003.1610130	11/0 THHN 1/0 COPPER 400V	6150	33000 LF	212	13647	0	17030	0	0	17714	10499
320003.1610125	1500 THHN 1/0 COPPER 400V	6150	1600 LF	67	3532	0	5579	0	0	1252	11388
320003.1610120	11/0 400V MILE TERMINATION	6150	1 EA	0	220	0	24	0	0	191	244
320003.1610126	1500 MCM 400V MILE TERM.	6150	1 EA	15	410	0	112	0	0	214	1011
320003.1610101	125M 400V LIGHT W/ARM AND 31' ROUND TAPERED STEEL POLE	6150	1 EA	213	4110	0	27092	0	0	10000	49900
320003.1610131	CONCRETE POLE BASE - 2'-DIA x 1' CONCRETE	6150	1 EA	125	4801	0	1684	0	0	1694	3079
320003.1610141	TRUCKING & BACKFILL 4" x 24"	6150	1800 LF	18	404	0	2740	0	0	1210	1230
SUBTOTAL ELECTRICAL				3,243	113,749	0	0	0	0	87,837	207,586
SALES TAX 6.04 %									0		7943
OVER 10% HANFORD ONLY									0		3192
TOTAL				3,243	113,749	0	167,774	0	0	91,410	318,533
COST CODE 6154 WBS 320003 REGULATION 14.401 - CONTINGENCY 20.00 %											
TOTAL WBS 320003 FACILITIES, SYSTEMS, & EQUIPMENT				3,243	113,749	0	167,774	0	0	91,410	318,533

HNF-SD-TWR-AGA-004
Rev. 0

FROM DANIEL NORTHWEST, INC.
LOCKHEED MARTIN WATFORD CORP.
JOB NO. 14612AA7/91N03
FILE NO. 24126AA7

** TEST - INTERACTIVE ESTIMATING **
TEAM DISPOD AL7 - INFRASTRUCTURE
PLANNING ESTIMATE
PDWNR04 - ESTIMATE DETAIL BY MSG / COST CODE

PAGE 1 10
DATE 12/06/93 12.03.23
BY CBL/KLR/DNR

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANPOWER	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- RENT	SHIP / S & I	TOTAL DOLLARS
130001	UTILITIES DTH AND LMSI										
130001.16	ELECTRICAL										
12001.1611+00	COMMUNICATION ALLOWANCE LAN / TELEPHONE DESIGN / ENGINEERING	4140	1 LB	0	0	0	0	10000	0	1000	9600
SUBTOTAL	ELECTRICAL			0	0	0	0	50000	0	5000	55000
TOTAL	COST CODE 61014 MSG 130001 (ESCALATION 14.46% - CONTINGENCY 21.00 %)			0	0	0	0	50000	0	5000	55000
130001.16	ELECTRICAL										
130002.1605004	UTILITIES TEST, INSPECTION, & CORRECT ELECTRICAL 13.8 KV ALLOWANCE	4150	2 LB	0	0	0	0	50000	0	5000	55000
SUBTOTAL	ELECTRICAL			0	0	0	0	50000	0	5000	55000
TOTAL	COST CODE 61014 MSG 130002 (ESCALATION 14.46% - CONTINGENCY 21.00 %)			0	0	0	0	50000	0	5000	55000
TOTAL MSG 130002 UTILITIES DTH AND LMSI				0	0	0	0	100000	0	10000	110000

HNF-SD-TWR-AGA-004
Rev. D

FLOOR DANIEL NORTHWEST, TMC.
 LOC) HEND MARTIN HAMFORD CORP.
 JOB NO. 244752A1/FINX01
 FILE NO. 244752A2

** EST - INTERACTIVE ESTIMATING **
 LAM DISPOSEAL ALT. - INFRASTRUCTURE
 PLANNING ESTIMATE

PAGE \ 11
 DATE 02/06/97 13.42.14
 BY CDB/JLR/DKH

FORMER - ESTIMATE DETAIL BY NOS / COST CODE

ACCOUNT NUMBER	DESC (PCTN)	COST CODE	QUANTITY	HAN HOUR	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- RENT	CHRG F B & I	TOTAL DOLLARS
*****+*****											
^											
REPORT TOTAL			7.621		238.171		5,980.419		2,575.948		13,864.125

ENF-SD-TWR-AGA-004
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PRINTER ENGINEERS NAME/NO
UNIVERSITY NAME/NO
100 MU. 204875 APT 1

PRINTER ENGINEERS INTERACTIVE ESTIMATION
SINGLE SHEET TAKE OFF/ESTIMATE
12" DIAMETER HOLE ANALYSIS L. WALL
SERIES - ESTIMATE DETAIL BY NOS / COST CODE

PAGE 12
DATE 08/15/00 11:17:58
MT 00000000

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WARRANTY	LABOR	GRADE	MATERIAL	CONTRACT	UNIT	AMOUNT	TOTAL
510006	ELECTRICAL DEMOLITION										
510006-16	ELECTRICAL										
510006-1600004	ELECTRICAL DEMOLITION	810 N	1 LB	500	15000	0	350	0	0	15300	30600
	ASSUME 20 PER CENT 0/00										
	WARRANTY										
510006-1600006	ELECTRICAL DEMOLITION	810 N	1 LB	124	3720	0	0	0	0	3720	7514
	ASSUME 20 PER CENT @ 15 NR										
SUBTOTAL	ELECTRICAL										
	(BASE)			424		0		0		19,094	
	SUB 100.00%			424	12,720		350	0	0		30,144
	GENERAL FOREMAN 5.00 %			624	18720						18720
	CONSTRUCTION 5.00 %			62	1872						1872
	SALES TAX 7.00 %						21				21
	UNDERGROUND 20.00 %						29				29
	OVER (FOR MATERIALS ONLY)						74				74
										21004	21004
TOTAL	COST CODE 81016			1,310	30,312	0	474	0	0	40,098	70,804
	ESCALATION 0.00 % - CONTINGENCY 50.00 %										
TOTAL SUB 510006 ELECTRICAL DEMOLITION				1,310	30,312	0	474	0	0	40,098	70,804

KAISER ENGINEERS HANFORD
DESIGN/ANALYSIS HANFORD COMPANY
JOB NO. 220875 ALI 01

KAISER ENGINEERS INTERACTIVE ESTIMATION
SINGLE SHELL TANK WASTE RETENTION BIODR
12' DIAMETER HOLE ANALYSIS L. HALL
TENSORS - ESTIMATE METAL BY US / COST CODE

PAGE 13
DATE 02/25/90 11 40 AM
BY CUB/UTS

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HOURS	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- MENT	ORIG / B & L	TOTAL	
*****	*****	****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
310010	BORROW - BASE ASSUMPTION											
310010.01	GENERAL REMOVALS											
310010.014300A	BORROW (LABOR - 667 HIR @ 15 HR X 2.16 K 1.05	810	2641	MHR	7441	79230	0	0	0	0	88815	160015
310010.014300B	BORROW (LABOR - 501 MHR @ 30 HR X 4.20 K 1.05	810	3103	MHR	3103	95490	0	0	0	0	97400	192090
310010.014300C	BORROW (LABOR - 375 MHR @ 40 HR X 8.42 K 1.05	810	5965	MHR	5965	178950	0	0	0	0	161917	360267
310010.014300D	BORROW (LABOR - 367 MHR @ 120 HR X 17.14 K 1.05	810	17979	MHR	17979	539370	0	0	0	0	550157	1089527
310010.014300E	BORROW (LABOR - 375 MHR @ 225 HR X 32.16 K 1.05	810	22297	MHR	22297	668910	0	0	0	0	682760	1351190
310010.014300F	QUICKEN SUPPORT LABOR	810	4160	MHR	4160	104000	0	0	0	0	106000	210000
SUBTOTAL	GENERAL REMOVALS		56,205		1,665,350	0	0	0	0	0	1,665,350	3,364,007
TOTAL	COST CODE 310010 (REGULATION 0.00 L - CONFIDENCE 30.00 %)		56,205		1,665,350	0	0	0	0	0	1,665,350	3,364,007
TOTAL US 310010 BUREAU - BASE ASSUMPTION			56,205		1,665,350	0	0	0	0	0	1,665,350	3,364,007

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP RENT	DISP / M & E	TOTAL DOLLARS
110020	NOT DISPOSAL FEE										
110020.01	GENERAL REQUIREMENTS										
110020.010004	LOW LEVEL BURT CHARGES FOR NOT DIT & CONCRETE ASSUME 90 PER CENT LOW LVL MIXED WASTE BURT CHARGES FOR NOT DIT & CONCRETE	010	4363 CF	0	0	0	0	200116	0	0	200116
110020.010008	ASSUME 90 PER CENT LOW LVL MIXED WASTE BURT CHARGES FOR NOT DIT & CONCRETE	010	207 CF	0	0	0	0	70274	0	0	70274
110020.010008	ASSUME 90 PER CENT MIXED LOW LEVEL DISPOSAL CHARGES FOR PIPING AND RISERS ASSUME 50 PER CENT LOW LEVEL MIXED WASTE DISPOSAL CHARGES FOR PIPING AND RISERS	010	150 CF	0	0	0	0	4710	0	0	4710
110020.010010	MIXED WASTE DISPOSAL CHARGES FOR PIPING AND RISERS ASSUME 50 PER CENT MIXED LOW LEVEL DISPOSAL CHARGES FOR PERMANENT MATERIALS & EQUIPMENT	010	150 CF	0	0	0	0	16820	0	0	16820
110020.010012	LOW LEVEL DISPOSAL CHARGES FOR PERMANENT MATERIALS & EQUIPMENT	010	650 CF	0	0	0	0	20443	0	0	20443
110020.010014	MIXED WASTE DISPOSAL CHARGES FOR CONTAMINATED LEAD CRISTOLING MATERIAL	010	248 CF	0	0	0	0	20154	0	0	20154
110020.010022	LOW LEVEL DISPOSAL CHARGES FOR DUNE CONCRETE ASSUME 50 PER CENT MIXED WASTE DISPOSAL CHARGES FOR DUNE CONCRETE	010	271 CF	0	0	0	0	30387	0	0	30387
110020.010024	MIXED WASTE DISPOSAL CHARGES FOR DUNE CONCRETE ASSUME 20 PER CENT MIXED	010	31 CF	0	0	0	0	3812	0	0	3812
SUBTOTAL	GENERAL REQUIREMENTS							384,726			384,726
TOTAL	COST CODE 01001 USE 110020 ESTIMATION 4.00 % - CONTINGENCY (30.00 %)							384,726			384,726
TOTAL NOT 110020 NOT DISPOSAL FEE								384,724			384,724

Kaiser Engineers Hawaii
 Westinghouse Sanford Company
 Job No. 130075 Act 1

** Kaiser Engineers Interactive Estimate **
 Single Shell Tank Waste Retrieval Study
 12" Diameter Hole Analysis & Hole
 Penetration Estimate Detail by NBS / Cost Code

Page 15
 Date 06/15/00 11:40:03
 By 008/013

Account Number	Description	Cost Code	Quantity	Manhours	Labor	Usage	Material	Contract	Equip	Over	Total Dollars
330000	Westinghouse Management										
330000.00	Technical Services										
330000.000004	WMC Management - Assume 8 months	000	1 LS	1344	114,240	0	0	0	0	0	114,240
	Subtotal Technical Services			1,344	114,240	0	0	0	0	0	114,240
				1,344	114,240	0	0	0	0	0	114,240
TOTAL	Cost Code 00000 WMC Management Escalation 0.00 % - Contingency 50.00 %										
				1,344	114,240	0	0	0	0	0	114,240
TOTAL THE 330000 WESTINGHOUSE MANAGEMENT				1,344	114,240	0	0	0	0	0	114,240

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Table A-12. Summary of Estimated Construction Costs for Addition of One 48-Foot Diameter Opening to the Center of a Single-Shell Tank Based on Diamond Wire Cutting Technology (Option 3).

Note: The above estimate was developed based on August 1990 dollars. For Table 5-8, demolition cost was escalated to September 30, 2002, by using multipliers of 1.26 (based on 3.3 percent per year to June 1997) and 1.16. Both escalators were based on composite labor and materials information from FDHC. See Figures A-1, A-2, A-3, and A-5 for technique.

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KAISER ENGINEERS MANHATTAN
WESTINGHOUSE MANHATTAN COMPANY
JOB NO. 10007

KAISER ENGINEERS INTERACTIVE ESTIMATING
SINGLE TASK TASK BASIC RETRIEVAL SYSTEM
4. HALL
REMARK - PROJECT COST SUMMARY

PAGE 1 OF 8
DATE 08/09/90 10:04:43
BY DKS/MIS

COST CODE	DESCRIPTION	ESCALATED TOTAL COST	COST/PERCENTAGE %	TOTAL	TOTAL DOLLARS
000	ENGINEERING	3,140,000	50	1,570,000	4,710,000
110	CONSTRUCTION	21,420,000	50	10,710,000	32,130,000
(ADJUSTED TO MEET DOE \$100,000)					
PROJECT TOTAL					
		24,560,000	50	12,280,000	36,840,000

48 9/10/90

CHECK

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TYPE OF ESTIMATE	ENGINEERING STUDY	08/09/90	REMARKS:
ARCHITECT ENGINEER	YSL		
OPERATING CONTRACTOR			

(ADJUSTED TO MEET DOE \$100,000 / 100,000 - PERCENTAGES NOT RECALCULATED TO REFLECT ADJUSTMENT)

KALISZ ENGINEERS ARCHITECTS
VEGETATION MANAGEMENT COMPANY
JOB NO. 280675

KAISER ENGINEER INTERACTIVE ESTIMATING
SINGLE SHEET TAKE MAKE ACQUISITION REPORT
L. WALL
KENTON - WORK BREAKDOWN STRUCTURE SUMMARY

PAGE 2 OF 4
DATE 08/09/98 14:04:44
BY OKR/UIS

LINE DESCRIPTION	ESTIMATE SUBTOTAL	CRITICAL ESTIMATE	QUB TOTAL	ESCALATION % TOTAL	QUB TOTAL	CONSTRUCTION % TOTAL	TOTAL DOLLARS
110000 DEFENSITIVE DESIGN	1899950	0	1899950	0.00	0	1899950	2849923
SUBTOTAL 1 DEFENSITIVE DESIGN	1899950	0	1899950	0.00	0	1899950	2849923
120000 S/L BUILDING CONSTRUCTION	940030	0	940030	0.00	0	940030	1418045
SUBTOTAL 2 S/L BUILDING CONSTRUCTION	940030	0	940030	0.00	0	940030	1418045
SUBTOTAL 3 ENGINEERING	2839980	0	2839980	0.00	0	2839980	4267968
310000 TEMPORARY FACILITIES	7510674	0	7510674	0.00	0	7510674	1228881
310001 EARTHWORK	726443	0	726443	0.00	0	726443	1092725
310002 CONCRETE DEMOLITION	597952	0	597952	0.00	0	597952	886778
310003 MECHANICAL DEMOLITION	796605	0	796605	0.00	0	796605	1195209
310004 ELECTRICAL DEMOLITION	307456	0	307456	0.00	0	307456	461184
310010 WAREHOUSE - BULK ASSEMBLY	15487704	0	15487704	0.00	0	15487704	23231556
310020 W/L DISPOSAL FEE	1991747	0	1991747	0.00	0	1991747	2987621
SUBTOTAL 31 CONSTRUCTION	21428722	0	21428722	0.00	0	21428722	32543004
310000 WAREHOUSE MANAGEMENT	299200	0	299200	0.00	0	299200	448800
SUBTOTAL 3 CONSTRUCTION	21727922	0	21727922	0.00	0	21727922	32991804
PROJECT TOTAL	26,567,902	0	26,567,902	0.00	0	26,567,902	36,851,874

KAISEN ENGINEERS HANOI
HESIMONHISE HANOI KHU PHU
JOB NO. 6103/75

" KAISEN ENGINEERS INTERACTIVE ESTIMATING "™
SINGLE SHEET PANK VABIE RETENTION STUDY
L. WALL
KHANH - ESTIMATE BASIC SHEET

PAGE 3 OF 6
DATE 08/08/90 16:28:16
BY 08/08/90

1. DOCUMENTS AND DRAWINGS

DOCUMENTS: NONE

DRAWINGS: SELECTED REFERENCE UNITS OF EXISTING FACILITIES ONLY.

2. MATERIAL PRICES

UNIT COSTS: CURRENT PRICES FOR SPECIFIED MATERIAL.

3. LABOR RATES

CHARGE: HANOI RATE AS ISSUED BY KEN (ISSUE # 1), REV. D, DATED 3-1-90. INCLUDE FRINGE BENEFITS,
LABOR INSURANCE, TAXES AND TRAVEL WHERE APPLICABLE.

4. GENERAL REQUIREMENTS/TECHNICAL SERVICES

A.3. ON-SITE CONSTRUCTION FORCES GENERAL REQUIREMENTS AND TECHNICAL SERVICES COSTS ARE INCLUDED AS A COMPOSITE
PERCENTAGE BASED ON THE KEN ESTIMATING FACTOR/SCHEDULE SCHEDULE REVISION TO DATED JANUARY 92, 1990. THE TOTAL
COMPOSITE PERCENTAGE APPLIED TO ON-SITE CONSTRUCTION FORCES LABOR FOR THIS PROJECT IS 72 TO 79% FOR SHOP WORK
AND 102 TO 104% FOR FIELD WORK WHICH IS REFLECTED IN THE "OVER / & L" COLUMN OF THE ESTIMATE DETAIL.

5. RELOCATION

NO RELOCATION IS INCLUDED IN THE ESTIMATE.

6. BOUNDING - LINE ITEM

W.1. BOUNDING OF ELEMENT - DOE ORDER 5100.4, PAGE 2-7 SUBPARAGRAPH (H), REQUIRES BOUNDING OF A COST ESTIMATE
TO \$10,000 FOR ITEM COST AND \$100,000 FOR TOTAL COST. REFERENCE: DOE 5100.4, FIGURE 1-11, DATED 10-31-84.

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F. COMMENTS

- A.3 AS OF DECEMBER 1, 1989, QUALITY SUPPORT AND SAFETY FOR CONSTRUCTION FORCES ARE INCLUDED IN THE DRAFT APPENDIX.
- B.3 ESTIMATE IS A PRINCIPLE ESTIMATE FOR ONE TANK WITH A 66" DIAMETER BOLT CUT THROUGH THE CONCRETE DOME. ESTIMATE IS INCLUSIVE AND SOME COSTS COULD BE POTENTIALLY REDUCED BY RE-USE OF ADDITIONAL TANKS. NO ATTEMPT HAS BEEN MADE TO ESTIMATE THE AMORTIZATION OF THESE COSTS TO OTHER WORK.
- C.3 ESTIMATE ASSUMES AIA DEMOLITION, INCLUDING EXCAVATION TO BE PERFORMED WITHIN BLACK BOX GREENHOUSE PROVIDED BY OTHERS. ESTIMATE ASSUMES THE FOLLOWING EQUIPMENT AND FACILITIES WILL BE AVAILABLE IN-SIDE OF THIS FACILITY:
1. A 2-1/2 TON OVERHEAD CRANE WITH AN EXTENSION BOOM EXTENDING INWARD AN APPROX 100' TO A TRUCK LOADING BAY.
 2. A PERSONNEL AIRLOCK WITH INTERCONNECTING PORTABLE DECON AND CHANGE FACILITIES.
 3. AN EQUIPMENT AND MATERIAL AIRLOCK APPROX 20' X 20' X 14' HIGH.
 4. A LOADING AREA ADJACENT TO EQUIPMENT AIR LOCK APPROX 20' X 60' X 14' HIGH.
 5. AN OVERHEAD ROLD WATER SPRAY MIST SYSTEM.
 6. UTILITY POWER AND WATER FOR LOCAL APPLICATIONS.
 7. TEMPORARY LIGHTING.
 8. NEGATIVE AIR W/ FILTER SYSTEM AND FACILITIES FOR HEPA VAC & FLEX DUCTING TO SECONDARY CONTAINMENT GREENHOUSES.
 9. WASHING FACILITIES IN EXHAUST SYSTEM.
 10. HEATING AND COOLING EQUIPMENT FOR MAKE-UP AIR WHILE.
 11. BREATHING AIR SYSTEM INCLUDING COMPRESSOR MAKEUP & DISTRIBUTION SYSTEM.
- C.3 ESTIMATE DOES NOT INCLUDE DEMOLITION OF ANY ABOVE GROUND FACILITIES OR PIP JOINTS. ESTIMATE INCLUDES AN ALLOWANCE FOR WELD PIPING IN DG PITS.
- D.3 ESTIMATE ASSUMES CUTTING AND CORE DRILLING OPERATIONS TO BE PERFORMED WITHIN SECONDARY GREENHOUSES.
- E.3 ESTIMATE ASSUMES MAXIMUM PRACTICAL USE OF SHIELDING TO REDUCE RADIATION EXPOSURE TO PERSONNEL.
- F.3 DISPOSAL COSTS FOR WASTE MATERIALS HAVE BEEN CALCULATED AT THE CURRENT WMC QUANTAL CHARGES.
- G.3 ESTIMATE BASED UPON USING WIRE CONCRETE CUTTING TECHNOLOGY TO CUT CONCRETE. ESTIMATE BASED ON CUTTING AND REMOVING WASTE CONCRETE FROM 10 SECTIONS APPROX 5' X 4' X 3'.
- H.3 ESTIMATE DOES NOT INCLUDE DECONTAMINATION AND OR REMOVAL OF TANKS & THEIR CONTENTS; BACKFILLING OF TANK INTERIORS OR VOIDING.
- I.3 ESTIMATE ASSUMES BACKFILL OF EXCAVATED AREA WILL BE FREE OF CONTAMINATION AND COVER AND MACHINE BACKFILL WILL BE ALLOWED.
- K.3 PRELIMINARY DESIGN BASED ON 20 PER CENT OF DIRECT CONSTRUCTION COST.
- L.3: 1.21 DURING CONSTRUCTION BASED ON 10 PER CENT OF DIRECT CONSTRUCTION COST.
- M.3 ESTIMATING MANAGEMENT BASED ON 2 YEAR JOB DURATION.

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KAISER ENGINEERING HANFORD
 WEISBERGHOUSE HANFORD COMPANY
 JOB NO 810075

KAISER ENGINEERING INTERACTIVE ESTIMATING
 SINGLE SMALL TASK BASE RETRIEVAL STUDY
 L. MALL
 RENDES - COST CODE ACCOUNT SUMMARY

PAGE 5 OF 8
 DATE 08/07/90 10:04:55
 BY BJR/MTR

WBS DESCRIPTION	ESTIMATE SUBTOTAL	ONHOLE SUBTOTAL	WBS TOTAL	ESCALATION % TOTAL	WBS TOTAL	CONSTRUCTION % TOTAL	TOTAL DOLLARS
U00 ENGINEERING							
11000 DEFINITIVE DESIGN	1899950	0	1899950	0.00	0	1899950	2849023
12000 G/F DURING CONSTRUCTION	940030	0	940030	0.00	0	940030	140045
33000 WEISBERGHOUSE MANAGEMENT	299200	0	299200	0.00	0	299200	448600
TOTAL U00 ENGINEERING	3139180	0	3139180	0.00	0	3139180	4708770
D10 DEMOLITION							
31000 TEMPORARY FACILITIES	1518674	0	1518674	0.00	0	1518674	224011
31001 EXISTENCE	720405	0	720405	0.00	0	720405	1092735
31002 CONCRETE DEMOLITION	597952	0	597952	0.00	0	597952	896770
31003 MECHANICAL DEMOLITION	796806	0	796806	0.00	0	796806	1195209
31004 ELECTRICAL DEMOLITION	307456	0	307456	0.00	0	307456	461184
31005 GROUNDWATER BASE ASSUMPTION	15467704	0	15467704	0.00	0	15467704	23235556
31006 WDI DISPOSAL FEE	1991747	0	1991747	0.00	0	1991747	2987621
TOTAL D10 DEMOLITION	21428722	0	21428722	0.00	0	21428722	32163064
PROJECT TOTAL	24,567,902	0	24,567,902	0.00	0	24,567,902	36,651,654

HNH-SD-TWR-AGA-004
 Rev. 0

BAKER ENGINEERS BAKFORD
 WESTINGHOUSE NUKUNO COMPANY
 JOB NO. 000075

BAKER ENGINEERS INTERACTIVE ESTIMATING -
 SINGLE SHELL BARK WASTE RETRIEVAL STUDY
 L. HALL
 APPROX - ESTIMATE SUMMARY OF COST DIVISION

PAGE 4 OF 8
 DATE 08/09/90 14:04:55
 BY CCR/UTE

WBS DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE IMPLEMENTS	BBB TOTAL	SCALATION % TOTAL	BBB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
ENGINEERING							
00 TECHNICAL SERVICES	3139100	0	3139100	0.00	0	3139100	4700770
TOTAL ENGINEERING	3139100	0	3139100	0.00	0	3139100	4700770
CONSTRUCTION							
01 GENERAL REQUIREMENTS	10998125	0	10998125	0.00	0	10998125	20177100
02 SITEWORK	1324335	0	1324335	0.00	0	1324335	1909503
10 MECHANICAL	790806	0	790806	0.00	0	790806	1195209
10 ELECTRICAL	307430	0	307430	0.00	0	307430	401184
TOTAL CONSTRUCTION	21620722	0	21620722	0.00	0	21620722	32343006
PROJECT TOTAL		0	24,507,902	0.00	0	24,507,902	36,071,056

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KATZER ENGINEERING HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. EPH875

^^ KATZER ENGINEERS INTERACTIVE ESTIMATING ^^
SINGLE SMALL TANK WASTE RECOVERY SIMUL
S. HALL
KEMER6 - CONFIDENCY ANALYSIS BASIC SHEET

PAGE 7 of 8
DATE 08/04/90 19:04:33
BY DFR/NTS

REFERENCE: ESTIMATE BASIS SHEET
COST CODE ACCOUNT SUMMARY

PAGE 3 of 6
PAGE 5 of 6

THE U.S. DEPARTMENT OF ENERGY - RICHLAND ORDER 5706.3 "COST ESTIMATION, ANALYSIS AND STANDARDIZATION"
DATED 1-27-83, PROVIDES GUIDELINES FOR ESTIMATE CONFINEMENTS, THE OUTLINE FOR A
SHOULD HAVE AN OVERALL RANGE OF 10 X, ESTIMATE

CONFIDENCY IS EVALUATED AT THE BIDD COST CODE LEVEL AND SUMMARIZED AT THE PRIMARY AND SECONDARY COST CODE
LEVEL OF THE DETAILED COST ESTIMATE.

ENGINEERING

AVERAGE ENGINEERING CONFIDENCY 50%

CONSTRUCTION

AVERAGE CONSTRUCTION CONFIDENCY 50%

AVERAGE PROJECT CONFIDENCY 50%

ENF-SD-TWR-ADA-004
Rev. 0

Kaiser Engineers Hanford
Waste Storage Hanford Compact
Job No. W80875

** Kaiser Engineers Interactive Estimating **
SIMPLE GELL TANK WASTE REMOVAL STUMP
C. HALL
K28827 - QUOTE INCLUDE COSTS BY VBS

PAGE 0 OF 3
DATE 08/09/98 16:04:58
BY PER/MIS

WBS DESCRIPTION	ESTIMATE SUBTOTAL	CONTRACT ADMINISTRATION	TOTAL	WED. PACK PREP.	OWNER INDIRECTS	TOTAL INDIRECTS
-----	-----	-----	-----	-----	-----	-----
110000 DEFINITIVE DESIGN	1090950	0.00	0	0	0	0
120000 E/FI BUILDING CONSTRUCTION	940010	0.00	0	0	0	0
130000 TEMPORARY FACILITIES	1518674	0.00	0	0	0	0
140000 EXCAVATION	728683	0.00	0	0	0	0
170000 CONCRETE DEMOLITION	507852	0.00	0	0	0	0
180000 MECHANICAL DEMOLITION	794004	0.00	0	0	0	0
190000 ELECTRICAL DEMOLITION	307656	0.00	0	0	0	0
190410 DEMOLITION - BASE ASSUMPTION	16487766	0.00	0	0	0	0
310000 WGT DISPOSAL FEE	7991742	0.00	0	0	0	0
320000 WASTEHOUSE MANAGEMENT	299200	0.00	0	0	0	0
PROJECT TOTAL	24,567,992					

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KAISER ENGINEERS HANFORD
JULSTINGHOUSE HANFORD COMPANY
JOB NO. E00073

KAISER ENGINEERS INTERACTIVE ESTIMATING
SINGLE SHELL TANK WASTE REMOVAL & REMEDIAL
L. HALL
KRECOB - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 1
DATE 08/07/90 16:05:06
BY DEE/WES

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MATERIALS	LABOR	EQUIP USAGE	MATERIAL	CONTRACT	EQUIP- RENT	CONTRACT	TOTAL
110000	DEFINITIVE DESIGN										
110000.00	TECHNICAL SERVICES										
110000.0000000	DEFINITIVE DESIGN AT 20 PER CENT OF DIRECT COST	000	1 LS	20230	1209950	0	0	0	0	0	1209950
<hr/>											
SUBTOTAL	TECHNICAL SERVICES			20,230	1,209,950	0	0	0	0	0	1,209,950
<hr/>											
TOTAL	COST CODE 00000 WBS 110000 RESERVATION 0.00 % - CONTINGENCY 50.00 %			20,230	1,209,950	0	0	0	0	0	1,209,950
<hr/>											
TOTAL WBS 110000 DEFINITIVE DESIGN				20,230	1,209,950	0	0	0	0	0	1,209,950

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PAGE 14; 05; 06
BY JKR/1213

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	100%P MATERIAL	SUB- CONTRACT	EQUIP- MENT	GR&P F & E	TOTAL DOLLARS
120000	E/F DURING CONSTRUCTION									
120000.00	TECHNICAL SERVICES	000	7.45	14,402	940,030	0	0	0	0	940,030
120000.000000	E/F			14,402	940,030	0	0	0	0	940,030
	TECHNICAL SERVICES			14,402	940,030	0	0	0	0	940,030
TOTAL	COST CODE 0000 MIS 120000 CLASSIFICATION 0.00 4 - CONTRACT	50.00 3)		14,462	940,030	0	0	0	0	940,030
TOTAL MIS 120000 E/F DURING CONSTRUCTION				14,462	940,030	0	0	0	0	940,030

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** KATSON ENGINEERS INTERACTIVE ELECTRONICS **
 SINGLE CHANNEL ANALOG WASTE DISPOSAL SYSTEM
 L. HALL
 TOWNSEND, ESSEX, MASSACHUSETTS 01469 / 617-251-0000

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DATE 08/08/90 14:05:00
BY DES/MS

EQUIP- NUMBER	DESCRIPTION	COST CODE	QUANTITY	HOURS	LABOR	EQUIP USAGE	MATERIAL	SUP- CONTRACT	EQUIP- MILE	DIST / O I	TOTAL COST/LAB
510000	TEMPORARY FACILITIES										
510000.01	GENERAL RECONSTRUCTION										
510000.010007	LEAD SHEETING GARAGE & WALL HANDLING ASSUME AVERAGE 120 HR	816 N	1 LS	240	6000	0	0	0	0	6120	92120
510000.010008	LEAD SHEETING & BLANKETS FOR WDS ASSUME AVERAGE 120 HR EXPOSURE	810 M	1 LS	400	10000	0	15000	0	0	10200	33200
510000.010010	LEAD SHEETING & BLANKETS FOR WALLS ASSUME AVERAGE 30 HR EXPOSURE	810 H	1 LS	100	2500	0	5000	0	0	2550	10050
510000.010012	LEAD SHEETING & BLANKETS FOR ROOF ASSUME AVERAGE 120 HR EXPOSURE	810 M	1 LS	100	2500	0	5000	0	0	2550	10050
510000.010014	FAB & ERECT SECONDARY CONTAINMENT GREENHOUSES 50 PER CENT W/ NO BUSHING	810 M	3000 SF	150	3750	0	1900	0	0	3825	9475
510000.010015	FAB & ERECT SECONDARY CONTAINMENT GREENHOUSES 10 PER CENT @ 15 HR	810 M	1000 SF	50	750	0	300	0	0	765	1095
510000.010016	FAB & ERECT SECONDARY CONTAINMENT GREENHOUSES 10 PER CENT @ 30 HR	810 M	1000 SF	30	750	0	300	0	0	765	1095
510000.010017	FAB & ERECT SECONDARY CONTAINMENT GREENHOUSES 30 PER CENT @ 40 HR	810 M	1000 SF	30	750	0	300	0	0	765	1095
510000.010018	FAB & ERECT SECONDARY CONTAINMENT GREENHOUSES 10 PER CENT @ 120 HR	810 M	1000 SF	30	750	0	300	0	0	765	1095
510000.010019	FAB & ERECT SECONDARY CONTAINMENT GREENHOUSES 10 PER CENT @ 225 HR	810 M	1 LS	400	10000	0	1000	0	0	10200	27200
510000.010019	RELOCATE & REMOVE SECONDARY CONTAINMENT GREENHOUSES ASSUME ALL @ 15 HR	810 M	1 LS	240	7200	0	2500	0	0	7340	17040
510000.010020	TEMPORARY ELECTRICAL ASSUME NO BUSHING	810 M	1 LS	1200	36000	0	3000	0	0	14720	77720

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WALKER ENGINEERS HANFORD
MOSHINGHOUSE HANFORD COMPANY
JOB NO. 680875

** KASLER ENGINEERING INTERACTIVE ESTIMATING **
SINGLE SHEET TAKE MAKE REMOVAL STUDY
L. BALL
KASLER - ESTIMATE DETAILS BY HOS / COST CODE

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DATE 08/09/90 16:05:00
BY BSR/VIS

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-RENT	OVERHEAD	TOTAL
310000 010000	WISC SUPPLY STEEL FOR KILLING AND PILL & DOME SUPPORT DURING DEMOLITION ATCHME NO BURROW	810 M	1.10	500	16500	0	10000	0	0	16700	39200
<hr/>											
SUBTOTAL	GENERAL DEMOLITION	(MAKE)		3,400			47,300	0	0	90,124	
	SUP 100.00%			3400	96,240				0		241,424
	GENERAL CONTRACT 5.00 %			160	9620						9620
	CONSOLIDATES 4.00 %						2838				2838
	SALES TAX 7.00 %						3911				3911
	WAREHOUSING 20.00 %						10020				10020
	OVERL (ON MAKEUP UNIT)									107730	107730
<hr/>											
TOTAL	COST CODE B1000			7,300		0		0		208,060	
	WISC 310000				202,020		46,076		0		472,157
	REGULATION 0.00 % - CONTINGENCY 50.00 %										
<hr/>											
310000 01	GENERAL DEMOLITION										
310000 010000	LEAD ENVELOPING OF SHUDES	810 M	3.74	400	15000	0	21500	0	0	15300	72600
310000 010000	LEAD ENVELOPING OF SHUDES	810 M	1.10	200	4000	0	10000	0	0	4120	22120
310000 010000	BRACKETING AND SUPPORT LABORS	810 M	5200 MHR	5200	130000	0	0	0	0	152600	262600
	ASSUMES COMPLETION OF ANALYSIS										
310000 010000	SUPPLY AND MAINTENANCE LABORS	810 M	10400 MHR	10400	260000	0	0	0	0	305200	525200
<hr/>											
SUBTOTAL	GENERAL DEMOLITION	(MAKE)		16,440			12,500	0	0	419,220	
	SUP 15.00%				431,400						862,720
	GENERAL CONTRACT 5.00 %			244	61450						61450
	CONSOLIDATES 4.00 %			945	75433						75433
	SALES TAX 7.00 %						1956				1956
	WAREHOUSING 20.00 %						2807				2807
	OVERL (ON MAKEUP UNIT)						8090				8090
										80900	80900
<hr/>											
TOTAL	COST CODE B1000			19,051		0		0		506,208	
	WISC 310000				496,763		46,027		0		1,044,518
	REGULATION 0.00 % - CONTINGENCY 50.00 %										
<hr/>											
TOTAL WISC 310000 INHOLAKE FACILITIES				27,357		0		0		712,260	
					970,503		108,103		0		1,518,673

ATSER ENGINEERS NASHUA
ESTIMATING DEPARTMENT
05 30. 000075

" KAISER ENGINEERS INTERACTIVE ESTIMATING " "
SINGLE SPEC TANK WASTE REMOVAL STUDY
L. HALL
KESKOB - ESTIMATE DETAIL BY HES / COST CODE

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DATE 02/09/90 14:05:17
BY BRZ/HIS

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP	MATERIAL	CONTRACT	EQUIP- HIRE	EQUIP- / H I	TOTAL DOLLARS
110000	FAIRHURST										
110001.02	REPAIRS										
110001.0200004	HAND EXCAVATE INSIDE 60" DIA CAISSON TO JANK HOME 10 PER CENT H/WO SURROUND	810 H	525 CY	2303	59075	0	2625	0	0	40257	121957
110001.0200005	HAND EXCAVATE INSIDE 60" DIA CAISSON TO JANK HOME 10 PER CENT H IS MR	810 H	105 CY	473	11625	0	525	0	0	12062	26412
110001.0200006	HAND EXCAVATE INSIDE 60" DIA CAISSON TO JANK HOME 10 PER CENT H IS MR	810 H	105 CY	473	11625	0	525	0	0	12062	26412
110001.0200007	HAND EXCAVATE INSIDE 60" DIA CAISSON TO JANK HOME 10 PER CENT H IS MR	810 H	105 CY	473	11625	0	525	0	0	12062	26412
110001.0200008	HAND EXCAVATE INSIDE 60" DIA CAISSON TO JANK HOME 10 PER CENT H IS MR	810 H	105 CY	473	11625	0	525	0	0	12062	26412
110001.0200009	HAND EXCAVATE INSIDE 60" DIA CAISSON TO JANK HOME 10 PER CENT H IS MR	810 H	105 CY	473	11625	0	525	0	0	12062	26412
110001.0200014	ROAD & RAIL TO RUBY SHOOPER LAMBE ASSOCIATES DUE TO MINUTE UNLOADING & TRUCK SWIRLING	810 H	1300 CY	650	16250	36400	0	0	0	16575	60225
110001.0200044	SECTIONAL CAISSON 60" DIA X 12" DEEP BOLTED ASST	810 H	100 PHL	36	900	0	7200	0	0	918	9018
110001.0200045	SECTIONAL CAISSON 60" DIA X 12" DEEP BOLTED ASST	810 H	36 PHL	7	175	0	1440	0	0	179	1794
110001.0200046	SECTIONAL CAISSON 60" DIA X 12" DEEP BOLTED ASST	810 H	36 PHL	7	175	0	1440	0	0	179	1794
110001.0200047	SECTIONAL CAISSON 60" DIA X 12" DEEP BOLTED ASST	810 H	36 PHL	7	175	0	1440	0	0	179	1794
110001.0200048	SECTIONAL CAISSON 60" DIA X 12" DEEP BOLTED ASST	810 H	36 PHL	7	175	0	1440	0	0	179	1794
110001.0200049	SECTIONAL CAISSON 60" DIA X 12" DEEP BOLTED ASST	810 H	36 PHL	7	175	0	1440	0	0	179	1794
SUBTOTAL	FAIRHURST	(HASK)	5,449	134,225	36,400	19,650	0	0	138,955	531,230	

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TABLES IN THIS REPORT
VEHICLEWORKS MANUFACTURING
JOB NO. 000000

* CARDS ENGINEERS INTERACTIVE ESTIMATING *
SIMPLE SHEET JANE MARSIE RETRIEVAL STUDY
L. MARSIE
KELLER - ESTIMATE PREPARED BY NOS / COST CODE

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DATE 08/00/90 10.05.13
BY DEE/013

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANDWORK	LABOR	EQUIP	MATERIAL	SUB-CONTRACT	EQUIP-RENT	OVERHEAD	TOTAL
	SUP 100,000			5440	130225						130225
	GENERAL FOREMAN 5.00 %			545	13023						13023
	CONSUMABLES 0.00 %						1179				1179
	SALES TAX 7.00 %						1025		0		1025
	UNEMPLOYMENT 20.00 %						1100				1100
	Overhead (100% Handwork Only)									152044	152044
10100	COST CODE 01002			11,463	286,073	30,400	26,619	0	0	271,789	640,000
	WKS 310001										
	ESTABLISHMENT 0.00 % - CONFIDENCE 50.00 %										
310001.02	STEELER										
310001.0200074	ROAD & RAIL FILL TO FILL	010 W	1300 CY	455	11371	12600	0	0	0	11605	55578
310001.0200081	RECEIPT EXCAVATION - 0005	010 W	1300 CY	455	11375	19500	0	0	0	11605	62670
	NOI INCLUDES FILL EXISTING ON										
	VOID ASSUME MACHINE FILL										
	ASSUME NO UNREQU										
310001.02	STEELER			910	22,750	32,400	0	0	0	23,204	78,054
	WKS 110001			937	3413						3413
	GENERAL FOREMAN 5.00 %			52	1304						1304
	Overhead (100% Handwork Only)									6015	6015
10100	COST CODE 01002			1,009	27,471	32,400	0	0	0	30,021	87,592
	WKS 110001										
	ESTABLISHMENT 0.00 % - CONFIDENCE 50.00 %										
TOTAL WKS 310001 ESTABLISHMENT				12,542	113,543	68,500	26,619	0	0	310,020	728,403

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KANSAS ENGINEERS BARTON
WORTHINGTON COMPANY
106 W. 4th St.

KAISER ENGINEERING INTERACTIVE ESTIMATING
SINGLE SHEET TAKE MASS / INDIVIDUAL STUDY
L. WALL
KEMERO - ESTIMATE DETAIL BY 1985 / COST 0000

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DATE 08/02/06 16195.17
BY JKK/JUS

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MARKERS	LABOR	EMER WEAR	MATERIAL	SUB- CONTRACT	EQUIP- MENT	DESP / P & J	TOTAL
310002.0200020	20 PER CENT @ 30 MM 1st-Off, 1st, 2nd & 3rd CONCRETE SECTIONS	B10 H	1 LR	192	5376	0	0	0	0	5484	10860
310002.0200021	20 PER CENT @ 40 MM 1st-Off, 1st, 2nd & 3rd CONCRETE SECTIONS	B10 H	1 LR	192	5376	0	0	0	0	5484	10860
310002.0200022	20 PER CENT @ 120 MM 1st-Off, 1st, 2nd & 3rd CONCRETE SECTIONS	B10 H	1 LR	192	5376	0	0	0	0	5484	10860
310002.0200034	20 PER CENT @ 225 MM SERVICES OF WIRE CUTTING TECH. HRP	B10 H	120 MD	0	0	0	0	81000	0	0	81000
310002.0200035	HOWE TECH IN & OUT	B10 H	1 EA	0	0	0	0	8000	0	0	8000
310002.0200044	REPAIR OF STAND-UP WIRE CUTTING MACHINE	B10 H	1 EA	0	0	0	24000	0	0	0	24000
310002.0200046	REPAIR OF STAND-UP WIRE CUTTING MACHINE	B10 H	1 EA	0	0	0	24000	0	0	0	24000
310002.0200048	DIAMOND DRILLING CUTTING MIXE	B10 H	500 LR	0	0	0	15000	0	0	0	15000
SUBTOTAL	WIREWORK	(HASK)	3.495	90,255	0	93,000	89,000	0	92,065	354,320	
	SUP. 100.00%		3.495	90,255						354,320	
	SEVERAL WORKMAN 5.00 %		150	9025						9025	
	CONSUMABLES 0.00 %						5500			5500	
	SALES TAX 7.00 %						7000			7000	
	MARGINALITY 20.00 %						19716			19716	
	DESP FOR HASKIPS ONLY									161766	101266
TOTAL	COST CODE 02002 HMS 310002 ALLOCATION 0.00 % - CONTINGENCY 30.00 %		7.340	189,536	0	125,985	89,000	0	193,331	597,852	
TOTAL HMS 310002 CONCRETE DEMOLITION			7.340	189,536	0	125,985	89,000	0	193,331	597,852	

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ACCTNO	DESCRIPTION	CODE	QUANTITY	MARKED	LABOR	AMOUNT	MATERIAL	SUB-CONTRACT	EQUIP-RENT	OVERHEAD	TOTAL
NUMBER											
310003	MECHANICAL DEMOLITION										
310003.15	MECHANICAL										
310003.1500014	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	75 PC	400	10720	0	375	0	0	18101	10200
310003.1500015	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500016	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500017	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500018	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500019	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500020	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500021	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500022	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500023	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500024	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500025	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500026	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500027	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500028	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500029	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500030	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500031	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500032	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500033	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500034	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500035	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500036	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500037	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500038	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500039	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500040	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500041	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500042	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500043	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500044	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH	810 H	15 PC	320	3745	0	75	0	0	3820	7610
310003.1500045	REMOVE PIPE SPOOLS ASSUME 10' AVE LENGTH										

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KAISER ENGINEERS HANNOVER
WESTINGHOUSE HANNOVER COMPANY
408 ED. EK0025

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
SINGLE SHEET TAKE OFF RETRIEVAL STUDY
L. RAIL
KENNEDY - ESTIMATE DETAIL BY WAY / COST CODE

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DATE 08/07/90 16:05:23
BY DCA/WIE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANNOVER	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	JOINT- VENT	CRP / S & I	TOTAL DOLLARS
310003.1500027	EXP EXISTING PIPE 10 PER CENT @ 40 HR	010 H	5 01	80	2497	0	150	0	0	2547	5194
310003.1500028	EXP EXISTING PIPE 10 PER CENT @ 120 HR	010 H	5 01	80	2497	0	150	0	0	2547	5194
310003.1500039	EXP EXISTING PIPE 10 PER CENT @ 225 HR	010 H	5 01	80	2497	0	150	0	0	2547	5194
310003.1500044	REMOVE EXISTING TANK RISERS 20 PER CENT @ 15 HR	010 H	5 EA	60	1873	0	50	0	0	1910	3033
310003.1500045	REMOVE EXISTING TANK RISERS 20 PER CENT @ 30 HR	010 H	5 EA	60	1873	0	50	0	0	1910	3033
310003.1500046	REMOVE EXISTING TANK RISERS 20 PER CENT @ 40 HR	010 H	5 EA	60	1873	0	50	0	0	1910	3033
310003.1500047	REMOVE EXISTING TANK RISERS 20 PER CENT @ 120 HR	010 H	5 EA	60	1873	0	50	0	0	1910	3033
310003.1500056	REMOVE EXISTING TANK RISERS 20 PER CENT @ 225 HR	010 H	5 EA	60	1873	0	50	0	0	1910	3033
310003.1500054	PLUG & GROUT RISER STUBS 20 PER CENT @ 15 HR	010 H	5 EA	60	1873	0	250	0	0	1910	4033
310003.1500055	PLUG & GROUT RISER STUBS 20 PER CENT @ 30 HR	010 H	5 EA	60	1873	0	250	0	0	1910	4033
310003.1500056	PLUG & GROUT RISER STUBS 20 PER CENT @ 40 HR	010 H	5 EA	60	1873	0	250	0	0	1910	4033
310003.1500057	PLUG & GROUT RISER STUBS 20 PER CENT @ 120 HR	010 H	5 EA	60	1873	0	250	0	0	1910	4033
310003.1500058	PLUG & GROUT RISER STUBS 20 PER CENT @ 225 HR	010 H	5 EA	60	1873	0	250	0	0	1910	4033
310003.1500064	CUT RISERS (DIAMETER INCREASE) 20 PER CENT @ 15 HR	010 H	104 01	55	1717	0	9200	0	0	1751	12688
310003.1500065	CUT RISERS (DIAMETER INCREASE) 20 PER CENT @ 30 HR	010 H	104 01	55	1717	0	360	0	0	1751	3634
310003.1500066	CUT RISERS (DIAMETER INCREASE) 20 PER CENT @ 40 HR	010 H	104 01	55	1717	0	360	0	0	1751	3634
310003.1500067	CUT RISERS (DIAMETER INCREASE) 20 PER CENT @ 120 HR	010 H	104 01	55	1717	0	360	0	0	1751	3634
310003.1500068	CUT RISERS (DIAMETER INCREASE) 20 PER CENT @ 225 HR	010 H	104 01	55	1717	0	360	0	0	1751	3634
310003.1500071	ALLOWANCE FOR DEMOLITION OF RAIL PIPING IN VALVE & FLUSH PIES	010 H	1 LS	120	1745	0	250	0	0	3020	7015
310003.1500086	ASSUME TO UNKNOW LUMP & BULK PIPE TO DISPOSAL SITE	010 H	1 LS	160	5000	5000	0	0	0	6000	13080
	REMOVE NO SURROUND - REMOVE HANDING AND INNER SHIELDING										

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Kaiser Engineers Bauform
 Westinghouse Bauform Company
 100 00. 4708/5

** KAISER ENGINEERS INTERACTIVITY ESTIMATING **
 SINGLE SHOT TANK WASTE RETRIEVAL STUDY
 L. MAIL
 KENR008 - ESTIMATE DETAIL BY MBS / COST CODE

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 BY BKR/MTS

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP SHARE	MATERIAL	SUB- CONTRACT	EQUIP- SHARE	OVER- HEAD	TOTAL DOLLARS
SUBTOTAL	MECHANICAL	(BASE)		5,840		7,500		0		144,805	
	SUP 100,000				101,374		15,014		0		388,405
	GENERAL OVERHEAD 5.00 %				5040		101274				181274
	COMMISSIONS 6.00 %				364		10124				10124
	SALES TAX 7.00 %						903				903
	MARSHALLING 20.00 %						1241		0		1241
	OVER (ON MARSHALLING ONLY)						2193				2193
										203392	203392
TOTAL	COST CODE 01035			12,264		7,500		0		388,287	
	MBS 110003				100,400		20,339		0		796,805
	(GENERALIZATION 0.00 % - CONTINGENCY 50.00 %)										
TOTAL MBS 110003 MECHANICAL RETRIEVAL				12,264		7,500		0		388,287	
					100,400		20,339		0		796,805

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KALISH ENGINEERS HANFORD
 005112000000 HANFORD COMPANY
 JOB NO. E00325

PP SARGEN ENGINEERS INTERACTIVE ESTIMATING --
 SINGLE SHELL TANK WASTE INCINERATOR STUDY
 1, HALL
 REPORT - ESTIMATE DETAIL BY WBS / COST CODE

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	UNITS	HOURS	LABOR	EQUIP	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OVERHEAD	TOTAL
310004	ELECTRICAL DEMOLITION										
310004.16	ELECTRICAL										
310004.1600004	ELECTRICAL DEMOLITION ASSUMED 80 PER CENT W/DO BURNOUT	810 M	1 LB	1020	57400	0	1500	0	0	58732	117652
310004.1600006	ELECTRICAL DEMOLITION ASSUMED 20 PER CENT @ 15 MH	810 M	1 LB	480	14400	0	0	0	0	14000	29800
	WBS TOTAL				71800	0	1,500	0	0	73,132	147,452
					2400	72000					148,040
	EXP 100.00%				2400	72000					72000
	GENERAL FOREMAN 5.00 %				240	7200					7200
	CONCRETEWORK 6.00 %										90
	SALES TAX 7.00 %						90				90
	WARRANTY 20.00 %						124				124
	OVER 10% HOURS ONLY						318				318
										88784	88784
					5,040	0		0		154,224	347,456
	TOTAL WBS 310004 ELECTRICAL DEMOLITION				5,040	0	2,012	0	0	154,224	347,456

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIALS	SUB-CONTRACT	EQUIP-RENT	OH&P / %	TOTAL DOLLARS
310010	BURIED - BASE ASSUMPTION										
310010.01	GENERAL REQUIREMENTS										
310010.0143004	BURIED LABOR - 2000 HRS @ 15 HR X 2.14 X 1.85	010	11723	11723	191408	0	0	0	0	350724	710616
310010.0143006	BURIED LABOR - 1941 HRS @ 10 HR X 4.29 X 1.85	010	15084	15084	462120	0	0	0	0	471362	933482
310010.0143008	BURIED LABOR - 1841 HRS @ 10 HR X 6.57 X 1.85	010	29186	29186	875640	0	0	0	0	692153	1768793
310010.0143010	BURIED LABOR - 2564 HRS @ 120 HRS X 17.14 X 1.85	010	21840	21840	2455200	0	0	0	0	2504306	4959984
310010.0143012	BURIED LABOR - 1820 HRS @ 225 HRS X 32.14 X 1.85	010	168751	168751	3282516	0	0	0	0	3327701	6590311
310010.0143012	BURIED SWAPPER LABOR	010	10400	10400	240000	0	0	0	0	265200	525200
SUBTOTAL	GENERAL REQUIREMENTS				257,306	0	0	0	0	7,620,524	15,487,704
TOTAL	COST CODE 01001 WBS 310010 RESCALATION 0.00 % - CONTINGENCY 50.00 %				257,306	0	0	0	0	7,620,524	15,487,704
TOTAL WBS 310010 BURIED - BASE ASSUMPTION					257,306	0	0	0	0	7,620,524	15,487,704

KAISER ENGINEERS BARRONS
WETTINGHOUSE HANJINO COMPANY
JUL 90, E10273

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
SINGLE SHELL TANK WASTE RETRIEVAL STUDY
C. HALL
ESTIM8 - ESTIMATE DETAIL BY URS / COST CODE

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HOURS	LABOR	EQUIP	MATERIAL	SUB-CONTRACT	EQUIP-RENT	WHS / P & I	TOTAL DOLLARS
310020	NOT DISPOSAL FEES										
310020.01	GENERAL REQUIREMENTS										
310020.0100004	LOW LEVEL BURY CHARGES FOR 104 BKT 8 CONCRETE	010	25315 CF	0	0	0	0	802647	0	0	802647
310020.0100006	HIKEU WASTE BURY CHARGES FOR 807 BKT 4 CONCRETE	010	2035 CF	0	0	0	0	317080	0	0	317080
310020.0100008	LOW LEVEL DISPOSAL CHARGES FOR TYPING AND REISSUE	010	500 CF	0	0	0	0	15723	0	0	15723
310020.0100010	HIKEU WASTE DISPOSAL CHARGES FOR BKT 8 AND BKT 4	010	500 CF	0	0	0	0	56065	0	0	56065
310020.0100012	LOW LEVEL DISPOSAL CHARGES FOR CONCRETE MATERIALS & EQUIPMENT	010	2500 CF	0	0	0	0	70625	0	0	70625
310020.0100014	HIKEU WASTE DISPOSAL CHARGES FOR CONTAMINATED LEAD	010	1000 CF	0	0	0	0	132130	0	0	132130
310020.0100022	HIKEU WASTE DISPOSAL CHARGES FOR CONCRETE	010	1344 CF	0	0	0	0	487093	0	0	487093
310020.0100024	HIKEU WASTE DISPOSAL CHARGES FOR CONCRETE	010	1086 CF	0	0	0	0	121773	0	0	121773
SUBTOTAL	GENERAL REQUIREMENTS				0	0	0	1,991,747	0	0	1,991,747
10121	COST CODE 01001 WHS 310020 DISCLOSURE 0.00 & - CONTINGENCY 50.00 %				0	0	0	1,991,747	0	0	1,991,747
TOTAL WBS 310020 NOT DISPOSAL FEES					0	0	0	1,991,747	0	0	1,991,747

KALSTER ENGINEERS HARTFORD
JEROME/SOONS COMPANY
JOB NO. 870875

" KALSTER ENGINEERS INTERACTIVE (SILMABIND) "
SINGLE SHELL TANK WASTE RECOVERY STUDY
C. HALL
KEXHOB - WASTE REPAIR BY MUR / COST CODE

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ACCOUNT NUMBER	DESCRIPTION	CODE CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTACT	EQUIP- RENT	CHAP / B & S	TOTAL DOLLARS
ALPHEI TOTAL				188,863		78,406		2,486,747		9,586,455	
				12,539,621			283,879		0	24,567,042	

Kaiser Engineers Incorporated
Westinghouse Hanford Company
Job No. 220475

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
SINGLE SHELL PAKK WASTE REPROCESSING
L. MAIL
KENNES - ESTIMATE DETAIL BY WBS / COST CODE

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WARRANTY	LABOR	COMP. USAGE	MATERIAL	SUB. CONTRACT	COMP. MEAS.	GRIP / O & I	TOTAL DOLLARS
330000	WESTINGHOUSE MANAGEMENT										
330000-00	TECHNICAL SERVICES	000	1 EA	3720	299200	0	0	0	0	0	299200
330000-000000	WBS MANAGEMENT - ASSUME 2 YEARS										
SUBTOTAL	TECHNICAL SERVICES			3,520	299,200	0	0	0	0	0	299,200
TOTAL	COST CODE 00000 WBS 330000 (ESCALATION 0.00 % - CONTINGENCY 34.00 %)			3,520	299,200	0	0	0	0	0	299,200
TOTAL WBS 330000 WESTINGHOUSE MANAGEMENT				3,520	299,200	0	0	0	0	0	299,200

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Figure A-1. Diamond Wire Cutting Technology.

Figure A-2. Overview of 48-Foot Diameter Hole in Single-Shell Tank.

Figure A-3. Overview of Saw Cut Pattern for 48-Foot Diameter Node In Single-Shell Tank.

NOTE: FINAL CUTS THROUGH EXISTING DOME TO BE MADE BY REMOTE CUTTING DEVICE LOCATED WITHIN NEW PORTABLE CONFINEMENT RETRIEVAL EQUIP. MODULE.

PRELIMINARY

7-31-90

Figure A-4. Overview of 12-Foot Diameter Hole in Single-Shell Tank With Enclosure.

Figure A-5. Overview of 48-Foot Diameter Hole in Single-Shell Tank With Enclosure.

A2.3 CANYON BUILDINGS (OPTIONS 4A AND 4B)**Table A-13. Summary of Estimated Costs for 221-U Canyon Building Disposition Based on Internal and External Waste Disposal Alternatives of Phase I Feasibility Study (FS Options 3 and 4).^a (2 Sheets)**

Alternative	Internal waste disposal		Internal/external waste disposal	
Function	\$ million	Applicable ^b	\$ million	Applicable ^b
1.0 Prepare Existing Complex				
Establish Hazards Protection	0.87	0	1.35	No
Establish Infrastructure	2.30	0	2.30	No
Modify Facility	15.1	9.1	15.1	9.1
Modify External Area	17.6	0 No	15.5	6.0
Manage Hazardous Materials	0.58	0.58	0.58	Yes
1.0 Applicable Subtotal	36.5	9.7	34.8	15.7
2.0 Operate the Complex				
Decontaminate Surfaces, Equipment and Structures	0	0	0	0
Remove Equipment and Structures	0	0	0	0
Identify Waste Sources	0.1	0.1	0.1	0.1
Process Waste	0.76	0	0.76	0
Dispose of Waste Materials	15.5	15.5	41.4	20.7
Maintain Waste Operations Capability	0.76	0.76	0.76	0.76
Demolish and Excavate Building	0	0	0	0
Collapse Main Structure	0	0	0	0
2.0 Applicable Subtotal	17.1	16.4	430	21.6
3.0 Close the Complex				
Establish Closure Systems	1.51	0	1.51	0.8
Install Final Barriers	24.8	0	24.8	12.4
Sustain Post Closure	2.40	0	2.40	1.2
3.0 Applicable Subtotal	28.7	0	28.7	14.4

Table A-13. Summary of Estimated Costs for 221-U Canyon Building Disposition Based on Internal and External Waste Disposal Alternatives of Phase I Feasibility Study (FS Options 3 and 4).^a (2 Sheets)

Alternative	Internal waste disposal		Internal/external waste disposal	
Subtotal All Applicable	62.3	28.4	106.5	49.7
Contingency at 35 %	28.8	9.9	37.3	17.9
Applicable Total Capital Cost	111.1	38.3	143.8	67.1

^a Source of information is DOE/RL-97-11 (FS Options 3 and 4).

^b Activity evaluated as applicable to capital or operating cost for subsequent comparison.

Table A-14. Summary of Adjusted Applicable Estimated Construction and Closure Costs for Disposition of Four Canyon Buildings Based on Internal and External Waste Disposal Alternatives of 221-U (AGA Options 4A and 4B).^a

Option	Construction \$ M	Infrastructure \$ M	Closure \$ M	Total \$ M
4A - Internal Waste Disposal	65.1 ^b	0 ^d	0 ^c	65.1
4B - Internal and External Waste Disposal	105.4 ^c	0 ^d	83.2 ^e	188.6

^a Source of information is Table A-13 and below calculations.

^b Capital Cost = $[(9.1 + 0.58)E06 \times 1.17 \text{ escalation} \times 1.35 \text{ contingency} \times 4.25 \text{ equivalent buildings}] = \65.1 million

^c Capital Cost = $[(15.7)E06 \times 1.17 \text{ escalation} \times 1.35 \text{ contingency} \times 4.25 \text{ equivalent buildings}] = \105.4 million

^d Infrastructure Cost = $[(0)E06 \times 1.17 \text{ escalation} \times 1.35 \text{ contingency} \times 4.25 \text{ equivalent buildings}] = \0 million

^e Closure Cost = $[(12.4)E06 \times 1.17 \text{ escalation} \times 1.35 \text{ contingency} \times 4.25 \text{ equivalent buildings}] = \83.2 million

Table A-15. Summary of Estimated Staff Requirements for Remote-Handled Immobilized Low-Activity Waste Container Disposal Phase I and Phase II (Option 4A).

Position	Type	Phase I	Three Shifts 1 Disposal Unit	Phase II	Five Shifts 1 Disposal Unit
Canyon Bldg. Disposal RH			1		1
Facility Manager	M		0		0
Clerk	G		0		0
Plant Engineer	E		0	0	0
Technical Support Manager	M		0		0
Clerk	G		0		0
Planner/Scheduler	P		0		0
Budget Analyst	P		0		0
Training Coordinator	G		0		0
Trainer	P		0.5		0.5
Procedure Writer	P		0.5		0.5
Electrical Engineer	E		0		0
Env. Compl. Engineer	E		0		0
M&C Engineer	E		0		0
Mechanical Engineer	E		0		0
QA Engineer	E		0		0
QC Inspector	T		0	1	0
Production Manager	M		1		1
Shift Supervisor	M		3		5
Document Clerk	G		1		1
Maintenance PIC	P		1		1
O&M Planner	P		1		1
Instrument Tech	T		1		2
Electricians	C		0		0
Mechanical crafts	C		0		0
Millwrights	C		3		5
Process Operators	R		3		8
HPTs	T		3		8
Power Operators	R		0		0
Crane Operators	R		8		10
Truck Drivers, HD	C		3		6
ForkLift Drivers	C		0	28	0
			27	27	45
	M		4		8
	E		0		0
	S		0		0
	P		3		3
	T		4		8
	C		8		11
	R		9		16
	L		0		0
	G		1		1
			27		45
	W7		7		9
	W8		15		27
	W9		5		9
			27		45

Table A-16. Summary of Estimated Staff Requirements and Costs for Remote-Handled Low-Activity Waste Container Disposal Phase I and Phase II (Option 4A).

Table A-16. Summary of Estimated Staff Requirements and Costs for Remote-Handled Low-Activity Waste Container Disposal Phase I and Phase II (Option 4A)												
Canyon Buildings - Operations Preparations for Phase I Remote-Handled Low-Activity Waste Container Disposal												
Schedule Activity Number	JC	OC	GE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	D/L
M000	73000	010	1		Managers	2	24	1	7,400	528	2	6/1/00 6/31/02
E000	73000	010	1		Engineers	0	24	1	0	0	2	6/1/00 6/31/02
P000	73000	010	1		Professionals	1.5	24	1	5,550	396	2	6/1/00 6/31/02
T000	73000	060	1		Technicians	2	24	1	7,400	413	2	6/1/00 6/31/02
C000	73000	060	1		Crafts	3	24	1	11,100	820	2	6/1/00 6/31/02
R000	73000	060	1		Operators	4.5	24	1	16,950	930	2	6/1/00 6/31/02
L000	73000	060	1		Laborers	0	24	1	0	0	2	6/1/00 6/31/02
G000	73000	000	1		Clerical	0.5	24	1	1,650	62	2	6/1/00 6/31/02
	73000	140	1		Office Supplies	13.5	24	2		7	2	6/1/00 6/31/02
	73000	180	1		Computer HW/SW	13.5	24	2		34	2	6/1/00 6/31/02
	73000	210	1		Onsite Training	13.5	24	2		17	2	6/1/00 6/31/02
	73000	400	1		MPR		24	4		3	2	6/1/00 6/31/02
									48,950	3,010		
Canyon Building - Hot Operations for Phase I Remote-Handled Low-Activity Waste Container Disposal (1 Unit x shift ops)												
Schedule Activity Number	JC	OC	GE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	D/L
M000	73000	010	1		Managers	4	108	1	68,800	4,751	0	6/1/02 5/31/11
E000	73000	010	1		Engineers	0	108	1	0	0	0	6/1/02 5/31/11
P000	73000	010	1		Professionals	3	108	1	49,950	3,563	0	6/1/02 5/31/11
T000	73000	060	1		Technicians	4	108	1	68,800	3,721	0	6/1/02 5/31/11
C000	73000	060	1		Crafts	6	108	1	68,800	5,581	0	6/1/02 5/31/11
R000	73000	060	1		Operators	9	108	1	149,850	8,372	0	6/1/02 5/31/11
L000	73000	060	1		Laborers	0	108	1	0	0	0	6/1/02 5/31/11
G000	73000	000	1		Clerical	1	108	1	16,650	557	0	6/1/02 5/31/11
	73000	140	1		Office Supplies	27	108	2		81	0	6/1/02 5/31/11
	73000	180	1		Computer HW/SW	27	108	2		305	0	6/1/02 5/31/11
	73000	210	1		Onsite Training	27	108	2		153	0	6/1/02 5/31/11
	73000	220	1		Electricity	108	3			678	0	6/1/02 5/31/11
	73000	410	1		Laundry Service	19	108	3		430	0	6/1/02 5/31/11
	73000	410	1		Vehicle Maint		108	3		1,886	0	6/1/02 5/31/11
	73000	100	1		Waste & Equip		108	3		585	0	6/1/02 5/31/11
	73000	400	1		MPR		108	4		65	0	6/1/02 5/31/11
									449,586	30,426		

Table A-16 Summary of Estimated Staff Requirements and Costs for Remote Handled ILAW Container Disposal Phase I and Phase II (Option 4A)

Canyon Buildings - Deactivation of Phase 1 Remote Handle ILAW Disposal Facilities														
Schedule Activity Number	JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1		Managers	2	12	1	3,700	264	3	6/1/11	5/31/12	
E000	73000	010	1		Engineers	0	12	1	0	0	3	6/1/11	5/31/12	
P000	73000	010	1		Professionals	1.6	12	1	2,776	106	3	6/1/11	5/31/12	
T000	73000	060	1		Technicians	2	12	1	3,700	207	3	6/1/11	5/31/12	
C000	73000	060	1		Crafts	3	12	1	6,650	310	3	6/1/11	5/31/12	
R000	73000	060	1		Operators	4.6	12	1	9,326	465	3	6/1/11	5/31/12	
L000	73000	060	1		Laborers	0	12	1	0	0	3	6/1/11	5/31/12	
G000	73000	060	1		Clerical	0.5	12	1	825	31	3	6/1/11	5/31/12	
	73000	210	1		Onsite Training	13.3	12	2		1	3	6/1/11	5/31/12	
	73000	220	1		Electricity		12	3		25	3	6/1/11	5/31/12	
	73000	410	1		Laundry Service	0.5	12	3		24	3	6/1/11	5/31/12	
	73000	400	1		MPR		12	4		0	3	6/1/11	5/31/12	
									24,975	1,525				
Canyon Buildings - Operations Preparations for Phase 2 Remote Handled ILAW Disposal														
Schedule Activity Number	JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1		Managers	3	24	1	11,100	782	2	5/1/08	4/30/11	
E000	73000	010	1		Engineers	0	24	1	0	0	2	5/1/08	4/30/11	
P000	73000	010	1		Professionals	1.6	24	1	6,350	390	2	5/1/08	4/30/11	
T000	73000	060	1		Technicians	4	24	1	14,800	827	2	5/1/08	4/30/11	
C000	73000	060	1		Crafts	6.6	24	1	20,350	1,137	2	5/1/08	4/30/11	
R000	73000	060	1		Operators	8	24	1	28,800	1,664	2	5/1/08	4/30/11	
L000	73000	060	1		Laborers	0	24	1	0	0	2	5/1/08	4/30/11	
G000	73000	060	1		Clerical	0.6	24	1	1,850	62	2	5/1/08	4/30/11	
	73000	140	1		Office Supplies	22.5	24	2		11	2	5/1/08	4/30/11	
	73000	150	1		Computer HW/SW	22.6	24	2		57	2	5/1/08	4/30/11	
	73000	210	1		Onsite Training	22.5	24	2		28	2	5/1/08	4/30/11	
	73000	400	1		MPR		24	4		5	2	5/1/08	4/30/11	
									83,250	4,968				

Table A-16 Summary of Estimated Staff Requirements and Costs for Remote Handled ILAW Container Disposal Phase I and Phase II (Option 4A)

Schedule Activity Number Canyon Building - Hot Operations for Phase 2 Remote Handled ILAW Disposal (1 Unit 4+T shift)

JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
AB000	73000	010	1	Managers	8	184	1	151,700	10,821	0	5/1/11	12/31/24	
EB000	73000	010	1	Engineers	0	184	1	0	0	0	5/1/11	12/31/24	
SO000	73000	010	1	Scientists	0	184	1	0	0	0	5/1/11	12/31/24	
PO000	73000	010	1	Professionals	3	184	1	75,850	5,410	0	5/1/11	12/31/24	
TO000	73000	060	1	Technicians	8	184	1	302,867	11,301	0	5/1/11	12/31/24	
CO000	73000	060	1	Crafts	11	184	1	278,117	16,538	0	5/1/11	12/31/24	
RO000	73000	060	1	Operators	16	184	1	404,633	22,801	0	5/1/11	12/31/24	
LO000	73000	060	1	Laborers	0	184	1	0	0	0	5/1/11	12/31/24	
GO000	73000	060	1	Clerical	1	184	1	26,363	948	0	5/1/11	12/31/24	
	73000	140	1	Office Supplies	48	184	2		194	0	5/1/11	12/31/24	
	73000	190	1	Computer HW/SW	48	184	2		772	0	5/1/11	12/31/24	
	73000	210	1	Onsite Training	48	184	2		388	0	5/1/11	12/31/24	
	73000	220	1	Electricity		184	3		1,573	0	5/1/11	12/31/24	
	73000	410	1	Laundry Service	35	184	3		1,202	0	5/1/11	12/31/24	
	73000	420	1	Vehicle Maint		184	3		7,724	0	5/1/11	12/31/24	
	73000	100	1	Meds & Equip		184	3		689	0	5/1/11	12/31/24	
	73000	4C0	1	MFR		184	4		113	0	5/1/11	12/31/24	
								1,137,750	78,928				

Schedule Activity Number Canyon Building - Decommission of Phase 2 Remote Handled ILAW Disposal Facilities

JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
MD000	73000	010	1	Managers	3	12	1	6,550	398	3	1/1/25	12/31/25	
ED000	73000	010	1	Engineers	0	12	1	0	0	3	1/1/25	12/31/25	
PD000	73000	010	1	Professionals	1.6	12	1	3,776	198	3	1/1/25	12/31/25	
TD000	73000	060	1	Technicians	1.6	12	1	2,776	153	3	1/1/25	12/31/25	
CD000	73000	060	1	Crafts	4	12	1	7,400	413	3	1/1/25	12/31/25	
RO000	73000	060	1	Operators	5.5	12	1	10,175	568	3	1/1/25	12/31/25	
LO000	73000	060	1	Laborers	8	12	1	14,800	0	3	1/1/25	12/31/25	
GO000	73000	060	1	Clerical	0	12	1	0	0	3	1/1/25	12/31/25	
	73000	210	1	Onsite Training	23.5	12	2		15	3	1/1/25	12/31/25	
	73000	220	1	Electricity		12	3		26	3	1/1/25	12/31/25	
	73000	410	1	Laundry Service	19	12	3		48	3	1/1/25	12/31/25	
	73000	4C0	1	MFR		12	4		0	3	1/1/25	12/31/25	
								43,475	1,618				

Table A-15 Summary of Estimated Staff Requirements and Costs for Remote Handled ILAW Container Disposal Phase I and Phase II (Option 4A)

Canyon Buildings - Performs Long Term Monitoring of ILAW Disposal Facilities													
Schedule	Activity Number												
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	OWL
M000	73000	010	1	Managers	1.5	105	1	24,281	1,732	0	1/1/25	9/30/33	
E000	73000	010	1	Engineers	0	105	1	0	0	0	1/1/25	9/30/33	
P000	73000	010	1	Professionals	0.75	105	1	12,141	868	0	1/1/25	9/30/33	
T000	73000	080	1	Technicians	2	105	1	32,375	1,809	0	1/1/25	9/30/33	
C000	73000	080	1	Crafts	2.75	105	1	44,516	2,487	0	1/1/25	9/30/33	
R000	73000	080	1	Operators	4	105	1	64,750	3,518	0	1/1/25	9/30/33	
L000	73000	080	1	Laborers	0	105	1	0	0	0	1/1/25	9/30/33	
G000	73000	000	1	Clerical	0.25	105	1	4,047	135	0	1/1/25	9/30/33	
	73000	140	1	Office Supplies	11.25	105	2		25	0	1/1/25	9/30/33	
	73000	190	1	Computer HW/SW	11.25	105	2		124	0	1/1/25	9/30/33	
	73000	210	1	Onsite Training	11.25	105	2		62	0	1/1/25	9/30/33	
	73000	220	1	Electricity		105	3		55	0	1/1/25	9/30/33	
	73000	410	1	Laundry Service	8.75	105	3		192	0	1/1/25	9/30/33	
	73000	100	1	Mats & Equip		105	3		27	0	1/1/25	9/30/33	
	73000	400	1	MPR		105	4		12	0	1/1/25	9/30/33	
								182,100	11,144				
Notes:													
1) Staffing estimate based on attached staffing chart. Assume one FTE is equivalent to 1850 hrs													
2) CE140 - Office supplies based on \$200 per FTE + 1.25% for G&A and escalation													
CE190 - Computer hardware and software based on \$1000 per FTE + 1.25% for G&A and escalation													
CE210 - Onsite training based on \$500 per FTE + 1.25% for G&A and escalation													
3) The following costs are assumed based of VROM estimates. Actual estimates will be generated following design studies in FY 1998													
These costs apply only after hot start as costs prior to hot start are assumed to be covered by the project													
CE 220 - BPA electricity \$20K per shift per year + 1.25% for G&A and escalation													
CE410 - Laundry service based on \$2K per bargaining unit FTE + 1.25% for G&A and escalation													
CE490 - Transportation (truck maintenance) \$50K per year per vehicle + 1.25% for G&A and escalation													
CE100 - Materials and equipment (spare parts) \$50K per year + 1.25% for G&A and escalation													
4) 400 - MPR based on 7.0 & of Cost Elements 100, 140 and 190													

Table A-17. Summary of Estimated Staff Requirements for Remote-Handled Immobilized Low-Activity Waste Container Disposal Phase I and Phase II (Option 4B).

Position	Type	Phase I	Three Shifts 1 Disposal Unit	Phase II	Three Shifts 3 Disposal Units
Canyon Bldg. Disposal - CH					
Facility Manager	M		0		0
Clerk	G		0		0
Plant Engineer	E		0	0	0
					0
Technical Support Manager	M		0		0
Clerk	G		0		0
Planner/Scheduler	P		0		0
Budget Analyst	P		0		0
Training Coordinator	G		0		0
Trainer	P		0.5		0.5
Procedure Writer	P		0.5		0.5
Electrical Engineer	E		0		0
Env. Compl. Engineer	E		0		0
I&C Engineer	E		0		0
Mechanical Engineer	E		0		0
QA Engineer	E		0		0
QC Inspector	T		0	1	0
					1
Production Manager	M		1		1
Shift Supervisor	M		3		3
Document Clerk	G		1		1
Maintenance PIC	P		1		1
O&M Planner	P		1		3
Instrument Tech	T		1		2
Electricians	C		0		0
Mechanical crafts	C		0		0
Millwrights	C		0		0
Process Operators	R		3		9
HPTs	T		3		6
Power Operators	R		0		0
Crane Operators	R		0		0
Truck Drivers, HD	C		4		12
Forklift Operators	C		4	22	12
			23	23	50
					51
	M		4		4
	E		0		0
	S		0		0
	P		3		5
	T		4		6
	C		8		24
	R		3		9
	L		0		0
	G		1		1
			23		51
	W7		7		9
	W8		11		33
	W9		5		9
			23		51

Table A-18. Summary of Estimated Staff Requirements and Costs for Remote-Handled Immobilized Low-Activity Waste Container Disposal Phase I and Phase II (Option 4B).

Table A-18. Summary of Estimated Staff Requirements and Costs for Contact Handled LAW Container Disposal Phase I and Phase II (Option 4B)													
Schedule Activity Number Canyon Buildings - Operations Preparations for Phase I Contact Handled LAW Disposal													
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	2	24	1	7,400	528	2	8/1/00	5/31/02	
E000	73000	010	1	Engineers	0	24	1	0	0	2	8/1/00	5/31/02	
P000	73000	010	1	Professionals	1	24	1	3,700	264	2	8/1/00	5/31/02	
T000	73000	060	1	Technicians	2	24	1	7,400	413	2	8/1/00	5/31/02	
C000	73000	060	1	Crafts	4	24	1	14,800	827	2	8/1/00	5/31/02	
R000	73000	060	1	Operators	1.5	24	1	5,550	310	2	8/1/00	5/31/02	
L000	73000	060	1	Laborers	0	24	1	0	0	2	8/1/00	5/31/02	
G000	73000	000	1	Clerical	0.5	24	1	1,850	62	2	8/1/00	5/31/02	
	73000	140	1	Office Supplies	11	24	2		8	2	8/1/00	5/31/02	
	73000	180	1	Computer HW/SW	11	24	2		28	2	8/1/00	5/31/02	
	73000	200	1	Onsite Training	11	24	2		14	2	8/1/00	5/31/02	
	73000	400	1	MFR		24	4		2	2	8/1/00	5/31/02	
								40,700	2,453				
Schedule Activity Number Canyon Building - Hot Operations for Phase I Contact Handled LAW Disposal (1 Unit 3 shift ops)													
JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	4	108	1	86,600	4,751	0	8/1/02	5/31/11	
E000	73000	010	1	Engineers	0	108	1	0	0	0	8/1/02	5/31/11	
P000	73000	010	1	Professionals	2	108	1	33,900	2,375	0	8/1/02	5/31/11	
T000	73000	060	1	Technicians	4	108	1	68,600	3,721	0	8/1/02	5/31/11	
C000	73000	060	1	Crafts	8	108	1	133,200	7,442	0	8/1/02	5/31/11	
R000	73000	060	1	Operators	3	108	1	49,950	2,791	0	8/1/02	5/31/11	
L000	73000	060	1	Laborers	0	108	1	0	0	0	8/1/02	5/31/11	
G000	73000	000	1	Clerical	1	108	1	18,850	557	0	8/1/02	5/31/11	
	73000	140	1	Office Supplies	22	108	2		50	0	8/1/02	5/31/11	
	73000	180	1	Computer HW/SW	22	108	2		249	0	8/1/02	5/31/11	
	73000	200	1	Onsite Training	22	108	2		124	0	8/1/02	5/31/11	
	73000	220	1	Electrocity		108	3		878	0	8/1/02	5/31/11	
	73000	410	1	Laundry Service	15	108	3		339	0	8/1/02	5/31/11	
	73000	490	1	Vehicle Maint		108	3		1,896	0	8/1/02	5/31/11	
	73000	100	1	Mats & Equip		108	3		589	0	8/1/02	5/31/11	
	73000	400	1	MFR		108	4		90	0	8/1/02	5/31/11	
								386,300	25,388				

Table A-18 Summary of Estimated Staff Requirements and Costs for Contact Handled ILAW Container Disposal Phase I and Phase II (Options 4B)

Canyon Buildings - Deactivation of Phase 1 Contact Handled ILAW Disposal Facilities														
Schedule Activity Number	JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1		Managers	2	12	1	3,700	264	3	6/1/11	5/31/12	
E000	73000	010	1		Engineers	0	12	1	0	0	3	6/1/11	5/31/12	
P000	73000	010	1		Professionals	1	12	1	1,650	132	3	6/1/11	5/31/12	
T000	73000	060	1		Technicians	2	12	1	3,700	207	3	6/1/11	5/31/12	
C000	73000	060	1		Crafts	4	12	1	7,400	413	3	6/1/11	5/31/12	
R000	73000	060	1		Operators	1.5	12	1	2,775	155	3	6/1/11	5/31/12	
L000	73000	060	1		Laborers	0	12	1	0	0	3	6/1/11	5/31/12	
G000	73000	000	1		Clerical	0.5	12	1	926	31	3	6/1/11	5/31/12	
	73000	210	1		Onsite Training	11	12	2		1	3	6/1/11	5/31/12	
	73000	220	1		Electricity		12	3		25	3	6/1/11	5/31/12	
	73000	400	1		Laundry Service	7.5	12	8		18	3	6/1/11	5/31/12	
	73000	400	1		MPR		12	4		0	3	6/1/11	5/31/12	
									20,360	1,247				
Canyon Buildings - Operations Preparations for Phase 2 Contact Handled ILAW Disposal														
Schedule Activity Number	JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1		Managers	2	24	1	7,400	528	2	5/1/09	4/30/11	
E000	73000	010	1		Engineers	0	24	1	0	0	2	5/1/09	4/30/11	
P000	73000	010	1		Professionals	2	24	1	7,400	528	2	5/1/09	4/30/11	
T000	73000	060	1		Technicians	4	24	1	14,800	827	2	5/1/09	4/30/11	
C000	73000	060	1		Crafts	12	24	1	44,400	2,481	2	5/1/09	4/30/11	
R000	73000	060	1		Operators	4.5	24	1	16,650	830	2	5/1/09	4/30/11	
L000	73000	060	1		Laborers	0	24	1	0	0	2	5/1/09	4/30/11	
G000	73000	000	1		Clerical	0.5	24	1	1,850	62	2	5/1/09	4/30/11	
	73000	140	1		Office Supplies	25	24	2		13	2	5/1/09	4/30/11	
	73000	190	1		Computer HW/SW	25	24	2		83	2	5/1/09	4/30/11	
	73000	210	1		Onsite Training	25	24	2		31	2	5/1/09	4/30/11	
	73000	400	1		MPR		24	4		5	2	5/1/09	4/30/11	
									82,500	5,467				

Table A-18 Summary of Estimated Staff Requirements and Costs for Contact Handled ILAW Container Disposal Phase I and Phase II (Option 4B)

Schedule Activity Number Canyon Building - Hot Operations for Phase 2 Contact Handled ILAW Disposal (3 Units 3 shift op)

JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	4	164	1	101,133	7,214	0	5/1/11	12/31/24	
E000	73000	010	1	Engineers	0	164	1	0	0	0	5/1/11	12/31/24	
S000	73000	010	1	Scientists	0	164	1	0	0	0	5/1/11	12/31/24	
P000	73000	010	1	Professionals	4	164	1	101,133	7,214	0	5/1/11	12/31/24	
T000	73000	060	1	Technicians	8	164	1	202,267	11,801	0	5/1/11	12/31/24	
C000	73000	060	1	Crafts	24	164	1	606,800	33,902	0	5/1/11	12/31/24	
R000	73000	060	1	Operators	8	164	1	227,550	12,713	0	5/1/11	12/31/24	
L000	73000	060	1	Laborers	0	164	1	0	0	0	5/1/11	12/31/24	
G000	73000	090	1	Clerical	1	164	1	25,293	848	0	5/1/11	12/31/24	
	73000	140	1	Office Supplies	50	164	2		172	0	5/1/11	12/31/24	
	73000	180	1	Computer HW/SW	50	164	2		858	0	5/1/11	12/31/24	
	73000	210	1	Onsite Training	50	164	2		429	0	5/1/11	12/31/24	
	73000	220	1	Electricity		164	3		1,373	0	5/1/11	12/31/24	
	73000	410	1	Laundry Service	41	164	3		1,408	0	5/1/11	12/31/24	
	73000	4PD	1	Vehicle Maint		164	3		7,724	0	5/1/11	12/31/24	
	73000	100	1	Mate B Equip		164	3		683	0	5/1/11	12/31/24	
	73000	4C0	1	MPR		164	4		120	0	5/1/11	12/31/24	
								1,264,187	85,957				

Schedule Activity Number Canyon Building - Deactivation of Phase 2 Contact Handled ILAW Disposal Facilities

JC	OC	CE	FT	Description	FTEs	Months	Note	MH	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	2	12	1	3,700	264	3	1/1/25	12/31/25	
E000	73000	010	1	Engineers	0	12	1	0	0	3	1/1/25	12/31/25	
P000	73000	010	1	Professionals	2	12	1	3,700	264	3	1/1/25	12/31/25	
T000	73000	060	1	Technicians	2	12	1	3,700	297	3	1/1/25	12/31/25	
C000	73000	060	1	Crafts	4	12	1	7,400	413	3	1/1/25	12/31/25	
R000	73000	060	1	Operators	12	12	1	22,200	1,240	3	1/1/25	12/31/25	
L000	73000	060	1	Laborers	4.5	12	1	6,326	0	3	1/1/25	12/31/25	
G000	73000	090	1	Clerical	0	12	1	0	0	3	1/1/25	12/31/25	
	73000	210	1	Onsite Training	26.5	12	2		17	3	1/1/25	12/31/25	
	73000	220	1	Electricity		12	3		25	3	1/1/25	12/31/25	
	73000	410	1	Laundry Service	22.5	12	3		67	3	1/1/25	12/31/25	
	73000	4C0	1	MPR		12	4		0	3	1/1/25	12/31/25	
								49,025	2,487				

Table A-13 Summary of Estimated Staff Requirements and Costs for Contract Handled ILAW Container Disposal Phase I and Phase II (Option 4B)

Canyon Buildings - Perform Long Term Monitoring of ILAW Disposal Facilities													
Schedule Activity Number													
JC	QC	CE	FT	Description	FTEs	Months	Note	MI	\$K	Curve	Start	Finish	D/L
M000	73000	010	1	Managers	1	105	1	18,186	1,155	0	1/1/25	8/30/33	
E000	73000	010	1	Engineers	0	105	1	0	0	0	1/1/25	8/30/33	
P000	73000	010	1	Professionals	1	105	1	15,186	1,185	0	1/1/25	8/30/33	
T000	73000	060	1	Technicians	2	105	1	22,378	1,909	0	1/1/25	8/30/33	
C000	73000	060	1	Crafts	6	105	1	97,125	5,426	0	1/1/25	8/30/33	
R000	73000	060	1	Operators	2.25	105	1	36,422	2,038	0	1/1/25	8/30/33	
L000	73000	080	1	Laborers	0	105	1	0	0	0	1/1/25	8/30/33	
G000	73000	000	1	Clerical	0.25	105	1	4,047	135	0	1/1/25	8/30/33	
	73000	140	1	Office Supplies	12.5	105	2		27	0	1/1/25	8/30/33	
	73000	190	1	Computer HW/SW	12.5	105	2		197	0	1/1/25	8/30/33	
	73000	210	1	Onsite Training	12.5	105	2		69	0	1/1/25	8/30/33	
	73000	220	1	Electricity		105	3		55	0	1/1/25	8/30/33	
	73000	410	1	Laundry Service	10.25	105	3		226	0	1/1/25	8/30/33	
	73000	100	1	Mails & Equip		105	3		27	0	1/1/25	8/30/33	
	73000	400	1	MFR		105	4		13	0	1/1/25	8/30/33	
								202,344	12,269				
Notes													
1) Staffing estimate based on attached staffing chart. Assume one FTE is equivalent to 1950 hrs.													
2) CE100 - Office supplies based on \$200 per FTE + 1.25% for G&A and escalation.													
CE100 - Computer hardware and software based on \$1800 per FTE + 1.25% for G&A and escalation.													
CE210 - Onsite training based on \$500 per FTE + 1.25% for G&A and escalation.													
3) The following costs are assumed bases of VRCM estimates. Actual estimates will be generated following design studies in FY 1993.													
These costs apply only after hot start as costs prior to hot start are assumed to be covered by the project.													
CE220 - EPA electricity \$20K per shift per year + 1.25% for G&A and escalation.													
CE410 - Laundry service based on \$2K per bargaining unit FTE + 1.25% for G&A and escalation.													
CE400 - Transportation (truck maintenance) \$50K per year per vehicle + 1.25% for G&A and escalation.													
CE100 - Materials and equipment (spare parts) \$50K per year + 1.25% for G&A and escalation.													
4) 400 - MFR based on 7 D B of Cost Elements 100, 140 and 190.													

Table A-19. Summary of Total Estimated Operating Costs for Four Canyon Building Disposition Based on Internal and External Waste Disposal Alternatives of 221-U and Operating Crew for Immobilized Low-Activity Waste Disposal (AGA Options 4A and 4B).^a

Option	Operational preparation \$ M	Hot operation \$ M	Deactivation \$ M	Subtotal \$ M	Grand total \$ M
4A - Internal Waste Disposal (23,330 ILAW Containers)	117.8 ^b		0 ^d	117.8	146.8
	1.9 ^c	26.3 ^e	0.8 ^f	29.0	
4B - Internal and External Waste Disposal (98,200 ILAW Containers)	155.7 ^g		14.4 ^d	170.1	292.5
	7.8 ^h	111.0 ⁱ	3.6 ^j	122.4	

^a Source of information are Table A-13, Table A-16, Table A-18 and below calculations.

^b Operating Cost = $[(0.1 + 15.5 + 0.8)E06 \times 1.256 \text{ escalation} \times 1.35 \text{ contingency} \times 4.24 \text{ equivalent buildings}] = \$117.8 \text{ million (Table A-13)}$

^c Operating Cost = $[(0.1 + 20.7 + 0.8)E06 \times 1.256 \text{ escalation} \times 1.35 \text{ contingency} \times 4.25 \text{ equivalent buildings}] = \$155.7 \text{ million (Table A-13)}$

^d Deactivation Cost = $[(2.0)E06 \times 1.256 \text{ escalation} \times 1.35 \text{ contingency} \times 4.25 \text{ equivalent buildings}] = \$14.4 \text{ million (Table A-13)}$

^e Operation prep cost = $[(3.0 + 5.0)E06 \times 0.24] = \$1.9 \text{ million (Table A-16)}$

^f Hot operation cost = $[(30.5 + 78.9)E06 \times 0.24] = \$26.3 \text{ million (Table A-16)}$

^g Deactivation cost = $[(1.5 + 1.8)E06 \times 0.24] = \$0.8 \text{ million (Table A-16)}$

^h Operation prep cost = $[(2.4 + 5.4)E06 \times 0.76 + \$1.9E06] = \$7.8 \text{ million (Table 18 and note } ^a \text{ above)}$

ⁱ Hot operation cost = $[(25.4 + 86.0)E06 \times 0.76 + \$26.3E06] = \$111.0 \text{ million (Table A-18 and note } ^a \text{ above)}$

^j Deactivation cost = $[(1.2 + 2.5)E06 \times 0.76 + \$0.8E06] = \$3.6 \text{ million (Table A-18 and note } ^a \text{ above)}$.

A2.4 EXPANDED INTERIM STORAGE (OPTION 5)

Table A-20. Cost Estimate for Project W-112 Enhanced Radioactive and Mixed Waste Storage.

DON'T SAY IT --- Write It!

DATE: August 6, 1997

TO: Mike J. Klem

HS-27

FROM: Eric G. Erpenbeck

Telephone: 376-8032

SUBJECT: OLD ICF XH ESTIMATE FOR LONG TERM DRUM STORAGE BUILDING 2404 SERIES

Per your request, attached are copies of an estimate used on Project W-112 for the 2404 W series building constructed at the Hanford Site Central Waste Complex. This estimate is for a pre-engineered metal butler building with a concrete coated floor for the storage of Radioactive Mixed Waste. The facility is a double profile sloped roof with 20' eave height, a dry pipe sprinkler and alarm system, two 16,700 CFM roof ventilators, overhead coil doors on both ends of the building and a fixed head air sampler with control cabinet to verify the absence of radioactive contamination.

I hope this information will be useful in whatever applications you are considering.

Very Truly Yours,

Eric G. Erpenbeck
Project Engineer

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OVER- / E & I	TOTAL DOLLARS
322100	LODR TERM DRUM STORAGE BLDG #1										
322100.00	TECHNICAL SERVICES										
322100.000010	LODR TERM DRUM STORAGE PERIOD - BUILDING #1	020	1 LB	0	0	0	0	65000	0	6500	71500
SUBTOTAL	TECHNICAL SERVICES			0	0	0	0	65,000	0	6,500	71,500
TOTAL	COST CODE 02000 WBS 322100 (ESCALATION 1.85% + CONTINGENCY 15.00 %)			0	0	0	0	65,000	0	6,500	71,500
322100.03	STEELWORK										
322100.0234510	EXCAVATE FOOTINGS	501	400 LF	0	0	0	0	2400	0	360	2760
322100.0234512	POUR CONCRETE FOOTINGS	503	400 LF	0	0	0	0	2400	0	360	2760
322100.0234514	GUARD POSTS	503	0 EA	0	0	0	0	1400	0	210	1610
SUBTOTAL	STEELWORK			0	0	0	0	6,200	0	930	7,130
TOTAL	COST CODE 10102 WBS 322100 (ESCALATION 1.85% + CONTINGENCY 15.00 %)			0	0	0	0	6,200	0	930	7,130
322100.05	CONCRETE										
322100.0300001	FINE GRADE FOOTINGS	501	1520 SF	75	400	0	0	0	0	102	506
322100.0300004	GRADE & COVERED SLAB	501	21600 SF	175	3001	0	6320	0	0	2330	11751
322100.0300006	FORM FOOTINGS & PADS	501	1640 SF	147	4474	0	2300	0	0	1699	8493
322100.0300008	FORM SLAB	501	1000 LF	06	2629	0	1350	0	0	995	4974
322100.0300010	FORM WALLS 2'-4"	501	3000 SF	300	9171	0	3750	0	0	3230	16151
322100.0300012	FORM CURB	501	600 LF	04	2503	0	750	0	0	820	4148
322100.0300014	KEY JOINTS	501	600 LF	30	917	0	360	0	0	319	1596
322100.0300016	SEAL & OIL	501	6320 SF	90	2096	0	1630	0	0	1152	5763
322100.0300018	CONCRETE FOOTINGS & PADS	501	71 SF	57	1674	0	4264	0	0	1604	2418
322100.0300020	CONCRETE SLAB W/ SUMP	501	354 SF	443	13011	0	33240	0	0	11543	57814
322100.0300022	CONCRETE WALLS 2"	501	30 SF	43	3265	0	2340	0	0	907	4504
322100.0300024	CONCRETE CURB & LANDS	501	8 SF	24	705	0	480	0	0	296	1481
322100.0300026	CURB	501	8 SF	24	705	0	480	0	0	296	1481
322100.0300028	REBAR 0 800	501	26120 SF	141	3820	0	560	0	0	1006	5674
322100.0300030	FORMEL FINISH	501	33760 SF	501	19742	0	15095	0	0	8704	43520
322100.0300032	CONTROL JOINTS	501	2160 SF	216	6344	0	0	0	0	1536	7936
322100.0300034	CONTROL JOINTS	501	420 LF	21	617	0	252	0	0	117	1806

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WARRANT	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-RENT	OPER / S & I	TOTAL DOLLARS
322100.0500034	ENBEDS & GRATING (ALLOW)	501	1 LS	32	1070	0	1000	0	0	310	2380
322100.0500056	CONCRETE STODPS, GRIEVS & BLDG. ADDITION PADS	501	1312 SF	0	0	0	0	5000	0	750	5755
SUBTOTAL	CONCRETE			2,501		0		5,000		37,790	
	SALES TAX 7.50 %						77,647				190,976
	DEEP (ON MARKUPS ONLY)						5600				5600
										1415	1415
TOTAL	COST CODE 50103 WBS 322100 (ESCALATION 1.85% - CONTINGENCY 15.00 %)			2,501		0	77,307	5,000	0	39,215	108,051
322100.05	METALS										
322100.0500002	ALLOWANCE FOR ROOF ACCESS NO DESIGN AVAILABLE	501	1 LS	0	0	0	0	0000	0	1200	9200
SUBTOTAL	METALS			0		0		0,000		1,200	9,200
	SALES TAX 7.50 %										
	DEEP (ON MARKUPS ONLY)										
TOTAL	COST CODE 50105 WBS 322100 (ESCALATION 1.85% - CONTINGENCY 15.00 %)			0		0		0,000		1,200	9,200
322100.07	MOISTURE AND THERMAL PERIMETER INSULATION	501	223 SF	0	0	0	0	268	0	40	304
322100.0700002	MISC. SEALANTS & CAULKING	501	1 LS	40	1223	0	1000	0	0	550	2779
SUBTOTAL	MOISTURE AND THERMAL			40		0		268		590	
	SALES TAX 7.50 %				1,223		1,000				3,087
	DEEP (ON MARKUPS ONLY)						79				79
										10	19
TOTAL	COST CODE 50107 WBS 322100 (ESCALATION 1.85% - CONTINGENCY 15.00 %)			40	1,223	0	1,079	268	0	615	3,105
322100.08	DOORS, WINDOWS AND G										
322100.0876510	12X14 OVERHEAD DOORS	501	2 EA	0	0	0	0	9136	0	1370	10506
322100.0876512	3/8 IN DOOR & FRAME WITH HARDWARE, EXTERIOR	501	5 EA	50	1529	0	4500	0	0	1507	7530
322100.0876514	6/8 IN DOOR & FRAME WITH HARDWARE	501	1 EA	14	430	0	1200	0	0	607	2035

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REV. 0

KAISER ENGINEERS HANFORD
 WESTINGHOUSE HANFORD COMPANY
 JOB NO. H-112 / P78463

** BEST + INTERACTIVE ESTIMATING **
 ENHANCED RADIOACTIVE & MIXED WASTE STORAGE PHASE T
 FINAL ESTIMATE - REV. 01
 DOC_008 - ESTIMATE DETAIL BY WBS / CODE CODE

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 BY COL/KLM/JSM/AM/RDP

ACCOUNT NUMBER	DESCRIPTION	CODE CODE	QUANTITY	HOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OVER / B & I	TOTAL DOLLARS
SUBTOTAL	DOORS, WINDOWS AND O			64		0		9,136		3,294	
	SALES TAX 7.00 %				1,957		5,700				20,077
	DESP (ON WAREHOUSES ONLY)						450				450
										112	112
TOTAL	DOOR CODE 50100			64		0		9,136		3,396	
	WBS 322100				1,957		6,150				20,639
	(ESCALATION 1.85% - CONTINGENCY 15.00 %)										
322100.00	FINISHES										
322100.0947610	PAINT OVERHEAD DOORS	501	2 EA	0	0	0	0	400	0	90	490
322100.0947612	PAINT DOORS	501	9 EA	0	0	0	0	450	0	68	518
322100.0947614	SPECIAL COATING FLOOR	501	2240 SF	0	0	0	0	7200	0	18920	23720
322100.0947616	RISC PAINTING	501	1 JOB	0	0	0	0	2500	0	375	2875
SUBTOTAL	FINISHES			0		0		76,350		11,453	
					0		0				87,803
TOTAL	DOOR CODE 50100			0		0		76,350		11,453	
	WBS 322100				0		0				87,803
	(ESCALATION 1.85% - CONTINGENCY 15.00 %)										
322100.10	SPECIALTIES										
322100.1000002	FIRE EXTINGUISHERS 20LB (SMALL ONLY)	501	4 EA	0	245	0	0	0	0	61	306
SUBTOTAL	SPECIALTIES			0		0		0		61	
					245		0				306
TOTAL	DOOR CODE 50100			0		0		0		61	
	WBS 322100				245		0				306
	(ESCALATION 1.85% - CONTINGENCY 15.00 %)										
322100.13	SPECIAL CONSTRUCTION										
322100.1345610	PRE-ENGINEERED METAL BLDG. 100X120X20 ERECTED W/FIRE RISER & ELEC. PANEL ATTACHMENT ABOVE.	501	21600 SF	0	0	0	0	200000	0	42120	322920
SUBTOTAL	SPECIAL CONSTRUCTION			0		0		200,000		42,120	
					0		0				322,920

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WARRANTY	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-RENT	ONAP / B & I	TOTAL DOLLARS
TOTAL	COST CODE 30113 WBS 322100 (ESTIMATION 1.03% + CONTINGENCY 15.00 %)			0	0	0	0	240,400	0	41,120	322,920
322100.15	MECHANICAL										
322100.1500004	FIRE PROTECTION SPRINKLER SYSTEM	501	0	0	0	0	0	0	0	0	0
322100.1500006	ORDINARY HAZ. DR. SPRINKLER SYSTEM (WAREHOUSE SECTION) INCLUDES SNAT BRACING EXTRA WRENCHES AND HEADS	501	21600 SF	622	20922	0	14010	0	0	7760	38798
322100.1500008	ORDINARY HAZ. DR. SPRINKLER SYSTEM (ELECTRICAL ROOMS) INCLUDES SNAT BRACING	501	625 SF	594	19121	0	319	0	0	4400	24300
322100.1500010	FIRE PROTECTION ALARM RING	501	0	0	0	0	0	0	0	0	0
322100.1500106	6" FLANGED BALL	501	2 EA	1	32	0	204	0	0	0	290
322100.1500108	6" FLANGED SPool EXP 2" x 1"	501	1 EA	1	32	0	170	0	0	0	233
322100.1500110	6" BOLT NOT & GERT BOLT-WP	501	2 EA	7	223	0	152	0	0	0	421
322100.1500112	6" PIPE TO FLOOR SUPPORT	501	1 EA	4	129	0	25	0	0	0	193
322100.1500114	6" BACKFLOW PREVENTER	501	1 EA	4	253	0	1943	0	0	1301	6504
322100.1500116	6" FLANGED GATE VALVE	501	1 EA	4	129	0	162	0	0	0	344
322100.1500118	6" VALVE SILING CHECK	501	1 EA	2	64	0	136	0	0	0	233
322100.1500120	3" THREADED ANGEL VALVE	501	1 EA	2	64	0	159	0	0	0	279
322100.1500122	ALARM VALVE	501	1 EA	5	161	0	502	0	0	166	820
322100.1500124	ALARM WATER MOTOR BORE	501	1 EA	2	64	0	106	0	0	43	213
322100.1500126	7/8" ALARM HORN	501	1 EA	2	64	0	29	0	0	23	116
322100.1500128	4" SWING CHECK W/BALL DRIP	501	1 EA	5	161	0	74	0	0	59	204
322100.1500130	4" SCH 40 C/S PIPE	501	10 LF	10	313	0	143	0	0	145	825
322100.1500132	DR. PIPE VALVE, INCH & GAUGE	501	1 EA	10	322	0	500	0	0	206	1028
322100.1500134	AIR COMPRESSOR	501	1 EA	5	161	0	518	0	0	170	849
322100.1500136	3/4" HSE CONNECTION	501	1 EA	3	97	0	250	0	0	87	434
322100.1500138	PAINT ALARM ASSEN & SYSTEM DRAWN	501	1 ES	0	0	0	0	250	0	0	250
SUBTOTAL MECHANICAL			1,293		41,621	0	19,374	250	0	13,281	76,499

BAITER SHEETPERS MANFORD
WELLSCHROEDER MANFORD COMPANY
JOB NO. W-192 / #78913

*** 1257 - INTERACTIVE ESTIMATING ***
ENHANCED RADIOACTIVE & MIXED WASTE STORAGE PHASE V
FINAL ESTIMATE - REV. #3
WBS_RBS - ESTIMATE DETAIL BY WBS / COST CODE

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BY C01/KLR/JJK/JPM/RBP

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	WAREHOUSE	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	GRAND TOTAL	TOTAL DOLLARS
	SALES TAX 7.9% GRAND TOTAL MARKUPS ONLY						1530		0	1530	1530
	COST CODE 50115 WBS 322100 RECALCULATION 1.85% - CONTINGENCY 15.00 %			1,293	41,621	0	28,704	350	0	15,634	78,412
322100.15	MECHANICAL	501	0	0	0	0	0	0	0	0	0
322100.1500100	WATERBARRIER	501	0	0	0	0	0	0	0	0	0
322100.1500200	ROOF VENTILATOR-20,000 CFM @ 1/2" I.P. W/10 HP MTR. PEAK CURB DATE & APPROX W/10	501	2 EA	32	1081	0	6856	0	0	2161	9276
322100.1500202	ROUTER-3/4" W X 2"	501	13 EA	26	882	0	2418	0	0	990	4290
322100.1500204	AIR FILTERS-24" X 24" X 2"	501	26 EA	26	882	0	104	0	0	296	1202
322100.1500206	AIR INTAKE SCREEN METAL 10 GA GALV STEEL	501	2739 LBS	274	9291	0	1370	0	0	3196	13899
322100.1500208	AIR INTAKE STRUCT STEEL	501	790 LBS	79	2679	0	356	0	0	911	3546
322100.1500210	AIR INTAKE WALL OPENING FRAMING - C4 X 5.4	501	647 LBS	65	2540	0	312	0	0	790	3446
322100.1500212	SAND FILTER BAFFLE PLATE - 1/4 GA. PERFORATED	501	120 SF	12	407	0	520	0	0	261	1216
322100.1500216	EXPANDED METAL FILTER SCREEN 16GA .875" X 2.25" OPENING	501	107 SF	11	373	0	161	0	0	160	694
322100.1500218	FILTER BANK PRESSURE DIFF INDICATING TRANSMITTER W/FILTER KIT	501	13 EA	13	641	0	2646	0	0	366	3751
322100.1500219	BUILDING PRESSURE DIFF INDIC- ATOR W/OUTDOOR SENSOR	501	1 EA	1	36	0	76	0	0	32	140
322100.1500220	BUILDING PRESSURE DIFF TRAN- SMITTER	501	1 EA	1	36	0	129	0	0	49	212
322100.1500222	FIRE RISER ROOM BASEBOARD HEATER- 3' W	501	1 EA	1	36	0	43	0	0	24	103
322100.1500224	TEMPERATURE ELEMENT/TRANS- MITTER & INDICATOR (ALLOYS)	501	3 EA	3	102	0	600	0	0	271	913
322100.1500226	ELEC/NEC ROOM AIR IN- TAKER W/MOUNTING BRACKET	501	1 EA	1	102	0	330	0	0	130	562
322100.1500228	ELEC/NEC ROOM AIR INTAKE W/FILTER & FRAME, ROOM &	501	1 EA	10	339	0	350	0	0	207	896

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- RENT	DRIP / # & J	TOTAL DOLLARS
322100.1500250	AUX DAMPER ELEC/MISC ROOM EXHAUST FAN 300 CFM WALL TYPE W/BACK DRAFT OHMR. & THERMOSTAT	501	1 ea	2	68	0	250	0	0	95	413
322100.1500320	TEST & BALANCE	501	1 JOB	12	407	0	0	0	0	123	329
SUBTOTAL	MECHANICAL			375	19,500	0	15,321	0	0	10,509	45,330
	SALES TAX 7.90 K ONAP (ON MATERIALS ONLY)						1220	0	0		1220
TOTAL	COST CODE 50115 WBS 322100 INTEGRATION 1.05% + CONTINGENCY 15.00 %			375	19,500	0	16,747	0	0	10,274	47,126
322100.16	ELECTRICAL										
322100.1610321	20A 6W Feeder - 1/2" EMC W/6 B12 THHN CONDUCTORS	501	1600 LF	110	4257	0	1279	0	0	1461	7397
322100.1610322	20A 6W Feeder - 3/4" EMC W/6 B12 THHN CONDUCTORS	501	1700 LF	153	5494	0	1075	0	0	2291	9580
322100.1616316	1-CWPVC Sch 40 FWT 8000 Bank Concrete Encased	501	160 LF	56	2091	0	2661	0	0	1402	4074
322100.1621521	#250 2AWG 9/C Copper 600F	501	750 LF	21	754	0	1323	0	0	683	2960
322100.1632310	INDUSTRIAL FLUORESCENT 18-PENDANT FIXTURES	501	0 ea	0	0	0	0	0	0	0	0
322100.1632311	4" 2LAMP INDUSE FLUOR FIXR	501	1 ea	1	36	0	73	0	0	33	162
322100.1632314	4" 2LAMP INDUSE FLUOR FIXR	501	1 ea	2	72	0	119	0	0	57	248
322100.1632331	4" 2LAMP INDUSE FLUOR FIXR	501	1 ea	2	72	0	143	0	0	71	306
322100.1632334	WEM Battery 4" 2LAMP INDUSE FLUOR FIXR	501	1 ea	3	108	0	209	0	0	95	412
322100.1633247	250W Indus BPS Fix w/PurBook & Lamp	501	56 ea	66	2374	0	20420	0	0	6837	29627
322100.1633002	35W LPS Wall Mount Fixture & Lamp	501	6 ea	9	323	0	964	0	0	586	1473
322100.1635013	EXIT LIGHT 320V UNIVERSAL NF W/Battery	501	4 ea	4	213	0	232	0	0	264	1251
322100.1636001	3W SW W/Box SpecGr IcyPkt	501	2 ea	1	36	0	18	0	0	16	70
322100.1636003	3W SW W/Box SpecGr IcyPkt	501	8 ea	4	144	0	76	0	0	68	286
322100.1636004	4W SW W/Box SpecGr IcyPkt	501	8 ea	4	144	0	108	0	0	94	406
322100.1637013	WP SpecGr20A W/BoxAPLT 401	501	4 ea	2	72	0	95	0	0	50	215

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HOURS	LABOR	EQUIP	MATERIAL	SUB-CONTRACT	EQUIP-RENT	OVERHEAD	TOTAL DOLLARS
322100.1642630	BATTERY SUELF	501	1 ea	3	72	0	76	0	0	14	102
322100.1642642	KEY-32 SEMIFLUSH TRIM FOR 64-32 ENCLOSURE	501	1 ea	2	72	0	76	0	0	14	102
322100.1642916	F.A. ATP & Test Allowance	501	1 job	16	575	0	50	0	0	100	813
322100.1644035	Electric Service Grounding	501	1 lot	24	862	0	250	0	0	334	1446
322100.1647311	5 KW 3PH GENERATOR	501	1 ea	2	72	0	256	0	0	98	626
322100.1647331	Unistrut T-Track	501	1 ea	0	0	0	29	0	0	9	38
322100.1647332	5KW Unistrut Brll	501	1 ea	2	72	0	32	0	0	28	122
322100.1660311	Motor & Socker	501	1 ea	3	108	0	500	0	0	182	790
322100.1661311	30/3 HP W/SS 600V M2R	501	2 ea	2	72	0	192	0	0	79	343
322100.1661331	30/3 HP W/SS 600V M12	501	1 ea	1	36	0	121	0	0	47	204
322100.1661551	UNISTRUT SUPPORT FOR WALL MOUNTED SAFETY SWITCH	501	3 job	3	108	0	41	0	0	65	194
322100.1664231	Factory Assembled Plug-On Panelboard 3 Phase 480V KCM 225A - 320	501	1 ea	14	503	0	2297	0	0	840	3640
322100.1664381	5 KVA Hemiphr Zone Pnl 3ph	501	1 ea	5	180	0	495	0	0	261	1132
322100.1664582	C.B. COHS START 480V 3P W1 5125 1 10HP	501	2 ea	3	108	0	1531	0	0	492	1731
322100.1666001	Starter Accessory Kit - 100VA Control Xfmr, B-D-A, Aux Contacts, Ind Lights	501	2 ea	6	216	0	395	0	0	205	837
322100.1664991	Unistrut Support for Wall Mounting of Motor Control	501	2 job	2	72	0	30	0	0	30	130
322100.1664301	Connect Overhead 600V Motor Operator	501	2 ea	0	216	0	580	0	0	236	1023
322100.1664701	480V 0-10 HP MOTOR CONNECTION	501	2 ea	3	108	0	23	0	0	39	170
SUBTOTAL	ELECTRICAL			719		0	44,590	0	0	21,128	91,543
	GENERAL FOREMAN 5.00 %			35	1296				0		1291
	CONDUKABLES 3.00 %						1337				1337
	SHLES TAX 7.00 %						3628		0		3628
	OHAP (ON PARKUPS ONLY)									1077	1077
TOTAL	COST CODE 30116 W99 122100 (SCALATION 1.85% - CONVEJANCEY 10.00 %)			754	27,118	0	49,535	0	0	23,005	99,670
322100.16	ELECTRICAL										
322100.1664101	Initial Sampler System Allowance	7065	2 16	100	3591	0	40000	0	0	13077	56660

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP. RENT	WSP J & J	TOTAL DOLLARS
322100.1637414	WP Spacktop20A W/Boa&Pit	505	36 ea	17	610	0	550	0	0	351	1520
322100.1641502	Plywood Telephone Backboard 4'x 4'x 3/4"	501	1 ea	3	100	0	35	0	0	43	106
322100.1641507	WP Telephone	501	2 ea	2	72	0	200	0	0	82	354
322100.1642020	Radio Transmitter/Antenna & Interface & Zone P.A. Hektor 804	501	1 ea	12	431	0	50	0	0	144	623
322100.1642023	P.A. LOCATION LIGHT W/CONDUIT & WIRE	501	1 ea	2	72	0	71	0	0	43	104
322100.1642039	CONNECT SPRINKLER PIY VALVE	501	1 job	4	144	0	25	0	0	51	220
322100.1642040	CONNECT TAMPER SWITCH	501	1 job	2	72	0	12	0	0	26	113
322100.1642042	CONNECT SPRINKLER FLOW SW	501	1 job	2	72	0	15	0	0	26	113
322100.1642043	CONNECT PRESSURE SWITCH	501	1 ea	2	72	0	15	0	0	26	113
322100.1642044	CONNECT LOW TEMP SWITCH	501	1 ea	2	72	0	15	0	0	26	113
322100.1642092	FIRE ALARM CONDUIT & WIRE ALLOW 1/2" CAT W/4014	501	1000 lf	70	2514	0	734	0	0	974	4222
322100.1642121	PYROTECHNICS RMS-501 MANUAL STATION W/50-5	501	6 ea	4	215	0	430	0	0	200	863
322100.1642137	PYROTECHNICS RMS-1024 10" P.A. BELL	501	0 ea	3	160	0	270	0	0	137	393
322100.1642137	PYROTECHNICS STROBE	501	6 ea	5	180	0	960	0	0	342	1492
322100.1642319	PYROTECHNICS SLS-6016, AD-39, AND STA-3 - FIRE MUFF DETECTOR, BOWBING & SAMPLING TUBE	501	2 ea	4	287	0	555	0	0	233	1095
322100.1642602	PER-32 16 MODULE ENCLOSURE	501	1 ea	4	144	0	370	0	0	154	668
322100.1642607	PER-35 CONTROL PANEL 2 ZONE 1 SIGNAL CIRCUIT & ALARM	501	1 ea	2	72	0	700	0	0	232	1004
322100.1642608	EPS-25 POWER SUPPLY 24VDC - 120VAC 10 AMP	501	1 ea	2	72	0	275	0	0	104	451
322100.1642611	ENC-36 MASTER CODE MODULE	501	1 ea	2	72	0	118	0	0	63	273
322100.1642612	PER-32 PROGRAM MATRIX MODULE 35 D1000	501	1 ea	2	72	0	105	0	0	54	234
322100.1642614	PER-40 DUAL SWITCH MODULE	501	1 ea	2	72	0	76	0	0	45	195
322100.1642619	PER-34U/12 DUAL ZONE GATE VALVE SUPERVISION MODULE	501	1 ea	2	72	0	320	0	0	88	380
322100.1642625	PER-30M ALARM EXTENSION MODULE	501	2 ea	4	144	0	380	0	0	127	551
322100.1642629	PER-35 MULTIPLE SUPPLEMENTARY RELAY MOD (BPOE 2K 120V/30V)	501	2 ea	4	144	0	616	0	0	164	720
322100.1642634	PER-33/31-34 10AM BATTERY MODULE AND BATTERY PACK	501	1 ea	3	108	0	335	0	0	133	576
322100.1642635	PER-25 BATTERY CHARGER/TRANSFER MODULE FOR CP-32	501	1 ea	2	72	0	224	0	0	89	305

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KALISA ENGINEERS BARFORD
 WESTINGHOUSE BARFORD COMPANY
 JOB NO. W-112 / P7043

** TEST - INTERACTIVE ESTIMATE **
 ENHANCED RAPIDACTIV & MIXED WASTE STORAGE PHASE V
 FINAL ESTIMATE - REV. #1
 DOE_R02 - ESTIMATE DETAIL BY WBS / COST CODE

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 BY EOL/KLR/44R/JPH/RDP

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OVER- / O R I	TOTAL DOLLARS	
322100.1684104	Heat Trace Tubing Allowance	7065	400	14	80	2875	0	3000	0	0	1762	7635
322100.1684107	Sound & Bell Alarm Allowance	7065	1	14	8	287	0	500	0	0	236	1023
322100.1684131	Temperature Element, Wtr, & Indicator Allowance	7065	1	04	6	218	0	550	0	0	230	995
322100.1684161	Local Annunciator Panel Allowance	7065	1	14	8	287	0	750	0	0	311	1348
322100.1684201	Local Control Panel Allowance	7065	1	04	10	575	0	3000	0	0	1073	4644
322100.1684661	Instrumentation Wtr & Cable Allowance	7065	750	14	55	1975	0	600	0	0	775	3559
322100.1699010	ATP & Test Allowance	7065	1	100	40	1436	0	150	0	0	476	2062
SUBTOTAL ELECTRICAL					313		0		0		17,944	
GENERAL FOREMAN 5.00 %					15	11,319		40,559		0		77,736
CONSUMABLES 3.00 %						561						561
SALES TAX 7.90 %							1436					1436
OH&P (ON MARKUPS ONLY)							3959			0		3959
											1790	1790
TOTAL					328		0		0		19,730	
COST CODE 70616 WBS 322100 (ESCALATION 1.05% - CONTINGENCY 15.00 %)						11,880		53,947		0		85,498
TOTAL WBS 322100 LONG TERM DRUM STORAGE BLOC 01					5,544		0	225,711	451,088		174,730	1,031,452

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Table A-21. Summary of Cost Estimate for Construction of Interim Storage Units for Contact-Handled Mixed ILAW Containers Based on Project W-112 (Option 5)

Description	W-112 Project Estimate		CH-MW ILAW Storage Estimate	
	\$ million	Value	\$ million	Value
Unit 1	1.03	\$515/m ²	2.06	\$515/m ²
Adjustments to Floor Slab				
Concrete	None ^a	\$116/m ²	0.31 ^b	\$116/m ²
Rebar	None ^a	\$87/m ²	0.23 ^b	\$87/m ²
Subtotal	1.03	-	2.60	\$650/m ²
Escalation to 2002 ^c	-	-	0.57	-
Total 1 Unit	1.03	\$515/m ²	3.17	\$793/m ²
Total 2 Units	2.1	\$515/m ²	6.3	\$793/m ²

^a Baseline floor slab is 2000 m² area and 0.25 m thick.

^b New floor slab requirement is estimated at 4000 m² and 0.5 m thick.

^c Based on 5.2% from November 1995 to June 1997 and 16% to September 30, 2002.

^d Based on information in Table A-20.

Table A-22. Summary of Infrastructure Cost Estimate for Interim Storage Units for Contact-Handled Mixed Immobilized Low-Activity Waste Containers Based on Project W-112.

Description	Total Cost \$K
Infrastructure Support	79
Procurement of Radio Fire Alarm Report Boxes	38
Electrical Tie-Ins and Furniture	34
General Conditions	104
Water Line	375
Site Grading	204
Paved Roads	355
Paved Parking and Drives	114
Sidewalks and Fencing	62
Soil Stabilization	158
Sanitary Sewer	311
Sagebrush Mitigation	500
Hanford Local Area Network (HLAN) and Telephone Services	314
Subtotal	2,648
Escalation ^a	582
Total	3,230

^a Based on 5.2% from November 1995 to June 1997 and 16% to September 30, 2002.

A2.5 SHIELDED OVERPACKS (OPTIONS 6A AND 6B)

Table A-23. *Summary of Cost Estimates for 5040 Concrete and 5040 Carbon Steel Shielded Overpacks for Disposal of Remote-Handled Immobilized Low-Activity Waste Containers (Options 6A and 6B).*

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FLUOR DANIEL NORTHWEST, INC
 LOCATED EASTEN HARTFORD CORP
 JOB NO 8467AAR1/70MKD1
 FILE NO 2467AAR1

14 LIST - INTERACTIVE ESTIMATING **
 14AM DISPOSAL OVERPACKS
 PLANNING ESTIMATE
 P000001 - PROJECT COST SUMMARY

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 DATE 04/14/77 00 14 16
 BY COL

SORT	DESCRIPTION	ESTIMATED TOTAL COST	CONTINGENCY %	TOTAL DOLLARS	TOTAL DOLLARS
P0001	FLUOR DANIEL NORTHWEST	51,940,000	25	12,980,000	64,920,000
	ADJUSTMENT TO MEET DOB \$100 41				
PROJECT TOTAL		51,940,000	25	12,980,000	64,920,000

DRAFT

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TYPE OF ESTIMATE	PLANNING ESTIMATE	DATE 14, 1977	REMARKS
FORM LEAD ESTIMATOR COL	ESTIMATING MANAGER		EQUIPMENT COST ONLY
PROJECT MANAGER			
CLIENT			

ROUNDING/ADJUSTED TO THE NEAREST * 10,000 * 100,000 * - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING

PACON DASHING NORTHWEST, INC.
 LOCKHEED MARTIN HAMPFORD CORP
 JOB NO. 4431AAL/FINR01
 FILE NO. 5447AAL

17 1987 - INTERACTIVE ESTIMATING -
 ILAM DISPOSAL OVERPACKS
 PLANNING ESTIMATE
 PDMMR01 - NO.1 BREAKDOWN STRUCTURE (HRS) SUMMARY

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 DATE 04/18/87 01:46:27
 BY GDL

NO#	DESCRIPTION	ESTIMATE SUBTOTAL	CONTRACT INCENT	SWR TOTAL	EXCALATION % TOTAL	SWR TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
200001	ILAM DISPOSAL OVERPACKS	65936461	0	46214682	11.01 6710124	61918750	26 12810946	64921823
200007	TOTAL	65,936,461	0	46,214,682	11.01	61,918,750	26	64,921,823

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FLORE DANIEL NORTHWEST, INC.
LOCKHEED MARTIN WAREHOUSE CORP
JOB NO. 4167441/PJN001
FILE NO. 00000001

** TEST - INTERACTIVE ESTIMATING **
PLAN DISPOSED OVERPACKS
PLANNING INCOMPLETE
FORMING - WBS COST CODE SUMMARY

COST CODES/WSA DESCRIPTION SUBSTRUCT TOTAL SUBSTRUCT TOTAL SUBSTRUCT TOTAL
*****
449 OTHER STRUCTURES
208001 143W B100-003L OVERPACKS 0 45218442 34.46 4738388 51925020 36 13507916 41319821
TOTAL 539 OTHER STRUCTURES 45218442 0 49386442 34.46 49386442 51925020 36 13507916 41319821

PROJECT TOTAL
*****
45,218,442 0 49,386,442 34.46 49,386,442 51,925,020 36 13,507,916 41,319,821
*****

```

1

Revised 04/10/97 14:14

1. DEFINITION OF CONTINGENCY AS PROVIDED BY DOE

CONTINGENCY COVERS COSTS THAT MAY RESULT FROM INCOMPLETE DESIGN, UNFORESEEN AND UNPREDICTABLE CONDITIONS, OR UNCERTAINTIES WITHIN THE DEFINED PROJECT SCOPE. THE AMOUNT OF CONTINGENCY WILL DEPEND ON THE STAGES OF DESIGN, PROCUREMENT, AND CONSTRUCTION; AND THE COMPLEXITY AND UNCERTAINTIES OF THE COMPONENT PARTS OF THE PROJECT. CONTINGENCY IS NOT TO BE USED TO AVOID MAKING AN ACCURATE ASSESSMENT OF EXPECTED COST (OFFICE OF NUCLEAR MANAGEMENT ITEM 381 COST AND SCHEDULE GUIDE).

2. CONTINGENCY ALLOWANCE GUIDELINES

THE DOE GUIDELINE CONTINGENCY ALLOWANCE FOR A...
PLANNING ESTIMATE - STANDARD = 25% - 30%

3. METHODOLOGY

CONTINGENCY IS EVALUATED AT THE LOWEST WORK BREAKDOWN STRUCTURE (WBS) LEVEL WITHIN THE COST ESTIMATE DETAILS. IT IS SUMMARIZED AT WBS4 WBS LEVELS AND REPORTED ON THE SUMMARY REPORTS.

4. ANALYSIS

AN ASSESSMENT OF DESIGN MATURITY, WORK COMPLEXITY AND PROJECT UNCERTAINTIES HAS BEEN PERFORMED. AN EXPLANATION OF THIS ASSESSMENT AND CONTINGENCY RATES WHICH HAVE BEEN ADDED TO THE COST OF WORK ARE AS FOLLOWS.

WBS 246201 A CONTINGENCY OF 25% HAS BEEN APPLIED DUE TO A VERY LIMITED AMOUNT OF DESIGN AVAILABLE AT THIS TIME.

FLORA BAKING NORTHWEST, INC.
LOCKWOOD MARTIN HANFORD CORP
JOB NO. 1457A01/PIH001
FILE NO. 1457A01

PP TEST - INTERACTIVE ESTIMATING **
PLAN DISPOSAL OVERPARCH
PLANNING ESTIMATE
FORMS05 - ACTIVITY SUMMARY BY CEA DIVISION

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DATE 04/19/99 08:44:30
BY CBL

EST DESCRIPTION	CONSTRUCTION	SUB TOTAL	ESCALATION	TOTAL	CONSTRUCTION	TOTAL	CONSTRUCTION	TOTAL
CONSTRUCTION								
01 CONCRETE	0	10567.00	14.86	34193.82	25	45018.6	33403329	
02 METALS	4	5884260	14.86	4280215	25	8505913	81429894	
TOTAL CONSTRUCTION	4	45,214,462	14.86	4,719,134	25	12,082,449	110,470	
PROJECT TOTAL								
	0	44,214,462	14.86	4,719,134	25	12,082,449	84,989,824	
		45,230,452						

1. ESTIMATE PURPOSE

THIS ESTIMATE WILL BE USED FOR A SCOPE STUDY.

2. ESTIMATE TECHNICAL BASIS

- 1. THIS ESTIMATE HAS BEEN PREPARED FOR THE ILAN DISPOSAL PROJECT AS REQUESTED BY LOCKHEED MARTIN HANFORD CORP.
2. A DESCRIPTION OF THE TECHNICAL SCOPE OF WORK MAY BE FOUND IN THE FOLLOWING REFERENCE DOCUMENTS:
 *WAFB SCOPE OF WORK (SOW) DATED JUNE 3, 1997
3. WORK SCOPE NOT INCLUDED IN THIS ESTIMATE: THIS ESTIMATE IS FOR DIRECT COST OF WASTE PACKAGE OVERPACKS ONLY

3. ESTIMATE METHODOLOGY

- A. DIRECT COSTS
 THIS ESTIMATE USES PRIMARILY A VENDOR QUOTE TECHNIQUE

B. DIRECT COST FACTORS
 (1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 4%

C. INDIRECT COSTS
 FIXED PRICE VENDOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS ARE INCLUDED IN THE UNIT PRICES AS SHOWN IN THE ESTIMATE.

4. ESCALATION

ESCALATION PERCENTAGES WERE CALCULATED FROM THE JANUARY 1997 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDICES FOR 80% CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE ACQUISITION" FM-59.

5. CONTINGENCY

A CONTINGENCY ANALYSIS HAS BEEN PERFORMED AND IS DOCUMENTED IN FORMER REPORT OF THIS ESTIMATE.

6. REMARKS

- A.1 ASSUME PROCUREMENT BY OTHERS. THIS ESTIMATE DOES NOT INCLUDE ANY COST ASSOCIATED WITH PROCUREMENT.
B.1 CARBON STEEL OVERPACK SUPPORTARY PRICING BY RAYMAR SALES ZEMMELICK WA.
C.1 CONCRETE OVERPACK SUPPORTARY PRICING BY CENTRAL PREMIX/PRODUCT SERVICES WA.
D.1 DRAFT SCOPE OF WORK DID NOT INCLUDE ATTACHED CONCEPT. BASIS FOR CONFIGURATION OF OVERPACKS WAS DEVELOPED BY FORM COST ESTIMATING.
E.1 REFERENCE - DRAFT SCOPE OF WORK, DESCRIPTION OF WORK. IT IS UNKNOWN AT THIS TIME IF THE ESTIMATING CONCEPT OF THE OVERPACK DESIGN COMPLIES WITH CURRENT REGULATIONS FOR ON SITE TRANSPORTATION AND STORAGE OF RADIOACTIVE WASTE.
F.1 THIS ESTIMATE IS NOT A TPC OR TEC ESTIMATE. THIS ESTIMATE IS TO SHOW ONLY THE COST TO FABRICATE AND DELIVER WASTE PACKAGE OVERPACKS.

FLUOR DANIEL, SOUTHWEST, INC.
 ROBERTER MARTIN, BARFORD CORP.
 1000 W. 10TH AVENUE
 P.O. BOX 1000
 DENVER, CO 80202
 FILE NO. 544724A1

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 DATE 06/21/85 08.43.07
 BY COL

FORM 001 - CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

WBS DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	OTHER COSTS	SUB TOTAL
200001 ILAH DISPOSAL OVERPAGES	45234642	0.00	0	0
PROJECT TOTAL	45,234,642	0	0	0

FLUOR DANIEL NORTHWEST, INC.
 LOCKHEED MARTIN HANFORD CORP
 JOB NO. 8457AAL/710001
 FILE NO. 2167AAL

** IEST - INTERACTIVE ESTIMATING **
 ILAW DISPOSAL OVERPACKS
 PLANTING ESTIMATE
 PERHRS - ESTIMATE DETAILS BY WBS / COST CODE

PAGE . 2
 DATE 86/12/97 08:47:21
 BY CGL

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANDBOOK	LABOR	EQUIP USOR	MATERIAL	CONTRACT	EQUIP. HRS	DMAP / M & I	TOTAL DOLLARS

REPORT TOTAL				*		*	45,215,662	0	0	0	45,215,662

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Table A-24 Radiation Exposure Estimate for Transporting Remote-Handled Immobilized Low-Activity Waste Containers to Disposal Based On Transportation Shielding Requirements

Table A-24 Radiation Exposure Estimate for Transporting Remote-Handled LAMP Containers to Disposal Based On Transportation Shielding Requirements															
Position	Truck Drivers			Processor Operators			HPTs			HHEs/HTs			Crane Operators		
	Time hr	Dose Rate mrem/hr	Exposure mrem	Time hr	Dose Rate mrem/hr	Exposure mrem	Time hr	Dose Rate mrem/hr	Exposure mrem	Time hr	Dose Rate mrem/hr	Exposure mrem	Time hr	Dose Rate mrem/hr	Exposure mrem
General Operational Step															
1. Transport Container from VIL Bldg	0.25	2.8	0.7	0.25	0.25	0.13	0.25	0.25	0.08	0.25	0.25	0.06	0.25	0.25	0.06
2. Position Transporter in Receiving Area	0.25	2.8	0.7	0.25	0.25	0.13	0.25	0.25	0.08	0.25	0.25	0.06	0.25	0.25	0.06
3. Stabilize and Disconnect Trailer	0.25	2.8	0.7	0.25	0.25	0.13	0.25	0.25	0.08	0.25	0.25	0.06	0.25	0.25	0.06
4. Remove Trailer and Close Door	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04
5. Remove Cook Lid and Store	0.30	0.25	0.08	0.30	0.25	0.07	0.30	0.25	0.08	0.30	0.25	0.08	0.30	0.25	0.08
6. Inspect & Survey Cook & LAMP Container	0.8	0.25	0.2	0.8	0.25	0.2	0.8	0.25	0.2	0.8	0.25	0.2	0.8	0.25	0.2
7. Position Crane Pick-Up LAMP Container	0.5	0.25	0.13	0.5	0.25	0.13	0.5	0.25	0.13	0.5	0.25	0.13	0.5	0.25	0.13
8. Transfer LAMP Container to Location	0.25	0.25	0.06	0.25	0.25	0.13	0.25	0.25	0.08	0.25	0.25	0.06	0.25	0.25	0.06
9. Place LAMP Container into Poolish	0.08	0.25	0.01	0.08	0.25	0.05	0.08	0.25	0.01	0.08	0.25	0.01	0.08	0.25	0.01
10. Move Crane to Cook Lid Location	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04
11. Remove & Replace Cook Lid	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04	0.17	0.25	0.04
12. Open Door and Connect Trailer	0.25	0.25	0.06	0.25	0.25	0.13	0.25	0.25	0.08	0.25	0.25	0.06	0.25	0.25	0.06
13. Transport from VIL to VIL Bldg	0.25	0.08	0.01	0.25	0.08	0.13	0.25	0.08	0.01	0.25	0.08	0.01	0.25	0.08	0.01
Total per 1 Container Trailer	3.4		2.6	3.4		2.3	3.4		1.4	3.4		0.8	3.4		0.8
Exposure per Person at Capacity Interface			1250			375			175			425			425
Exposure can occur per Container									10						
Max Cont. Exposure at 1000 mrem/yr Limit									2000			3500			7000
Personnel at 5000 & 7500 mrem/yr Limit			2544			625			6000			23600			29400
Personnel at 5000 & 7500 mrem/yr Limit			8786			17625									
Assumptions:									1670 average and 2000 peak						
Personnel at 5000 & 7500 mrem/yr Limit									6000 average and 8000 peak						
Assumptions:															
1. Surface dose 1000 mrem/yr (5000 Cpm) in C-157 glass mobile waste form and 1.25 cm steel wall of LAMP container															
2. 5.4 cm steel shielding for transportation includes the dose rate to the following:															
- 10 mrem/yr at 2.5 m															
- 2.5 mrem/yr at 3.0 m															
- 2.5 mrem/yr at 3.5 m															
3. Activity shielding reduces dose rate to 0.25 mrem/yr in 6.5 m air operating area															
4. 1 shielded container per truck trailer															
5. Personnel in vehicle operation															
6. 3 hr 20 min total net ground time															

Table A-25. Radiation Exposure Estimate for Transporting Contact-Handled Immobilized Low-Activity Waste Containers to Disposal Based on Transportation Shielding Requirements

Table A-25 Radiation Exposure Estimates for Transporting Compact High-Level (CHLW) Containers to Disposal Based on Transportation Shielding Requirements															
Position	Truck Driver			Process Operators			HRTs			Maintenance			Facility Operators		
	Time hr	Dose Rate mrem/hr	Exposure mrem	Time hr	Dose Rate mrem/hr	Exposure mrem	Time hr	Dose Rate mrem/hr	Exposure mrem	Time hr	Dose Rate mrem/hr	Exposure mrem	Time hr	Dose Rate mrem/hr	Exposure mrem
Sequential Operations Only															
1. Transport Containers from VLS Bldg	0.25	2.3	0.58	0.25	0.26	0.06	0.25	0.23	0.06	0	0	0	0.25	0.28	0.06
2. Position Containers	0.25	2.3	0.58	0.25	0.26	0.06	0.25	0.23	0.06	0	0	0	0.25	0.28	0.06
3. Subarea 2 Container Trailer	0.25	2.3	0.58	0.25	0.26	0.06	0.25	0.23	0.06	0	0	0	0.25	0.28	0.06
4. Remove Tilt Container and Store	0.25	0.26	0.13	0.25	0.26	0.06	0.25	0.23	0.06	0	0	0	0.25	0.28	0.06
5. Inspect & Survey 2 Containers	0.67	0.23	0.18	0.67	2.3	1.5	0.67	2.3	1.5	0	0	0	0.67	0.28	0.19
6. Move Pallet to Trailer	0.05	0.25	0.01	0.05	0.23	0.01	0.05	0.23	0.01	0	0	0	0.05	0.25	0.01
7. Pick up 1st Container to Pallet	0.05	0.25	0.01	0.05	0.23	0.01	0.05	0.23	0.01	0	0	0	0.05	0.25	0.01
8. Transfer Container to Location	0.17	0.23	0.04	0.17	0.23	0.04	0.17	0.23	0.04	0	0	0	0.17	0.23	0.04
9. Place Container into Pallet	0.06	0.23	0.02	0.06	0.23	0.02	0.06	0.23	0.02	0	0	0	0.06	0.23	0.02
10. Rollout Pallet to Trailer	0.75	0.23	0.04	0.75	0.23	0.06	0.75	0.23	0.04	0	0	0	0.75	0.23	0.04
11. Pick Up 2nd Container w/ Pallet	0.05	0.23	0.01	0.05	0.23	0.01	0.05	0.23	0.01	0	0	0	0.05	0.23	0.01
12. Transfer Container to Location	0.17	0.23	0.04	0.17	0.23	0.04	0.17	0.23	0.04	0	0	0	0.17	0.23	0.04
13. Place Container into Storage	0.06	0.23	0.02	0.06	0.23	0.02	0.06	0.23	0.02	0	0	0	0.06	0.23	0.02
14. Move Pallet to Storage	0.17	0.23	0.04	0.17	0.23	0.04	0.17	0.23	0.04	0	0	0	0.17	0.23	0.04
15. Inspect & Survey Trailer	0.25	0.26	0.06	0.25	0.26	0.06	0.25	0.26	0.06	0	0	0	0.25	0.26	0.06
16. Transport from VLS to VLS Bldg	0.25	0.23	0.06	0.25	0.23	0.06	0.25	0.23	0.06	0	0	0	0.25	0.23	0.06
Total for 2 Containers Trailer	3.4		2.3	3.4		3.4		2.4		0		0	3.4		2.3
Exposure per Person at Capacity Assembly	1170			1637			1081			0			1000		
Exposure per Month per Container															
No Cont. Transported in 1000 monthly Limit															
Based on 3 Shifts & 1 Disposal Unit	2469			1696			2469						2708		
Based on 3 Shifts & 3 Disposal Units	10456			3231			4968						11254		
Production Rates															
Phase I Number Containers per yr	4700 average and 5000 peak														
Phase II Number Containers per yr	6400 average and 6000 peak														
Assumptions															
a. surface dose rate of 260 mrem/hr (0.01 mCi/cm ² of 137Cs waste) from 1.63 cm steel wall of CHLW container plus 0.5 cm steel cladding															
b. 2 x 2 cm steel shielding for transportation produces the following dose rates															
c. 10 mrem at 2.0 m															
d. 2.3 mrem at 3.0 m															
e. 2.0 mrem at 4.0 m															
f. 2 containers per truck trailer															
g. shielded trailer															
h. manual contact operation															
i. 3 hr 20 min interturnaround time															

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APPENDIX B

CONSTRAINTS ON DESIGN OF THE IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL FACILITY

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APPENDIX B

CONSTRAINTS ON DESIGN OF THE IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL FACILITY

Italic type = requirement was added to RDD 100 baseline before Feb review of Borneman/Burbank/Klem.

~~Reference~~ = change or requirement added based on Feb review or subsequent information.

Code of Federal Regulations

Document Identifier	Title	Applicable	Justification
TITLE 10 ENERGY PART 61 LICENSING REQUIREMENTS FOR LAND DISPOSAL OF RADIOACTIVE WASTE			
10 CFR 61.41	Subpart C- Performance Objectives Protection of the general population from releases of radioactivity	Y	<p>Limitations on annual dose to the public by effluents to the public. Reasonable effort to maintain releases of radioactivity in effluents to general environment or public to ALARA.</p> <p>Note: Planned vitrification of dangerous and extremely hazardous wastes provides the best achievable management method to remove and reduce the waste harmful properties or characteristics provided processing is performed in accordance with applicable requirements.</p>
10 CFR 61.42	Subpart C- Performance Objectives <i>Protection of individuals from inadvertent intrusion</i>	Y	Design, operation and closure of land disposal facility ensures protection of individual inadvertently intruding into disposal site, occupying site or contacting waste after loss of institutional controls over the disposal site.

Code of Federal Regulations

Document Identifier	Title	Applicable	Justification
10 CFR 61.43	Subpart C- Performance Objectives Protection of individuals during operation	Y	Disposal operations must be conducted in compliance with standards for radiation protection in part 10 CFR 20 , except for releases of radioactivity which shall be governed by 10 CFR 61.41. Every reasonable effort shall be made to maintain radiation exposures ALARA.
10 CFR 61.44	Subpart C - Performance Objectives Stability of the disposal site after closure	Y	Disposal facility must be sited, designed, used, operated and closed to achieve long-term stability of the disposal site and eliminate to the extent practicable the need for ongoing active maintenance of the disposal site following closure so that the only surveillance, monitoring or major custodial care are required.
10 CFR 61.45	Subpart C- Performance Objectives Stability of the disposal site after closure	N	Disposal operations must be conducted in compliance with standards for radiation protection in part 10 CFR 20 , except for releases of radioactivity which shall be governed by 10 CFR 61.41. Every reasonable effort shall be made to maintain radiation exposures ALARA.

Code of Federal Regulations

Document Identifier	Title	Applicable	Justification
10 CFR 61.51	<p><i>Subpart D - Technical Requirements for Land Disposal Facilities</i></p> <p><i>Disposal site design for land disposal</i></p>	Y	<p>Disposal site design for near surface disposal:</p> <ol style="list-style-type: none"> 1. Features designed toward long-term isolation and avoidance of need for continuing active maintenance and site closure. 2. Design and operation must be compatible with site closure and stabilization. 3. Designed to complement and improve where appropriate ability of disposal site's natural characteristics. 4. Cover designed to minimize to the extent practicable water infiltration. 5. Surface features designed to direct surface water drainage away from disposal units at velocities and gradients that will not result in erosion and ongoing active maintenance in the future. 6. Designed to minimize to extent practicable contact of water with waste during disposal and percolating or standing water after disposal.

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Document Identifier	Title	Applicable	Justification
10 CFR 61.52	Subpart D - Technical Requirements for Land Disposal Facilities Land disposal facility operation and disposal site closure	Y	<ol style="list-style-type: none"> 4. Waste emplacement shall maintain package integrity, minimize void spaces between packages and permit filling of void spaces. 5. Fill void spaces with earth or other material to reduce future subsidence within the fill. 6. Place and cover waste to limit radiation dose rate at surface of cover to levels that at minimum permit licensee to comply with all provisions. 7. Boundary and locations of each disposal unit be accurately located, mapped and marked. 8. Buffer zone of land maintained between buried waste and disposal site boundary. 9. Complete closure and stabilization methods as set forth in approved site closure plan. 10. Active waste disposal operations must not have adverse effect on completed closure and stabilization measures. 11. Only mixed wastes shall be disposed of at the disposal site.
10 CFR 61.53	Subpart D - Technical Requirements for Land Disposal Facilities Environmental monitoring	Y	During land disposal site construction and operation maintain a monitoring program. After disposal site closure maintain a monitoring system.
10 CFR 61.55	Subpart D - Technical Requirements for Land Disposal Facilities Waste classification	N	Guidelines for classification of radioactive waste as NRC Class A, Class B and Class C. Waste exceeding Class C generally not acceptable for near-surface disposal.

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Document Identifier	Title	Applicable	Justification
10 CFR 61.80	Subpart G Records, Reports, Tests and Inspections Maintenance of records, reports and transfers	N	covered under sections 73, 74, 75, 77 and 174 of 40 CFR 264. Not applicable to the program.
10 CFR 61.81	Subpart G Records, Reports, Tests and Inspections Internal	N	covered under sections 73, 74, 75, 77 and 174 of 40 CFR 264. Not applicable to the program.
10 CFR 61.82	Subpart G Records, Reports, Tests and Inspections Internal	N	covered under sections 73, 74, 75, 77 and 174 of 40 CFR 264. Not applicable to the program.
10 CFR 61.80	Subpart G Records, Reports, Tests and Inspections Maintenance of records, reports and transfers	N	Covered under sections 73, 74, 75, 77 and 174 of 40 CFR 264.
10 CFR 61.83	Subpart G Records, Reports, Tests and Inspections Internal	N	covered under sections 73, 74, 75, 77 and 174 of 40 CFR 264. Not applicable to the program.

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Document Identifier	Title	Applicable	Justification
100-443894	Subject's Records and Instructions Continuation of Series of Individuals	X	Subject's Records and Instructions are maintained in the files of the Department of Justice and are not available for release.

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Document Identifier	Title	Applicable	Justification
TITLE 10 ENERGY SUBPART 830 NUCLEAR SAFETY MANAGEMENT			
10 CFR 830.120 a-c	Subpart A - General Provisions Quality Assurance Requirements	Y	a) General rule <ul style="list-style-type: none"> • Conduct work in accordance with criteria of paragraph (c) below. • Develop and submit for approval by DOE a QAP for the work. • Implement the QAP as approved and modified by DOE. b) Develop QAP using criteria of paragraph (c) c) Quality assurance criteria elements <ul style="list-style-type: none"> • Management • Performance • Assessment
10 CFR 830.120 d-e	Subpart B - Organization Subpart C - Management Subpart D - Performance Subpart E - Assessment	Y	Subpart B - Organization Subpart C - Management Subpart D - Performance Subpart E - Assessment

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Document Identifier	Title	Applicable	Justification
TITLE 40 PROTECTION OF THE ENVIRONMENT PART 61 NATIONAL EMISSION STANDARDS FOR HAZARDOUS POLLUTANTS			
40 CFR 61.90	<i>Subpart H National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities</i> <i>Designation of facilities</i>	Y	<p>Applicable to operations at any DOE facility that emits any radionuclide other than radon-222 and radon-220 into the air, except disposal facilities subject to 40 CFR 191 subpart B or 40 CFR 192 (both non LAW).</p> <p>Note: ILAW in sealed and decontaminated containers are not a source of radioactive emission.</p>
40 CFR 61.91	<i>Subpart H National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities</i> <i>Standard</i>	Y	<p>Emissions of radionuclides to ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.</p> <p>See requirements of WAC 173.480.60 and WAC 246.247.</p>

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Document Identifier	Title	Applicable	Justification
TITLE 40 PROTECTION OF THE ENVIRONMENT PART 260 HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL			
40 CFR 260.22 a-d,f,h-i	<i>Subpart C - Rulemaking Petitions</i> <i>Petitions to amend part 261 to exclude a waste produced at a particular facility</i>	Y	The alternative to RCRA controls for storage and disposal is petition for delisting of ILAW from DST/SST (codes F, C, R, E, T and assuming favorable test results with aerial wastes). No requirements available at this time for mixed waste. Delisting of verified hazardous waste has enormous potential for simplifying storage and disposal requirements.
TITLE 40 PROTECTION OF THE ENVIRONMENT PART 264 STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITIES			
40 CFR 264.13 a	<i>Subpart B - General Facility Standards</i> <i>General waste analysis</i>	Y	<p>Before disposal of any hazardous waste obtain detailed chemical and physical analysis from a representative sample of the waste. The analysis must contain all the information needed for disposal of the waste in accordance with requirements. The information shall be included in the data base of the facility.</p> <p>Don't have to do this if you're not going to dispose of the waste at the facility.</p> <p>Note: Detailed analysis is needed for disposal and responsibility of the pretreatment operation.</p>
40 CFR 264.14 a	<i>Subpart B - General Facility Standards</i> <i>Security</i>	Y	<p>Prevent unauthorized entry and minimize possibility of unauthorized entry of persons or livestock onto the active portion of the facility.</p> <p>Don't have to do this if you're not going to dispose of the waste at the facility.</p>

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Document Identifier	Title	Applicable	Justification
40 CFR 264.15 a-d	Subpart B - General Facility Standards General inspection requirements	Y	Inspect facility for malfunctions, deterioration, operator errors which may be causing or lead to release of hazardous waste components to the environment or threat to human health. Remedy any deterioration or malfunction of equipment or structures on a schedule that the problem does not lead to an environmental or human health hazard. Record inspection in log and maintain records for at least 3 yr. Facility personnel must successfully complete a program of class room training or on-the-job training that enables them to perform their duties in a way that ensures the facility's compliance with requirements.
40 CFR 264.16 a-e	Subpart B - General Facility Standards Personnel training	Y	Facility personnel must successfully complete a program of class room training or on-the-job training that enables them to perform their duties in a way that ensures the facility's compliance with requirements. Training must be completed 6 mo after date of employment or assignment to the facility or new position at the facility. Maintain documents and records of personnel for each position at the facility <ul style="list-style-type: none"> • training records on former employees must be kept for at least 3 yr from date of employment last worked at facility • training records on current employees kept until closure Facility personnel must successfully complete a program of class room training or on-the-job training that enables them to perform their duties in a way that ensures the facility's compliance with requirements.
40 CFR 264.18 ab	Subpart B - General Facility Standards Location Standards	Y	Disposal unit may not be located in a 100 year floodplain or within 61 meters (200 ft) of a fault which has displacement in Holocene time. Facility personnel must successfully complete a program of class room training or on-the-job training that enables them to perform their duties in a way that ensures the facility's compliance with requirements.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.31	Subpart C - Preparedness and Prevention Design and operation of facility	Y	Facility must be designed, constructed, operated to minimize the possibility of a fire, explosion or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, surface water which could threaten human health or the environment.
40 CFR 264.32 a-d	Subpart C - Preparedness and Prevention Required equipment	Y	The following equipment is required in all facilities unless it can be demonstrated that none of the hazards posed by waste handled at the facility could require a particular kind of the following equipment. a) Internal communications or alarm system capable of providing immediate emergency instruction to facility personnel. b) A device capable of summoning emergency assistance. c) Portable fire extinguisher, fire control equipment, spill control equipment and decontamination equipment. d) Adequate water or foam producing equipment.
40 CFR 264.33	Subpart C - Preparedness and Prevention Testing and maintenance of equipment	Y	All facility communications or alarm systems, fire protection equipment spill control and decontamination equipment where required must be tested and maintained as necessary to assure its proper operation in time of emergency.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.73 ab	Subpart E - Manifest System, Record Keeping and Reporting Operating record	Y	Maintain a current written operating record at the facility until closure of the facility. Waste receipt, storage location and quantity of each hazardous waste, inspections and details of incidents must be recorded. Operating record must be maintained until closure of the facility.
40 CFR 264.74 a-c	Subpart E - Manifest System, Record Keeping and Reporting Availability, retention and disposition of records	Y	All records including plans must be furnished upon request and made available at all reasonable times for inspection. Retention period for all records automatically extended during the course of any unresolved enforcement action regarding the facility or as requested by the Administrator. Copy of records of waste disposal and quantities must be submitted up on closure of the facility. Records must be maintained until closure of the facility.
40 CFR 264.75	Subpart E - Manifest System, Record Keeping and Reporting Biennial report	Y	Prepare and submit a copy of a biennial report by March 1 of each even numbered year. Biennial report must be submitted by March 1 of each even numbered year.
40 CFR 264.77 a-c	Subpart E - Manifest System, Record Keeping and Reporting Additional reporting	Y	Prepare and submit reports as necessary on releases, fire, explosions, corrective measures, facility closures and other applicable requirements. Reports must be submitted as necessary on releases, fire, explosions, corrective measures, facility closures and other applicable requirements.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.90 ab	Subpart F - Releases from Solid Waste Management Units Applicability	Y	Regulated unit(s) are not subject to regulation for releases into the upper most aquifer if exempt under 264.1 or Administrator finds: <ul style="list-style-type: none"> • an engineered structure • does not receive or contain liquid waste or wastes contain free liquids • designed and operated to exclude liquid, precipitation and other run-on and run-off • has both inner and outer layers of containment enclosing the waste • has leak detection system built into each containment layer • provide continuing operation and maintenance of leak detection system during active life of the unit and the closure and post closure care periods • to a reasonable degree of certainty will not allow hazardous constituents to migrate beyond the outer containment layer before the end of the post closure period.
40 CFR 264.101 ab	Subpart F - Releases from Solid Waste Management Units Corrective action for solid waste management units	Y	Institute a corrective action as necessary to protect human health and the environment for all releases of hazardous waste or constituents from any waste management unit at the facility regardless of the time the waste was placed in such unit. Corrective action will be specified in the permit. Corrective action will be specified in the permit. The permit will specify the corrective action to be taken if a release of hazardous waste or constituents is detected.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.111 a-c	Subpart G - Closure and Post Closure Closure performance standard	Y	Closes facility in manner that: <ul style="list-style-type: none"> • minimizes further maintenance • controls, minimizes to the extent necessary to protect human health and the environment, post closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off or hazardous waste decomposition products to the ground or surface waters or to the atmosphere • complies with closure requirements
40 CFR 264.113 a-c	Subpart G Closure and Post Closure Care Closure; time allowed for closure	Y	Complete final closure within 90 or 180 days of receiving the final volume of hazardous waste in accordance with approved closure plan. A longer period may be approved by Administrator after compliance with requirements for requesting a modification to the permit (at least 30 days before expiration date) and demonstrated activities take longer.
40 CFR 264.114	Subpart G - Closure and Post Closure Care Disposal or decontamination of equipment, structures and soils	Y	During the partial and final closure period all contaminated equipment, structures and soils must be properly disposed of or decontaminated. Removal of hazardous waste or constituents during partial and final closure may be hazardous waste generation and require handling wastes in accordance with 40 CFR 262.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.117	Subpart G - Closure and Post Closure Care Post-closure care and use of property	Y	Post closure care for each hazardous waste management unit must begin after completion of closure and continue for 30 yr after that date. It must consist of at least: <ul style="list-style-type: none"> • monitoring and reporting in accordance with applicable requirements • monitoring and maintenance of waste containment system in accordance with applicable requirements Duplicates WAC 173-303.
40 CFR 264.171	Subpart I - Use and Management of Containers Condition of containers	N	Applicable to facilities that store hazardous waste for a temporary period, at the end of which the waste is treated, disposed of or stored else where. Not different from existing Note: Concern on any waste collected and stored during disposal operation of ILAV. Waste may need to be assessed against the designation requirements. See WAC 173.490.025 for exemption on VOC materials used for maintenance.
40 CFR 264.172	Subpart I - Use and Management of Containers Compatibility of waste with containers	N	Applicable to facilities that store hazardous waste for a temporary period, at the end of which the waste is treated, disposed of or stored else where. Not different from existing Note: There is good compatibility of mixed waste with container for disposal.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.173 ab	Subpart I - Use and Management of Containers Management of containers	N	Applicable to facilities that store hazardous waste for a temporary period, at the end of which the waste is treated, disposed of or stored else where. duplicate WAC 173-303 Note: Concern on any waste collected and stored during disposal operation of ILAW. Waste may need to be assessed against the designation requirements. Containers of hazardous waste must not be opened during storage except when adding or removing waste. It must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.
40 CFR 264.174	Subpart I - Use and Management of Containers Inspections	N	Applicable to facilities that store hazardous waste for a temporary period, at the end of which the waste is treated, disposed of or stored else where. Duplicates WAC 173-303. Note: Concern on any waste collected and stored during disposal operation of ILAW. Waste may need to be assessed against the designation requirements. At least weekly inspect areas where waste containers are stored. Look for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.175 c	Subpart I - Use and Management of Containers Containment	N	Applicable to facilities that store hazardous waste for a temporary period, at the end of which the waste is treated, disposed of or stored else where. Facilities that store hazardous waste Note: Concern on any waste collected and stored during disposal operation of ILAW. Waste may need to be assessed against the designation requirements. Hazardous waste container storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting precipitation or containers are elevated or protected from contact with accumulated liquid.
40 CFR 264.176	Subpart I - Use and Management of Containers Special requirements for ignitable or reactive waste	N	Applicable to facilities that store hazardous waste for a temporary period, at the end of which the waste is treated, disposed of or stored else where. Facilities that store hazardous waste Note: ILAW containers do not contain ignitable or reactive waste.
40 CFR 264.177 a,c	Subpart I - Use and Management of Containers Special requirements for incompatible waste	N	Applicable to facilities that store hazardous waste for a temporary period, at the end of which the waste is treated, disposed of or stored else where. Facilities that store hazardous waste Note: ILAW does not contain incompatible wastes or incompatible wastes and material.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.178	Subpart I - Use and Management of Containers Closure	Y	Applicable to facilities that store hazardous waste for a temporary period, at the end of which the waste is treated, disposed of or stored elsewhere. Note: Concern on any waste collected and stored during disposal operation of ILAW. Waste may need to be assessed against the designation requirements. At closure all stored hazardous waste and hazardous waste residues must be removed from containment system. Remaining containers, bases and soil of stored leachate contaminated with hazardous waste or hazardous waste residues must be decontaminated or removed.
40 CFR 264.603	Subpart X - Miscellaneous Units Post closure care	N	Applicable to hazardous waste management units where hazardous waste is disposed of and is not a container, tank, landfill, etc., with appropriate technical standards or not eligible for a research, development and demonstration permit. <i>Duplicates WAC 173-303</i>
40 CFR 264.1032 a	Subpart AA - Air Emission Standards Process vents	N	Disposal facility has no distillation, fractionation, thin film evaporation, solvent extraction or air or steam stripping operations of hazardous waste with organic concentrations of at least 10 ppmw. Note: The ILAW will be placed in a container that will be leak-tight. ANSI M14.5 or equivalent method should be used to determine if container is leak tight. The container should be designed to remain leak tight for 50 years or longer under ambient temperatures and pressure.

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Document Identifier	Title	Applicable	Justification
40 CFR 264.1054 a-c	Subpart BB - Air Emission Standards Pressure relief devices in gas/vapor service	N	Applicable to equipment that contains or contacts hazardous waste with organic concentrations exceeding 10 percent by weight. Applicable to equipment that contains or contacts hazardous waste with organic concentrations exceeding 10 percent by weight.
40 CFR 264.1102 ab	Subpart DD - Containment Buildings Closure and post closure care	N	Applicable to treatment or storage of hazardous waste. Applicable to treatment or storage of hazardous waste. Note: Concern on any wastes collected and stored during disposal operation of ILAW. These wastes may need to be assessed against the designation requirements. See WAC 173.490.025 for exemption on VOC materials used for maintenance.
TITLE 40 PROTECTION OF THE ENVIRONMENT PART 268 LAND DISPOSAL RESTRICTIONS (Assessment of waste management and disposal practices for hazardous waste treatment, storage, and disposal)			
40 CFR 268.1 a,c	Subpart A - General Purpose, scope and applicability	N	Planned treatment by vitrification of LAW should meet treatment standards for onsite land disposal of hazardous waste.
40 CFR 268.50 a2	Subpart E - Prohibitions on storage Prohibitions on storage of restricted waste	N	Note: Concern on any wastes collected and stored during disposal operation of ILAW. These wastes may need to be assessed against the designation requirements. Each container of stored hazardous waste must be clearly marked to identify its contents and the date each period of accumulation begins.

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Document Identifier	Title	Applicable	Justification
40 CFR 268.35. j	Subpart C - Prohibitions on Land Disposal Waste specific prohibitions - Third waste	N	Planned treatment by vitrification of LAW should meet treatment standards for on-site land disposal of hazardous waste. Note: The initial generator must test a representative sample of the waste extract or end-re waste, depending on whether the treatment standards are expressed as concentrations in the waste extract or the generator may use knowledge of the waste. If waste exceeds applicable subpart D levels, waste is prohibited for land disposal.
40 CFR 268.37	Subpart C - Prohibitions on Land Disposal Waste specific prohibitions - ignitable and corrosive characteristic waste whose treatment standards were vacated	N	Planned vitrification of LAW should meet the required treatment standards for D001 and D002 waste codes. The exterior of the containers must be free of contamination to eliminate/minimize generation of regulated debris or air emissions during the disposal operation.
40 CFR 268.40	Subpart D - Treatment Standards Applicability of treatment standards	N	Planned vitrification of LAW should meet required treatment standards for hazardous wastes. The exterior of the containers must be free of contamination to eliminate/minimize generation of regulated debris or air emissions during the disposal operation.
40 CFR 268.41 a-c	Subpart D - Treatment Standards Treatment standards expressed as concentration in waste extract	N	Same as 40 CFR 268.40

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Document Identifier	Title	Applicable	Justification
40 CFR 268.42a	Subpart D - Treatment Standards Treatment standards expressed as specified technologies	N	DST and SST waste contains no PCBs unless K basin sludge is stored in DSTs. ILAW should not contain halogenated organic compounds in total concentration of ≥ 1000 mg/kg. The exterior of the canisters must be free of contamination to eliminate/minimize generation of regulated debris air emission and waste water during the disposal operation.
TITLE 40 PROTECTION OF THE ENVIRONMENT PART 50 NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS			
40 CFR 50.4	Subpart C - Air Programs National primary ambient air quality standards for sulfur oxides (sulfur dioxide)	Y	ILAW in sealed and clean canisters should not generate or release sulfur oxide gas. When the canisters are sealed, the canisters should not generate or release sulfur oxide gas. The canisters should be sealed in a clean, dry, and well-ventilated area. The canisters should be sealed in a clean, dry, and well-ventilated area. The canisters should be sealed in a clean, dry, and well-ventilated area.
40 CFR 50.5	Subpart C - Air Programs National secondary ambient air quality standards for sulfur oxides (sulfur dioxide)	Y	ILAW in sealed and clean canisters should not generate and release secondary sulfur oxide gas. When the canisters are sealed, the canisters should not generate or release sulfur oxide gas. The canisters should be sealed in a clean, dry, and well-ventilated area. The canisters should be sealed in a clean, dry, and well-ventilated area. The canisters should be sealed in a clean, dry, and well-ventilated area.
40 CFR 50.6	Subpart C - Air Programs National primary and second ambient air quality standards for particulate matter	Y	ILAW in sealed and clean canisters should not release air borne particulate matter. When the canisters are sealed, the canisters should not release air borne particulate matter. The canisters should be sealed in a clean, dry, and well-ventilated area. The canisters should be sealed in a clean, dry, and well-ventilated area. The canisters should be sealed in a clean, dry, and well-ventilated area.

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Document Identifier	Title	Applicable	Justification
40 CFR 50.8.a	Subpart C - Air Programs National primary ambient air quality standards for carbon monoxide	☒	ILAW in sealed and clean canisters should not generate and release carbon monoxide gas. This is not a concern for the ILAW as it is not sealed and clean canisters should not generate and release carbon monoxide gas.
40 CFR 50.9	Subpart C - Air Programs National primary and second ambient air quality standards for ozone	☒	ILAW in sealed and clean canisters should not generate and release ozone gas. This is not a concern for the ILAW as it is not sealed and clean canisters should not generate and release ozone gas.
40 CFR 50.11.a-b	Subpart C - Air Programs National primary and secondary ambient air quality standard for nitrogen dioxide	☒	ILAW in sealed and clean canisters should not generate and release nitrogen dioxide gas. This is not a concern for the ILAW as it is not sealed and clean canisters should not generate and release nitrogen dioxide gas.
40 CFR 50.12	Subpart C - Air Programs National primary and secondary ambient air quality for lead	☒	ILAW in sealed and clean canisters should not generate and release volatile lead or lead compounds. This is not a concern for the ILAW as it is not sealed and clean canisters should not generate and release volatile lead or lead compounds.

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Document Identifier	Title	Applicable	Justification
TITLE 173 DEPARTMENT OF ECOLOGY CHAPTER 303 DANGEROUS WASTE REGULATIONS			
WAC 173.303.140, 4, 5	<i>Land disposal restrictions</i> <i>Land disposal restrictions and prohibitions</i> <i>Treatment in land disposal facilities</i>	Y Y Y	Planned vitrification of dangerous and extremely hazardous wastes provides the best achievable management method to remove and reduce the wastes' harmful properties or characteristics provided processing is performed in accordance with applicable requirements. Exemption may be obtained for land disposal of treatment residuals from exterior of containers.
WAC 173.303.141	Treatment in land disposal facilities	Y	Exemption may be obtained for land disposal of treatment residuals from exterior of containers.
WAC 173.303.145.3	<i>Spills and discharges to the environment</i> <i>Mitigation and control</i>	Y	A spill of dangerous waste or hazardous substances (e.g. rupture of ILAW container or use of a substance at disposal facility) requires appropriate immediate action to protect human health and the environment.

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Document Identifier	Title	Applicable	Justification
WAC 350.03.010	Section 350.03.010 Prohibition of Sale	§	Section 350.03.010 is a prohibition of sale. It is not a rule that is subject to the rulemaking process. It is a rule that is subject to the rulemaking process.
WAC 350.03.020	Section 350.03.020 Prohibition of Sale	§	Section 350.03.020 is a prohibition of sale. It is not a rule that is subject to the rulemaking process. It is a rule that is subject to the rulemaking process.
WAC 350.03.030	Section 350.03.030 Prohibition of Sale	§	Section 350.03.030 is a prohibition of sale. It is not a rule that is subject to the rulemaking process. It is a rule that is subject to the rulemaking process.

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Document Identifier	Title	Applicable	Justification
WAC 173.303.100.1	General waste analysis	Y	Requires confirmation on knowledge of dangerous waste before disposal.
WAC 173.303.100.2	Central Region Comprehensive Environmental Response Facility	Y	Requires confirmation on knowledge of dangerous waste before disposal.
WAC 173.303.100.3	State of Washington	Y	Requires confirmation on knowledge of dangerous waste before disposal.
WAC 173.303.100.4	State of Washington	Y	Requires confirmation on knowledge of dangerous waste before disposal.
WAC 173.303.300	General waste analysis	Y	Requires confirmation on knowledge of dangerous waste before disposal. Note: An analysis of each ILAW container will be provided by the treatment operation and included in the manifest. See WAC 173.303.380 for facility record keeping.
WAC 173.303.310.1,2	Security Comply with requirements unless it can be demonstrated	Y	Security requirements depend on: <ul style="list-style-type: none"> Physical contact with the ILAW containers within the active portion of the facility will injure personnel or livestock Disturbance of wastes or equipment within active portion by personnel or livestock will not result violations of WAC 173.303

Washington Administrative Code

Document Identifier	Title	Applicable	Justification
WAC 173.303.310.2	<i>Security</i> <i>Facility requirements</i>	Y	Requirements: <ul style="list-style-type: none"> • Signs posted at each entrance to active portion and at other locations and • A 24 hr surveillance system which monitors and controls entry to the active portion or • A barrier which completely surrounds the active portion with a means to control access through entrances at all times
WAC 173.303.320	<i>General inspection</i>	Y	<ul style="list-style-type: none"> • Requires inspection of facility to prevent malfunctions and deterioration, operator errors and discharges which may lead to release of dangerous waste constituents to the environment or threat to human health. • Develop and follow a written schedule for inspection. • Remedy any problems revealed by the inspection on a schedule which prevents hazards to the public health and environment. Take remedial action immediately where a hazard is imminent or has occurred.
WAC 173.303.330	<i>Personnel training</i>	Y	<ul style="list-style-type: none"> • Provide a program of class room instruction or on-the-job training for facility personnel. • Develop and keep a written training plan at the facility. • Maintain training records of former employees for 3 yr and current employees until closure of the facility.
WAC 173.303.340	<i>Preparedness and prevention</i>	Y	Facilities must be designed, constructed, maintained and operated to minimize the possibility of fire, explosion or any unplanned sudden release or nonspilled release of dangerous waste or dangerous waste constituents to air, soil or surface or ground water which could threaten the public health or the environment.

Washington Administrative Code

Document Identifier	Title	Applicable	Justification
WAC 173.303.340.1	<i>Preparedness and prevention</i> <i>Required equipment</i>	Y	<p>All facilities must have the following equipment unless it can be demonstrated none of the hazards imposed by waste handled at facility could require a particular kind of equipment.</p> <ul style="list-style-type: none"> ▪ internal communications or alarm system capable of providing immediate emergency instruction ▪ device capable of summoning emergency assistance from local response teams ▪ portable fire extinguishers, fire control equipment, spill control equipment and decontamination equipment ▪ water at adequate volume and pressure to supply fire suppression system(s)
WAC 173.303.340.2	<i>Preparedness and prevention</i> <i>Access to communications or alarms</i>	Y	<p>Personnel must have immediate access to signaling devices:</p> <ul style="list-style-type: none"> • whenever dangerous waste is being handled and • whenever there is just one employee on the premises while the facility is operating.
WAC 173.303.340.3	<i>Preparedness and prevention</i> <i> aisle space</i>	Y	<p>Maintain aisle space to allow unobstructed movement personnel and equipment to any area of facility operation in an emergency unless it can be demonstrated that aisle space is not needed.</p>
WAC 173.303.380	<i>Facility record keeping</i>	Y	<p>Keep a written operating record at the facility:</p> <ul style="list-style-type: none"> ▪ types, quantities and management of dangerous waste ▪ available for inspection and retained until at least closure

Washington Administrative Code

Document Identifier	Title	Applicable	Justification
WAC 173.303.390	Facility reporting	Y	<ul style="list-style-type: none"> • Submit annual reports to WDOH per requirements. • Submit addition reports per requirements. • Maintain copy of above reports for 3 yr from date report was submitted.
WAC 173.303.395	Other general requirements	Y	<ul style="list-style-type: none"> • Requires facility to be designed, maintained, and operated in compliance with all applicable federal, state and local laws and regulations. • Loading areas of liquid dangerous waste must: <ul style="list-style-type: none"> - contain spills and leaks - prevent release of dangerous constituents to ground or surface waters - contain any wash waters from cleaning - allow for removal of collected wastes from spills, leaks and equipment cleaning • Label tanks and containers
WAC 173.303.610.2	Closure and post closure Applicability	Y	<p>Closes facility in a manner that:</p> <ul style="list-style-type: none"> • minimizes need for further maintenance • controls, minimizes or eliminates to the extent necessary to protect health and the environment post closure escape of dangerous waste, dangerous constituents, leachate, contamination run-off or dangerous waste decomposition products to the ground, surface water, ground water or atmosphere • returns land to appearance and use of surrounding land areas to the degree possible • meets closure requirements for removal or detoxification of dangerous wastes, waste residues, or equipment, bases, liners, soils, or other material containing or contaminated with dangerous wastes or waste residues.

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Document Identifier	Title	Applicable	Justification
WAC 173.303.610.4	<i>Closure and post closure</i> <i>Closure: time allowed for closure</i>	Y	Complete closure of facility according to approved closure plan in nominal 90 or 180 day period after receiving final volume of dangerous waste.
WAC 173.303.610.5	<i>Closure and post closure</i> <i>Disposal or decontamination of equipment structures and soils</i>	Y	Properly dispose or decontaminate all contaminated equipment, structures and soils during the partial and final closure periods (facility may become a generator of dangerous waste and must handle waste in accordance with all applicable requirements of WAC 173.303-170 through 173.303.230).
WAC 173.303.610.7	<i>Closure and post closure</i> <i>Post closure and use of property</i>	Y	Initiate post closure care after closure and continue for 30 yr after that date for each dangerous waste management unit.
WAC 173.303.630	<i>Use and management of containers</i>	Y	Regulations in this section are applicable to dangerous waste facilities that store/manage containers of dangerous waste for a temporary period of time. Note: Concern on any treatment residuals or wastes collected and stored from the active portion during disposal of LLAW. These wastes may need to be assessed against the designation requirements in WAC 173.303.9904 and WAC 173.303.9905. If stored waste has been determined to be dangerous, then these regulations are applicable. See WAC 173. for exception on VOC materials used for maintenance. REGULATIONS ARE NOT APPLICABLE TO WASTE MANAGEMENT UNITS.

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Document Identifier	Title	Applicable	Justification
WAC 173.303.640	Tank systems	N	<p>Regulations in this section apply to facilities that use tank systems to treat or store dangerous waste.</p> <p>Note: Concern on any wastes collected and stored from the active portion during disposal of ILAW. These wastes may need to be assessed against the designation requirements in WAC 173.303.9904 and WAC 173.303.9905. If stored waste has been determined to be dangerous, then these regulations are applicable. See WAC 173.490.025 for exception on VOC materials used for maintenance. See WAC 173.490.025 for exception on VOC materials used for maintenance.</p>
WAC 173.303.645	Releases from regulated units	Y	<ul style="list-style-type: none"> Applies to regulated units that receive any dangerous waste and which cause the waste to be regulated for purposes of detecting, characterizing and responding to releases to the upper most aquifer. Identifies requirements for regulated units not subject to regulation for releases to upper most aquifer.
WAC 173.303.646.1	Corrective action Purpose and applicability	Y	Provisions establish requirements for corrective action for releases of dangerous waste and dangerous constituents.
WAC 173.303.646.2	Corrective action Requirements	Y	Requires instituting corrective action as necessary to protect human health and the environment for all releases of dangerous wastes and dangerous constituents.
WAC 173.303.665.1	Landfills Applicability	Y	ILAW land disposal facility is considered a landfill.

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Document Identifier	Title	Applicable	Justification
WAC 173.303.665.2.a,b	Landfills Design and operating conditions	Y	Landfills operating before specified dates of 1992 must have a non permeable liner for all portions of the landfill that functions through its scheduled closure. New land fill which construction commences after 01/29/92 or lateral expansion of older landfills must have two or more geo membrane type liners and a leachate collection and removal system that prevent migration of dangerous constituents into it during the active life and post closure care period.
WAC 173.303.665.2.c	Landfills Design and operating conditions	Y	Design, construct, operate and maintain a run-on control system capable of preventing flow onto the active portion of the landfill during peak discharge from at least a 25 yr storm.
WAC 173.303.665.2.d	Landfills Design and operating conditions	Y	Design, construct, operate, and maintain a run-off management system to collect and control at least the water volume resulting from a 24 hr, 25 yr storm.
WAC 173.303.665.4.a,b	Landfills <i>Monitoring and inspection</i>	Y	Liners must be inspected during and after construction. It must be inspected weekly and after storms while the landfill is in operation.
WAC 173.303.665.6	Landfills Closure and post closure	Y	<ul style="list-style-type: none"> • At closure of the landfill or upon closure of any cell cover the landfill or cell with final cover that meets requirement of this subchapter. • After final closure comply with all post closure requirements contained in WAC 173.303.610.7-10 including maintenance and monitoring through out the post closure period.

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Document Identifier	Title	Applicable	Justification
WAC 173.303.691.1	Air emission standards for equipment leaks Applicability	N	Applies to equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by wt. Planned verification of dangerous and extremely hazardous wastes provides the best achievable management method to remove and reduce the wastes harmful properties or characteristics provided processing is performed in accordance with applicable requirements.
<p>TITLE 173 DEPARTMENT OF ECOLOGY CHAPTER 304 MINIMUM FUNCTIONAL STANDARDS FOR SOLID WASTE HANDLING Department of Ecology, 17300 1st Avenue, SW, Box 340800, Seattle, WA 98134-0800 Phone: (206) 462-3000, Fax: (206) 462-3001</p>			
WAC 173.304.130.1	Locational standards for disposal sites Applicability	N	All new and expanded final disposal sites of solid wastes that are to be closed as landfills.
WAC 173.304.130.2	Locational standards for disposal sites Locational standards	N	Facility locational standards for: <ul style="list-style-type: none"> • Geology • Ground water • Natural soils • Flooding • Surface water • Slope • Cover material • Capacity • Climatic factors • Land use • Toxic air emissions

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Document Identifier	Title	Applicable	Justification
WAC 173.304.460.1	<i>Landfilling standards</i> <i>Applicability</i>	<u>N</u>	Applicable to facilities that dispose of solid waste in landfills except for: <ul style="list-style-type: none"> • Inert and demolition wastes • Wood waste
WAC 173.304.460.2	<i>Landfilling standards</i> <i>Minimum functional standards for performance</i>	<u>N</u>	Facility standards for: <ul style="list-style-type: none"> • Groundwater • Air quality and toxic air emissions • Surface waters
WAC 173.304.460.3	<i>Landfilling standards</i> <i>Minimum functional standards for design</i>	<u>N</u>	Standards of design for: <ul style="list-style-type: none"> • Minimizing liquids • Leachate systems • Liner designs • Closures • Gas control • Other requirements
WAC 173.304.460.4	<i>Landfilling standards</i> <i>Minimum functional standards for maintenance and operation</i>	<u>N</u>	Standards for operation and maintenance: <ul style="list-style-type: none"> • Operate within approved plans • Maintain reserve equipment • Mark active area boundaries • Use ground water monitoring
WAC 173.304.490.1	<i>Ground water monitoring requirements</i> <i>Applicability</i>	<u>N</u>	Requirements for landfill disposal facilities required to perform ground water monitoring
WAC 173.304.490.2	<i>Ground water monitoring requirements</i> <i>Ground water monitoring requirements</i>	<u>N</u>	Monitoring system requirements: <ul style="list-style-type: none"> • Number, location and depth of wells • Casing of well bore hole • Good procedures and techniques for sampling and sample analysis

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Document Identifier	Title	Applicable	Justification
TITLE 173 DEPARTMENT OF ECOLOGY CHAPTER 173.460 CONTROLS FOR NEW SOURCES OF TOXIC AIR POLLUTANTS			
WAC 173.460.030.1	Requirements, applicability and exemptions Applicability	Y	ILAW disposal facility is a landfill. Note: ILAW may comply with sealed source.
WAC 173.460.030.2	Requirements, applicability and exemptions Exempt sources	Y	Planned vitrification of dangerous and extremely hazardous wastes provides the best achievable management method to remove and reduce the wastes harmful properties or characteristics provided processing is performed in accordance with applicable requirements. Containers of ILAW disposed at the facility do not have a vent and therefore are exempt as a toxic pollutant source. A source review (WAC 173.460.040 and 173.460.110) may be needed to identify any potential toxic air pollutant(s) resulting from planned disposal facility operations.
WAC 173.460.040.1	New source review Applicability	Y	Containers of ILAW disposed at the facility do not have a vent and therefore are exempt as a toxic pollutant source. Planned disposal facility operations should be reviewed for potential sources of toxic air pollutants (eg. solvent cleaner for degreasing of crane motor assembly for maintenance). Design changes may be needed to meet air pollution control rules. See WAC 173.490.025 for exception on VOC materials used for maintenance.

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Document Identifier	Title	Applicable	Justification
WAC 173.460.050.2	Requirements to quantify emissions Small quantity sources	YES	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is source of toxic air pollutants. Note: Applicable to maintenance area.
WAC 173.460.060.5	Control technology requirements Solvent metal cleaners	YES	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants. Describes required equipment and operation of solvent metal cleaning system (if used in disposal facility).
WAC 173.460.070	Ambient impact requirement	YES	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants. Emissions from a new toxic air pollutant source must be sufficiently low to protect human health and safety from potential carcinogenic and/or other toxic effects.
WAC 173.460.080.3	Demonstrating ambient impact compliance Criteria for compliance	N	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants. Source's maximum incremental ambient air impact levels do not exceed the Class A or Class B acceptable source impact levels of WAC 173.460.130 and WAC 173.460.160 or emission rates specified in subsection 2e of this section.
WAC 173.460.090	Second tier analysis	N	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants.

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Document Identifier	Title	Applicable	Justification
WAC 173.460.100	Request for risk management decision	N	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants.
WAC 173.460.110	Acceptable source impacts levels	N	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants.
WAC 173.460.120	Scientific review and amendment of acceptable source impact levels and lists	N	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants.
WAC 173.460.130	Fees	N	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants.
WAC 173.460.140	Remedies	N	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants.
WAC 173.460.150.1	Class A toxic air pollutants: Known probable and potential human carcinogens and acceptable source impacts Class A toxic pollutants	N	Not required unless results of new source review (WAC 173.460.040) show the ILAW disposal facility is a source of toxic air pollutants. Information in this section, WAC 173.460.040.3, and WAC 173.460.160 are used as criteria for compliance.

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Document Identifier	Title	Applicable	Justification
WAC 173.460.150.2	<p>Class A toxic air pollutants: Known probable and potential human carcinogens and acceptable source impacts</p> <p>Class A toxic pollutants with established acceptable source impacts levels</p>	N	Not required unless results of new source review (WAC 173.460.040) show the LLAW disposal facility is a source of toxic air pollutants. Information in this section, WAC 173.460.080.3, and WAC 173.460.160 are used as criteria for compliance.
WAC 173.460.150.3	<p>Class A toxic air pollutants: Known probable and potential human carcinogens and acceptable source impacts</p> <p>Class A toxic pollutants with special acceptable source impacts levels</p>	N	Not required unless results of new source review (WAC 173.460.040) show the LLAW disposal facility is a source of toxic air pollutants. Information in this section, WAC 173.460.160 and WAC 173.460.080.3 are used as criteria for compliance.
WAC 173.460.160	Class B toxic air pollutants and acceptable impact levels	N	Not required unless results of new source review (WAC 173.460.040) show the LLAW disposal facility is a source of toxic air pollutants. Information in this section, WAC 173.460.160 and WAC 173.460.080.3 are used as criteria for compliance.
<p>TITLE 173 DEPARTMENT OF ECOLOGY CHAPTER 475 AMBIENT AIR QUALITY STANDARDS FOR CARBON MONOXIDE OZONE AND NITROGEN DIOXIDE</p>			

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Document Identifier	Title	Applicable	Justification
WAC 173.475.030.1,2,3	Air quality standards	X	<ol style="list-style-type: none"> 1. ILAW in sealed and clean canisters should not generate or release carbon monoxide. 2. ILAW in sealed and clean canisters should not generate or release ozone. 3. ILAW in sealed and clean canisters should not generate or release nitrogen dioxide. <p> <small> WAC 173.475.030.1,2,3 are not necessary because the BART standard for carbon monoxide, ozone, and nitrogen dioxide is more stringent than the ILAW standard. The BART standard for carbon monoxide is 0.0001 ppm, the BART standard for ozone is 0.0001 ppm, and the BART standard for nitrogen dioxide is 0.0001 ppm. The ILAW standard for carbon monoxide is 0.0001 ppm, the ILAW standard for ozone is 0.0001 ppm, and the ILAW standard for nitrogen dioxide is 0.0001 ppm. Therefore, the BART standard is more stringent than the ILAW standard. </small> </p>
TITLE 173 DEPARTMENT OF ECOLOGY CHAPTER 480 AMBIENT AIR QUALITY STANDARDS AND EMISSION LIMITS FOR RADIONUCLIDES			
WAC 173.480.60	Emission standards for new and modified emission units	N	ILAW disposal facility is not a radioactive emission unit. ILAW in sealed and clean canisters provides the BART. There should be no release of radionuclides to unrestricted areas or to the air that exceed ambient standards of WAC 173.480.040.
WAC 173.480.70	Emission monitoring and compliance procedures	N	Exempted by WAC 246.240.020.2.

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Document Identifier	Title	Applicable	Justification
TITLE 173 DEPARTMENT OF ECOLOGY CHAPTER 490 EMISSION STANDARDS AND CONTROLS FOR SOURCES EMITTING VOLATILE ORGANIC COMPOUNDS (VOC)			
WAC 173.490.025.4	<i>General Applicability</i> <i>Exempted VOC sources</i>	Y	Use of any VOC in the ILAW disposal facility will be limited to maintenance (eg crane motor assembly degreasing) and utility activities. Expected use or emissions would not exceed 18 kg (40 lb) per month and qualify for exemption.
TITLE 246 DEPARTMENT OF HEALTH CHAPTER 220 RADIATION PROTECTION - GENERAL PROVISIONS			
WAC 246.220.007	Statement of philosophy	Y	Make every reasonable effort to maintain radiation exposures and releases of radioactive materials in efforts to unrestricted areas ALARA.
WAC 246.220.020.1	Records	Y	Maintain records relating to disposal of containers of ILAW (radiation sources) and other records as the department may require which will permit the determination of extent of occupational and public exposure.
WAC 246.220.030.1	Inspectors	Y	<ul style="list-style-type: none"> WDOH to inspect sources of radiation, premises and (disposal) facilities at all reasonable times. WDOH inspection of records maintained pursuant to regulations at all reasonable times.

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Document Identifier	Title	Applicable	Justification
<i>WAC 246.220.040.1</i>	<i>Tests and Surveys</i>	<i>Y</i>	Perform reasonable tests and surveys upon instructions of WDOE on <ul style="list-style-type: none"> • sources of radiation • (disposal) facilities • radiation detection and monitoring instruments • other equipment and devices used in conjunction with (disposal) of the sources of radiation
TITLE 246 DEPARTMENT OF HEALTH CHAPTER 247 RADIATION PROTECTION AIR EMISSIONS			
WAC 246.247.001	Purpose	Y	Establish application requirements and procedures for issuance of radioactive air emissions license and regulation of those emissions
WAC 246.247.002	Authority	Y	Rules and regulation adopted and enforced by WDOE
WAC 246.247.010.1,2	Applicability	Y	<ol style="list-style-type: none"> 1. Applicable to facilities licensed by WDOE or US NRC and US DOE facilities 2. Apply to point sources, nonpoint sources and fugitive emissions
WAC 246.247.020.1,2	Exemptions	Y	<ol style="list-style-type: none"> 1. Facilities with sealed sources may be exempted from radioactive emission requirements 2. ILAW as sealed and clean containers provided the BART and <ul style="list-style-type: none"> • Should meet emission standards of WAC 246.247.040 • Potential to emit for emissions units results in a TBE to the MBI from all pathways less than 0.1 mrem/yr
WAC 246.247.030	Definitions	Y	Information purposes only

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Document Identifier	Title	Applicable	Justification
WAC 246.247.040.1,3,6	Standards	Y	<ol style="list-style-type: none"> 1. WDOE shall enforce the most stringent radioactive air emission standard in effect, regardless of any agreement between and any other agency. 3. All new construction units shall utilize BARCT. 6. All emissions of radionuclides are subject to standards of this section and subject to enforcement actions.
WAC 246.247.60.7	Applications, registration and licensing	Y	<p>Describes the information requirements for approval to construct, modify and operate an emission unit.</p> <p>7) Each federal facility under authority of this chapter shall hold one license for each site or installation.</p>
WAC 246.247.65.1	Fees	N	<p>Requires a fee with each air emission license and each application or sealed source evaluation. The fee would not be required by disposal facility since air emission would be included in site license. Cost of sealed source evaluation does not apply since LAW container sources do not require registration with US NRC.</p>

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Document Identifier	Title	Applicable	Justification
WAC 246.247.75.3,4,6,7	Monitoring, testing and quality assurance	Y	<ol style="list-style-type: none"> 3) Emission unit with potential to emit less than 0.1 mton/TEDE to the MBI may estimate those radionuclides emission in lieu of monitoring in accordance with 40 CFR 61 Appendix D or other procedure approved by WDOH. 4. WDOH may allow a facility to use alternate monitoring procedures or methods if continuous monitoring is not a feasible or reasonable requirement. 6. Licensed facilities shall conduct and document a quality assurance program. 7. Facilities shall monitor nonpoint and fugitive emissions of radioactive material.
WAC 246.247.80	Inspections, reporting and record keeping	Y	<ol style="list-style-type: none"> 1. WDOH inspects and audits all construction activities, equipment operations, documents, data and other records related to requirements. 3. Submit annual information requirements to WDOH adopted in 40 CFR 61 Subparts H & I. 4. Notify WDOH with 24 hr of any conditions if allowed to persist would result in emissions of radioactive material in excess of applicable standards or license requirements. 7. Maintain a log for each emission unit. 8. Readily retrievable storage area for all records and documents. 9. All emission units fully accessible to department inspectors. 10. Make available in a timely manner all documents requested by WDOH.
WAC 246.247.85	Compliance, determination for existing emission units and facilities	NA	<p>Not applicable to this rule.</p>

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Document Identifier	Title	Applicable	Justification
WAC 246.247.100	Enforcement actions	Y	Describes actions to enforce compliance and obtain information.

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Document Identifier	Title	Applicable	Justification
TITLE 246 DEPARTMENT OF HEALTH CHAPTER 250 RADIOACTIVE WASTE - LICENSING LAND DISPOSAL			
<i>WAC 246.250.001</i>	<i>Purpose and Scope</i>	<i>N</i>	<p>Applies to land disposal of low-level radioactive wastes received from other persons.</p> <p>Note: No plans for disposal of offsite ILAW or offsite LAW requiring prepayment at this time.</p>
Title 296 DEPARTMENT OF LABOR AND INDUSTRIES			
<i>WAC 296.24</i>	<i>General Safety and Health Standards</i>	<i>Y</i>	Applicable to all permanent places of employment except where OSHA Standards exist.
<i>WAC 296.62</i>	<i>Occupational Health Standards</i> <i>Safety Standards For Carcinogens</i>	<i>N</i>	<p>Applicable to hazardous chemicals.</p> <p>Does not apply to:</p> <p>6 b) Any hazardous waste defined by Solid Waste Disposal Act as amended by RCRA when subject to regulations issued under that act by</p> <p>6 j) Ionizing and non ionizing radiation.</p>

Constraints on Design of the ILAW Disposal Facility

U.S. Department of Energy

Document Identifier	Title	Applicable	Justification
DOE-RL-93-08	Hanford Mission Plan	Y	The 200 Area is a limited use area.
DOE 4330.4b	Maintenance Management Plan. Policy	N	a) Maintain a maintenance management program (using graded approach) for all DOE property that promotes operational safety, worker health, environmental protection and compliance, property preservation and cost effectiveness while meeting the program mission. b) Structures, systems and components important to safe operation are subject to a maintenance program to meet or exceed their design requirements life throughout their life. c) Perform periodic inspection of structures, systems, components and equipment to determine deterioration or technical obsolescence which threaten performance and/or safety.
DOE-RL-93-08	General Design Manual for the ILAW Disposal Facility	N	DOE-RL-93-08 is a limited use area.
DOE 5400.5.2.1.a	Radiation Protection of the Public and Environment Public dose limit - all exposure modes	Y	Expose members of public to radiation sources as a consequence of all routine DOE activities (eg retrieval, pretreatment, storage and disposal operations) to an effective dose equivalent greater than 100 mrem in a year. Note: No airborne radioactive emission from ILAW disposal.

U.S. Department of Energy

Document Identifier	Title	Applicable	Justification
DOE 5400.5.2.1.b	<i>Radiation Protection of the Public and Environment</i> <i>Airborne emissions only - all DOE sources</i>	N	Duplicate of maximum 10 mrem in a year exposure to public from release of radioactive material to atmosphere. See 10 CFR 61.91 DOE 5400.5.2.1.c
DOE 5400.5.2.1.d	Radiation Protection of the Public and Environment Drinking Water Pathway - all DOE sources	Y	DOE activities shall not cause public drinking water standards on site and down stream of the facility to exceed radiological limits of 40 CFR 141.
DOE 5480.19	Conduct of Operation for DOE facilities	Y	Contain guidelines to assist DOE facilities meet operations performance and safety objectives. Guidelines used to review existing or planned programs or facilities or programs where none presently exist.
DOE 5480.20.a	Personnel Selection, Qualification and Training for DOE Nuclear Facilities	Y	Requires establishment and implementation of certain training related procedures. Implementation of these requirements will meet 10 CFR 830.120.c management criteria 2 on personnel training and qualification.
DOE 5480.21	Unreviewed Safety Question	Y	The USQ allows physical and procedural changes to the facility and conduct tests without prior DOE approval as long as changes do not affect the authorization basis of facility or result in a Technical Safety Requirement change. Sufficiently flexibility needs to be included in the design of the facility to allow for credible proposed changes and their implementation by USQ.

U.S. Department of Energy

Document Identifier	Title	Applicable	Justification
DOE 5480.22.9.a	Technical Safety Requirements	Y	A TSR is required for new facilities and existing facilities that do not have a DOE approved TSR. A TSR defines the operating limits and surveillance requirements, basis thereof, safety boundaries, and management or administrative controls to protect the health and safety of the public and to minimize the potential risk to workers from the uncontrolled release of radioactive or other hazardous materials and from radiation exposure due to inadvertent criticality.
DOE 5480.23.8	Nuclear Safety Analysis Report	Y	A safety analysis is performed by contractors responsible for design, operation or decommissioning of DOE nuclear facilities and selected non-facility nuclear operations. A SAR documents the adequacy of a safety analysis for a nuclear facility to ensure the facility can be constructed, operated, maintained, shutdown and decommissioned safely and in compliance with applicable law and regulations.
DOE 5480.24.7	Nuclear Criticality Safety	N	ILAW is non-transuranic (<100 mCi/g).
DOE 5480.28	Natural Phenomena Hazards Mitigation	Y	Mitigation includes use of NPH resistant design, evaluation, construction requirements and operational procedures. This order does not apply to parts and portions of DOE owned or leased facilities which are licensed by the NRC.
DOE 5480.4	Environmental Protection, Safety and Health Protection	Y	Provides a listing of mandatory ES&H standards and guidelines to be used at all DOE and contractor operations for facility design, construction, operation, modification and decommissioning.

U.S. Department of Energy

Document Identifier	Title	Applicable	Justification
DOE 5480.7A	Fire Protection	☒	<p>Identifies criteria for fire protection. DOE facilities, projects and programs licensed by NRC or NRC Agreement State shall use requirements specified by NRC or NRC Agreement State in lieu of this Order where requirements overlap NRC or NRC Agreement State regulations.</p> <p>Note: Order has been cancelled. Contractors required to comply until contractually relieved.</p>
DOE 5483.1A	Occupational Safety and Health Program for DOE Contractor Employees at Government Owned Contractor Operated Facilities	☒	<p>Establishes and enforces DOE prescribed OSHA standards at GOCO facilities.</p> <p>Note: Order has been cancelled. Contractors required to comply until contractually relieved.</p>
DOE 5700.6C	Quality Assurance	TBD	<p>Provides guidance for developing and implementing QAP's and criteria (management, performance and assessment categories) to be used by DOE for approval of QAP's.</p> <p>Note: Not applicable to work licensed by NRC or NRC Agreement State and subject to quality assurance requirements of that agency.</p>
DOE 5820.2A.3.2.c	Radioactive Waste Management Management of Low Level Waste Policy	Y	<p>Dispose of DOE LAW on site at which it was generated, if practical, or at other DOE disposal facility if on site disposal capacity is not available.</p>

U.S. Department of Energy

Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.b.1	Radioactive Waste Management Management of Low Level Waste Requirements - Performance assessment	Y	Field organizations with disposal sites prepare and maintain a site specific radiological performance assessment for disposal of waste and demonstrating compliance with performance objectives of section 3a of this chapter.
DOE 5820.2A.3.3.b.2	Radioactive Waste Management Management of Low Level Waste Requirements - Performance assessment	Y	Each field organization shall prepare an overall waste management systems performance assessment supporting combination of waste management practices.
DOE 5820.2A.3.3.b.3	Radioactive Waste Management Management of Low Level Waste Requirements - Performance assessment	Y	Use monitoring measurements to evaluate actual and prospective performance at locations as required within and outside of each facility and disposal site.

U.S. Department of Energy

Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.e.4	Radioactive Waste Management Management of Low Level Waste Requirements - Waste generation	X	Each DOE LAW generator preparing a design for a new process or process change shall incorporate principles into design that will minimize generation of LAW. Note: Concern on any treatment residuals or wastes collected and stored from the active portion during disposal of LAW.
DOE 5820.2A.3.3.e.1	Radioactive Waste Management Management of Low Level Waste Requirements - Waste acceptance criteria	X	Applies to waste shipped from one field organization to another for treatment, storage or disposal. Note: Current planning is based on disposal of onsite waste only.
DOE 5820.2A.3.3.e.2	Radioactive Waste Management Management of Low Level Waste Requirements - Waste acceptance criteria	Y	Requires establishing waste acceptance criteria for each LAW treatment, storage and disposal facility.

U.S. Department of Energy

Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.e.3	Radioactive Waste Management Management of Low Level Waste Requirements - Waste acceptance criteria	Y	Requires generators of waste to implement a LAW certification program to provide assurance waste acceptance criteria for any LAW disposal facility used by the generator are met. Generators and facilities receiving waste are jointly responsible for assuring compliance with waste acceptance criteria.
DOE 5820.2A.3.3.e.5	Radioactive Waste Management Management of Low Level Waste Requirements - Waste acceptance criteria	Y	Identifies waste acceptance criteria issues for storage, treatment and disposal facilities.
DOE 5820.2A.3.3.h.1-4	Radioactive Waste Management Management of Low Level Waste Requirements - Long-term storage	N	Applies to long-term storage of LAW to allow for decay of radionuclides until they can be disposed of by approved methods.

U.S. Department of Energy

Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.i.1	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	Y	LAW shall be disposed of by methods appropriate to achieve performance objectives in paragraph 3a of this chapter and controlled with disposal site radiological performance assessment of paragraph 3b of this chapter.
DOE 5820.2A.3.3.i.2	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	Y	Engineered modifications for specific waste types and for specific waste compositions for each disposal site shall be developed through a performance assessment model in paragraph 3b of this chapter.
DOE 5820.2A.3.3.i.3	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	Y	Requires an Oversight and Peer Review Panel to ensure consistency and technical quality in development and application of performance assessment models that include site specific geo hydrology and waste composition.
DOE 5820.2A.3.3.i.4	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	Y	LAW is not greater than NRC Class C. Disposition of waste designated as greater than NRC Class C must be handled as special cases and justified by a specific performance assessment.

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Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.1.5	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	Y	Planned vitrification of LAW and packaging in sealed, steel casks must meet the additional disposal requirements identified in this paragraph for improved stability of the disposal site, facilitate handling, and provide protection of health and safety of personnel at the disposal site.
DOE 5820.2A.3.3.1.6	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	N	Waste containing amounts of radionuclides below regulatory concern as defined by federal regulations may be disposed of without regard to radioactive content. There are no plans for retrieval and pretreatment of the mixed waste based on radioactivity. Few if any sealed casks would be expected to contain amounts of radionuclides below regulatory concern. Note: Waste materials resulting from operation and maintenance in the active portion of the disposal facility may qualify under this paragraph.
DOE 5820.2A.3.3.1.7	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	Y	Contains requirements on disposal site selection.

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Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.1.8	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	Y	Contains requirements on disposal facility and disposal site design.
DOE 5820.2A.3.3.1.9.b	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal	Y	Contains requirements on disposal facility operations. Specific requirement (9b) is for emplacement of permanent identification markers for disposal excavations and monitoring wells.
DOE 5820.2A.3.3.j.1	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal site closure/post closure	Y	Develop site specific comprehensive closure plan for new and existing operating LAW disposal sites. Plan shall address closure of disposal units within 3 yr period after each is filled and conform to requirements of N process.

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Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.j.2	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal site closure/post closure	Y	Requires that during closure and post closure residual radioactive levels for soils shall comply with existing decommissioning guidelines.
DOE 5820.2A.3.3.j.3	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal site closure/post closure	Y	Requires corrective measures be applied to new disposal sites or individual disposal units if conditions occur or are forecasted that could jeopardize attainment of performance objectives.
DOE 5820.2A.3.3.j.4	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal site closure/post closure	NEE	Applies to currently inactive disposal facilities, disposal sites and disposal units. Management of LLW disposal facility will be included in closure plan.

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Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.j.5	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal site closure/post closure	Y	Requires closure plans for new and existing operating facilities LAW disposal facilities be reviewed and approved by appropriate field organization.
DOE 5820.2A.3.3.j.6	Radioactive Waste Management Management of Low Level Waste Requirements - Disposal site closure/post closure	Y	Requires termination of monitoring and maintenance activity at closed facilities or sites be based on analysis of site performance at the end of institutional control period.
DOE 5820.2A.3.3.k.1	Radioactive Waste Management Management of Low Level Waste Requirements - Environmental monitoring	Y	Requires each operational and non operational LAW treatment, storage, and disposal facility be monitored by an environmental monitoring program that conforms with DOE 5484.1 and as a minimum meets the requirements of below paragraphs 3.k.2 - 3.k.4.

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Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.k.2	Radioactive Waste Management Management of Low Level Waste Requirements - Environmental monitoring	Y	Requires environmental monitoring be designed to measure: <ul style="list-style-type: none"> • operational effluents releases • migration of radionuclides • disposal unit subsidence • changes in disposal facility and disposal site parameters which may effect long-term site performance
DOE 5820.2A.3.3.k.3	Radioactive Waste Management Management of Low Level Waste Requirements - Environmental monitoring	Y	Environmental monitoring program may include but not necessarily limited to monitoring: <ul style="list-style-type: none"> • surface soil and water • air • subsurface soil and water both in saturated and unsaturated zones
DOE 5820.2A.3.3.k.4	Radioactive Waste Management Management of Low Level Waste Requirements - Environmental monitoring	Y	Requires monitoring program to be capable of detecting changing trends in performance sufficiently in advance to allow application of any necessary corrective action before exceeding performance objectives.

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Document Identifier	Title	Applicable	Justification
DOE 5820.2A.3.3.m.1	Radioactive Waste Management Management of Low Level Waste Requirements - Records and reports	Y	Requires development and maintenance of a record keeping system of the waste.
DOE 5820.2A.3.3.m.2	Radioactive Waste Management Management of Low Level Waste Requirements - Records and reports	Y	Requires a waste manifest accompany each waste package from generator through final disposal. Paragraph identifies minimum data requirements of a manifest.
DOE 5820.2A.5.3.a.2	Radioactive Waste Management Decommissioning of Radioactively Contaminated Facilities Requirements - General	Y	Requires operational records be available for all contaminated facilities for use in preparing decommissioning plans. Note: Decommissioning is part of final site closure to reduce potential health and safety impacts. The sealed LLAW canisters should not release any contamination to the active portion disposal facility or disposal unit during its active life.

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Document Identifier	Title	Applicable	Justification
DOE 5820.2A.5.3.a.5	Radioactive Waste Management Decommissioning of Radioactively Contaminated Facilities Requirements - General	N	Permits responsibility for contaminated facilities to be transferred from one program organization to another by mutual agreement of programs involved.
DOE 5820.2A.5.3.b	Radioactive Waste Management Decommissioning of Radioactively Contaminated Facilities Requirements - Facility design	Y	Requires facilities in which radioactive or other hazardous materials are utilized be designed to simplify decontamination and decommissioning and/or increase potential for reuse. Features and procedures that simplify and facilitate decommissioning to reduce potential health and safety impacts shall be identified during planning and design. Note: The sealed LAW canisters shall be disposed (not utilized) at the facility. They should not release any contamination to the source portion of the disposal facility or disposal unit during its active life. There is no potential further use of the active portion of the disposal facility.

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Document Identifier	Title	Applicable	Justification
DOE 5820.2A.5.3.c	<p align="center">Radioactive Waste Management</p> <p align="center">Decommissioning of Radioactively Contaminated Facilities</p> <p align="center">Requirements - Post operational activities</p>	Y	<p>Requires:</p> <ul style="list-style-type: none"> ▪ identification of contaminated waste disposal facilities. ▪ performing adequate surveillance and maintenance of facilities before initiation of decommissioning activities.

Constraints on Design of the ILAW Disposal Facility

Miscellaneous

Document Identifier	Title	Applicable	Justification
WAC 173.400 WHC-SD-W0496-ICD-001 Rev 2 WHC-SD-W0496-ICD-001 ICD-001 Rev 2	General Regulations for Air Pollution Sources	Y	<p>The General Regulation for Air Pollution Sources, WAC 173.400 shall apply except for sections WAC 173.400.070 (Emission Standards for Certain Source Categories) and WAC 173.173.400.190 (Requirements for Nonattainment areas).</p>
DOE 5820.2A DOE 5280.2A.3.3.e3	Hanford Site Permits	Y	Requires submission of all technical information and analysis to modify or comply with any affected Hanford Site permits necessary to dispose of the waste.

Miscellaneous

Document Identifier	Title	Applicable	Justification
"Bader to Trego" Letter 95-PRI-073	Estimated TWRS Project Schedule	Y	Establishes TWRS remediation schedule, LAW schedule: <ul style="list-style-type: none"> • Design, permitting, flowing, construction 2005 to 2013 • Operation 2011 to 2021 • D&D 2021 to 2033
None identified	SDWP Permit 4502 and Fact Sheet	N	Requires compliance with requirements of SDWP 4502 for 200 Area TRDF.
WAC 173.440.141 WAC 173.460.060 WHC-CM-7-5	Toxic Air Emissions (Hazardous Air Pollutants)	N	The ILAW will be prepared using T-BACT and placed into sealed containers to control release/emission of potential constituents.
None identified	Rain Water Infiltration	Y	Requires the 200 Area disposal systems to use barriers to limit infiltration by rainwater. Duplicate requirement.
WHC-SD-ETF-WAC-001	Effluent Treatment Facility Waste Acceptance Criteria	Y	Establishes criteria for all secondary radioactive, mixed and non radioactive dangerous liquid effluents transferred to LERR/ETP for treatment and disposal. Note: The sealed ILAW containers should not release any contamination to the active portion of the disposal facility or disposal unit during its active life. Some hazardous waste may result from maintenance activities.

Miscellaneous

Document Identifier	Title	Applicable	Justification
10 CFR 20.1301 10 CFR 20.1601 10 CFR 20.1602 10 CFR 20.1603 10 CFR 20.1701 10 CFR 20.1702 40 CFR 191.03.a 40 CFR 192 40 CFR 193	NRC Requirements	☒	Required for any activities that produce NRC regulated materials. Note: Requirements will be phased in over the life of facility.
DOE 5400.5.2.1.d	Public Drinking Water	☒	Requires DOE to provide a level of protection of drinking water for persons consuming water from a public drinking water operated by DOE equivalent to that provided to the public by the public drinking water standards of 40 CFR 141.
DOE/EIS-0189 SEN-35-91	Public Drinking Water	☒	Requires DOE to provide a level of protection of drinking water for persons consuming water from a public drinking water operated by DOE equivalent to that provided to the public by the public drinking water standards of 40 CFR 141.
DOE/EIS-0189 SEN-35-91	Radioactive Air Emissions	Y	TWRS allocation from use for radioactive air emissions is 1 m ³ /yr. The dispose allocation is 0.1475 m ³ /yr. Note: The sealed ILAW canisters should not release any contamination to the active portion of the disposal facility or disposal unit during its active life. See WHC-CM-7-5 on radioactive airborne emissions.

Miscellaneous

Document Identifier	Title	Applicable	Justification
DOE 5820.2a.3.3.g WHC-EP-0063	Radioactive and Radioactive Dangerous Solid Waste Forecasting	Yes	Requires annual estimate of the volume of radioactive and radioactive dangerous waste to be generated. Note: The sealed ILAW containers should not release any contamination to the active portion of the disposal facility or disposal unit during its active life.
Decision Control Paper #33, Decision 3 DOE 5820.2A.3.2.c	Radioactive and Radioactive Mixed Waste Disposal	Y	Requires TWRS generated radioactive and mixed wastes be transferred to Solid Waste Partition for disposal. Note: ILAW must meet requirements for durability and consistent loss rate to geological environment. See WHC-CM-7-5 for standards on management and disposal of solid radioactive and mixed wastes.
None Identified	ILLW Product Rework and Retrievalability	N	Applies to design and capacity of ILAW treatment facility.
Dec. Control Paper 33 Decision 1,3,4,5,8,11-16	Availability of Utilities and Services	Y	DOE will furnish property, utilities and services in quantities not in excess of those set forth in privatization contract.
Future for Hanford Uses and Cleanup (Durmonond) WHC-SD-WM-SE-021 Rev 0	Land Use	N	ILAW disposal will located in the 200 Area.

Miscellaneous

Document Identifier	Title	Applicable	Justification
Bernero 1993.1 10 CFR 61.55	Incidental Waste	Y	NRC will regard LAW as incidental waste based on: <ul style="list-style-type: none"> • waste has been processed to remove key radionuclides to maximum extent technically and economically practicable • incorporate processed waste in a solid physical form at a concentration that does not exceed NRC Class C LAW • manage waste pursuant to ABA so safety requirements comparable to performance objectives in 10CFR61 are satisfied.
DOE 5820.2A.1.3.b.2.c DOE 5820.2A3.2.c Final Report Hanford Tank Waste Task Force Future Report For Hanford Uses and Cleanup (1022)	Disposal Site Location	EX	Selection of LAW Disposal Site shall be limited to boundaries of current 200 Area. Duplicate requirement.
DOE 5820.2A.3.3.b (1030)	ILLW Physical and Chemical Properties	EX	ILLW performance will be based on performance assessment calculations for durability and constituent loss rate to geological environment. Duplicate requirement.
DOE 5820.2A WAC 173.303 (1033)	Dangerous Waste Management	EX	Facilities that treat, store or dispose of dangerous and mixed waste shall conform to DOE Order 5820.2A. Dangerous waste is regulated by RCRA and WAC. Duplicate requirement.

Miscellaneous

Document Identifier	Title	Applicable	Justification
ETF State Discharge Permit WHC-CM-7-5 (1039)	Untreated Liquid Effluents	☒	Describes criteria for discharges to the BPT. Note: The sealed ILAW canisters should not release any contamination to the active portion of the disposal facility or disposal unit during its active life.
DOE Direction for Privatization (1040)	Nonradionuclide Airborne Emissions	☐	Requires use of BACT and T-BACT for construction, installation or establishment of a new source of non radioactive emissions. Note: The sealed ILAW canisters should not release any contamination to the active portion of the disposal facility or disposal unit during its active life.
WAC 246.247 WHC-CM-7-5 (1041)	Notification of Startup, Shutdown or Other Change That May Affect Emissions Measurement	☒	Requires notification of the on-site Environmental Emission Management organization after any radioactive encapsulated forced air exhaust systems start up or shut down. Note: The sealed ILAW canisters should not release any contamination to the active portion of the disposal facility or disposal unit during its active life.
DOE 6430.1A (1065)	Safety Class	☐	Requires degree of redundancy, reliability, and availability correspond to a systematically determined safety classification for all systems, structures and components.
DOE 6430.1A, 0200-99.0.4 PNL 4622 PNL 6415 Rev 6 (1503)	Environmental Conditions	☐	Requires new facilities and systems functioning at the Hanford Site shall with stand specified environmental conditions. Thermal effects of soils shall be considered for the buried portion of the system.

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Miscellaneous

Document Identifier	Title	Applicable	Justification
DOE 6430.1A, 1300-12.1 DOE 6430.1A, 1300-12.4.11 DOE 6430.1A, 1300-12.4.2 DOE 6430.1A, 1300-12.4.6 (1512)	Human factors	Y	Applies to new construction and to retrofitting of existing facilities. Equipment that is to be used by personnel shall be designed or selected to accommodate their body dimensions.
DOE 6430.1A, 1300-1.3 WHC-EP-0750, 11.9.10 (1514)	ALARA Design	Y	Establishes cost/benefit analysis for exposure of personnel to potential radiation.
DOE/EIS-0189 (2010)	Site Boundary	N	Establishes boundary of Hanford Site.
DOE 1540.1 DOE-95-SWT-186 WHC-CM-2-14 WHC-FP-0063 (2019)	Radioactive Solid Waste Transfer	N	Transfer of radioactive and radioactive dangerous wastes to Hanford Site Solid Waste Program for dispositioning shall meet criteria of WHC-EP-0063. Note: All waste disposed at the LAW disposal facility must meet PA requirements for durability and consistent low rate to geological environment.
10 CFR 835 WHC-SD-GN-DGS-30011 (2023)	Shielding Criteria	NS	Provides criteria to determine shielding requirements for different areas in the facility. Design shielding to limit the whole body dose to less than 5 mSv per year (most restrictive constraint.)

Miscellaneous

Document Identifier	Title	Applicable	Justification
ANSI/ANS-3.2-88 ASME-NQA-1-1-1989-1A ASME-NQA-1-1994-1A DOE-STD-1073-93 DOE 5500.7b (2031)	Documentation	Y	Records, documents, and control pertinent to design functions shall be in accordance with: 10 CFR 830.120 DOE 1324.5B DOE 1430.1D DOE 5500.7b DOE-STD-1073-93 ANSI/ANS-3.2-88.
DOE Decision Paper: Specification of Radionuclide Concentrations in TWRS Low-Activity Waste (2040)	Glass/Matrix Waste Form	N	Identifies that short and long term durability tests be performed on glass to provide reasonable assurance that LAW glass will meet minimum performance criteria. Long term requirements will depend on disposal facility design.
10 CFR 61 10 CFR 61.55 10 CFR 193 DOE Order 5820.2A (2051)	Disposal Facility	Y	Wastes designated as NRC Class C must be disposed of so top of waste is minimum 5 meter below top surface of the cover or must be disposed of with intruder barriers that are designed to protect against inadvertent intruders for at least 100 years. Mandates development and maintenance of site specific performance assessment for disposal facility.
DOE 5280.2A.3.3.1.9 (2052)	Disposal Site Excavation Markers	NA	Mandates permanent identification markers for disposal excavations and monitoring.

Miscellaneous

Document Identifier	Title	Applicable	Justification
Sen. 35.91	Nuclear Safety Policy	Y	Establishes quantitative safety goals to limit risks of fatalities with DOE nuclear operations; identical to NRC goals. Goals require DOE nuclear facilities and activities to be designed, constructed, operated and decommissioned with: <ul style="list-style-type: none"> • appropriate barriers to prevent or minimize potential releases • engineered safety features to minimize potential releases • procedural controls to mitigate effect of potential releases.
Decision Control Paper #33, Decision 16 (POC.TR.8)	Transportation Container	Y	Requires DOE to provide approved shipping container for ILAW product.
Decision Control Paper #33, Decision 16 (POC.TR.6)	Transportation Vehicles	Y	Requires DOE to supply transportation vehicles for the ILAW product.
Decision Control Paper #33, Decision 16 DOE 96-RTI-035 (POC.TR.4)	Infrastructure Support for Transportation	Y	Requires DOE to provide infrastructure support for transport activities (vehicles, shipping containers, etc.) and perform transportation of the products.

Miscellaneous

Document Identifier	Title	Applicable	Justification
DOE 5480.11	Worker Radiological Safety; Hanford Site Radiological Control Manual Chapter 1, Part 1 Section 111 and 112	Y	Provides basis for consistent and uniform implementation of radiological control requirements for the Hanford Site. Basic requirements established through 10 CFR 835 and enforced through regulatory system established in 10 CFR 820 and DOE 5480.11.
Unknown (POC.B.1)	ILLW Shipping frequency	TBD	Unknown

Constraints on Design of the ILAW Disposal Facility

Westinghouse Hanford Company

Document Identifier	Title	Applicable	Justification
WHC-CM-2-14	Hazardous Material Packaging and Shipping	N	<p>Requires that radioactive mixed waste be packaged and transported onsite and/or offsite in accordance with 49 CFR 171-179 or under a DOE approved alternative which is formally documented and provides an equivalent degree of safety.</p> <p>Note: Material packaging is responsibility of shipper (ILAW pretreatments or ILAW storage). DOE provides the infrastructure support for transportation of material.</p>
WHC-CM-7-5	Radioactive Air Emissions Site Wide	Y	<p>Establishes requirements and guidelines on airborne emissions of radioactive effluents. Applies to all existing and planned facilities and activities.</p> <p>Requires:</p> <ul style="list-style-type: none"> • continuous monitoring and alarm system for all systems having potential to exceed ten times any of DCF-Public values at point of release on an annual average. • sampling and particulate filtration systems for all airborne effluents having potential to exceed 10 percent of any DCF-Public values on annual basis. <p>Note: ILAW will be prepared using T-BACT and placed into sealed canisters to control release/emission of potential constituents during disposal.</p>

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