Interim Storage Report

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ABSTRACT

High-level radioactive waste (HLW) stored at the Idaho Chemical Processing Plant (ICPP) in the form of calcine and liquid and liquid sodium-bearing waste (SBW) will be processed to provide a stable waste form and prepare the waste to be transported to a permanent repository. Because a permanent repository will not be available when the waste is processed, the waste must be stored at ICPP in an Interim Storage Facility (ISF). This report documents consideration of an ISF for each of the waste processing options under consideration.

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ACRONYMS

CFR	Code of Federal Regulations
CWO	Cementitious Waste Option
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOE-ID	DOE Idaho Operations Office
DOT	Department of Transportation
DPC	Dual Purpose Canister
DTC	Dry Transfer Cell
DCWO	Direct Cementitious Waste Option
EDF	Engineering Design File
EIS	Environmental Impact Study
FPR	Fuel Processing Restoration Facility
HAW	high-activity waste
HIP	Hot Isostatic Press
HLW	high-level radioactive waste
HLW&FD	High-Level Waste and Facilities Disposition
HWO	HIP Waste Option
ICPP	Idaho Chemical Processing Plant
IFSF	Irradiated Fuel Storage Facility
INEEL	Idaho National Engineering and Environmental Laboratory
ISF	Interim Storage Facility—Facility for the storage of HLW in canisters at ICPP
LAW	low-activity waste
LMITCO	Lockheed Martin Idaho Technologies Company
MP-187	Transport/shipping cask commercially available through VECTRA Technologies, soon to be purchased by Chem Nuclear, Inc.

NRC	Nuclear Regulatory Commission
NUHOMS	Trade mark for concrete storage modules commercially available through VECTRA Technologies, soon to be purchased by Chem Nuclear, Inc.
RCRA	Resource Conservation and Recovery Act
SBW	sodium-bearing waste
SNF	spent nuclear fuel
SRS	Savannah River Site
TRU	transuranic
VWO	Vitrified Waste Option
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant

Interim Storage Report

1. INTRODUCTION

1.1 Background

The Idaho Chemical Processing Plant (ICPP) located at the Idaho National Engineering and Environmental Laboratory (INEEL) has been used for reprocessing spent nuclear fuel (SNF) since 1953. SNF was reprocessed to recover fissile uranium; however, changing world events have diminished the need to recover and recycle this material. In April 1992, the Department of Energy (DOE) discontinued reprocessing SNF and shifted its focus toward continued management and disposal of waste accumulated from previous reprocessing activities. ICPP waste treatment activities produce a granular solid waste (calcine) that contains dissolved fission products and fuel cladding material. Decontamination activities at the ICPP produce liquid radioactive, sodium-bearing waste (SBW) and ongoing operations at the ICPP produce liquid waste that contains low levels of radioactivity. The treatment of radioactive wastes for transfer out of Idaho is mandated under a "Settlement Agreement"¹ between DOE and the State of Idaho. The Settlement Agreement requires that the existing inventory of liquid high-level radioactive waste (HLW) be calcined by June 30, 1998, and SBW by the end of 2012, and the target date for all waste to be ready to ship from the INEEL is 2035.

The Department of Energy Idaho Operations Office (DOE-ID) is preparing the High-Level Waste and Facilities Disposition Environmental Impact Statement (HLW&FD EIS), in accordance with the National Environmental Policy Act, to support the decision-making process regarding HLW management at the INEEL. The Fluor Daniel Corporation and the INEEL operating contractor, Lockheed Martin Idaho Technologies Company (LMITCO), have been tasked with performing studies that provide the basis for portions of the EIS. Waste treatment options include dissolving the calcine; both the dissolved calcine and the liquid SBW would then be separated into high-activity waste (HAW) and low-activity waste (LAW). The HAW would be mixed with a glass matrix and poured into canisters. These are termed the "Separations Options." Alternative options that do not involve a separation step are termed the "Nonseparations Options." The Waste Treatment Studies consider the several alternative processes for preparing the calcine and liquid waste for ultimate removal from the INEEL: Separations [(Full and transuranic (TRU)] and Nonseparations (Vitrified, Hot Isostatic Press, Cementitious, and Direct Cementitious). Fluor Daniel Corporation is studying the Full Separations alternative and the others are being studied by LMITCO. The product of each of the processes will be waste in a storage canister that is ready for shipment to a permanent repository. Because the repositories will not be capable to receive the canisters at the time they are produced, interim storage will be required at the INEEL. This report documents cost, schedule, and environmental impact for interim storage of the waste generated with the above processes in an Interim Storage Facility (ISF). A new ISF for the Full Separations alternative is included in the Fluor Daniel Corporation Study. This study includes a modified existing facility study for interim storage for the Full Separations Option.

1.2 Objective and Scope of Work

The objective of this study is to explore alternatives for interim storage of the waste in canisters that result from SBW and HLW processing of the calcine and liquid waste at ICPP. Table 1 gives the processing options and associated data that are included in this study.

Table 1. Waste processing options and study data.

	Storage Type	Number of Canisters	Production Rate, Number/Shift	Dose Rate at Contact, R/hr	Heat Output, Watts/Canister
Separations Options Full Separations					
	Modified Existing Facility	780		2.4–2500	25–220
TRU/Class A Separations	New Facility	170	1/month	160,000	12,350
	NUHOMS™	170	1/month	160,000	12,350
	Modified Existing Facility	170	1/month	160,000	12,350
Nonseparations Options: Vitrified					
	New Facility	14,000	6	6.1–172	0.6–14.7
	Modified Existing Facility	14,000	6	6.1–172	0.6–14.7
Direct Cementitious	New Facility	18,000	35	6.9–287	0.4–16.4
	Modified Existing Facility	18,000	35	6.9–287	0.4–16.4
Cementitious	New Facility	16,000	32	140	8.9
	Modified Existing Facility	16,000	32	140	8.9
	HIP Preliminary Plan	31,000 drums	32	140	8.9
Hot Isostatic Press	New Facility	5,700	9	14–580	1.7–61
	Modified Existing Facility	5,700	9	14–580	1.7–61

The objective of this study was to determine the cost, schedule, and environmental impacts for the storage of the waste canisters that result from each of the processing options in Table 1. A new facility was studied that incorporates appropriate design features from the Fluor Daniel Corporation design for interim storage presented in their document, *Idaho Chemical Processing Plant, Waste Treatment Facilities, Feasibility Study Report*, December 12, 1997 (see Reference 2). Modification of existing facilities at ICPP for storage of the waste was considered. The Fuel Processing Restoration (FPR) facility is a large unfinished and unoccupied building that has large cells that can be used for waste storage. This facility was considered the most attractive existing facility at ICPP for interim storage. The Irradiated Fuel Storage Facility (IFSF) is another facility that was considered for modification for interim storage, but space limitations and current use made it impractical for interim storage of HLW. The storage of canisters resulting from the Full Separations Option in NUHOMS™ modules was the subject of report, *DPC Loading Feasibility Study Report*, INEEL/EXT-97-01251, November 1997 (see Reference 3). This study considers storage of the canisters that result from the TRU/Class A Separations Option in the NUHOMS™ module. The TRU/Class A Separations option would generate three waste streams designated as LLW: LAW, HAW, and TRU waste. All of these waste streams are actually considered HLW. It is expected that the LAW and TRU meet the definition of Nuclear Regulatory Commission (NRC) LLW Class A and TRU, respectively. However, these wastes do not conform to the existing classification scheme for radioactive waste. Therefore, they will need the evaluation and concurrence of

appropriate government authorities (NRC and DOE) for reclassification. Only the HAW will require interim storage. The LAW is assumed to go directly to a Class A waste disposal site and the TRU waste to go directly to the Waste Isolation Pilot Plant (WIPP). The TRU/Class C Separations Option does not require interim storage.

A preliminary plan for the Cementitious and Direct Cementitious Options is under consideration. The resulting grout would be placed into drums within a 5-year period and placed into the ISF. Over a 20-year period, the drums would be subjected to a Hot Isostatic Press (HIP) process that would further reduce the volume. This alternative was included in this study.

2. DESIGN BASIS, KEY ASSUMPTIONS, AND REQUIREMENTS

2.1 Design Basis

A facility is required near the processing facility to store the HLW from the time it leaves the processing facility until it can be moved to a permanent waste repository. The quantities of canisters and their characteristics given in Table 1 result from the studies for the processing alternatives. The design life for the facilities is from 40 to 60 years.

The Savanna River Site (SRS) HLW and the West Valley Demonstration Project HLW canisters meet the repository Waste Acceptance Criteria (WAC) for dimensions, although there are significant differences in these canisters' physical makeup. The SRS canister is used as the baseline for this study because it was selected in the ICPP Waste Treatment Facilities Feasibility Study Report.² However, the DOE Hanford Facility has adopted a 4.5-m (15-ft) long canister for containing immobilized HLW. This longer canister is apparently acceptable for co-disposal at the repository, and therefore should be considered before finalizing the canister size. Consideration of the 4.5-m (15-ft) canister is addressed in the recommendations in Section 9. Some cost increase would result because the head height for handling the longer canisters is greater, and depth of excavation, equipment capacities, etc. increase. Cost increases would also occur because of the increase in the ISF transport tunnel height, canister handling machine size and capacity, and the ceiling height. However, smaller ISFs may be adequate with fewer canisters, and handling, shipping, and final disposal operations with fewer canisters would offset the cost increases if the longer canisters were adopted. The net result of the cost changes is unknown.

Transport of the waste to the ISF is included in this study, however transport from the facility is not included. Equipment for handling the canisters for movement into and from the facility is included.

A passive cooling system is desired. The additional safety issues and operating costs of an active system would thus be avoided.

2.2 Key Assumptions

The following assumptions formed the framework, i.e., and the directed charter, for this study. Therefore, although some of these assumptions are likely to change, and such changes may have a significant impact on the results of this study, it is beyond the scope of this study to predict such changes or evaluate the associated risk.

1. The quantities and characteristics of waste to be stored are tabulated in Table 1.
2. The waste will be stored in the SRS canister described in the Engineering Design File, EDF-DPC-001, Appendix E of *DPC Loading Feasibility Study Report*, INEEL/EXT-97-01251, November 1997.
3. The processed waste is not Resource Conservation and Recovery Act (RCRA) hazardous waste as a result of delisting before processing and by virtue of processing when all "listed" hazardous and characteristic constituents are treated to the Land Disposal Regulation standards, then the waste is no longer classed as RCRA waste.
4. The LAW and TRU waste will be reclassified as LLW Class A and TRU, respectively.

5. The facility will be licensed by the NRC in accordance with the requirements of 10 CFR Part 72. Existing facilities may not have been built to these requirements and replacement or upgrading of the components may not be possible. In these cases, it is assumed that the NRC will consider equivalence or alternative approaches and issue the license.
6. The processing facilities will not have lag storage. If the ISF cannot handle the canisters at the rate produced by the facility as given in Table 1, the ISF must have the capability to store them in a lag storage area. This lag storage would only be used if the processing facility releases the canisters in a batch or for maintenance of the canister handling equipment in the ISF.
7. The handling equipment will interface with an MP-187 cask for canister shipment from the ISF.
8. Physical security requirements are enveloped by those for SNF.
9. Dual Purpose Canisters (DPCs) will be acceptable for storage under 10 CFR Part 72.
10. The maximum weight of a canister is 5,300 lb.

2.3 Requirements

2.3.1 Regulations

The NRC in accordance with 10 CFR Part 72 will license the storage facility, however the additional cost for licensing is not included in the cost estimates. It is assumed that the canisters, as received from the processing facility, will meet Department of Transportation (DOT), NRC, and/or HLW Repository WAC requirements and require no further conditioning, testing, treatment, marking, etc. This requires that the waste will be excluded from RCRA hazardous waste management requirements at the INEEL due to successful delisting and/or treatment.

The ISF will be licensed to meet 10 CFR Part 72 for HLW; therefore the receipt, handling, packaging, and storage of canisters of waste must also be governed under 10 CFR Part 72. Changes required to the facility license must be evaluated through a 10 CFR 72.48 evaluation, issuance of a Safety Analysis Report, and licensing documentation amendments. It is assumed that the Department of Energy Idaho Operations Office (DOE-ID) will continue to implement the quality assurance program described in DOE-RW-0333P, *Quality Assurance Requirements and Description*⁴ and will apply it to this effort. The impact of implementing DOE-RW-0333P is reflected in the capital and operating cost estimates generated by this feasibility study.

2.3.2 HLW Repository WAC

The requirements of the potential future repository waste acceptance will be satisfied by the processing facility before the canisters being released to the ISF. The ISF will not provide any capability to process, modify, or change the waste or canisters.

2.3.3 Applicable Codes and Standards

The NRC licenses and regulates waste storage facilities in accordance with 10 CFR Part 72. DOE requirements that are included in 10 CFR Part 72 will be superseded by them, however any DOE requirements that are not covered by 10 CFR Part 72 will also apply.

3. INTERIM STORAGE FACILITY DESIGNS

3.1 Basic Design Concepts

3.1.1 Design Philosophy

The Waste Treatment Facilities Studies that this report supports are discussed in reports covering the various treatment options. This study provides information about the interim storage required for each of the treatment options. A new facility has been studied that can be built near the processing facility. The design features of the Fluor Daniel Corporation interim storage facility² have been incorporated into the new facility discussed here to the extent that the features were applicable. This allows comparison and use of common cost estimates. The modification of an existing facility at ICPP for this storage is also presented. Features of the Fluor Daniel Corporation design² are used for this facility also where applicable. The flow of HLW from the processing facility through the storage period and until it is shipped from INEEL to a permanent repository is shown in Figure 1.

3.1.2 New Interim Storage Facility

EDF-IS-001, *New Facility for Interim Storage of HLW*, Appendix A, documents the study for an ISF at ICPP to store the waste that results from the various processing alternatives. The number of canisters produced from the processing options range from 170 to 18,000. The layout for an ISF has been arranged to accommodate modular sizing so that the core facility containing the receiving and shipping area, canister handling equipment, lag storage, and office and support space is centrally located. The alternatives discussed in EDF-IS-001 contain the required number of modules of storage vaults. Each module contains 630 storage tubes. Each tube can hold three canisters stacked vertically with space for cushioning material at the bottom and between each canister. Tests have been performed on the canisters to verify that they can be dropped from a height of 9 meters without rupture. Anytime the canisters are handled at a height that would allow a drop distance in excess of 9 meters (30 ft), cushioning material must be provided to limit the impact to the equivalent impact for the 9 meters (30 ft). The ISF will be provided with cushioning material to satisfy this requirement. Storage of the canisters three high allows for a more compact facility than a two high arrangement would require. Cushioning can be provided to allow the handling of the canisters at this height.

An office area is provided similar to the one provided in the Fluor Daniel Corporation design.² The gantry crane is also like the one included in the Fluor Daniel Corporation design.² A transfer tunnel is included for transport of the canisters from the processing facility to the storage facility. The tunnel will be belowgrade to have the benefit of the soil for shielding. A load out-bay is provided to load the canisters into a shipping cask similar to the MP-187 cask that is mounted on a railroad car. The plot plan shows the railroad spur to the facility, however, the cost of the spur is not included in the cost estimate. It is included in a cost estimate that covers the infrastructure for the ICPP for all of the alternatives. This cost estimate is found in *Utilities and Infrastructure Report*, INEEL/EXT-98-01398, February 1998 (see Reference 5).

The handling crane is sized to handle the largest expected load, which is 50 tons. It is mounted in a gantry arrangement to allow it to locate the handling machine accurately over the storage positions. In some of the designs, a crane maintenance area is provided at the ends of the building. In the alternatives involving fewer canisters, the crane maintenance will occur over the central module.

The new ISF facilities presented in this study have been used in the processing option studies as the baseline storage facility. This has been done to be consistent so that a direct cost comparison can be made.

Figure 1 - Flow Diagram for the Storage of High Level Waste in Interim Storage

3.1.3 Modified Existing Interim Storage Facility

EDF-IS-002, *Modification of FPR for Interim Storage of HLW* (see Appendix A) describes the modification of the FPR Facility at ICPP. This facility was investigated for storage of the HLW.

The FPR Facility is a large unfinished and unoccupied building that was in the final stages of construction when stopped. The outside of the building is complete and the concrete and structure of the interior is in place. The lighting and life support systems were not installed. The facility has shielded cells that were investigated to determine suitability for interim storage. Modifications to the facility are required to interface with a transfer tunnel from the processing facility, a gantry crane to handle the canisters, pipe sleeves to store the canisters, and a load-out facility to transfer the canisters to a shipping cask for shipment to a repository.

The maximum number of canisters that can be stored in FPR was determined, assuming that the inner concrete walls are removed to form one cell of all cells 1 through 12 and the pump and valve corridor. It is also assumed that the storage sleeves can be located next to each other without the need for a cooling air path through the array. The maximum number of 66-cm (26-inch) diameter storage sleeves that can be placed in the cell is 2,336. With four canisters in each sleeve, a maximum of 9,344 canisters can be stored. This quick look at the facility reduced the subsequent investigation for the various processing options. The options with greater than 9,344 canisters are out of the question for storage in FPR. The options with fewer than 9,344 can conceivably be stored in FPR. Therefore, only the Full and TRU/Class A Separations Options and the HIP Waste Option (HWO) were investigated further.

The IFSF (CPP-603) was investigated for suitability for storage of HLW for the processing options that have small numbers of canisters. This facility was determined to not be suitable for the following reasons:

1. The facility is partly loaded with Fort St. Vrain fuel that will not be removed from IFSF until a permanent repository is available.
2. The storage configuration at IFSF is for canisters made from 46-cm (18-inch) diameter pipe.
3. Expansion of the storage area to provide space suitable for the HLW canisters was an attractive storage alternative until a recent modification of the facility added concrete walls that make this unattractive. The walls were added because of seismic concerns with the temporary walls.

The HLW canisters cannot be stored in the current configuration. The storage configuration cannot be modified with the Fort St. Vrain fuel in storage. Expansion to provide space designed for HLW but able to use the basic facility features is no longer an attractive storage alternative. Therefore, the use of IFSF for HLW interim storage was not investigated further.

3.2 Interim Storage for Full Separations Option

A new facility for storage of waste processed by the full separation option is included in the Fluor Daniel Corporation report² and therefore, is not part of this study.

3.2.1 Modified Existing Facility

The 780 canisters of waste material that result from the Full Separations Option can be stored in the FPR as shown in the drawings in Appendix 2 of EDF-IS-002. The drawings show the building

modifications required for handling of the canisters and receiving and removal of the canisters. The building must be completed to include such items as lighting, rest rooms, alarms, etc., that are included in the cost estimate as "life safety" equipment.

3.3 Interim Storage for TRU/Class A Separations Option

The discussion on the TRU/Class A Separations Waste Option (TRU/Class A) is documented in the report, *TRU Separations Option Study Report*, INEEL/EXT-01428, February 1998 (see Reference 6).

3.3.1 New Storage Facility

A new storage facility has been studied to store the 170 canisters of HLW, the only waste stream that requires interim storage, from the TRU/Class A Separations processing option. The facility is discussed in EDF-IS-001 and the drawings are in Appendix 2 of that EDF. Because of the small number of canisters (170), the basic facility design is modified to only have one canister in each storage sleeve. The design studied was one vault of the modular design that can store 630 canisters. The additional capacity would be available for other storage.

3.3.2 NUHOMS™ Storage

Assuming space for 75 DPCs is available on the pad for the ISFSI/NUHOMS storage area, the 170 canisters produced in the TRU/Class A Separations Option can be placed into 43 DPCs and stored in NUHOM™ storage casks on the existing pad. This scheme for storage is addressed in detail in the report, *DPC Loading Feasibility Study Report*, INEEL/EXT-97-01251 (see Reference 3). Assuming the modifications at the Dry Transfer Cell (DTC) would be required or additions at the processing facility having a similar cost are needed and the portion of the DPC/NUHOMS™ Procurement for 43 casks instead of 195, the estimated cost for a storage facility would be \$73,400,000.

3.3.3 Modified Existing Facility

The 170 canisters of waste material that result from the Full Separations Option can be stored in the FPR as shown in the drawings in Appendix 2 of EDF-IS-002. The drawings show the building modifications required for handling of the canisters and receiving and removal of the canisters. The building must be completed to include such items as lighting, rest rooms, alarms, etc., that are included in the cost estimate as "life safety" equipment.

3.4 Interim Storage for Vitrified Waste Option

The discussion on the Vitrified Waste Option (VWO) is documented in the report, *Vitrified Waste Option Study Report*, INEEL/EXT-01389, February 1998 (see Reference 7).

3.4.1 New Storage Facility

A new storage facility has been studied to store the 14,000 canisters that require interim storage with this processing option. The facility is discussed in EDF-IS-001 and the drawings in Appendix B of that EDF. The facility consists of eight vaults capable of storing 15,120 canisters with them stacked three high.

3.4.2 Modified Existing Facility

The FPR Facility can be modified to contain a maximum of 9,344 and, therefore, cannot store the 14,000 canisters produced by this processing option. A more realistic storage capability for FPR is 5,896 as discussed in Section 3.7.2 for the HIP processing option. In addition to modification of FPR, a new storage facility would be required to store the additional 8,104 canisters. This would require a five-vault size facility.

3.5 Interim Storage for Direct Cementitious Waste Option

The discussion on the Direct Cementitious Waste Option (DCWO) is documented in the report, *Direct Cementitious Waste Option Study Report*, INEEL/EXT-01399, February 1998 (see Reference 8).

3.5.1 New Storage Facility

A new storage facility has been studied to store the 18,000 canisters that require interim storage with this processing option. The facility is discussed in EDF-IS-001 and the drawings in Appendix 2 of that EDF. The facility consists of 10 vaults capable of storing 18,900 canisters with them stacked three high.

3.5.2 Modified Existing Facility

The FPR Facility can be modified to contain a maximum of 9,344 and, therefore, cannot store the 18,000 canisters produced by this processing option. A more realistic storage capability is 5,896 as discussed in Section 3.7.2 for the HIP processing option. In addition to modification of FPR, a new storage facility would be required to store the additional 12,104 canisters. This would require a seven-vault size facility.

3.5.3 New Storage Facility for the HIP Preliminary Plan

A preliminary plan is being considered for the DCWO that adds another process, HIP, that further reduces the waste volume. The number of canisters that results is estimated to be 11,700. An ISF with seven modules would be required to store the waste for this plan.

3.6 Interim Storage for Cementitious Waste Option

The discussion on the Cementitious Waste Option (CWO) is documented in the report, *Cementitious Waste Option Study Report*, INEEL/EXT-01389, February 1998 (see Reference 9).

3.6.1 New Storage Facility

A new storage facility has been studied to store the 16,000 canisters that require interim storage with this processing option. The facility is discussed in EDF-IS-001 and the drawings in Appendix 2 of that EDF. The facility consists of nine vaults capable of storing 18,900 canisters with them stacked three high.

3.6.2 Modified Existing Facility

The FPR Facility can be modified to contain a maximum of 9,344 and, therefore, cannot store the 16,000 canisters produced by this processing option. A more realistic storage capability is 5,896 as discussed in Section 3.7.2 for the HIP processing option. In addition to modification of FPR, a new storage facility would be required to store the additional 10,104 canisters. This would require a six-vault size facility.

3.6.3 New Storage Facility for the HIP Preliminary Plan

A preliminary plan is being considered for the CWO that allows the waste to be processed in a 5-year period and stored in drums later to be subjected to a HIP process that would further reduce the volume of waste. The later process would be performed over a 20-year period. Interim storage of the drums is required until processed and for the canisters that the HIPed drums are placed in after processing. The estimated number of drums is 31,000. For information about the drums and this process, refer to EDF-CWO-001 in Appendix E of the report *Cementitious Waste Option Study Report*, INEEL/EXT-01389 (see Reference 9). The drums can be stored in the same storage sleeves that are planned for the canisters. A special handling grapple would be required to handle the drums in addition to the handling equipment for canisters. The grapple must be capable of lowering the drums into the storage sleeves and releasing from the drum. The grapple must also be capable of the reverse operation to remove the drums for processing. The unprocessed drums are 142-cm (56 inches) long, therefore, six can be stored in each storage sleeve. The maximum storage requirement will be at the end of 5 years of operation when 7,750 drums have been HIPed into 2,583 canisters. The facility will be required, at the end of the 5th year of operation, to also store 23,250 drums. The canisters and drums will require 4,736 storage sleeves or eight modules, the same size as is needed for the VIT Option, which is one module smaller than required for the CWO option in Section 3.6.1. The cost for the facility is, therefore, the same as for the VIT Option with the additional cost for the handling equipment for the drums.

3.7 Interim Storage for Hot Isostatic Press Waste Option

The discussion on the HIP Option is documented in the report, *Hot Isostatic Press Waste Option Report*, INEEL/EXT-01392, February 1998 (see Reference 10).

3.7.1 New Storage Facility

A new storage facility has been studied to store the 5,700 canisters that require interim storage with this processing option. The facility is discussed in EDF-IS-001 and the drawings in Appendix 2 of that EDF. The facility consists of four vaults capable of storing 7,560 canisters with them stacked three high.

3.7.2 Modified Existing Facility

The 5,700 canisters of waste material that result from the HIP Option can be stored in the FPR as shown in the drawings in Appendix 2 of EDF-IS-002. The drawings show the building modifications required for handling of the canisters and receiving and removal of the canisters. The building must be completed to include such items as lighting, rest rooms, alarms, etc., that are included in the cost estimate as "life safety" equipment.

4. TOTAL PROJECT, LIFE-CYCLE, AND D&D COSTS

Cost estimates for the interim storage alternatives are in Appendix 1 of the respective EDFs (EDF-IS-001 and EDF-IS-002). These EDFs are in Appendix A of this report. The costs are summarized in Table 2.

Table 2. Project Costs

Cost Item	Separations Options				
	Full Separations	TRU/Class A Separations			Vitrification
	Modified Existing Facility	New Facility	NUHOMS	Modified Existing Facility	New Facility
	\$	\$	\$	\$	\$
OPC (unescalated)	13,941,000	15,228,000	Not	13,168,000	16,228,000
OPC Escalation	4,469,000	4,118,000	Calculated	4,747,000	4,118,000
OPC Mgmt Reserve	0	0		0	
OPC Contingency	4,590,000	4,854,000		4,484,000	5,118,000
Total OPC	23,000,000	24,200,000		22,400,000	25,500,000
TEC (unescalated)	89,245,000	66,308,000	Not	77,219,000	382,760,000
TEC Escalation	44,166,000	30,078,000	Calculated	34,353,000	138,310,000
TEC Mgmt Reserve	9,188,000	6,647,000		7,686,000	40,060,000
TEC Contingency	19,901,000	14,267,000		16,942,000	65,040,000
Total TEC	162,500,000	117,300,000		136,200,000	626,200,000
TPC (unescalated)	103,186,000	81,536,000	Not	90,387,000	399,010,000
TPC Escalation	48,634,000	34,195,000	Calculated	39,100,000	142,460,000
TPC Mgmt Reserve	9,188,000	6,647,000		7,686,000	40,060,000
TPC Contingency	24,491,000	19,121,000		21,426,000	70,160,000
Total TPC	185,500,000	141,500,000	73,400,000	158,600,000	651,700,000
Operations (unescalated)	45,526,000	41,433,000	Not	45,431,000	149,750,000
Operations Escalation	90,825,000	80,511,000	Calculated	88,164,000	172,520,000
Operations Contingency	40,905,000	36,583,000		40,079,000	96,680,000
Total Operations	177,257,000	158,527,000		173,674,000	418,960,000
Post Operations (unescalated)	29,049,000	22,749,000	Not	25,399,000	106,260,000
Post Operations Escalation	182,326,000	142,784,000	Calculated	159,413,000	666,950,000
Post Operations Contingency	63,413,000	49,660,000		55,444,000	231,960,000
Total Post Operations	274,788,000	215,193,000		240,256,000	1,005,180,000
Total Cost (unescalated)	177,761,000	145,718,000	Not	161,217,000	651,700,000
Total Cost (w/escalation, mgt reserve, and contingency)	637,545,000	515,220,000	Calculated	572,529,000	2,075,840,000
Discounted Cost (escalated)	105,247,000	89,476,000		97,808,000	426,040,000

Non-separations Options						
	Direct Cementitious		Cementitious		Hot Isostatic Pressed	
	New Facility	HIP Preliminary Plan	New Facility	HIP Preliminary Plan	New Facility	Modified Existing Facility
	\$	\$	\$	\$	\$	\$
000	16,228,000	Not	16,228,000	Not	16,228,000	16,228,000
000	4,138,000	Calculated	4,253,000	Calculated	4,310,000	4,605,000
0	0		0		0	0
000	5,133,000		5,118,000		5,161,000	5,166,000
000	25,500,000	25,500,000	25,600,000	25,500,000	25,700,000	26,000,000
000	451,415,000	Not	417,093,000	Not	224,756,000	197,722,000
000	163,984,000	Calculated	151,004,000	Calculated	80,542,000	70,977,000
000	48,663,000		44,363,000		22,291,000	19,374,000
000	73,938,000		69,440,000		41,012,000	37,827,000
000	738,000,000	571,200,000	681,900,000	626,300,000	368,600,000	325,900,000
000	467,644,000	Not	433,321,000	Not	240,984,000	213,950,000
000	168,122,000	Calculated	155,258,000	Calculated	84,852,000	75,583,000
000	48,663,000		44,363,000		22,291,000	19,374,000
000	79,071,000		74,558,000		46,173,000	42,993,000
000	763,500,000	596,700,000	707,500,000	651,800,000	394,300,000	351,900,000
000	206,580,000	Not	48,245,000	Not	95,689,000	87,239,000
000	371,029,000	Calculated	57,554,000	Calculated	119,204,000	111,240,000
000	173,283,000		31,740,000		64,468,000	59,544,000
000	750,893,000		137,538,000		279,361,000	258,022,000
000	122,735,000	Not	114,497,000	Not	65,515,000	58,729,000
000	770,341,000	Calculated	718,639,000	Calculated	411,201,000	368,613,000
000	267,923,000		249,941,000		143,015,000	128,203,000
000	1,160,998,000		1,083,077,000		619,730,000	555,544,000
030	796,959,000	Not	596,063,000	Not	402,188,000	359,918,000
000	2,675,391,000	Calculated	1,928,115,000	Calculated	1,293,391,000	1,165,466,000
000	505,982,000		405,774,000		255,814,000	230,745,000

5. PROJECT SCHEDULE

Figure 2 for each processing option and interim storage alternative show the schedules for the installation or modification of the storage facilities.

Figure 2. Project Schedule.

Figure 2. (continued).

Figure 2. (continued).

Figure 2. (continued).

Figure 2. (continued).

Figure 2. (continued).

Figure 2. (continued).

Figure 2. (continued).

6. RISK ASSESSMENT

High-level risks identified in this study are categorized below. The assumptions in Section 2.2 provide the framework for this list. The highest risk is rated at 4. Data Sheets for all the identified risks and explanation of the risk rating calculation are included in Appendix 4 of the respective EDFs (EDF-IS-001 and EDF-IS-002). These EDFs are in Appendix A of this report.

1. The quantities and characteristics of the waste are different than assumed in the study. Risk = 3 (Probability = 3, Impact = 1).
2. Waste will not be stored in the SRS canister. Risk = 2 (Probability = 2, Impact = 1).
3. The facility would have to be redesigned if the waste is classified as a RCRA waste after processing. Risk = 3 (Probability = 1, Impact = 3).
4. The obtaining of the NRC license for the FPR would be more difficult than assumed. Risk = 4 (Probability = 2, Impact = 2).
5. A storage canister will be mishandled or dropped during waste transfer to, from, or in the facility. Risk = 2 (Probability = 1, Impact = 2).
6. A catastrophic flood could flood the FPR Facility. Risk = 2 (Probability = 1, Impact = 2).
7. The facility might not be operational when needed. Risk = 2 (Probability = 1, Impact = 2).

Many risks including environmental, safety, and health risks were not identified in this study.

7. CONSTRUCTION AND OPERATIONAL ENVIRONMENTAL IMPACTS

The Product Data Sheets that summarize the construction and operational environmental impacts for the interim storage facilities that support the waste processing options are in Table 3. Data are presented for the construction, operation, and decommissioning of the project. Estimates are included for the following parameters:

- Cost
- Schedule
- Air emissions
- Liquid effluents
- Solid wastes
- Utilities used
- Manpower requirements
- Regulatory requirements.

Because this project is at a very preliminary stage of design, much of the information presented in the Project Data Sheets is based on representative literature values, existing laboratory data, and engineering judgment. The cost data in Table 3 were obtained from the cost estimates in Appendix 1 and the supporting information for the remainder of the data is in Appendix 5 of the respective EDFs (EDF-IS-001 and EDF-IS-002) in Appendix A of this report.

The Product Data Sheets are presented in the following order in Table 3. Product Data Sheets were not prepared for the TRU/Class A Separations NUHOMS™ Option, and the HIP Preliminary Plan for the DCWO and CWO.

Processing Option	Project Data Sheet Title
Full Separations – IS in the FPR	PDS for Storage at FPR for WFS
TRU/Class A Separations – New ISF	PDS for Interim Storage Facility for TRU
TRU/Class A Separations – IS in the FPR	PDS for Storage at FPR for TRU
Vitrified	PDS for Interim Storage Facility for VWO
Direct Cementitious	PDS for Interim Storage Facility for DCWO – 20 Yr
Cementitious	PDS for Interim Storage Facility for CWO
Hot Isostatic Press – New ISF	PDS for Interim Storage Facility for HIP
Hot Isostatic Press – IS in the FPR	PDS for Storage at FPR for HWO

Table 3. Project data sheet for Interim Storage.

Project Data Sheet for Interim Storage Facility for TRU

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	TRU Separations Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	3,350 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside TRU Separation Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation an

Conceptual Design	\$4,240,000
Management for Project Development	\$4,520,000
Permitting and Documentation	\$3,656,000
SO Test & Start-Up	\$6,930,000
Contingency	\$4,854,000
Total Preconstruction	\$24,200,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$10,601,000
Management (PM/CM)	\$10,177,000
Construction	\$42,405,000
G&A/PIF	\$2,701,000
Procurement Fees, Management Reserve and Contingency	\$15,116,000
Total Construction (TEC)	\$81,000,000
Schedule start/end: Preconstruction	January 1999 through December 2001
Schedule start/end: Construction	January 2010 through December 2013
Schedule start/end: SO Test & Start-up	January 2014 through December 2014

Number of workers each year of construction (new/existing)

Nonradiation	58 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	1,156
Hours of operation	5,287 hours (total)

Acres disturbed and duration of disturbance

New	January 2010 through December 2013
Previous	None
	3.0 acres

Table 3. (continued).**Project Data Sheet for Interim Storage Facility for TRU**

Revegetated

None

Air emissions

Dust

86 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

4,814 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

28 tons (total)

Total air emissions

4,928 tons (total)

Effluents

Sanitary wastewater

2,469,713 liters (total)

Lube Oil

1,001 liters (total)

Solid wastes

Type - construction trash

1,375 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)Pits/Ponds created (m²)

None

Water usage:

Dust control

616,810 liters (total)

Domestic water

2,469,713 liters (total)

Energy requirements

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

0 liters (total)

Permits needed for construction

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$7,007,000

Operations/Process Facility

\$17,581,000

Procurement, materials, utilities, maintenance

\$16,845,000

Total operations

\$41,433,000

Schedule start/end

January 2014 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for TRU

Operations	3	
Maintenance	0.5	
Support	3	
Total	6.5	
Number of radiation workers	2.5 (included in above total)	
Average annual work radiation dose (rem/yr)	0.19 rem/yr	per worker
Heavy Equipment	None	
<u>Air Emissions</u>		
Radioactive off-gas	None	
<u>Effluents</u>		
Sanitary Wastewater	224,498 liters/yr	
<u>Solid Wastes</u>		
Sanitary/Industrial Trash	36 m ³ /yr	
Radioactive wastes (canisters)	122 m ³ /yr	
<u>Hazardous/toxic chemicals and wastes</u>		
Pits/Ponds used (m ²)	None	
<u>Water usage:</u>		
Domestic water	224,498 liters/yr	
<u>Energy Requirements:</u>		
Electrical (MWh/yr)	2,533 MWh/yr	
Fossil fuel (liters/yr)	None	
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.	
Decontamination & Decommissioning (D&D) Information		
<u>Cost (\$): D&D (unescalated)</u>		
Decommission	\$3,180,000	
Decontamination	\$0	
Demolition	\$19,569,000	
Total D&D	\$22,749,000	
Schedule start/end: D&D	January 2069 through December 2071	
Number of workers each year of D&D (new/existing)	53 New workers/yr	
Number of radiation workers (D&D)	5 New workers/yr	
Average annual worker radiation dose (rem/yr)	0.19 rem/yr	per worker
<u>Heavy equipment:</u>		
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders	

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for TRU

Trips	Roll-off trucks	3 per day
Hours of operation (all heavy equipment)		9,480 Hours
<u>Acres disturbed and duration of disturbance</u>		January 2069 through December 2071
New		None
Previous		3.0 acres
Revegetated		None
<u>Air emissions</u>		
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	5,510 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	32 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)
<u>Effluents</u>		
radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	3,414,175 liters (total)
non-radioactive	Lube oil	1,794 liters (total)
<u>Solid wastes:</u>		
radioactive		10,663 m ³
Non-radioactive (industrial)		2 m ³
Hazardous		23 m ³
<u>Hazardous/toxic chemicals and wastes (type)</u>		
Storage/inventory		None m ³ (total)
Pits/Ponds created (m ²)		None
Hazardous Waste		909 m ³ (total)
<u>Water usage:</u>		
Domestic water		3,414,175 liters (total)
Source of water	ICPP site wells	
<u>Energy requirements:</u>		
Electrical (MWh/yr)		156 MWh/yr
Fossil fuel (liters)		215,291 liters (total)
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)	Work will be done under closure provisions of existing permits.	

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for VWO

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Vitrified Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	13,493 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside Vitrification Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and contingency.

Conceptual Design	\$5,000,000
Management for Project Development	\$4,000,000
Permitting and Documentation	\$2,728,432
SO Test & Start-Up	\$4,500,000
Contingency	\$7,571,568
Total Preconstruction	\$23,800,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$35,000,000
Management (PM/CM)	\$55,337,700
Construction	\$273,376,540
G&A/PIF	\$16,334,715
Procurement Fees, Management Reserve and Contingency	\$79,451,045
Total Construction (TEC)	\$459,500,000
Schedule start/end: Preconstruction	January 2003 through December 2007
Schedule start/end: Construction	January 2006 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2012

Number of workers each year of construction (new/existing)

Nonradiation	114 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	2,191
Hours of operation	13,683 hours (total)

Acres disturbed and duration of disturbance

New	January 2006 through December 2011
Previous	None
	5 acres

Table 3. (continued).**Project Data Sheet for Interim Storage Facility for VWO**

Revegetated

None

Air emissions

Dust

288 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

13,189 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

77 tons (total)

Total air emissions

13,554 tons (total)

Effluents

Sanitary wastewater

9,708,525 liters (total)

Lube Oil

2,590 liters (total)

Solid wastes

Type - construction trash

5,406 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)Pits/Ponds created (m²)

None

Water usage:

Dust control

2,056,032 liters (total)

Domestic water

9,708,525 liters (total)

Energy requirements

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

0 liters (total)

Permits needed for construction

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$7,293,000

Operations/Process Facility

\$18,299,000

Procurement, materials, utilities, maintenance

\$124,165,000

Total operations

\$149,757,000

Schedule start/end

January 2012 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for VWO

Operations	3
Maintenance	0.5
Support	3
Total	6.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	224,498 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	36 m ³ /yr
Radioactive wastes (canisters)	10,584 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	224,498 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,368 MWh/yr
Fossil fuel (liters/yr)	None
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Decontamination & Decommissioning (D&D) Information	
<u>Cost (\$): D&D (unescalated)</u>	
Decommission	\$10,500,000
Decontamination	\$0
Demolition	\$95,783,000
Total D&D	\$106,283,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	249 New workers/yr
Number of radiation workers (D&D)	25 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker
<u>Heavy equipment:</u>	
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).**Project Data Sheet for Interim Storage Facility for VWO**

Trips	Roll-off trucks	9 per day
Hours of operation (all heavy equipment)		50,220 Hours
<u>Acres disturbed and duration of disturbance</u>		January 2069 through December 2071
New		None
Previous		5.0 acres
Revegetated		None
<u>Air emissions</u>		
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	29,189 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	170 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)
<u>Effluents</u>		
radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	15,898,593 liters (total)
non-radioactive	Lube oil	9,504 liters (total)
<u>Solid wastes:</u>		
radioactive		None m ³
Non-radioactive (industrial)		42,946 m ³
Hazardous		8 m ³
<u>Hazardous/toxic chemicals and wastes (type)</u>		
Storage/inventory		None m ³ (total)
Pits/Ponds created (m ²)		None
Hazardous waste		909 m ³ (total)
<u>Water usage:</u>		
Domestic water		15,898,593 liters (total)
Source of water		ICPP site wells
<u>Energy requirements:</u>		
Electrical (MWh/yr)		156 MWh/yr
Fossil fuel (liters)		1,140,496 liters (total)
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)	Work will be done under closure provisions of existing permits.	

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for DCWO - 20 yr

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Direct Cementitious Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	15,967 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside Grouting Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and

Conceptual Design	\$5,850,000
Management for Project Development	\$4,700,000
Permitting and Documentation	\$3,247,000
SO Test & Start-Up	\$6,570,000
Contingency	\$5,133,000
Total Preconstruction	\$25,500,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$45,750,000
Management (PM/CM)	\$83,023,000
Construction	\$455,030,000
G&A/PIF	\$27,046,000
Procurement Fees, Management Reserve and Contingency	\$127,151,000
Total Construction (TEC)	\$738,000,000
Schedule start/end: Preconstruction	January 2003 through December 2007
Schedule start/end: Construction	January 2006 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2013

Number of workers each year of construction (new/existing)

Nonradiation	134 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	2,482
Hours of operation	15,642 hours (total)

Acres disturbed and duration of disturbance

New	January 2006 through December 2011
Previous	None
	9 acres

Table 3. (continued).**Project Data Sheet for Interim Storage Facility for DCWO - 20 yr**

Revegetated

None

Air emissions

Dust	518 tons (total)
Major gases (CO ₂ , H ₂ O, O ₂ , N ₂) from diesel exhaust	15,023 tons (total)
Contaminants (Particulates, CO, NO _x , SO ₂ , hydrocarbons) from diesel exhaust.	88 tons (total)
Total air emissions	15,629 tons (total)

Effluents

Sanitary wastewater	11,411,775 liters (total)
Lube Oil	2,960 liters (total)

Solid wastes

Type - construction trash	6,355 m ³ (total)
Radioactive wastes	None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory	13 m ³
Hazardous waste (construction)	217 m ³ (total)
Pits/Ponds created (m ²)	None

Water usage:

Dust control	3,700,858 liters (total)
Domestic water	11,411,775 liters (total)

Energy requirements

Electrical (MWh/yr)	156 MWh/yr
Fossil fuel (liters)	586,966 liters (total)

Permits needed for construction

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Operational Information

Cost (\$): Operations (unescalated)	
Facility/Administration	\$7,293,000
Operations/Process Facility	\$18,299,000
Procurement, materials, utilities, maintenance	\$180,989,000
Total operations	\$206,581,000
Schedule start/end	January 2012 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).**Project Data Sheet for Interim Storage Facility for DCWO - 20 yr**

Operations	4
Maintenance	0.5
Support	4
Total	8.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	293,574 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	47 m ³ /yr
Radioactive wastes (canisters)	12,096 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	293,574 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,586 MWh/yr
Fossil fuel (liters/yr)	None
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Decontamination & Decommissioning (D&D) Information	
<u>Cost (\$): D&D</u>	
Decommission	\$10,500,000
Decontamination	\$0
Demolition	\$112,235,000
Total D&D	\$122,735,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	287 New workers/yr
Number of radiation workers (D&D)	29 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker
<u>Heavy equipment:</u>	
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).**Project Data Sheet for Interim Storage Facility for DCWO - 20 yr**

Trips	Roll-off trucks	12 per day
Hours of operation (all heavy equipment)		62,100 Hours

Acres disturbed and duration of disturbance

January 2073 through December 2075

New	None
Previous	9.0 acres
Revegetated	None

Air emissions

non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	36,094 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	211 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)

Effluents

radioactive	Spent decontamination solution	5,109,750 liters (total)
non-radioactive	Sanitary wastewater	18,346,756 liters (total)
non-radioactive	Lube oil	11,752 liters (total)

Solid wastes:

radioactive	50,817 m ³	Ci
Non-radioactive (industrial)	10 m ³	
Hazardous	108 m ³	

Hazardous/toxic chemicals and wastes (type)

Storage/inventory	None m ³ (total)
Pits/Ponds created (m ²)	None
radioactive (mixed waste)	909 m ³ (total)

Water usage:

Domestic water	18,346,756 liters (total)
Source of water	ICPP site wells

Energy requirements:

Electrical (MWh/yr)	156 MWh/yr
Fossil fuel (liters)	1,410,291 liters (total)

Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)	Work will be done under closure provisions of existing permits.
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Table 3. (continued).**Project Data Sheet for Interim Storage Facility for CWO****Generic Information**

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Calcined Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	14,725 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside Grouting Facility
Candidate for privatization?	Yes

Construction InformationCost (\$): Pre-Operations (Other Project Costs) with escalation and

Conceptual Design	\$5,000,000
Management for Project Development	\$4,000,000
Permitting and Documentation	\$2,728,000
SO Test & Start-Up	\$4,500,000
Contingency	\$4,072,000
Total Preconstruction	\$20,300,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$35,000,000
Management (PM/CM)	\$58,275,000
Construction	\$302,752,000
G&A/PIF	\$18,038,000
Procurement Fees, Management Reserve and Contingency	\$85,935,000
Total Construction (TEC)	\$500,000,000
Schedule start/end: Preconstruction	January 2003 through December 2006
Schedule start/end: Construction	January 2006 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2013

Number of workers each year of construction (new/existing)

Nonradiation	124 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	2,337
Hours of operation	14,637 hours (total)

Acres disturbed and duration of disturbance

New	January 2006 through December 2011
Previous	None
	9 acres

Table 3. (continued).**Project Data Sheet for Interim Storage Facility for CWO**

Revegetated

None

Air emissions

Dust

518 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

14,091 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

83 tons (total)

Total air emissions

14,692 tons (total)

Effluents

Sanitary wastewater

10,560,150 liters (total)

Lube Oil

2,770 liters (total)

Solid wastes

Type - construction trash

5,880 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)Pits/Ponds created (m²)

None

Water usage:

Dust control

3,700,858 liters (total)

Domestic water

10,560,150 liters (total)

Energy requirements

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

0 liters (total)

Permits needed for construction

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$3,003,000

Operations/Process Facility

\$7,535,000

Procurement, materials, utilities, maintenance

\$37,708,000

Total operations

\$48,246,000

Schedule start/end

January 2012 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).**Project Data Sheet for Interim Storage Facility for CWO**

Operations	4
Maintenance	0.5
Support	4
Total	8.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	293,574 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	47 m ³ /yr
Radioactive wastes (canisters)	3,456 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	293,574 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,368 MWh/yr
Fossil fuel (liters/yr)	None
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Decontamination & Decommissioning (D&D) Information	
<u>Cost (\$): D&D (unescalated)</u>	
Decommission	\$10,500,000
Decontamination	\$0
Demolition	\$103,997,000
Total D&D	\$114,497,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	268 New workers/yr
Number of radiation workers (D&D)	14 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker
<u>Heavy equipment:</u>	
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued)**Project Data Sheet for Interim Storage Facility for CWO**

Trips	Roll-off trucks	12 per day	
Hours of operation (all heavy equipment)		67,500	Hours
<u>Acres disturbed and duration of disturbance</u>		January 2069 through December 2071	
New		None	
Previous		9.0	acres
Revegetated		None	
<u>Air emissions</u>			
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	39,233	tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	229	tons (total)
radioactive	HEPA filtered off-gas	None	tons (total)
<u>Effluents</u>			
radioactive	Spent decontamination solution	None	liters (total)
non-radioactive	Sanitary wastewater	17,111,456	liters (total)
non-radioactive	Lube oil	12,774	liters (total)
<u>Solid wastes:</u>			
radioactive		46,864	m ³ Ci
Non-radioactive (industrial)		9	m ³
Hazardous		100	m ³
<u>Hazardous/toxic chemicals and wastes (type)</u>			
Storage/inventory		None	m ³ (total)
Pits/Ponds created (m ²)		None	
radioactive (mixed waste)		None	m ³ (total)
<u>Water usage:</u>			
Domestic water		17,111,456	liters (total)
Source of water		ICPP site wells	
<u>Energy requirements:</u>			
Electrical (MWh/yr)		156	MWh/yr
Fossil fuel (liters)		1,532,925	liters (total)
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)	Work will be done under closure provisions of existing permits.		

Table 3. (continued)

Project Data Sheet for Interim Storage Facility for HIP

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Hipping Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	7,287 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside Vitrification Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and

Conceptual Design	\$5,000,000
Management for Project Development	\$4,000,000
Permitting and Documentation	\$2,728,000
SO Test & Start-Up	\$4,500,000
Contingency	\$4,072,000
Total Preconstruction	\$20,300,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$33,085,000
Management (PM/CM)	\$49,305,000
Construction	\$208,097,000
G&A/PIF	\$12,729,000
Procurement Fees, Management Reserve and Contingency	\$65,384,000
Total Construction (TEC)	\$368,600,000
Schedule start/end: Preconstruction	January 2003 through December 2007
Schedule start/end: Construction	January 2006 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2012

Number of workers each year of construction (new/existing)

Nonradiation	92 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	1,349
Hours of operation	8,140 hours (total)

Acres disturbed and duration of disturbance

New	January 2006 through December 2011
Previous	None
	2.5 acres

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for HIP

Revegetated	None
<u>Air emissions</u>	
Dust	108 tons (total)
Major gases (CO ₂ , H ₂ O, O ₂ , N ₂) from diesel exhaust	4,017 tons (total)
Contaminants (Particulates, CO, NO _x , SO ₂ , hydrocarbons) from diesel exhaust.	24 tons (total)
Total air emissions	4,149 tons (total)
<u>Effluents</u>	
Sanitary wastewater	5,876,213 liters (total)
Lube Oil	1,541 liters (total)
<u>Solid wastes</u>	
Type - construction trash	3,272 m ³ (total)
Radioactive wastes	None
<u>Hazardous/toxic chemicals and wastes (type)</u>	
Storage/inventory	13 m ³
Hazardous waste (construction)	217 m ³ (total)
Pits/Ponds created (m ²)	None
<u>Water usage:</u>	
Dust control	771,012 liters (total)
Domestic water	5,876,213 liters (total)
<u>Energy requirements</u>	
Electrical (MWh/yr)	156 MWh/yr
Fossil fuel (liters)	310,806 liters (total)
Permits needed for construction	NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Operational Information	
Cost (\$): Operations (unescalated)	
Facility/Administration	\$7,293,000
Operations/Process Facility	\$18,299,000
Procurement, materials, utilities, maintenance	\$70,097,000
Total operations	\$95,689,000
Schedule start/end	January 2013 through December 2068
<u>Number of workers each year of operation (new/existing)</u>	

Table 3. (continued)**Project Data Sheet for Interim Storage Facility for HIP**

Operations	3
Maintenance	0.5
Support	3
Total	6.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker

Heavy Equipment None

Air Emissions

Radioactive off-gas None

Effluents

Sanitary Wastewater 224,498 liters/yr

Solid Wastes

Sanitary/Industrial Trash 36 m³/yr

Radioactive wastes (canisters) 4,309 m³/yr

Hazardous/toxic chemicals and wastes

Pits/Ponds used (m²) None

Water usage:

Domestic water 224,498 liters/yr

Energy Requirements:

Electrical (MWh/yr) 4,368 MWh/yr

Fossil fuel (liters/yr) None

HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.

Permits needed (for facility operations)

Decontamination & Decommissioning (D&D) InformationCost (\$): D&D (unescalated)

Decommission \$7,678,000

Decontamination \$0

Demolition \$57,836,000

Total D&D \$65,514,000

Schedule start/end: D&D January 2069 through December 2071

Number of workers each year of D&D (new/existing) 154 New workers/yr

Number of radiation workers (D&D) 16 New workers/yr

Average annual worker radiation dose (rem/yr) 0.19 rem/yr per worker

Heavy equipment:

Equipment used Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued)**Project Data Sheet for Interim Storage Facility for HIP**

Trips	Roll-off trucks	9 per day
Hours of operation (all heavy equipment)		35,640 Hours
<u>Acres disturbed and duration of disturbance</u>		January 2069 through December 2071
New		None
Previous		2.5 acres
Revegetated		None
<u>Air emissions</u>		
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	20,715 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	121 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)
<u>Effluents</u>		
radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	9,818,650 liters (total)
non-radioactive	Lube oil	6,745 liters (total)
<u>Solid wastes:</u>		
radioactive		None m ³
Non-radioactive (industrial)		23,191 m ³
Hazardous		4 m ³
<u>Hazardous/toxic chemicals and wastes (type)</u>		
Storage/inventory		None m ³ (total)
Pits/Ponds created (m ²)		None
Hazardous wastes		909 m ³ (total)
<u>Water usage:</u>		
Domestic water		9,818,650 liters (total)
Source of water		ICPP site wells
<u>Energy requirements:</u>		
Electrical (MWh/yr)		156 MWh/yr
Fossil fuel (liters)		809,384 liters (total)
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)	Work will be done under closure provisions of existing permits.	

Table 3. (continued).

Project Data Sheet for Storage at FPR for WFS

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Full Separations Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	5,853 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	FPR Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and contingency.

Conceptual Design	\$3,170,000
Management for Project Development	\$4,501,000
Permitting and Documentation	\$3,629,000
SO Test & Start-Up	\$7,110,000
Contingency	\$4,590,000
Total Preconstruction	\$23,000,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$20,965,000
Management (PM/CM)	\$20,566,000
Construction	\$85,690,000
G&A/PIF	\$5,332,000
Procurement Fees, Management Reserve and Contingency	\$29,947,000
Total Construction (TEC)	\$162,500,000
Schedule start/end: Preconstruction	January 1999 through December 2001
Schedule start/end: Construction	January 2011 through December 2014
Schedule start/end: SO Test & Start-up	January 2015 through December 2015

Number of workers each year of construction (new/existing)

Nonradiation	161 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes,
Trips (construction materials delivery)	702
Hours of operation	14,769 hours (total)

Acres disturbed and duration of disturbance

New	January 2011 through December 2014
Previous	None
	155 acres

Table 3. (continued)–**Project Data Sheet for Storage at FPR for WFS**

Revegetated	None
<u>Air emissions</u>	
Dust	4,464 tons (total)
Major gases (CO ₂ , H ₂ O, O ₂ , N ₂) from diesel exhaust	10,261 tons (total)
Contaminants (Particulates, CO, NO _x , SO ₂ , hydrocarbons) from diesel exhaust.	60 tons (total)
Total air emissions	14,785 tons (total)
<u>Effluents</u>	
Sanitary wastewater	6,855,581 liters (total)
Lube Oil	2,795 liters (total)
<u>Solid wastes</u>	
Type - construction trash	3,817 m ³ (total)
Radioactive wastes	None
<u>Hazardous/toxic chemicals and wastes (type)</u>	
Storage/inventory	13 m ³
Hazardous waste (construction)	217 m ³ (total)
Pits/Ponds created (m ²)	None
<u>Water usage:</u>	
Dust control	31,868,496 liters (total)
Domestic water	6,855,581 liters (total)
<u>Energy requirements</u>	
Electrical (MWh/yr)	150 MWh/yr
Fossil fuel (liters)	0 liters (total)
Permits needed for construction	NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Operational Information	
Cost (\$): Operations (unescalated)	
Facility/Administration	\$6,721,000
Operations/Process Facility	\$18,940,000
Procurement, materials, utilities, maintenance	\$19,864,000
Total operations	\$45,525,000
Schedule start/end	January 2015 through December 2068
<u>Number of workers each year of operation (new/existing)</u>	

Table 3. (continued).

Project Data Sheet for Storage at FPR for WFS

Operations	3
Maintenance	1
Support	3
Total	7
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	241,767 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	39 m ³ /yr
Radioactive wastes (canisters)	147 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	241,767 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,368 MWh/yr
Steam	56,000,000 lb/yr
Permits needed (for facility operations)	NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and
Decontamination & Decommissioning (D&D) Information	
<u>Cost (\$): D&D (unescalated)</u>	
Decommission	\$4,284,000
Decontamination	\$0
Demolition	\$24,785,000
Total D&D	\$29,069,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	68 New workers/yr
Number of radiation workers (D&D)	7 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker
<u>Heavy equipment:</u>	
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).**Project Data Sheet for Storage at FPR for WFS**

Trips	Roll-off trucks	6 per day
Hours of operation (all heavy equipment)		14,280 Hours
<u>Acres disturbed and duration of disturbance</u>		January 2074 through December 2076
New		None
Previous		165 acres
Revegetated		None
<u>Air emissions</u>		
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	8,300 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	48 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)
<u>Effluents</u>		
radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	4,364,496 liters (total)
non-radioactive	Lube oil	2,702 liters (total)
<u>Solid wastes:</u>		
radioactive		18,628 m ³
Non-radioactive (industrial)		4 m ³
Hazardous		40 m ³
<u>Hazardous/toxic chemicals and wastes (type)</u>		
Storage/inventory		None m ³ (total)
Pits/Ponds created (m ²)		None
Hazardous waste		909 m ³ (total)
<u>Water usage:</u>		
Domestic water		4,364,496 liters (total)
Source of water		ICPP site wells
<u>Energy requirements:</u>		
Electrical (MWh/yr)		156 MWh/yr
Fossil fuel (liters)		324,299 liters (total)
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)	Work will be done under closure provisions of existing permits.	

Table 3. (continued)**Project Data Sheet for Storage at FPR for TRU****Generic Information**

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	TRU Separations Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	5,853 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	FPR Facility
Candidate for privatization?	Yes

Construction Information**Cost (\$): Pre-Operations (Other Project Costs) with escalation and**

Conceptual Design	\$2,470,000
Management for Project Development	\$3,470,000
Permitting and Documentation	\$2,728,000
SO Test & Start-Up	\$4,500,000
Contingency	\$3,332,000
Total Preconstruction	\$16,500,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$12,352,000
Management (PM/CM)	\$11,858,000
Construction	\$49,408,000
G&A/PIF	\$3,107,000
Procurement Fees, Management Reserve and Contingency	\$18,075,000
Total Construction (TEC)	\$94,800,000
Schedule start/end: Preconstruction	January 1999 through December 2001
Schedule start/end: Construction	January 2010 through December 2013
Schedule start/end: SO Test & Start-up	January 2014 through December 2014

Number of workers each year of construction (new/existing)

Nonradiation	155 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	702
Hours of operation	14,740 hours (total)

Acres disturbed and duration of disturbance

New	January 2010 through December 2013
Previous	None
	155 acres

Table 3. (continued)-**Project Data Sheet for Storage at FPR for TRU**

Revegetated	None
<u>Air emissions</u>	
Dust	4,464 tons (total)
Major gases (CO ₂ , H ₂ O, O ₂ , N ₂) from diesel exhaust	5,174 tons (total)
Contaminants (Particulates, CO, NO _x , SO ₂ , hydrocarbons) from diesel exhaust.	30 tons (total)
Total air emissions	9,668 tons (total)
<u>Effluents</u>	
Sanitary wastewater	6,600,094 liters (total)
Lube Oil	2,790 liters (total)
<u>Solid wastes</u>	
Type - construction trash	3,675 m ³ (total)
Radioactive wastes	None
<u>Hazardous/toxic chemicals and wastes (type)</u>	
Storage/inventory	13 m ³
Hazardous waste (construction)	217 m ³ (total)
Pits/Ponds created (m ²)	None
<u>Water usage:</u>	
Dust control	31,868,496 liters (total)
Domestic water	6,600,094 liters (total)
<u>Energy requirements</u>	
Electrical (MWh/yr)	150 MWh/yr
Fossil fuel (liters)	0 liters (total)
Permits needed for construction	NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Operational Information	
Cost (\$): Operations (unescalated)	
Facility/Administration	\$7,007,000
Operations/Process Facility	\$19,746,000
Procurement, materials, utilities, maintenance	\$18,677,000
Total operations	\$45,430,000
Schedule start/end	January 2014 through December 2068
<u>Number of workers each year of operation (new/existing)</u>	

Table 3. (continued).**Project Data Sheet for Storage at FPR for TRU**

Operations	3
Maintenance	1
Support	3
Total	7
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	241,767 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	39 m ³ /yr
Radioactive wastes (canisters)	141 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	241,767 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,368 MWh/yr
Steam	56,000,000 lb/yr
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Decontamination & Decommissioning (D&D) Information	
<u>Cost (\$): D&D (unescalated)</u>	
Decommission	\$3,706,000
Decontamination	\$0
Demolition	\$21,693,000
Total D&D	\$25,399,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	60 New workers/yr
Number of radiation workers (D&D)	6 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker
<u>Heavy equipment:</u>	
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).—**Project Data Sheet for Storage at FPR for TRU**

Trips	Roll-off trucks	6 per day	
Hours of operation (all heavy equipment)		13,200 Hours	
<u>Acres disturbed and duration of disturbance</u>		January 2069 through December 2071	
New		None	
Previous		155.0 acres	
Revegetated		None	
<u>Air emissions</u>			
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	7,672 tons (total)	
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	45 tons (total)	
radioactive	HEPA filtered off-gas	None tons (total)	
<u>Effluents</u>			
radioactive	Spent decontamination solution	None liters (total)	
non-radioactive	Sanitary wastewater	3,813,258 liters (total)	
non-radioactive	Lube oil	2,498 liters (total)	
<u>Solid wastes:</u>			
radioactive		18,628 m ³	Ci
Non-radioactive (industrial)		4 m ³	
Hazardous		40 m ³	
<u>Hazardous/toxic chemicals and wastes (type)</u>			
Storage/inventory		None m ³ (total)	
Pits/Ponds created (m ²)		None	
Hazardous waste		909 m ³ (total)	
<u>Water usage:</u>			
Domestic water		3,813,258 liters (total)	
Source of water		ICPP site wells	
<u>Energy requirements:</u>			
Electrical (MWh/yr)		156 MWh/yr	
Fossil fuel (liters)		299,772 liters (total)	
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)		Work will be done under closure provisions of existing permits.	

Table 3. (continued).

Project Data Sheet for Storage at FPR for HWO

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Hot Isostatic Pressing Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	5,853 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	FPR Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and

Conceptual Design	\$5,000,000
Management for Project Development	\$4,000,000
Permitting and Documentation	\$2,728,000
SO Test & Start-Up	\$4,500,000
Contingency	\$4,072,000
Total Preconstruction	\$20,300,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$24,604,000
Management (PM/CM)	\$31,699,000
Construction	\$132,077,000
G&A/PIF	\$8,021,000
Procurement Fees, Management Reserve and Contingency	\$43,999,000
Total Construction (TEC)	\$240,400,000
Schedule start/end: Preconstruction	January 2004 through December 2005
Schedule start/end: Construction	January 2007 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2012

Number of workers each year of construction (new/existing)

Nonradiation	152 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	702
Hours of operation	27,414 hours (total)

Acres disturbed and duration of disturbance

New	January 2007 through December 2011
Previous	None
	155 acres

Table 3. (continued).

Project Data Sheet for Storage at FPR for HWO

Revegetated	None
<u>Air emissions</u>	
Dust	6,696 tons (total)
Major gases (CO ₂ , H ₂ O, O ₂ , N ₂) from diesel exhaust	17,610 tons (total)
Contaminants (Particulates, CO, NO _x , SO ₂ , hydrocarbons) from diesel exhaust.	103 tons (total)
Total air emissions	24,409 tons (total)
<u>Effluents</u>	
Sanitary wastewater	9,708,525 liters (total)
Lube Oil	5,188 liters (total)
<u>Solid wastes</u>	
Type - construction trash	5,406 m ³ (total)
Radioactive wastes	None
<u>Hazardous/toxic chemicals and wastes (type)</u>	
Storage/inventory	13 m ³
Hazardous waste (construction)	217 m ³ (total)
Pits/Ponds created (m ²)	None
<u>Water usage:</u>	
Dust control	47,802,744 liters (total)
Domestic water	9,708,525 liters (total)
<u>Energy requirements</u>	
Electrical (MWh/yr)	150 MWh/yr
Fossil fuel (liters)	0 liters (total)
Permits needed for construction	NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Operational Information	
Cost (\$): Operations (unescalated)	
Facility/Administration	\$5,039,000
Operations/Process Facility	\$18,299,000
Procurement, materials, utilities, maintenance	\$63,902,000
Total operations	\$87,240,000
Schedule start/end	January 2012 through December 2068
<u>Number of workers each year of operation (new/existing)</u>	

Table 3. (continued).

Project Data Sheet for Storage at FPR for HWO

Operations	3
Maintenance	1
Support	3
Total	7
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	241,767 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	39 m ³ /yr
Radioactive wastes (canisters)	4,309 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	241,767 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,368 MWh/yr
Steam	56,000,000 lb/yr
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Decontamination & Decommissioning (D&D) Information	
<u>Cost (\$): D&D (unescalated)</u>	
Decommission	\$7,381,000
Decontamination	\$0
Demolition	\$51,348,000
Total D&D	\$58,729,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	138 New workers/yr
Number of radiation workers (D&D)	14 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker
<u>Heavy equipment:</u>	
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).**Project Data Sheet for Storage at FPR for HWO**

Trips	Roll-off trucks	6 per day	
Hours of operation (all heavy equipment)		29,700 Hours	
<u>Acres disturbed and duration of disturbance</u>		January 2069 through December 2071	
New		None	
Previous		155 acres	
Revegetated		None	
<u>Air emissions</u>			
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	17,263 tons (total)	
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	101 tons (total)	
radioactive	HEPA filtered off-gas	None tons (total)	
<u>Effluents</u>			
radioactive	Spent decontamination solution	None liters (total)	
non-radioactive	Sanitary wastewater	8,806,174 liters (total)	
non-radioactive	Lube oil	5,621 liters (total)	
<u>Solid wastes:</u>			
radioactive		18,628 m ³	Ci
Non-radioactive (industrial)		4 m ³	
Hazardous		40 m ³	
<u>Hazardous/toxic chemicals and wastes (type)</u>			
Storage/inventory		None m ³ (total)	
Pits/Ponds created (m ²)		None	
radioactive (mixed waste)		None m ³ (total)	
<u>Water usage:</u>			
Domestic water		8,806,174 liters (total)	
Source of water		ICPP site wells	
<u>Energy requirements:</u>			
Electrical (MWh/yr)		156 MWh/yr	
Fossil fuel (liters)		674,487 liters (total)	
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)		Work will be done under closure provisions of existing permits.	

8. PROJECT-SPECIFIC OPTIONS

No project-specific options were assigned, identified, or evaluated.

9. POTENTIAL IMPACTS OF NRC LICENSING

Licensing of an ISF by the NRC under 10 CFR 72 is assumed, however the cost impact for this licensing is not included in the cost estimates in Appendix 1 of the respective EDFs (EDF-IS-001 and EDF-IS-002). These EDFs are in Appendix A of this report. Licensing a nuclear facility requires preparing and submitting an application and supporting documents to the NRC, such as Safety Analysis Reports, Environmental Reports, quality assurance documents, training plans, monitoring plans, and safeguards and security plans. The NRC licensing process is divided into four stages: preapplication stage, application review stage, construction and operating license stage, and decontamination and site closure stage. The licensing duration from submitting the application to receiving of the license is expected to take 3 to 5 more years, or longer. The benefits of NRC licensing are enhanced operating safety, strengthened relationships with stakeholders, and license-holder participation in future regulation development.

According to data developed in the Fluor Daniel Corporation, *Waste Treatment Facilities Feasibility Study Report*,² the estimated cost for NRC licensing is 26% of the Total Estimated Cost. This additional cost is required to comply with the NRC requirements that exceed the current DOE requirements for ISFs. An NRC licensed facility will have greater cost during the operating period as well. These additional costs are discussed in the reports for the separate processing options⁶⁻¹⁰ and the cost is identified in the section titled "Potential Impacts of NRC Licensing" in those reports.

Some of the potential major impacts associated with NRC licensing of ISF facilities, other than cost, are:

- Increased oversight, including more public involvement and input in all decision processes
- More restrictive physical limits on some parameters, including exposure limits, seismic, and tornado
- More strict radiation monitoring
- Restrictions on sharing utilities between facilities
- More stringent evaluations of the impact from off-Site hazards.
- Full testing required for emergency utilities
- Physical changes to the plant and equipment
- More elapsed schedule time required
- Methods to comply with some other codes and standards may be complicated and require more time

- Although the NRC may license the treatment facilities, it may not automatically inherit or adopt the same agreements and obligations with the State of Idaho and EPA Region 10 that are in place for DOE and INEEL.

10. RECOMMENDATIONS

The impact for NRC licensing of a waste ISF, particularly an existing facility, should be investigated further. Licensing of an ISF has not been done and licensing of an existing facility that was not built initially to the current requirements raises questions that have not been studied in this work.

Consideration should be given to the passive cooling capability in a new ISF. The modified FPR would require forced ventilation that adds safety considerations to the operation of the facility.

A future study should be conducted to determine if a standard 4.6-m (15-ft) long "Hanford" canister should be substituted for the 3-m (10-ft) SRS canister assumed in this study. Use of a 4.6-m (15-ft) canister would increase the interim storage construction costs but would reduce the operation (handling) costs, and greatly reduce offsite transportation and disposal costs. A large net cost saving, primarily as a result of reduced transportation and disposal costs, could be realized by using the 4.6-m (15-ft) canister.

11. CONCLUSIONS

This study has investigated the design of a new ISF and modification of FPR for storage of HLW that results from processing the waste at ICPP. The processing options are discussed in separate reports. It is concluded that a new facility can be designed, built, tested, and placed into operation that can store the waste in canisters for the period from processing until the time a permanent repository is available for receipt of this waste. This study determined that FPR can hold a maximum of 9,344 canisters and only those processing options that produce fewer canisters can be accommodated in the FPR. It is concluded that FPR can be modified and placed into operation to store the waste in canisters for the Full and TRU/Class A Separations Option and the HIP Option for the period from processing until the time a permanent repository is available for receipt of this waste. The schedules and costs associated with interim storage for the processing options are presented in this report.

12. REFERENCES

1. October 17, 1995 Consent Order and Settlement Agreement between DOE and the State of Idaho regarding spent fuel and nuclear waste issues.
2. *Idaho Chemical Processing, Plant Waste Treatment Facilities, Feasibility Study Report*, December 12, 1997, Fluor Daniel Corporation.
3. *DPC Loading Feasibility Study Report*, INEEL/EXT-97-01251, November 1997.
4. U. S. Department of Energy, Office of Civilian Radioactive Waste Management, *Quality Assurance Requirements and Description (QARD)*, DOE/RW-0333P.
5. *Utilities and Infrastructure Report*, INEEL/EXT-98-01398, February 1998.
6. *TRU Separations Option Study Report*, INEEL/EXT-01428, February 1998.
7. *Vitrified Waste Option Study Report*, INEEL/EXT-01389, February 1998.
8. *Direct Cementitious Waste Option Study Report*, INEEL/EXT-01399, February 1998.
9. *Cementitious Waste Option Study Report*, INEEL/EXT-01389, February 1998.
10. *Hot Isostatic Press Waste Option Report*, INEEL/EXT-01392, February 1998.

Appendix A

Engineering Design Files

CONTENTS

A.1 EDF-IS-001..... A-1

A-2. EDF-IS-002..... A-20

Project File Number 02BJ0

Project/Task Waste Treatment Project Feasibility
Studies

Subtask Interim Storage Study

Title: New Facility for Interim Storage of HLW

Summary: This summary briefly defines the problem or activity to be addressed in the Engineering Design File (EDF), gives a summary of the activities performed in addressing the problem, and states the conclusions, recommendations, or results arrived at from this task.

High-level radioactive waste (HLW) stored at the Idaho Chemical Processing Plant (ICPP) in the form of calcine and liquid will be processed to provide a stable waste form and prepare the waste to be transported to a permanent repository. Because a permanent repository will not be available when the waste is processed, the waste must be stored at ICPP in an Interim Storage Facility (ISF). This EDF documents consideration of a new ISF for each of the processing options.

Distribution (complete package): Included in Appendix A of *Interim Storage Study Report*, INEEL/EXT-97-01393, February 1998.

Distribution (summary package only):

Author	Dept.	Reviewed	Date	Approved	Date
4130	LMITCO Review	Date 2/10/98	LMITCO Approval	Date 2/10/98

See Management Control Procedure (MCP) 6 for instructions on use of this form.

New Facility for Interim Storage of HLW

ABSTRACT

High-level radioactive waste (HLW) stored at ICPP in the form of calcine and liquid and liquid sodium-bearing waste (SBW) will be processed to provide a stable waste form and prepare the waste to be transported to a permanent repository. Because a permanent repository will not be available when the waste is processed, the waste must be stored at ICPP in an ISF. This EDF documents consideration of a new ISF for each of the processing options.

SUMMARY

Disposal of radioactive wastes now stored at the ICPP at the Idaho National Engineering and Environmental Laboratory (INEEL) is mandated under a "Settlement Agreement" between the Department of Energy (DOE) and the State of Idaho. Among other things, the Settlement Agreement requires that existing inventory of liquid high-level radioactive waste (HLW) be calcined by June 30, 1998, and SBW by the end of 2012, and the target date for all waste to be ready to ship from the INEEL is 2035.

The Department of Energy Idaho Operations Office (DOE-ID) is preparing the High-Level Waste and Facilities Disposition Environmental Impact Statement (HLW&FD EIS), in accordance with the National Environmental Policy Act, to support the decision-making process regarding HLW management at the INEEL. Fluor Daniel Corporation and Lockheed Martin Idaho Technologies Company (LMITCO) are studying waste treatment options. Because a repository for the waste will not be available as processing is performed, an ISF is required for storage for the period of time between processing and when a permanent repository is available.

This EDF documents a study that investigated the design, costs, and environmental impacts for a new ISF for each of the processing options.

Conclusions

It is concluded that a new facility can be designed, built, tested, and placed into operation that can store the waste in canisters for the period from processing until the time a permanent repository is available for receipt of this waste. The schedules and costs associated for the various processing options are presented in this EDF.

Recommendations

The complexity that Nuclear Regulatory Commission (NRC) licensing adds to the permitting of an ISF has not been estimated in this study. The ramifications should be investigated in greater detail before the design of an ISF is started.

A future study should be performed to determine if a standard 4.6-m (15-ft) long "Hanford" canister should be substituted for the 3-meters (10-ft) SRS Defense Waste Processing Facility (DWPF) canister assumed in this study. Use of a 4.6-m (15-ft) canister would increase the interim storage

construction costs but would reduce the operation (handling) costs, and greatly reduce offsite transportation and disposal costs. A large net cost saving, primarily as a result of reduced transportation and disposal costs, could be realized by using the 4.6-m (15-ft) canister.

ACKNOWLEDGMENTS

The assistance of Byron L. Blakely who designed the new ISF presented in this EDF is greatly appreciated. Rick D. Adams prepared the project cost estimates and Robert J. Turk prepared the Life-Cycle Costs. Jennifer Quigley and Rod R. Kimmitt prepared the Project Data Sheets. Karen Williams was the Project Lead. Stephen S. Lortie performed technical editing.

ACRONYMS

CFR	Code of Federal Regulations
CWO	Cementitious Waste Option
DCWO	Direct Cementitious Waste Option
DOE	Department of Energy
DOE-ID	DOE Idaho Operations Office
DOT	Department of Transportation
DPC	Dual Purpose Canister
DWPF	Defense Waste Processing Facility
EDF	Engineering Design File
EIS	Environmental Impact Statement
HAW	high-activity waste
HIP	Hot Isostatic Press
HLW	high-level radioactive waste
HLW&FD	High-Level Waste and Facilities Disposition
HWO	HIP Waste Option
INEEL	Idaho National Engineering and Environmental Laboratory
ICPP	Idaho Chemical Processing Plant
ISF	Interim Storage Facility
LAW	low-activity waste
LMITCO	Lockheed Martin Idaho Technologies Company
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NUHOMS	Trade mark for concrete storage modules commercially available through VECTRA Technologies, soon to be purchased by Chem Nuclear, Inc.
RCRA	Resource Conservation and Recovery Act
SBW	sodium-bearing waste
SNF	spent nuclear fuel
SRS	Savannah River Site
TRU	Transuranic
VWO	Vitrified Waste Option
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

1.1 Background

The Idaho Chemical Processing Plant (ICPP) located at the Idaho National Engineering and Environmental Laboratory (INEEL) has been used for reprocessing spent nuclear fuel (SNF) since 1953. SNF was reprocessed to recover fissile uranium; however, changing world events have diminished the need to recover and recycle this material. In April 1992, the Department of Energy (DOE) discontinued reprocessing SNF and shifted its focus toward continued management and disposal of waste accumulated from previous reprocessing activities. ICPP waste treatment activities produce a granular solid waste (calcine) that contains dissolved fission products and fuel cladding material. Decontamination activities at the ICPP produce liquid radioactive, sodium-bearing waste (SBW) and ongoing operations at the ICPP produce liquid waste that contains low levels of radioactivity. The treatment of radioactive wastes for transfer out of Idaho is mandated under a "Settlement Agreement" between DOE and the State of Idaho.¹ The Settlement Agreement requires that the existing inventory of liquid high-level radioactive waste (HLW) be calcined by June 30, 1998, and SBW by the end of 2012, and the target date for all waste to be ready to ship from the INEEL is 2035.

The Department of Energy Idaho Operations Office (DOE-ID) is preparing the High-Level Waste and Facilities Disposition Environmental Impact Statement (HLW&FD EIS), in accordance with the National Environmental Policy Act, to support the decision-making process regarding HLW management at the INEEL. The Fluor Daniel Corporation and the INEEL operating contractor, Lockheed Martin Idaho Technologies Company (LMITCO), have been tasked with performing studies that provide the basis for portions of the EIS. Waste treatment options include dissolving the calcine; both the dissolved calcine and the liquid SBW would then be separated into high-activity waste (HAW) and low-activity waste (LAW). The HAW would be mixed with a glass matrix and poured into canisters. This is termed the "Separations Option." Alternative options that do not involve a separation step are termed the "Nonseparations Option." The Waste Treatment Studies²⁻⁹ consider the several alternative processes for preparing the calcine and liquid waste for ultimate removal from the INEEL: Separations [(Full and Transuranic (TRU)) and Nonseparations (Vitrified, Hot Isostatic Press, Cementitious, and Direct Cementitious). Fluor Daniel Corporation is studying the Full Separations alternative and the others are being studied by LMITCO. The product of each of the processes will be waste in a storage canister that is ready for shipment to a permanent repository. Because the repositories will not be capable to receive the canisters at the time they are produced, interim storage will be required at the INEEL. This EDF documents cost, schedule, and environmental impact for storage of the waste generated by the above processes in a new Interim Storage Facility (ISF). A new ISF for the Full Separations alternative is included in the Fluor Daniel Corporation Study. This study includes a modified existing facility study for interim storage for the Full Separations Option. Interim storage in the FPR at the ICPP is documented in EDF-IS-002.

1.2 Objective and Scope of Work

The objective of this study is to explore alternatives for new interim storage of the waste in canisters that result from HLW processing of the calcine and liquid waste at ICPP. Table 1 gives the processing options and associated data that are included in this study:

Table 1. Waste processing options and study data.

	Storage Type	Number of Canisters	Production Rate, Number/Shift	Dose Rate at Contact, R/hr	Heat Output, Watts/Canister
Separations Options					
TRU/Class A Separations	New Facility	170	1/month	160,000	12,350
	NUHOMS™	170	1/month	160,000	12,350
Nonseparations Options:					
Vitrified	New Facility	14,000	6	6.1–172	0.6–14.7
Direct Cementitious	New Facility	18,000	35	6.9–287	0.4–16.4
Cementitious	New Facility	16,000	32	140	8.9
	HIP Preliminary Plan	31,000 drums	64	140	8.9
Hot Isostatic Press	New Facility	5,700	9	14–580	1.7–61

The objective of this study was to determine the cost, schedule, and environmental impacts for the storage of the waste canisters that result from each of the processing options in Table 1. A new facility was studied that incorporates appropriate design features from the Fluor Daniel Corporation design for interim storage presented in their document, *Waste Treatment Facilities, Feasibility Study Report*, December 12, 1997 (see Reference 2). The storage of canisters resulting from the Full Separations Option in NUHOMS™ modules was the subject of report, *DPC Loading Feasibility Study Report*, INEEL/EXT-97-01251, November 1997 (see Reference 3). This study considers storage of the canisters that result from the TRU/Class A Separations Option in the NUHOMS™ module. The TRU/Class A Separations option would generate three waste streams designated as LLW: LAW, HAW, and TRU waste. All of these waste streams are actually considered HLW. It is expected that the LAW and TRU meet the definition of NRC LLW Class A and TRU, respectively. However, these wastes do not conform to the existing classification scheme for radioactive waste. Therefore, they will need the evaluation and concurrence of appropriate government authorities (NRC and DOE) for reclassification. Only the HAW will require interim storage. The LAW is assumed to go directly to a Class A waste disposal site and the TRU waste to go directly to the Waste Isolation Pilot Plant (WIPP). The TRU/Class C Separations Option does not require interim storage.

A preliminary plan for the Cementitious Option is under consideration. The resulting grout would be placed into drums within a 5-year period and placed into the ISF. Over a 20-year period, the drums would be subjected to a Hot Isostatic Press (HIP) process that would further reduce the volume. This alternative was included in this study.

2.0 DESIGN BASIS, KEY ASSUMPTIONS, AND REQUIREMENTS

2.1 Design Basis

A facility is required near the processing facility to store the HLW from the time it leaves the processing facility until it can be moved to a permanent waste repository. The quantities of canisters and

their characteristics given in Table 1 result from the studies for the processing alternatives. The design life for the facilities is from 40 to 60 years.

The Savanna River Site (SRS) HLW canister and the West Valley Demonstration Project HLW canister meet the repository Waste Acceptance Criteria (WAC) for dimensions, although there are significant differences in these canisters' physical makeup. The SRS canister is used as the baseline for this study because it was selected in the ICPP Waste Treatment Facilities Feasibility Study Report.² However, the DOE Hanford Facility has adopted a 4.6-m (15-ft) long canister for containing immobilized HLW. This longer canister is apparently acceptable for co-disposal at the repository, and therefore should be considered before finalizing the canister size. Consideration of the 4.6-m (15-ft) canister is addressed in the recommendations in Section 9. Some cost increase would result because the head height for handling the longer canisters is greater, and depth of excavation, equipment capacities, etc., increase. Cost increases would also occur because of the increase in the ISF transport tunnel height, canister handling machine size and capacity, and the ceiling height. However, smaller interim storage facilities may be adequate with fewer canisters, and handling, shipping and final disposal operations with fewer canisters would offset the cost increases if the longer canisters were adopted. The net result of the cost changes is unknown.

Transport of the waste to the interim storage facility is included, however transport from the facility is not included in this study. Equipment for handling the canisters for movement into and from the facility is included.

A passive cooling system is desired. The additional safety issues and operating costs of an active system would thus be avoided.

2.2 Key Assumptions

The following assumptions formed the framework, i.e., and the directed charter, for this study. Therefore, although some of these assumptions are likely to change, and such changes may have a significant impact on the results of this study, it is beyond the scope of this study to predict such changes or evaluate the associated risk.

1. The quantities and characteristics of waste to be stored are as tabulated in Table 1.
2. The waste will be stored in the SRS canister described in EDF-DPC-001, Appendix E of *DPC Loading Feasibility Study Report*, INEEL/EXT-97-01251, November 1997. All canisters will be sealed and radiologically clean.
3. The processed waste is not Resource Conservation and Recovery Act (RCRA) hazardous waste as a result of delisting before processing and by virtue of processing when all "listed" hazardous and characteristic constituents are treated to the Land Disposal Regulation standards, then the waste is no longer classified as RCRA waste.
4. The LAW and TRU waste will be reclassified as LLW Class A and TRU, respectively.
5. The NRC will license the facility in accordance with the requirements of 10 CFR Part 72. However, the cost for the licensing is not included.

6. The processing facilities will not have lag storage. If the ISF cannot handle the canisters at the rate produced by the facility as given in Table 1, the ISF must have the capability to store them in a lag storage area. This lag storage would only be used if the processing facility releases the canisters in a batch or for maintenance of the canister handling equipment in the ISF.
7. The handling equipment will interface with an MP-187 cask for canister shipment from the ISF.
8. Physical security requirements are enveloped by those for SNF.
9. Dual Purpose Canisters (DPCs) will be acceptable for storage under 10 CFR 72.
10. The maximum weight of a canister is 5,300 lb.
11. Others will provide the proposed rail spur.
12. The transfer cart systems are described in the process facility options.
13. Shipments from the facility will be on a licensed rail shipping cask at grade and shipments to the facility are on a transfer cart in a belowgrade shielded transfer tunnel.
14. Storage of canisters shall be stacked as deep as three high inside sealed carbon steel tubes supported by support stools on the vault floor, both spaced for convection cooling and optimizing storage inside shielded concrete vaults.
15. A charged face floor system shall be used to maximize storage capacity, shielding, and strength while minimizing floor weight and contractibility concerns.
16. Convection air-cooling shall be used for cooling the canisters.
17. The same low profile gantry crane used in the proposed Interim Storage Facility Study at ICPP by Fluor Daniel Corporation² shall be used in the Charge House for placing the canisters and transferring them for future shipments.
18. The Administrative Support building shall be like the one that supports the proposed Interim Storage Facility Study at ICPP by Fluor Daniel Corporation.²
19. The north and south end walls shall be designed so as to allow expansion in both directions.
20. Assumed concrete shielding thickness to be .9 meters (3 feet) thick for all storage alternatives except for the TRU/Class A Separations option that will have 1.5 meters (5 feet) thick concrete.
21. The assumed transfer cask on the gantry crane is to be similar to that of a bottom loading Peach Bottom cask.

2.3 Requirements

2.3.1 Regulations

The NRC in accordance with 10 CFR Part 72 will license the storage facility, however the cost for licensing is not included in this report. It is assumed that the canisters, as received from the processing facility, will meet Department of Transportation (DOT), NRC, and/or HLW Repository WAC requirements and require no further conditioning, testing, treatment, marking, etc. This requires that the waste will be excluded from RCRA hazardous waste management requirements at the INEEL due to successful delisting and/or treatment.

The ISF will be licensed to meet 10 CFR Part 72 for HLW; therefore the receipt, handling, packaging, and storage of canisters of waste must also be governed under 10 CFR Part 72. Changes required to the facility license must be evaluated through a 10 CFR 72.48 evaluation, issuance of a Safety Analysis Report, and licensing documentation amendments. It is assumed that the Department of Energy Idaho Operations Office (DOE-ID) will continue to implement the quality assurance program described in DOE-RW-0333P, *Quality Assurance Requirements and Description*⁴ and will apply it to this effort as well. The impact of implementing DOE-RW-0333P is reflected in the capital and operating cost estimates generated by this feasibility study.

2.3.2 HLW Repository WAC

The requirements of the potential future repository waste acceptance will be satisfied by the processing facility before the canisters being released to the ISF. The ISF will not provide any capability to process, modify, or change the waste or canisters.

2.3.3 Applicable Codes and Standards

The NRC licenses and regulates waste storage facilities in accordance with 10 CFR Part 72. DOE requirements that are included in 10 CFR Part 72 will be superseded by them, however, any DOE requirements that are not covered by 10 CFR Part 72 will also apply.

3.0 INTERIM STORAGE FACILITY DESIGNS

3.1 Basic Design Concepts

Each alternative in the study will be designed to meet all applicable codes and standards. Because of the minimal physical access requirements for the job descriptions of the ISF to maintain safety, to control operations and to evacuate all personnel of a potentially dangerous work environment in an emergency, the alternative floor plans proposed in these studies do not reflect accommodations for all the National Statutes (such as Americans with Disabilities Act). This is also due to the minimal number of employees involved for staffing and feasibility of such in a remote nuclear facility of this type. Detailed information on other applicable and relevant codes and standards shall be further defined in the Conceptual Design. In summary, the following codes and standards shall apply to the ISF:

- United States Nuclear Regulatory Commission
- Code of Federal Regulations (such as 10 CFR Part 72)
- Department of Energy Orders, Standards, and Manuals
- National and International Standards (such as ANSI, ASHRAE, UBC, ISO, etc.)
- State of Idaho Requirements
- LMITCO Manuals and Procedures.

The same Administrative Support building and the same gantry crane used in the Fluor Daniel Corporation study ISF is used as a baseline in these ISF alternatives.

Convection air cooling of the vault storage is used requiring no heating, ventilating, and cooling equipment. Heating, ventilating, and air conditioning is provided in the Administrative Support Structure.

The elevation of the ISF was determined by the railroad-shipping bay being fixed at existing grade to allow rail-car shipments to be more convenient and to avoid flood plain concerns.

The ISF as shown in the drawings in Appendix 2 can be modular in design by varying the number of vaults depending on which alternative is applicable. The ISF is designed to hold SRS canisters resulting from HLW processing options of the calcined and liquid waste at ICPP in individual vertically sealed storage tubes (66 cm/26 inch diameter) retained within a concrete structure forming the storage vault. The storage tube provides structural support for the stacked canisters with cushion blocks and a mechanical barrier between the canisters and the environmental cooling circuit.

The typical vault has a concrete floor and walls with inlet and outlet air cooling ducts. The roof of the vault is a composite steel and concrete structure called the Charge Face Structure, which has holes to receive the storage tubes that each hold three canisters and their cushion blocks. The Charge Face Structure combined with support stools in the vault floor maintains a fixed array of storage tubes optimized for maximum density and efficient cooling.

Removable shield plugs in the Charge Face Structure allow loading of the storage tubes, multiple canisters, and their cushion blocks. In this configuration a vault can store 1,890 canisters.

Cooling air enters through a protective screen mesh, flows through a labyrinth that prevents radiation streaming, and enters the vault through distribution louvers. The air picks up heat from the HLW before passing through the exit louvers, up the concrete chase, and out into the atmosphere via protective screen mesh and weather protected stack.

The cooling system is passive, self-regulating and driven by the natural buoyancy of warm air. The louvers are designed to direct airflow as well as regulate the volume of airflow during extreme weather conditions. The size of the inlets and outlets are anticipated to be oversized for partial and entire blockages even for extended time periods, however, these conditions are to be further evaluated in conceptual design for actual conditions and when design heat loads are known.

Supplementary Lag Storage locations are provided at the end of the transfer cart tunnel to provide more immediate storage in the event of failure of a transfer crane so that the other transfer crane can keep up and avoid a bottleneck in storage from the production line. The Supplementary Lag Storage also offers an additional degree of independence during off-normal event storage should HLW canisters need additional isolation and for fluctuations during future ISF shipping operations.

Transfer Cart Tunnel and Reception Bay is located belowgrade approximately 37 feet below the Charge Face Floor. The enclosed reception area is shielded with 5 feet thick concrete construction for transfer of HLW canisters arriving in a transfer cart from the process facility. There will be camera monitoring required in the Reception Bay and access for manned entry when operation procedure allows such to occur. A 5-ton overhead crane will be provided for remote maintenance should conditions require it.

The Shipping Cask Bay is an enclosed area located at the same grade as the rail spur with 3.7-m (12-ft) X 5.5-m (18-ft) overhead doors located at each end. The Shipping Cask Bay is located at finish grade, 6.4 meters (21 feet) below the Transfer Bay. A specialized Cask Maneuvering Hydraulic Platform will be provided to upright and recline the shipping cask for loading while on the rail-car and also be capable of lifting the shipping cask and rail-car (up to 180 tons) to receive transfer of HLW from the Transfer Bay above with restraints to prevent movement in the event of a seismic disturbance.

The Transfer Bay is an approximate 13.7-m (45-ft) x 36.6-m (120-ft) bay of the Charge House in which all the receiving, shipping, transfer, and lag storage of the HLW canisters take place.

The enclosed area above the Charge Face Structure and the Transfer Bay is the Charge Hall, which provides a weatherproof enclosure for the loading and unloading operations of the HLW canisters, crane maintenance areas, and two facility gantry cranes (in most storage alternatives). The Charge Hall slopes up from 14.6 m (48 ft) at the lowest eave leaving a clear height inside of approximately 11 m (36 ft). The enclosure is an unconditioned space with a concrete and uninsulated metal skin. The top of the stack where the cooling air outlet is located is 19.5-m (64-ft) above the Charge Face Floor.

3.2 Modular Expansion to Satisfy Processing Concept Requirements

The proposed new ISF is designed to be modular construction to accommodate a variety of alternative process requirements, quantities, and time durations.

There are five design alternatives supported for the IFS using the generic modular designs with slight variations in number of modules and equipment, but with one exception. The TRU/Class A Separations Option with 170 canisters has a much higher gamma field due to the HLW being more concentrated and therefore requires 5-foot thick instead of 3-foot thick concrete shielding in vault construction. The alternatives considered for the ISF are listed below. See the drawings in Appendix 2.

1. One vault facility for the TRU/Class A Separations Option, requiring storage for 170 canisters over a 20-year period.
2. Four vault facility for the HIP Waste Option, requiring storage for 5,700 canisters over a 20-year period.
3. Eight vault facility for the Vitrified Waste Option, requiring storage for 14, 000 canisters over a 20-year period.
4. Nine vault facility for the Cementitious Waste Option and the preliminary plan, requiring storage for 16, 000 canisters over a 5-year period.
5. Ten vault facility for the Direct Cementitious Waste Option, requiring storage for 18,000 canisters over a 5-year period.

3.3 Cementitious Waste Option (CWO) and Direct Cementitious Waste Option (DCWO) HIP Preliminary Plan

A preliminary plan for subjecting the CWO waste to the HIP process is under consideration. The preliminary plan is to perform the initial processing to place cementitious waste in drums over a 5-year processing period. The drums selected are those shown in EDF-CWO-001 in Appendix E of the report *Cementitious Waste Option Study Report*, INEEL/EXT-01389 (see Reference 8). The waste in the drums will then be subjected to the HIP process that will reduce the waste volume. Interim storage of the drums is required for the period of time from initial processing to the time the HIP process is performed. The CWO process will take place over the first 5 years of the 20 years that the HIP process takes and the HIP process over the full 20 years. For storage, the drums will be stored in the 66-cm (26-inch) diameter sleeves that will ultimately store the waste in the canisters. As the waste in drums is removed from storage for the HIP process, storage sleeves will be emptied. The drums can be stored in the same storage sleeves that are planned for the canisters. A special handling grapple would be required to handle the drums in addition to the handling equipment for canisters. The grapple must be capable of lowering the drums into the storage sleeves and releasing from the drum. The grapple must also be capable of the reverse operation to remove the drums for processing. The unprocessed drums are 142-cm (56 inches) long, therefore, six can be stored in each storage sleeve. The maximum storage requirement will be at the end of 5 years of operation when 7,750 drums have been HIPed and placed into 2,583 canisters. The facility will be required, at the end of the 5th year of operation, to also store 23,250 drums. The canisters and drums will require 4,736 storage sleeves or eight modules, the same size as is needed for the VWO Option, which is one module smaller than required for the CWO option in Section 3.6.1. The cost for the facility is, therefore, the same as for the VWO Option with the additional cost for the handling equipment for the drums.

The preliminary plan for HIPing with the DCWO produces waste in drums that are HIPed and placed into canisters directly. Instead of 18,000 canisters, only 11,700 require storage. A seven-module storage facility would be required. Because the drums are not handled in the interim storage facility, no additional handling equipment is required.

4.0 TOTAL PROJECT, LIFE-CYCLE, AND D&D COSTS

Cost estimates for the new interim storage alternatives are in Appendix 1. The costs are summarized in Table 2.

The costs shown for the DCWO and CWO Preliminary Plan have been arrived at as follows: the cost estimate for Vitrified Waste Option (VWO) with eight modules has been scaled to get the cost for the ISF for the DCWO Preliminary Plan with seven modules. The cost for the CWO Preliminary Plan was arrived at by adding the estimated cost for the drum handling equipment, \$100,000, to the estimate for the VWO facility, because a facility that is the same size as the VWO facility would be required.

Table 2. Project Costs

Cost Item	Separations Options		Non-separations Options			
	TRU/Class A Separations		Vitrified	Direct Cementitious		
	New Facility	NUHOMS	New Facility	New Facility	HIP Preliminary Plan	Facility
	\$	\$	\$	\$	\$	\$
OPC (unescalated)	15,228,000	Not	16,228,000	16,228,000	Not	16,228,000
OPC Escalation	4,118,000	Calculated	4,153,000	4,138,000	Calculated	4,138,000
OPC Mgmt Reserve	0		0	0		0
OPC Contingency	4,854,000		5,118,000	5,133,000		5,133,000
Total OPC	24,200,000		25,500,000	25,500,000	25,500,000	25,500,000
TEC (unescalated)	66,308,000	Not	382,783,000	451,415,000	Not	451,415,000
TEC Escalation	30,078,000	Calculated	138,310,000	163,984,000	Calculated	163,984,000
TEC Mgmt Reserve	6,647,000		40,065,000	48,663,000		48,663,000
TEC Contingency	14,267,000		65,043,000	73,938,000		73,938,000
Total TEC	117,300,000		626,200,000	738,000,000	571,200,000	681,143,000
TPC (unescalated)	81,536,000	Not	399,011,000	467,644,000	Not	467,644,000
TPC Escalation	34,195,000	Calculated	142,463,000	168,122,000	Calculated	168,122,000
TPC Mgmt Reserve	6,647,000		40,065,000	48,663,000		48,663,000
TPC Contingency	19,121,000		70,161,000	79,071,000		79,071,000
Total TPC	141,500,000	73,400,000	651,700,000	763,500,000	596,700,000	707,756,000
Operations (unescalated)	41,433,000	Not	149,756,000	206,580,000	Not	206,580,000
Operations Escalation	80,511,000	Calculated	172,524,000	371,029,000	Calculated	371,029,000
Operations Contingency	36,583,000		96,684,000	173,283,000		173,283,000
Total Operations	158,527,000		418,964,000	750,893,000		750,893,000
Post Operations (unescalated)	22,749,000	Not	106,263,000	122,735,000	Not	122,735,000
Post Operations Escalation	142,784,000	Calculated	666,956,000	770,341,000	Calculated	770,341,000
Post Operations Contingency	49,660,000		231,966,000	267,923,000		267,923,000
Total Post Operations	215,193,000		1,005,184,000	1,160,998,000		1,083,101,000
Total Cost (unescalated)	145,718,000	Not	655,030	796,959,000	Not	596,700,000
Total Cost (w/escalation, mgt reserve, and contingency)	515,220,000	Calculated	2,075,848,000	2,675,391,000	Calculated	1,928,000,000
Discounted Cost (escalated)	89,476,000		426,040,000	505,982,000		405,458,000

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ions		
Cementitious		Hot Iso. Pressed
W	HIP Preliminary	New
ity	Plan	Facility
	\$	\$
28,000	Not	16,228,000
53,000	Calculated	4,310,000
0		0
18,000		5,161,000
10,000	25,500,000	25,700,000
13,000	Not	224,756,000
14,000	Calculated	80,542,000
13,000		22,291,000
10,000		41,012,000
10,000	626,300,000	368,600,000
11,000	Not	240,984,000
18,000	Calculated	84,852,000
13,000		22,291,000
18,000		46,173,000
10,000	651,800,000	394,300,000
15,000	Not	95,689,000
14,000	Calculated	119,204,000
10,000		64,468,000
18,000		279,361,000
17,000	Not	65,515,000
19,000	Calculated	411,201,000
11,000		143,015,000
17,000		619,730,000
13,000	Not	402,188,000
15,000	Calculated	1,293,391,000
14,000		255,814,000

5.0 PROJECT SCHEDULE

Figure 2 for each processing option and interim storage alternatives show the schedules for the installation or modification of the storage facilities.

6.0 RISK ASSESSMENT

High-level risks identified in this study are categorized below. The assumptions in Section 2.2 provide the framework for this list. The highest risk is rated at “3” (out of “9”). Data Sheets for all the identified risks are included in Appendix 3, along with an explanation of the Risk Rating calculation method.

1. The quantities and characteristics of the waste are different than assumed in the study. Risk = 3 (Probability = 3, Impact = 1).
2. Waste will not be stored in the SRS canister. Risk = 2 (Probability = 2, Impact = 1).
3. The facility would have to be redesigned if the waste is classified as a RCRA waste after processing. Risk = 3 (Probability = 1, Impact = 3).
4. A storage canister will be mishandled or dropped during waste transfer to, from, or in the facility. Risk = 2 (Probability = 1, Impact = 2).
5. The facility might not be operational when needed. Risk = 2 (Probability = 1, Impact = 2).

Many risks including environmental, safety, and health risks were not identified in this study.

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Figure 2. (continued).

Figure 2. (continued).

Figure 2. (continued).

Figure 2. (continued).

7.0 CONSTRUCTION AND OPERATIONAL ENVIRONMENTAL IMPACTS

The Product Data Sheets that summarize the construction and operational environmental impacts for the interim storage facilities that support the waste processing options are in Table 3. Data are presented for the construction, operation, and decommissioning of the project. Estimates are included for the following parameters:

- Cost
- Schedule
- Air emissions
- Liquid effluents
- Solid wastes
- Utilities used
- Manpower requirements
- Regulatory requirements.

Because this project is at a very preliminary stage of design, much of the information presented in the Project Data Sheets is based on representative literature values, existing laboratory data, and engineering judgment. The cost data in Table 3 were obtained from the cost estimates in Appendix 1 and the supporting information for the remainder of the data is in Appendix 4. The Product Data Sheets are presented in the following order in Table 3:

Processing Option	Project Data Sheet Title
TRU/Class A Separations – New ISF	PDS for Interim Storage Facility for TRU
Vitrified	PDS for Interim Storage Facility for VWO
Direct Cementitious	PDS for Interim Storage Facility for DCWO – 20 Yr
Cementitious	PDS for Interim Storage Facility for CWO
Hot Isostatic Press – New ISF	PDS for Interim Storage Facility for HIP

Table 3. Project Data Sheets
Project Data Sheet for Interim Storage Facility for TRU

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	TRU Separations Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	3,350 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside TRU Separation Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and

Conceptual Design	\$4,240,000
Management for Project Development	\$4,520,000
Permitting and Documentation	\$3,656,000
SO Test & Start-Up	\$6,930,000
Contingency	\$4,854,000
Total Preconstruction	\$24,200,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$10,601,000
Management (PM/CM)	\$10,177,000
Construction	\$42,405,000
G&A/PIF	\$2,701,000
Procurement Fees, Management Reserve and Contingency	\$15,116,000
Total Construction (TEC)	\$81,000,000
Schedule start/end: Preconstruction	January 1999 through December 2001
Schedule start/end: Construction	January 2010 through December 2013
Schedule start/end: SO Test & Start-up	January 2014 through December 2014

Number of workers each year of construction (new/existing)

Nonradiation	58 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	1,156
Hours of operation	5,287 hours (total)

Acres disturbed and duration of disturbance

New	January 2010 through December 2013
Previous	None
	3.0 acres

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Table 3. (continued).

Project Data Sheet for Interim Storage Facility for TRU

Revegetated

None

Air emissions

Dust

86 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

4,814 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

28 tons (total)

Total air emissions

4,928 tons (total)

Effluents

Sanitary wastewater

2,469,713 liters (total)

Lube Oil

1,001 liters (total)

Solid wastes

Type - construction trash

1,375 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)

Pits/Ponds created (m²)

None

Water usage:

Dust control

616,810 liters (total)

Domestic water

2,469,713 liters (total)

Energy requirements

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

0 liters (total)

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Permits needed for construction

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$7,007,000

Operations/Process Facility

\$17,581,000

Procurement, materials, utilities, maintenance

\$16,845,000

Total operations

\$41,433,000

Schedule start/end

January 2014 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for TRU

Operations	3
Maintenance	0.5
Support	3
Total	6.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker

Heavy Equipment None

Air Emissions

Radioactive off-gas None

Effluents

Sanitary Wastewater 224,498 liters/yr

Solid Wastes

Sanitary/Industrial Trash 36 m³/yr

Radioactive wastes (canisters) 122 m³/yr

Hazardous/toxic chemicals and wastes

Pits/Ponds used (m²) None

Water usage:

Domestic water 224,498 liters/yr

Energy Requirements:

Electrical (MWh/yr) 2,533 MWh/yr

Fossil fuel (liters/yr) None

Permits needed (for facility operations)

HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.

Decontamination & Decommissioning (D&D) Information

Cost (\$): D&D (unescalated)

Decommission \$3,180,000

Decontamination \$0

Demolition \$19,569,000

Total D&D \$22,749,000

Schedule start/end: D&D

January 2069 through December 2071

Number of workers each year of D&D (new/existing)

53 New workers/yr

Number of radiation workers (D&D)

5 New workers/yr

Average annual worker radiation dose (rem/yr)

0.19 rem/yr per worker

Heavy equipment:

Equipment used Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for TRU

Trips	Roll-off trucks	3 per day
Hours of operation (all heavy equipment)		9,480 Hours

Acres disturbed and duration of disturbance

January 2069 through December 2071

New	None
Previous	3.0 acres
Revegetated	None

Air emissions

non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	5,510 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	32 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)

Effluents

radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	3,414,175 liters (total)
non-radioactive	Lube oil	1,794 liters (total)

Solid wastes:

radioactive	10,663 m ³
Non-radioactive (industrial)	2 m ³
Hazardous	23 m ³

Hazardous/toxic chemicals and wastes (type)

Storage/inventory	None m ³ (total)
Pits/Ponds created (m ²)	None
Hazardous Waste	909 m ³ (total)

Water usage:

Domestic water	3,414,175 liters (total)
Source of water	ICPP site wells

Energy requirements:

Electrical (MWh/yr)	156 MWh/yr
Fossil fuel (liters)	215,291 liters (total)

Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)

Work will be done under closure provisions of existing permits.

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for VWO

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Vitrified Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	13,493 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside Vitrification Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and contingency.

Conceptual Design	\$5,000,000
Management for Project Development	\$4,000,000
Permitting and Documentation	\$2,728,432
SO Test & Start-Up	\$4,500,000
Contingency	\$7,571,568
Total Preconstruction	\$23,800,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$35,000,000
Management (PM/CM)	\$55,337,700
Construction	\$273,376,540
G&A/PIF	\$16,334,715
Procurement Fees, Management Reserve and Contingency	\$79,451,045
Total Construction (TEC)	\$459,500,000
Schedule start/end: Preconstruction	January 2003 through December 2007
Schedule start/end: Construction	January 2006 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2012

Number of workers each year of construction (new/existing)

Nonradiation	114 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	2,191
Hours of operation	13,683 hours (total)

Acres disturbed and duration of disturbance

New	January 2006 through December 2011
Previous	None
	5 acres

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Table 3. (continued).

Project Data Sheet for Interim Storage Facility for VWO

Revegetated

None

Air emissions

Dust

288 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

13,189 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

77 tons (total)

Total air emissions

13,554 tons (total)

Effluents

Sanitary wastewater

9,708,525 liters (total)

Lube Oil

2,590 liters (total)

Solid wastes

Type - construction trash

5,406 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)

Pits/Ponds created (m²)

None

Water usage:

Dust control

2,056,032 liters (total)

Domestic water

9,708,525 liters (total)

Energy requirements

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

0 liters (total)

Permits needed for construction

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$7,293,000

Operations/Process Facility

\$18,299,000

Procurement, materials, utilities, maintenance

\$124,165,000

Total operations

\$149,757,000

Schedule start/end

January 2012 through December 2068

Number of workers each year of operation (new/existing)

ENGINEERING DESIGN FILE

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for VWO

Operations	3
Maintenance	0.5
Support	3
Total	6.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	224,498 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	36 m ³ /yr
Radioactive wastes (canisters)	10,584 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	224,498 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,368 MWh/yr
Fossil fuel (liters/yr)	None
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Decontamination & Decommissioning (D&D) Information	
<u>Cost (\$): D&D (unescalated)</u>	
Decommission	\$10,500,000
Decontamination	\$0
Demolition	\$95,783,000
Total D&D	\$106,283,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	249 New workers/yr
Number of radiation workers (D&D)	25 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker
<u>Heavy equipment:</u>	
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for VWO

Trips	Roll-off trucks	9 per day
Hours of operation (all heavy equipment)		50,220 Hours

Acres disturbed and duration of disturbance

January 2069 through December 2071

New	None
Previous	5.0 acres
Revegetated	None

Air emissions

non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	29,189 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	170 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)

Effluents

radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	15,898,593 liters (total)
non-radioactive	Lube oil	9,504 liters (total)

Solid wastes:

radioactive	None m ³
Non-radioactive (industrial)	42,946 m ³
Hazardous	8 m ³

Hazardous/toxic chemicals and wastes (type)

Storage/inventory	None m ³ (total)
Pits/Ponds created (m ²)	None
Hazardous waste	909 m ³ (total)

Water usage:

Domestic water	15,898,593 liters (total)
Source of water	ICPP site wells

Energy requirements:

Electrical (MWh/yr)	156 MWh/yr
Fossil fuel (liters)	1,140,496 liters (total)

Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)

Work will be done under closure provisions of existing permits.

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for DCWO - 20 yr

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Direct Cementitious Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	15,967 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside Grouting Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and

Conceptual Design	\$5,850,000
Management for Project Development	\$4,700,000
Permitting and Documentation	\$3,247,000
SO Test & Start-Up	\$6,570,000
Contingency	\$5,133,000
Total Preconstruction	\$25,500,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$45,750,000
Management (PM/CM)	\$83,023,000
Construction	\$455,030,000
G&A/PIF	\$27,046,000
Procurement Fees, Management Reserve and Contingency	\$127,151,000
Total Construction (TEC)	\$738,000,000
Schedule start/end: Preconstruction	January 2003 through December 2007
Schedule start/end: Construction	January 2006 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2013

Number of workers each year of construction (new/existing)

Nonradiation	134 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	2,482
Hours of operation	15,642 hours (total)

Acres disturbed and duration of disturbance

New	January 2006 through December 2011
Previous	None
	9 acres

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for DCWO - 20 yr

Revegetated

None

Air emissions

Dust

518 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

15,023 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

88 tons (total)

Total air emissions

15,629 tons (total)

Effluents

Sanitary wastewater

11,411,775 liters (total)

Lube Oil

2,960 liters (total)

Solid wastes

Type - construction trash

6,355 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)

Pits/Ponds created (m²)

None

Water usage:

Dust control

3,700,858 liters (total)

Domestic water

11,411,775 liters (total)

Energy requirements

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

586,966 liters (total)

Permits needed for construction

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$7,293,000

Operations/Process Facility

\$18,299,000

Procurement, materials, utilities, maintenance

\$180,989,000

Total operations

\$206,581,000

Schedule start/end

January 2012 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for DCWO - 20 yr

Operations	4
Maintenance	0.5
Support	4
Total	8.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	293,574 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	47 m ³ /yr
Radioactive wastes (canisters)	12,096 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	293,574 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,586 MWh/yr
Fossil fuel (liters/yr)	None
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.

Decontamination & Decommissioning (D&D) Information

<u>Cost (\$): D&D</u>	
Decommission	\$10,500,000
Decontamination	\$0
Demolition	\$112,235,000
Total D&D	\$122,735,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	287 New workers/yr
Number of radiation workers (D&D)	29 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker

Heavy equipment:

Equipment used Mobile Cranes, Roll-off trucks, Dozers, Loaders

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Table 3. (continued).

Project Data Sheet for Interim Storage Facility for DCWO - 20 yr

Trips Roll-off trucks 12 per day
Hours of operation (all heavy equipment) 62,100 Hours

Acres disturbed and duration of disturbance

January 2073 through December 2075

New None
Previous 9.0 acres
Revegetated None

Air emissions

non-radioactive Fuel combustion gases (CO₂, H₂O, O₂, N₂) 36,094 tons (total)
non-radioactive Fuel combustion contaminants (CO, particulates, NO_x, SO₂, hydrocarbons) 211 tons (total)
radioactive HEPA filtered off-gas None tons (total)

Effluents

radioactive Spent decontamination solution 5,109,750 liters (total)
non-radioactive Sanitary wastewater 18,346,756 liters (total)
non-radioactive Lube oil 11,752 liters (total)

Solid wastes:

radioactive 50,817 m³ Ci
Non-radioactive (industrial) 10 m³
Hazardous 108 m³

Hazardous/toxic chemicals and wastes (type)

Storage/inventory None m³ (total)
Pits/Ponds created (m²) None
radioactive (mixed waste) 909 m³ (total)

Water usage:

Domestic water 18,346,756 liters (total)
Source of water ICPP site wells

Energy requirements:

Electrical (MWh/yr) 156 MWh/yr
Fossil fuel (liters) 1,410,291 liters (total)

Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)

Work will be done under closure provisions of existing permits.

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Table 3. (continued).

Project Data Sheet for Interim Storage Facility for CWO

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Calcined Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	14,725 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside Grouting Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation an

Conceptual Design	\$5,000,000
Management for Project Development	\$4,000,000
Permitting and Documentation	\$2,728,000
SO Test & Start-Up	\$4,500,000
Contingency	\$4,072,000
Total Preconstruction	\$20,300,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$35,000,000
Management (PM/CM)	\$58,275,000
Construction	\$302,752,000
G&A/PIF	\$18,038,000
Procurement Fees, Management Reserve and Contingency	\$85,935,000
Total Construction (TEC)	\$500,000,000
Schedule start/end: Preconstruction	January 2003 through December 2006
Schedule start/end: Construction	January 2006 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2013

Number of workers each year of construction (new/existing)

Nonradiation	124 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	2,337
Hours of operation	14,637 hours (total)

Acres disturbed and duration of disturbance

New	January 2006 through December 2011
Previous	None
	9 acres

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Table 3. (continued).

Project Data Sheet for Interim Storage Facility for CWO

Revegetated	None
<u>Air emissions</u>	
Dust	518 tons (total)
Major gases (CO ₂ , H ₂ O, O ₂ , N ₂) from diesel exhaust	14,091 tons (total)
Contaminants (Particulates, CO, NO _x , SO ₂ , hydrocarbons) from diesel exhaust.	83 tons (total)
Total air emissions	14,692 tons (total)
<u>Effluents</u>	
Sanitary wastewater	10,560,150 liters (total)
Lube Oil	2,770 liters (total)
<u>Solid wastes</u>	
Type - construction trash	5,880 m ³ (total)
Radioactive wastes	None
<u>Hazardous/toxic chemicals and wastes (type)</u>	
Storage/inventory	13 m ³
Hazardous waste (construction)	217 m ³ (total)
Pits/Ponds created (m ²)	None
<u>Water usage:</u>	
Dust control	3,700,858 liters (total)
Domestic water	10,560,150 liters (total)
<u>Energy requirements</u>	
Electrical (MWh/yr)	156 MWh/yr
Fossil fuel (liters)	0 liters (total)
Permits needed for construction	NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Operational Information	
Cost (\$): Operations (unescalated)	
Facility/Administration	\$3,003,000
Operations/Process Facility	\$7,535,000
Procurement, materials, utilities, maintenance	\$37,708,000
Total operations	\$48,246,000
Schedule start/end	January 2012 through December 2068
<u>Number of workers each year of operation (new/existing)</u>	

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for CWO

Operations	4
Maintenance	0.5
Support	4
Total	8.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker
Heavy Equipment	None
<u>Air Emissions</u>	
Radioactive off-gas	None
<u>Effluents</u>	
Sanitary Wastewater	293,574 liters/yr
<u>Solid Wastes</u>	
Sanitary/Industrial Trash	47 m ³ /yr
Radioactive wastes (canisters)	3,456 m ³ /yr
<u>Hazardous/toxic chemicals and wastes</u>	
Pits/Ponds used (m ²)	None
<u>Water usage:</u>	
Domestic water	293,574 liters/yr
<u>Energy Requirements:</u>	
Electrical (MWh/yr)	4,368 MWh/yr
Fossil fuel (liters/yr)	None
Permits needed (for facility operations)	HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Decontamination & Decommissioning (D&D) Information	
<u>Cost (\$): D&D (unescalated)</u>	
Decommission	\$10,500,000
Decontamination	\$0
Demolition	\$103,997,000
Total D&D	\$114,497,000
Schedule start/end: D&D	January 2069 through December 2071
Number of workers each year of D&D (new/existing)	268 New workers/yr
Number of radiation workers (D&D)	14 New workers/yr
Average annual worker radiation dose (rem/yr)	0.19 rem/yr per worker
<u>Heavy equipment:</u>	
Equipment used	Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for CWO

Trips Roll-off trucks
Hours of operation (all heavy equipment)

12 per day
67,500 Hours

Acres disturbed and duration of disturbance

January 2069 through December 2071

New

None

Previous

9.0 acres

Revegetated

None

Air emissions

non-radioactive Fuel combustion gases (CO₂, H₂O, O₂, N₂)

39,233 tons (total)

non-radioactive Fuel combustion contaminants (CO,
particulates, NO_x, SO₂, hydrocarbons)

229 tons (total)

radioactive HEPA filtered off-gas

None tons (total)

Effluents

radioactive Spent decontamination solution

None liters (total)

non-radioactive Sanitary wastewater

17,111,456 liters (total)

non-radioactive Lube oil

12,774 liters (total)

Solid wastes:

radioactive

46,864 m³

Ci

Non-radioactive (industrial)

9 m³

Hazardous

100 m³

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

None m³ (total)

Pits/Ponds created (m²)

None

radioactive (mixed waste)

None m³ (total)

Water usage:

Domestic water

17,111,456 liters (total)

Source of water

ICPP site wells

Energy requirements:

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

1,532,925 liters (total)

Permits needed (e.g. for facility closures, physical characteristics
and quantities of radioactive and hazardous materials remaining
after closure)

Work will be done under closure provisions of
existing permits.

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for HIP

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Hipping Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	7,287 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	Inside Vitrification Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and

Conceptual Design	\$5,000,000
Management for Project Development	\$4,000,000
Permitting and Documentation	\$2,728,000
SO Test & Start-Up	\$4,500,000
Contingency	\$4,072,000
Total Preconstruction	\$20,300,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$33,085,000
Management (PM/CM)	\$49,305,000
Construction	\$208,097,000
G&A/PIF	\$12,729,000
Procurement Fees, Management Reserve and Contingency	\$65,384,000
Total Construction (TEC)	\$368,600,000
Schedule start/end: Preconstruction	January 2003 through December 2007
Schedule start/end: Construction	January 2006 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2012

Number of workers each year of construction (new/existing)

Nonradiation	92 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	1,349
Hours of operation	8,140 hours (total)

Acres disturbed and duration of disturbance

New	January 2006 through December 2011
Previous	None
	2.5 acres

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for HIP

Revegetated

None

Air emissions

Dust

108 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

4,017 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

24 tons (total)

Total air emissions

4,149 tons (total)

Effluents

Sanitary wastewater

5,876,213 liters (total)

Lube Oil

1,541 liters (total)

Solid wastes

Type - construction trash

3,272 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)

Pits/Ponds created (m²)

None

Water usage:

Dust control

771,012 liters (total)

Domestic water

5,876,213 liters (total)

Energy requirements

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

310,806 liters (total)

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Permits needed for construction

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$7,293,000

Operations/Process Facility

\$18,299,000

Procurement, materials, utilities, maintenance

\$70,097,000

Total operations

\$95,689,000

Schedule start/end

January 2013 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for HIP

Operations	3
Maintenance	0.5
Support	3
Total	6.5
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker

Heavy Equipment None

Air Emissions

Radioactive off-gas None

Effluents

Sanitary Wastewater 224,498 liters/yr

Solid Wastes

Sanitary/Industrial Trash 36 m³/yr

Radioactive wastes (canisters) 4,309 m³/yr

Hazardous/toxic chemicals and wastes

Pits/Ponds used (m²) None

Water usage:

Domestic water 224,498 liters/yr

Energy Requirements:

Electrical (MWh/yr) 4,368 MWh/yr

Fossil fuel (liters/yr) None

HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Permits needed (for facility operations)

Decontamination & Decommissioning (D&D)-Information

Cost (\$): D&D (unescalated)

Decommission \$7,678,000

Decontamination \$0

Demolition \$57,836,000

Total D&D \$65,514,000

Schedule start/end: D&D January 2069 through December 2071

Number of workers each year of D&D (new/existing) 154 New workers/yr

Number of radiation workers (D&D) 16 New workers/yr

Average annual worker radiation dose (rem/yr) 0.19 rem/yr per worker

Heavy equipment:

Equipment used Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).

Project Data Sheet for Interim Storage Facility for HIP

Trips	Roll-off trucks	9 per day
Hours of operation (all heavy equipment)		35,640 Hours
<u>Acres disturbed and duration of disturbance</u>		January 2069 through December 2071
New		None
Previous		2.5 acres
Revegetated		None
<u>Air emissions</u>		
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	20,715 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	121 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)
<u>Effluents</u>		
radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	9,818,650 liters (total)
non-radioactive	Lube oil	6,745 liters (total)
<u>Solid wastes:</u>		
radioactive		None m ³
Non-radioactive (industrial)		23,191 m ³
Hazardous		4 m ³
<u>Hazardous/toxic chemicals and wastes (type)</u>		
Storage/inventory		None m ³ (total)
Pits/Ponds created (m ²)		None
Hazardous wastes		909 m ³ (total)
<u>Water usage:</u>		
Domestic water		9,818,650 liters (total)
Source of water		ICPP site wells
<u>Energy requirements:</u>		
Electrical (MWh/yr)		156 MWh/yr
Fossil fuel (liters)		809,384 liters (total)
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)		Work will be done under closure provisions of existing permits.

8.0 PROJECT-SPECIFIC OPTIONS

No project-specific options were assigned, identified, or evaluated.

9.0 RECOMMENDATIONS

The complexity that NRC licensing adds to the permitting of an ISF has not been estimated in this study. The ramifications should be investigated in greater detail before the design of an ISF is started.

A future study should be performed to determine if a standard 4.6-m (15-ft) long "Hanford" canister should be substituted for the 3-m (10-ft) SRS DWPF canister assumed in this study. Use of a 3-m (15-ft) canister would increase the interim storage construction costs but would reduce the operation (handling) costs, and greatly reduce offsite transportation and disposal costs. A large net cost saving, primarily as a result of reduced transportation and disposal costs, could be realized by using the 4.6-m (15-ft) canister.

10.0 CONCLUSIONS

This study has investigated the design of a new interim storage facility for storage of HLW that results from processing the waste at ICPP. The processing options are discussed in separate reports. It is concluded that a new facility can be designed, built, tested, and placed into operation that can store the waste in canisters for the period from processing until the time a permanent repository is available for receipt of this waste. The schedules and costs associated with interim storage for the various processing options are presented in the body of this EDF.

11.0 REFERENCES

1. October 17, 1995, *Consent Order and Settlement Agreement between DOE and the State of Idaho regarding spent fuel and nuclear waste issues.*
2. *Waste Treatment Facilities Feasibility Study Report*, December 12, 1997, Fluor Daniel Corporation.
3. Ronald E. Dafoe, Daryl A. Lopez, and Karen L. Williams, *DPC Loading Feasibility Study Report*, INEEL/EXT-97-01251, November 1997.
4. DOE/RW-0333P, U. S. Department of Energy, *Office of Civilian Radioactive Waste Management, Quality Assurance Requirements and Description (QARD).*
5. William H. Landman, *TRU Separations Option Study Report*, INEEL/EXT-01428, February 1998.
6. Daryl A. Lopez, *Vitrified Waste Option Study Report*, INEEL/EXT-01389, February 1998.
7. Ronald E. Dafoe, *Direct Cementitious Waste Option Study Report*, INEEL/EXT-01399, February 1998.

8. Allen E. Lee, *Cementitious Waste Option Study Report*, INEEL/EXT-01389, February 1998.
9. Neal E. Russell, *Hot Isostatic Press Waste Option Report*, INEEL/EXT-01392, February 1998.

12.0 APPENDICES

- Appendix 1 – Cost Estimates
- Appendix 2 – Drawings and Sketches
- Appendix 3 – Risk Assessment/Data Sheets
- Appendix 4 – Background Information for Project Data Sheets

Appendix 1

Cost Estimates

The cost estimates for the new Interim Storage Facilities (ISFs) are contained in this appendix in the same order as in the following summary table (see estimates attached to the letter RDA-3-98):

Summary Table of Cost Estimates

Waste Option	Not Escalated			Escalated		
	Total Estimate d Cost, K\$	Other Project Cost, K\$	Total Project Cost, K\$	Total Estimate d Cost, K\$	Other Project Cost, K\$	Total Project Cost, K\$
TRU/Class A Separations	81,000	19,000	100,000	117,300	24,200	141,500
Vitrified	440,300	23,800	464,100	600,100	29,700	629,800
Direct Cementitious	540,400	20,300	560,700	738,000	25,500	763,500
Cementitious	500,000	20,300	520,300	681,900	25,600	707,500
Hot Isostatic Press	271,500	20,300	291,800	368,600	25,700	394,300

The Life-Cycle Cost Estimate for the TRU/Class A Separations Option is attached to the letter, "Economic and Life-Cycle Analysis conducted for the Interim Storage Facility-TRU – RJT-23-98," dated February 3, 1998.

The Life-Cycle Cost Estimate for the Vitrified Option is attached to the letter "Economic and Life-Cycle Analysis conducted for the Vitrification Interim Storage Facilities – RJT-13-98," dated January 30, 1998.

The Life-Cycle Cost Estimate for the Direct Cementitious Option is attached to the letter "Economic and Life-Cycle Analysis conducted for the Direct Cementitious Waste Option (DCWO)-20 Yr Storage Facility – RJT-19-98," dated February 2, 1998.

The Life-Cycle Cost Estimate for the Cementitious Option is attached to the letter "Economic and Life-Cycle Analysis conducted for the Cementitious Waste Option (CWO) Storage Facility – RJT-21-98," dated February 2, 1998.

The Life-Cycle Cost Estimate for the Hot Isostatic Press Option is attached to the letter "Economic and Life-Cycle Analysis conducted for the Hot Isostatic Pressing (HIP) Storage Facilities – RJT-16-98," dated January 30, 1998.

Lockheed Martin Idaho Technologies Company**INTERDEPARTMENTAL COMMUNICATION**

Date: January 28, 1998

To: J. K. Rawlins MS 3765 6-4303

From: R. D. Adams *RDA* MS 3655 6-2963

Subject: INTERIM STORAGE STUDY - RDA-3-98

Cost Estimating has prepared Planning Cost Estimates for the subject project. These estimates were based on information received from you, your design team and reviewers from November 11, 1997 through January 23, 1998.

These estimates include permitting costs, direct and indirect construction costs, G&A, Performance Incentive Fee (PIF), procurement fee, Engineering costs, Inspection costs, Project Management costs, Construction Management costs, escalation and contingency. The estimated costs have been escalated to the midpoint of the anticipated schedule. For more detailed information, please refer to the Cost Estimate Support Data Recapitulation forms.

Attached for your review are the Summary Estimate sheets, the Cost Estimate Support Data Recapitulation form, detailed estimate sheets, Contingency Analysis sheets G&A/PIF Adder Calculation Sheets.

Also attached are the schedules.

Please refer to the attached table for a summary of the subject estimates.

If you have any questions regarding this estimate, please contact me at 526-2963.

RDA

Attachments:

cc: Estimate File #2421 *RDA*
R. D. Adams File

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: HLW INTERIM STORAGE FACILITY - TRU
Type of Estimate: PROJECT SUPPORT
File No: 2421-TRU

Estimator: RDA
Date: 1/26/98
Approved By: Red

I. SCOPE OF WORK: *Brief description of the proposed project.*

This facility will unload, store in vertical tubes and load out canisters containing High Level Waste (HLW) from the proposed TRU Separations class A option (TRU).

II. BASIS OF THE ESTIMATE: *Drawings, Design Report, Engineers notes, and/or other documentation upon which the estimate is originated.*

Draft sketches, a draft EDF, and the SNF Canister Storage Building Final Design Estimate from Fluor Daniel Northwest, Inc. were used as the basis for this estimate.

III. ASSUMPTIONS: *Condition statements accepted or supposed true without proof or demonstration. An assumption has a direct impact on total estimated cost.*

1. The Interim Storage Facility will be located within 100 feet of the TRU Seps facility.
2. Rock will not be encountered during excavation.
3. The estimates include both present day costs summaries and contingency analysis and escalated summaries and contingency analysis. The escalated summaries and contingency analysis reflect the attached schedule. All activities are escalated to the appropriate schedule mid-point.
4. Per the draft EDF, one storage module, containing 630 storage tubes, will accommodate the estimated 170 canisters produced at the TRU Seps facility.
5. Most quantities used for this estimate were obtained by preliminary take offs from the draft sketches.
6. The storage tube costs, gantry crane cost and associated rail system costs were used from the Fluor estimate of a facility which is approximately eighty percent complete.
7. All assumptions and information included in the draft "New Interim Storage Facility for Interim Storage of HLW" apply to the estimate.
8. Where quantities could not be determined from the draft sketches, factors or assumed quantities were used by the estimator.
9. Sufficient construction craft will be available to support this project.
10. Markups on direct construction costs to get the construction costs listed on the summary sheet are as follows:

Labor indirects, overheads and profit (OH&P)	50% of labor
Material & equipment OH&P	5% of material and equipment
Subcontract OH&O	10% of subcontract cost
Construction equipment allowance	10% of labor
NQA-1 quality requirements	30% of material
DOE/RW/0333P quality requirements	10% of material
Subcontractor procurement	1% of material and equipment
Bond	2% of everything

**COST ESTIMATE SUPPORT DATA RECAPITULATION
(CONTINUATION)**

File No: 2396

Page 2 of 2

III. **ASSUMPTIONS:** (Continued)

12. Only the railroad track within the storage facility is included in this estimate. The remainder of the branch line is included in the infrastructure estimate.
13. All utilities are assumed to be available at the facility wall.

IV. **CONTINGENCY GUIDELINE IMPLEMENTATION:** *The percentage used for contingency as determined by the contingency allowance guidelines can be altered to reflect the type of construction and conditions that may impact the total estimated cost.*

A large portion of the estimated costs is based on actual costs from Fluor's SNF Canister Storage Building. The majority of the remaining costs are for standard construction activities. For these reasons, the contingency is lower than would be experienced for a processing type facility at this stage of development.

V. **OTHER COMMENTS/CONCERNS SPECIFIC TO THE ESTIMATE:**

1. All FY'98 and later projects are to be assessed a Procurement Fee of 1%, a G&A Fee of 23%, with a \$500,000 ceiling per year, and a Performance Incentive Fee (PIF) of 5.5%. See the attached G&A/PIF calculation sheet for the method used to calculate these fees.
2. A procurement fee of one percent of construction was used to cover the operating contractor support to DOE-ID for their contract administration. It is felt that one percent is sufficient for jobs of this size.

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Rev. 8/96

COST ESTIMATE SUMMARY

 PROJECT NAME: **TRU SEPS. FACILITY - INTERIM STORAGE
FACILITY - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-TRU**
 PREPARED BY: **R. D. ADAMS**
 REPORT NAME: **Cost Estimate Summary**

 DATE: **26-Jan-1998**
 TIME: **15:27:59**
 CHECKED BY: **SAW**
 APPRD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$15,053,702
1.1.1	DESIGN ENGINEERING TITLE I & II	8,481,000	3,477,210	11,958,210
1.1.2	TITLE III INSPECTION	2,120,200	975,292	3,095,492
1.2	<u>MANAGEMENT COSTS</u>			>> \$14,858,566
1.2.1	PROJECT MANAGEMENT	5,936,600	2,730,836	8,667,436
1.2.2	CONSTRUCTION MANAGEMENT	4,240,500	1,950,630	6,191,130
1.3	<u>CONSTRUCTION</u>			>> \$61,910,603
1.3.1	GENERAL CONDITIONS	1,168,827	537,660	1,706,487
1.3.2	SITWORK	324,794	149,405	474,199
1.3.3	CONCRETE	9,046,326	4,161,310	13,207,636
1.3.5	METALS	1,580,519	727,039	2,307,558
1.3.7	THERMAL & MOISTURE PROTECTION	543,946	250,215	794,161
1.3.8	DOORS & WINDOWS	71,240	32,770	104,010
1.3.9	FINISHES	255,077	117,335	372,412
1.3.13	SPECIAL CONSTRUCTION	21,429,637	9,857,633	31,287,270
1.3.14	CONVEYING SYSTEMS	7,156,751	3,292,106	10,448,857
1.3.15	MECHANICAL	479,586	220,610	700,196
1.3.16	ELECTRICAL	347,820	159,997	507,817
1.5	<u>G&A/PIF</u>			>> \$3,943,628
1.5.1	G&A/PIF ADDER	2,701,115	1,242,513	3,943,628
1.5.2	PROCUREMENT FEES	424,045	195,061	>> \$619,106
	SUBTOTAL INCLUDING ESCALATION	66,307,983	30,077,622	>> \$96,385,605
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$6,647,334
	CONTINGENCY			>> \$14,267,061
	TOTAL ESTIMATED COST			>> \$117,300,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 24.00%

CONTINGENCY= 21.70%

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Rev. 6/96

COST ESTIMATE SUMMARY

 PROJECT NAME: **TRU SEPS. FACILITY - INTERIM STORAGE
FACILITY - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-TRU**
 PREPARED BY: **R. D. ADAMS**
 REPORT NAME: **Cost Estimate Summary**

 DATE: **26-Jan-1998**
 TIME: **15:29:56**
 CHECKED BY: *[Signature]*
 APPRD BY: *[Signature]*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$10,601,200
1.1.1	DESIGN ENGINEERING TITLE I & II	8,481,000	0	8,481,000
1.1.2	TITLE III INSPECTION	2,120,200	0	2,120,200
1.2	<u>MANAGEMENT COSTS</u>			>> \$10,177,100
1.2.1	PROJECT MANAGEMENT	5,936,600	0	5,936,600
1.2.2	CONSTRUCTION MANAGEMENT	4,240,500	0	4,240,500
1.3	<u>CONSTRUCTION</u>			>> \$42,404,523
1.3.1	GENERAL CONDITIONS	1,168,827	0	1,168,827
1.3.2	SITWORK	324,794	0	324,794
1.3.3	CONCRETE	9,046,326	0	9,046,326
1.3.5	METALS	1,580,519	0	1,580,519
1.3.7	THERMAL & MOISTURE PROTECTION	543,946	0	543,946
1.3.8	DOORS & WINDOWS	71,240	0	71,240
1.3.9	FINISHES	255,077	0	255,077
1.3.13	SPECIAL CONSTRUCTION	21,429,637	0	21,429,637
1.3.14	CONVEYING SYSTEMS	7,156,751	0	7,156,751
1.3.15	MECHANICAL	479,586	0	479,586
1.3.16	ELECTRICAL	347,820	0	347,820
1.5	<u>G&A/PIF</u>			>> \$2,701,115
1.5.1	G&A/PIF ADDER	2,701,115	0	2,701,115
1.5.2	PROCUREMENT FEES	424,045	0	>> \$424,045
	SUBTOTAL INCLUDING ESCALATION	66,307,983	0	>> \$66,307,983
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$4,552,968
	CONTINGENCY			>> \$10,139,049
	TOTAL ESTIMATED COST			>> \$81,000,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 25.00%

CONTINGENCY= 22.16%

Rev. 6/96

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-TRU**
PREPARED BY: **R. D. ADAMS**

DATE 26-Jan-1998
TIME: 15:25:49

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

Rev. 6/98

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-TRU**
PREPARED BY: **R. D. ADAMS**

DATE 26-Jan-1998
TIME: 15:25:49

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

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Rev. 6/96

 PROJECT NAME: **TRU SEPS. FACILITY - INTERIM STORAGE FACILITY**

 LOCATION 1: **INEEL/ICPP**

 REQUESTOR: **J. K. RAWLINS**
DETAILED COST ESTIMATE SHEET

 TYPE OF ESTIMATE: **PLANNING**

 PROJECT NO.: **2421-TRU**

 PREPARED BY: **R. D. ADAMS**

 PAGE # **3**

 DATE **26-Jan-1998**

 TIME: **15:25:49**

 REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.5	METALS											
	CHARGE FACE SLAB FRAME	33	TON	1,100.00	IRON GEN	6.000	198	7,288		36,300		43,588
	BUILDING STRUCTURAL STEEL	433	TON	1,200.00	IRON GEN	10.000	4,330	159,387		519,600		678,987
	GANTRY CRANE RAILS, EMBEDS, ETC.	200	LF	161.00	IRON GEN	3.850	770	28,344		32,200		60,544
	RAILROAD TRACKS - WITHIN BUILDING	300	LF	92.00	IRON GEN	2.000	600	22,086		27,600		49,686
	TRANSFER CART RAILS	350	LF	92.00	IRON GEN	2.000	700	25,767		32,200		57,967
	BIRD SCREEN AND VENT LOUVERS	960	SF	40.00	SHEE GEN	0.250	240	8,318		38,400		46,718
	AIR OUTLET WALL (INSIDE)	3,200	SF		GEN	0.000					38,400	38,400
	METALS S/T						6,838	\$251,191		\$686,300	\$38,400	\$975,891
1.3.7	THERMAL & MOISTURE PROTECTION											
	SUBGRADE WATERPROOFING	16,000	SF		GEN	0.000					24,000	24,000
Memo:	ROOF & WALL SYSTEMS <i>(includes metal roofing or wall panel, insulation and hanging system. Assume standing seam roof. Assume all sheets prefinished.)</i>	38,400	sf		GEN	0.000					460,800	460,800
	THERMAL & MOISTURE PROTECTION S/T						0				\$484,800	\$484,800
1.3.8	DOORS & WINDOWS											
	OVERHEAD DOORS	2	EA	16,000.00	SKWK GEN	75.000	150	4,967		32,000		36,967
	PERSONNEL DOORS	5	EA	1,000.00	SKWK GEN	10.000	50	1,656		5,000		6,656
	DOORS & WINDOWS S/T						200	\$6,622		\$37,000		\$43,622

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Rev. 8/98

PROJECT NAME: **TRU SEPS. FACILITY - INTERIM STORAGE**

FACILITY

LOCATION 1: **INEEL/ICPP**

REQUESTOR: **J. K. RAWLINS**

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: **PLANNING**

PROJECT NO.: **2421-TRU**

PREPARED BY: **R. D. ADAMS**

PAGE # **4**

DATE **26-Jan-1998**

TIME: **15:25:49**

REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.9	FINISHES											
	PAINT STRUCTURAL STEEL	65,000	SF	0.10	PAIN GEN	0.080	5,200	145,288		6,500		151,788
	FINISHES S/T						5,200	\$145,288		\$6,500		\$151,788
1.3.13	SPECIAL CONSTRUCTION											
	SUPPORT BUILDING	3,600	SF			0.000					540,000	540,000
	VAULT TUBE ASSEMBLIES	740	EA	15,800.00	IRON GEN	40.000	29,600	1,089,576		11,692,000		12,781,576
	SPECIAL CONSTRUCTION S/T						29,600	\$1,089,576		\$11,692,000	\$540,000	\$13,321,576
1.3.14	CONVEYING SYSTEMS											
	GANTRY CRANE	1	EA	2,500,000.00	SKWK GEN	1000.00	1,000	33,110		2,500,000		2,533,110
	TRANSFER CART IN TUNNEL	1	EA	300,000.00	SKWK GEN	500.000	500	16,555		300,000		316,555
	5 TON DECONTAMINATABLE BRIDGE CRANE	2	EA	250,000.00	SKWK GEN	300.000	600	19,866		500,000		519,866
	CASK MANUVERING HYDRAULIC PLATFORM	1	EA	1,000,000.00	SKWK GEN	1000.00	1,000	33,110		1,000,000		1,033,110
	CONVEYING SYSTEMS S/T						3,100	\$102,641		\$4,300,000		\$4,402,641
1.3.15	MECHANICAL											
	MISC. PIPING - ALLOW	1	LOT			0.000					3,000	3,000
	FIRE PROTECTION	14,600	SF			0.000					51,100	51,100

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: TRU SEPS. FACILITY - INTERIM STORAGE
FACILITY

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
PROJECT NO.: 2421-TRU
PREPARED BY: R. D. ADAMS

PAGE # 5

DATE 26-Jan-1998
TIME: 15:25:49
REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.15	MECHANICAL HVAC	14,600	SF	11.20	SHEE GEN	0.180	2,628	91,086		163,520		254,606
	MECHANICAL S/T						2,628	\$91,086		\$163,520	\$54,100	\$308,706
1.3.16	ELECTRICAL											
	ELECTRICAL ALLOWANCE	1	LOT		GEN	0.000					310,000	310,000
	ELECTRICAL S/T						0				\$310,000	\$310,000
1.5.1 00701000	G&A/PIF ADDER G&A	1	LOT			0.000					327,530	327,530
	PIF	1	LOT			0.000					2,373,585	2,373,585
	G&A/PIF ADDER S/T						0				\$2,701,115	\$2,701,115
	PROJECT SUBTOTAL						181,612	\$26,928,361	\$387,355	\$18,335,988	\$4,353,415	\$50,005,119

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **TRU SEPS. FACILITY - INTERIM STORAGE
FACILITY - UNESCALATED
INEEL/ICPP**
 LOCATION 1:
 REQUESTOR: **J. K. RAWLINS**
CONTINGENCY ANALYSIS

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-TRU**
 PREPARED BY: **R. D. ADAMS**

 DATE: **26-Jan-1998**
 TIME: **15:30:08**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	8,481,000	12.79	20	35	2.56	4.48	3.773%	16.99%	2,496,401	10,977,401
1.1.2	TITLE III INSPECTION	2,120,200	3.20	20	30	0.64	0.96	0.799%	3.60%	528,886	2,649,086
1.2.1	PROJECT MANAGEMENT	5,936,600	8.95	20	35	1.79	3.13	2.641%	11.89%	1,747,451	7,684,051
1.2.2	CONSTRUCTION MANAGEMENT	4,240,500	6.40	20	30	1.28	1.92	1.599%	7.20%	1,057,797	5,298,297
1.3.1	GENERAL CONDITIONS	1,168,827	1.76	20	35	0.35	0.62	0.520%	2.34%	344,047	1,512,874
1.3.2	SITWORK	324,794	0.49	20	30	0.10	0.15	0.122%	0.55%	81,020	405,814
1.3.3	CONCRETE	9,046,326	13.64	20	30	2.73	4.09	3.411%	15.36%	2,256,615	11,302,941
1.3.5	METALS	1,580,519	2.38	20	25	0.48	0.60	0.489%	2.20%	323,295	1,903,814
1.3.7	THERMAL & MOISTURE PROTECTION	543,946	0.82	20	30	0.16	0.25	0.205%	0.92%	135,688	679,634
1.3.8	DOORS & WINDOWS	71,240	0.11	20	20	0.02	0.02	0.017%	0.08%	11,373	82,613
1.3.9	FINISHES	255,077	0.38	20	35	0.08	0.13	0.113%	0.51%	75,082	330,159
1.3.13	SPECIAL CONSTRUCTION	21,429,637	32.32	20	20	6.46	6.46	5.171%	23.29%	3,421,213	24,850,850
1.3.14	CONVEYING SYSTEMS	7,156,751	10.79	20	25	2.16	2.70	2.213%	9.96%	1,463,912	8,620,663
1.3.15	MECHANICAL	479,586	0.72	20	30	0.14	0.22	0.181%	0.81%	119,633	599,219
1.3.16	ELECTRICAL	347,820	0.52	20	25	0.10	0.13	0.108%	0.48%	71,147	418,967
1.5.1	G&A/PIF ADDER	2,701,115	4.07	5	20	0.20	0.81	0.713%	3.21%	471,657	3,172,772
1.5.2	PROCUREMENT FEES	424,045	0.64	20	25	0.13	0.16	0.131%	0.59%	86,738	510,783
	ESCALATION	0	0.00	20	25	0.00	0.00	0.000%	0.00%	62	62
SUBTOTAL		66,307,983	100.00					22.206%			
CALCULATED CONTINGENCY		14,724,290									
RESULTANT TEC		81,032,273									
ROUNDED TEC		81,000,000									
PROJECT CONTINGENCY		14,692,017						22.16%			
MANAGEMENT RESERVE		4,552,968									
CONTINGENCY		10,139,049									
TOTAL ESTIMATED COST		81,000,000								14,692,017	81,000,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

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CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/98

 PROJECT NAME: **TRU SEPS. FACILITY - INTERIM STORAGE
FACILITY - ESCALATED
INEEL/ICPP**
 LOCATION 1:
 REQUESTOR: **J. K. RAWLINS**
CONTINGENCY ANALYSIS

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-TRU**
 PREPARED BY: **R. D. ADAMS**

 DATE: **26-Jan-1998**
 TIME: **15:28:05**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency			Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	8,481,000	8.80	20	35	1.76	3.08	2.596%	11.98%	2,504,743	10,985,743
1.1.2	TITLE III INSPECTION	2,120,200	2.20	20	30	0.44	0.66	0.550%	2.54%	530,653	2,650,853
1.2.1	PROJECT MANAGEMENT	5,936,600	6.16	20	35	1.23	2.16	1.817%	8.38%	1,753,290	7,689,890
1.2.2	CONSTRUCTION MANAGEMENT	4,240,500	4.40	20	30	0.88	1.32	1.100%	5.07%	1,061,332	5,301,832
1.3.1	GENERAL CONDITIONS	1,168,827	1.21	20	35	0.24	0.42	0.358%	1.65%	345,196	1,514,023
1.3.2	SITEWORK	324,794	0.34	20	30	0.07	0.10	0.084%	0.39%	81,291	406,085
1.3.3	CONCRETE	9,046,326	9.39	20	30	1.88	2.82	2.346%	10.83%	2,264,156	11,310,482
1.3.5	METALS	1,580,519	1.64	20	25	0.33	0.41	0.336%	1.55%	324,375	1,904,894
1.3.7	THERMAL & MOISTURE PROTECTION	543,946	0.56	20	30	0.11	0.17	0.141%	0.65%	136,141	680,087
1.3.8	DOORS & WINDOWS	71,240	0.07	20	20	0.01	0.01	0.012%	0.05%	11,411	82,651
1.3.9	FINISHES	255,077	0.26	20	35	0.05	0.09	0.078%	0.36%	75,333	330,410
1.3.13	SPECIAL CONSTRUCTION	21,429,637	22.23	20	20	4.45	4.45	3.557%	16.41%	3,432,645	24,862,282
1.3.14	CONVEYING SYSTEMS	7,156,751	7.43	20	25	1.49	1.86	1.522%	7.02%	1,468,804	8,625,555
1.3.15	MECHANICAL	479,586	0.50	20	30	0.10	0.15	0.124%	0.57%	120,033	599,619
1.3.16	ELECTRICAL	347,820	0.36	20	25	0.07	0.09	0.074%	0.34%	71,384	419,204
1.5.1	G&A/PIF ADDER	2,701,115	2.80	5	20	0.14	0.56	0.490%	2.26%	473,233	3,174,348
1.5.2	PROCUREMENT FEES	424,045	0.44	20	25	0.09	0.11	0.090%	0.42%	87,028	511,073
	ESCALATION	30,077,622	31.21	20	25	6.24	7.80	6.397%	29.52%	6,173,347	36,250,969
SUBTOTAL		96,385,605	100.00					21.674%			
CALCULATED CONTINGENCY		20,890,202									
RESULTANT TEC		117,275,807									
ROUNDED TEC		117,300,000									
PROJECT CONTINGENCY		20,914,395						21.70%			
MANAGEMENT RESERVE		6,647,334									
CONTINGENCY		14,267,061									
TOTAL ESTIMATED COST		117,300,000								20,914,395	117,300,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

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CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE III/AFC Market Conditions

G&A/PIF ADDER CALCULATION SHEET

PROCUREMENT FEE:

CONSTRUCTION =	\$42,404,523	
GFE =	\$0	
Subtotal	\$42,404,523	
FEE @ 1% =	\$42,404,523	* 0.01 = \$424,045.23

G&A @ 23% (with a ceiling of \$500,000 imposed per year)

CONSTRUCTION OR CEILING * 2 YEARS =	\$1,000,000	
GFE =	\$0	
PROCUREMENT FEE =	\$424,045	
Subtotal	\$1,424,045	
FEE @ 23% =	\$1,424,045	* 0.23 = \$327,530

PIF @ 5.5%

CONSTRUCTION =	\$42,404,523	
GFE =	\$0	
PROCUREMENT FEE =	\$424,045	
G&A =	\$327,530	
Subtotal	\$43,156,099	
FEE @ 5.5% =	\$43,156,099	* 0.055 = \$2,373,585

TOTAL PROCUREMENT FEE:	\$424,045
TOTAL G&A FEE:	\$327,530
TOTAL PIF:	\$2,373,585

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **TRU - INTERIM STORAGE
FACILITY - OPC - ESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **242106**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
TIME: **15:31:50**
CHECKED BY: **SNW**
APPRD BY: **bol**

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> <u>\$4,240,000</u>
1.1.1	CONCEPTUAL DESIGN	4,000,000	240,000	4,240,000
1.2	<u>MANAGEMENT COSTS</u>			>> <u>\$4,520,000</u>
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	180,000	3,180,000
1.2.2	SAFETY REVIEWS	1,000,000	340,000	1,340,000
1.3	<u>PERMITTING</u>			>> <u>\$3,656,099</u>
1.3.1	PERMITTING	2,728,432	927,667	3,656,099
1.4	<u>TURNOVER</u>			>> <u>\$6,930,000</u>
1.4.1	SO TEST & STARTUP	4,500,000	2,430,000	6,930,000
1.5.2	PROCUREMENT FEES	0	0	>> <u>\$0</u>
SUBTOTAL INCLUDING ESCALATION		15,228,432	4,117,667	>> \$19,346,099
PROJECT CONTINGENCY				
MANAGEMENT RESERVE				>> \$0
CONTINGENCY				>> \$4,853,901
TOTAL ESTIMATED COST				>> \$24,200,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= **40.00%**

CONTINGENCY= **25.09%**

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **TRU - INTERIM STORAGE
FACILITY - OPC - UNESCALATED
INEEL/ICPP**
LOCATION 1:
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **242106**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
TIME: **15:33:24**
CHECKED BY: **SNW**

APPRD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> \$4,000,000
1.1.1	CONCEPTUAL DESIGN	4,000,000	0	4,000,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$4,000,000
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	0	3,000,000
1.2.2	SAFETY REVIEWS	1,000,000	0	1,000,000
1.3	<u>PERMITTING</u>			>> \$2,728,432
1.3.1	PERMITTING	2,728,432	0	2,728,432
1.4	<u>TURNOVER</u>			>> \$4,500,000
1.4.1	SO TEST & STARTUP	4,500,000	0	4,500,000
1.5.2	PROCUREMENT FEES	0	0	>> \$0
	SUBTOTAL INCLUDING ESCALATION	15,228,432	0	>> \$15,228,432
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$3,771,568
	TOTAL ESTIMATED COST			>> \$19,000,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 55.00%

CONTINGENCY= 24.77%

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **242106**
PREPARED BY: **R. D. ADAMS**

TIME: 15:30:58

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **TRU - INTERIM STORAGE**

FACILITY - OPC

LOCATION 1: **INEEL/ICPP**

REQUESTOR: **J. K. RAWLINS**

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: **PLANNING**

PROJECT NO.: **242106**

PREPARED BY: **R. D. ADAMS**

PAGE # **2**

DATE **26-Jan-1998**

TIME: **15:30:58**

REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	PERMITTING QUALITY REVIEWS	1	LOT			0.000					500,000	500,000
	PERMITTING S/T						13,040	\$988,432			\$1,740,000	\$2,728,432
1.4.1	SO TEST & STARTUP											
	ORR	1	LOT			0.000		2,000,000				2,000,000
	SO TEST & TRAINING	1	LOT		LMITCO	0.000		1,000,000				1,000,000
	SO TEST & STARTUP S/T						0	\$3,000,000				\$3,000,000
1.4.1.1	PROJECT SUPPORT SUPPORT DURING DESIGN, CONSTRUCTION & STARTUP	1	LOT		LMITCO	0.000		1,500,000				1,500,000
	PROJECT SUPPORT S/T						0	\$1,500,000				\$1,500,000
	PROJECT SUBTOTAL						13,040	\$13,488,432	\$0	\$0	\$1,740,000	\$15,228,432

CONTINGENCY ANALYSIS

PROJECT NAME: TRU - INTERIM STORAGE
FACILITY - OPC - UNESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 242106
PREPARED BY: R. D. ADAMS

DATE: 26-Jan-1998
TIME: 15:33:29

REPORT NAME: Contingency Analysis

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	4,000,000	26.27	20	30	5.25	7.88	6.567%	26.27%	990,665	4,990,665
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	19.70	20	30	3.94	5.91	4.925%	19.70%	742,999	3,742,999
1.2.2	SAFETY REVIEWS	1,000,000	6.57	20	30	1.31	1.97	1.642%	6.57%	247,666	1,247,666
1.3.1	PERMITTING	2,728,432	17.92	20	30	3.58	5.38	4.479%	17.92%	675,740	3,404,172
1.4.1	SO TEST & STARTUP	4,500,000	29.55	20	30	5.91	8.86	7.387%	29.55%	1,114,498	5,614,498
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	0	0.00	20	30	0.00	0.00	0.000%	0.00%	0	0
SUBTOTAL		15,228,432	100.00					25.000%			
CALCULATED CONTINGENCY		3,807,108									
RESULTANT TEC		19,035,540									
ROUNDED TEC		19,000,000									
PROJECT CONTINGENCY		3,771,568						24.77%			
MANAGEMENT RESERVE		0									
CONTINGENCY		3,771,568									
TOTAL ESTIMATED COST		19,000,000								3,771,568	19,000,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

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PLANNING 20% -- 30%
Experimental/Special Conditions.....Up to 50%
Conceptual 15% -- 25%
Experimental/Special Conditions.....Up to 40%
TITLE I 10% -- 20%
TITLE II 5% -- 15%
TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **TRU - INTERIM STORAGE
FACILITY - OPC - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242106**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **15:31:55**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY.		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	4,000,000	20.68	20	30	4.14	6.20	5.169%	20.68%	1,003,593	5,003,593
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	15.51	20	30	3.10	4.65	3.877%	15.51%	752,695	3,752,695
1.2.2	SAFETY REVIEWS	1,000,000	5.17	20	30	1.03	1.55	1.292%	5.17%	250,898	1,250,898
1.3.1	PERMITTING	2,728,432	14.10	20	30	2.82	4.23	3.526%	14.10%	684,559	3,412,991
1.4.1	SO TEST & STARTUP	4,500,000	23.26	20	30	4.65	6.98	5.815%	23.26%	1,129,042	5,629,042
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	4,117,657	21.28	20	30	4.26	6.39	5.321%	21.28%	1,033,114	5,150,781
SUBTOTAL		19,346,099	100.00					25.000%			
CALCULATED CONTINGENCY		4,836,525									
RESULTANT TEC		24,182,624									
ROUNDED TEC		24,200,000									
PROJECT CONTINGENCY		4,853,901						25.09%			
MANAGEMENT RESERVE		0									
CONTINGENCY		4,853,901									
TOTAL ESTIMATED COST		24,200,000								4,853,901	24,200,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

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 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE II/AFC Market Conditions

**TRU CLASS A GROUT
INTERIM STORAGE FACILITY**

Project: 2421-IRU.MPP
Date: Mon 1/26/98

Task

Summary

Rolled Up Progress

Progress

Rolled Up Task

Milestone

Rolled Up Milestone

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: <u>HLW ISF - DCWO</u>	Estimator: <u>R. D. Adams</u>
Date: <u>January 26, 1998</u>	File: <u>2421-DCWO</u>
Approved By: <u> </u>	

I. **SCOPE OF WORK:** *Brief description of the proposed project.*

This facility will unload, store in vertical tubes and load out canisters containing High Level Waste (HLW) from the proposed Direct Cementitious Waste Option (DCWO).

II. **BASIS OF THE ESTIMATE:** *Drawings, Design Report, Engineers Notes and/or other documentation upon which the estimate is originated.*

Draft sketches, a draft EDF, and the SNF Canister Storage Building Final Design Estimate from Fluor Daniel Northwest, Inc. were used as the basis for this estimate.

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: <u>HLW ISF - DCWO</u>	Estimator: <u>R. D. Adams</u>
Date: <u>January 26, 1998</u>	File: <u>2421-DCWO</u>
Approved By: _____	

III. ASSUMPTIONS: *Conditions statements accepted or supposed true without proof of demonstration. An assumption has a direct impact on total estimated cost.*

1. The Interim Storage Facility will be located within 100 feet of the VWO facility.
2. Rock will not be encountered during excavation.
3. The estimates include both present day costs summaries and contingency analysis and escalated summaries and contingency analysis. The escalated summaries and contingency analysis reflect the attached schedule. All activities are escalated to the appropriate schedule mid-point.
4. Per the draft EDF, ten storage modules, containing 630 storage tubes each, will accommodate the estimated 18,000 canisters produced at the Cementious Waste Facility.
5. Most quantities used for this estimate were obtained by preliminary take offs from the draft sketches.
6. The storage tube costs, gantry crane cost and associated rail system costs were used from the Fluor estimate of a facility which is approximately eighty percent complete.
7. All assumptions and information included in the draft "New Interim Storage Facility for Interim Storage of HLW" apply to the estimate.
8. Where quantities could not be determined from the draft sketches, factors or assumed quantities were used by the estimator.
9. Since the storage tubes and conveying equipment represent such a large percentage of this facility's cost, lower design, inspection, Project Management and turnover costs are used in the estimate.
10. Sufficient construction craft will be available to support this project.
11. Markups on direct construction costs to get the construction costs listed on the summary sheet are as follows:
 - Labor indirects, overheads and profit(OH&P) 50% of labor
 - Material & equipment OH&P 5% of material and equipment
 - Subcontract OH&O 10% of subcontract cost
 - Construction equipment allowance 10% of labor
 - NQA-1 quality requirements 30% of material
 - DOE/RW/0333P quality requirements 10% of material
 - Subcontractor procurement 1% of material and equipment
 - Bond 2% of everything
12. Only the railroad track within the storage facility is included in this estimate. The remainder of the branch line is included in the infrastructure estimate.
13. All utilities are assumed to be available at the facility wall.

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: <u>HLW ISF - DCWO</u>	Estimator: <u>R. D. Adams</u>
Date: <u>January 26, 1998</u>	File: <u>2421-DCWO</u>
Approved By: _____	

- IV. **CONTINGENCY GUIDELINE IMPLEMENTATION:** *The percentage used for contingency as determined by the contingency allowance guidelines can be altered to reflect the type of construction and conditions that may impact the total estimated cost.*

A large portion of the estimated costs is based on actual costs from Fluor's SNF Canister Storage Building. The majority of the remaining costs are for standard construction activities. For these reasons, the contingency is lower than would be experienced for a processing type facility at this stage of development.

V. **OTHER COMMENTS/CONCERNS SPECIFIC TO THE ESTIMATE:**

1. All FY'98 and later projects are to be assessed a Procurement Fee of 1%, a G&A Fee of 23%, with a \$500,000 ceiling per year, and a Performance Incentive Fee (PIF) of 5.5%. See the attached G&A/PIF calculation sheet for the method used to calculate these fees.
2. A procurement fee of one percent of construction was used to cover the operating contractor support to DOE-ID for their contract administration. It is felt that one percent is sufficient for jobs of this size.

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: **DCWO FACILITY - INTERIM STORAGE
FACILITY - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-DCWO**
 PREPARED BY: **R. D. ADAMS**
 REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
 TIME: **16:25:18**
 CHECKED BY: **SM**
 APPRD BY: **JA**

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$45,750,000
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	5,200,000	25,200,000
1.1.2	TITLE III INSPECTION	15,000,000	5,550,000	20,550,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$83,023,043
1.2.1	PROJECT MANAGEMENT	28,000,000	9,520,000	37,520,000
1.2.2	CONSTRUCTION MANAGEMENT	33,213,900	12,289,143	45,503,043
1.3	<u>CONSTRUCTION</u>			>> \$455,029,942
1.3.1	GENERAL CONDITIONS	5,873,047	2,173,028	8,046,075
1.3.2	SITWORK	622,553	230,345	852,898
1.3.3	CONCRETE	31,561,362	11,677,704	43,239,066
1.3.5	METALS	13,921,902	5,151,104	19,073,006
1.3.7	THERMAL & MOISTURE PROTECTION	2,219,540	821,230	3,040,770
1.3.8	DOORS & WINDOWS	71,240	26,359	97,599
1.3.9	FINISHES	1,138,036	421,073	1,559,109
1.3.13	SPECIAL CONSTRUCTION	260,550,163	96,403,560	356,953,723
1.3.14	CONVEYING SYSTEMS	11,272,944	4,170,989	15,443,933
1.3.15	MECHANICAL	2,963,621	1,096,540	4,060,161
1.3.16	ELECTRICAL	1,944,235	719,367	2,663,602
1.5	<u>G&A/PIF</u>			>> \$27,045,904
1.5.1	G&A/PIF ADDER	19,741,536	7,304,368	27,045,904
1.5.2	PROCUREMENT FEES	3,321,386	1,228,913	>> \$4,550,299
	SUBTOTAL INCLUDING ESCALATION	451,415,465	163,983,723	>> \$615,399,188
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$48,662,615
	CONTINGENCY			>> \$73,938,197
	TOTAL ESTIMATED COST			>> \$738,000,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 10.00%

CONTINGENCY= 19.92%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **DCWO FACILITY - INTERIM STORAGE
FACILITY - UNESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **2421-DCWO**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
TIME: **16:27:27**
CHECKED BY: **SAW**
APPROD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$35,000,000
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	0	20,000,000
1.1.2	TITLE III INSPECTION	15,000,000	0	15,000,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$61,213,900
1.2.1	PROJECT MANAGEMENT	28,000,000	0	28,000,000
1.2.2	CONSTRUCTION MANAGEMENT	33,213,900	0	33,213,900
1.3	<u>CONSTRUCTION</u>			>> \$332,138,643
1.3.1	GENERAL CONDITIONS	5,873,047	0	5,873,047
1.3.2	SITWORK	622,553	0	622,553
1.3.3	CONCRETE	31,561,362	0	31,561,362
1.3.5	METALS	13,921,902	0	13,921,902
1.3.7	THERMAL & MOISTURE PROTECTION	2,219,540	0	2,219,540
1.3.8	DOORS & WINDOWS	71,240	0	71,240
1.3.9	FINISHES	1,138,036	0	1,138,036
1.3.13	SPECIAL CONSTRUCTION	260,550,163	0	260,550,163
1.3.14	CONVEYING SYSTEMS	11,272,944	0	11,272,944
1.3.15	MECHANICAL	2,963,621	0	2,963,621
1.3.16	ELECTRICAL	1,944,235	0	1,944,235
1.5	<u>G&A/PIF</u>			>> \$19,741,536
1.5.1	G&A/PIF ADDER	19,741,536	0	19,741,536
1.5.2	PROCUREMENT FEES	3,321,386	0	>> \$3,321,386
	SUBTOTAL INCLUDING ESCALATION	451,415,465	0	>> \$451,415,465
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$35,520,157
	CONTINGENCY			>> \$53,464,378
	TOTAL ESTIMATED COST			>> \$540,400,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 11.00%

CONTINGENCY= 19.71%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **DCWO FACILITY - INTERIM STORAGE**

FACILITY

LOCATION 1: **INEEL/ICPP**

REQUESTOR: **J. K. RAWLINS**

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: **PLANNING**

PROJECT NO.: **2421-DCWO**

PREPARED BY: **R. D. ADAMS**

PAGE # **1**

DATE **26-Jan-1998**

TIME: **16:24:00**

REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.1.1	DESIGN ENGINEERING TITLE I & II											
11000000.00	TITLE I & II	1	LOT			0.000		20,000,000				20,000,000
	DESIGN ENGINEERING TITLE I & II S/T						0	\$20,000,000				\$20,000,000
1.1.2	TITLE III INSPECTION											
11000000.00	TITLE III	1	LOT			0.000		15,000,000				15,000,000
	TITLE III INSPECTION S/T						0	\$15,000,000				\$15,000,000
1.2.1	PROJECT MANAGEMENT											
11000000.00	PROJECT MANAGMENT	1	LOT			0.000		28,000,000				28,000,000
	PROJECT MANAGEMENT S/T						0	\$28,000,000				\$28,000,000
1.2.2	CONSTRUCTION MANAGEMENT											
11000000.00	CONSTRUCTION MANAGMENT @ 10% OF CONSTRUCTION	1	LOT			0.000		33,213,900				33,213,900
	CONSTRUCTION MANAGEMENT S/T						0	\$33,213,900				\$33,213,900
1.3.1	GENERAL CONDITIONS											
	SUPERVISION @ 5% OF LABOR HOURS	1	LOT		CARF GEN	41900.0	41,900	1,445,131				1,445,131

Lockheed Martin Idaho Technologies Co.

Rev. 6/98

PROJECT NAME: DCWO FACILITY - INTERIM STORAGE
FACILITY

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-DCWO

PREPARED BY: R. D. ADAMS

PAGE # 2

DATE 26-Jan-1998

TIME: 16:24:00

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	GENERAL CONDITIONS											
	TRAINING @ 3% OF LABOR HOURS	1	LOT		SSWK GEN	25130.0	25,130	925,035				925,035
	SMALL TOOLS & CONSUMABLES @ 4% OF LABOR DOLLARS	1	LOT	1,160,000.00	GEN	0.000				1,160,000		1,160,000
	GENERAL CONDITIONS S/T						67,030	\$2,370,166		\$1,160,000		\$3,530,166
1.3.2	SITEWORK											
	TUNNEL EXCAVATION	6,150	CY		ENGR GEN	0.012	74	2,328	12,300			14,628
	TUNNEL BACKFILL	3,430	CY		ENGR GEN	0.060	206	6,493	6,860			13,353
	BUILDING EXCAVATION	78,840	CY		ENGR GEN	0.012	946	29,849	157,680			187,529
	BUILDING BACKFILL	22,850	CY		ENGR GEN	0.060	1,371	43,255	45,700			88,955
	BUILDING BERM FILL	30,000	CY		ENGR GEN	0.060	1,800	56,790	60,000			116,790
	HAUL AWAY EXCESS MATERIAL	25,990	CY		TRHV GEN	0.020	520	16,187	51,980			68,167
	SITEWORK S/T						4,916	\$154,902	\$334,520			\$489,422
1.3.3	CONCRETE											
	TUNNEL CONCRETE	1,360	CY	126.10	SKWK GEN	12.300	16,728	553,864	34,340	171,496		759,700
	BUILDING CONCRETE	27,310	CY	126.10	SKWK GEN	12.300	335,913	11,122,079	689,578	3,443,791		15,255,448
	CHARGE FACE SLAB	7,735	CY	121.70	SKWK GEN	8.000	61,880	2,048,847	24,211	941,350		3,014,407

Rev. 6/98

FACILITY

REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING

PREPARED BY: R. D. ADAMS

DATE 26-Jan-1998

TIME: 16:24:00

REPORT NAME: **Detail Cost Estimate Sheet**[illegible]

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **DCWO FACILITY - INTERIM STORAGE FACILITY**

 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**
DETAILED COST ESTIMATE SHEET

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO.: **2421-DCWO**
 PREPARED BY: **R. D. ADAMS**

PAGE # 4

 DATE **26-Jan-1998**
 TIME: **16:24:00**
 REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.8	<u>DOORS & WINDOWS</u>											
	OVERHEAD DOORS	2	EA	16,000.00	SKWK GEN	75.000	150	4,967		32,000		36,967
	PERSONNEL DOORS	5	EA	1,000.00	SKWK GEN	10.000	50	1,656		5,000		6,656
	DOORS & WINDOWS S/T						200	\$6,622		\$37,000		\$43,622
1.3.9	<u>FINISHES</u>											
	PAINT STRUCTURAL STEEL	290,000	SF	0.10	PAIN GEN	0.080	23,200	648,208		29,000		677,208
	FINISHES S/T						23,200	\$648,208		\$29,000		\$677,208
1.3.13	<u>SPECIAL CONSTRUCTION</u>											
	SUPPORT BUILDING	3,600	SF		GEN	0.000					540,000	540,000
	VAULT TUBE ASSEMBLIES	6,400	EA	23,100.00	IRON GEN	50.000	320,000	11,779,200		147,840,000		159,619,200
	SPECIAL CONSTRUCTION S/T						320,000	\$11,779,200		\$147,840,000	\$540,000	\$160,159,200
1.3.14	<u>CONVEYING SYSTEMS</u>											
	GANTRY CRANE	2	EA	2,500,000.00	SKWK GEN	1000.00	2,000	66,220		5,000,000		5,066,220
	TRANSFER CART IN TUNNEL	1	EA	300,000.00	SKWK GEN	500.000	500	16,555		300,000		316,555
	5 TON DECONTAMINABLE BRIDGE CRANE	2	EA	250,000.00	SKWK GEN	300.000	600	19,866		500,000		519,866

PROJECT NAME: DCWO FACILITY - INTERIM STORAGE
FACILITY

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-DCWO

PREPARED BY: R. D. ADAMS

PAGE # 5

DATE 26-Jan-1998

TIME: 16:24:00

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.14	CONVEYING SYSTEMS											
	CASK MANUVERING HYDRAULIC PLATFORM	1	EA	1,000,000.00	SKWK GEN	1000.00	1,000	33,110		1,000,000		1,033,110
	CONVEYING SYSTEMS S/T						4,100	\$135,751		\$6,800,000		\$6,935,751
1.3.15	MECHANICAL											
	MISC. PIPING - ALLOW	1	LOT		GEN	0.000					118,000	118,000
	FIRE PROTECTION	86,800	SF		GEN	0.000					303,800	303,800
	HVAC	86,800	SF	11.20	SHEE GEN	0.180	15,624	541,528		972,160		1,513,688
	MECHANICAL S/T						15,624	\$541,528		\$972,160	\$421,800	\$1,935,488
1.3.16	ELECTRICAL											
	SWITCHGEAR AND TRANSFORMERS	1	LOT	310,000.00	ELEC GEN	780.000	780	25,982		310,000		335,982
	LIGHTING	86,800	SF		ELEC GEN	0.000					238,700	238,700
	RACEWAYS & ENCLOSURES	1	LOT	76,000.00	ELEC GEN	2000.00	2,000	66,620		76,000		142,620
	CONDUCTORS & GROUNDING	1	LOT	154,600.00	ELEC GEN	2700.00	2,700	89,937		154,600		244,537
	WIRING DEVICES & SPECIAL SYSTEMS	1	LOT	201,000.00	ELEC GEN	1930.00	1,930	64,288		201,000		265,288
	INSTRUMENTATION & CONTROLS	1	LOT	6,000.00	ELEC GEN	270.000	270	8,994		6,000	7,700	22,694
	TESTING	1	LOT		ELEC GEN	410.000	410	13,657				13,657
	ELECTRICAL S/T						8,090	\$269,478		\$747,600	\$246,400	\$1,263,478

DETAILED COST ESTIMATE SHEET

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.5.1 00701000	G&A/PIF ADDER G&A	1	LOT			0.000					1,223,919	1,223,919
	PIF	1	LOT			0.000					18,517,617	18,517,617
	G&A/PIF ADDER S/T						0				\$19,741,536	\$19,741,536
	PROJECT SUBTOTAL						904,809	\$127,574,148	\$1,082,648	\$168,686,347	\$23,493,736	\$320,936,879

Lockheed Martin Idaho Technologies Co.

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CONTINGENCY ANALYSIS

PROJECT NAME: **DCWO FACILITY - INTERIM STORAGE
FACILITY - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-DCWO**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **16:27:32**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	4.43	20	35	0.89	1.55	1.307%	6.63%	5,897,408	25,897,408
1.1.2	TITLE III INSPECTION	15,000,000	3.32	20	30	0.66	1.00	0.831%	4.21%	3,748,353	18,748,353
1.2.1	PROJECT MANAGEMENT	28,000,000	6.20	20	35	1.24	2.17	1.830%	9.28%	8,256,371	36,256,371
1.2.2	CONSTRUCTION MANAGEMENT	33,213,900	7.36	20	30	1.47	2.21	1.839%	9.33%	8,299,827	41,513,727
1.3.1	GENERAL CONDITIONS	5,873,047	1.30	20	35	0.26	0.46	0.384%	1.95%	1,731,788	7,604,835
1.3.2	SITWORK	622,553	0.14	20	30	0.03	0.04	0.034%	0.17%	155,570	778,123
1.3.3	CONCRETE	31,561,362	6.99	20	30	1.40	2.10	1.748%	8.86%	7,886,874	39,448,236
1.3.5	METALS	13,921,902	3.08	20	25	0.62	0.77	0.632%	3.21%	2,852,736	16,774,638
1.3.7	THERMAL & MOISTURE PROTECTION	2,219,540	0.49	20	30	0.10	0.15	0.123%	0.62%	554,641	2,774,181
1.3.8	DOORS & WINDOWS	71,240	0.02	20	20	0.00	0.00	0.003%	0.01%	11,393	82,633
1.3.9	FINISHES	1,138,036	0.25	20	35	0.05	0.09	0.074%	0.38%	335,573	1,473,609
1.3.13	SPECIAL CONSTRUCTION	260,550,163	57.72	20	20	11.54	11.54	9.235%	46.83%	41,669,712	302,219,875
1.3.14	CONVEYING SYSTEMS	11,272,944	2.50	20	25	0.50	0.62	0.512%	2.60%	2,309,938	13,582,882
1.3.15	MECHANICAL	2,963,621	0.66	20	30	0.13	0.20	0.164%	0.83%	740,580	3,704,201
1.3.16	ELECTRICAL	1,944,235	0.43	20	25	0.09	0.11	0.088%	0.45%	398,393	2,342,628
1.5.1	G&A/PIF ADDER	19,741,536	4.37	5	20	0.22	0.87	0.765%	3.88%	3,453,251	23,194,787
1.5.2	PROCUREMENT FEES	3,321,386	0.74	20	25	0.15	0.18	0.151%	0.76%	680,585	4,001,971
	ESCALATION	0	0.00	20	25	0.00	0.00	0.000%	0.00%	1,542	1,542
SUBTOTAL		451,415,465	100.00					19.721%			
CALCULATED CONTINGENCY		89,022,102									
RESULTANT TEC		540,437,567									
ROUNDED TEC		540,400,000									
PROJECT CONTINGENCY		88,984,535						19.71%			
MANAGEMENT RESERVE		35,520,157									
CONTINGENCY		53,464,378									
TOTAL ESTIMATED COST		540,400,000								88,984,535	540,400,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **DCWO FACILITY - INTERIM STORAGE**
FACILITY - ESCALATED

 LOCATION 1: **INEL/ICPP**

 REQUESTOR: **J. K. RAWLINS**
CONTINGENCY ANALYSIS

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-DCWO**
 PREPARED BY: **R. D. ADAMS**

 DATE: **26-Jan-1998**
 TIME: **16:25:25**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency			Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	3.25	20	35	0.65	1.14	0.959%	4.81%	5,898,271	25,898,271
1.1.2	TITLE III INSPECTION	15,000,000	2.44	20	30	0.49	0.73	0.609%	3.06%	3,748,901	18,748,901
1.2.1	PROJECT MANAGEMENT	28,000,000	4.55	20	35	0.91	1.59	1.342%	6.74%	8,257,579	36,257,579
1.2.2	CONSTRUCTION MANAGEMENT	33,213,900	5.40	20	30	1.08	1.62	1.349%	6.77%	8,301,042	41,514,942
1.3.1	GENERAL CONDITIONS	5,873,047	0.95	20	35	0.19	0.33	0.282%	1.41%	1,732,041	7,605,088
1.3.2	SITWORK	622,553	0.10	20	30	0.02	0.03	0.025%	0.13%	155,593	778,146
1.3.3	CONCRETE	31,561,362	5.13	20	30	1.03	1.54	1.282%	6.43%	7,888,028	39,449,390
1.3.5	METALS	13,921,902	2.26	20	25	0.45	0.57	0.464%	2.33%	2,853,154	16,775,056
1.3.7	THERMAL & MOISTURE PROTECTION	2,219,540	0.36	20	30	0.07	0.11	0.090%	0.45%	554,722	2,774,262
1.3.8	DOORS & WINDOWS	71,240	0.01	20	20	0.00	0.00	0.002%	0.01%	11,395	82,635
1.3.9	FINISHES	1,138,036	0.18	20	35	0.04	0.06	0.055%	0.27%	335,622	1,473,658
1.3.13	SPECIAL CONSTRUCTION	260,550,163	42.34	20	20	8.47	8.47	6.774%	33.99%	41,675,810	302,225,973
1.3.14	CONVEYING SYSTEMS	11,272,944	1.83	20	25	0.37	0.46	0.376%	1.88%	2,310,276	13,583,220
1.3.15	MECHANICAL	2,963,621	0.48	20	30	0.10	0.14	0.120%	0.60%	740,688	3,704,309
1.3.16	ELECTRICAL	1,944,235	0.32	20	25	0.06	0.08	0.065%	0.32%	398,451	2,342,686
1.5.1	G&A/PIF ADDER	19,741,536	3.21	5	20	0.16	0.64	0.561%	2.82%	3,453,756	23,195,292
1.5.2	PROCUREMENT FEES	3,321,386	0.54	20	25	0.11	0.13	0.111%	0.56%	680,685	4,002,071
	ESCALATION	163,983,723	26.65	20	25	5.33	6.66	5.463%	27.41%	33,604,798	197,588,521
SUBTOTAL		615,399,188	100.00					19.928%			
CALCULATED CONTINGENCY		122,638,766									
RESULTANT TEC		738,037,954									
ROUNDED TEC		738,000,000									
PROJECT CONTINGENCY		122,600,812						19.92%			
MANAGEMENT RESERVE		48,662,615									
CONTINGENCY		73,938,197									
TOTAL ESTIMATED COST		738,000,000								122,600,812	738,000,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

G&A/PIF ADDER CALCULATION SHEET

PROCUREMENT FEE:

CONSTRUCTION =	\$332,138,643	
GFE =	\$0	
Subtotal	\$332,138,643	
FEE @ 1% =	\$332,138,643	* 0.01 = \$3,321,386.43

G&A @ 23% (with a ceiling of \$500,000 imposed per year)

CONSTRUCTION OR CEILING * 4 YEARS =	\$2,000,000	
GFE =	\$0	
PROCUREMENT FEE =	\$3,321,386	
Subtotal	\$5,321,386	
FEE @ 23% =	\$5,321,386	* 0.23 = \$1,223,919

PIF @ 5.5%

CONSTRUCTION =	\$332,138,643	
GFE =	\$0	
PROCUREMENT FEE =	\$3,321,386	
G&A =	\$1,223,919	
Subtotal	\$336,683,948	
FEE @ 5.5% =	\$336,683,948	* 0.055 = \$18,517,617

TOTAL PROCUREMENT FEE:	\$3,321,386
TOTAL G&A FEE:	\$1,223,919
TOTAL PIF:	\$18,517,617

Rev. 6/98

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **242104**
PREPARED BY: **R. D. ADAMS**

DATE 26-Jan-1998

TIME: 16:28:27

REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.1.1	CONCEPTUAL DESIGN											
	DESIGN	1	LOT		LMITCO	0.000		5,000,000				5,000,000
	CONCEPTUAL DESIGN S/T						0	\$5,000,000				\$5,000,000
1.2.1	PM FOR PROJECT DEVELOPMENT ACDC/SOW,CPDS,PEP,DC/SOW & REVIEWS	1	LOT		LMITCO	0.000		3,000,000				3,000,000
	PM FOR PROJECT DEVELOPMENT S/T						0	\$3,000,000				\$3,000,000
1.2.2	SAFETY REVIEWS PSAR & SAR	1	LOT		LMITCO	0.000		1,000,000				1,000,000
	SAFETY REVIEWS S/T						0	\$1,000,000				\$1,000,000
1.3.1	PERMITTING SITING AGREEMENT	1	LOT		Z-4170	640.000	640	48,512				48,512
	HWMA/RCRA PERMIT	1	LOT		Z-4170	6800.00	6,800	515,440				515,440
	PERMIT TO CONSTRUCT	1	LOT		Z-4170	3600.00	3,600	272,880				272,880
	CWA, STORM WATER, HISTORICAL, OTHER REG. COMPLIANCE	1	LOT		Z-4170	2000.00	2,000	151,600				151,600
	P.E. CERTIFICATION	1	LOT			0.000					40,000	40,000
	HEALTH &SAFETY ISSUES	1	LOT			0.000					1,200,000	1,200,000

Rev. 8/98

PROJECT NAME: DCWO FACILITY - INTERIM STORAGE

TYPE OF ESTIMATE: PLANNING

DATE 26-Jan-1998

FACILITY - OPC

PROJECT NO.: 242104

TIME: 16:28:27

LOCATION 1: INEEL/ICPP

PREPARED BY: R. D. ADAMS

REPORT NAME: Detail Cost Estimate Sheet

REQUESTOR: J. K. RAWLINS

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	PERMITTING QUALITY REVIEWS	1	LOT			0.000					500,000	500,000
	PERMITTING S/T						13,040	\$988,432			\$1,740,000	\$2,728,432
1.4.1	SO TEST & STARTUP											
	ORR	1	LOT			0.000		2,000,000				2,000,000
	SO TEST & TRAINING	1	LOT			0.000		1,000,000				1,000,000
					LIMITCO							
	SO TEST & STARTUP S/T						0	\$3,000,000				\$3,000,000
1.4.1.1	PROJECT SUPPORT SUPPORT DURING DESIGN, CONSTRUCTION & STARTUP	1	LOT			0.000		1,500,000				1,500,000
					LIMITCO							
	PROJECT SUPPORT S/T						0	\$1,500,000				\$1,500,000
	PROJECT SUBTOTAL						13,040	\$14,488,432	\$0	\$0	\$1,740,000	\$16,228,432

Lockheed Martin Idaho Technologies Co.
Rev. 6/96

PROJECT NAME: **DCWO FACILITY - INTERIM STORAGE
FACILITY - OPC - UNESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **242104**
PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
TIME: **16:31:09**

REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	30.81	20	30	6.16	9.24	7.703%	30.81%	1,254,455	6,254,455
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	18.49	20	30	3.70	5.55	4.622%	18.49%	752,673	3,752,673
1.2.2	SAFETY REVIEWS	1,000,000	6.16	20	30	1.23	1.85	1.541%	6.16%	250,891	1,250,891
1.3.1	PERMITTING	2,728,432	16.81	20	30	3.36	5.04	4.203%	16.81%	684,539	3,412,971
1.4.1	SO TEST & STARTUP	4,500,000	27.73	20	30	5.55	8.32	6.932%	27.73%	1,129,010	5,629,010
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	0	0.00	20	30	0.00	0.00	0.000%	0.00%	0	0
SUBTOTAL		16,228,432	100.00					25.000%			
CALCULATED CONTINGENCY		4,057,108									
RESULTANT TEC		20,285,540									
ROUNDED TEC		20,300,000									
PROJECT CONTINGENCY		4,071,568						25.09%			
MANAGEMENT RESERVE		0									
CONTINGENCY		4,071,568									
TOTAL ESTIMATED COST		20,300,000								4,071,568	20,300,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
Experimental/Special Conditions.....Up to 50%
Conceptual 15% -- 25%
Experimental/Special Conditions.....Up to 40%
TITLE I 10% -- 20%
TITLE II 5% -- 15%
TITLE III/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

CONTINGENCY ANALYSIS

PROJECT NAME: **DCWO FACILITY - INTERIM STORAGE
FACILITY - OPC - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242104**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **16:29:30**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	24.55	20	30	4.91	7.36	6.137%	24.55%	1,260,178	6,260,178
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	14.73	20	30	2.95	4.42	3.682%	14.73%	756,107	3,756,107
1.2.2	SAFETY REVIEWS	1,000,000	4.91	20	30	0.98	1.47	1.227%	4.91%	252,036	1,252,036
1.3.1	PERMITTING	2,728,432	13.40	20	30	2.68	4.02	3.349%	13.40%	687,662	3,416,094
1.4.1	SO TEST & STARTUP	4,500,000	22.09	20	30	4.42	6.63	5.524%	22.09%	1,134,160	5,634,160
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	4,138,402	20.32	20	30	4.06	6.10	5.080%	20.32%	1,043,023	5,181,425
SUBTOTAL		20,366,834	100.00					25.000%			
CALCULATED CONTINGENCY		5,091,709									
RESULTANT TEC		25,458,543									
ROUNDED TEC		25,500,000									
PROJECT CONTINGENCY		5,133,166						25.20%			
MANAGEMENT RESERVE		0									
CONTINGENCY		5,133,166									
TOTAL ESTIMATED COST		25,500,000								5,133,166	25,500,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE II/AFC Market Conditions

DCWO INTERIM STORAGE FACILITY

Project: 2421Dcwo.MPP
Date: Mon 1/26/98

Task

Summary

Rolled Up Progress

Progress

Rolled Up Task

Milestone

Rolled Up Milestone

**COST ESTIMATE SUPPORT DATA RECAPITULATION
(CONTINUATION)**

File No: 2396

Page 2 of 2

III. ASSUMPTIONS: (Continued)

12. Only the railroad track within the storage facility is included in this estimate. The remainder of the branch line is included in the infrastructure estimate.
13. All utilities are assumed to be available at the facility wall.

IV. CONTINGENCY GUIDELINE IMPLEMENTATION: *The percentage used for contingency as determined by the contingency allowance guidelines can be altered to reflect the type of construction and conditions that may impact the total estimated cost.*

A large portion of the estimated costs is based on actual costs from Fluor's SNF Canister Storage Building. The majority of the remaining costs are for standard construction activities. For these reasons, the contingency is lower than would be experienced for a processing type facility at this stage of development.

V. OTHER COMMENTS/CONCERNS SPECIFIC TO THE ESTIMATE:

1. All FY'98 and later projects are to be assessed a Procurement Fee of 1%, a G&A Fee of 23%, with a \$500,000 ceiling per year, and a Performance Incentive Fee (PIF) of 5.5%. See the attached G&A/PIF calculation sheet for the method used to calculate these fees.
2. A procurement fee of one percent of construction was used to cover the operating contractor support to DOE-ID for their contract administration. It is felt that one percent is sufficient for jobs of this size.

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **CWO FACILITY - INTERIM STORAGE
FACILITY- ESCALATED
INEEL/ICPP**
 LOCATION 1:
 REQUESTOR: **J. K. RAWLINS**
COST ESTIMATE SUMMARY

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-CWOA**
 PREPARED BY: **R. D. ADAMS**
 REPORT NAME: **Cost Estimate Summary**

 DATE: **26-Jan-1998**
 TIME: **13:53:34**

 CHECKED BY: *SW*
 APPRD BY: *for*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> <u>\$45,750,000</u>
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	5,200,000	25,200,000
1.1.2	TITLE III INSPECTION	15,000,000	5,550,000	20,550,000
1.2	<u>MANAGEMENT COSTS</u>			>> <u>\$78,717,024</u>
1.2.1	PROJECT MANAGEMENT	28,000,000	9,240,000	37,240,000
1.2.2	CONSTRUCTION MANAGEMENT	30,275,200	11,201,824	41,477,024
1.3	<u>CONSTRUCTION</u>			>> <u>\$414,770,474</u>
1.3.1	GENERAL CONDITIONS	5,423,282	2,006,614	7,429,896
1.3.2	SITWORK	589,840	218,241	808,081
1.3.3	CONCRETE	29,671,461	10,978,440	40,649,901
1.3.5	METALS	12,679,179	4,691,296	17,370,475
1.3.7	THERMAL & MOISTURE PROTECTION	2,049,726	758,399	2,808,125
1.3.8	DOORS & WINDOWS	71,240	26,359	97,599
1.3.9	FINISHES	1,059,550	392,034	1,451,584
1.3.13	SPECIAL CONSTRUCTION	235,368,061	87,086,182	322,454,243
1.3.14	CONVEYING SYSTEMS	11,272,944	4,170,989	15,443,933
1.3.15	MECHANICAL	2,762,200	1,022,014	3,784,214
1.3.16	ELECTRICAL	1,804,688	667,735	2,472,423
1.5	<u>G&A/PIF</u>			>> <u>\$24,711,801</u>
1.5.1	G&A/PIF ADDER	18,037,811	6,673,990	24,711,801
1.5.2	PROCUREMENT FEES	3,027,522	1,120,183	>> <u>\$4,147,705</u>
SUBTOTAL INCLUDING ESCALATION		417,092,704	151,004,300	>> <u>\$568,097,004</u>
PROJECT CONTINGENCY				
MANAGEMENT RESERVE				>> <u>\$44,362,998</u>
CONTINGENCY				>> <u>\$69,439,998</u>
TOTAL ESTIMATED COST				>> <u>\$681,900,000</u>

PROJECT COST PARAMETERS

 EDI AS A % OF CONST. + GFE= **11.00%**

 CONTINGENCY= **20.03%**

Lockheed Martin Idaho Technologies Co.
Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: CWO FACILITY - INTERIM STORAGE
FACILITY- UNESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 2421-CWOA
PREPARED BY: R. D. ADAMS
REPORT NAME: Cost Estimate Summary

DATE: 26-Jan-1998
TIME: 13:55:09
CHECKED BY: *[Signature]*
APPRD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
<u>1.1</u>	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$35,000,000
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	0	20,000,000
1.1.2	TITLE III INSPECTION	15,000,000	0	15,000,000
<u>1.2</u>	<u>MANAGEMENT COSTS</u>			>> \$58,275,200
1.2.1	PROJECT MANAGEMENT	28,000,000	0	28,000,000
1.2.2	CONSTRUCTION MANAGEMENT	30,275,200	0	30,275,200
<u>1.3</u>	<u>CONSTRUCTION</u>			>> \$302,752,171
1.3.1	GENERAL CONDITIONS	5,423,282	0	5,423,282
1.3.2	SITWORK	589,840	0	589,840
1.3.3	CONCRETE	29,671,461	0	29,671,461
1.3.5	METALS	12,679,179	0	12,679,179
1.3.7	THERMAL & MOISTURE PROTECTION	2,049,726	0	2,049,726
1.3.8	DOORS & WINDOWS	71,240	0	71,240
1.3.9	FINISHES	1,059,550	0	1,059,550
1.3.13	SPECIAL CONSTRUCTION	235,368,061	0	235,368,061
1.3.14	CONVEYING SYSTEMS	11,272,944	0	11,272,944
1.3.15	MECHANICAL	2,762,200	0	2,762,200
1.3.16	ELECTRICAL	1,804,688	0	1,804,688
<u>1.5</u>	<u>G&A/PIF</u>			>> \$18,037,811
1.5.1	G&A/PIF ADDER	18,037,811	0	18,037,811
1.5.2	PROCUREMENT FEES	3,027,522	0	>> \$3,027,522
	SUBTOTAL INCLUDING ESCALATION	417,092,704	0	>> \$417,092,704
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$32,381,750
	CONTINGENCY			>> \$50,525,546
	TOTAL ESTIMATED COST			>> \$500,000,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 12.00%

CONTINGENCY= 19.88%

Lockheed Martin Idaho Technologies Co.

Rev. 6/98

PROJECT NAME: CWO FACILITY - INTERIM STORAGE
FACILITY

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-CWO

PREPARED BY: R. D. ADAMS

PAGE # 1

DATE 26-Jan-1998

TIME: 10:13:34

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.1.1	DESIGN ENGINEERING TITLE I & II											
11000000.00	TITLE I & II	1	LOT			0.000		20,000,000				20,000,000
	DESIGN ENGINEERING TITLE I & II S/T						0	\$20,000,000				\$20,000,000
1.1.2	TITLE III INSPECTION											
11000000.00	TITLE III	1	LOT			0.000		15,000,000				15,000,000
	TITLE III INSPECTION S/T						0	\$15,000,000				\$15,000,000
1.2.1	PROJECT MANAGEMENT											
11000000.00	PROJECT MANAGMENT	1	LOT			0.000		28,000,000				28,000,000
	PROJECT MANAGEMENT S/T						0	\$28,000,000				\$28,000,000
1.2.2	CONSTRUCTION MANAGEMENT											
11000000.00	CONSTRUCTION MANAGMENT @ 10% OF CONSTRUCTION	1	LOT			0.000		30,275,200				30,275,200
	CONSTRUCTION MANAGEMENT S/T						0	\$30,275,200				\$30,275,200
1.3.1	GENERAL CONDITIONS											
	SUPERVISION @ 5% OF LABOR HOURS	1	LOT		CARF GEN	38700.0	38,700	1,334,763				1,334,763

DETAILED COST ESTIMATE SHEET

Rev. 6/86

PROJECT NAME: CWO FACILITY - INTERIM STORAGE
FACILITY

TYPE OF ESTIMATE: PLANNING

DATE 26-Jan-1998

LOCATION 1: INEEL/ICPP

PROJECT NO.: 2421-CWO

TIME: 10:13:34

REQUESTOR: J. K. RAWLINS

PREPARED BY: R. D. ADAMS

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	GENERAL CONDITIONS TRAINING @ 3% OF LABOR HOURS	1	LOT		SSWK GEN	23220.0	23,220	854,728				854,728
	SMALL TOOLS & CONSUMABLES @ 4% OF LABOR DOLLARS	1	LOT	1,070,300.00	GEN	0.000				1,070,300		1,070,300
	GENERAL CONDITIONS S/T						61,920	\$2,189,491		\$1,070,300		\$3,259,791
1.3.2	SITEWORK											
	TUNNEL EXCAVATION	6,150	CY		ENGR GEN	0.012	74	2,328	12,300			14,628
	TUNNEL BACKFILL	3,430	CY		ENGR GEN	0.060	206	6,493	6,860			13,353
	BUILDING EXCAVATION	73,790	CY		ENGR GEN	0.012	885	27,937	147,580			175,517
	BUILDING BACKFILL	21,750	CY		ENGR GEN	0.060	1,305	41,173	43,500			84,673
	BUILDING BERM FILL	30,000	CY		ENGR GEN	0.060	1,800	56,790	60,000			116,790
	HAUL AWAY EXCESS MATERIAL	22,040	CY		TRHV GEN	0.020	441	13,727	44,080			57,807
	SITEWORK S/T						4,711	\$148,448	\$314,320			\$462,768
1.3.3	CONCRETE											
	TUNNEL CONCRETE	1,360	CY	126.10	SKWK GEN	12.300	16,728	553,864	34,340	171,496		759,700
	BUILDING CONCRETE	25,430	CY	126.10	SKWK GEN	12.300	312,789	10,356,444	642,108	3,206,723		14,205,274
	CHARGE FACE SLAB	7,480	CY	121.70	SKWK GEN	8.000	59,840	1,981,302	23,412	910,316		2,915,031

Rev. 6/96

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-CWO**
PREPARED BY: **R. D. ADAMS**

DATE 26-Jan-1998

TIME: 10:13:34

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

PROJECT NAME: CWO FACILITY - INTERIM STORAGE

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-CWO

PREPARED BY: R. D. ADAMS

PAGE # 4

DATE 26-Jan-1998

TIME: 10:13:34

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.8	<u>DOORS & WINDOWS</u>											
	OVERHEAD DOORS	2	EA	16,000.00	SKWK GEN	75.000	150	4,967		32,000		36,967
	PERSONNEL DOORS	5	EA	1,000.00	SKWK GEN	10.000	50	1,656		5,000		6,656
	DOORS & WINDOWS S/T						200	\$6,622		\$37,000		\$43,622
1.3.9	<u>FINISHES</u>											
	PAINT STRUCTURAL STEEL	270,000	SF	0.10	PAINT GEN	0.080	21,600	603,504		27,000		630,504
	FINISHES S/T						21,600	\$603,504		\$27,000		\$630,504
1.3.13	<u>SPECIAL CONSTRUCTION</u>											
	SUPPORT BUILDING	3,600	SF		GEN	0.000					540,000	540,000
	VAULT TUBE ASSEMBLIES	5,780	EA	23,100.00	IRON GEN	50.000	289,000	10,638,090		133,518,000		144,156,090
	SPECIAL CONSTRUCTION S/T						289,000	\$10,638,090		\$133,518,000	\$540,000	\$144,696,090
1.3.14	<u>CONVEYING SYSTEMS</u>											
	GANTRY CRANE	2	EA	2,500,000.00	SKWK GEN	1000.00	2,000	66,220		5,000,000		5,066,220
	TRANSFER CART IN TUNNEL	1	EA	300,000.00	SKWK GEN	500.000	500	16,555		300,000		316,555
	5 TON DECONTAMINATABLE BRIDGE CRANE	2	EA	250,000.00	SKWK GEN	300.000	600	19,866		500,000		519,866

Lockheed Martin Idaho Technologies Co.

Rev. 6/98

PROJECT NAME: CWO FACILITY - INTERIM STORAGE
FACILITY

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
PROJECT NO.: 2421-CWO
PREPARED BY: R. D. ADAMS

PAGE # 5

DATE 26-Jan-1998
TIME: 16:13:34
REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.14	CONVEYING SYSTEMS											
	CASK MANUVERING HYDRAULIC PLATFORM	1	EA	1,000,000.00	SKWK GEN	1000.00	1,000	33,110		1,000,000		1,033,110
	CONVEYING SYSTEMS S/T						4,100	\$135,751		\$6,800,000		\$6,935,751
1.3.15	MECHANICAL											
	MISC. PIPING - ALLOW	1	LOT		GEN	0.000					110,000	110,000
	FIRE PROTECTION	80,900	SF		GEN	0.000					283,150	283,150
	HVAC	80,900	SF	11.20	SHEE GEN	0.180	14,562	504,719		906,080		1,410,799
	MECHANICAL S/T						14,562	\$504,719		\$906,080	\$393,150	\$1,803,949
1.3.16	ELECTRICAL											
	SWITCHGEAR AND TRANSFORMERS	1	LOT	290,000.00	ELEC GEN	720.000	720	23,983		290,000		313,983
	LIGHTING	80,900	SF		ELEC GEN	0.000					222,475	222,475
	RACEWAYS & ENCLOSURES	1	LOT	70,000.00	ELEC GEN	1850.00	1,850	61,624		70,000		131,624
	CONDUCTORS & GROUNDING	1	LOT	142,800.00	ELEC GEN	2500.00	2,500	83,275		142,800		226,075
	WIRING DEVICES & SPECIAL SYSTEMS	1	LOT	186,000.00	ELEC GEN	1780.00	1,780	59,292		186,000		245,292
	INSTRUMENTATION & CONTROLS	1	LOT	5,560.00	ELEC GEN	250.000	250	8,328		5,560	7,100	20,988
	TESTING	1	LOT		ELEC GEN	380.000	380	12,658				12,658
	ELECTRICAL S/T						7,480	\$249,159		\$694,360	\$229,575	\$1,173,094

Lockheed Martin Idaho Technologies Co.

Rev. 6/98

PROJECT NAME: CWO FACILITY - INTERIM STORAGE
FACILITY

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-CWO

PREPARED BY: R. D. ADAMS

PAGE # 6

DATE 26-Jan-1998

TIME: 10:13:34

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
	PROJECT SUBTOTAL						835,982	\$122,222,712	\$1,014,180	\$153,293,225	\$3,528,975	\$280,059,092

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **CWO FACILITY - INTERIM STORAGE
FACILITY- UNESCALATED**
 LOCATION 1: **INEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-CWOA**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **13:55:14**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency		Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	4.80	20	35	0.96	1.68	1.415%	7.12%	5,901,314	25,901,314
1.1.2	TITLE III INSPECTION	15,000,000	3.60	20	30	0.72	1.08	0.899%	4.52%	3,750,835	18,750,835
1.2.1	PROJECT MANAGEMENT	28,000,000	6.71	20	35	1.34	2.35	1.980%	9.97%	8,261,840	36,261,840
1.2.2	CONSTRUCTION MANAGEMENT	30,275,200	7.26	20	30	1.45	2.18	1.815%	9.13%	7,570,486	37,845,686
1.3.1	GENERAL CONDITIONS	5,423,282	1.30	20	35	0.26	0.46	0.384%	1.93%	1,600,225	7,023,507
1.3.2	SITWORK	589,840	0.14	20	30	0.03	0.04	0.035%	0.18%	147,493	737,333
1.3.3	CONCRETE	29,671,461	7.11	20	30	1.42	2.13	1.778%	8.95%	7,419,518	37,090,979
1.3.5	METALS	12,679,179	3.04	20	25	0.61	0.76	0.623%	3.14%	2,599,811	15,278,990
1.3.7	THERMAL & MOISTURE PROTECTION	2,049,726	0.49	20	30	0.10	0.15	0.123%	0.62%	512,546	2,562,272
1.3.8	DOORS & WINDOWS	71,240	0.02	20	20	0.00	0.00	0.003%	0.01%	11,401	82,641
1.3.9	FINISHES	1,059,550	0.25	20	35	0.05	0.09	0.075%	0.38%	312,637	1,372,187
1.3.13	SPECIAL CONSTRUCTION	235,368,061	56.43	20	20	11.29	11.29	9.029%	45.43%	37,667,278	273,035,339
1.3.14	CONVEYING SYSTEMS	11,272,944	2.70	20	25	0.54	0.68	0.554%	2.79%	2,311,468	13,584,412
1.3.15	MECHANICAL	2,762,200	0.66	20	30	0.13	0.20	0.166%	0.83%	690,704	3,452,904
1.3.16	ELECTRICAL	1,804,688	0.43	20	25	0.09	0.11	0.089%	0.45%	370,043	2,174,731
1.5.1	G&A/PIF ADDER	18,037,811	4.32	5	20	0.22	0.86	0.757%	3.81%	3,157,320	21,195,131
1.5.2	PROCUREMENT FEES	3,027,522	0.73	20	25	0.15	0.18	0.149%	0.75%	620,780	3,648,302
	ESCALATION	0	0.00	20	25	0.00	0.00	0.000%	0.00%	1,597	1,597
	SUBTOTAL	417,092,704	100.00					19.873%			
	CALCULATED CONTINGENCY	82,887,236									
	RESULTANT TEC	499,979,940									
	ROUNDED TEC	500,000,000									
	PROJECT CONTINGENCY	82,907,296						19.88%			
	MANAGEMENT RESERVE	32,381,750									
	CONTINGENCY	50,525,546									
	TOTAL ESTIMATED COST	500,000,000								82,907,296	500,000,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE III/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

CONTINGENCY ANALYSIS

PROJECT NAME: **CWO FACILITY - INTERIM STORAGE**
FACILITY- ESCALATED
 LOCATION 1: **INEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-CWOA**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **13:53:39**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	3.52	20	35	0.70	1.23	1.039%	5.18%	5,898,033	25,898,033
1.1.2	TITLE III INSPECTION	15,000,000	2.64	20	30	0.53	0.79	0.660%	3.29%	3,748,749	18,748,749
1.2.1	PROJECT MANAGEMENT	28,000,000	4.93	20	35	0.99	1.73	1.454%	7.26%	8,257,246	36,257,246
1.2.2	CONSTRUCTION MANAGEMENT	30,275,200	5.33	20	30	1.07	1.60	1.332%	6.65%	7,566,276	37,841,476
1.3.1	GENERAL CONDITIONS	5,423,282	0.95	20	35	0.19	0.33	0.282%	1.41%	1,599,335	7,022,617
1.3.2	SITWORK	589,840	0.10	20	30	0.02	0.03	0.026%	0.13%	147,411	737,251
1.3.3	CONCRETE	29,671,461	5.22	20	30	1.04	1.57	1.306%	6.52%	7,415,392	37,086,853
1.3.5	METALS	12,679,179	2.23	20	25	0.45	0.56	0.458%	2.28%	2,598,365	15,277,544
1.3.7	THERMAL & MOISTURE PROTECTION	2,049,726	0.36	20	30	0.07	0.11	0.090%	0.45%	512,261	2,561,987
1.3.8	DOORS & WINDOWS	71,240	0.01	20	20	0.00	0.00	0.002%	0.01%	11,395	82,635
1.3.9	FINISHES	1,059,550	0.19	20	35	0.04	0.07	0.055%	0.27%	312,463	1,372,013
1.3.13	SPECIAL CONSTRUCTION	235,368,061	41.43	20	20	8.29	8.29	6.629%	33.08%	37,646,332	273,014,393
1.3.14	CONVEYING SYSTEMS	11,272,944	1.98	20	25	0.40	0.50	0.407%	2.03%	2,310,183	13,583,127
1.3.15	MECHANICAL	2,762,200	0.49	20	30	0.10	0.15	0.122%	0.61%	690,320	3,452,520
1.3.16	ELECTRICAL	1,804,688	0.32	20	25	0.06	0.08	0.065%	0.32%	369,838	2,174,526
1.5.1	G&A/PIF ADDER	18,037,811	3.18	5	20	0.16	0.64	0.556%	2.77%	3,155,564	21,193,375
1.5.2	PROCUREMENT FEES	3,027,522	0.53	20	25	0.11	0.13	0.109%	0.55%	620,435	3,647,957
	ESCALATION	151,004,300	26.58	20	25	5.32	6.65	5.449%	27.19%	30,943,398	181,947,698
	SUBTOTAL	568,097,004	100.00					20.039%			
	CALCULATED CONTINGENCY	113,843,117									
	RESULTANT TEC	681,940,121									
	ROUNDED TEC	681,900,000									
	PROJECT CONTINGENCY	113,802,996						20.03%			
	MANAGEMENT RESERVE	44,362,998									
	CONTINGENCY	69,439,998									
	TOTAL ESTIMATED COST	681,900,000								113,802,996	681,900,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

G&A/PIF ADDER CALCULATION SHEET

PROCUREMENT FEE:

CONSTRUCTION =	\$302,752,171	
GFE =	\$0	
Subtotal	\$302,752,171	
FEE @ 1% =	\$302,752,171	* 0.01 = \$3,027,521.71

G&A @ 23% (with a ceiling of \$500,000 imposed per year)

CONSTRUCTION OR CEILING * 4 YEARS =	\$2,000,000	
GFE =	\$0	
PROCUREMENT FEE =	\$3,027,522	
Subtotal	\$5,027,522	
FEE @ 23% =	\$5,027,522	* 0.23 = \$1,156,330

PIF @ 5.5%

CONSTRUCTION =	\$302,752,171	
GFE =	\$0	
PROCUREMENT FEE =	\$3,027,522	
G&A =	\$1,156,330	
Subtotal	\$306,936,023	
FEE @ 5.5% =	\$306,936,023	* 0.055 = \$16,881,481

TOTAL PROCUREMENT FEE:	\$3,027,522
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TOTAL G&A FEE:	\$1,156,330
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TOTAL PIF:	\$16,881,481
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Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: CWO FACILITY - INTERIM STORAGE
 FACILITY - OPC - ESCALATED
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: PLANNING
 PROJECT NO: 242105
 PREPARED BY: R. D. ADAMS
 REPORT NAME: Cost Estimate Summary

DATE: 26-Jan-1998
 TIME: 12:46:32
 CHECKED BY: *SNW*
 APPRD BY: *BR*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> <u>\$5,950,000</u>
1.1.1	CONCEPTUAL DESIGN	5,000,000	950,000	5,950,000
1.2	<u>MANAGEMENT COSTS</u>			>> <u>\$4,760,000</u>
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	570,000	3,570,000
1.2.2	SAFETY REVIEWS	1,000,000	190,000	1,190,000
1.3	<u>PERMITTING</u>			>> <u>\$3,246,834</u>
1.3.1	PERMITTING	2,728,432	518,402	3,246,834
1.4	<u>TURNOVER</u>			>> <u>\$6,525,000</u>
1.4.1	SO TEST & STARTUP	4,500,000	2,025,000	6,525,000
1.5.2	PROCUREMENT FEES	0	0	>> <u>\$0</u>
	SUBTOTAL INCLUDING ESCALATION	16,228,432	4,253,402	>> \$20,481,834
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$5,118,166
	TOTAL ESTIMATED COST			>> \$25,600,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 61.00%

CONTINGENCY= 24.99%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: CWO FACILITY - INTERIM STORAGE
FACILITY - OPC - UNESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 242105
PREPARED BY: R. D. ADAMS
REPORT NAME: Cost Estimate Summary

DATE: 26-Jan-1998
TIME: 12:43:49
CHECKED BY: *SM*
APPRD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
<u>1.1</u>	<u>DESIGN & DEVELOPMENT</u>			>> <u>\$5,000,000</u>
1.1.1	CONCEPTUAL DESIGN	5,000,000	0	5,000,000
<u>1.2</u>	<u>MANAGEMENT COSTS</u>			>> <u>\$4,000,000</u>
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	0	3,000,000
1.2.2	SAFETY REVIEWS	1,000,000	0	1,000,000
<u>1.3</u>	<u>PERMITTING</u>			>> <u>\$2,728,432</u>
1.3.1	PERMITTING	2,728,432	0	2,728,432
<u>1.4</u>	<u>TURNOVER</u>			>> <u>\$4,500,000</u>
1.4.1	SO TEST & STARTUP	4,500,000	0	4,500,000
1.5.2	PROCUREMENT FEES	0	0	>> <u>\$0</u>
	SUBTOTAL INCLUDING ESCALATION	16,228,432	0	>> \$16,228,432
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$4,071,568
	TOTAL ESTIMATED COST			>> \$20,300,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 69.00%

CONTINGENCY= 25.09%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **CWO FACILITY - INTERIM STORAGE
FACILITY - OPC**

LOCATION 1: **INEEL/ICPP**

REQUESTOR: **J. K. RAWLINS**

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: **PLANNING**

PROJECT NO.: **242105**

PREPARED BY: **R. D. ADAMS**

PAGE # **1**

DATE **26-Jan-1998**

TIME: **12:42:44**

REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.1.1	CONCEPTUAL DESIGN											
	DESIGN	1	LOT		LMITCO	0.000		5,000,000				5,000,000
	CONCEPTUAL DESIGN S/T						0	\$5,000,000				\$5,000,000
1.2.1	PM FOR PROJECT DEVELOPMENT ACDC/SOW, CPDS, PEP, DC/SOW & REVIEWS	1	LOT		LMITCO	0.000		3,000,000				3,000,000
	PM FOR PROJECT DEVELOPMENT S/T						0	\$3,000,000				\$3,000,000
1.2.2	SAFETY REVIEWS PSAR & SAR	1	LOT		LMITCO	0.000		1,000,000				1,000,000
	SAFETY REVIEWS S/T						0	\$1,000,000				\$1,000,000
1.3.1	PERMITTING SITING AGREEMENT	1	LOT		Z-4170	640.000	640	48,512				48,512
	HWMA/RCRA PERMIT	1	LOT		Z-4170	6800.00	6,800	515,440				515,440
	PERMIT TO CONSTRUCT	1	LOT		Z-4170	3600.00	3,600	272,880				272,880
	CWA, STORM WATER, HISTORICAL, OTHER REG. COMPLIANCE	1	LOT		Z-4170	2000.00	2,000	151,600				151,600
	P.E. CERTIFICATION	1	LOT			0.000					40,000	40,000
	HEALTH & SAFETY ISSUES	1	LOT			0.000					1,200,000	1,200,000

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 242105

PREPARED BY: R. D. ADAMS

PAGE # 2

DATE 26-Jan-1998

TIME: 12:42:44

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	PERMITTING QUALITY REVIEWS	1	LOT			0.000					500,000	500,000
	PERMITTING S/T						13,040	\$988,432			\$1,740,000	\$2,728,432
1.4.1	SO TEST & STARTUP											
	ORR	1	LOT			0.000		2,000,000				2,000,000
	SO TEST & TRAINING	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SO TEST & STARTUP S/T						0	\$3,000,000				\$3,000,000
1.4.1.1	PROJECT SUPPORT SUPPORT DURING DESIGN, CONSTRUCTION & STARTUP	1	LOT		LIMITCO	0.000		1,500,000				1,500,000
	PROJECT SUPPORT S/T						0	\$1,500,000				\$1,500,000
	PROJECT SUBTOTAL						13,040	\$14,488,432	\$0	\$0	\$1,740,000	\$16,228,432

Lockheed Martin Idaho Technologies Co.

Rev. 6/95

PROJECT NAME: **CWO FACILITY - INTERIM STORAGE
FACILITY - OPC - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242105**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **12:43:53**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	30.81	20	30	6.16	9.24	7.703%	30.81%	1,254,455	6,254,455
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	18.49	20	30	3.70	5.55	4.622%	18.49%	752,673	3,752,673
1.2.2	SAFETY REVIEWS	1,000,000	6.16	20	30	1.23	1.85	1.541%	6.16%	250,891	1,250,891
1.3.1	PERMITTING	2,728,432	16.81	20	30	3.36	5.04	4.203%	16.81%	684,539	3,412,971
1.4.1	SO TEST & STARTUP	4,500,000	27.73	20	30	5.55	8.32	6.932%	27.73%	1,129,010	5,629,010
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	0	0.00	20	30	0.00	0.00	0.000%	0.00%	0	0
	SUBTOTAL	16,228,432	100.00					25.000%			
	CALCULATED CONTINGENCY	4,057,108									
	RESULTANT TEC	20,285,540									
	ROUNDED TEC	20,300,000									
	PROJECT CONTINGENCY	4,071,568						25.09%			
	MANAGEMENT RESERVE	0									
	CONTINGENCY	4,071,568									
	TOTAL ESTIMATED COST	20,300,000								4,071,568	20,300,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

CONTINGENCY ANALYSIS

PROJECT NAME: **CWO FACILITY - INTERIM STORAGE
FACILITY - OPC - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242105**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **12:46:36**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency			Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	24.41	20	30	4.88	7.32	6.103%	24.41%	1,249,440	6,249,440
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	14.65	20	30	2.93	4.39	3.662%	14.65%	749,664	3,749,664
1.2.2	SAFETY REVIEWS	1,000,000	4.88	20	30	0.98	1.46	1.221%	4.88%	249,888	1,249,888
1.3.1	PERMITTING	2,728,432	13.32	20	30	2.66	4.00	3.330%	13.32%	681,803	3,410,235
1.4.1	SO TEST & STARTUP	4,500,000	21.97	20	30	4.39	6.59	5.493%	21.97%	1,124,496	5,624,496
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	4,253,402	20.77	20	30	4.15	6.23	5.192%	20.77%	1,062,875	5,316,277
	SUBTOTAL	20,481,834	100.00					25.000%			
	CALCULATED CONTINGENCY	5,120,459									
	RESULTANT TEC	25,602,293									
	ROUNDED TEC	25,600,000									
	PROJECT CONTINGENCY	5,118,166						24.99%			
	MANAGEMENT RESERVE	0									
	CONTINGENCY	5,118,166									
	TOTAL ESTIMATED COST	25,600,000								5,118,166	25,600,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%

Experimental/Special Conditions.....Up to 50%

Conceptual 15% - 25%

Experimental/Special Conditions.....Up to 40%

TITLE I 10% - 20%

TITLE II 5% - 15%

TITLE II/AFC Market Conditions

CWO INTERIM STORAGE FACILITY

Project: 2421cwo.MPP
Date: Mon 1/26/98

Task

Summary

Rolled Up Progress

Progress

Rolled Up Task

Milestone

Rolled Up Milestone

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: HLW INTERIM STORAGE FACILITY - HWO
Type of Estimate: PROJECT SUPPORT
File No: 2421-HWO

Estimator: RDA
Date: 1/26/98
Approved By:

I. SCOPE OF WORK: *Brief description of the proposed project.*

This facility will unload, store in vertical tubes and load out canisters containing High Level Waste (HLW) from the proposed Hot Isokinetic Press Waste Option (VWO).

II. BASIS OF THE ESTIMATE: *Drawings, Design Report, Engineers notes, and/or other documentation upon which the estimate is originated.*

Draft sketches, a draft EDF, and the SNF Canister Storage Building Final Design Estimate from Fluor Daniel Northwest, Inc. were used as the basis for this estimate.

III. ASSUMPTIONS: *Condition statements accepted or supposed true without proof or demonstration. An assumption has a direct impact on total estimated cost.*

1. The Interim Storage Facility will be located within 100 feet of the HWO facility.
2. Rock will not be encountered during excavation.
3. The estimates include both present day costs summaries and contingency analysis and escalated summaries and contingency analysis. The escalated summaries and contingency analysis reflect the attached schedule. All activities are escalated to the appropriate schedule mid-point.
4. Per the draft EDF, four storage modules, containing 630 storage tubes each, will accommodate the estimated 5,700 canisters produced at the HIP Facility.
5. Most quantities used for this estimate were obtained by preliminary take offs from the draft sketches.
6. The storage tube costs, gantry crane cost and associated rail system costs were used from the Fluor estimate of a facility which is approximately eighty percent complete.
7. All assumptions and information included in the draft "New Interim Storage Facility for Interim Storage of HLW" apply to the estimate.
8. Where quantities could not be determined from the draft sketches, factors or assumed quantities were used by the estimator.
9. Since the storage tubes and conveying equipment represent such a large percentage of this facility's cost, lower design, inspection, Project Management and turnover costs are used in the estimate.
10. Sufficient construction craft will be available to support this project.
11. Markups on direct construction costs to get the construction costs listed on the summary sheet are as follows:

Labor indirects, overheads and profit (OH&P)	50% of labor
Material & equipment OH&P	5% of material and equipment
Subcontract OH&O	10% of subcontract cost
Construction equipment allowance	10% of labor
NQA-1 quality requirements	30% of material
DOE/RW/0333P quality requirements	10% of material
Subcontractor procurement	1% of material and equipment
Bond	2% of everything

**COST ESTIMATE SUPPORT DATA RECAPITULATION
(CONTINUATION)**

File No: 2396

Page 2 of 2

III. ASSUMPTIONS: (Continued)

12. Only the railroad track within the storage facility is included in this estimate. The remainder of the branch line is included in the infrastructure estimate.
13. All utilities are assumed to be available at the facility wall.

IV. CONTINGENCY GUIDELINE IMPLEMENTATION: *The percentage used for contingency as determined by the contingency allowance guidelines can be altered to reflect the type of construction and conditions that may impact the total estimated cost.*

A large portion of the estimated costs is based on actual costs from Fluor's SNF Canister Storage Building. The majority of the remaining costs are for standard construction activities. For these reasons, the contingency is lower than would be experienced for a processing type facility at this stage of development.

V. OTHER COMMENTS/CONCERNS SPECIFIC TO THE ESTIMATE:

1. All FY'98 and later projects are to be assessed a Procurement Fee of 1%, a G&A Fee of 23%, with a \$500,000 ceiling per year, and a Performance Incentive Fee (PIF) of 5.5%. See the attached G&A/PIF calculation sheet for the method used to calculate these fees.
2. A procurement fee of one percent of construction was used to cover the operating contractor support to DOE-ID for their contract administration. It is felt that one percent is sufficient for jobs of this size.

Lockheed Martin Idaho Technologies Co.

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PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY - ESCALATED
INEEL/ICPP**
LOCATION 1:
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **2421-HIP**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
TIME: **14:26:15**

CHECKED BY: *SM*
APPROD BY: *hml*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$33,084,876
1.1.1	DESIGN ENGINEERING TITLE I & II	18,000,000	4,680,000	22,680,000
1.1.2	TITLE III INSPECTION	7,594,800	2,810,076	10,404,876
1.2	<u>MANAGEMENT COSTS</u>			>> \$49,305,117
1.2.1	PROJECT MANAGEMENT	21,265,300	7,230,202	28,495,502
1.2.2	CONSTRUCTION MANAGEMENT	15,189,500	5,620,115	20,809,615
1.3	<u>CONSTRUCTION</u>			>> \$208,096,567
1.3.1	GENERAL CONDITIONS	2,940,677	1,088,050	4,028,727
1.3.2	SITWORK	286,313	105,936	392,249
1.3.3	CONCRETE	17,492,211	6,472,118	23,964,329
1.3.5	METALS	7,138,051	2,641,079	9,779,130
1.3.7	THERMAL & MOISTURE PROTECTION	1,333,273	493,311	1,826,584
1.3.8	DOORS & WINDOWS	71,240	26,359	97,599
1.3.9	FINISHES	741,685	274,424	1,016,109
1.3.13	SPECIAL CONSTRUCTION	107,832,897	39,898,172	147,731,069
1.3.14	CONVEYING SYSTEMS	11,272,944	4,170,989	15,443,933
1.3.15	MECHANICAL	1,646,543	609,221	2,255,764
1.3.16	ELECTRICAL	1,139,470	421,604	1,561,074
1.5	<u>G&A/PIF</u>			>> \$12,729,571
1.5.1	G&A/PIF ADDER	9,291,658	3,437,913	12,729,571
1.5.2	PROCUREMENT FEES	1,518,953	562,013	>> \$2,080,966
SUBTOTAL INCLUDING ESCALATION		224,755,515	80,541,582	>> \$305,297,097
PROJECT CONTINGENCY				
MANAGEMENT RESERVE				>> \$22,290,710
CONTINGENCY				>> \$41,012,193
TOTAL ESTIMATED COST				>> \$368,600,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 16.00%

CONTINGENCY= 20.73%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY - UNESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **2421-HIP**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
TIME: **14:28:19**
CHECKED BY: *SAW*
APPRD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$25,594,800
1.1.1	DESIGN ENGINEERING TITLE I & II	18,000,000	0	18,000,000
1.1.2	TITLE III INSPECTION	7,594,800	0	7,594,800
1.2	<u>MANAGEMENT COSTS</u>			>> \$36,454,800
1.2.1	PROJECT MANAGEMENT	21,265,300	0	21,265,300
1.2.2	CONSTRUCTION MANAGEMENT	15,189,500	0	15,189,500
1.3	<u>CONSTRUCTION</u>			>> \$151,895,304
1.3.1	GENERAL CONDITIONS	2,940,677	0	2,940,677
1.3.2	SITework	286,313	0	286,313
1.3.3	CONCRETE	17,492,211	0	17,492,211
1.3.5	METALS	7,138,051	0	7,138,051
1.3.7	THERMAL & MOISTURE PROTECTION	1,333,273	0	1,333,273
1.3.8	DOORS & WINDOWS	71,240	0	71,240
1.3.9	FINISHES	741,685	0	741,685
1.3.13	SPECIAL CONSTRUCTION	107,832,897	0	107,832,897
1.3.14	CONVEYING SYSTEMS	11,272,944	0	11,272,944
1.3.15	MECHANICAL	1,646,543	0	1,646,543
1.3.16	ELECTRICAL	1,139,470	0	1,139,470
1.5	<u>G&A/PIF</u>			>> \$9,291,658
1.5.1	G&A/PIF ADDER	9,291,658	0	9,291,658
1.5.2	PROCUREMENT FEES	1,518,953	0	>> \$1,518,953
	SUBTOTAL INCLUDING ESCALATION	224,755,515	0	>> \$224,755,515
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$16,270,591
	CONTINGENCY			>> \$30,473,894
	TOTAL ESTIMATED COST			>> \$271,500,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 17.00%

CONTINGENCY= 20.80%

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LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-HIP**
PREPARED BY: **R. D. ADAMS**

PAGE # 1

TIME: 14:25:04

REPORT NAME: **Detail Cost Estimate Sheet**[illegible]

PROJECT NAME: HIP FACILITY - INTERIM STORAGE
FACILITY

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-HIP

PREPARED BY: R. D. ADAMS

PAGE # 2

DATE 26-Jan-1998

TIME: 14:25:04

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	GENERAL CONDITIONS											
	SUPERVISION @ 5% OF LABOR HOURS	1	LOT		CARF GEN	21030.0	21,030	725,325				725,325
	TRAINING @ 3% OF LABOR HOURS	1	LOT		SSWK GEN	12620.0	12,620	464,542				464,542
	SMALL TOOLS & CONSUMABLES @ 4% OF LABOR DOLLARS	1	LOT	577,600.00	GEN	0.000				577,600		577,600
	GENERAL CONDITIONS S/T						33,650	\$1,189,867		\$577,600		\$1,767,467
1.3.2	SITWORK											
	TUNNEL EXCAVATION	6,150	CY		ENGR GEN	0.012	74	2,328	12,300			14,628
	TUNNEL BACKFILL	3,430	CY		ENGR GEN	0.060	206	6,493	6,860			13,353
	BUILDING EXCAVATION	28,600	CY		ENGR GEN	0.012	343	10,828	57,200			68,028
	BUILDING BACKFILL	20,400	CY		ENGR GEN	0.060	1,224	38,617	40,800			79,417
	BUILDING BERM FILL	11,500	CY		ENGR GEN	0.060	690	21,770	23,000			44,770
	SITWORK S/T						2,537	\$80,036	\$140,160			\$220,196
1.3.3	CONCRETE											
	TUNNEL CONCRETE	1,360	CY	126.10	SKWK GEN	12.300	16,728	553,864	34,340	171,496		759,700
	BUILDING CONCRETE	15,050	CY	126.10	SKWK GEN	12.300	185,115	6,129,158	380,013	1,897,805		8,406,975
	CHARGE FACE SLAB	3,375	CY	121.70	SKWK GEN	8.000	27,000	893,970	10,564	410,738		1,315,271

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LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-HIP

PREPARED BY: **R. D. ADAMS**

PAGE # 3

DATE 26-Jan-1998

TIME: 14:25:04

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

Lockheed Martin Idaho Technologies Co.

DETAILED COST ESTIMATE SHEET

PAGE # 4

Rev. 6/96
PROJECT NAME: HIP FACILITY - INTERIM STORAGE
FACILITY
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
PROJECT NO.: 2421-HIP
PREPARED BY: R. D. ADAMS

DATE 26-Jan-1998
TIME: 14:25:04
REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.8	DOORS & WINDOWS											
	OVERHEAD DOORS	2	EA	16,000.00	SKWK GEN	75.000	150	4,967		32,000		36,967
	PERSONNEL DOORS	5	EA	1,000.00	SKWK GEN	10.000	50	1,656		5,000		6,656
	DOORS & WINDOWS S/T						200	\$6,622		\$37,000		\$43,622
1.3.9	FINISHES											
	PAINT STRUCTURAL STEEL	189,000	SF	0.10	PAINT GEN	0.080	15,120	422,453		18,900		441,353
	FINISHES S/T						15,120	\$422,453		\$18,900		\$441,353
1.3.13	SPECIAL CONSTRUCTION											
	SUPPORT BUILDING	3,600	SF			0.000					540,000	540,000
	VAULT TUBE ASSEMBLIES	2,640	EA	23,100.00	IRON GEN	50.000	132,000	4,858,920		60,984,000		65,842,920
	SPECIAL CONSTRUCTION S/T						132,000	\$4,858,920		\$60,984,000	\$540,000	\$66,382,920
1.3.14	CONVEYING SYSTEMS											
	GANTRY CRANE	2	EA	2,500,000.00	SKWK GEN	1000.00	2,000	66,220		5,000,000		5,066,220
	TRANSFER CART IN TUNNEL	1	EA	300,000.00	SKWK GEN	500.000	500	16,555		300,000		316,555
	5 TON DECONTAMINATABLE BRIDGE CRANE	2	EA	250,000.00	SKWK GEN	300.000	600	19,866		500,000		519,866

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: HIP FACILITY - INTERIM STORAGE

FACILITY

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-HIP

PREPARED BY: R. D. ADAMS

PAGE # 5

DATE 26-Jan-1998

TIME: 14:25:04

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.14	CONVEYING SYSTEMS											
	CASK MANUVERING HYDRAULIC PLATFORM	1	EA	1,000,000.00	SKWK GEN	1000.00	1,000	33,110		1,000,000		1,033,110
	CONVEYING SYSTEMS S/T						4,100	\$135,751		\$6,800,000		\$6,935,751
1.3.15	MECHANICAL											
	MISC. PIPING - ALLOW	1	LOT		GEN	0.000					75,000	75,000
	FIRE PROTECTION	47,900	SF		GEN	0.000					167,650	167,650
	HVAC	47,900	SF	11.20	SHEE GEN	0.180	8,622	298,839		536,480		835,319
	MECHANICAL S/T						8,622	\$298,839		\$536,480	\$242,650	\$1,077,969
1.3.16	ELECTRICAL											
	SWITCHGEAR AND TRANSFORMERS	1	LOT	197,300.00	ELEC GEN	480.000	480	15,989		197,300		213,289
	LIGHTING	47,900	SF		ELEC GEN	4 0.000					131,725	131,725
	RACEWAYS & ENCLOSURES	1	LOT	46,800.00	ELEC GEN	1240.00	1,240	41,304		46,800		88,104
	CONDUCTORS & GROUNDING	1	LOT	95,700.00	ELEC GEN	1680.00	1,680	55,961		95,700		151,661
	WIRING DEVICES & SPECIAL SYSTEMS	1	LOT	125,000.00	ELEC GEN	190.000	190	6,329		125,000		131,329
	INSTRUMENTATION & CONTROLS	1	LOT	3,730.00	ELEC GEN	170.000	170	5,663		3,730	4,750	14,143
	TESTING	1	LOT		ELEC GEN	260.000	260	8,661				8,661
	ELECTRICAL S/T						4,020	\$133,906		\$468,530	\$136,475	\$738,911

Lockheed Martin Idaho Technologies Co.
 Rev. 8/96
 PROJECT NAME: HIP FACILITY - INTERIM STORAGE
 FACILITY
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
 PROJECT NO.: 2421-HIP
 PREPARED BY: R. D. ADAMS

PAGE # 6

DATE 26-Jan-1998
 TIME: 14:25:04
 REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.5.1 00701000	G&A/PIF ADDER G&A	1	LOT			0.000					809,359	809,359
	PIF	1	LOT			0.000					8,482,299	8,482,299
	G&A/PIF ADDER S/T						0				\$9,291,658	\$9,291,658
	PROJECT SUBTOTAL						454,293	\$77,678,570	\$565,076	\$75,164,209	\$11,876,083	\$165,283,938

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**
CONTINGENCY ANALYSIS

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-HIP**
 PREPARED BY: **R. D. ADAMS**

 DATE: **26-Jan-1998**
 TIME: **14:28:24**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	18,000,000	8.01	20	35	1.60	2.80	2.363%	11.35%	5,307,684	23,307,684
1.1.2	TITLE III INSPECTION	7,594,800	3.38	20	30	0.68	1.01	0.845%	4.06%	1,897,872	9,492,672
1.2.1	PROJECT MANAGEMENT	21,265,300	9.46	20	35	1.89	3.31	2.791%	13.41%	6,270,528	27,535,828
1.2.2	CONSTRUCTION MANAGEMENT	15,189,500	6.76	20	30	1.35	2.03	1.690%	8.12%	3,795,719	18,985,219
1.3.1	GENERAL CONDITIONS	2,940,677	1.31	20	35	0.26	0.46	0.386%	1.86%	867,121	3,807,798
1.3.2	SITWORK	286,313	0.13	20	30	0.03	0.04	0.032%	0.15%	71,547	357,860
1.3.3	CONCRETE	17,492,211	7.78	20	30	1.56	2.33	1.946%	9.35%	4,371,146	21,863,357
1.3.5	METALS	7,138,051	3.18	20	25	0.64	0.79	0.651%	3.13%	1,462,662	8,600,713
1.3.7	THERMAL & MOISTURE PROTECTION	1,333,273	0.59	20	30	0.12	0.18	0.148%	0.71%	333,173	1,666,446
1.3.8	DOORS & WINDOWS	71,240	0.03	20	20	0.01	0.01	0.005%	0.02%	11,393	82,633
1.3.9	FINISHES	741,685	0.33	20	35	0.07	0.12	0.097%	0.47%	218,702	960,387
1.3.13	SPECIAL CONSTRUCTION	107,832,897	47.98	20	20	9.60	9.60	7.676%	36.89%	17,245,739	125,078,636
1.3.14	CONVEYING SYSTEMS	11,272,944	5.02	20	25	1.00	1.25	1.028%	4.94%	2,309,946	13,582,890
1.3.15	MECHANICAL	1,646,543	0.73	20	30	0.15	0.22	0.183%	0.88%	411,456	2,057,999
1.3.16	ELECTRICAL	1,139,470	0.51	20	25	0.10	0.13	0.104%	0.50%	233,489	1,372,959
1.5.1	G&A/PIF ADDER	9,291,658	4.13	5	20	0.21	0.83	0.723%	3.48%	1,625,331	10,916,989
1.5.2	PROCUREMENT FEES	1,518,953	0.68	20	25	0.14	0.17	0.139%	0.67%	311,250	1,830,203
	ESCALATION	0	0.00	20	25	0.00	0.00	0.000%	0.00%	(273)	(273)
SUBTOTAL		224,755,515	100.00					20.807%			
CALCULATED CONTINGENCY		46,765,153									
RESULTANT TEC		271,520,668									
ROUNDED TEC		271,500,000									
PROJECT CONTINGENCY		46,744,485						20.80%			
MANAGEMENT RESERVE		16,270,591									
CONTINGENCY		30,473,894									
TOTAL ESTIMATED COST		271,500,000								46,744,485	271,500,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING	20% - 30%
Experimental/Special Conditions.....	Up to 50%
Conceptual	15% - 25%
Experimental/Special Conditions.....	Up to 40%
TITLE I	10% - 20%
TITLE II	5% - 15%
TITLE II/AFC	Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**
CONTINGENCY ANALYSIS

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-HIP**
 PREPARED BY: **R. D. ADAMS**

 DATE: **26-Jan-1998**
 TIME: **14:26:21**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	18,000,000	5.90	20	35	1.18	2.06	1.739%	8.39%	5,312,268	23,312,268
1.1.2	TITLE III INSPECTION	7,594,800	2.49	20	30	0.50	0.75	0.622%	3.00%	1,899,511	9,494,311
1.2.1	PROJECT MANAGEMENT	21,265,300	6.97	20	35	1.39	2.44	2.055%	9.91%	6,275,943	27,541,243
1.2.2	CONSTRUCTION MANAGEMENT	15,189,500	4.98	20	30	1.00	1.49	1.244%	6.00%	3,798,997	18,988,497
1.3.1	GENERAL CONDITIONS	2,940,677	0.96	20	35	0.19	0.34	0.284%	1.37%	867,870	3,808,547
1.3.2	SITEWORK	286,313	0.09	20	30	0.02	0.03	0.023%	0.11%	71,609	357,922
1.3.3	CONCRETE	17,492,211	5.73	20	30	1.15	1.72	1.432%	6.91%	4,374,921	21,867,132
1.3.5	METALS	7,138,051	2.34	20	25	0.47	0.58	0.479%	2.31%	1,463,925	8,601,976
1.3.7	THERMAL & MOISTURE PROTECTION	1,333,273	0.44	20	30	0.09	0.13	0.109%	0.53%	333,461	1,666,734
1.3.8	DOORS & WINDOWS	71,240	0.02	20	20	0.00	0.00	0.004%	0.02%	11,403	82,643
1.3.9	FINISHES	741,685	0.24	20	35	0.05	0.09	0.072%	0.35%	218,891	960,576
1.3.13	SPECIAL CONSTRUCTION	107,832,897	35.32	20	20	7.06	7.06	5.651%	27.27%	17,260,633	125,093,530
1.3.14	CONVEYING SYSTEMS	11,272,944	3.69	20	25	0.74	0.92	0.757%	3.65%	2,311,941	13,584,885
1.3.15	MECHANICAL	1,646,543	0.54	20	30	0.11	0.16	0.135%	0.65%	411,812	2,058,355
1.3.16	ELECTRICAL	1,139,470	0.37	20	25	0.07	0.09	0.077%	0.37%	233,691	1,373,161
1.5.1	G&A/PIF ADDER	9,291,658	3.04	5	20	0.15	0.61	0.533%	2.57%	1,626,735	10,918,393
1.5.2	PROCUREMENT FEES	1,518,953	0.50	20	25	0.10	0.12	0.102%	0.49%	311,518	1,830,471
	ESCALATION	80,541,582	26.38	20	25	5.28	6.60	5.408%	26.09%	16,517,774	97,059,356
SUBTOTAL		305,297,097	100.00					20.726%			
CALCULATED CONTINGENCY		63,276,177									
RESULTANT TEC		368,573,274									
ROUNDED TEC		368,600,000									
PROJECT CONTINGENCY		63,302,903						20.73%			
MANAGEMENT RESERVE		22,290,710									
CONTINGENCY		41,012,193									
TOTAL ESTIMATED COST		368,600,000								63,302,903	368,600,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

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CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

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PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
TITLE I 10% -- 20%
TITLE II 5% -- 15%
TITLE II/AFC Market Conditions

G&A/PIF ADDER CALCULATION SHEET

PROCUREMENT FEE:

CONSTRUCTION =	\$151,895,303	
GFE =	\$0	
Subtotal	\$151,895,303	
FEE @ 1% =	\$151,895,303	• 0.01 = \$1,518,953.03

G&A @ 23% (with a ceiling of \$500,000 imposed per year)

CONSTRUCTION OR CEILING • 4 YEARS =	\$2,000,000	
GFE =	\$0	
PROCUREMENT FEE =	\$1,518,953	
Subtotal	\$3,518,953	
FEE @ 23% =	\$3,518,953	• 0.23 = \$809,359

PIF @ 5.5%

CONSTRUCTION =	\$151,895,303	
GFE =	\$0	
PROCUREMENT FEE =	\$1,518,953	
G&A =	\$809,359	
Subtotal	\$154,223,615	
FEE @ 5.5% =	\$154,223,615	• 0.055 = \$8,482,299

TOTAL PROCUREMENT FEE:	\$1,518,953
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TOTAL G&A FEE:	\$809,359
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TOTAL PIF:	\$8,482,299
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Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY - OPC - ESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **242102**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
TIME: **14:33:46**
CHECKED BY: *SW*
APPRD BY: *Box*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> \$5,850,000
1.1.1	CONCEPTUAL DESIGN	5,000,000	850,000	5,850,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$4,790,000
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	570,000	3,570,000
1.2.2	SAFETY REVIEWS	1,000,000	220,000	1,220,000
1.3	<u>PERMITTING</u>			>> \$3,328,687
1.3.1	PERMITTING	2,728,432	600,255	3,328,687
1.4	<u>TURNOVER</u>			>> \$6,570,000
1.4.1	SO TEST & STARTUP	4,500,000	2,070,000	6,570,000
1.5.2	PROCUREMENT FEES	0	0	>> \$0
	SUBTOTAL INCLUDING ESCALATION	16,228,432	4,310,255	>> \$20,538,687
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$5,161,313
	TOTAL ESTIMATED COST			>> \$25,700,000

PROJECT COST PARAMETERSEDI AS A % OF CONST. + GFE= **59.00%**CONTINGENCY= **25.13%**

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY - OPC - UNESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **242102**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
TIME: **14:48:44**

CHECKED BY: *SW*

APPR'D BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> \$5,000,000
1.1.1	CONCEPTUAL DESIGN	5,000,000	0	5,000,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$4,000,000
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	0	3,000,000
1.2.2	SAFETY REVIEWS	1,000,000	0	1,000,000
1.3	<u>PERMITTING</u>			>> \$2,728,432
1.3.1	PERMITTING	2,728,432	0	2,728,432
1.4	<u>TURNOVER</u>			>> \$4,500,000
1.4.1	SO TEST & STARTUP	4,500,000	0	4,500,000
1.5.2	PROCUREMENT FEES	0	0	\$0
	SUBTOTAL INCLUDING ESCALATION	16,228,432	0	>> \$16,228,432
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$4,071,568
	TOTAL ESTIMATED COST			>> \$20,300,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= **69.00%**

CONTINGENCY= **25.09%**

Rev. 6/96

FACILITY - OPC

J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 242102

PREPARED BY: R. D. ADAMS

PAGE # 1

DATE 26-Jan-1998

TIME: 14:31:05

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.1.1	CONCEPTUAL DESIGN											
	DESIGN	1	LOT		LIMITCO	0.000		5,000,000				5,000,000
	CONCEPTUAL DESIGN S/T						0	\$5,000,000				\$5,000,000
1.2.1	PM FOR PROJECT DEVELOPMENT ACDC/SOW, CPDS, PEP, DC/SOW & REVIEWS	1	LOT		LIMITCO	0.000		3,000,000				3,000,000
	PM FOR PROJECT DEVELOPMENT S/T						0	\$3,000,000				\$3,000,000
1.2.2	SAFETY REVIEWS PSAR & SAR	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SAFETY REVIEWS S/T						0	\$1,000,000				\$1,000,000
1.3.1	PERMITTING SITING AGREEMENT	1	LOT		Z-4170	640.000	640	48,512				48,512
	HWMA/RCRA PERMIT	1	LOT		Z-4170	6800.00	6,800	515,440				515,440
	PERMIT TO CONSTRUCT	1	LOT		Z-4170	3600.00	3,600	272,880				272,880
	CWA, STORM WATER, HISTORICAL, OTHER REG. COMPLIANCE	1	LOT		Z-4170	2000.00	2,000	151,600				151,600
	P.E. CERTIFICATION	1	LOT			0.000					40,000	40,000
	HEALTH & SAFETY ISSUES	1	LOT			0.000					1,200,000	1,200,000

Lockheed Martin Idaho Technologies Co.
 Rev. 6/96
 PROJECT NAME: HIP FACILITY - INTERIM STORAGE
 FACILITY - OPC
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
 PROJECT NO.: 242102
 PREPARED BY: R. D. ADAMS

PAGE # 2
 DATE 26-Jan-1998
 TIME: 14:31:05
 REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	PERMITTING QUALITY REVIEWS	1	LOT			0.000					500,000	500,000
	PERMITTING S/T						13,040	\$988,432			\$1,740,000	\$2,728,432
1.4.1	SO TEST & STARTUP											
	ORR	1	LOT			0.000		2,000,000				2,000,000
	SO TEST & TRAINING	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SO TEST & STARTUP S/T						0	\$3,000,000				\$3,000,000
1.4.1.1	PROJECT SUPPORT SUPPORT DURING DESIGN, CONSTRUCTION & STARTUP	1	LOT		LIMITCO	0.000		1,500,000				1,500,000
	PROJECT SUPPORT S/T						0	\$1,500,000				\$1,500,000
	PROJECT SUBTOTAL						13,040	\$14,488,432	\$0	\$0	\$1,740,000	\$16,228,432

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY - OPC - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**
CONTINGENCY ANALYSIS

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242102**
 PREPARED BY: **R. D. ADAMS**

 DATE: **26-Jan-1998**
 TIME: **14:46:50**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	30.81	20	30	6.16	9.24	7.703%	30.81%	1,254,455	6,254,455
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	18.49	20	30	3.70	5.55	4.622%	18.49%	752,673	3,752,673
1.2.2	SAFETY REVIEWS	1,000,000	6.16	20	30	1.23	1.85	1.541%	6.16%	250,891	1,250,891
1.3.1	PERMITTING	2,728,432	16.81	20	30	3.36	5.04	4.203%	16.81%	684,539	3,412,971
1.4.1	SO TEST & STARTUP	4,500,000	27.73	20	30	5.55	8.32	6.932%	27.73%	1,129,010	5,629,010
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	0	0.00	20	30	0.00	0.00	0.000%	0.00%	0	0
SUBTOTAL		16,228,432	100.00					25.000%			
CALCULATED CONTINGENCY		4,057,108									
RESULTANT TEC		20,285,540									
ROUNDED TEC		20,300,000									
PROJECT CONTINGENCY		4,071,568						25.09%			
MANAGEMENT RESERVE		0									
CONTINGENCY		4,071,568									
TOTAL ESTIMATED COST		20,300,000								4,071,568	20,300,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

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PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE III/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE**
FACILITY - OPC - ESCALATED
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242102**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **14:33:51**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	24.34	20	30	4.87	7.30	6.086%	24.34%	1,256,486	6,256,486
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	14.61	20	30	2.92	4.38	3.652%	14.61%	753,891	3,753,891
1.2.2	SAFETY REVIEWS	1,000,000	4.87	20	30	0.97	1.46	1.217%	4.87%	251,297	1,251,297
1.3.1	PERMITTING	2,728,432	13.28	20	30	2.66	3.99	3.321%	13.28%	685,647	3,414,079
1.4.1	SO TEST & STARTUP	4,500,000	21.91	20	30	4.38	6.57	5.477%	21.91%	1,130,837	5,630,837
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	4,310,255	20.99	20	30	4.20	6.30	5.247%	20.99%	1,083,155	5,393,410
SUBTOTAL		20,538,687	100.00					25.000%			
CALCULATED CONTINGENCY		5,134,672									
RESULTANT TEC		25,673,359									
ROUNDED TEC		25,700,000									
PROJECT CONTINGENCY		5,161,313						25.13%			
MANAGEMENT RESERVE		0									
CONTINGENCY		5,161,313									
TOTAL ESTIMATED COST		25,700,000								5,161,313	25,700,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

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PLANNING 20% -- 30%

Experimental/Special Conditions.....Up to 50%

Conceptual 15% -- 25%

Experimental/Special Conditions.....Up to 40%

TITLE I 10% -- 20%

TITLE II 5% -- 15%

TITLE II/AFC Market Conditions

HIP OPTION INTERIM STORAGE FACILITY

Project: 2421-HIP.MPP
Date: Mon 1/26/98

Task

Summary

Rolled Up Progress

Progress

Rolled Up Task

Milestone

Rolled Up Milestone

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: HLW INTERIM STORAGE FACILITY - VWO
Type of Estimate: PROJECT SUPPORT
File No: 2421-VWO

Estimator: RDA
Date: 1/26/98
Approved By:

I. SCOPE OF WORK: *Brief description of the proposed project.*

This facility will unload, store in vertical tubes and load out canisters containing High Level Waste (HLW) from the proposed Vitrified Waste Option (VWO).

II. BASIS OF THE ESTIMATE: *Drawings, Design Report, Engineers notes, and/or other documentation upon which the estimate is originated.*

Draft sketches, a draft EDF, and the SNF Canister Storage Building Final Design Estimate from Fluor Daniel Northwest, Inc. were used as the basis for this estimate.

III. ASSUMPTIONS: *Condition statements accepted or supposed true without proof or demonstration. An assumption has a direct impact on total estimated cost.*

1. The Interim Storage Facility will be located within 100 feet of the CWO facility.
2. Rock will not be encountered during excavation.
3. The estimates include both present day costs summaries and contingency analysis and escalated summaries and contingency analysis. The escalated summaries and contingency analysis reflect the attached schedule. All activities are escalated to the appropriate schedule mid-point.
4. Per the draft EDF, nine storage modules, containing 630 storage tubes each, will accommodate the estimated 16,000 canisters produced at the Cementitious Waste Facility.
5. Most quantities used for this estimate were obtained by preliminary take offs from the draft sketches.
6. The storage tube costs, gantry crane cost and associated rail system costs were used from the Fluor estimate of a facility which is approximately eighty percent complete.
7. All assumptions and information included in the draft "New Interim Storage Facility for Interim Storage of HLW" apply to the estimate.
8. Where quantities could not be determined from the draft sketches, factors or assumed quantities were used by the estimator.
9. Since the storage tubes and conveying equipment represent such a large percentage of this facility's cost, lower design, inspection, Project Management and turnover costs are used in the estimate.
10. Sufficient construction craft will be available to support this project.
11. Markups on direct construction costs to get the construction costs listed on the summary sheet are as follows:

Labor indirects, overheads and profit(OH&P)	50% of labor
Material & equipment OH&P	5% of material and equipment
Subcontract OH&O	10% of subcontract cost
Construction equipment allowance	10% of labor
NQA-1 quality requirements	30% of material
DOE/RW/0333P quality requirements	10% of material
Subcontractor procurement	1% of material and equipment
Bond	2% of everything

**COST ESTIMATE SUPPORT DATA RECAPITULATION
(CONTINUATION)**

File No: 2396

Page 2 of 2

III. ASSUMPTIONS: (Continued)

12. Only the railroad track within the storage facility is included in this estimate. The remainder of the branch line is included in the infrastructure estimate.
13. All utilities are assumed to be available at the facility wall.

IV. CONTINGENCY GUIDELINE IMPLEMENTATION: *The percentage used for contingency as determined by the contingency allowance guidelines can be altered to reflect the type of construction and conditions that may impact the total estimated cost.*

A large portion of the estimated costs is based on actual costs from Fluor's SNF Canister Storage Building. The majority of the remaining costs are for standard construction activities. For these reasons, the contingency is lower than would be experienced for a processing type facility at this stage of development.

V. OTHER COMMENTS/CONCERNS SPECIFIC TO THE ESTIMATE:

1. All FY'98 and later projects are to be assessed a Procurement Fee of 1%, a G&A Fee of 23%, with a \$500,000 ceiling per year, and a Performance Incentive Fee (PIF) of 5.5%. See the attached G&A/PIF calculation sheet for the method used to calculate these fees.
2. A procurement fee of one percent of construction was used to cover the operating contractor support to DOE-ID for their contract administration. It is felt that one percent is sufficient for jobs of this size.

Lockheed Martin Idaho Technologies Co.

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 PROJECT NAME: **VIT FACILITY - INTERIM STORAGE
FACILITY - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**
COST ESTIMATE SUMMARY

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-VIT**
 PREPARED BY: **R. D. ADAMS**
 REPORT NAME: **Cost Estimate Summary**

 DATE: **26-Jan-1998**
 TIME: **13:22:01**
 CHECKED BY: **SWA**
 APPRD BY: **BOL**

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$45,750,000
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	5,200,000	25,200,000
1.1.2	TITLE III INSPECTION	15,000,000	5,550,000	20,550,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$74,692,649
1.2.1	PROJECT MANAGEMENT	28,000,000	9,240,000	37,240,000
1.2.2	CONSTRUCTION MANAGEMENT	27,337,700	10,114,949	37,452,649
1.3	<u>CONSTRUCTION</u>			>> \$374,525,860
1.3.1	GENERAL CONDITIONS	4,975,554	1,840,955	6,816,509
1.3.2	SITWORK	563,208	208,387	771,595
1.3.3	CONCRETE	27,781,559	10,279,177	38,060,736
1.3.5	METALS	11,441,457	4,233,339	15,674,796
1.3.7	THERMAL & MOISTURE PROTECTION	1,879,911	695,567	2,575,478
1.3.8	DOORS & WINDOWS	71,240	26,359	97,599
1.3.9	FINISHES	981,065	362,994	1,344,059
1.3.13	SPECIAL CONSTRUCTION	210,185,958	77,768,805	287,954,763
1.3.14	CONVEYING SYSTEMS	11,272,944	4,170,989	15,443,933
1.3.15	MECHANICAL	2,558,535	946,658	3,505,193
1.3.16	ELECTRICAL	1,665,109	616,090	2,281,199
1.5	<u>G&A/PIF</u>			>> \$22,378,560
1.5.1	G&A/PIF ADDER	16,334,715	6,043,845	22,378,560
1.5.2	PROCUREMENT FEES	2,733,765	1,011,493	>> \$3,745,258
	SUBTOTAL INCLUDING ESCALATION	382,782,720	138,309,607	>> \$521,092,327
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$40,064,968
	CONTINGENCY			>> \$65,042,705
	TOTAL ESTIMATED COST			>> \$626,200,000

PROJECT COST PARAMETERS

 EDI AS A % OF CONST. + GFE= **12.00%**

 CONTINGENCY= **20.17%**

Lockheed Martin Idaho Technologies Co.
Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: VIT FACILITY - INTERIM STORAGE
FACILITY - UNESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 2421-VIT
PREPARED BY: R. D. ADAMS
REPORT NAME: Cost Estimate Summary

DATE: 26-Jan-1998
TIME: 13:30:09
CHECKED BY: *[Signature]*
APPRD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	ENGINEERING, DESIGN AND INSPECTION			>> \$35,000,000
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	0	20,000,000
1.1.2	TITLE III INSPECTION	15,000,000	0	15,000,000
1.2	MANAGEMENT COSTS			>> \$55,337,700
1.2.1	PROJECT MANAGEMENT	28,000,000	0	28,000,000
1.2.2	CONSTRUCTION MANAGEMENT	27,337,700	0	27,337,700
1.3	CONSTRUCTION			>> \$273,376,540
1.3.1	GENERAL CONDITIONS	4,975,554	0	4,975,554
1.3.2	SITework	563,208	0	563,208
1.3.3	CONCRETE	27,781,559	0	27,781,559
1.3.5	METALS	11,441,457	0	11,441,457
1.3.7	THERMAL & MOISTURE PROTECTION	1,879,911	0	1,879,911
1.3.8	DOORS & WINDOWS	71,240	0	71,240
1.3.9	FINISHES	981,065	0	981,065
1.3.13	SPECIAL CONSTRUCTION	210,185,958	0	210,185,958
1.3.14	CONVEYING SYSTEMS	11,272,944	0	11,272,944
1.3.15	MECHANICAL	2,558,535	0	2,558,535
1.3.16	ELECTRICAL	1,665,109	0	1,665,109
1.5	G&A/PIF			>> \$16,334,715
1.5.1	G&A/PIF ADDER	16,334,715	0	16,334,715
1.5.2	PROCUREMENT FEES	2,733,765	0	>> \$2,733,765
SUBTOTAL INCLUDING ESCALATION		382,782,720	0	>> \$382,782,720
PROJECT CONTINGENCY				
MANAGEMENT RESERVE				>> \$29,244,502
CONTINGENCY				>> \$47,472,778
TOTAL ESTIMATED COST				>> \$459,500,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 13.00%

CONTINGENCY= 20.04%

Lockheed Martin Idaho Technologies Co.

Rev. 6/98

PROJECT NAME: VIT FACILITY - INTERIM STORAGE
FACILITY

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 2421-VIT
PREPARED BY: R. D. ADAMS

PAGE # 1

DATE 26-Jan-1998
TIME: 13:28:34

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
<u>1.1.1</u>	<u>DESIGN ENGINEERING TITLE I & II</u>											
11000000.00	TITLE I & II	1	LOT			0.000		20,000,000				20,000,000
	DESIGN ENGINEERING TITLE I & II S/T						0	\$20,000,000				\$20,000,000
<u>1.1.2</u>	<u>TITLE III INSPECTION</u>											
11000000.00	TITLE III	1	LOT			0.000		15,000,000				15,000,000
	TITLE III INSPECTION S/T						0	\$15,000,000				\$15,000,000
<u>1.2.1</u>	<u>PROJECT MANAGEMENT</u>											
11000000.00	PROJECT MANAGMENT	1	LOT			0.000		28,000,000				28,000,000
	PROJECT MANAGEMENT S/T						0	\$28,000,000				\$28,000,000
<u>1.2.2</u>	<u>CONSTRUCTION MANAGEMENT</u>											
11000000.00	CONSTRUCTION MANAGMENT @ 3% OF CONSTRUCTION	1	LOT			0.000		27,337,700				27,337,700
	CONSTRUCTION MANAGEMENT S/T						0	\$27,337,700				\$27,337,700
<u>1.3.1</u>	<u>GENERAL CONDITIONS</u>											
	SUPERVISION @ 5% OF LABOR HOURS	1	LOT		CARF GEN	35520.0	35,520	1,225,085				1,225,085

Rev. 6/96

PROJECT NAME: VIT FACILITY - INTERIM STORAGE

TYPE OF ESTIMATE: PLANNING

DATE 26-Jan-1998

FACILITY

PROJECT NO.: 2421-VIT

TIME: 13:28:34

LOCATION 1: INEEL/ICPP

PREPARED BY: R. D. ADAMS

REPORT NAME: Detail Cost Estimate Sheet

REQUESTOR: J. K. RAWLINS

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	GENERAL CONDITIONS											
	TRAINING @ 3% OF LABOR HOURS	1	LOT		SSWK GEN	21310.0	21,310	784,421				784,421
	SMALL TOOLS & CONSUMABLES @ 4% OF LABOR DOLLARS	1	LOT	981,140.00	GEN	0.000				981,140		981,140
	GENERAL CONDITIONS S/T						56,830	\$2,009,506		\$981,140		\$2,990,646
1.3.2	SITEWORK											
	TUNNEL EXCAVATION	6,150	CY		ENGR GEN	0.012	74	2,328	12,300			14,628
	TUNNEL BACKFILL	3,430	CY		ENGR GEN	0.060	206	6,493	6,860			13,353
	BUILDING EXCAVATION	68,740	CY		ENGR GEN	0.012	825	26,025	137,480			163,505
	BUILDING BACKFILL	20,640	CY		ENGR GEN	0.060	1,238	39,072	41,280			80,352
	BUILDING BERM FILL	30,000	CY		ENGR GEN	0.060	1,800	56,790	60,000			116,790
	HAUL AWAY EXCESS MATERIAL	20,000	CY		TRHV GEN	0.020	400	12,456	40,000			52,456
	SITEWORK S/T						4,543	\$143,164	\$297,920			\$441,084
1.3.3	CONCRETE											
	TUNNEL CONCRETE	1,360	CY	126.10	SKWK GEN	12.300	16,728	553,864	34,340	171,496		759,700
	BUILDING CONCRETE	23,550	CY	126.10	SKWK GEN	12.300	289,665	9,590,808	594,638	2,969,655		13,155,101
	CHARGE FACE SLAB	7,225	CY	121.70	SKWK GEN	8.000	57,800	1,913,758	22,614	879,283		2,815,655

Rev. 6/96

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-VIT**
PREPARED BY: **R. D. ADAMS**

DATE 26-Jan-1998

TIME: 13:28:34

REPORT NAME: **Detail Cost Estimate Sheet**[illegible]

Lockheed Martin Idaho Technologies Co.
 Rev. 6/96
 PROJECT NAME: VIT FACILITY - INTERIM STORAGE
 FACILITY
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
 PROJECT NO.: 2421-VIT
 PREPARED BY: R. D. ADAMS

PAGE # 4

DATE 26-Jan-1998
 TIME: 13:28:34
 REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
<u>1.3.8</u>	<u>DOORS & WINDOWS</u>											
	OVERHEAD DOORS	2	EA	16,000.00	SKWK GEN	75.000	150	4,967		32,000		36,967
	PERSONNEL DOORS	5	EA	1,000.00	SKWK GEN	10.000	50	1,656		5,000		6,656
	DOORS & WINDOWS S/T						200	\$6,622		\$37,000		\$43,622
<u>1.3.9</u>	<u>FINISHES</u>											
	PAINT STRUCTURAL STEEL	250,000	SF	0.10	PAINT GEN	0.080	20,000	558,800		25,000		583,800
	FINISHES S/T						20,000	\$558,800		\$25,000		\$583,800
<u>1.3.13</u>	<u>SPECIAL CONSTRUCTION</u>											
	SUPPORT BUILDING	3,600	SF			0.000					540,000	540,000
	VAULT TUBE ASSEMBLIES	5,160	EA	23,100.00	GEN IRON GEN	50.000	258,000	9,496,980		119,196,000		128,692,980
	SPECIAL CONSTRUCTION S/T						258,000	\$9,496,980		\$119,196,000	\$540,000	\$129,232,980
<u>1.3.14</u>	<u>CONVEYING SYSTEMS</u>											
	GANTRY CRANE	2	EA	2,500,000.00	SKWK GEN	1000.00	2,000	66,220		5,000,000		5,066,220
	TRANSFER CART IN TUNNEL	1	EA	300,000.00	SKWK GEN	500.000	500	16,555		300,000		316,555
	5 TON DECONTAMINATABLE BRIDGE CRANE	2	EA	250,000.00	SKWK GEN	300.000	600	19,866		500,000		519,866

Lockheed Martin Idaho Technologies Co.

Rev. 6/98

 PROJECT NAME: **VIT FACILITY - INTERIM STORAGE FACILITY**

 LOCATION 1: **INEEL/ICPP**

 REQUESTOR: **J. K. RAWLINS**
DETAILED COST ESTIMATE SHEET

 TYPE OF ESTIMATE: **PLANNING**

 PROJECT NO.: **2421-VIT**

 PREPARED BY: **R. D. ADAMS**

 PAGE # **5**

 DATE **26-Jan-1998**

 TIME: **13:28:34**

 REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.14	CONVEYING SYSTEMS											
	CASK MANUVERING HYDRAULIC PLATFORM	1	EA	1,000,000.00	SKWK GEN	1000.00	1,000	33,110		1,000,000		1,033,110
	CONVEYING SYSTEMS S/T						4,100	\$135,751		\$6,800,000		\$6,935,751
1.3.15	MECHANICAL											
	MISC. PIPING - ALLOW	1	LOT		GEN	0.000					100,000	100,000
	FIRE PROTECTION	75,000	SF		GEN	0.000					262,500	262,500
	HVAC	75,000	SF	11.20	SHEE GEN	0.180	13,500	467,910		840,000		1,307,910
	MECHANICAL S/T						13,500	\$467,910		\$840,000	\$362,500	\$1,670,410
1.3.16	ELECTRICAL											
	SWITCHGEAR AND TRANSFORMERS	1	LOT	270,000.00	ELEC GEN	660.000	660	21,985		270,000		291,985
	LIGHTING	75,000	SF		ELEC GEN	0.000					206,250	206,250
	RACEWAYS & ENCLOSURES	1	LOT	64,000.00	ELEC GEN	1700.00	1,700	56,627		64,000		120,627
	CONDUCTORS & GROUNDING	1	LOT	131,000.00	ELEC GEN	2300.00	2,300	76,613		131,000		207,613
	WIRING DEVICES & SPECIAL SYSTEMS	1	LOT	171,000.00	ELEC GEN	1630.00	1,630	54,295		171,000		225,295
	INSTRUMENTATION & CONTROLS	1	LOT	5,100.00	ELEC GEN	230.000	230	7,661		5,100	6,500	19,261
	TESTING	1	LOT		ELEC GEN	350.000	350	11,659				11,659
	ELECTRICAL S/T						6,870	\$228,840		\$641,100	\$212,750	\$1,082,690

Lockheed Martin Idaho Technologies Co.
 Rev. 6/90
 PROJECT NAME: VIT FACILITY - INTERIM STORAGE
 FACILITY
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
 PROJECT NO.: 2421-VIT
 PREPARED BY: R. D. ADAMS

PAGE # 6
 DATE 26-Jan-1998
 TIME: 13:28:34
 REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.5.1 00701000	G&A/PIF ADDER G&A	1	LOT			0.000					1,088,766	1,088,766
	PIF	1	LOT			0.000					15,245,949	15,245,949
	G&A/PIF ADDER S/T						0				\$16,334,715	\$16,334,715
	PROJECT SUBTOTAL						767,252	\$116,875,754	\$949,512	\$137,902,234	\$19,638,465	\$275,365,964

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **VIT FACILITY - INTERIM STORAGE
FACILITY - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**
CONTINGENCY ANALYSIS

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-VIT**
 PREPARED BY: **R. D. ADAMS**

 DATE: **26-Jan-1998**
 TIME: **13:30:14**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	5.22	20	35	1.04	1.83	1.541%	7.69%	5,897,055	25,897,055
1.1.2	TITLE III INSPECTION	15,000,000	3.92	20	30	0.78	1.18	0.980%	4.89%	3,748,128	18,748,128
1.2.1	PROJECT MANAGEMENT	28,000,000	7.31	20	35	1.46	2.56	2.158%	10.76%	8,255,877	36,255,877
1.2.2	CONSTRUCTION MANAGEMENT	27,337,700	7.14	20	30	1.43	2.14	1.785%	8.90%	6,831,014	34,168,714
1.3.1	GENERAL CONDITIONS	4,975,554	1.30	20	35	0.26	0.45	0.383%	1.91%	1,467,056	6,442,610
1.3.2	SITWORK	563,208	0.15	20	30	0.03	0.04	0.037%	0.18%	140,732	703,940
1.3.3	CONCRETE	27,781,559	7.26	20	30	1.45	2.18	1.814%	9.05%	6,941,923	34,723,482
1.3.5	METALS	11,441,457	2.99	20	25	0.60	0.75	0.613%	3.06%	2,344,328	13,785,785
1.3.7	THERMAL & MOISTURE PROTECTION	1,879,911	0.49	20	30	0.10	0.15	0.123%	0.61%	469,743	2,349,654
1.3.8	DOORS & WINDOWS	71,240	0.02	20	20	0.00	0.00	0.003%	0.01%	11,393	82,633
1.3.9	FINISHES	981,065	0.26	20	35	0.05	0.09	0.076%	0.38%	289,270	1,270,335
1.3.13	SPECIAL CONSTRUCTION	210,185,958	54.91	20	20	10.98	10.98	8.786%	43.81%	33,612,968	243,798,926
1.3.14	CONVEYING SYSTEMS	11,272,944	2.94	20	25	0.59	0.74	0.604%	3.01%	2,309,800	13,582,744
1.3.15	MECHANICAL	2,558,535	0.67	20	30	0.13	0.20	0.167%	0.83%	639,314	3,197,849
1.3.16	ELECTRICAL	1,665,109	0.44	20	25	0.09	0.11	0.089%	0.44%	341,177	2,006,286
1.5.1	G&A/PIF ADDER	16,334,715	4.27	5	20	0.21	0.85	0.747%	3.72%	2,857,148	19,191,863
1.5.2	PROCUREMENT FEES	2,733,765	0.71	20	25	0.14	0.18	0.146%	0.73%	560,142	3,293,907
	ESCALATION	0	0.00	20	25	0.00	0.00	0.000%	0.00%	212	212
SUBTOTAL		382,782,720	100.00					20.052%			
CALCULATED CONTINGENCY		76,755,379									
RESULTANT TEC		459,538,099									
ROUNDED TEC		459,500,000									
PROJECT CONTINGENCY		76,717,280						20.04%			
MANAGEMENT RESERVE		29,244,502									
CONTINGENCY		47,472,778									
TOTAL ESTIMATED COST		459,500,000								76,717,280	459,500,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE III/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

CONTINGENCY ANALYSIS

 PROJECT NAME: **VIT FACILITY - INTERIM STORAGE
FACILITY - ESCALATED
INEEL/ICPP**
 LOCATION 1:
 REQUESTOR: **J. K. RAWLINS**

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-VIT**
 PREPARED BY: **R. D. ADAMS**

 DATE: **26-Jan-1998**
 TIME: **13:32:06**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	20,000,000	3.84	20	35	0.77	1.34	1.132%	5.61%	5,899,896	25,899,896
1.1.2	TITLE III INSPECTION	15,000,000	2.88	20	30	0.58	0.86	0.720%	3.57%	3,749,934	18,749,934
1.2.1	PROJECT MANAGEMENT	28,000,000	5.37	20	35	1.07	1.88	1.585%	7.86%	8,259,854	36,259,854
1.2.2	CONSTRUCTION MANAGEMENT	27,337,700	5.25	20	30	1.05	1.57	1.312%	6.50%	6,834,304	34,172,004
1.3.1	GENERAL CONDITIONS	4,975,554	0.95	20	35	0.19	0.33	0.282%	1.40%	1,467,762	6,443,316
1.3.2	SITEWORK	563,208	0.11	20	30	0.02	0.03	0.027%	0.13%	140,800	704,008
1.3.3	CONCRETE	27,781,559	5.33	20	30	1.07	1.60	1.333%	6.61%	6,945,267	34,726,826
1.3.5	METALS	11,441,457	2.20	20	25	0.44	0.55	0.450%	2.23%	2,345,457	13,786,914
1.3.7	THERMAL & MOISTURE PROTECTION	1,879,911	0.36	20	30	0.07	0.11	0.090%	0.45%	469,969	2,349,880
1.3.8	DOORS & WINDOWS	71,240	0.01	20	20	0.00	0.00	0.002%	0.01%	11,398	82,638
1.3.9	FINISHES	981,065	0.19	20	35	0.04	0.07	0.056%	0.28%	289,409	1,270,474
1.3.13	SPECIAL CONSTRUCTION	210,185,958	40.34	20	20	8.07	8.07	6.454%	31.99%	33,629,158	243,815,116
1.3.14	CONVEYING SYSTEMS	11,272,944	2.16	20	25	0.43	0.54	0.443%	2.20%	2,310,913	13,583,857
1.3.15	MECHANICAL	2,558,535	0.49	20	30	0.10	0.15	0.123%	0.61%	639,622	3,198,157
1.3.16	ELECTRICAL	1,665,109	0.32	20	25	0.06	0.08	0.066%	0.32%	341,341	2,006,450
1.5.1	G&A/PIF ADDER	16,334,715	3.13	5	20	0.16	0.63	0.549%	2.72%	2,858,525	19,193,240
1.5.2	PROCUREMENT FEES	2,733,765	0.52	20	25	0.10	0.13	0.108%	0.53%	560,412	3,294,177
	ESCALATION	138,309,607	26.54	20	25	5.31	6.64	5.441%	26.98%	28,353,652	166,663,259
SUBTOTAL		521,092,327	100.00					20.171%			
CALCULATED CONTINGENCY		105,108,848									
RESULTANT TEC		626,201,175									
ROUNDED TEC		626,200,000									
PROJECT CONTINGENCY		105,107,673						20.17%			
MANAGEMENT RESERVE		40,064,968									
CONTINGENCY		65,042,705									
TOTAL ESTIMATED COST		626,200,000								105,107,673	626,200,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE II/AFC Market Conditions

G&A/PIF ADDER CALCULATION SHEET

PROCUREMENT FEE:

CONSTRUCTION =	\$273,376,541	
GFE =	\$0	
Subtotal	\$273,376,541	
FEE @ 1% =	\$273,376,541	* 0.01 = \$2,733,765.41

G&A @ 23% (with a ceiling of \$500,000 imposed per year)

CONSTRUCTION OR CEILING * 4 YEARS =	\$2,000,000	
GFE =	\$0	
PROCUREMENT FEE =	\$2,733,765	
Subtotal	\$4,733,765	
FEE @ 23% =	\$4,733,765	* 0.23 = \$1,088,766

PIF @ 5.5%

CONSTRUCTION =	\$273,376,541	
GFE =	\$0	
PROCUREMENT FEE =	\$2,733,765	
G&A =	\$1,088,766	
Subtotal	\$277,199,072	
FEE @ 5.5% =	\$277,199,072	* 0.055 = \$15,245,949

TOTAL PROCUREMENT FEE:	\$2,733,765
TOTAL G&A FEE:	\$1,088,766
TOTAL PIF:	\$15,245,949

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: VIT FACILITY - INTERIM STORAGE
FACILITY - OPC - ESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 242101
PREPARED BY: R. D. ADAMS
REPORT NAME: Cost Estimate Summary

DATE: 26-Jan-1998
TIME: 13:24:40
CHECKED BY: *[Signature]*
APPROD BY: *[Signature]*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> <u>\$5,850,000</u>
1.1.1	CONCEPTUAL DESIGN	5,000,000	850,000	5,850,000
1.2	<u>MANAGEMENT COSTS</u>			>> <u>\$4,760,000</u>
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	570,000	3,570,000
1.2.2	SAFETY REVIEWS	1,000,000	190,000	1,190,000
1.3	<u>PERMITTING</u>			>> <u>\$3,246,834</u>
1.3.1	PERMITTING	2,728,432	518,402	3,246,834
1.4	<u>TURNOVER</u>			>> <u>\$6,525,000</u>
1.4.1	SO TEST & STARTUP	4,500,000	2,025,000	6,525,000
1.5.2	PROCUREMENT FEES	0	0	>> <u>\$0</u>
SUBTOTAL INCLUDING ESCALATION		16,228,432	4,153,402	>> <u>\$20,381,834</u>
PROJECT CONTINGENCY				
MANAGEMENT RESERVE				>> <u>\$0</u>
CONTINGENCY				>> <u>\$5,118,166</u>
TOTAL ESTIMATED COST				>> <u>\$25,500,000</u>

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 60.00%

CONTINGENCY= 25.11%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: **VIT FACILITY - INTERIM STORAGE
FACILITY - OPC - UNESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **242101**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **26-Jan-1998**
TIME: **13:18:17**
CHECKED BY: *[Signature]*
APPROD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> \$5,000,000
1.1.1	CONCEPTUAL DESIGN	5,000,000	0	5,000,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$4,000,000
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	0	3,000,000
1.2.2	SAFETY REVIEWS	1,000,000	0	1,000,000
1.3	<u>PERMITTING</u>			>> \$2,728,432
1.3.1	PERMITTING	2,728,432	0	2,728,432
1.4	<u>TURNOVER</u>			>> \$4,500,000
1.4.1	SO TEST & STARTUP	4,500,000	0	4,500,000
1.5.2	PROCUREMENT FEES	0	0	\$0
SUBTOTAL INCLUDING ESCALATION		16,228,432	0	>> \$16,228,432
PROJECT CONTINGENCY				
MANAGEMENT RESERVE				>> \$0
CONTINGENCY				>> \$7,571,568
TOTAL ESTIMATED COST				>> \$23,800,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 69.00%

CONTINGENCY= 46.66%

Rev. 6/96

PROJECT NAME: **VIT FACILITY - INTERIM STORAGE**

FACILITY - OPC

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 242101

PREPARED BY: R. D. ADAMS

PAGE # 1

DATE 26-Jan-1998

TIME: 13:17:46

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

PROJECT NAME: VIT FACILITY - INTERIM STORAGE

FACILITY - OPC

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 242101

PREPARED BY: R. D. ADAMS

PAGE # 2

DATE 26-Jan-1998

TIME: 13:17:46

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	PERMITTING QUALITY REVIEWS	1	LOT			0.000					500,000	500,000
	PERMITTING S/T						13,040	\$988,432			\$1,740,000	\$2,728,432
1.4.1	SO TEST & STARTUP											
	ORR	1	LOT			0.000		2,000,000				2,000,000
	SO TEST & TRAINING	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SO TEST & STARTUP S/T						0	\$3,000,000				\$3,000,000
1.4.1.1	PROJECT SUPPORT SUPPORT DURING DESIGN, CONSTRUCTION & STARTUP	1	LOT		LIMITCO	0.000		1,500,000				1,500,000
	PROJECT SUPPORT S/T						0	\$1,500,000				\$1,500,000
	PROJECT SUBTOTAL						13,040	\$14,488,432	\$0	\$0	\$1,740,000	\$16,228,432

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **VIT FACILITY - INTERIM STORAGE
FACILITY - OPC - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242101**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **13:18:21**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	30.81	20	30	6.16	9.24	7.703%	30.81%	2,332,809	7,332,809
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	18.49	20	30	3.70	5.55	4.622%	18.49%	1,399,686	4,399,686
1.2.2	SAFETY REVIEWS	1,000,000	6.16	20	30	1.23	1.85	1.541%	6.16%	466,562	1,466,562
1.3.1	PERMITTING	2,728,432	16.81	20	30	3.36	5.04	4.203%	16.81%	1,272,982	4,001,414
1.4.1	SO TEST & STARTUP	4,500,000	27.73	20	30	5.55	8.32	6.932%	27.73%	2,099,529	6,599,529
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	0	0.00	20	30	0.00	0.00	0.000%	0.00%	0	0
SUBTOTAL		16,228,432	100.00					25.000%			
CALCULATED CONTINGENCY		4,057,108									
RESULTANT TEC		20,285,540									
ROUNDED TEC		23,800,000									
PROJECT CONTINGENCY		7,571,568						46.66%			
MANAGEMENT RESERVE		0									
CONTINGENCY		7,571,568									
TOTAL ESTIMATED COST		23,800,000								7,571,568	23,800,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **VIT FACILITY - INTERIM STORAGE
FACILITY - OPC - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242101**
 PREPARED BY: **R. D. ADAMS**

DATE: **26-Jan-1998**
 TIME: **13:24:44**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency			Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	24.53	20	30	4.91	7.36	6.133%	24.53%	1,255,571	6,255,571
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	14.72	20	30	2.94	4.42	3.680%	14.72%	753,342	3,753,342
1.2.2	SAFETY REVIEWS	1,000,000	4.91	20	30	0.98	1.47	1.227%	4.91%	251,114	1,251,114
1.3.1	PERMITTING	2,728,432	13.39	20	30	2.68	4.02	3.347%	13.39%	685,148	3,413,580
1.4.1	SO TEST & STARTUP	4,500,000	22.08	20	30	4.42	6.62	5.520%	22.08%	1,130,013	5,630,013
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	4,153,402	20.38	20	30	4.08	6.11	5.094%	20.38%	1,042,978	5,196,380
SUBTOTAL		20,381,834	100.00					25.000%			
CALCULATED CONTINGENCY		5,095,459									
RESULTANT TEC		25,477,293									
ROUNDED TEC		25,500,000									
PROJECT CONTINGENCY		5,118,166						25.11%			
MANAGEMENT RESERVE		0									
CONTINGENCY		5,118,166									
TOTAL ESTIMATED COST		25,500,000								5,118,166	25,500,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

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CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%

Experimental/Special Conditions.....Up to 50%

Conceptual 15% - 25%

Experimental/Special Conditions.....Up to 40%

TITLE I 10% - 20%

TITLE II 5% - 15%

TITLE II/AFC Market Conditions

VVO VITRIFICATION FACILITY INTERIM STORAGE FACILITY

Project: 2421-VIT.MPP
Date: Mon 1/26/98

Task

Progress

Milestone

Summary

Rolled Up Task

Rolled Up Milestone

Rolled Up Progress

Lockheed Martin Idaho Technologies Company**INTERDEPARTMENTAL COMMUNICATION****Date:** February 3, 1998**To:** John K. Rawlins MS 3765 6-4304**From:** R. J. Turk MS 3875 6-3611**Subject:** ECONOMIC AND LIFE CYCLE ANALYSIS CONDUCTED for the HIGH LEVEL WASTE (HLW) INTERIM STORAGE FACILITY-TRU -RJT-23-98**Purpose:**

As requested an Economic and Life-Cycle Cost (LCC) has been conducted to evaluate for the HLW-TRU INTERIM STORAGE FACILITY. The storage facility was evaluated based on a scoping study that incorporate appropriate design features from the Flour Daniel Corp. design for interim storage. This storage facility will be used to house canisters resulting from the HLW production option until final repository disposition.

This economic analysis is based on information provided by J. K. Rawlins, and K. L. Williams. R. D. Adams provided cost estimates. B.L. Blakely and D.E. Keller provided process personnel modeling.

Methodology:

The Economic Evaluation assumed a 73-year period (1999-2071) since this is the estimated time required to complete all of the anticipated remediation activities. The LCC identified and evaluated the initial development, construction, operating and post operating costs over the life-cycle. A discounted LCC analysis assumes a 1998-dollar basis, discounted 6.3% annually per the Office of Management and Budget (OMB) Circular A-94 for escalated costs. All costs are conservatively discounted assuming the end-of-year convention.

Assumptions:

The scope of work and requirements of all related activities are vague at this time. Facility and processing costs were developed from historical experience associated with DD&D work at the INEEL. The LCC analysis was generated to match cost estimating cost structure. These costs include Permitting, Direct and Indirect Construction, G&A, Procurement Fee, Engineering, Inspection, Project Management, Construction Management, Escalation and Contingency costs.

The design period is assumed to be accomplished in five-years with construction completed in two-years. Labor rates were assumed as follows: Managers, \$125/hr; Engineers, \$108 \$/hr; Other Technicians \$ 85/hr; Administration/support staff \$ 65/hr; Operators and Maintenance personnel \$ 65/hr. The operational period for this facility was assumed to be twenty years, to match the appropriate operating facility. This period is followed by five years for shipping to the repository, followed by three years of post-operations activities. Due to this project's lack of complexity and non-radioactive contaminated environment, this analysis assumed a decommissioning cost equal to 10% of the non-escalated engineering design cost, decontamination costs equal to 0% of non-escalated total pre-operation cost, and demolition costs equal to 8% of the non-escalated total pre-operation cost. Utilities were calculated assuming a \$.0824 per kWh. Surveillance and Monitoring costs were calculated at \$65,000 per year for manned security during operations then reduced to \$10,000 for remote surveillance during non-operation periods.

Results:

The HLW-TRU INTERIM STORAGE FACILITY has a discounted LCC of \$ 89.5 million.

Attachments:

cc: R. J. Turk File

escalated HLW Interim Storage Facility-TRU Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year counting year Escalation Factor	1999 1	2000 2	2001 3	2002 4	2003 5	2004 6	2005 7	2006 8	2007 9	2008 10
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting		3,578	3,578	3,578							
Testing and Start-up											
Total OPC (unescalated)		3,578	3,578	3,578	0	0	0	0	0	0	0
plus escalation of		967	967	967	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		1,140	1,140	1,140	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		5,683	5,683	5,683	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		3,578	3,578	3,578	0	0	0	0	0	0	0
plus escalation of		967	967	967	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		1,140	1,140	1,140	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		5,683	5,683	5,683	0	0	0	0	0	0	0
Operations 2080 hr-ship/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @ \$125 /hr.											
Engineers 0 FTE @ \$108 /hr.											
Other Tech. 0.5 FTE @ \$95 /hr.											
Administration/Support 0.5 FTE @ \$95 /hr.											
Operations/Process Facility 5											
Managers 0 FTE @ \$125 /hr.											
Engineers 0 FTE @ \$108 /hr.											
Other Tech. 0 FTE @ \$95 /hr.											
Supervisors 1 FTE @ \$95 /hr.											
Administration/Support 1 FTE @ \$95 /hr.											
Operators 2 FTE @ \$95 /hr.											
Maintenance 1 FTE @ \$95 /hr.											
Utilities 525 kw \$0.0624 /kwh											
Maintenance 2.00% of 45,530											
Monitoring/Surveillance 2.00 \$85,000.00 yr											
Operations subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)		3,578	3,578	3,578	0	0	0	0	0	0	0
Cumulative Total LCC (unescalated)		3,578	7,152	10,728	10,728	10,728	10,728	10,728	10,728	10,728	10,728
Total Cost (w/ escalation, mgt reserve, & contingency)		5,683	5,683	5,683	0	0	0	0	0	0	0
Cumulative Total LCC (escalated)		5,683	11,366	17,049	17,049	17,049	17,049	17,049	17,049	17,049	17,049
discount factor @ OMB discount rate of 6.30% for escalated costs		1.063	1.130	1.201	1.277	1.357	1.443	1.534	1.630	1.733	1.842
Discounted Annual Cost		\$5,346	\$5,029	\$4,731	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cumulative Discounted LCC		5,346	10,375	15,107	15,107	15,107	15,107	15,107	15,107	15,107	15,107

escalated HLW Interim Storage Facility-TRU Life-Cycle Cost (LCC) Analysis (ALL COST X1000)		fiscal year counting year Escalation Factor	2009 11 1.350	2010 12 1.387	2011 13 1.428	2012 14 1.468	2013 15 1.507	2014 16 1.550	2015 17 1.593	2016 18 1.638	2017 19 1.683	2018 20 1.730
Other Project Cost (OPC)												
OPC unescalated												
Conceptual Design, Project Mgt, & Permitting Testing and Start-up												
Total OPC (unescalated)			0	0	0	0	0	4,500	0	0	0	0
plus escalation of			0	0	0	0	0	1,217	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	1,434	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency			0	0	0	0	0	7,151	0	0	0	0
Total Estimated Cost (TEC)												
TEC unescalated												
Title Design, Inspection				2,650	7,951							
Project mgt				495	1,079	1,079	1,484					
Construction Mgt						2,120	2,120					
Construction, Equip, Q&A & Procurement						22,765	22,765					
Total TEC (unescalated)			0	3,145	9,030	26,864	26,369	0	0	0	0	0
plus escalation of			0	1,427	4,504	12,186	11,961	0	0	0	0	0
plus management reserve of			0	315	995	2,693	2,644	0	0	0	0	0
plus contingency of			0	677	2,137	5,780	5,074	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency			0	5,564	17,566	47,523	46,648	0	0	0	0	0
Total Project Cost (TPC)												
TPC unescalated			0	3,145	9,030	26,864	26,369	4,500	0	0	0	0
plus escalation of			0	1,427	4,504	12,186	11,961	1,217	0	0	0	0
plus management reserve of			0	315	995	2,693	2,644	0	0	0	0	0
plus contingency of			0	677	2,137	5,780	5,074	1,434	0	0	0	0
Total TPC including esc, mgt res, contingency			0	5,564	17,566	47,523	46,648	7,151	0	0	0	0
Operations 2080 hr./shift/yr.												
Facility/Administration 1.5												
Managers 0.5 FTE @ \$125 /hr.								65	130	130	130	130
Engineers 0 FTE @ \$108 /hr.								0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.								44	88	88	88	88
Administration/Support 0.5 FTE @ \$65 /hr.								34	68	68	68	68
Operations/Process Facility 5												
Managers 0 FTE @ \$125 /hr.								0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.								0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.								0	0	0	0	0
Supervisors 1 FTE @ \$85 /hr.								88	177	177	177	177
Administration/Support 1 FTE @ \$65 /hr.								68	135	135	135	135
Operations 2 FTE @ \$65 /hr.								135	270	270	270	270
Maintenance 1 FTE @ \$65 /hr.								68	135	135	135	135
Utilities 525 kw \$0.0824 /kwh								45	90	90	90	90
Maintenance 2.00% of 45,530								455	455	455	455	455
Monitoring/Surveillance 2.00 \$65,000.00 yr								65	130	130	130	130
Operations subtotal (unescalated)			0	0	0	0	0	1,087	1,079	1,079	1,079	1,079
plus Escalation			0	0	0	0	0	586	995	1,070	1,147	1,220
plus Operations Contingency @ 30.0%			0	0	0	0	0	496	802	825	848	972
Total Operations (w/ escalation & contingency)			0	0	0	0	0	2,150	3,477	3,574	3,674	3,777
Post Operations												
Decommission 10.00% of Engineering costs												
Decontamination 0.00% of Pre-operation Costs												
Demolition 8.00% of Pre-operation Costs												
Post-Operations Subtotal (unescalated)			0	0	0	0	0	0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)			0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)			0	3,145	9,030	26,864	26,369	5,567	1,079	1,079	1,079	1,079
Cumulative Total LCC (unescalated)			10,728	13,873	23,803	50,687	77,036	82,604	84,282	85,961	87,640	89,319
Total Cost (w/ escalation, mgt reserve, & contingency)			0	5,564	17,566	47,523	46,648	9,301	3,477	3,574	3,674	3,777
Cumulative Total LCC (escalated)			17,049	22,612	40,178	87,701	134,349	143,650	147,126	150,700	154,374	158,151
discount factor @ OMB discount rate of 6.30% for escalated costs			1,958	2,062	2,213	2,352	2,500	2,658	2,825	3,003	3,193	3,394
Discounted Annual Cost			\$0	\$2,673	\$7,639	\$20,204	\$18,657	\$3,499	\$1,231	\$1,190	\$1,151	\$1,113
Cumulative Discounted LCC			15,107	17,779	25,718	45,922	64,578	68,078	69,308	70,498	71,649	72,782

escalated HLW Interim Storage Facility-TRU Life-Cycle Cost (LCC) Analysis (ALL COST X1000)			fiscal year counting year Escalation Factor											
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
			21 1,779	22 1,829	23 1,880	24 1,933	25 1,987	26 2,042	27 2,100	28 2,158	29 2,219	30 2,281		
Other Project Cost (OPC)														
Conceptual Design, Project Mgt., & Permitting														
Testing and Start-up														
Total OPC (unescalated)			0	0	0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency			0	0	0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip., G&A & Procurement														
Total TEC (unescalated)			0	0	0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency			0	0	0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated			0	0	0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0	0	0
Total TPC including asc, mgt res, contingency			0	0	0	0	0	0	0	0	0	0	0	0
Operations			2080 hr-shft/yr. 1.5											
Facility/Administration			130	130	130	130	130	130	130	130	130	130	130	130
Managers			0	0	0	0	0	0	0	0	0	0	0	0
Engineers			88	88	88	88	88	88	88	88	88	88	88	88
Other Tech.			68	68	68	68	68	68	68	68	68	68	68	68
Administration/Support			5											
Operations/Process Facility			0	0	0	0	0	0	0	0	0	0	0	0
Managers			0	0	0	0	0	0	0	0	0	0	0	0
Engineers			0	0	0	0	0	0	0	0	0	0	0	0
Other Tech.			177	177	177	177	177	177	177	177	177	177	177	177
Supervisors			135	135	135	135	135	135	135	135	135	135	135	135
Administration/Support			270	270	270	270	270	270	270	270	270	270	270	270
Operators			135	135	135	135	135	135	135	135	135	135	135	135
Maintenance			90	90	90	90	90	90	90	90	90	90	90	90
Utilities			455	455	455	455	455	455	455	455	455	455	455	455
Maintenance			2.00%	45,530										
Monitoring/Surveillance			130	130	130	130	130	130	130	130	130	130	130	130
Operations subtotal (unescalated)			1,078	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079
plus Escalation			1,308	1,381	1,477	1,566	1,657	1,750	1,845	1,945	2,046	2,150	2,253	2,357
Total Operations (w/ escalation & contingency)			896	921	947	973	1,001	1,028	1,057	1,087	1,117	1,147	1,177	1,207
Total Operations (w/ escalation & contingency)			3,893	3,991	4,103	4,218	4,336	4,457	4,582	4,711	4,842	4,976	5,107	5,238
Post Operations														
Decommission			10.00% of Engineering costs											
Decontamination			0.00% of Pre-operation Costs											
Demolition			6.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)														
plus Escalation														
Total Post-Operations (w/ escalation & contingency)			30.0%											
Total Cost (unescalated)			1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079	1,079
Total Cost (w/ escalation, mgt reserve, & contingency)			90,996	92,077	94,356	96,035	97,713	99,392	101,071	102,750	104,429	106,108	107,787	109,466
Cumulative Total LCC (unescalated)			3,893	3,991	4,103	4,218	4,336	4,457	4,582	4,711	4,842	4,976	5,107	5,238
Cumulative Total LCC (escalated)			162,033	160,025	170,128	174,346	178,862	183,139	187,722	192,432	197,275	202,253	207,231	212,209
discount factor @ OMB discount rate of			3,607	3,635	4,078	4,333	4,608	4,898	5,205	5,533	5,881	6,252	6,652	7,081
Discounted Annual Cost			\$1,076	\$1,041	\$1,007	\$973	\$941	\$910	\$880	\$851	\$823	\$796	\$769	\$742
Cumulative Discounted LCC			73,638	74,979	75,886	76,859	77,801	78,711	79,591	80,443	81,268	82,062	82,826	83,561

escalated HLW Interim Storage Facility-TRU
Life-Cycle Cost (LCC) Analysis
(ALL COST X1000)

fiscal year
counting year
Escalation Factor

			2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
			31	32	33	34	35	36	37	38	39	40
			2.345	2.410	2.478	2.547	2.619	2.692	2.767	2.845	2.924	3.006
Other Project Cost (OPC)												
OPC unescalated												
Conceptual Design, Project Mgt, & Permitting												
Testing and Start-up												
Total OPC (unescalated)			0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency			0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)												
TEC unescalated												
Title Design, Inspection												
Project mgt												
Construction Mgt												
Construction, Equip, G&A & Procurement												
Total TEC (unescalated)			0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency			0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)												
TPC unescalated			0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency			0	0	0	0	0	0	0	0	0	0
Operations												
2080 hr-shif/yr.												
Facility/Administration 1.5												
Managers 0.5 FTE @ \$125 /hr.			130	130	130	130	130					
Engineers 0 FTE @ \$108 /hr.			0	0	0	0	0					
Other Tech. 0.5 FTE @ \$85 /hr.			88	88	88	88	88					
Administration/Support 0.5 FTE @ \$65 /hr.			88	88	88	88	88					
Operations/Process Facility 5												
Managers 0 FTE @ \$125 /hr.			0	0	0	0	0					
Engineers 0 FTE @ \$108 /hr.			0	0	0	0	0					
Other Tech. 0 FTE @ \$85 /hr.			0	0	0	0	0					
Supervisors 1 FTE @ \$85 /hr.			177	177	177	177	177					
Administration/Support 1 FTE @ \$65 /hr.			135	135	135	135	135					
Operators 2 FTE @ \$85 /hr.			270	270	270	270	270					
Maintenance 1 FTE @ \$85 /hr.			135	135	135	135	135					
Utilities 525 kw \$0.0824 /kwh			90	90	90	90	90					
Maintenance 2.00% of 45,530			455	455	455	455	455					
Monitoring/Surveillance 2.00 yr \$65,000.00			130	130	130	130	130	10	10	10	10	10
Operations subtotal (unescalated)			1,679	1,679	1,679	1,679	1,679	10	10	10	10	10
plus Escalation			2,258	2,368	2,481	2,598	2,717	17	18	18	19	20
plus Operations Contingency @ 30.0%			1,181	1,214	1,248	1,283	1,319	8	8	9	9	9
Total Operations (w/ escalation & contingency)			5,117	5,261	5,408	5,559	5,715	35	36	37	38	39
Post Operations												
Decommission 10.00% of Engineering costs												
Decontamination 0.00% of Pre-operation Costs												
Demolition 8.00% of Pre-operation Costs												
Post-Operations Subtotal (unescalated)			0	0	0	0	0	0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)			0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)												
Cumulative Total LCC (unescalated)			1,679	1,679	1,679	1,679	1,679	10	10	10	10	10
Total Cost (w/ escalation, mgt reserve, & contingency)			107,787	109,466	111,144	112,823	114,502	114,512	114,522	114,532	114,542	114,552
Cumulative Total LCC (escalated)			5,117	5,261	5,408	5,559	5,715	35	36	37	38	39
discount factor @ OMB discount rate of 6.30% for escalated costs			207,370	212,631	218,039	223,599	229,314	229,349	229,385	229,422	229,460	229,499
Discounted Annual Cost			8,646	7,064	7,509	7,982	8,485	9,020	9,588	10,192	10,834	11,517
Cumulative Discounted LCC			\$770	\$745	\$720	\$696	\$674	\$654	\$634	\$614	\$594	\$574
			82,832	83,577	84,297	84,994	85,667	85,671	85,675	85,679	85,682	85,686

escalated HLW Interim Storage Facility-TRU Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor	2039 41 3.090	2040 42 3.177	2041 43 3.268	2042 44 3.357	2043 45 3.451	2044 46 3.548	2045 47 3.647	2046 48 3.750	2047 49 3.855	2048 50 3.962
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shft/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @				\$125 / hr.										
Engineers 0 FTE @				\$108 / hr.										
Other Tech. 0.5 FTE @				\$85 / hr.										
Administration/Support 0.5 FTE @				\$85 / hr.										
Operations/Process Facility 5														
Managers 0 FTE @				\$125 / hr.										
Engineers 0 FTE @				\$108 / hr.										
Other Tech. 0 FTE @				\$85 / hr.										
Supervisors 1 FTE @				\$85 / hr.										
Administration/Support 1 FTE @				\$85 / hr.										
Operators 2 FTE @				\$85 / hr.										
Maintenance 1 FTE @				\$85 / hr.										
Utilities 525 kw				\$0.0824 / kwh										
Maintenance 2.00% of				45,530										
Monitoring/Surveillance 2.00				\$85,000.00 yr	10	10	10	10	10	10	10	10	10	10
Operations subtotal (unescalated)					10	10	10	10	10	10	10	10	10	10
plus Escalation					21	22	23	24	25	25	26	27	29	30
plus Operations Contingency @ 30.0%					9	10	10	10	10	11	11	11	12	12
Total Operations (w/ escalation & contingency)					40	41	42	44	45	46	47	49	50	52
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					10	10	10	10	10	10	10	10	10	10
Cumulative Total LCC (unescalated)					114,562	114,572	114,582	114,592	114,602	114,612	114,622	114,632	114,642	114,652
Total Cost (w/ escalation, mgt reserve, & contingency)					40	41	42	44	45	46	47	49	50	52
Cumulative Total LCC (escalated)					229,539	229,580	229,623	229,667	229,711	229,758	229,805	229,854	229,904	229,955
discount factor @ OMB discount rate of 6.30%				for escalated costs	12.242	13.014	13.833	14.705	15.631	16.616	17.663	18.776	19.959	21.216
Discounted Annual Cost					\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$2
Cumulative Discounted LCC					85,689	85,692	85,695	85,698	85,701	85,704	85,706	85,709	85,711	85,714

escalated HLW Interim Storage Facility-TRU Life-Cycle Cost (LCC) Analysis (ALL COST X1000)		fiscal year counting year Escalation Factor	2049 51 4.073	2050 52 4.187	2051 53 4.305	2052 54 4.425	2053 55 4.549	2054 56 4.677	2055 57 4.807	2056 58 4.942	2057 59 5.080	2058 60 5.223
Other Project Cost (OPC)												
OPC unescalated												
Conceptual Design, Project Mgt, & Permitting Testing and Start-up												
Total OPC (unescalated)			0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency			0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)												
TEC unescalated												
Title Design, Inspection Project mgt Construction Mgt Construction, Equip, G&A & Procurement												
Total TEC (unescalated)			0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency			0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)												
TPC unescalated			0	0	0	0	0	0	0	0	0	0
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency			0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shft/yr.												
Facility/Administration 1.5												
Managers 0.5 FTE @ \$125 /hr.												
Engineers 0 FTE @ \$108 /hr.												
Other Tech. 0.5 FTE @ \$85 /hr.												
Administration/Support 0.5 FTE @ \$65 /hr.												
Operations/Process Facility 5												
Managers 0 FTE @ \$125 /hr.												
Engineers 0 FTE @ \$108 /hr.												
Other Tech. 0 FTE @ \$85 /hr.												
Supervisors 1 FTE @ \$85 /hr.												
Administration/Support 1 FTE @ \$65 /hr.												
Operators 2 FTE @ \$65 /hr.												
Maintenance 1 FTE @ \$65 /hr.												
Utilities 525 kw \$0.0824 /kwh												
Maintenance 2.00% of 45,530												
Monitoring/Surveillance 2.00 of \$65,000.00 yr			10	10	10	10	10	10	10	10	10	10
Operations subtotal (unescalated)			10	10	10	10	10	10	10	10	10	10
plus Escalation			31	32	33	34	35	37	38	39	41	42
plus Operations Contingency @ 30.0%			12	13	13	13	14	14	14	15	15	16
Total Operations (w/ escalation & contingency)			53	54	56	58	59	61	62	64	66	68
Post Operations												
Decommission 10.00% of Engineering costs												
Decontamination 0.00% of Pre-operation Costs												
Demolition 8.00% of Pre-operation Costs												
Post-Operations Subtotal (unescalated)			0	0	0	0	0	0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)			0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)			10	10	10	10	10	10	10	10	10	10
Cumulative Total LCC (unescalated)			114,682	114,672	114,682	114,692	114,702	114,712	114,722	114,732	114,742	114,752
Total Cost (w/ escalation, mgt reserve, & contingency)			53	54	56	58	59	61	62	64	66	68
Cumulative Total LCC (escalated)			230,008	230,063	230,119	230,176	230,235	230,296	230,358	230,423	230,489	230,557
discount factor @ OMB discount rate of 6.30% for escalated costs			22,553	23,973	25,484	27,089	28,796	30,610	32,538	34,588	36,767	39,084
Discounted Annual Cost			\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
Cumulative Discounted LCC			85,718	85,718	85,721	85,723	85,725	85,727	85,729	85,731	85,732	85,734

[illegible]

escalated HLW Interim Storage Facility-TRU
Life-Cycle Cost (LCC) Analysis
(All Cost \$1000)

OLIM Project Cost (OPC) unescalated	fiscal year counting year Escalation Factor	2009 71 7.076	2070 72 7.275	2071 73 7.476	Total Cost
Conceptual Design, Project Mgt, & Permitting					10,728
Testing and Start-up					4,600
Total OPC (unescalated)					15,228
plus escalation of		0	0	0	4,118
plus management reserve of		0	0	0	0
plus contingency of		0	0	0	4,864
Total OPC including escalation, mgd reserve, & contingency		0	0	0	24,200
Total Estimated Cost (TEC)					
TEC unescalated					10,601
Title Design, Inspection					5,937
Project mgd					4,241
Construction Mgt					45,530
Total TEC (unescalated)					66,308
plus escalation of		0	0	0	30,078
plus management reserve of		0	0	0	6,847
plus contingency of		0	0	0	14,267
Total TEC including escalation, mgd reserve, contingency		0	0	0	117,300
Total Project Cost (TPC)					
TPC unescalated					81,538
plus escalation of		0	0	0	34,185
plus management reserve of		0	0	0	6,847
plus contingency of		0	0	0	10,121
Total TPC including esc, mgd res, contingency		0	0	0	141,500
Operations	2080 hr/yr 1.5				
Facility/Administration					3,185
Managers	0.5 FTE @				0
Engineers	0 FTE @				2,186
Other Tech	0.5 FTE @				1,652
Administration/Support	0.5 FTE @				0
Operations/Process Facility	5				0
Managers	0 FTE @				0
Engineers	0 FTE @				0
Other Tech	0 FTE @				0
Supervision	1 FTE @				4,332
Administration/Support	1 FTE @				3,312
Operators	2 FTE @				6,625
Maintenance	2 FTE @				3,312
Utilities	525 kW				2,205
Monitoring/Supervision	2.00 of				11,155
Operation Expend (unescalated)					3,485
plus Escalation		0	0	0	41,433
plus Operations Contingency @	30.0%	0	0	0	80,511
Total Operations (w/ escalation & contingency)		0	0	0	36,583
Post Operations					159,527
Decommission	10.00% of	1,060	1,060	1,060	3,180
Demolition	0.00% of	0	0	0	0
Post-Operations subtotal (unescalated)	8.00% of	6,523	6,523	6,523	19,569
plus Escalation		45,078	47,581	48,125	22,749
plus Post-Operations Contingency @	30.0%	16,098	16,548	17,013	142,784
Total Post-Operations (w/ escalation & contingency)		69,760	71,713	73,721	40,660
Total Cost (unescalated)					215,193
Cumulative Total LCC (unescalated)					145,718
Total Cost (w/ escalation, mgd reserve, & contingency)					515,220
Cumulative Total LCC (escalated)					515,220
Discount factor @ OMB discount rate of	6.30%	76,535	81,357	86,483	69,476
Discounted Annual Cost		\$911	\$881	\$852	
Cumulative Discounted LCC		87,742	89,524	91,476	

**CUMULATIVE DISCOUNTED LCC
HLW INTERIM STORAGE FACILITY-TRU**

TOTAL ANNUAL COST (escalated) HLW INTERIM STORAGE FACILITY-TRU

Lockheed Martin Idaho Technologies Company**INTERDEPARTMENTAL COMMUNICATION**

Date: January 30, 1998

To: John K. Rawlins MS 3765 6-4304

From: R. J. Turk MS 3875 6-3611

Subject: ECONOMIC AND LIFE CYCLE ANALYSIS CONDUCTED for the
VITRIFICATION INTERIM STORAGE FACILITIES- RJT-13-98

Purpose:

As requested an Economic and Life-Cycle Cost (LCC) has been conducted to evaluate for the INTERIM STORAGE FACILITIES. The storage facility was evaluated based on a scoping study that incorporate appropriate design features from the Flour Daniel Corp. design for interim storage. This storage facility will be used to house canisters resulting from the Vitrification production option until final repository disposition.

This economic analysis is based on information provided by J. K. Rawlins, and K. L. Williams. R. D. Adams provided cost estimates. B.L. Blakely provided process personnel modeling.

Methodology:

The Economic Evaluation assumed a 69-year period (2003-2071) since this is the estimated time required to complete all of the anticipated remediation activities. The LCC identified and evaluated the initial development, construction, operating and post operating costs over the life-cycle. A discounted LCC analysis assumes a 1998-dollar basis, discounted 6.3% annually per the Office of Management and Budget (OMB) Circular A-94 for escalated costs. All costs are conservatively discounted assuming the end-of-year convention.

Assumptions:

The scope of work and requirements of all related activities are vague at this time. Facility and processing costs were developed from historical experience associated with DD&D work at the INEEL. The LCC analysis was generated to match cost estimating cost structure. These costs include Permitting, Direct and Indirect Construction, G&A, Procurement Fee, Engineering, Inspection, Project Management, Construction Management, Escalation and Contingency costs.

The design period is assumed to be accomplished in five-years with construction completed in six-years. Labor rates were assumed as follows: Managers, \$125/hr; Engineers, \$108 \$/hr; Other Technicians \$ 85/hr; Administration/support staff \$ 65/hr; Operators and Maintenance personnel \$ 65/hr. The operational period for this facility was assumed to be twenty years, to match the appropriate operating facility. This period is followed by five years for shipping to the repository, followed by three years of post-operations activities. Due to this project's lack of complexity and non-radioactive contaminated environment, this analysis assumed a decommissioning cost equal to 10% of the non-escalated engineering design cost, decontamination costs equal to 0% of non-escalated total pre-operation cost, and demolition costs equal to 8% of the non-escalated total pre-operation cost. Utilities were calculated assuming a \$.0824 per kWh. Surveillance and Monitoring costs were calculated at \$65,000 per year for manned security during operations then reduced to \$10,000 for remote surveillance during non-operation periods.

Results:

The VITRIFICATION FACILITY INTERIM STORAGE has a discounted LCC of \$ 426 million.

Attachments:

cc: R. J. Turk File

escalated Vitrification Storage Facility Life-Cycle Cost (LCC) Analysis	fiscal year counting year Escalation Factor	1999 1	2000 2	2001 3	2002 4	2003 5	2004 6	2005 7	2006 8	2007 9	2008 10
		1.024	1.053	1.082	1.112	1.144	1.176	1.209	1.242	1.277	1.313
Other Project Cost (OPC)											
OPC unescalated						733	2,932	2,932	2,932	2,199	
Conceptual Design, Project Mgt, & Permitting Testing and Start-up						733	2,932	2,932	2,932	2,199	0
Total OPC (unescalated)		0	0	0	0	188	750	750	750	563	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	231	925	925	925	694	0
plus contingency of		0	0	0	0	1,152	4,607	4,607	4,607	3,455	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	1,152	4,607	4,607	4,607	3,455	0
Total Estimated Cost (TEC)											
TEC unescalated									4,565	6,067	6,067
Title Design, Inspection Project mgt									2,545	5,091	5,091
Construction Mgt											6,834
Construction, Equip, G&A & Procurement		0	0	0	0	0	0	0	7,111	11,178	73,111
Total TEC (unescalated)		0	0	0	0	0	0	0	2,569	4,039	91,124
plus escalation of		0	0	0	0	0	0	0	744	1,170	32,925
plus management reserve of		0	0	0	0	0	0	0	1,208	1,899	9,538
plus contingency of		0	0	0	0	0	0	0	11,632	18,286	15,484
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	11,632	18,286	149,070
Total Project Cost (TPC)											
TPC unescalated		0	0	0	0	733	2,932	2,932	10,043	13,377	91,124
plus escalation of		0	0	0	0	188	750	750	3,320	4,602	32,925
plus management reserve of		0	0	0	0	0	0	0	744	1,170	9,538
plus contingency of		0	0	0	0	231	925	925	2,133	2,593	15,484
Total TPC including esc, mgt res, contingency		0	0	0	0	1,152	4,607	4,607	16,240	21,741	149,070
Operations 2000 hr-shift/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @											
Engineers 0 FTE @											
Other Tech. 0.5 FTE @											
Administration/Support 0.5 FTE @											
Operations/Process Facility 5											
Managers 0 FTE @											
Engineers 0 FTE @											
Other Tech. 0 FTE @											
Supervisors 1 FTE @											
Administration/Support 1 FTE @											
Operators 2 FTE @											
Maintenance 1 FTE @											
Utilities 525 kW/yr											
Maintenance 2.00% of											
Monitoring/Surveillance 1.00											
Operations subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)		0	0	0	0	733	2,932	2,932	10,043	13,377	91,124
Cumulative Total LCC (unescalated)		0	0	0	0	733	3,685	6,597	16,540	30,017	121,141
Total Cost (w/ escalation, mgt reserve, & contingency)		0	0	0	0	1,152	4,607	4,607	16,240	21,741	149,070
Cumulative Total LCC (escalated)		0	0	0	0	1,152	5,759	10,366	28,608	49,348	197,418
discount factor @ OMB discount rate of 6.30% for escalated costs		1.083	1.130	1.201	1.277	1.357	1.443	1.534	1.630	1.733	1.842
Discounted Annual Cost		\$0	\$0	\$0	\$0	\$849	\$3,193	\$3,004	\$9,961	\$12,546	\$80,921
Cumulative Discounted LCC		0	0	0	0	849	4,042	7,046	17,007	29,553	110,473

escalated Vitrification Storage Facility Life-Cycle Cost (LCC) Analysis	fiscal year counting year Escalation Factor	2009 11 1.350	2010 12 1.387	2011 13 1.426	2012 14 1.466	2013 15 1.507	2014 16 1.550	2015 17 1.593	2016 18 1.638	2017 19 1.683	2018 20 1.730
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting					4,500						
Testing and Start-up											
Total OPC (unescalated)		0	0	0	4,500	0	0	0	0	0	0
plus escalation of		0	0	0	1,162	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	1,419	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	7,071	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection		6,087	6,087	6,087							
Project mgt		5,091	5,091	5,091							
Construction Mgt		6,834	6,834	6,834							
Construction, Equip, G&A & Procurement		73,111	73,111	73,111							
Total TEC (unescalated)		91,124	91,124	91,124	0	0	0	0	0	0	0
plus escalation of		32,925	32,925	32,925	0	0	0	0	0	0	0
plus management reserve of		9,538	9,538	9,538	0	0	0	0	0	0	0
plus contingency of		15,484	15,484	15,484	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		149,070	149,070	149,070	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		91,124	91,124	91,124	4,500	0	0	0	0	0	0
plus escalation of		32,925	32,925	32,925	1,162	0	0	0	0	0	0
plus management reserve of		9,538	9,538	9,538	0	0	0	0	0	0	0
plus contingency of		15,484	15,484	15,484	1,419	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		149,070	149,070	149,070	7,071	0	0	0	0	0	0
Operations 2080 hr-shft/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @ \$125 /hr.					65	130	130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.					0	0	0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.					44	88	88	88	88	88	88
Administration/Support 0.5 FTE @ \$65 /hr.					34	68	68	68	68	68	68
Operations/Process Facility 5											
Managers 0 FTE @ \$125 /hr.					0	0	0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.					0	0	0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.					0	0	0	0	0	0	0
Supervisors 1 FTE @ \$85 /hr.					88	177	177	177	177	177	177
Administration/Support 1 FTE @ \$85 /hr.					68	135	135	135	135	135	135
Operators 2 FTE @ \$65 /hr.					135	270	270	270	270	270	270
Maintenance 1 FTE @ \$65 /hr.					68	135	135	135	135	135	135
Utilities 525 KW/hr \$0.0824 /kwh					45	90	90	90	90	90	90
Maintenance 2.00% of 292,445					2,924	5,849	5,849	5,849	5,849	5,849	5,849
Monitoring/Surveillance 1.00 \$65,000.00 /yr					33	65	65	65	65	65	65
Operations subtotal (unescalated)		0	0	0	3,504	7,007	7,007	7,007	7,007	7,007	7,007
plus Escalation		0	0	0	1,634	3,555	3,851	4,155	4,467	4,789	5,119
plus Operations Contingency @ 30.0%		0	0	0	1,541	3,169	3,257	3,349	3,442	3,539	3,638
Total Operations (w/ escalation & contingency)		0	0	0	6,679	13,731	14,116	14,511	14,917	15,335	15,764
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)		91,124	91,124	91,124	8,004	7,007	7,007	7,007	7,007	7,007	7,007
Total Cost (w/ escalation, mgt reserve, & contingency)		149,070	149,070	149,070	13,750	13,731	14,116	14,511	14,917	15,335	15,764
Cumulative Total LCC (escalated)		346,488	495,559	644,620	858,379	872,110	886,226	900,736	915,654	930,989	946,753
discount factor @ OMB discount rate of 6.30% for escalated costs		1.958	2.082	2.213	2.352	2.500	2.658	2.825	3.003	3.183	3.394
Discounted Annual Cost		\$76,125	\$71,613	\$67,369	\$5,646	\$5,492	\$5,311	\$5,136	\$4,967	\$4,803	\$4,645
Cumulative Discounted LCC		186,598	258,211	325,580	331,425	336,617	342,228	347,384	352,331	357,134	361,780

escalated Vitrification Storage Facility Life-Cycle Cost (LCC) Analysis				fiscal year counting year Escalation Factor	2019 21 1.779	2020 22 1.829	2021 23 1.880	2022 24 1.933	2023 25 1.987	2024 26 2.042	2025 27 2.100	2026 28 2.158	2027 29 2.219	2028 30 2.281
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt., & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shift/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.					130	130	130	130	130	130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.					0	0	0	0	0	0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.					88	88	88	88	88	88	88	88	88	88
Administration/Support 0.5 FTE @ \$85 /hr.					68	68	68	68	68	68	68	68	68	68
Operations/Process Facility 5														
Managers 0 FTE @ \$125 /hr.					0	0	0	0	0	0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.					0	0	0	0	0	0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.					0	0	0	0	0	0	0	0	0	0
Supervisors 1 FTE @ \$85 /hr.					177	177	177	177	177	177	177	177	177	177
Administration/Support 1 FTE @ \$85 /hr.					135	135	135	135	135	135	135	135	135	135
Operators 2 FTE @ \$85 /hr.					270	270	270	270	270	270	270	270	270	270
Maintenance 1 FTE @ \$85 /hr.					135	135	135	135	135	135	135	135	135	135
Utilities 625 KW/hr \$0.0824 /kwh					90	90	90	90	90	90	90	90	90	90
Maintenance 2.00% of 292,445					5,849	5,849	5,849	5,849	5,849	5,849	5,849	5,849	5,849	5,849
Monitoring/Surveillance 1.00 \$85,000.00 /yr					85	85	85	85	85	85	85	85	85	85
Operations subtotal (unescalated)					7,007	7,007	7,007	7,007	7,007	7,007	7,007	7,007	7,007	7,007
plus Escalation					6,458	6,807	6,168	6,535	6,914	7,304	7,705	8,117	8,540	8,978
plus Operations Contingency @ 30.0%					3,740	3,844	3,952	4,063	4,177	4,293	4,414	4,537	4,664	4,795
Total Operations (w/ escalation & contingency)					16,206	16,659	17,126	17,605	18,098	18,605	19,126	19,662	20,212	20,778
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					7,007	7,007	7,007	7,007	7,007	7,007	7,007	7,007	7,007	7,007
Cumulative Total LCC (unescalated)					451,567	458,575	465,582	472,590	479,597	486,605	493,612	500,620	507,627	514,635
Total Cost (w/ escalation, mgt reserve, & contingency)					16,206	16,659	17,126	17,605	18,098	18,605	19,126	19,662	20,212	20,778
Cumulative Total LCC (escalated)					762,959	779,618	796,744	814,349	832,448	851,053	870,179	889,841	910,053	930,831
discount factor @ OMB discount rate of 6.30% for escalated costs					3.607	3.835	4.076	4.333	4.606	4.896	5.205	5.533	5.881	6.252
Discounted Annual Cost					\$4,492	\$4,344	\$4,201	\$4,063	\$3,929	\$3,800	\$3,675	\$3,554	\$3,437	\$3,324
Cumulative Discounted LCC					366,272	370,618	374,818	378,881	382,810	386,610	390,285	393,838	397,275	400,599

escalated Vitrification Storage Facility Life-Cycle Cost (LCC) Analysis			fiscal year counting year Escalation Factor		2029 31 2.345	2030 32 2.410	2031 33 2.478	2032 34 2.547	2033 35 2.619	2034 36 2.692	2035 37 2.767	2036 38 2.845	2037 39 2.924	2038 40 3.006
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)														
plus escalation of														
plus management reserve of														
plus contingency of														
Total OPC including escalation, mgt reserve, & contingency														
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)														
plus escalation of														
plus management reserve of														
plus contingency of														
Total TEC including escalation, mgt reserve, contingency														
Total Project Cost (TPC)														
TPC unescalated														
plus escalation of														
plus management reserve of														
plus contingency of														
Total TPC including esc, mgt res, contingency														
Operations														
2090 hr-shft/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.														
Engineers 0 FTE @ \$108 /hr.														
Other Tech. 0.5 FTE @ \$85 /hr.														
Administration/Support 0.5 FTE @ \$85 /hr.														
Operations/Process Facility 5														
Managers 0 FTE @ \$125 /hr.														
Engineers 0 FTE @ \$108 /hr.														
Other Tech. 0 FTE @ \$85 /hr.														
Supervisors 1 FTE @ \$85 /hr.														
Administration/Support 1 FTE @ \$85 /hr.														
Operators 2 FTE @ \$85 /hr.														
Maintenance 1 FTE @ \$85 /hr.														
Utilities 525 kW/yr \$0.0824 / kwh														
Maintenance 2.00% of \$85,000.00 yr														
Monitoring/Surveillance 1.00														
Operations subtotal (unescalated)														
plus Escalation														
plus Operations Contingency @ 30.0%														
Total Operations (w/ escalation & contingency)														
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)														
plus Escalation														
plus Post-Operations Contingency @ 30.0%														
Total Post-Operations (w/ escalation & contingency)														
Total Cost (unescalated)														
Cumulative Total LCC (unescalated)														
Total Cost (w/ escalation, mgt reserve, & contingency)														
Cumulative Total LCC (escalated)														
discount factor @ OMB discount rate of 6.30% for escalated costs														
Discounted Annual Cost														
Cumulative Discounted LCC														

escalated Vitrification Storage Facility Life-Cycle Cost (LCC) Analysis	fiscal year counting year Escalation Factor	2039 41 3.090	2040 42 3.177	2041 43 3.266	2042 44 3.357	2043 45 3.451	2044 46 3.548	2045 47 3.647	2046 48 3.750	2047 49 3.855	2048 50 3.962
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
TRM Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations											
Operations 2080 hr-shft/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @	\$125 /hr.										
Engineers 0 FTE @	\$100 /hr.										
Other Tech. 0.5 FTE @	\$85 /hr.										
Administration/Support 0.5 FTE @	\$85 /hr.										
Operations/Process Facility 5											
Managers 0 FTE @	\$125 /hr.										
Engineers 0 FTE @	\$100 /hr.										
Other Tech. 0 FTE @	\$85 /hr.										
Supervisors 1 FTE @	\$85 /hr.										
Administration/Support 1 FTE @	\$85 /hr.										
Operators 2 FTE @	\$85 /hr.										
Maintenance 1 FTE @	\$85 /hr.										
Utilities 525 kW/hr	\$0.0824 /kwh										
Maintenance 2.00% of	\$65,000.00										
Monitoring/Surveillance 1.00	yr	10	10	10	10	10	10	10	10	10	10
Operations subtotal (unescalated)		10	10	10	10	10	10	10	10	10	10
plus Escalation		21	22	23	24	25	25	26	27	28	30
plus Operations Contingency @ 30.0%		9	10	10	10	10	11	11	11	12	12
Total Operations (w/ escalation & contingency)		40	41	42	44	45	46	47	49	50	52
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)		542,735	542,745	542,765	542,785	542,775	542,785	542,795	542,805	542,815	542,825
Total Cost (w/ escalation, mgt reserve, & contingency)		40	41	42	44	45	46	47	49	50	52
Cumulative Total LCC (escalated)		1,020,188	1,020,227	1,020,289	1,020,313	1,020,358	1,020,404	1,020,451	1,020,500	1,020,550	1,020,602
discount factor @ OHS discount rate of 0.30% for escalated costs		12.242	13.014	13.833	14.705	15.631	16.618	17.663	18.776	19.959	21.216
Discounted Annual Cost		\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$2
Cumulative Discounted LCC		412,860	412,883	412,886	412,889	412,872	412,875	412,877	412,880	412,882	412,885

escalated Vitrification Storage Facility
Life-Cycle Cost (LCC) Analysis

fiscal year
counting year
Escalation Factor

			2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
			61	62	63	64	65	66	67	68	69	70
			5.369	5.519	5.674	5.833	5.996	6.164	6.336	6.514	6.696	6.884
Other Project Cost (OPC)												
OPC unescalated												
Conceptual Design, Project Mgt, & Permitting												
Testing and Start-up												
Total OPC (unescalated)												
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency												
0												
Total Estimated Cost (TEC)												
TEC unescalated												
Title Design, Inspection												
Project mgt												
Construction Mgt												
Construction, Equip, G&A & Procurement												
Total TEC (unescalated)												
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency												
0												
Total Project Cost (TPC)												
TPC unescalated												
plus escalation of			0	0	0	0	0	0	0	0	0	0
plus management reserve of			0	0	0	0	0	0	0	0	0	0
plus contingency of			0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency												
0												
Operations												
2060 hr-shft/yr.												
Facility/Administration 1.5												
Managers 0.5 FTE @ \$125 /hr.								130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.								0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.								89	89	89	89	89
Administration/Support 0.5 FTE @ \$65 /hr.								68	68	68	68	68
Operations/Process Facility 5												
Managers 0 FTE @ \$125 /hr.								0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.								0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.								0	0	0	0	0
Supervisors 1 FTE @ \$85 /hr.								177	177	177	177	177
Administration/Support 1 FTE @ \$65 /hr.								135	135	135	135	135
Operators 2 FTE @ \$65 /hr.								270	270	270	270	270
Maintenance 1 FTE @ \$65 /hr.								135	135	135	135	135
Utilities 525 kW/yr \$0.0624 /kwh								90	90	90	90	90
Maintenance 2.00% of 292,445								0	0	0	0	0
Monitoring/Surveillance 1.00 of \$65,000.00 yr								65	65	65	65	65
Operations subtotal (unescalated)								1,159	1,159	1,159	1,159	1,159
plus Escalation			44	45	47	48	50	5,983	6,183	6,389	6,600	6,817
plus Operations Contingency @ 30.0%			16	17	17	17	18	2,142	2,202	2,264	2,327	2,393
Total Operations (w/ escalation & contingency)								9,284	9,544	9,811	10,086	10,368
Post Operations												
Decommission 10.00% of Engineering costs								0	0	0	0	0
Decontamination 0.00% of Pre-operation Costs								0	0	0	0	0
Demolition 8.00% of Pre-operation Costs								0	0	0	0	0
Post-Operations Subtotal (unescalated)								0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)								0	0	0	0	0
Total Cost (unescalated)								1,159	1,159	1,159	1,159	1,159
Cumulative Total LCC (unescalated)								542,935	542,935	542,935	542,935	542,935
Total Cost (w/ escalation, mgt reserve, & contingency)								70	72	74	76	78
Cumulative Total LCC (escalated)								1,021,273	1,021,345	1,021,419	1,021,494	1,021,572
discount factor @ OMB discount rate of 6.30% for escalated costs								41,540	44,163	46,846	49,603	52,447
Discounted Annual Cost								\$2	\$2	\$2	\$2	\$1
Cumulative Discounted LCC								412,907	412,908	412,910	412,911	412,913
544,133								544,133	545,292	546,450	547,609	548,767
9,284								9,284	9,544	9,811	10,086	10,368
1,030,856								1,030,856	1,040,400	1,050,211	1,060,296	1,070,664
59,389								59,389	59,942	60,718	61,732	62,999
\$185								\$185	\$159	\$154	\$149	\$144
413,078								413,078	413,237	413,391	413,540	413,684

escalated Vitrification Storage Facility Life-Cycle Cost (LCC) Analysis		fiscal year counting year Escalation Factor		2009 71 7.070	2070 72 7.275	2071 73 7.478	Total Cost
Other Project Cost (OPC)							
OPC unescalated							
Conceptual Design, Project Mgt. & Permitting Testing and Start-up							
Total OPC (unescalated)				0	0	0	11,728
plus escalation of				0	0	0	4,500
plus management reserve of				0	0	0	16,228
plus contingency of				0	0	0	4,153
Total OPC including escalation, mgt reserve, & contingency				0	0	0	5,118
Total Estimated Cost (TEC)				0	0	0	25,500
TEC unescalated							
Title Design, Inspection Project Mgt							
Construction Mgt							
Construction, Equip, QA & Procurement							
Total TEC (unescalated)				0	0	0	35,000
plus escalation of				0	0	0	28,000
plus management reserve of				0	0	0	27,338
plus contingency of				0	0	0	202,445
Total TEC including escalation, mgt reserve, contingency				0	0	0	382,783
Total Project Cost (TPC)							
TPC unescalated							
plus escalation of				0	0	0	138,310
plus management reserve of				0	0	0	40,045
plus contingency of				0	0	0	40,045
Total TPC including escalation, mgt reserve, contingency				0	0	0	65,043
Total TPC including esc, mgt res, contingency				0	0	0	626,200
TPC unescalated							
398,011							
142,463							
40,065							
70,181							
651,700							
3,315							
0							
2,254							
1,724							
0							
0							
0							
0							
4,508							
3,448							
6,895							
3,448							
2,295							
119,902							
1,988							
149,758							
172,524							
94,861							
418,964							
10,500							
0							
95,763							
100,263							
666,868							
231,968							
1,005,184							
655,030							
2,075,848							
426,040							

CUMULATIVE DISCOUNTED LCC VITRIFICATION INTERIM STORAGE FACILITY

TOTAL ANNUAL COST (escalated)
VITRIFICATION INTERIM STORAGE FACILITY

Lockheed Martin Idaho Technologies Company

INTERDEPARTMENTAL COMMUNICATION

Date: February 2, 1998**To:** John K. Rawlins MS 3765 6-4304**From:** R. J. Turk MS 3875 6-3611**Subject:** ECONOMIC AND LIFE CYCLE ANALYSIS CONDUCTED for the DIRECT CEMENTITIOUS WASTE OPTION (DCWO)-20YR STORAGE FACILITY
RJT-19-98**Purpose:**

As requested an Economic and Life-Cycle Cost (LCC) has been conducted to evaluate for the DCWO 20-yr. INTERIM STORAGE FACILITIES. The storage facility was evaluated based on a scoping study that incorporate appropriate design features from the Flour Daniel Corp. design for interim storage. This storage facility will be used to house canisters resulting from the DCWO production option until final repository disposition.

This economic analysis is based on information provided by J. K. Rawlins, and K. L. Williams. R. D. Adams provided cost estimates. B.L. Blakely provided process personnel modeling.

Methodology:

The Economic Evaluation assumed a 69-year period (2003-2071) since this is the estimated time required to complete all of the anticipated remediation activities. The LCC identified and evaluated the initial development, construction, operating and post operating costs over the life-cycle. A discounted LCC analysis assumes a 1998-dollar basis, discounted 6.3% annually per the Office of Management and Budget (OMB) Circular A-94 for escalated costs. All costs are conservatively discounted assuming the end-of-year convention.

Assumptions:

The scope of work and requirements of all related activities are vague at this time. Facility and processing costs were developed from historical experience associated with DD&D work at the INEEL. The LCC analysis was generated to match cost estimating cost structure. These costs include Permitting, Direct and Indirect Construction, G&A, Procurement Fee, Engineering, Inspection, Project Management, Construction Management, Escalation and Contingency costs.

The design period is assumed to be accomplished in five-years with construction completed in six-years. Labor rates were assumed as follows: Managers, \$125/hr; Engineers, \$108 \$/hr; Other Technicians \$ 85/hr; Administration/support staff \$ 65/hr; Operators and Maintenance personnel \$ 65/hr. The operational period for this facility was assumed to be twenty years, to match the appropriate operating facility. This period is followed by five years for shipping to the repository, followed by three years of post-operations activities. Due to this project's lack of complexity and non-radioactive contaminated environment, this analysis assumed a decommissioning cost equal to 10% of the non-escalated engineering design cost, decontamination costs equal to 0% of non-escalated total pre-operation cost, and demolition costs equal to 8% of the non-escalated total pre-operation cost. Utilities were calculated assuming a \$.0824 per kWh. Surveillance and Monitoring costs were calculated at \$65,000 per year for manned security during operations then reduced to \$10,000 for remote surveillance during non-operation periods.

Results:

The DCWO 20-yr. INTERIM STORAGE FACILITY has a discounted LCC of \$ 506 million.

Attachments:

cc: R. J. Turk File

escalated DCWO 20YR. Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor	1999 1	2000 2	2001 3	2002 4	2003 5	2004 6	2005 7	2006 8	2007 9	2008 10
					1.024	1.053	1.082	1.112	1.144	1.178	1.209	1.242	1.277	1.313
Other Project Cost (OPC)														
OPC unescalated									733	2,932	2,932	2,932	2,199	
Conceptual Design, Project Mgt, & Permitting Testing and Start-up									733	2,932	2,932	2,932	2,199	0
Total OPC (unescalated)					0	0	0	0	187	748	748	748	561	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	232	927	927	927	690	0
plus contingency of					0	0	0	0	1,152	4,607	4,607	4,607	3,455	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	1,152	4,607	4,607	4,607	3,455	0
Total Estimated Cost (TEC)														
TEC unescalated												11,667	23,333	
Title Design, Inspection Project mgt Construction Mgt Construction, Equip, G&A & Procurement												2,545	5,091	5,091
Total TEC (unescalated)					0	0	0	0	0	0	0	14,212	28,424	102,195
plus escalation of					0	0	0	0	0	0	0	5,163	10,326	37,124
plus management reserve of					0	0	0	0	0	0	0	1,532	3,064	11,017
plus contingency of					0	0	0	0	0	0	0	2,328	4,656	16,739
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	23,235	46,470	167,074
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	733	2,932	2,932	17,144	30,823	102,195
plus escalation of					0	0	0	0	187	748	748	5,910	10,898	37,124
plus management reserve of					0	0	0	0	0	0	0	1,532	3,064	11,017
plus contingency of					0	0	0	0	232	927	927	3,255	5,351	16,739
Total TPC including esc, mgt res, contingency					0	0	0	0	1,152	4,607	4,607	27,642	49,925	167,074
Operations 2000 hr-shift/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.														
Engineers 0 FTE @ \$108 /hr.														
Other Tech. 0.5 FTE @ \$85 /hr.														
Administration/Support 0.5 FTE @ \$85 /hr.														
Operations/Process Facility 5														
Managers 0 FTE @ \$125 /hr.														
Engineers 0 FTE @ \$108 /hr.														
Other Tech. 0 FTE @ \$85 /hr.														
Supervisors 1 FTE @ \$85 /hr.														
Administration/Support 1 FTE @ \$85 /hr.														
Operators 2 FTE @ \$85 /hr.														
Maintenance 1 FTE @ \$85 /hr.														
Utilities 325 kW/yr \$0.0824 / kwh														
Maintenance 2.00% of \$35,202														
Monitoring/Surveillance 1.00 \$85,000.00 yr														
Operations subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					0	0	0	0	733	2,932	2,932	17,144	30,823	102,195
Cumulative Total LCC (unescalated)					0	0	0	0	733	3,685	6,597	23,741	54,365	156,500
Total Cost (w/ escalation, mgt reserve, & contingency)					0	0	0	0	1,152	4,607	4,607	27,642	49,925	167,074
Cumulative Total LCC (escalated)					0	0	0	0	1,152	5,759	10,366	38,208	88,133	255,207
discount factor @ OMB discount rate of 6.30% for escalated costs					1.063	1.130	1.201	1.277	1.357	1.443	1.534	1.630	1.733	1.842
Discounted Annual Cost					\$0	\$0	\$0	\$0	\$849	\$3,193	\$3,004	\$17,078	\$28,808	\$90,893
Cumulative Discounted LCC					0	0	0	0	849	4,042	7,046	24,124	62,932	143,626

escalated DCWO 20YR. Interim Storage Facility	fiscal year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Life-Cycle Cost (LCC) Analysis	counting year	21	22	23	24	25	26	27	28	29	30
(ALL COST X1000)	Escalation Factor	1.779	1.829	1.880	1.933	1.987	2.042	2.100	2.158	2.219	2.281
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations											
Facility/Administration	2000 hr-shift/yr.										
Managers	1.5										
Engineers	0.5 FTE @	\$125 /hr.	130	130	130	130	130	130	130	130	130
Other Tech.	0 FTE @	\$108 /hr.	0	0	0	0	0	0	0	0	0
Administration/Support	0.5 FTE @	\$85 /hr.	88	88	88	88	88	88	88	88	88
Operations/Process Facility	5	0.5 FTE @ \$65 /hr.	68	68	68	68	68	68	68	68	68
Managers	0 FTE @	\$125 /hr.	0	0	0	0	0	0	0	0	0
Engineers	0 FTE @	\$108 /hr.	0	0	0	0	0	0	0	0	0
Other Tech.	0 FTE @	\$85 /hr.	0	0	0	0	0	0	0	0	0
Supervisors	1 FTE @	\$65 /hr.	177	177	177	177	177	177	177	177	177
Administration/Support	1 FTE @	\$65 /hr.	135	135	135	135	135	135	135	135	135
Operators	2 FTE @	\$65 /hr.	270	270	270	270	270	270	270	270	270
Maintenance	1 FTE @	\$65 /hr.	135	135	135	135	135	135	135	135	135
Utilities	325 kW/hr	\$0.0824 /kwh	58	58	58	58	58	58	58	58	58
Maintenance	2.00% of	\$65,000.00 yr	7,104	7,104	7,104	7,104	7,104	7,104	7,104	7,104	7,104
Monitoring/Surveillance	1.00		65	65	65	65	65	65	65	65	65
Operations subtotal (unescalated)			8,228	8,228	8,228	8,228	8,228	8,228	8,228	8,228	8,228
plus Escalation			8,409	8,819	9,241	9,674	10,119	10,577	11,047	11,531	12,028
plus Operations Contingency @ 30.0%			4,391	4,514	4,641	4,771	4,904	5,042	5,183	5,328	5,477
Total Operations (w/ escalation & contingency)			19,029	19,562	20,110	20,673	21,252	21,847	22,458	23,087	23,734
Post Operations											
Decommission	10.00% of	Engineering costs									
Decontamination	0.00% of	Pre-operation Costs									
Demolition	8.00% of	Pre-operation Costs									
Post-Operations Subtotal (unescalated)			0	0	0	0	0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)			0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)			8,228	8,228	8,228	8,228	8,228	8,228	8,228	8,228	8,228
Total Cost (w/ escalation, mgt reserve, & contingency)			529,358	537,585	545,813	554,041	562,270	570,498	578,726	586,955	595,183
Cumulative Total LCC (escalated)			19,029	19,562	20,110	20,673	21,252	21,847	22,458	23,087	23,734
discount factor @ OMB discount rate of 5.30%		for escalated costs	894,142	913,704	933,814	954,488	975,738	997,584	1,020,043	1,043,130	1,066,863
Discounted Annual Cost			3,607	3,635	4,078	4,333	4,606	4,896	5,205	5,533	5,881
Cumulative Discounted LCC			\$5,275	\$5,101	\$4,933	\$4,771	\$4,614	\$4,462	\$4,315	\$4,173	\$4,038
			431,924	437,028	441,959	446,730	451,344	455,808	460,121	464,284	468,329

Escalated DCWO 20YR, Inflation Storage Facility	(All Cost \$1000)	(Life-Cycle Cost (LCC) Analysis)	Other Project Cost (OPC)	OPC unescalated	Conceptual Design, Project Mgt, & Permitting	Testing and Start-up	Total OPC (unescalated)	plus escalation of	plus management reserve of	Total OPC including escalation, mgt reserve, & contingency	Total Estimated Cost (TEC)	TEC unescalated	Title Design, Inspection	Construction Mgt	Construction, Equip, O&A & Procurement	Total TEC (unescalated)	plus escalation of	plus management reserve of	Total TEC including escalation, mgt reserve, contingency	Total Project Cost (TPC)	TPC unescalated	plus escalation of	plus management reserve of	Total TPC including esc, mgt res, contingency	Operations Facility/Administration	2080 hr-yr/yr	1.5				
Fiscal year	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059
Escalation Factor	2.345	2.410	2.476	2.547	2.619	2.692	2.767	2.845	2.924	3.006																					
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

escalated DCWO 20YR. Interim Storage Facility
Life-Cycle Cost (LCC) Analysis
(ALL COST X1000)

fiscal year
counting year
Escalation Factor

	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
	41	42	43	44	45	46	47	48	49	50
	3.090	3.177	3.266	3.357	3.451	3.548	3.647	3.750	3.855	3.962
Other Project Cost (OPC)										
OPC unescalated										
Conceptual Design, Project Mgt, & Permitting										
Testing and Start-up										
Total OPC (unescalated)	0	0	0	0	0	0	0	0	0	0
plus escalation of	0	0	0	0	0	0	0	0	0	0
plus management reserve of	0	0	0	0	0	0	0	0	0	0
plus contingency of	0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency	0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)										
TEC unescalated										
TKle Design, Inspection										
Project mgt										
Construction Mgt										
Construction, Equip, G&A & Procurement										
Total TEC (unescalated)	0	0	0	0	0	0	0	0	0	0
plus escalation of	0	0	0	0	0	0	0	0	0	0
plus management reserve of	0	0	0	0	0	0	0	0	0	0
plus contingency of	0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency	0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)										
TPC unescalated	0	0	0	0	0	0	0	0	0	0
plus escalation of	0	0	0	0	0	0	0	0	0	0
plus management reserve of	0	0	0	0	0	0	0	0	0	0
plus contingency of	0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency	0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shift/yr.										
Facility/Administration 1.5										
Managers 0.5 FTE @	\$125	/ hr.								
Engineers 0 FTE @	\$108	/ hr.								
Other Tech. 0.5 FTE @	\$85	/ hr.								
Administration/Support 0.5 FTE @	\$85	/ hr.								
Operations/Process Facility 5										
Managers 0 FTE @	\$125	/ hr.								
Engineers 0 FTE @	\$108	/ hr.								
Other Tech. 0 FTE @	\$85	/ hr.								
Supervisors 1 FTE @	\$85	/ hr.								
Administration/Support 1 FTE @	\$85	/ hr.								
Operators 2 FTE @	\$85	/ hr.								
Maintenance 1 FTE @	\$85	/ hr.								
Utilities 325 KW/hr	\$0.0824	/ kwh								
Maintenance 2.00% of	355,202									
Monitoring/Surveillance 1.00	\$65,000.00	yr								
Operations subtotal (unescalated)	10	10	10	10	10	10	10	10	10	10
plus Escalation	21	22	23	24	25	26	27	28	29	30
plus Operations Contingency @ 30.0%	9	10	10	10	10	11	11	11	12	12
Total Operations (w/ escalation & contingency)	40	41	42	44	45	46	47	49	50	52
Post Operations										
Decommission 10.00% of Engineering costs										
Decontamination 0.00% of Pre-operation Costs										
Demoition 8.00% of Pre-operation Costs										
Post-Operations Subtotal (unescalated)	0	0	0	0	0	0	0	0	0	0
plus Escalation	0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%	0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)	0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)										
Cumulative Total LCC (unescalated)	636,395	636,405	636,415	636,425	636,435	636,445	636,455	636,465	636,475	636,485
Total Cost (w/ escalation, mgt reserve, & contingency)	40	41	42	44	45	46	47	49	50	52
Cumulative Total LCC (escalated)	1,106,138	1,106,180	1,106,222	1,106,266	1,106,311	1,106,357	1,106,404	1,106,453	1,106,503	1,106,555
discount factor @ OMB discount rate of 6.30%	12.242	13.014	13.833	14.705	15.631	16.616	17.663	18.776	19.959	21.216
Discounted Annual Cost	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$2
Cumulative Discounted LCC	486,624	486,627	486,631	486,633	486,636	486,639	486,642	486,644	486,647	486,649

escalated DCWO 20YR. Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058
				counting year	51	52	53	54	55	56	57	58	59	60
				Escalation Factor	4.073	4.187	4.305	4.425	4.549	4.677	4.807	4.942	5.080	5.223
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shft/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 / hr.														
Engineers 0 FTE @ \$108 / hr.														
Other Tech. 0.5 FTE @ \$85 / hr.														
Administration/Support 0.5 FTE @ \$65 / hr.														
Operations/Process Facility 5														
Managers 0 FTE @ \$125 / hr.														
Engineers 0 FTE @ \$108 / hr.														
Other Tech. 0 FTE @ \$85 / hr.														
Supervisors 1 FTE @ \$85 / hr.														
Administration/Support 1 FTE @ \$65 / hr.														
Operators 2 FTE @ \$65 / hr.														
Maintenance 1 FTE @ \$65 / hr.														
Utilities 325 kW/hr \$0.0824 / kwh														
Maintenance 2.00% of 355,202														
Monitoring/Surveillance 1.00 \$65,000.00 yr					10	10	10	10	10	10	10	10	10	10
Operations subtotal (unescalated)					10	10	10	10	10	10	10	10	10	10
plus Escalation					31	32	33	34	35	37	38	39	41	42
plus Operations Contingency @ 30.0%					12	13	13	13	14	14	14	15	15	16
Total Operations (w/ escalation & contingency)					53	54	56	58	59	61	62	64	66	68
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					10	10	10	10	10	10	10	10	10	10
Cumulative Total LCC (unescalated)					636,495	636,505	636,515	636,525	636,535	636,545	636,555	636,565	636,575	636,585
Total Cost (w/ escalation, mgt reserve, & contingency)					53	54	56	58	59	61	62	64	66	68
Cumulative Total LCC (escalated)					1,196,608	1,196,662	1,196,716	1,196,775	1,196,835	1,196,895	1,196,958	1,197,022	1,197,088	1,197,150
discount factor @ OMB discount rate of 6.30% for escalated costs					22.553	23.973	25.484	27.089	28.796	30.610	32.538	34.588	36.767	39.084
Discounted Annual Cost					\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
Cumulative Discounted LCC					486,652	486,654	486,656	486,658	486,660	486,662	486,664	486,666	486,668	486,670

escalated DCWO 20YR. Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
counting year				Escalation Factor	61	62	63	64	65	66	67	68	69	70
					5.369	5.519	5.674	5.833	5.996	6.164	6.336	6.514	6.696	6.884
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations 2060 hr-shift/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.										130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.										0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.										88	88	88	88	88
Administration/Support 0.5 FTE @ \$85 /hr.										68	68	68	68	68
Operations/Process Facility 5														
Managers 0 FTE @ \$125 /hr.										0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.										0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.										0	0	0	0	0
Supervisors 1 FTE @ \$85 /hr.										177	177	177	177	177
Administration/Support 1 FTE @ \$85 /hr.										135	135	135	135	135
Operators 2 FTE @ \$85 /hr.										270	270	270	270	270
Maintenance 1 FTE @ \$85 /hr.										135	135	135	135	135
Utilities 325 kWhr \$0.0624 /kwh										68	68	68	68	68
Maintenance 2.00% of \$55,202										7,104	7,104	7,104	7,104	7,104
Monitoring/Surveillance 1.00 \$65,000.00 yr										65	65	65	65	65
Operations subtotal (unescalated)										8,228	8,228	8,228	8,228	8,228
plus Escalation										42,490	43,910	45,370	46,871	48,416
plus Operations Contingency @ 30.0%										18,215	18,642	19,079	19,530	20,000
Total Operations (w/ escalation & contingency)										65,934	67,780	69,678	71,629	73,614
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)										0	0	0	0	0
plus Escalation										0	0	0	0	0
plus Post-Operations Contingency @ 30.0%										0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)										0	0	0	0	0
Total Cost (unescalated)														
Cumulative Total LCC (unescalated)										8,228	8,228	8,228	8,228	8,228
Total Cost (w/ escalation, mgt reserve, & contingency)										64,463	65,991	67,520	69,050	70,580
Cumulative Total LCC (escalated)										65,934	67,780	69,678	71,629	73,614
discount factor @ OMB discount rate of 6.30% for escalated costs										1,197,226	1,197,226	1,197,226	1,197,226	1,197,226
Discounted Annual Cost										41,546	44,163	46,948	49,903	53,047
Cumulative Discounted LCC										\$2	\$2	\$2	\$2	\$2
										488,671	488,673	488,675	488,676	488,678

escalated DCWO 20YR, Interim Storage Facility
Life-Cycle Cost (LCC) Analysis
(ALL COST X1000)

	2069 71 7,076	2070 72 7,275	2071 73 7,478	fiscal year counting year Escalation Factor	Total Cost
Other Project Cost (OPC)					
OPC unescalated					11,728
Conceptual Design, Project Mgt. & Permitting					4,500
Testing and Start-up					10,228
Total OPC (unescalated)					4,138
plus escalation of	0	0	0		0
plus management reserve of	0	0	0		0
plus contingency of	0	0	0		5,133
Total OPC including escalation, mgt reserve, & contingency	0	0	0		25,500
Total Estimated Cost (TEC)					
TEC unescalated					35,000
TMA Design, Inspection					29,000
Project Mgt					33,214
Construction Mgt					335,202
Construction, Equip, GLA & Procurement					431,415
Total TEC (unescalated)	0	0	0		163,964
plus escalation of	0	0	0		48,663
plus management reserve of	0	0	0		73,938
plus contingency of	0	0	0		739,000
Total TEC including escalation, mgt reserve, contingency	0	0	0		487,644
Total Project Cost (TPC)					
TPC unescalated	0	0	0		166,122
plus escalation of	0	0	0		48,663
plus management reserve of	0	0	0		78,071
plus contingency of	0	0	0		783,500
Total TPC including esc, mgt res, contingency	0	0	0		
Operations					
2069 In-situity: 1.5					
Facility/Administration					3,315
Managers	0.5 FTE @	\$125 /hr			0
Engineers	0 FTE @	\$108 /hr			2,254
Other Tech.	0.5 FTE @	\$85 /hr			1,724
Administration/Support	0.5 FTE @	\$65 /hr			0
Operations/Process Facility					0
Managers	0 FTE @	\$125 /hr			0
Engineers	0 FTE @	\$108 /hr			0
Other Tech.	0 FTE @	\$85 /hr			0
Supervisors	1 FTE @	\$85 /hr			4,508
Administration/Support	1 FTE @	\$65 /hr			3,448
Operations	2 FTE @	\$65 /hr			6,895
Maintenance	1 FTE @	\$65 /hr			3,448
Utilities	325 kWh/yr	\$0.0824 /kwh			1,420
Maintenance	2,000% of	\$35,202			1,968
Monitoring/Surveillance		\$45,000.00			177,601
Operations subtotal (unescalated)					206,580
plus Escalation		0	0		371,029
plus Operations Contingency @ 30.0%		0	0		173,283
Total Operations (w/ escalation & contingency)		0	0		750,893
Post Operations					
Decommission	10.00% of	3,500	3,500		10,500
Decontamination	0.00% of	0	0		0
Demolition	8.00% of	37,412	37,412		112,235
Post-Operations Subtotal (unescalated)		40,912	40,912		122,735
plus Escalation		248,595	256,705		770,341
plus Post-Operations Contingency @ 30.0%		83,653	86,285		287,923
Total Post-Operations (w/ escalation & contingency)		373,160	386,901		1,180,998
Total Cost (unescalated)					
Cumulative Total LCC (unescalated)		40,912	40,912		796,959
Total Cost (w/ escalation, mgt reserve, & contingency)		373,160	756,047		2,875,391
Cumulative Total LCC (escalated)		373,160	386,901		595,062
discount factor @ 0.98% discount rate of		1,860,756	2,277,657		
Discounted Annual Cost		78,535	81,357		
Cumulative Discounted LCC		\$4,918	\$4,756		
		495,027	501,363		

TOTAL ANNUAL COST (escalated)
DCWO-20YR INTERIM STORAGE FACILITY

CUMULATIVE DISCOUNTED LCC DCWO-20YR INTERIM STORAGE FACILITY

Lockheed Martin Idaho Technologies Company**INTERDEPARTMENTAL COMMUNICATION**

Date: February 2, 1998

To: John K. Rawlins MS 3765 6-4304

From: R. J. Turk MS 3875 6-3611

Subject: ECONOMIC AND LIFE CYCLE ANALYSIS CONDUCTED for the
CEMENTITIOUS WASTE OPTION (CWO) STORAGE FACILITY
RJT-21-98

Purpose:

As requested an Economic and Life-Cycle Cost (LCC) has been conducted to evaluate for the CWO. INTERIM STORAGE FACILITY. The storage facility was evaluated based on a scoping study that incorporate appropriate design features from the Flour Daniel Corp. design for interim storage. This storage facility will be used to house canisters resulting from the CWO production option until final repository disposition.

This economic analysis is based on information provided by J. K. Rawlins, and K. L. Williams. R. D. Adams provided cost estimates. B.L. Blakely provided process personnel modeling.

Methodology:

The Economic Evaluation assumed a 69-year period (2003-2071) since this is the estimated time required to complete all of the anticipated remediation activities. The LCC identified and evaluated the initial development, construction, operating and post operating costs over the life-cycle. A discounted LCC analysis assumes a 1998-dollar basis, discounted 6.3% annually per the Office of Management and Budget (OMB) Circular A-94 for escalated costs. All costs are conservatively discounted assuming the end-of-year convention.

Assumptions:

The scope of work and requirements of all related activities are vague at this time. Facility and processing costs were developed from historical experience associated with DD&D work at the INEEL. The LCC analysis was generated to match cost estimating cost structure. These costs include Permitting, Direct and Indirect Construction, G&A, Procurement Fee, Engineering, Inspection, Project Management, Construction Management, Escalation and Contingency costs.

The design period is assumed to be accomplished in five-years with construction completed in six-years. Labor rates were assumed as follows: Managers, \$125/hr; Engineers, \$108 \$/hr; Other Technicians \$ 85/hr; Administration/support staff \$ 65/hr; Operators and Maintenance personnel \$ 65/hr. The operational period for this facility was assumed to be five years, to match the appropriate operating facility. This period is followed by five years for shipping to the repository, followed by three years of post-operations activities. Due to this project's lack of complexity and non-radioactive contaminated environment, this analysis assumed a decommissioning cost equal to 10% of the non-escalated engineering design cost, decontamination costs equal to 0% of non-escalated total pre-operation cost, and demolition costs equal to 8% of the non-escalated total pre-operation cost. Utilities were calculated assuming a \$.0824 per kWh. Surveillance and Monitoring costs were calculated at \$65,000 per year for manned security during operations then reduced to \$10,000 for remote surveillance during non-operation periods.

Results:

The CWO INTERIM STORAGE FACILITY has a discounted LCC of \$ 406 million.

Attachments:

cc: R. J. Turk File

escalated CWO Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor	1999 1	2000 2	2001 3	2002 4	2003 5	2004 6	2005 7	2006 8	2007 9	2008 10
Other Project Cost (OPC)					1.024	1.053	1.062	1.112	1.144	1.176	1.209	1.242	1.277	1.313
OPC unescalated									1,955	3,909	3,909	1,955		
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up					0	0	0	0	1,955	3,909	3,909	1,955	0	0
Total OPC (unescalated)					0	0	0	0	512	1,025	1,025	512	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	616	1,233	1,233	616	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	3,084	6,167	6,167	3,084	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection												11,687	23,333	5,091
Project mgt												2,545	5,091	7,559
Construction Mgt														80,954
Construction, Equip, G&A & Procurement					0	0	0	0	0	0	0	14,212	28,424	93,614
Total TEC (unescalated)					0	0	0	0	0	0	0	5,145	10,291	33,692
plus escalation of					0	0	0	0	0	0	0	5,145	10,291	33,692
plus management reserve of					0	0	0	0	0	0	0	1,512	3,023	9,957
plus contingency of					0	0	0	0	0	0	0	2,366	4,732	15,585
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	23,235	46,470	153,049
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	1,955	3,909	3,909	16,167	28,424	93,614
plus escalation of					0	0	0	0	512	1,025	1,025	5,658	10,291	33,692
plus management reserve of					0	0	0	0	0	0	0	1,512	3,023	9,957
plus contingency of					0	0	0	0	616	1,233	1,233	2,963	4,732	15,585
Total TPC including esc, mgt res, contingency					0	0	0	0	3,084	6,167	6,167	26,319	46,470	153,049
Operations 2080 hr-shift/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @				\$125 / hr.										
Engineers 0 FTE @				\$108 / hr.										
Other Tech. 0.5 FTE @				\$85 / hr.										
Administration/Support 0.5 FTE @				\$65 / hr.										
Operations/Process Facility 5														
Managers 0 FTE @				\$125 / hr.										
Engineers 0 FTE @				\$108 / hr.										
Other Tech. 0 FTE @				\$85 / hr.										
Supervisors 1 FTE @				\$85 / hr.										
Administration/Support 1 FTE @				\$65 / hr.										
Operators 2 FTE @				\$65 / hr.										
Maintenance 1 FTE @				\$65 / hr.										
Utilities 525 kW/yr				\$0.0624 / kWh										
Maintenance 2.00% of				\$23,818										
Monitoring/Surveillance 1.00				\$65,000.00 / yr										
Operations subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					0	0	0	0	1,955	3,909	3,909	16,167	28,424	93,614
Cumulative Total LCC (unescalated)					0	0	0	0	1,955	5,864	9,774	25,941	54,365	147,979
Total Cost (w/ escalation, mgt reserve, & contingency)					0	0	0	0	3,084	6,167	6,167	26,319	46,470	153,049
Cumulative Total LCC (escalated)					0	0	0	0	3,084	9,251	15,418	41,737	88,207	241,258
discount factor @ OMB discount rate of 6.30%				for escalated costs	1.063	1.130	1.201	1.277	1.357	1.443	1.534	1.630	1.733	1.842
Discounted Annual Cost					\$0	\$0	\$0	\$0	\$2,272	\$4,274	\$4,021	\$16,144	\$26,815	\$83,080
Cumulative Discounted LCC					0	0	0	0	2,272	6,546	10,567	26,711	53,526	136,606

escalated CWO Interim Storage Facility				fiscal year		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Life-Cycle Cost (LCC) Analysis				counting year		11	12	13	14	15	16	17	18	19	20
(ALL COST X1000)				Escalation Factor		1.350	1.387	1.426	1.466	1.507	1.550	1.593	1.638	1.683	1.730
Other Project Cost (OPC)															
OPC unescalated															
Conceptual Design, Project Mgt, & Permitting															
Testing and Start-up															
Total OPC (unescalated)						0	0	0	3,375	1,125	0	0	0	0	0
plus escalation of						0	0	0	885	295	0	0	0	0	0
plus management reserve of						0	0	0	0	0	0	0	0	0	0
plus contingency of						0	0	0	1,064	355	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency						0	0	0	5,324	1,775	0	0	0	0	0
Total Estimated Cost (TEC)															
TEC unescalated															
Title Design, Inspection						5,091	5,091	5,091							
Project mgt						7,569	7,569	7,569							
Construction Mgt						80,954	80,954	80,954							
Construction, Equip, G&A & Procurement						93,614	93,614	93,614	0	0	0	0	0	0	0
Total TEC (unescalated)						33,892	33,892	33,892	0	0	0	0	0	0	0
plus escalation of						9,957	9,957	9,957	0	0	0	0	0	0	0
plus management reserve of						15,585	15,585	15,585	0	0	0	0	0	0	0
plus contingency of						153,049	153,049	153,049	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency						153,049	153,049	153,049	0	0	0	0	0	0	0
Total Project Cost (TPC)															
TPC unescalated						93,614	93,614	93,614	3,375	1,125	0	0	0	0	0
plus escalation of						33,892	33,892	33,892	885	295	0	0	0	0	0
plus management reserve of						9,957	9,957	9,957	0	0	0	0	0	0	0
plus contingency of						15,585	15,585	15,585	1,064	355	0	0	0	0	0
Total TPC including esc, mgt res, contingency						153,049	153,049	153,049	5,324	1,775	0	0	0	0	0
Operations 2080 hr-shft/yr.															
Facility/Administration 1.5															
Managers 0.5 FTE @ \$125 /hr.									65	130	130	130	130	130	
Engineers 0 FTE @ \$108 /hr.									0	0	0	0	0	0	
Other Tech. 0.5 FTE @ \$85 /hr.									44	88	88	88	88	88	
Administration/Support 0.5 FTE @ \$65 /hr.									34	68	68	68	68	68	
Operations/Process Facility 5															
Managers 0 FTE @ \$125 /hr.									0	0	0	0	0	0	
Engineers 0 FTE @ \$108 /hr.									0	0	0	0	0	0	
Other Tech. 0 FTE @ \$85 /hr.									0	0	0	0	0	0	
Supervisors 1 FTE @ \$85 /hr.									88	177	177	177	177	177	
Administration/Support 1 FTE @ \$65 /hr.									68	135	135	135	135	135	
Operators 2 FTE @ \$65 /hr.									135	270	270	270	270	270	
Maintenance 1 FTE @ \$65 /hr.									68	135	135	135	135	135	
Utilities 525 kW/hr \$0.0824 /kwh									45	90	90	90	90	90	
Maintenance 2.00% of 323,818									3,238	6,476	6,476	6,476	6,476	6,476	
Monitoring/Surveillance 1.00 \$85,000.00 /yr									33	65	65	65	65	65	10
Operations subtotal (unescalated)						0	0	0	3,817	7,635	7,635	7,635	7,635	7,635	10
plus Escalation						0	0	0	1,780	3,673	4,196	4,527	4,887	5,217	7
plus Operations Contingency @ 30.0%						0	0	0	1,679	3,452	3,549	3,649	3,751	3,856	5
Total Operations (w/ escalation & contingency)						0	0	0	7,277	14,961	15,380	15,810	16,253	16,708	22
Post Operations															
Decommission 10.00% of Engineering costs															
Decontamination 0.00% of Pre-operation Costs															
Demolition 8.00% of Pre-operation Costs															
Post-Operations Subtotal (unescalated)						0	0	0	0	0	0	0	0	0	0
plus Escalation						0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%						0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)						0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)						93,614	93,614	93,614	7,192	8,760	7,635	7,635	7,635	7,635	10
Cumulative Total LCC (unescalated)						241,593	335,207	428,821	438,014	444,774	452,408	460,043	467,678	475,313	475,323
Total Cost (w/ escalation, mgt reserve, & contingency)						153,049	153,049	153,049	12,601	16,735	15,380	15,810	16,253	16,708	22
Cumulative Total LCC (escalated)						394,304	547,353	700,401	713,002	729,737	745,117	760,927	777,180	793,888	793,911
discount factor @ OMB discount rate of 6.30% for escalated costs						1.958	2.082	2.213	2.352	2.500	2.658	2.825	3.003	3.193	3.394
Discounted Annual Cost						\$78,156	\$73,524	\$69,187	\$5,357	\$4,693	\$5,786	\$5,596	\$5,412	\$5,234	\$7
Cumulative Discounted LCC						214,762	288,286	357,453	362,810	369,503	375,290	380,888	386,297	391,531	391,538

escalated CWO Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year counting year Escalation Factor	2019 21 1.779	2020 22 1.829	2021 23 1.880	2022 24 1.933	2023 25 1.987	2024 26 2.042	2025 27 2.100	2026 28 2.158	2027 29 2.219	2028 30 2.281
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shr/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @ \$125 /hr.											
Engineers 0 FTE @ \$108 /hr.											
Other Tech. 0.5 FTE @ \$85 /hr.											
Administration/Support 0.5 FTE @ \$65 /hr.											
Operations/Process Facility 5											
Managers 0 FTE @ \$125 /hr.											
Engineers 0 FTE @ \$108 /hr.											
Other Tech. 0 FTE @ \$85 /hr.											
Supervisors 1 FTE @ \$85 /hr.											
Administration/Support 1 FTE @ \$65 /hr.											
Operators 2 FTE @ \$65 /hr.											
Maintenance 1 FTE @ \$65 /hr.											
Utilities 625 kW/yr \$0.0824 / kwh											
Maintenance 2.00% of 323,818											
Monitoring/Surveillance 1.00 \$65,000.00 yr											
Operations subtotal (unescalated)		10	10	10	10	10	10	10	10	10	10
plus Escalation		8	8	9	9	10	10	11	12	12	13
plus Operations Contingency @ 30.0%		5	5	6	6	6	6	6	6	7	7
Total Operations (w/ escalation & contingency)		23	24	24	25	26	27	27	28	29	30
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 0.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)		10	10	10	10	10	10	10	10	10	10
Total Cost (w/ escalation, mgt reserve, & contingency)		475,333	475,343	475,353	475,363	475,373	475,383	475,393	475,403	475,413	475,423
Cumulative Total LCC (escalated)		23	24	24	25	26	27	27	28	29	30
discount factor @ OMB discount rate of 6.30% for escalated costs		793,934	793,957	793,982	794,007	794,033	794,059	794,087	794,115	794,144	794,173
Discounted Annual Cost		3,607	3,835	4,076	4,333	4,606	4,890	5,205	5,533	5,881	6,252
Cumulative Discounted LCC		\$6	\$6	\$6	\$6	\$6	\$5	\$5	\$5	\$5	\$5
		391,544	391,550	391,556	391,562	391,568	391,573	391,578	391,583	391,588	391,593

escalated CWO Interim Storage Facility
Life-Cycle Cost (LCC) Analysis
(ALL COST X1000)

fiscal year
counting year
Escalation Factor

	2020	2030	2031	2032	2033	2034	2035	2036	2037	2038
	31	32	33	34	35	36	37	38	39	40
	2.345	2.410	2.478	2.547	2.619	2.692	2.767	2.845	2.924	3.006
Other Project Cost (OPC)										
OPC unescalated										
Conceptual Design, Project Mgt, & Permitting										
Testing and Start-up										
Total OPC (unescalated)	0	0	0	0	0	0	0	0	0	0
plus escalation of	0	0	0	0	0	0	0	0	0	0
plus management reserve of	0	0	0	0	0	0	0	0	0	0
plus contingency of	0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency	0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)										
TEC unescalated										
Title Design, Inspection										
Project mgt										
Construction Mgt										
Construction, Equip, G&A & Procurement										
Total TEC (unescalated)	0	0	0	0	0	0	0	0	0	0
plus escalation of	0	0	0	0	0	0	0	0	0	0
plus management reserve of	0	0	0	0	0	0	0	0	0	0
plus contingency of	0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency	0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)										
TPC unescalated	0	0	0	0	0	0	0	0	0	0
plus escalation of	0	0	0	0	0	0	0	0	0	0
plus management reserve of	0	0	0	0	0	0	0	0	0	0
plus contingency of	0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency	0	0	0	0	0	0	0	0	0	0
Operations	2080 hr-shr/yr.									
Facility/Administration	1.5									
Managers	0.5 FTE @	\$125 / hr.								
Engineers	0 FTE @	\$108 / hr.								
Other Tech.	0.5 FTE @	\$85 / hr.								
Administration/Support	0.5 FTE @	\$65 / hr.								
Operations/Process Facility	5									
Managers	0 FTE @	\$125 / hr.								
Engineers	0 FTE @	\$108 / hr.								
Other Tech.	0 FTE @	\$85 / hr.								
Supervisors	1 FTE @	\$85 / hr.								
Administration/Support	1 FTE @	\$65 / hr.								
Operators	2 FTE @	\$65 / hr.								
Maintenance	1 FTE @	\$65 / hr.								
Utilities	525 kW/yr	\$0.0824 / kwh								
Maintenance	2.00% of	\$23,818								
Monitoring/Surveillance	1.00	\$85,000.00 yr								
Operations subtotal (unescalated)			10	10	10	10	10	10	10	10
plus Escalation			13	14	15	16	17	18	19	20
plus Operations Contingency @ 30.0%			7	7	7	8	8	9	9	9
Total Operations (w/ escalation & contingency)			30	31	32	33	34	35	37	39
Post Operations										
Decommission	10.00% of	Engineering costs								
Decontamination	0.00% of	Pre-operation Costs								
Demolition	8.00% of	Pre-operation Costs								
Post-Operations Subtotal (unescalated)			0	0	0	0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)			0	0	0	0	0	0	0	0
Total Cost (unescalated)			10	10	10	10	10	10	10	10
Cumulative Total LCC (unescalated)			475,433	475,443	475,453	475,463	475,473	475,483	475,493	475,503
Total Cost (w/ escalation, mgt reserve, & contingency)			30	31	32	33	34	35	37	39
Cumulative Total LCC (escalated)			794,204	794,235	794,267	794,300	794,334	794,368	794,402	794,436
discount factor @ OMB discount rate of 6.30% for escalated costs			8.648	7.064	7.509	7.962	8.485	9.020	9.588	10.183
Discounted Annual Cost			\$5	\$4	\$4	\$4	\$4	\$4	\$4	\$3
Cumulative Discounted LCC			391,598	391,602	391,606	391,610	391,614	391,618	391,622	391,626

escalated CWO Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
					41	42	43	44	45	46	47	48	49	50
					3.090	3.177	3.266	3.357	3.451	3.548	3.647	3.750	3.855	3.962
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt., & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shif/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @				\$125 /hr.										
Engineers 0 FTE @				\$108 /hr.										
Other Tech. 0.5 FTE @				\$85 /hr.										
Administration/Support 0.5 FTE @				\$85 /hr.										
Operations/Process Facility 5														
Managers 0 FTE @				\$125 /hr.										
Engineers 0 FTE @				\$108 /hr.										
Other Tech. 0 FTE @				\$85 /hr.										
Supervisors 1 FTE @				\$85 /hr.										
Administration/Support 1 FTE @				\$85 /hr.										
Operators 2 FTE @				\$85 /hr.										
Maintenance 1 FTE @				\$85 /hr.										
Utilities 525 kWh/yr				\$0.0824 /kwh										
Maintenance 2.00% of				\$23,818										
Monitoring/Surveillance 1.00				\$65,000.00 yr	10	10	10	10	10	10	10	10	10	10
Operations subtotal (unescalated)					21	22	23	24	25	26	27	28	29	30
plus Escalation					9	10	10	10	10	11	11	11	12	12
plus Operations Contingency @ 30.0%														
Total Operations (w/ escalation & contingency)					40	41	42	44	45	46	47	49	50	52
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					10	10	10	10	10	10	10	10	10	10
Cumulative Total LCC (unescalated)					475,533	475,543	475,553	475,563	475,573	475,583	475,593	475,603	475,613	475,623
Total Cost (w/ escalation, mgt reserve, & contingency)					40	41	42	44	45	46	47	49	50	52
Cumulative Total LCC (escalated)					794,560	794,601	794,643	794,687	794,732	794,778	794,825	794,874	794,924	794,976
discount factor @ OMB discount rate of 0.30%				for escalated costs	12.242	13.014	13.833	14.705	15.631	16.616	17.663	18.776	19.959	21.216
Discounted Annual Cost					\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$2
Cumulative Discounted LCC					391,636	391,639	391,642	391,645	391,648	391,651	391,653	391,656	391,659	391,661

escalated CWO Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST \$1000)	fiscal year counting year Escalation Factor	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058
		51	52	53	54	55	56	57	58	59	60
		4.073	4.187	4.305	4.425	4.549	4.677	4.807	4.942	5.080	5.223
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, QA & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated											
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations											
2080 hr-shft/yr.											
Facility/Administration 1.5											
Managers	0.5 FTE @	\$125	/hr.								
Engineers	0 FTE @	\$108	/hr.								
Other Tech.	0.5 FTE @	\$85	/hr.								
Administration/Support	0.5 FTE @	\$65	/hr.								
Operations/Process Facility 5											
Managers	0 FTE @	\$125	/hr.								
Engineers	0 FTE @	\$108	/hr.								
Other Tech.	0 FTE @	\$85	/hr.								
Supervisors	1 FTE @	\$85	/hr.								
Administration/Support	1 FTE @	\$85	/hr.								
Operations	2 FTE @	\$85	/hr.								
Maintenance	1 FTE @	\$85	/hr.								
Utilities	525 kWhr	\$0.0824	/kwh								
Maintenance	2.00% of	\$65,000.00	yr								
Monitoring/Surveillance	1.00										
Operations subtotal (unescalated)		10		10	10	10	10	10	10	10	10
plus Escalation		31	32	33	34	35	37	38	39	41	42
plus Operations Contingency @ 30.0%		12	13	13	13	14	14	14	15	15	16
Total Operations (w/ escalation & contingency)		53	54	56	58	59	61	62	64	66	68
Post Operations											
Decommission	10.00% of	Engineering costs									
Decontamination	0.00% of	Pre-operation Costs									
Demolition	8.00% of	Pre-operation Costs									
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)											
Total Cost (w/ escalation, mgt reserve, & contingency)		53	54	56	58	59	61	62	64	66	68
Cumulative Total LCC (escalated)											
discount factor @ OMB discount rate of 6.30% for escalated costs		795,029	795,083	795,139	795,197	795,256	795,317	795,379	795,443	795,509	795,577
Discounted Annual Cost		22,553	23,973	25,484	27,089	28,796	30,610	32,538	34,588	36,767	39,084
Cumulative Discounted LCC		\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
		391,663	391,666	391,668	391,670	391,672	391,674	391,676	391,678	391,680	391,681

escalated CWO Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year counting year Escalation Factor	2059 61 5.389	2060 62 5.519	2061 63 5.674	2062 64 5.833	2063 65 5.990	2064 66 6.164	2065 67 6.338	2066 68 6.514	2067 69 6.696	2068 70 6.884
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, O&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shr/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @ \$125 /hr.							130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.							0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.							88	88	88	88	88
Administration/Support 0.5 FTE @ \$65 /hr.							68	68	68	68	68
Operations/Process Facility 5											
Managers 0 FTE @ \$125 /hr.							0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.							0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.							0	0	0	0	0
Supervisors 1 FTE @ \$85 /hr.							177	177	177	177	177
Administration/Support 1 FTE @ \$65 /hr.							135	135	135	135	135
Operators 2 FTE @ \$65 /hr.							270	270	270	270	270
Maintenance 1 FTE @ \$65 /hr.							135	135	135	135	135
Utilities 525 kW/hr \$0.0824 /kwh							90	90	90	90	90
Maintenance 2.00% of 323,818							0	0	0	0	0
Monitoring/Surveillance 1.00 of \$65,000.00 yr							65	65	65	65	65
Operations subtotal (unescalated)		10	10	10	10	10	1,159	1,159	1,159	1,159	1,159
plus Escalation		44	45	47	48	50	5,083	6,183	6,388	6,600	6,817
plus Operations Contingency @ 30.0%		16	17	17	17	18	2,142	2,202	2,264	2,327	2,393
Total Operations (w/ escalation & contingency)		70	72	74	76	78	9,284	9,544	9,811	10,086	10,368
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)		10	10	10	10	10	1,159	1,159	1,159	1,159	1,159
Total Cost (w/ escalation, mgt reserve, & contingency)		475,733	475,743	475,753	475,763	475,773	476,032	476,090	476,249	480,406	481,566
Cumulative Total LCC (escalated)		70	72	74	76	78	9,284	9,544	9,811	10,086	10,368
discount factor @ OMB discount rate of 6.30% for escalated costs		41,546	44,163	46,946	49,903	53,047	56,389	59,942	63,718	67,732	71,999
Discounted Annual Cost		\$2	\$2	\$2	\$2	\$1	\$165	\$159	\$154	\$149	\$144
Cumulative Discounted LCC		391,683	391,685	391,686	391,688	391,689	391,854	392,013	392,167	392,316	392,460

escalated CWO Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)		fiscal year counting year Escalation Factor		2071		Total Cost
		2060	2070	71	72	
				7.070	7.275	7.478
Other Project Cost (OPC)						
OPC Unescalated						
Conceptual Design, Project Mgt., & Permitting						
Testing and Start-Up						
Total OPC (unescalated)						
plus escalation of						
plus management reserve of						
plus contingency of						
Total OPC including escalation, mgt reserve, & contingency						
Total Estimated Cost (TEC)						
TEC Unescalated						
Title Design, Inspection						
Project Mgt.						
Construction Mgt.						
Construction, Equip., O&A & Procurement						
Total TEC (unescalated)						
plus escalation of						
plus management reserve of						
plus contingency of						
Total TEC including escalation, mgt reserve, contingency						
Total Project Cost (TPC)						
TPC Unescalated						
plus escalation of						
plus management reserve of						
plus contingency of						
Total TPC including escalation, mgt res, contingency						
Operations						
Facility/Administration		2080 hr/yr	1.5			
Managers		0.5 FTE @	\$125 /hr.			1,365
Engineers		0 FTE @	\$108 /hr.			0
Other Tech.		0.5 FTE @	\$85 /hr.			928
Administration/Support		0.5 FTE @	\$85 /hr.			710
Operations/Process Facility		5				0
Managers		0 FTE @	\$125 /hr.			0
Engineers		0 FTE @	\$108 /hr.			0
Other Tech.		0 FTE @	\$85 /hr.			0
Supervisors		1 FTE @	\$85 /hr.			1,856
Administration/Support		1 FTE @	\$85 /hr.			1,420
Operators		2 FTE @	\$85 /hr.			2,839
Maintenance		1 FTE @	\$85 /hr.			1,420
Utilities		525 kWh/yr	\$0.0824 /kwh			945
Maintenance		2.00% of	\$23,818			35,620
Monitoring/Surveillance		1.00	\$85,000.00	yr		1,143
Operations subtotal (unescalated)						48,245
plus Escalation			0	0	0	0
plus Operations Contingency @ 30.0%			0	0	0	0
Total Operations (w/ escalation & contingency)			0	0	0	0
Post Operations						
Decommission		10.00% of	Engineering costs	3,500	3,500	10,500
Decontamination		0.00% of	Pre-operation Costs	0	0	0
Demolition		8.00% of	Pre-operation Costs	34,668	34,668	103,997
Post-Operations Subtotal (unescalated)				38,166	38,166	114,497
plus Escalation				231,913	247,250	718,639
plus Post-Operations Contingency @ 30.0%				81,024	85,282	249,941
Total Post-Operations (w/ escalation & contingency)				351,103	360,934	1,063,077
Total Cost (unescalated)						
Total Cost (w/ escalation, mgt reserve, & contingency)				38,166	38,166	596,063
Cumulative Total LCC (unescalated)				519,732	557,898	1,928,115
Total Cost (w/ escalation, mgt reserve, & contingency)				351,103	360,934	371,040
Cumulative Total LCC (escalated)				1,196,141	1,557,075	1,928,115
discount factor @ O&M discount rate of 6.30%				76,535	81,357	86,483
Discounted Annual Cost				\$4,587	\$4,436	\$4,290
Cumulative Discounted LCC				397,047	401,484	405,774

TOTAL ANNUAL COST (escalated) CWO INTERIM STORAGE FACILITY

CUMULATIVE DISCOUNTED LCC CWO INTERIM STORAGE FACILITY

Lockheed Martin Idaho Technologies Company**INTERDEPARTMENTAL COMMUNICATION****Date:** January 30, 1998**To:** John K. Rawlins MS 3765 6-4304**From:** R. J. Turk MS 3875 6-3611**Subject:** ECONOMIC AND LIFE CYCLE ANALYSIS CONDUCTED for the HOT ISOSTATIC PRESSING (HIP) STORAGE FACILITIES- RJT-16-98**Purpose:**

As requested an Economic and Life-Cycle Cost (LCC) has been conducted to evaluate for the INTERIM STORAGE FACILITIES. The storage facility was evaluated based on a scoping study that incorporate appropriate design features from the Flour Daniel Corp. design for interim storage. This storage facility will be used to house canisters resulting from the HIP production option until final repository disposition.

This economic analysis is based on information provided by J. K. Rawlins, and K. L. Williams. R. D. Adams provided cost estimates. B.L. Blakely provided process personnel modeling.

Methodology:

The Economic Evaluation assumed a 69-year period (2003-2071) since this is the estimated time required to complete all of the anticipated remediation activities. The LCC identified and evaluated the initial development, construction, operating and post operating costs over the life-cycle. A discounted LCC analysis assumes a 1998-dollar basis, discounted 6.3% annually per the Office of Management and Budget (OMB) Circular A-94 for escalated costs. All costs are conservatively discounted assuming the end-of-year convention.

Assumptions:

The scope of work and requirements of all related activities are vague at this time. Facility and processing costs were developed from historical experience associated with DD&D work at the INEEL. The LCC analysis was generated to match cost estimating cost structure. These costs include Permitting, Direct and Indirect Construction, G&A, Procurement Fee, Engineering, Inspection, Project Management, Construction Management, Escalation and Contingency costs.

The design period is assumed to be accomplished in five-years with construction completed in six-years. Labor rates were assumed as follows: Managers, \$125/hr; Engineers, \$108 \$/hr; Other Technicians \$ 85/hr; Administration/support staff \$ 65/hr; Operators and Maintenance personnel \$ 65/hr. The operational period for this facility was assumed to be twenty years, to match the appropriate operating facility. This period is followed by five years for shipping to the repository, followed by three years of post-operations activities. Due to this project's lack of complexity and non-radioactive contaminated environment, this analysis assumed a decommissioning cost equal to 10% of the non-escalated engineering design cost, decontamination costs equal to 0% of non-escalated total pre-operation cost, and demolition costs equal to 8% of the non-escalated total pre-operation cost. Utilities were calculated assuming a \$.0824 per kWh. Surveillance and Monitoring costs were calculated at \$65,000 per year for manned security during operations then reduced to \$10,000 for remote surveillance during non-operation periods.

Results:

The HOT ISOSTATIC PRESSING FACILITY INTERIM STORAGE has a discounted LCC of \$ 255.8 million.

Attachments:

cc: R. J. Turk File

escalated HOT ISOSTATIC PRESSING Interim Storage Facility LMA-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
counting year				Escalation Factor	1	2	3	4	5	6	7	8	9	10
					1.024	1.053	1.082	1.112	1.144	1.176	1.209	1.242	1.277	1.313
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting									733	2,932	2,932	2,932	2,199	
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	733	2,932	2,932	2,932	2,199	0
plus escalation of					0	0	0	0	195	779	779	779	584	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	233	933	933	933	699	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	1,161	4,643	4,643	4,643	3,483	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt												1,933	2,844	5,688
Construction Mgt													3,866	3,866
Construction, Equip, O&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	1,933	6,710	9,554
plus escalation of					0	0	0	0	0	0	0	693	2,405	3,424
plus management reserve of					0	0	0	0	0	0	0	192	666	948
plus contingency of					0	0	0	0	0	0	0	353	1,224	1,743
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	3,170	11,005	15,669
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	733	2,932	2,932	4,865	8,909	9,554
plus escalation of					0	0	0	0	195	779	779	1,472	2,989	3,424
plus management reserve of					0	0	0	0	0	0	0	192	666	948
plus contingency of					0	0	0	0	233	933	933	1,285	1,924	1,743
Total TPC including esc, mgt res, contingency					0	0	0	0	1,161	4,643	4,643	7,814	14,497	15,669
Operations				2080 hr-shift/yr.										
Facility/Administration				1.5										
Managers				0.5 FTE @	\$125	/hr.								
Engineers				0 FTE @	\$108	/hr.								
Other Tech.				0.5 FTE @	\$85	/hr.								
Administration/Support				0.5 FTE @	\$85	/hr.								
Operations/Process Facility				5										
Managers				0 FTE @	\$125	/hr.								
Engineers				0 FTE @	\$108	/hr.								
Other Tech.				0 FTE @	\$85	/hr.								
Supervisors				1 FTE @	\$85	/hr.								
Administration/Support				1 FTE @	\$85	/hr.								
Operations				2 FTE @	\$85	/hr.								
Maintenance				1 FTE @	\$85	/hr.								
Utilities				325 kWh/yr	\$0.0024	/kwh								
Maintenance				2.00% of	162,706									
Monitoring/Surveillance				1.00	\$85,000.00	yr								
Operations subtotal (unescalated)														
plus Escalation														
plus Operations Contingency @				30.0%										
Total Operations (w/ escalation & contingency)														
Post Operations														
Decommission				10.00% of Engineering costs										
Decontamination				0.00% of Pre-operation Costs										
Demolition				8.00% of Pre-operation Costs										
Post-Operations Subtotal (unescalated)														
plus Escalation														
plus Post-Operations Contingency @				30.0%										
Total Post-Operations (w/ escalation & contingency)														
Total Cost (unescalated)														
Cumulative Total LCC (unescalated)														
Total Cost (w/ escalation, mgt reserve, & contingency)														
Cumulative Total LCC (escalated)														
discount factor @ OMB discount rate of				6.30%	for escalated costs									
Discounted Annual Cost														
Cumulative Discounted LCC														

escalated HOT ISOSTATIC PRESSING Interim Storage Facility				fiscal year										
Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				counting year										
				Escalation Factor										
				2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
				11	12	13	14	15	16	17	18	19	20	
				1.350	1.387	1.428	1.468	1.507	1.550	1.593	1.638	1.683	1.730	
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)														
plus escalation of														
plus management reserve of														
plus contingency of														
Total OPC including escalation, mgt reserve, & contingency														
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)														
plus escalation of														
plus management reserve of														
plus contingency of														
Total TEC including escalation, mgt reserve, contingency														
Total Project Cost (TPC)														
TPC unescalated														
plus escalation of														
plus management reserve of														
plus contingency of														
Total TPC including esc, mgt res, contingency														
Operations														
2080 hr-utl/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.														
Engineers 0 FTE @ \$108 /hr.														
Other Tech. 0.5 FTE @ \$85 /hr.														
Administration/Support 0.5 FTE @ \$65 /hr.														
Operations/Process Facility 5														
Managers 0 FTE @ \$125 /hr.														
Engineers 0 FTE @ \$108 /hr.														
Other Tech. 0 FTE @ \$85 /hr.														
Supervisors 1 FTE @ \$85 /hr.														
Administration/Support 1 FTE @ \$65 /hr.														
Operators 2 FTE @ \$65 /hr.														
Maintenance 1 FTE @ \$65 /hr.														
Utilities 325 kW/yr \$0.0624 /kwh														
Maintenance 2.00% of 162,706														
Monitoring/Surveillance 1.00 \$85,000.00 yr														
Operations subtotal (unescalated)														
plus Escalation														
plus Operations Contingency @ 30.0%														
Total Operations (w/ escalation & contingency)														
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)														
plus Escalation														
plus Post-Operations Contingency @ 30.0%														
Total Post-Operations (w/ escalation & contingency)														
Total Cost (unescalated)														
Cumulative Total LCC (unescalated)														
Total Cost (w/ escalation, mgt reserve, & contingency)														
Cumulative Total LCC (escalated)														
discount factor @ OMB discount rate of 6.30% for escalated costs														
Discounted Annual Cost														
Cumulative Discounted LCC														

escalated HOT ISOSTATIC PRESSING Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
				counting year	21	22	23	24	25	26	27	28	29	30
				Escalation Factor	1.779	1.829	1.880	1.933	1.987	2.042	2.100	2.158	2.219	2.281
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, O&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations														
2080 hr-shift/yr.														
Facility/Administration														
1.5														
Managers					0.5 FTE @ \$125 /hr.	130	130	130	130	130	130	130	130	130
Engineers					0 FTE @ \$108 /hr.	0	0	0	0	0	0	0	0	0
Other Tech.					0.5 FTE @ \$85 /hr.	88	88	88	88	88	88	88	88	88
Administration/Support					0.5 FTE @ \$85 /hr.	88	88	88	88	88	88	88	88	88
Operations/Process Facility														
5														
Managers					0 FTE @ \$125 /hr.	0	0	0	0	0	0	0	0	0
Engineers					0 FTE @ \$108 /hr.	0	0	0	0	0	0	0	0	0
Other Tech.					0 FTE @ \$85 /hr.	0	0	0	0	0	0	0	0	0
Supervisors					1 FTE @ \$85 /hr.	177	177	177	177	177	177	177	177	177
Administration/Support					1 FTE @ \$85 /hr.	135	135	135	135	135	135	135	135	135
Operators					2 FTE @ \$85 /hr.	270	270	270	270	270	270	270	270	270
Maintenance					1 FTE @ \$85 /hr.	135	135	135	135	135	135	135	135	135
Utilities					325 kWhr @ \$0.0824 /kwh	58	58	58	58	58	58	58	58	58
Maintenance					2.00% of \$62,700	3,254	3,254	3,254	3,254	3,254	3,254	3,254	3,254	3,254
Monitoring/Surveillance					1.00 \$65,000.00 /yr	65	65	65	65	65	65	65	65	65
Operations subtotal (unescalated)						4,378	4,378	4,378	4,378	4,378	4,378	4,378	4,378	4,378
plus Escalation						3,411	3,820	3,853	4,063	4,320	4,564	4,814	5,072	5,338
plus Operations Contingency @ 30.0%						2,337	2,402	2,469	2,539	2,610	2,683	2,758	2,835	2,914
Total Operations (w/ escalation & contingency)						10,126	10,409	10,701	11,000	11,308	11,625	11,950	12,285	12,629
Post Operations														
Decommission					10.00% of Engineering costs									
Decontamination					0.00% of Pre-operation Costs									
Demolition					8.00% of Pre-operation Costs									
Post-Operations Subtotal (unescalated)						0	0	0	0	0	0	0	0	0
plus Escalation						0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%						0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)						0	0	0	0	0	0	0	0	0
Total Cost (unescalated)						4,378	4,378	4,378	4,378	4,378	4,378	4,378	4,378	4,378
Cumulative Total LCC (unescalated)						273,822	278,201	282,579	286,957	291,336	295,714	300,093	304,471	308,849
Total Cost (w/ escalation, mgt reserve, & contingency)						10,126	10,409	10,701	11,000	11,308	11,625	11,950	12,285	12,629
Cumulative Total LCC (escalated)						483,817	474,228	484,928	495,927	507,235	518,860	530,810	543,095	555,724
discount factor @ OMB discount rate of 6.30%					for escalated costs	3.807	3.835	4.076	4.333	4.606	4.896	5.205	5.533	5.881
Discounted Annual Cost						\$2,807	\$2,714	\$2,825	\$2,539	\$2,455	\$2,374	\$2,296	\$2,220	\$2,147
Cumulative Discounted LCC						218,276	220,091	223,616	228,154	230,984	233,280	235,500	237,648	239,724

escalated HOT ISOSTATIC PRESSING Interim Storage Facility				fiscal year	2020	2030	2031	2032	2033	2034	2035	2036	2037	2038
Life-Cycle Cost (LCC) Analysis				counting year	31	32	33	34	35	36	37	38	39	40
(ALL COST X1000)				Escalation Factor	2.345	2.410	2.478	2.547	2.619	2.692	2.767	2.845	2.924	3.006
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-ship/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.					130	130	130	130						
Engineers 0 FTE @ \$108 /hr.					0	0	0	0						
Other Tech. 0.5 FTE @ \$85 /hr.					88	88	88	88						
Administration/Support 0.5 FTE @ \$65 /hr.					68	68	68	68						
Operations/Process Facility 5														
Managers 0 FTE @ \$125 /hr.					0	0	0	0						
Engineers 0 FTE @ \$108 /hr.					0	0	0	0						
Other Tech. 0 FTE @ \$85 /hr.					0	0	0	0						
Supervisors 1 FTE @ \$85 /hr.					177	177	177	177						
Administration/Support 1 FTE @ \$65 /hr.					135	135	135	135						
Operators 2 FTE @ \$65 /hr.					270	270	270	270						
Maintenance 1 FTE @ \$65 /hr.					135	135	135	135						
Utilities 325 kW/hr \$0.0824 /kwh					56	56	56	56						
Maintenance 2.00% of \$65,000.00 yr					3,254	3,254	3,254	3,254						
Monitoring/Surveillance 1.00					65	65	65	65	10	10	10	10	10	10
Operations subtotal (unescalated)					4,378	4,378	4,378	4,378	10	10	10	10	10	10
plus Escalation					5,888	6,175	6,471	6,775	16	17	18	18	19	20
plus Operations Contingency @ 30.0%					3,080	3,166	3,255	3,346	8	8	9	9	9	9
Total Operations (w/ escalation & contingency)					13,346	13,720	14,104	14,499	34	35	36	37	38	39
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					4,378	4,378	4,378	4,378	10	10	10	10	10	10
Cumulative Total LCC (unescalated)					317,606	321,985	326,363	330,742	330,752	330,762	330,772	330,782	330,792	330,802
Total Cost (w/ escalation, mgt reserve, & contingency)					13,346	13,720	14,104	14,499	34	35	36	37	38	39
Cumulative Total LCC (escalated)					582,053	595,773	609,877	624,375	624,410	624,444	624,480	624,517	624,555	624,595
discount factor @ OMB discount rate of 6.30% for escalated costs					6,646	7,064	7,509	7,982	8,485	9,020	9,588	10,192	10,834	11,517
Discounted Annual Cost					\$2,008	\$1,942	\$1,876	\$1,816	\$4	\$4	\$4	\$4	\$4	\$3
Cumulative Discounted LCC					241,733	243,675	245,553	247,369	247,373	247,377	247,381	247,385	247,388	247,391

escalated HOT ISOSTATIC PRESSING Interim Storage Facility				fiscal year	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058
Life-Cycle Cost (LCC) Analysis				counting year	51	52	53	54	55	56	57	58	59	60
(ALL COST \$1000)				Escalation Factor	4.073	4.167	4.305	4.425	4.549	4.677	4.807	4.942	5.080	5.223
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, O&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations														
2080 hr-ship/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.														
Engineers 0 FTE @ \$108 /hr.														
Other Tech. 0.5 FTE @ \$85 /hr.														
Administration/Support 0.5 FTE @ \$65 /hr.														
Operations/Process Facility 5														
Managers 0 FTE @ \$125 /hr.														
Engineers 0 FTE @ \$108 /hr.														
Other Tech. 0 FTE @ \$85 /hr.														
Supervisors 1 FTE @ \$85 /hr.														
Administration/Support 1 FTE @ \$65 /hr.														
Operators 2 FTE @ \$65 /hr.														
Maintenance 1 FTE @ \$85 /hr.														
Utilities 325 kW/hr \$0.0824 /kwh														
Maintenance 2.00% of 162,706														
Monitoring/Surveillance 1.00 \$65,000.00 yr					10	10	10	10	10	10	10	10	10	10
Operations subtotal (unescalated)					10	10	10	10	10	10	10	10	10	10
plus Escalation					31	32	33	34	35	37	38	39	41	42
plus Operations Contingency @ 30.0%					12	13	13	13	14	14	14	15	15	16
Total Operations (w/ escalation & contingency)					53	54	56	58	59	61	62	64	66	68
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					10	10	10	10	10	10	10	10	10	10
Cumulative Total LCC (unescalated)					330,912	330,922	330,932	330,942	330,952	330,962	330,972	330,982	330,992	331,002
Total Cost (w/ escalation, mgt reserve, & contingency)					53	54	56	58	59	61	62	64	66	68
Cumulative Total LCC (escalated)					625,104	625,158	625,214	625,272	625,331	625,392	625,454	625,518	625,585	625,652
discount factor @ OMB discount rate of 6.30% for escalated costs					22,553	23,973	25,484	27,089	28,796	30,610	32,538	34,588	36,767	39,064
Discounted Annual Cost					\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
Cumulative Discounted LCC					247,422	247,424	247,427	247,429	247,431	247,433	247,435	247,437	247,438	247,440

escalated HOT ISOSTATIC PRESSING Interim Storage Facility				fiscal year	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
Life-Cycle Cost (LCC) Analysis				counting year	61	62	63	64	65	66	67	68	69	70
(ALL COST X1000)				Escalation Factor	5.369	5.519	5.674	5.833	5.996	6.164	6.336	6.514	6.696	6.884
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations 2060 hr-shft/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.										130	130	130	130	130
Engineers 0 FTE @ \$106 /hr.										0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.										88	88	88	88	88
Administration/Support 0.5 FTE @ \$85 /hr.										68	68	68	68	68
Operations/Process Facility 5														
Managers 0 FTE @ \$125 /hr.										0	0	0	0	0
Engineers 0 FTE @ \$106 /hr.										0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.										0	0	0	0	0
Supervisors 1 FTE @ \$85 /hr.										177	177	177	177	177
Administration/Support 1 FTE @ \$85 /hr.										135	135	135	135	135
Operators 2 FTE @ \$85 /hr.										270	270	270	270	270
Maintenance 1 FTE @ \$85 /hr.										135	135	135	135	135
Utilities 325 kW/hr \$0.0824 /kwh										56	56	56	56	56
Maintenance 2.00% of 162,706										0	0	0	0	0
Monitoring/Surveillance 1.00 \$85,000.00 yr					10	10	10	10	10	65	65	65	65	65
Operations subtotal (unescalated)					10	10	10	10	10	1,124	1,124	1,124	1,124	1,124
plus Escalation					44	45	47	48	50	5,806	6,000	6,199	6,404	6,615
plus Operations Contingency @ 30.0%					16	17	17	17	18	2,079	2,137	2,197	2,259	2,322
Total Operations (w/ escalation & contingency)					70	72	74	76	78	9,009	9,261	9,521	9,787	10,061
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					10	10	10	10	10	1,124	1,124	1,124	1,124	1,124
Cumulative Total LCC (unescalated)					331,012	331,022	331,032	331,042	331,052	332,176	333,300	334,424	335,548	336,673
Total Cost (w/ escalation, mgt reserve, & contingency)					70	72	74	76	78	9,009	9,261	9,521	9,787	10,061
Cumulative Total LCC (escalated)					625,722	625,794	625,868	625,944	626,021	635,031	644,292	653,812	663,600	673,661
discount factor @ OHB discount rate of 6.30% for escalated costs					41,546	44,163	46,948	49,903	53,047	56,389	59,942	63,718	67,732	71,999
Discounted Annual Cost					\$2	\$2	\$2	\$2	\$1	\$150	\$155	\$149	\$144	\$140
Cumulative Discounted LCC					247,442	247,443	247,445	247,447	247,448	247,608	247,762	247,912	248,056	248,196

escalated HOT ISOSTATIC PRESSING Interim Storage Facility fiscal year				counting year		Escalation Factor	Total Cost
Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				2060	2070		
				71	72	73	
				7,076	7,275	7,478	
Other Project Cost (OPC)							
Unescalated							
Conceptual Design, Project Mgt. & Permitting							11,728
Testing and Start-up							4,600
Total OPC (unescalated)							16,228
plus escalation of				0	0	0	0
plus management reserve of				0	0	0	0
plus contingency of				0	0	0	0
Total OPC including escalation, mgt reserve, & contingency				0	0	0	16,228
Total Estimated Cost (TEC)							
Unescalated							
Title Design, Inspection							25,595
Project Mgt							21,265
Construction, Equip. O&M & Procurement							15,190
Total TEC (unescalated)							162,706
plus escalation of				0	0	0	0
plus management reserve of				0	0	0	0
plus contingency of				0	0	0	0
Total TEC including escalation, mgt reserve, contingency				0	0	0	162,706
Total Project Cost (TPC)							
Unescalated							
TPC unescalated				0	0	0	240,884
plus escalation of				0	0	0	84,852
plus management reserve of				0	0	0	22,291
plus contingency of				0	0	0	46,174
Total TPC including esc, mgt res, contingency				0	0	0	394,300
Operations							
Factory/Administration							
Managers				0.5 FTE @	\$125 /hr.		3,315
Engineers				0 FTE @	\$108 /hr.		0
Other Tech.				0.5 FTE @	\$85 /hr.		2,254
Administration/Support				0.5 FTE @	\$65 /hr.		1,724
Operations/Process Facility							0
Managers				0 FTE @	\$125 /hr.		0
Engineers				0 FTE @	\$108 /hr.		0
Other Tech.				0 FTE @	\$85 /hr.		0
Supervisors				1 FTE @	\$85 /hr.		4,508
Administration/Support				1 FTE @	\$65 /hr.		3,448
Operators				2 FTE @	\$65 /hr.		6,895
Maintenance				1 FTE @	\$65 /hr.		3,448
Utilities				325 MW/yr	\$0.0824 /kwh		1,420
Monitoring/Surveillance				2.00% of	162,706		66,709
Operations subtotal (unescalated)				1.00	\$65,000.00 /yr		1,068
plus Escalation							95,689
Operations subtotal (w/ escalation & contingency)							119,204
Total Operations (w/ escalation & contingency)							64,468
Post Operations							
Decommission				10.00% of	Engineering costs	2,559	2,559
Demolition				0.00% of	Pre-operation Costs	0	0
Post-Operations subtotal (unescalated)				8.00% of	Pre-operation Costs	19,279	19,279
plus Escalation						21,838	21,838
plus Post-Operations Contingency @						132,700	141,475
Total Post-Operations (w/ escalation & contingency)						46,361	48,984
Total Post-Operations (w/ escalation & contingency)						200,699	212,307
Total Cost (unescalated)							
Cumulative Total LCC (unescalated)							402,188
Total Cost (w/ escalation, mgt reserve, & contingency)							1,293,391
Cumulative Total LCC (escalated)							1,293,391
discount factor @ OMB discount rate of							86,463
Discounted Annual Cost							\$2,455
Cumulative Discounted LCC							255,814

TOTAL ANNUAL COST (escalated) HIP INTERIM STORAGE FACILITY

CUMULATIVE DISCOUNTED LCC HIP INTERIM STORAGE FACILITY

431.02#
06/17/97
Rev. #04

ENGINEERING DESIGN FILE

Function File Number – SPR-01
EDF Serial Number – EDF-IS-001

Appendix 2

Drawings

CONTENTS

The following drawings are included in this appendix:

TRU/Class A Separations:	Site Map	TRUA-C-1
	Floor Plan Elevation -- 0'—0"	TRUA-A-7
	Floor Plan Elevation -- 21'—0"	TRUA-A-8
	Floor Plan Elevation -- 37'—0"	TRUA-A-9
	Section	TRUA-A-10
	Section and Detail	TRUA-A-11
	Section	TRUA-A-12
	Section	TRUA-A-13
Vitrified Waste Option:	Site Plan	VWO-C-1
	Floor Plan Elevation -- 0'—0"	VWO-A-6
	Floor Plan Elevation -- 21'—0"	VWO-A-7
	Floor Plan Elevation -- 37'—0"	VWO-A-8
	Section	VWO-A-9
	Section and Detail	VWO-A-10
	Section	VWO-A-11
	Section	VWO-A-12
Direct Cementitious Waste Option:	Site Plan	DCWO-C-1
	Floor Plan Elevation -- 0'—0"	DCWO-A-14
	Floor Plan Elevation -- 21'—0"	DCWO-A-15
	Floor Plan Elevation -- 37'—0"	DCWO-A-16
	Section	DCWO-A-17
	Section and Detail	DCWO-A-18
	Section	DCWO-A-19
	Section	DCWO-A-20
Cementitious Waste Option:	Site Plan	CWO-C-1
	Floor Plan Elevation -- 0'—0"	CWO-A-6
	Floor Plan Elevation -- 21'—0"	CWO-A-7
	Floor Plan Elevation -- 37'—0"	CWO-A-8
	Section	CWO-A-9
	Section and Detail	CWO-A-10
	Section	CWO-A-11
	Section	CWO-A-12
Hot Isostatic Press Waste Option:	Site Plan	HWO-C-1
	Floor Plan Elevation -- 0'—0"	HWO-A-7
	Floor Plan Elevation -- 21'—0"	HWO-A-8
	Floor Plan Elevation -- 37'—0"	HWO-A-9
	Section	HWO-A-10
	Section and Detail	HWO-A-11
	Section	HWO-A-12
	Section	HWO-A-13

D

AIR-WATER
TREATMENT
FACILITY

BULK CHEMICAL
STORAGE FACILITY

INTERIM STORAGE FACILITY

ENVIRONMENTAL LAB

CALCINE DISSOLUTION

HAW TREATMENT FACILITY

WASTE
SEPARATIONS
FACILITY

LAW TREATMENT FACILITY

LAW
COLLECTION
FACILITY

C

B

SITE PLAN

User: MKG

Date: 01/28/88 - 07:59 A.M.

File: 3532-24.dwg

Path: P:\CPP-HLW

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.			
 SCALE: 1" = 200.0'		REQUESTER: DESIGN: DRAIN: PROJECT NO. SPEC CODE			
DESIGN PHASE:		FOR REVIEW/APPROVAL SIGNATURES		SITE MAP SIZE: D 01MF3 CAGE CODE: 200 01001 021530 INDEX CODE NUMBER: 200 01001 021530 AREA: TYPE: Q: 050 DWG-	
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: 1" = 200.0' SHEET TRUA-C-1	

D

COOLING AIR
OUTLET STACK

FACILITY CRANE #1

C

B

CHARGE
HALL

User: MKG

Date: 01/28/88 - 08:03 A.M.

A

RETAINING WALL

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:		ICPP WASTE TREATMENT FACILITIES TRU/CLASS A OPTION WASTE SEPARATIONS FACILITY FLOOR PLAN ELEVATION 0'-0"	
		DESIGN:			
		DRAWN:			
		PROJECT NO.			
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		DWG-	
SEE DAR NO.		EFFECTIVE DATE:		REV	
QUALITY LEVEL:		SCALE: 1/16"=1'-0"		SHEET TRUA-A-7	

D

C

B

ADMIN SUPPORT AREA
ABOVE

COOLING AIR OUTLET STACK
4 PLCS

TYPICAL
MODULAR
STORAGE
VAULT

COOLING AIR INLETS
4 PLCS

26"ID W/5'-0" MIN SHIELDING

18' x 14' TRANSFER TUNNEL
BELOW

PERSONNEL DOOR
3 PLCS

FLOOR PLAN
ELEV -21'-0"

User: MKG
Date: 01/28/88 -- 08:05 AM

File: 3529-16.dwg
Path: P:\CPP-HLW

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRIVING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN				A							
		REQUESTER:		ICPP WASTE TREATMENT FACILITIES TRU/CLASS A OPTION WASTE SEPARATIONS FACILITY FLOOR PLAN ELEVATION -21'-0"											
		DESIGN:													
		DRAIN:													
		PROJECT NO.													
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE		CAGE CODE		INDEX CODE NUMBER		DWG-		REV			
DESIGN PHASE:		SEE DAR NO.		D		01MF3		AREA		TYP		CL		DSC	
QUALITY LEVEL:		EFFECTIVE DATE:		200		530		530							
				SCALE: 1/16"=1'-0"								SHEET TRUA-A-8			

D

C

B

A

LAG
STORAGE
ABOVE

18'-0"x14'-0" TRANSFER
TUNNEL

TO PROCESS
FACILITY

FLOOR PLAN
ELEVATION -37'-0"

User: MKG
Date: 01/28/88 - 08:38 A.M.

File: 3529-18.dwg
Path: P:\CPP-HLW

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
<div>10' 3' 5' 10' 20'</div> <div>SCALE: 1/16" = 1'-0"</div>		REQUESTER		ICPP WASTE TREATMENT FACILITIES TRU/CLASS A OPTION WASTE SEPARATIONS FACILITY FLOOR PLAN ELEVATION -37'-0"	
		DESIGN			
		DRAWN: <i>[Signature]</i>			
		PROJECT NO.			
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D	
DESIGN PHASE:		SEE DAR NO.		CAGE CODE: 01MF3	
QUALITY LEVEL:		EFFECTIVE DATE:		INDEX CODE NUMBER: 1530	
				DWG-REV	
				SCALE: 1/16"=1'-0"	
				SHEET TRUA-A-9	

D

C

B

A

TOP OF PARAPET

92'-8"

18' x 14' WASTE TRANSFER TUNNEL

TRANSPORT CART FROM
WASTE PROCESS PLANT

WASTE SHIPPING

SECTION A
TYP

User: MKG
Date: 01/28/95 - 08:39 AM

File: 3528-35.dwg
Path: P:\CPP-HLW

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN			
		REQUESTER:		ICPP WASTE TREATMENT FACILITIES TRU/CLASS A OPTION WASTE SEPARATIONS FACILITY SECTION			
		DESIGN:					
		DRAWN: R. S. EVANS					
		PROJECT NO.					
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 200 TYP: 1 GL: 086 DWG- SEE DAR NO.		REV	
DESIGN PHASE:		EFFECTIVE DATE:		SCALE: 3/32" = 1'-0"			
QUALITY LEVEL:				SHEET TRUA-A-10			

D

C

B

A

EL 40'

WEATHER ENCLOSURE

FACILITY GANTRY CRANE

SHIELD PLUGS

CHARGE HALL

COOLING
AIR
INLET

STORAGE
CONTAINER

CHARGE FACE STRUCTURE
SEE DETAIL

1

SECTION

SCALE: 3/32"=1'-0"

8

TYP

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.			
10' 2' 3' 4' 5' 10' 20' SCALE: 3/32" = 1'-0"		REQUESTER: DESIGN: DRAWN: K. BRONSON PROJECT NO. SPEC CODE			
DESIGN PHASE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 1530 AREA: TYPE: CL: LOSS:	
QUALITY LEVEL:		EFFECTIVE DATE:		DWG- REV SHEET TRUA-A-11	

D

C

B

A

WEATHER ENCLOSURE

EL 40'

CH

TRANSFER TUNNEL

TRANSFER CART FROM
WASTE PROCESS PLANT

SEC
SCALE: 3

User: MKG
Date: 01/29/99 - 08:46 A.M.

File: 3529-34.dwg
Path: P:\CPP-HLW

ON
1"=1'-0" TYP

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN				A		
		REQUESTER:		ICPP WASTE TREATMENT FACILITIES TRU/CLASS A OPTION WASTE SEPARATIONS FACILITY SECTION						
		DESIGN:								
		DRAWN: K BRONSON								
PROJECT NO.		SPEC CODE		SIZE	CAGE CODE	INDEX CODE NUMBER		DWG-	REV	
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.		EFFECTIVE DATE:		D	01MF3	AREA	TYP	Q	1	088
DESIGN PHASE:		QUALITY LEVEL:		SCALE: NOTED						SHEET TRUA-A-12

D

C

B

WEATHER ENCLOSURE

EL 40'

CHARGE HALL

OPENING IN FLOOR

CASK/RAIL CAR

HYDRAULIC CASK MANEUVERING PLATFORM

SECTION

SCALE: 3/32"=1'-0"

D
TYP

User: LMG
Date: 01/29/88 - 08:48 AM

A

File: 3528-33.dwg
Plot: P:\CPP-HLW

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:			
		DESIGN:			
		DRAWN:			
		PROJECT NO.			
DESIGN PHASE:		SPEC CODE:		INDEX CODE NUMBER	
QUALITY LEVEL:		FOR REVIEW/APPROVAL SIGNATURES		DWG-	
EFFECTIVE DATE:		SEE DAR NO.		REV	
		SCALE: NOTED		SHEET TRUA-A-13	

D
C
B

SITE PLAN

D

C

B

A

FLOOR PLAN
ELEVATION 0'-0"

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER: DESIGN: DRAWN: PROJECT NO.: SPEC CODE:		ICPP WASTE TREATMENT FACILITY VITRIFIED WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION 0'-0"	
DESIGN PHASE:		FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: AREA: 200 TYPE: 1 G: 0855 DWG- 530	REV
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE 1/32"=1'-0" SHEET VWO-A-6	

D

C

B

A

FLOOR PLAN
ELEV -21'-0"

User: MKG
Date: 01/27/88 - 10:58 A.M.

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN
REQUESTER:		ICPP WASTE TREATMENT FACILITY VITRIFIED WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION -21'-0"	
		DESIGN:			
		DRAWING:			
		PROJECT NO.:			
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		DWG-	
SEE DAR NO.		EFFECTIVE DATE:		REV	
DESIGN PHASE:		SCALE: 1/32" = 1'-0"		SHEET VWO-A-7	
QUALITY LEVEL:					

8

7

6

5

D

C

B

COMPACTED
BACKFILL

SPIRAL STAIRS

508'-5"

COO

LAG
STORAGE

18'-0"x14'-0" TRANSFER
TUNNEL

TO PROCESS
FACILITY

FLOOR
ELEVATION

User: MKG
Date: 01/27/98 - 12:18 P.M.

File: 3529-07.dwg
Path: P:\CPP-HLW

8

7

6

5

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

12

PLAN
-0"

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN											
		REQUESTER:		ICPP WASTE TREATMENT FACILITY VITRIFIED WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION -37'-0"											
		DESIGN:													
		DRAWN: <i>James Zoller</i>													
		PROJECT NO.													
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE		CAGE CODE		INDEX CODE NUMBER		DWG-		REV			
DESIGN PHASE:		SEE DAR NO.		D		01MF3		AREA		TYPE		CL		ORIG	
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: 1/32"=1'-0"				530							
SHEET VWO-A-8															

8

7

6

5

D

C

B

A

TOP OF PARAPET

GANTRY CRANE
STORAGE/
MAINTENANCE AREA
2 PLCS

BERM

CHARGE
HOUSE

FACILITY CRANE #2
18' x 14' WASTE TRANSFER TUNNEL

TRANSPORT CART FROM
WASTE PROCESS PLANT

510'-5"

SECTION A
TYP

User: MKG
Date: 01/27/88 - 12:22 P.M.

File: 3528-31.dwg
Plot: P:\COP-HLW

8

7

6

5

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.													
		REQUESTER:		ICPP WASTE TREATMENT FACILITY VITRIFIED WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION											
		DESIGN:													
		DRAWN: R. S. EVANS													
		PROJECT NO.													
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		<table border="1"> <tr> <td>SIZE</td> <td>CAGE CODE</td> <td colspan="2">INDEX CODE NUMBER</td> <td rowspan="2">DWG-</td> <td rowspan="2">REV</td> </tr> <tr> <td>D 01MF3</td> <td>200</td> <td>200</td> <td>530</td> </tr> </table>		SIZE	CAGE CODE	INDEX CODE NUMBER		DWG-	REV	D 01MF3	200	200	530
SIZE	CAGE CODE	INDEX CODE NUMBER		DWG-	REV										
D 01MF3	200	200	530												
DESIGN PHASE:		SEE DAR NO.		<table border="1"> <tr> <td>SCALE: 1/32"=1'-0"</td> <td>SHEET VWO-A-9</td> </tr> </table>		SCALE: 1/32"=1'-0"	SHEET VWO-A-9								
SCALE: 1/32"=1'-0"	SHEET VWO-A-9														
QUALITY LEVEL:		EFFECTIVE DATE													

8

7

6

5

D

C

B

A

EL 40'

WEATHER ENCLOSURE

FACILITY GANTRY CRANE

SHIELD PLUGS

CHARGE HALL

COOLING AIR INLET

STORAGE CONTAINER

CHARGE FACE STRUCTURE
SEE DETAIL

1

SECTION

SCALE: 3/32"=1'-0"

8
TYP

User: MKG

Date: 01/27/88 - 12:49 P.M.

File: 3529-22.dwg
Plot: P:\CPP-JLW

8

7

6

5

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN ICPP WASTE TREATMENT FACILITY VITRIFIED WASTE OPTION HLW INTERIM STORAGE SECTION AND DETAIL						
10' 20' 30' SCALE 3/32" = 1'-0"		REQUESTER: DESIGNER: DRAWN: PROJECT NO.: SPEC CODE:						SIZE	CAGE CODE	INDEX CODE NUMBER
DESIGN PHASE:		FOR REVIEW/APPROVAL SIGNATURES		D	01MF3	AREA	TYP	Q	ORIG	DWG-
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: NOTED				SHEET VW0-A-10		

D

C

B

User: MKG
Date: 01/27/08 - 12:57 P.M.

A

SE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER: DESIGN: DRAWN: PROJECT NO. SPEC CODE		ICPP WASTE TREATMENT FACILITY VITRIFIED WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION	
DESIGN PHASE: SCOPING		FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.		SIZE: D CAGE CODE: 01MF3 AREA: 200 INDEX CODE NUMBER: 001530 DWG- REV	
QUALITY LEVEL: III		EFFECTIVE DATE:		SCALE: 1/32" = 1'-0" SHEET VWO-A-11	

D

C

B

User: MKG
Date: 01/27/98 - 1:03 P.M.
A

File: 3529-28.dwg
Path: P:\CFP-HLW

SECTION D
TYP

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER: DESIGN: DRAWN: PROJECT NO. SPEC CODE			
DESIGN PHASE: SCOPING		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D 01MF3 CAGE CODE: 200 INDEX CODE NUMBER: 100530	
QUALITY LEVEL: III		EFFECTIVE DATE:		DWG- SHEET VWO-A-12

五

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN ICPP WASTE TREATMENT FACILITY DIRECT CEMENTITIOUS WASTE OPTION	
200' 100' 50' 0' 200' SCALE: 1" = 200.0'		REQUESTER: DESIGN: DRAWN: PROJECT NO.: SPEC CODE:			
DESIGN PHASE: SCOPING		FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.		SITE PLAN SIZE: D 01MF3 AREA: 200 TYPE: 0100 Q: 02 DATE: 1530	
QUALITY LEVEL: III		EFFECTIVE DATE:		DWG- SHEET DCWO-C-1	

D

C

B

LAG STORAGE
TRANSFER TUNNEL

RETAINING WALL

FLOOR P
ELEVATION 0

User: MKG
Date: 01/28/88 - 09:24 A.M.

A

File: 3528-02.dwg
Path: P:\CPP-HLW

AN

FOR DRAWING INDEX SEE DRAWING NO.		SUB/CONTRACT NO.						A	
		REQUESTER:		ICPP WASTE TREATMENT FACILITY DIRECT CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION 0'-0"					
		DESIGN:							
		DRAWN:							
		PROJECT NO.:							
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: CAGE CODE: INDEX CODE NUMBER D 01MF3 AREA: 200 TYPE: 1 Q: 1 CLASS: 530		DWG-		REV	
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: 1/32"=1'-0"		SHEET DCWO-A-14			

D

C

B

A

SPIRAL STAIR

ADMIN SUPPORT AREA

COOLING AIR OUTLET STACK
10 PLCS

COMPACTED
BACKFILL

TYPICAL
MIDDLE-
RANGE
STORAGE
VAULT

COOLING AIR INLETS
10 PLCS

26"ID W/5'-0" MIN SHIELDING

18' x 14' TRANSFER TUNNEL
BELOW

PERSONNEL DOOR
3 PLCS

FLOOR F
ELEV -21'

User: MKG
Date: 01/28/98 - 08:27 AM

File: 3529-03.dwg
Path: P:\CAPP-HLW

D

C

B

FLOOR
ELEVATION

User: MKG
Date: 01/28/88 - 09:35 A.M.
A

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN			
		REQUESTER:		ICPP WASTE TREATMENT FACILITY DIRECT CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION -37'-0"			
		DESIGN:					
		DRAWN: <i>John F. Keller</i>					
		PROJECT NO.					
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D	CAGE CODE: 01MF3	INDEX CODE NUMBER: 1530	DWG-REV
DESIGN PHASE:		SEE DAR NO.		SCALE: 1/32" = 1'-0"			
QUALITY LEVEL:		EFFECTIVE DATE:		SHEET DCWO-A-16			

D

C

B

A

SECTION A
A
TM

User: MKG
Date: 01/28/98 - 10:19 A.M.

File: 3529-19.dwg
Plot: P:\CPP-HLW

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN				
		REQUESTER:		ICPP WASTE TREATMENT FACILITY DIRECT CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION				
		DESIGN:						
		DRAWING: R. S. EVANS						
		PROJECT NO.						
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE	CAGE CODE	INDEX CODE NUMBER		
SEE DAR NO.		EFFECTIVE DATE		D	01MF3	AREA	TYP	CL
DESIGN PHASE:		QUALITY LEVEL:		200		1530		DWG-
				SCALE: 1/32"=1'-0"		SHEET DCWO-A-17		

4 3 2 1

D

C

B

EL 40'

WEATHER ENCLOSURE

FACILITY GANTRY CRANE

SHIELD PLUGS

CHARGE HALL

COOLING
AIR
INLET

STORAGE
CONTAINER

CHARGE FACE STRUCTURE
SEE DETAIL

1

SECTION

SCALE: 3/32"=1'-0"

8
TYP

User: MKG
Date: 01/28/88 - 10:26 A.M.

A

File: 3528-04.dwg
Path: P:\COP-HLW

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:		ICPP WASTE TREATMENT FACILITY DIRECT CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION AND DETAIL	
		DESIGN:			
		DRAWN:			
		PROJECT NO.			
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D GAGE CODE: 01MF3 INDEX CODE NUMBER: 1530 DWG- REV	
DESIGN PHASE:		SEE DAR NO.		SCALE: NOTED	
QUALITY LEVEL:		EFFECTIVE DATE:		SHEET DCWO-A-18	

D

WEATHER ENCLOSURE

EL. 40'

C

B

TRANSFER TUNNEL

TRANSFER CART FROM
WASTE PROCESS PLANT

A

User: MKG
Date: 01/29/88 - 10:29 A.M.

File: 3528-17.dwg
Plot: P:\CPP-HLW

SE
SCALE:

ION
32"=1'-0" (C) TYP

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:		ICPP WASTE TREATMENT FACILITY DIRECT CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION	
		DESIGN:			
		DRAWING:			
		PROJECT NO.			
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: AREA TYPE CL T ORG 530	
DESIGN PHASE:		SEE DAR NO.		DWG-	
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE NOTED	
SHEET DCWO-A-19					

D

C

B

A

EL 40'

WEATHER ENCLOSURE

CHARGE HALL

OPENING IN FLOOR

CASK/RAIL CAR

HYDRAULIC CASK MANEUVERING PLATFORM

RAIL

SECTION

SCALE: 3/32"=1'-0"

D
TYP

User: MKG
Date: 01/29/98 - 10:32 A.M.

File: 3529-14.dwg
Plot: P:\CPP-HLW

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN

SCALE: 3/32" = 1'-0"		REQUESTER:		ICPP WASTE TREATMENT FACILITY DIRECT CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION	
		DESIGN:			
		DRAWN:			
		PROJECT NO.			
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 530 DWG- AREA TYPE: 530	
DESIGN PHASE:		SEE DAR NO.		REV	
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: NOTED	
SHEET DCWO-A-20					

D

C

B

A

SITE PLAN

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN ICPP WASTE TREATMENT FACILITY CEMENTITIOUS WASTE OPTION	
200' 100' 50' 0' 200' SCALE: 1" = 200.0'		REQUESTER: DESIGN: DRAWN: PROJECT NO. SPEC CODE			
DESIGN PHASE: SCOPING QUALITY LEVEL: III		FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. EFFECTIVE DATE:		SITE PLAN SIZE: D 01MF3 INDEX CODE NUMBER: 200 0100 02 530 SCALE: 1"=200.0'	
				SHEET CWO-C-1	

D

C

SPIRAL STAIRS

COOLING AIR
OUTLET STACK

ADMIN SUPPORT BLDG

FACILITY CRANE
#2

CRANE MAINTENANCE
AREA

B

RETAINING WALL

LAG STORAGE
TRANSFER TUNNEL

FLOOR 1
ELEVATION C

User: MKG
Date: 01/28/88 - 3:43 P.M.

A

AN
0"

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN
		REQUESTER:		ICPP WASTE TREATMENT FACILITY CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION 0'-0"			
		DESIGN:					
		DRAWN:					
		PROJECT NO.:					
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 200		AREA: 1 TYPE: G ORG: 530 DWG-	
DESIGN PHASE:		SEE DAR NO.		SCALE: 1/32"=1'-0"		REV	
QUALITY LEVEL:		EFFECTIVE DATE:				SHEET CWO-A-6	

D

C

B

A

FLOOR F
ELEV -21'-

User: MKG
Date: 01/28/98 - 3:44 P.M.

File: 3528-11.dwg
Path: P:\CPP-HLW

D
-1'

AN

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN																							
		REQUESTER:		ICPP WASTE TREATMENT FACILITY CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION -21'-0"																							
		DESIGN:																									
		DRAWN: R. S. EVANS																									
		PROJECT NO.																									
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">SIZE</th> <th style="width: 10%;">CAGE CODE</th> <th colspan="4" style="text-align: center;">INDEX CODE NUMBER</th> <th style="width: 10%;">DWG-</th> <th style="width: 10%;">REV</th> </tr> <tr> <td rowspan="2" style="text-align: center; font-weight: bold;">D</td> <td rowspan="2" style="text-align: center; font-weight: bold;">01MF3</td> <td style="width: 10%;">AREA</td> <td style="width: 10%;">TYPE</td> <td style="width: 10%;">Q</td> <td style="width: 10%;">ORIG</td> <td rowspan="2" style="text-align: center; font-weight: bold;">200</td> <td rowspan="2" style="text-align: center; font-weight: bold;">530</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>				SIZE	CAGE CODE	INDEX CODE NUMBER				DWG-	REV	D	01MF3	AREA	TYPE	Q	ORIG	200	530				
SIZE	CAGE CODE	INDEX CODE NUMBER						DWG-	REV																		
D	01MF3	AREA	TYPE					Q	ORIG	200	530																
DESIGN PHASE:		SEE DAR NO.		SCALE: 1/32"=1'-0"																							
QUALITY LEVEL:		EFFECTIVE DATE:		SHEET CWO-A-7																							

D

C

554'-0"

SPIRAL STAIR

COMPACTED BACKFILL

B

18'-0"x14'-0" TRANSFER TUNNEL

LAG STORAGE

TO PROCESS FACILITY

FLOOR ELEVATION

User: MKG
Date: 01/28/98 - 3:47 P.M.
A

4	3	2	1	
REVISONS				
REV	DESCRIPTION			EFFECTIVE DATE

0
-11

PLAN
57'-0"

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.						
		REQUESTER:		ICPP WASTE TREATMENT FACILITY CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION -37'-0"				
		DESIGN:						
		PROJECT NO.						
		SPEC CODE						
FOR REVIEW/APPROVAL SIGNATURES		SEE DAR NO.		SIZE	CAGE CODE	INDEX CODE NUMBER	REV	
DESIGN PHASE:		EFFECTIVE DATE:		D	01MF3	AREA	TYPE	Q
QUALITY LEVEL:								530
				SCALE: 1/32" = 1'-0"				SHEET CWO-A-8

D

C

B

User: MKG
Date: 01/28/98 - 3:50 P.M.

A

TOP OF PARAPET

GANTRY CRANE
STORAGE/
MAINTENANCE AREA
2 PLCS

BERM

CHARGE
HOUSE

FACILITY CRANE #2

18' x 14' WASTE TRANSFER TUNNEL

TRANSPORT CART FROM
WASTE PROCESS PLANT

555'-0"

SECTION A
TM

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN			
<p>SCALE: 1/32" = 1'-0"</p>		REQUESTER:		ICPP WASTE TREATMENT FACILITY CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION			
		DESIGN:					
		DRAWN: R. S. EVANS					
		PROJECT NO.					
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 200		REV	
SEE DAR NO.		EFFECTIVE DATE:		AREA: 200 TYPE: G I: 080 DWG-		SHEET CWO-A-9	
QUALITY LEVEL:				SCALE: 1/32" = 1'-0"			

D

C

B

EL. 40'

WEATHER ENCLOSURE

FACILITY GANTRY CRANE

SHIELD PLUGS

CHARGE HALL

COOLING
AIR
INLET

STORAGE
CONTAINER

CHARGE FACE STRUCTURE
SEE DETAIL

User: MKG
Date: 01/28/88 - 3:53 P.M.

A

SECTION

SCALE: 3/32"=1'-0"

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.								
<p>SCALE: 3/32" = 1'-0"</p>		REQUESTER:		<p>ICPP WASTE TREATMENT FACILITY CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION AND DETAIL</p>						
		DESIGN:								
		DRAWN:								
		PROJECT NO.:								
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE	CAGE CODE	INDEX CODE NUMBER	REV			
DESIGN PHASE:		SEE DAR NO.		D	01MF3	AREA	TYPE	Q	DATE	DWG-
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: NOTED				SHEET CWO-A-10		

D

C

B

A

WEATHER ENCLOSURE

EL. 40'

CHA

TRANSFER TUNNEL

TRANSFER CART FROM
WASTE PROCESS PLANT

SEC'
SCALE: 3/

User: MKG
Date: 01/28/98 - 3:59 P.M.

File: 3528-26.dwg
Path: P:\CPP-HLW

ON
=1'-0" TYP

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN				
		REQUESTER:		ICPP WASTE TREATMENT FACILITY CEMENTITIOUS WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION				
		DESIGN:						
		PROJECT NO.						
		SPEC CODE						
FOR REVIEW/APPROVAL SIGNATURES		FOR REVIEW/APPROVAL SIGNATURES		SIZE	CAGE CODE	INDEX CODE NUMBER	DWG-	REV
SEE DAR NO.		SEE DAR NO.		D	01MF3	AREA	TYPE	CL
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: NOTED		530		SHEET CWO-A-11

D

C

B

A

User: MKG
Date: 01/29/98 - 4:04 P.M.

File: 3529-29.dwg
Path: P:\CAPP-HLW

SECTION
SCALE: 3/32"=1'-0" (D TYP)

SITE PLAN

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN

REQUESTER:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION SITE PLAN																
		DESIGN:																		
		DRAWN:																		
		PROJECT NO.																		
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		<table border="1"> <tr> <td>SIZE:</td> <td>CAGE CODE</td> <td colspan="2">INDEX CODE NUMBER</td> <td>REV</td> </tr> <tr> <td>D</td> <td>01MF3</td> <td>AREA</td> <td>TYPE</td> <td>Q.1086</td> </tr> <tr> <td colspan="2"></td> <td>200</td> <td>0100</td> <td>021530</td> </tr> </table>		SIZE:	CAGE CODE	INDEX CODE NUMBER		REV	D	01MF3	AREA	TYPE	Q.1086			200	0100	021530
SIZE:	CAGE CODE	INDEX CODE NUMBER		REV																
D	01MF3	AREA	TYPE	Q.1086																
		200	0100	021530																
EFFECTIVE DATE:		SCALE: 1"=200.0'		SHEET IWO-C-1																
DESIGN PHASE: SCOPING		QUALITY LEVEL: III

File: 3528-10.dwg
Path: P:\CAPP-HLW
User: MKG
Date: 01/27/88 - 2:12 P.M.

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.	
		REQUESTER DESIGN DRAWING PROJECT NO. SPEC CODE FOR REVIEW/APPROVAL SIGNATURES SEE DWR NO. EFFECTIVE DATE	
DESIGN PHASE QUALITY LEVEL		LOCKHEED MARTIN IOPP WASTE TREATMENT FACILITY HIP WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION 0'-0"	
SIZE CODE D 01MF3 200		NEXT CODE NUMBER 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350	
SCALE 1/16" = 1'-0"		SHEET HWO-A-7	

WALL

4 3 2 1

B

C

D

234'-11"

D

ADMIN SUPPORT AREA

COOLING AIR OUTLET STACK
4 PLCS

C

B

COOLING AIR INLETS
4 PLCS

26"ID W/5'-0" MIN SHIELDING

18' x 14' TRANSFER TUNNEL
BELOW

PERSONNEL DOOR
3 PLCS

User: MKG
Date: 01/27/88 - 2:31 P.M.

A

FLOOR PLAN

ELEV -21'-0"

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.						A		
 SCALE: 1/16" = 1'-0"		REQUESTER:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION -21'-0"						
		DESIGN:								
		DRAWN:								
		PROJECT NO.:								
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE	CAGE CODE	INDEX CODE NUMBER		DWG-	REV	
DESIGN PHASE:		SEE DAR NO.		D	01MF3	AREA	TYP	Q. 1	082	1530
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: 1/16" = 1'-0"						SHEET HWO-A-8

234'-11"

COOLING AIR OUTLET STACK

LAG
STORAGE

COOLING AIR INLET

18'-0"x14'-0" TRANSFER
TUNNEL

TO PROCESS
FACILITY

FLOOR PLAN
ELEVATION -37'-0"

User: MKG
Date: 01/27/88 - 2:34 P.M.
A

File: 3529-08.dwg
Plot: P:\CPP-HLW

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN					
		REQUESTOR:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION HLW INTERIM STORAGE FACILITY FLOOR PLAN ELEVATION -37'-0"					
		DESIGN:							
		DRAWN: <i>Chris Zoller</i>							
		PROJECT NO.							
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE	CAGE CODE	INDEX CODE NUMBER	DWG-	REV	
DESIGN PHASE:		SEE BAR NO.		D	01MF3	AREA	TYPE	GL	DATE
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: 1/16"=1'-0"		530		SHEET HWO-A-9	

D

C

B

A

TOP OF PARAPET

FACILITY CRANE #2

GANTRY CRANE
STORAGE/
MAINTENANCE AREA
2 PLCS

CHARGE
HOUSE

BERM

5 TON CRANE 2 PLCS

18' x 14' WASTE TRANSFER TUNNEL

TRANSPORT CART FROM
WASTE PROCESS PLANT

328'-1"

SECTION

Uter: MKG
Date: 01/27/88 - 2:38 P.M.

File: 3528-32.dwg
Path: P:\COPP-HLW

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN			
		REQUESTER:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION			
		DESIGN:					
		DRAWN: R. S. EVANS					
		PROJECT NO.					
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 200 TYPE: G I: 050 DWG- SEE DAR NO. 530		REV	
DESIGN PHASE:		EFFECTIVE DATE:		SCALE: 1/16" = 1'-0"			
QUALITY LEVEL:				SHEET HWO-A-10			

D

C

B

A

EL. 40'

WEATHER ENCLOSURE

FACILITY GANTRY CRANE

SHIELD PLUGS

CHARGE HALL

COOLING
AIR
INLET

STORAGE
CONTAINER

CHARGE FACE STRUCTURE
SEE DETAIL

SECTION

SCALE: 3/32"=1'-0"

B

TYP

User: MKG
Date: 01/27/88 -- 2:39 P.M.

File: 3528-21.dwg
Path: P:\CAPP-HLW

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
1" = 25' 4" 5" 10" 20" SCALE: 3/32" = 1'-0"		REQUESTER: DESIGN: DRAWING: PROJECT NO.: SPEC CODE:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION AND DETAIL	
DESIGN PHASE:		FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.		SIZE: D CAGE CODE: 01MF3	INDEX CODE NUMBER: AREA: 1 TYPE: 01 082 530
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE: NOTED	DWG- REV SHEET HWO-A-11

D

C

B

A

WEATHER ENCLOSURE

EL 40'

CHAR

TRANSFER TUNNEL

5 TON OVERHEAD CRANE

TRANSFER CART FROM
WASTE PROCESS PLANT

SECT
SCALE: 3/4"

User: MKG
Date: 01/23/98 - 2:52 P.M.

File: 3529-24.dwg
Path: P:\CPP-HLW

N
1'-0" TYP

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION	
		DESIGN:			
		DRAWING:			
		PROJECT NO.:			
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 530	
SEE DAR NO.		EFFECTIVE DATE:		AREA: 1 TYPE: Q Q: 082 DWG- 530	
QUALITY LEVEL:		SCALE: NOTED		REV: 530	
				SHEET HWO-A-12	

D

C

B

A

EL 40'

WEATHER ENCLOSURE

CHARGE HALL

OPENING IN FLOOR

CASK/RAIL CAR

HYDRAULIC CASK MANEUVERING PLATFORM

SECTION

SCALE: 3/32"=1'-0"

D
TYP

User: MKG
Date: 01/27/88 - 2:55 P.M.

File: 3529-27.dwg
Path: P:\CPP-HLW

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION HLW INTERIM STORAGE FACILITY SECTION	
		DESIGN:			
		DRAWING:			
		PROJECT NO.:			
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D	
DESIGN PHASE:		SEE DAR NO.		CAGE CODE: 01MF3	
QUALITY LEVEL:		EFFECTIVE DATE:		INDEX CODE NUMBER: 530	
				DWG-: 530	
				SCALE: NOTED	
				SHEET HWO-A-13	

Appendix 3

Risk Assessment/Data Sheets

RISK ASSESSMENT SUMMARY

This appendix contains a data sheet for each of the following significant risk identified for the Interim Storage Facilities (ISFs):

1. The quantities and characteristics of the waste are different than assumed in the study. Risk = 3.
2. Waste will not be stored in the Savanna River Site (SRS) canister. Risk = 2.
3. The facility would have to be redesigned if the waste is classified as a RCRA waste after processing. Risk = 3.
4. A storage canister will be mishandled or dropped during waste transfer to, from, or in the facility. Risk = 2.
5. The facility might not be operational when needed. Risk = 2.

As risks were evaluated, the probability of occurrence and the impact if the risk is realized were rated. The probability and impact were assigned numerical values of 3 for high, 2 for medium, and 1 for low, as shown on the data sheets. The equation for risk calculation is $\text{Risk} = \text{Probability} \times \text{Impact}$. The maximum risk rating is therefore 3. The risk matrix in Figure 3-1 shows what action to take as a function of the risk rating; these actions are defined in Table 3-1.

Probability	High (3)	Evaluate (3)	Contingency Plan (6)	Eliminate risk (9)
	Medium (2)	Monitor (2)	Contingency Plan (4)	Contingency Plan (6)
	Low (1)	Forget (1)	Monitor (2)	Evaluate (3)
		Low (1)	Medium (2)	High (3)
		Impact		
		$\text{Risk} = \text{Probability} \times \text{Impact}$		

Figure 3-1. Risk Matrix.

Table 3-1. Risk Action Definition.

Risk Rating	Action
9	Any risk determined to be in this category will be mitigated through additional design or analysis until the risk is no longer in this category.
6 and 4	Risks in this category will be mitigated to the extent feasible within cost and schedule guidelines. For those risks that cannot be mitigated, contingency plans have been made to deal with the risk if it occurs.
3	Risks in this category will be evaluated during the project to identify if they are becoming problems.
2	These risks will be monitored, with no specific action identified.
1	These risks are noted for interest only.

Risk Assessment - Data Sheet

Risk Type ☒ Project ☐ Technical ☐ ESH

<p><u>RISK:</u></p> <p>The quantities and characteristics of the waste are different than assumed in the study</p>	<p><u>PREVENTIVE PLANS</u></p> <p>Interim storage facility sized to most current referenced information</p> <p>The new interim storage facility is based on a modular design concept allowing for additional storage to be readily incorporated</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Scoping study level of preliminary information</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>The facility design might have to be adjusted</p>
<div style="display: flex; justify-content: space-between;"> <div> <p><u>PROBABILITY</u></p> <div style="border: 1px solid black; padding: 5px;"> ☒ High (3) ☐ Medium (2) ☐ Low (1) </div> </div> <div> <p><u>IMPACT</u></p> <div style="border: 1px solid black; padding: 5px;"> ☐ High (3) ☐ Medium (2) ☒ Low (1) </div> </div> </div> <p>Risk = 3</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>Redesign of facility during conceptual and title phases</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project. Medium - Has the potential to occur during the project. Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance. Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance. Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Evaluate continuing studies for facility design adequacy</p>

Risk Assessment - Data Sheet

Risk Type ☐ Project ☒ Technical ☐ ESH

<p><u>RISK:</u></p> <p>Waste will not be stored in the Savannah River Canister</p>	<p><u>PREVENTIVE PLANS</u></p> <p>The facility is designed to be flexible. The new facility design would be adjusted to accept the new canister</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Different canister identified due to additional study</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p>
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><u>PROBABILITY</u></p> <div style="border: 1px solid black; padding: 5px;"> ☐ High (3) ☒ Medium (2) ☐ Low (1) </div> </div> <div style="width: 45%;"> <p><u>IMPACT</u></p> <div style="border: 1px solid black; padding: 5px;"> ☐ High (3) ☐ Medium (2) ☒ Low (1) </div> </div> </div> <p>Risk = 2</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>Facility redesign during conceptual and title phases.</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project. Medium - Has the potential to occur during the project. Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance. Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance. Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Monitor continuing studies to identify the canister to be selected</p>

Risk Assessment - Data Sheet

Risk Type ☒ Project ☐ Technical ☐ ESH

<u>RISK:</u> The facility would have to be redesigned if the waste is classified as a RCRA waste after processing		<u>PREVENTIVE PLANS</u> None
<u>PROBABLE CAUSE(S):</u> The delisting of the waste after processing is not approved Re-evaluation of the waste determines that it should be classified as RCRA waste after processing		<u>CONSEQUENCES IF RISK NOT RESOLVED</u> The facility would have to be redesigned. The costs for the facility would increase.
<u>PROBABILITY</u> <div style="border: 1px solid black; padding: 5px;"> ☐ High (3) ☐ Medium (2) ☒ Low (1) </div>	<u>IMPACT</u> <div style="border: 1px solid black; padding: 5px;"> ☒ High (3) ☐ Medium (2) ☐ Low (1) </div>	<u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u> None
Risk = 3 Risk = Probability x Impact		
Probability Definition High - Likely to occur during the project. Medium - Has the potential to occur during the project. Low - Has little potential to occur during the project. Impact Definition High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance. Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance. Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.		<u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u> Continue to monitor the status of the option to delist the waste

Risk Assessment - Data Sheet

Risk Type ☐ Project ☒ Technical ☐ ESH

<p><u>RISK:</u></p> <p>A storage canister will be mishandled or dropped during waste transfer to, from, or in the facility.</p>	<p><u>PREVENTIVE PLANS</u></p> <p>Facility will be designed to be able to recover from these accidents</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Possible scenario include</p> <ol style="list-style-type: none"> 1. Canister falls from the transfer cart in the tunnel 2. Canister is dropped during transfer from the transfer cart 	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>Additional design for new equipment</p>
<div style="display: flex; justify-content: space-between;"> <div> <p><u>PROBABILITY</u></p> <p>☐ High (3)</p> <p>☐ Medium (2)</p> <p>☒ Low (1)</p> </div> <div> <p><u>IMPACT</u></p> <p>☐ High (3)</p> <p>☒ Medium (2)</p> <p>☐ Low (1)</p> </div> </div> <p>Risk = 2</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>None</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Ongoing review of the facility during design reviews, SAR preparation, etc.</p>

Risk Assessment - Data Sheet

Risk Type ☒ Project ☐ Technical ☐ ESH

<p><u>RISK:</u></p> <p>The facility might not be operational when needed</p>	<p><u>PREVENTIVE PLANS</u></p> <p>Fund both the process and the storage facilities at the same time</p> <p>Evaluate and resolve NRC and construction problems during design</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Lack of funding</p> <p>NRC licensing issues</p> <p>Construction problems</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>The process facility would not be able to operate creating a delay in the process schedule</p>
<div style="display: flex; justify-content: space-between;"> <div> <p><u>PROBABILITY</u></p> <p>☐ High (3)</p> <p>☐ Medium (2)</p> <p>☒ Low (1)</p> </div> <div> <p><u>IMPACT</u></p> <p>☐ High (3)</p> <p>☒ Medium (2)</p> <p>☐ Low (1)</p> </div> </div> <p>Risk = 2</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>None</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>None</p>

Appendix 4

Background Information for Project Data Sheets

CONTENTS

Background information for the Project Data Sheets are included in this appendix in the following order:

1. TRU/Class A Option
2. Vitrified Waste Option
3. Direct Cementitious Waste Option
4. Cementitious Waste Option
5. Hot Isostatic Press Waste Option.

The background information includes:

- Construction Assumptions
- Operations Assumptions
- D&D Labor
- D&D Assumptions
- Estimate of Diesel Engine Emissions.

431.02#
06/17/97
Rev. #04

ENGINEERING DESIGN FILE

Function File Number – SPR-01
EDF Serial Number – EDF-IS-001

TRU Class A Option

Construction Assumptions

Construction costs are from the detailed cost estimate (R. Adams)

Interim Storage Facility Option, Prepared by Byron L. Blackley, R.A., December 24, 1997.		
Construction duration =	2 years	
Labor =	58 new workers/yr	
1 man-year of labor =	1800 manhours	
Square footage =	36,063 sq.ft =	3,350 m ²
Acres disturbed =	3.0 acres (previous)	

Excavation: Material needs to be imported.

Imported material = 10,850 yd³
(Detailed Cost Estimate)

Air Emissions:

Dust during construction = 1.2 tons/month-acre = 86 tons (total)
(from USEPA Office of Air Quality Planning and Standards)

Air emissions from fuel usage are based on the diesel emissions spreadsheet.

Effluents:

Sanitary Wastewater = 326,250 gal/yr = 2,469,713 liters (total)
(based on 25 gal/person-day and 225 days/year of construction)

(Benfield, LD and C.W. Randall, Biological Process Design for Wastewater Treatment, InPrint, Inc., 1987, p. 104 - wastewater generation = 15-30 gal/day-person)

Assume 3 gallons of lubricating oil and hydraulic fluid generated for every 60 hours of operation of heavy equipment =
(Heavy equipment hrs are calculated below.)

1,001 liter (total)

Solid Wastes:

Construction trash = 1,798 yd³ (total) = 1,375 m³ (total)
(Use 15.5 yd³/yr per capita. This is twice the generation rate of trash from site operations)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste generation = 275 gal/week = 217 m³ (total)
(based on an assumed generation rate of 5 55-gallon drums of waste per week)

Hazardous waste storage = 3300 gal = 13 m³
(Assume waste is accumulated for 12 weeks [84 days] in a 90-day accumulation area, then

Water Usage:

Water used for dust control =
Area

3 acres (previous)
43,560 sq ft/acre
0.05 in water/wk
0.08333 ft/in
28.320 liter/ft³
20 wk/yr
2 yr

616,810 liter

assume 0.05" water per week to control dust

assume dust control required 20 weeks
Length of Construction

Domestic water use is assumed to be the same as sanitary waste.

Construction Assumptions

Energy Requirements:

Electrical usage assumed to be 3,000 kWh (from John Duggan)
156 MWh/yr

Fossil Fuel Use

Concrete:

Amount used =	9,260 yd ³	Building
(Detailed Cost Estimate)	460 yd ³	Charge Face Slab
	<hr/> 9,720 yd ³	Total Concrete

Number of truckloads = 442 (based on 22 yd³/load... tandem trailers)
Fuel usage = 9,720 gal (assumes 5 mpg and round trip of 110 miles)

Materials delivery:

Number of truckloads = 221 (assume 1/2 the loads of concrete)
Fuel usage = 6,627 gal (assumes 5 mpg and round trip of 150 miles)

Imported Material Delivery:

Material 10,850 yd³
Number of truckloads = 493 (based on 22 yd³/load... tandem trailers)
Fuel usage = 10,850 gal (assumes 5 mpg and round trip of 110 miles)

Construction Equipment:

Construction Equipment Cost \$378,355 (Detailed Cost Estimate)

\$75 per hr
5,045 hr

Labor Hours 181,612 (Detailed Cost Estimate)

750 labor hr/equipment hr
242 hr

Total Equipment Hours = 5,287 hr

Equipment fuel usage (see <http://www.deere.com/ind>) = 6 gal/hr
Total heavy equipment fuel usage = 31,721 gal
or 120,065 liters (total)

Total heavy equipment and materials delivery fuel used =

Concrete Delivery	6,627 gal
Materials Delivery	493 gal
Imported Materials Deliver	10,850 gal
Heavy Equipment	31,721 gal
	<hr/> 49,692 gal
	3.785 liter/gal
	<hr/> 188,083 liter

Operations Assumptions

Operating costs are taken from the life cycle cost estimate.

Operation

Loading	20 yr
Holding	30 yr
Shipping	5 yr

Interim Storage Facility Option, Prepared by Byron L. Blackley, R.A., December 24, 1997.

Labor:	6.5
Cannisters	170
Power	290 kW

Radiation worker annual dose is based on the average annual dose received at ICCP during the last three years (see attached memorandum)

Effluents:

Sanitary wastewater = 59,313 gal/yr = 224,498 liters/yr
(based on 25 gal/day per worker, facility occupied year-round)

Solid Wastes:

Sanitary/Industrial trash = 47 yd³/yr 36 m³/yr
(based on 7.25 yd³/person-year... Bob Skinner [cuber facility])

Product canisters = 6 m³/yr
(based on 0.72 m³/canister)

Total rad waste = 122 m³

Water Usage:

Domestic water usage = same as sanitary wastewater rate.

Energy Requirements

Electric power usage = 2,533 MWh/yr
(based on 290 kW)

D&D Labor

D&D Labor

Years From D&D
3 Assumptions

Crew #	Crew Function	Total MH/day	Total \$/day	Material \$/day	Equipment \$/day	Total \$/day	D&D Cost Allocated	Total MH	Man-hours/yr	
D	Documentation	18	\$1,136	\$114	\$ -	\$1,250	\$ 1,150,000	16,560	5,520	
1	Characterization	44	\$2,302	\$460	\$691	\$3,453	\$ 1,720,000	21,917	7,306	
2	Rad Demolition-Systems	77	\$4,091	\$818	\$1,023	\$5,932	\$ -	-	-	
2A	Rad Demolition-Building	99	\$5,319	\$1,064	\$1,596	\$7,979	\$ -	-	-	
3	Demolition-Systems	72	\$3,762	\$752	\$941	\$5,455	\$ 4,900,000	64,675	21,558	\$ 845,261
3A	Demolition-Building	88	\$4,808	\$962	\$1,442	\$7,212	\$ 9,800,000	119,578	39,859	\$ 1,959,456
4	Asbestos Abatement	77	\$3,753	\$375	\$188	\$4,316	\$ -	-	-	\$ 2,804,718
5	Decontamination	77	\$3,753	\$751	\$1,126	\$5,630	\$ -	-	-	
6	Prep/Fabrication	61	\$3,217	\$643	\$965	\$4,826	\$ 2,900,000	36,656	12,219	\$ 3,740
7	RADCON Surveys	50	\$2,596	\$519	\$779	\$3,894	\$ 2,279,000	29,263	9,754	
Total							\$ 22,749,000	288,649	96,216	
vailable							\$ 22,749,000			

Notes:

- 1 Crew functions and daily estimates are from the D&D program (Dave Haycraft)
- 2 Total costs are based on life cycle estimate by R. Turk
- 3 Assume all workers in crews 2, 2A, 5, and 7 are rad workers
- 4 Assume a man-year is 1800 hours.

D D Assumptions

Duration of D & D = 3 years

No decontamination of the storage facility will be required.

D & D labor requirements are taken from D & D labor and equipment spreadsheet.

D & D costs come from the life cycle cost estimate.

1 manyear of labor = 1800 manhours

Heavy Equipment	# Used	Hours/day	Days/wk	Wks/yr	Hours/yr
Mobile Crane	1	3	5	20	300
Roll-Off Truck	1	8	5	20	800
Dozer	1	6	5	20	600
Loader	1	8	5	20	800
Scabbler (w/ Vacuum System)**	1	6	3	20	360
Pneumatic Ram	1	3	5	20	300
Demolition Machine (Remote Control)**	0	4	4	45	-

** Not needed, contamination not expected

Total hours/yr 3,160

Total heavy equipment hours = 9,480

Assume each piece of equipment uses 6 gallon of diesel fuel per hour. Consumption rate from John Deere

Web Site (Construction Equipment - <http://www.deere.com/ind/product/product.html>)

No. of gallons of fuel used during D & D = 56,880 gal = 215,291 liters (total)

Assume each roll-off truck makes 3 trips per day to RWMC

No. of trips = 3

Miles traveled @ 12 miles/round trip= 36

Acres disturbed and duration of disturbance

Acreage disturbed is the same as for construction = 3.0 acres

Air emissions

HEPA filter ventilation is not required during D&D.

Air emissions from fuel are based on the diesel emissions spreadsheet.

Effluents

No decontamination solution required during D&D.

Sanitary wastewater = 300,676 gal/yr = 3,414,175 liters (total)

(based on 25 gal/day per worker, 225 day/yr)

Lube oil = 1,794 liters (total)

(based on 3 gal for every 60 hours of operation)

Solid wastes:

D D Assumptions

The following factors from Dave Kenoyer are based on a contaminated building. The storage facility is not expected to be contaminated. Therefore, all items identified as LLW will be included with the non-contaminated waste. These factors are used for consistency in waste volumes with facilities which are contaminated.

Solid Waste Generation (factors from Dave Kenoyer - D&D Program)

Waste Type	Waste Type	Factor (cu.ft./sq.ft.)	Sq.Ft. in Facility	Cu.Ft. of Waste	Cu. Meters
WERF-LLW Combustible PPEs		0.167	36,063	6,023	172
WERF-LLW Combustible Building		0.128	36,063	4,616	132
WERF-LLW Compactable Building		0.195	36,063	7,032	201
RWMC-LLW Non-Compactable Equipment		0.513	36,063	18,500	529
RWMC-LLW Non-Compt Building Debris		0.684	36,063	24,667	705
RWMC-LLW Non-Compt Concrete Rubble *		3.44	36,063	124,057	3,544
RWMC-LLW Non-Compt Scrap Metal		0.778	36,063	28,057	802
RWMC-LLW Asbestos/ACM Covered Pipe		0	36,063	-	
CFA Landfill Non-Compt Building Debris		1.99	36,063	71,765	2,050
CFA Landfill Non-Compt Concrete Rubble *		2.454	36,063	88,499	2,529
CFA Landfill Asbestos		0	36,063	-	
HWSF Hazardous Mtrls (Hg/PCBs/etc)		0.002	36,063	72	2
Metal Recycle		0.022	36,063	793	23
Non-Rad =				373,216	10,663
Hazardous =				72	2
Metal =				793	23

* (Factor used is twice that given by Dave Kenoyer due to use of concrete for shielding)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste = 26,445 gal (total) = 909 m3 (total)
(based on an assumed 5 55-gallon drums generated per week... work only 225 days/yr)

Water Usage

Domestic water use is assumed to be the same as sanitary waste.

Energy requirements:

Electric power usage = 156,000 kWh/yr 156 MWh/yr
(based on 3,000 kWh/wk - John Duggan)

Fossil Fuels = 215,291 liters

Estimate of Diesel Engine Emissions Interim Storage Facility - TRU

Bases & Assumptions:

1. Air to fuel ratio = 25:1 (Mass Basis)
2. Diesel fuel density = 7.5 lbs./gal.
3. Air is 21% O₂, 79% N₂, with a pseudomolecular weight of 29.
4. Combustion is simulated as: $C_9H_{18} + 13.5O_2 \longrightarrow 9CO_2 + 9H_2O$
5. Particulates = 5 mg/scf
6. CO = 2,500 ppmv
7. NO_x = 2,000 ppmv
8. Unburned hydrocarbons = 100 ppmv
9. Diesel fuel (# 2 fuel oil) contains 1 wt. % sulfur
10. Combustion is about 99% efficient.

from Wark, K. and C.F.
Warner, Air Pollution, Its
Origin and Control, IEP,
New York, 1976, p. 446,
423

Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 336

Lbs. Of Construction Fuel	372,405
Lbs. Of Operations Fuel	-
Lbs. Of D&D Fuel	426,276
Total Lbs. of Fuel Used	798,681

Lb-Moles of Construction Fuel	2,956
Lb-Moles of Operations Fuel	-
Lb-Moles of D&D Fuel	3,383
Total Lb-Moles of Fuel (as C₉H₁₈)	6,339

Lbs of Air for Construction Fuel (based on air-to-fuel ratio)	9,310,122
Lbs. of Air for Operations Fuel (based on air-to-fuel ratio)	-
Lbs. of Air for D&D Fuel (based on air-to-fuel ratio)	10,656,895
Total Lbs. of Air Added	19,967,017

Lb-Moles of Air for Combustion Fuel	321,039
Lb-Moles of Air for Operations Fuel	-
Lb-Moles of Air for D&D Fuel	367,479
Total Lb- Moles of Air	688,518

Grand Total of Materials Fed, Lbs. 20,765,697

Exhaust Gases, Construction Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	1,158,711	579	26,334	9,454,030
H ₂ O	474,018	237	26,334	9,454,030
O ₂	893,331	447	27,917	10,022,062
N ₂	7,101,376	3,551	253,621	91,049,784
Subtotal of Major Gases	9,627,437	4,814	334,206	119,979,906
SO ₂	7,448	3.7		
Particulates	1,321	0.7		
CO	23,394	11.7		
NO _x (assumed NO)	20,052	10.0		
Unburned Hydrocarbons	4,211	2.1		
Subtotal of Contaminants	56,427	28		

Exhaust Gases, Operations Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	-	-	-	-
H ₂ O	-	-	-	-
O ₂	-	-	-	-
N ₂	-	-	-	-
Subtotal of Major Gases	-	-	-	-
SO ₂	-	-	-	-
Particulates	-	-	-	-
CO	-	-	-	-
NO _x (assumed NO)	-	-	-	-
Unburned Hydrocarbons	-	-	-	-
Subtotal of Contaminants	-	-	-	-

Exhaust Gases, D&D Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	1,326,327	663	30,144	10,821,620
H ₂ O	542,588	271	30,144	10,821,620
O ₂	1,022,558	511	31,955	11,471,822
N ₂	8,128,638.23	4,064	290,309	104,220,754
Subtotal of Major Gases	11,020,111	5,510	382,551	137,335,815
SO ₂	8,259	4.1	-	-
Particulates	1,513	0.8	-	-
CO	26,779	13.4	-	-
NO _x (assumed NO)	22,953	11.5	-	-
Unburned Hydrocarbons	4,820	2.4	-	-
Subtotal of Contaminants	64,323	32	-	-

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Vitrified Waste Option

Construction Assumptions

Construction costs are from the detailed cost estimate (R. Adams)

Interim Storage Facility Option, Prepared by Byron L. Blakely, R.A., December 24, 1997.		
Construction duration =	4 years	
Labor =	114 new workers/yr	
1 man-year of labor =	1800 manhours	
Square footage =	145,242 sq.ft =	13,493 m ²
Acres disturbed =	5 acres (previous)	

Excavation: Excavated earth will be spread in a spoil area adjacent to ICPP, except for backfill soil.

Excess Material= 20,000 yd³
(from Detailed Cost Estimate)

Air Emissions:

Dust during construction = 1.2 tons/month-acre = 288 tons (total)
(from USEPA Office of Air Quality Planning and Standards)

Air emissions from fuel usage are based on the diesel emissions spreadsheet.

Effluents:

Sanitary Wastewater = 641,250 gal/yr = 9,708,525 liters (total)
(based on 25 gal/person-day and 225 days/year of construction)

(Benefield, LD and C.W. Randall, Biological Process Design for Wastewater Treatment, InPrint, Inc., 1987, p. 104 - wastewater generation = 15-30 gal/day-person)

Assume 3 gallons of lubricating oil and hydraulic fluid generated for every 60 hours of operation of heavy equipment =

2,590 liter (total)

(Heavy equipment hrs are calculated below.)

Solid Wastes:

Construction trash = 7,068 yd³ (total) = 5,406 m³ (total)
(Use 15.5 yd³/yr per capita. This is twice the generation rate of trash from site operations)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste generation = 275 gal/week = 217 m³ (total)
(based on an assumed generation rate of 5 55-gallon drums of waste per week)

Hazardous waste storage = 3300 gal = 13 m³
(Assume waste is accumulated for 12 weeks [84 days] in a 90-day accumulation area, then

Water Usage:

Water used for dust control =
Area

5 acres (previous)

43,560 sq ft/acre

assume 0.05" water per week to control dust

0.05 in water/wk

0.08333 ft/in

28.320 liter/ft³

assume dust control required 20 weeks

20 wk/yr

Length of Construction

4 yr

2,056,032 liter

Construction Assumptions

Domestic water use is assumed to be the same as sanitary waste.

Energy Requirements:

Electrical usage assumed to be 3,000 kWh (from John Duggan)
156 MWh/yr

Fossil Fuel Use

Concrete:

Amount used =	1,360 yd ³	Tunnel
(Detailed Cost Estimate)	23,550 yd ³	Building
	7,225 yd ³	Charge Face Slab
	<hr/> 32,135 yd ³	Total Concrete

Number of truckloads = 1,461 (based on 22 yd³/load... tandem trailers)
Fuel usage = 32,135 gal (assumes 5 mpg and round trip of 110 miles)

Materials delivery:

Number of truckloads = 730 (assume 1/2 the loads of concrete)
Fuel usage = 21,910 gal (assumes 5 mpg and round trip of 150 miles)

Construction Equipment:

Construction Equipment Cost \$949,512 (Detailed Cost Estimate)
\$75 per hr

12,660 hr

Labor Hours 767,252 (Detailed Cost Estimate)
750 labor hr/equipment hr

1,023 hr

Total Equipment Hours = 13,683 hr

Equipment fuel usage (see <http://www.deere.com/ind>) = 6 gal/hr
Total heavy equipment fuel usage = 82,099 gal

Total heavy equipment and materials delivery fuel used =

Concrete Delivery	32,135 gal
Materials Delivery	21,910 gal
Heavy Equipment	82,099 gal
	<hr/> 136,144 gal
	3.785 liter/gal
	<hr/> 515,306 liter

Operations Assumptions

Operating costs are taken from the life cycle cost estimate.		
Operation		
Loading	23 yr	
Holding	37 yr	
Shipping	5 yr	

Interim Storage Facility Option, Prepared by Byron L. Blakely, R.A., December 24, 1997.		
Labor:	6.5	
Cannisters	14000	
Power	500 kW	

Radiation worker annual dose is based on the average annual dose received at ICCP during the last three years (see attached memorandum)

Effluents:

Sanitary wastewater = 59,313 gal/yr = 224,498 liters/yr
(based on 25 gal/day per worker, facility occupied year-round)

Solid Wastes:

Sanitary/Industrial trash = 47 yd³/yr 36 m³/yr
(based on 7.25 yd³/person-year... Bob Skinner [cuber facility])

Product canisters = 504 m³/yr
(based on 14,000 canisters @ 0.72 m³/canister)

Total rad waste = 11,592 m³

Water Usage:

Domestic water usage = same as sanitary wastewater rate.

Energy Requirements

Electric power usage = 4,368 MWh/yr
(based on 500 kW)

D&D Labor

D&D Labor

D&D Years = 3

Crew #	Crew Function	Total MH/day	Total \$/day	Material \$/day	Equipment \$/day	Total \$/day	D&D Cost Allocated	Total MH	Man-hours/yr
D	Documentation	18	\$1,136	\$114	\$ -	\$1,250	\$ 3,150,000	45,360	15,120
1	Characterization	44	\$2,302	\$460	\$691	\$3,453	\$ 6,300,000	80,278	26,759
2	Rad Demolition-Systems	77	\$4,091	\$818	\$1,023	\$5,932	\$ -	-	-
2A	Rad Demolition-Building	99	\$5,319	\$1,064	\$1,596	\$7,979	\$ -	-	-
3	Demolition-Systems	72	\$3,762	\$752	\$941	\$5,455	\$ 23,950,000	316,114	105,371
3A	Demolition-Building	88	\$4,808	\$962	\$1,442	\$7,212	\$ 47,900,000	584,470	194,823
4	Asbestos Abatement	77	\$3,753	\$375	\$188	\$4,316	\$ -	-	-
5	Decontamination	77	\$3,753	\$751	\$1,126	\$5,630	\$ -	-	-
6	Prep/Fabrication	61	\$3,217	\$643	\$965	\$4,826	\$ 14,350,000	181,382	60,461
7	RADCON Surveys	50	\$2,596	\$519	\$779	\$3,894	\$ 10,633,000	136,531	45,510
Total							\$ 106,283,000	1,344,135	448,045
available							\$ 106,283,000		

Notes:

- 1 Crew functions and daily estimates are from the D&D program (Dave Haycraft)
- 2 Total costs are based on life cycle estimate by R. Turk
- 3 Assume all workers in crews 2, 2A, 5, and 7 are rad workers
- 4 Assume a man-year is 1800 hours.

D D Assumptions

Duration of D & D = 3 years

No decontamination of the storage facility will be required.

D & D labor requirements are taken from D & D labor and equipment spreadsheet.

D & D costs come from the life cycle cost estimate.

1 manyear of labor = 1800 manhours

Heavy Equipment	# Used	Hours/day	Days/wk	Wks/yr	Hours/yr
Mobile Crane	2	3	5	45	1,350
Roll-Off Truck	3	8	5	45	5,400
Dozer	3	6	5	45	4,050
Loader	3	8	5	45	5,400
Scabbler (w/ Vacuum System)**	0	6	4	45	-
Pneumatic Ram	1	3	4	45	540
Demolition Machine (Remote Control)**	0	4	4	45	-
** Not needed, contamination not expected					
Total hours/yr					16,740

Total heavy equipment hours = 50,220

Assume each piece of equipment uses 6 gallon of diesel fuel per hour. Consumption rate from John Deere

Web Site (Construction Equipment - <http://www.deere.com/ind/product/product.html>)

No. of gallons of fuel used during D & D = 301,320 gal = 1,140,496 liters (total)

Assume each roll-off truck makes 3 trips per day to RWMC

No. of trips = 9

Miles traveled @ 12 miles/round trip= 108

Acres disturbed and duration of disturbance

Acreage disturbed is the same as for construction = 5.0 acres

Air emissions

HEPA filter ventilation is not required during D&D.

Air emissions from fuel are based on the diesel emissions spreadsheet.

Effluents

No decontamination solution required during D&D.

Sanitary wastewater = 1,400,140 gal/yr = 15,898,593 liters (total)
(based on 25 gal/day per worker, 225 day/yr)

Lube oil = 9,504 liters (total)
(based on 3 gal for every 60 hours of operation)

Solid wastes:

D D Assumptions

The following factors from Dave Kenoyer are based on a contaminated building. The storage facility is not expected to be contaminated. Therefore, all items identified as LLW will be included with the non-contaminated waste. These factors are used for consistency in waste volumes with facilities which are contaminated.

Solid Waste Generation (factors from Dave Kenoyer - D&D Program)

Waste Type	Waste Type	Factor (cu.ft./sq.ft.)	Sq.Ft. in Facility	Cu.Ft. of Waste	Cu. Meters
WERF-LLW Combustible PPEs		0.167	145,242	24,255	693
WERF-LLW Combustible Building		0.128	145,242	18,591	531
WERF-LLW Compactable Building		0.195	145,242	28,322	809
RWMC-LLW Non-Compactable Equipment		0.513	145,242	74,509	2,129
RWMC-LLW Non-Compt Building Debris		0.684	145,242	99,346	2,838
RWMC-LLW Non-Compt Concrete Rubble *		3.44	145,242	499,632	14,275
RWMC-LLW Non-Compt Scrap Metal		0.778	145,242	112,998	3,229
RWMC-LLW Asbestos/ACM Covered Pipe		0	145,242	-	
CFA Landfill Non-Compt Building Debris		1.99	145,242	289,032	8,258
CFA Landfill Non-Compt Concrete Rubble *		2.454	145,242	356,424	10,184
CFA Landfill Asbestos		0	145,242	-	
HWSF Hazardous Mtrls (Hg/PCBs/etc)		0.002	145,242	290	8
Metal Recycle		0.022	145,242	3,195	91
Non-Rad =				1,503,109	42,946
Hazardous =				290	8
Metal =				3,195	91

* (Factor used is twice that given by Dave Kenoyer due to use of concrete for shielding)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste = 26,445 gal (total) = 909 m3 (total)
(based on an assumed 5 55-gallon drums generated per week... work only 225 days/yr)

Water Usage

Domestic water use is assumed to be the same as sanitary waste.

Energy requirements:

Electric power usage = 156,000 kWh/yr 156 MWh/yr
(based on 3,000 kWh/wk - John Duggan)

Fossil Fuels = 1,140,496 liters

Estimate of Diesel Engine Emissions VWO

Bases & Assumptions:

1. Air to fuel ratio = 25:1 (Mass Basis)
2. Diesel fuel density = 7.5 lbs./gal.
3. Air is 21% O₂, 79% N₂, with a pseudomolecular weight of 29.
4. Combustion is simulated as: $C_9H_{18} + 13.5O_2 \longrightarrow 9CO_2 + 9H_2O$
5. Particulates = 5 mg/scf
6. CO = 2,500 ppmv
7. NO_x = 2,000 ppmv
8. Unburned hydrocarbons = 100 ppmv
9. Diesel fuel (# 2 fuel oil) contains 1 wt. % sulfur
10. Combustion is about 99% efficient.

from Wark, K. and C.F.
Warner, Air Pollution, Its
Origin and Control, IEP,
New York, 1976, p. 446,
423

Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 336

Lbs. Of Construction Fuel	1,020,306
Lbs. Of Operations Fuel	-
Lbs. Of D&D Fuel	2,258,182
Total Lbs. of Fuel Used	3,278,488

Lb-Moles of Construction Fuel	8,098
Lb-Moles of Operations Fuel	-
Lb-Moles of D&D Fuel	17,922
Total Lb-Moles of Fuel (as C₉H₁₈)	26,020

Lbs of Air for Construction Fuel (based on air-to-fuel ratio)	25,507,638
Lbs.of Air for Operations Fuel (based on air-to-fuel ratio)	-
Lbs.of Air for D&D Fuel (based on air-to-fuel ratio)	56,454,562
Total Lbs. of Air Added	81,962,199

Lb-Moles of Air for Combustion Fuel	879,574
Lb-Moles of Air for Operations Fuel	-
Lb-Moles of Air for D&D Fuel	1,946,709
Total Lb- Moles of Air	2,826,283

Grand Total of Materials Fed, Lbs.	85,240,687
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Exhaust Gases, Construction Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	3,174,608	1,587	72,150	25,901,913
H ₂ O	1,298,703	649	72,150	25,901,913
O ₂	2,447,527	1,224	76,485	27,458,193
N ₂	19,456,170	9,728	694,863	249,455,900
Subtotal of Major Gases	26,377,008	13,189	915,649	328,717,918
SO ₂	20,406	10.2		
Particulates	3,620	1.8		
CO	64,095	32.0		
NO _x (assumed NO)	54,939	27.5		
Unburned Hydrocarbons	11,537	5.8		
Subtotal of Contaminants	154,598	77		

Exhaust Gases, Operations Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	-	-	-	-
H ₂ O	-	-	-	-
O ₂	-	-	-	-
N ₂	-	-	-	-
Subtotal of Major Gases	-	-	-	-
SO ₂	-	-		
Particulates	-	-		
CO	-	-		
NO _x (assumed NO)	-	-		
Unburned Hydrocarbons	-	-		
Subtotal of Contaminants	-	-		

Exhaust Gases, D&D Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	7,026,173	3,513	159,686	57,327,188
H ₂ O	2,874,344	1,437	159,686	57,327,188
O ₂	5,416,968	2,708	169,280	60,771,612
N ₂	43,061,203.77	21,531	1,537,900	552,106,148
Subtotal of Major Gases	58,378,689	29,189	2,026,552	727,532,136
SO ₂	43,752	21.9		
Particulates	8,012	4.0		
CO	141,859	70.9		
NO _x (assumed NO)	121,593	60.8		
Unburned Hydrocarbons	25,535	12.8		
Subtotal of Contaminants	340,751	170		

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Direct Cementitious Waste Option

Construction Assumptions

Construction costs are from the detailed cost estimate (R. Adams)

Interim Storage Facility Option, Prepared by Byron L. Blackley, R.A., December 24, 1997.		
Construction duration =	4 years	
Labor =	134 new workers/yr	
1 man-year of labor =	1800 manhours	
Square footage =	171,863 sq.ft =	15,967 m ²
Acres disturbed =	9 acres (previous)	

Excavation: Excavated earth will be spread in a spoil area adjacent to ICPP, except for backfill soil.

Excess Material= 25,990 yd³
(from Detailed Cost Estimate)

Air Emissions:

Dust during construction = 1.2 tons/month-acre = 518 tons (total)
(from USEPA Office of Air Quality Planning and Standards)

Air emissions from fuel usage are based on the diesel emissions spreadsheet.

Effluents:

Sanitary Wastewater = 753,750 gal/yr = 11,411,775 liters (total)
(based on 25 gal/person-day and 225 days/year of construction)

(Benefield, LD and C.W. Randall, Biological Process Design for Wastewater Treatment, InPrint, Inc., 1987, p. 104 -
wastewater generation = 15-30 gal/day-person)

Assume 3 gallons of lubricating oil and hydraulic
fluid generated for every 60 hours of operation
of heavy equipment = 2,960.20 liter (total)
(Heavy equipment hrs are calculated below.)

Solid Wastes:

Construction trash = 8,308 yd³ (total) = 6,355 m³ (total)
(Use 15.5 yd³/yr per capita. This is twice the generation rate of trash from site operations)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste generation = 275 gal/week = 217 m³ (total)
(based on an assumed generation rate of 5 55-gallon drums of waste per week)

Hazardous waste storage = 3300 gal = 13 m³
(Assume waste is accumulated for 12 weeks [84 days] in a 90-day accumulation area, then

Water Usage:

Water used for dust control =
Area 9 acres (previous)
43,560 sq ft/acre
assume 0.05" water per week to control dust 0.05 in water/wk
0.08333 ft/in
28.320 liter/ft³
assume dust control required 20 weeks 20 wk/yr
Length of Construction 4 yr

3,700,858 liter

Construction Assumptions

Domestic water use is assumed to be the same as sanitary waste.

Energy Requirements:

Electrical usage assumed to be 3,000 kWh (from John Duggan)

156 MWh/yr

Fossil Fuel Use

Concrete:

Amount used =	1,360 yd ³	Tunnel
(Detailed Cost Estimate)	27,310 yd ³	Building
	7,735 yd ³	Charge Face Slab
	<hr/> 36,405 yd ³	Total Concrete

Number of truckloads = 1,655 (based on 22 yd³/load... tandem trailers)
Fuel usage = 36,405 gal (assumes 5 mpg and round trip of 110 miles)

Materials delivery:

Number of truckloads = 827 (assume 1/2 the loads of concrete)
Fuel usage = 24,822 gal (assumes 5 mpg and round trip of 150 miles)

Construction Equipment:

Construction Equipment Cost \$1,082,648 (Detailed Cost Estimate)
\$75 per hr

14,435 hr

Labor Hours 904,809 (Detailed Cost Estimate)
750 labor hr/equipment hr

1,206 hr

Total Equipment Hours = 15,642 hr

Equipment fuel usage (see <http://www.deere.com/ind>) = 6 gal/hr
Total heavy equipment fuel usage = 93,850.31 gal
or 355,223 liters (total)

Total heavy equipment and materials delivery fuel used = 586,966 liters

Operations Assumptions

Operating costs are taken from the life cycle cost estimate.

Operation

Loading	21 yr
Holding	31 yr
Shipping	5 yr

Interim Storage Facility Option, Prepared by Byron L. Blackley, R.A., December 24, 1997.

Labor:	8.5
Cannisters	16000
Power	525 kW

Radiation worker annual dose is based on the average annual dose received at ICCP during the last three years (see attached memorandum)

Effluents:

Sanitary wastewater = 77,563 gal/yr = 293,574 liters/yr
(based on 25 gal/day per worker, facility occupied year-round)

Solid Wastes:

Sanitary/Industrial trash = 62 yd³/yr 47 m³/yr
(based on 7.25 yd³/person-year... Bob Skinner [cuber facility])

Product canisters = 576 m³/yr
(based on 16,000 canisters @ 0.72 m³/canister)

Total rad waste = 12,096 m³

Water Usage:

Domestic water usage = same as sanitary wastewater rate.

Energy Requirements

Electric power usage = 4,586 MWh/yr
(based on 525kW)

D&D Labor

D&D Labor

Years

From D&D
3 Assumptions

Crew #	Crew Function	Total MH/day	Total \$/day	Material \$/day	Equipment \$/day	Total \$/day	D&D Cost Allocated	Total MH	Man-hours/yr
D	Documentation	18	\$1,136	\$114	\$ -	\$1,250	\$ 3,150,000	45,360	15,120
1	Characterization	44	\$2,302	\$460	\$691	\$3,453	\$ 6,300,000	80,278	26,759
2	Rad Demolition-Systems	77	\$4,091	\$818	\$1,023	\$5,932	\$ -	-	-
2A	Rad Demolition-Building	99	\$5,319	\$1,064	\$1,596	\$7,979	\$ -	-	-
3	Demolition-Systems	72	\$3,762	\$752	\$941	\$5,455	\$ 28,059,000	370,348	123,449
3A	Demolition-Building	88	\$4,808	\$962	\$1,442	\$7,212	\$ 56,117,000	684,733	228,244
4	Asbestos Abatement	77	\$3,753	\$375	\$188	\$4,316	\$ -	-	-
5	Decontamination	77	\$3,753	\$751	\$1,126	\$5,630	\$ -	-	-
6	Prep/Fabrication	61	\$3,217	\$643	\$965	\$4,826	\$ 16,835,000	212,792	70,931
7	RADCON Surveys	50	\$2,596	\$519	\$779	\$3,894	\$ 12,274,000	157,601	52,534
Total							\$ 122,735,000	1,551,113	517,038
vailable							\$ 122,735,000		

Notes:

- 1 Crew functions and daily estimates are from the D&D program (Dave Haycraft)
- 2 Total costs are based on life cycle estimate by R. Turk
- 3 Assume all workers in crews 2, 2A, 5, and 7 are rad workers
- 4 Assume a man-year is 1800 hours.

D D Assumptions

Duration of D & D = 3 years

No decontamination of the storage facility will be required.

D & D labor requirements are taken from D & D labor and equipment spreadsheet.

D & D costs come from the life cycle cost estimate.

1 manyear of labor = 1800 manhours

Heavy Equipment	# Used	Hours/day	Days/wk	Wks/yr	Hours/yr
Mobile Crane	1	6	5	45	1,350
Roll-Off Truck	4	8	5	45	7,200
Dozer	3	6	5	45	4,050
Loader	4	8	5	45	7,200
Scabbler (w/ Vacuum System)**	0	6	5	45	-
Pneumatic Ram	1	4	5	45	900
Demolition Machine (Remote Control) **	0	4	4	45	-

** Not needed, contamination not expected

Total hours/yr	20,700
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Total heavy equipment hours =	62,100
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Assume each piece of equipment uses 6 gallon of diesel fuel per hour. Consumption rate from John Deere Web Site (Construction Equipment - <http://www.deere.com/ind/product/product.html>)

No. of gallons of fuel used during D & D =	372,600 gal =	1,410,291 liters (total)
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Assume each roll-off truck makes 3 trips per day to RWMC

No. of trips =	12
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Miles traveled @ 12 miles/round trip=	144
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Acres disturbed and duration of disturbance

Acreage disturbed is the same as for construction =	9.0 acres
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Air emissions

No decontamination solution required during D&D.

Air emissions from fuel are based on the diesel emissions spreadsheet.

Effluents

Assume daily spent decon. solution=	2000 gal/day	5,109,750 liters (total)
(assumes 225 days/yr total)		

Sanitary wastewater =	1,615,742 gal/yr =	18,346,756 liters (total)
(based on 25 gal/day per worker, 225 day/yr)		

Lube oil =	11,752 liters (total)
(based on 3 gal for every 60 hours of operation)	

Solid wastes:

The following factors from Dave Kenoyer are based on a contaminated building. The storage facility is not expected to be contaminated. Therefore, all items identified as LLW will be included with the non-contaminated waste. These factors are used for consistency in waste volumes with facilities which are contaminated.

Solid Waste Generation (factors from Dave Kenoyer - D&D Program)

D D Assumptions

Waste Type	Waste Type	Factor (cu.ft./sq.ft.)	Sq.Ft. in Facility	Cu.Ft. of Waste	Cu. Meters
WERF-LLW Combustible PPEs		0.167	171,863	28,701	820
WERF-LLW Combustible Building		0.128	171,863	21,998	629
WERF-LLW Compactable Building		0.195	171,863	33,513	958
RWMC-LLW Non-Compactable Equipment		0.513	171,863	88,166	2,519
RWMC-LLW Non-Compt Building Debris		0.684	171,863	117,554	3,359
RWMC-LLW Non-Compt Concrete Rubble *		3.44	171,863	591,209	16,892
RWMC-LLW Non-Compt Scrap Metal		0.778	171,863	133,709	3,820
RWMC-LLW Asbestos/ACM Covered Pipe		0	171,863	-	
CFA Landfill Non-Compt Building Debris		1.99	171,863	342,007	9,772
CFA Landfill Non-Compt Concrete Rubble *		2.454	171,863	421,752	12,050
CFA Landfill Asbestos		0	171,863	-	
HWSF Hazardous Mtrls (Hg/PCBs/etc)		0.002	171,863	344	10
Metal Recycle		0.022	171,863	3,781	108
Non-Rad =				1,778,610	50,817
Hazardous =				344	10
Metal =				3,781	108

* (Factor used is twice that given by Dave Kenoyer due to use of concrete for shielding)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste = 26,445 gal (total) = 909 m3 (total)
(based on an assumed 5 55-gallon drums generated per week... work only 225 days/yr)

Water Usage

Domestic water use is assumed to be the same as sanitary waste.

Energy requirements:

Electric power usage = 156,000 kWh/yr 156 MWh/yr
(based on 3,000 kWh/wk - John Duggan)

Fossil Fuels = 1,410,291 liters

Estimate of Diesel Engine Emissions DCWO

Bases & Assumptions:

1. Air to fuel ratio = 25:1 (Mass Basis)
2. Diesel fuel density = 7.5 lbs./gal.
3. Air is 21% O₂, 79% N₂, with a pseudomolecular weight of 29.
4. Combustion is simulated as: $C_9H_{18} + 13.5O_2 \longrightarrow 9CO_2 + 9H_2O$
5. Particulates = 5 mg/scf
6. CO = 2,500 ppmv
7. NO_x = 2,000 ppmv
8. Unburned hydrocarbons = 100 ppmv
9. Diesel fuel (# 2 fuel oil) contains 1 wt. % sulfur
10. Combustion is about 99% efficient.

from Wark, K. and C.F.
Warner, Air Pollution, Its
Origin and Control, IEP,
New York, 1976, p. 446,
423

Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 336

Lbs. Of Construction Fuel	1,162,193
Lbs. Of Operations Fuel	-
Lbs. Of D&D Fuel	2,792,376
Total Lbs. of Fuel Used	3,954,569

Lb-Moles of Construction Fuel	9,224
Lb-Moles of Operations Fuel	-
Lb-Moles of D&D Fuel	22,162
Total Lb-Moles of Fuel (as C₉H₁₈)	31,385

Lbs of Air for Construction Fuel (based on air-to-fuel ratio)	29,054,821
Lbs.of Air for Operations Fuel (based on air-to-fuel ratio)	-
Lbs.of Air for D&D Fuel (based on air-to-fuel ratio)	69,809,405
Total Lbs. of Air Added	98,864,225

Lb-Moles of Air for Combustion Fuel	1,001,890
Lb-Moles of Air for Operations Fuel	-
Lb-Moles of Air for D&D Fuel	2,407,221
Total Lb- Moles of Air	3,409,111

Grand Total of Materials Fed, Lbs.	102,818,794
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Exhaust Gases, Construction Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	3,616,080	1,808	82,184	29,503,925
H ₂ O	1,479,305	740	82,184	29,503,925
O ₂	2,787,889	1,394	87,122	31,276,627
N ₂	22,161,815	11,081	791,493	284,146,129
Subtotal of Major Gases	30,045,089	15,023	1,042,982	374,430,607
SO ₂	23,244	11.6		
Particulates	4,124	2.1		
CO	73,009	36.5		
NO _x (assumed NO)	62,579	31.3		
Unburned Hydrocarbons	13,142	6.6		
Subtotal of Contaminants	176,097	88		

Exhaust Gases, Operations Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	-	-	-	-
H ₂ O	-	-	-	-
O ₂	-	-	-	-
N ₂	-	-	-	-
Subtotal of Major Gases	-	-	-	-
SO ₂	-	-		
Particulates	-	-		
CO	-	-		
NO _x (assumed NO)	-	-		
Unburned Hydrocarbons	-	-		
Subtotal of Contaminants	-	-		

Exhaust Gases, D&D Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	8,688,279	4,344	197,461	70,888,458
H ₂ O	3,554,296	1,777	197,461	70,888,458
O ₂	6,698,402	3,349	209,325	75,147,692
N ₂	53,247,725.09	26,624	1,901,704	682,711,904
Subtotal of Major Gases	72,188,702	36,094	2,505,951	899,636,513
SO ₂	54,102	27.1		
Particulates	9,908	5.0		
CO	175,417	87.7		
NO _x (assumed NO)	150,357	75.2		
Unburned Hydrocarbons	31,575	15.8		
Subtotal of Contaminants	421,359	211		

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ENGINEERING DESIGN FILE

Function File Number – SPR-01
EDF Serial Number – EDF-IS-001

Cementitious Waste Option

Construction Assumptions

Construction costs are from the detailed cost estimate (R. Adams)

Interim Storage Facility Option, Prepared by Byron L. Blackley, R.A., December 24, 1997.		
Construction duration =	4 years	
Labor =	124 new workers/yr	
1 man-year of labor =	1800 manhours	
Square footage =	158,494 sq.ft =	14,725 m ²
Acres disturbed =	9 acres (previous)	

Excavation: Excavated earth will be spread in a spoil area adjacent to ICPP, except for backfill soil.

Excess Material = 22,040 yd³ (detailed cost estimate)

Air Emissions:

Dust during construction = 1.2 tons/month-acre = 518 tons (total)
(from USEPA Office of Air Quality Planning and Standards)

Air emissions from fuel usage are based on the diesel emissions spreadsheet.

Effluents:

Sanitary Wastewater = 697,500 gal/yr = 10,560,150 liters (total)
(based on 25 gal/person-day and 225 days/year of construction)

(Benefield, LD and C.W. Randall, Biological Process Design for Wastewater Treatment, InPrint, Inc., 1987, p. 104 - wastewater generation = 15-30 gal/day-person)

Assume 3 gallons of lubricating oil and hydraulic fluid generated for every 60 hours of operation of heavy equipment = 2,770 liter (total)
(Heavy equipment hrs are calculated below.)

Solid Wastes:

Construction trash = 7,688 yd³ (total) = 5,880 m³ (total)
(Use 15.5 yd³/yr per capita. This is twice the generation rate of trash from site operations)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste generation = 275 gal/week = 217 m³ (total)
(based on an assumed generation rate of 5 55-gallon drums of waste per week)

Hazardous waste storage = 3300 gal = 13 m³
(Assume waste is accumulated for 12 weeks [84 days] in a 90-day accumulation area, then

Water Usage:

Water used for dust control =
Area 9 acres (previous)
43,560 sq ft/acre

assume 0.05" water per week
to control dust 0.05 in water/wk
0.08333 ft/in
28.320 liter/ft³

Construction Assumptions

assume dust control required

20 weeks

Length of Construction

20 wk/yr

4 yr

3,700,858 liter

Domestic water use is assumed to be the same as sanitary waste.

Energy Requirements:

Electrical usage assumed to be 3,000 kWh (from John Duggan)

156 MWh/yr

Fossil Fuel Use

Concrete:

Amount used =

1,360 yd³

Tunnel

(Detailed Cost Estimate)

25,430 yd³

Building

7,480 yd³

Charge Face Slab

34,270 yd³

Total Concrete

Number of truckloads =

1,558 (based on 22 yd³/load... tandem trailers)

Fuel usage =

34,270 gal (assumes 5 mpg and round trip of 110 miles)

Materials delivery:

Number of truckloads =

779 (assume 1/2 the loads of concrete)

Fuel usage =

23,366 gal (assumes 5 mpg and round trip of 150 miles)

Construction Equipment: (formula from Byron Blakely)

Construction Equipment Cost \$1,014,180 (Detailed Cost Estimate)

\$75 per hr

13,522 hr

Labor Hours

835,982 (Detailed Cost Estimate)

750 labor hr/equipment hr

1,115 hr

Total Equipment Hours =

14,637 hr

Equipment fuel usage (see <http://www.deere.com/ind>) =

6 gal/hr

Total heavy equipment fuel usage =

87,822 gal

or

332,407 liters (total)

Total heavy equipment and materials

Concrete Delivery 34,270 gal

Materials Delivery 23,366 gal

Heavy Equipment 87,822 gal

145,458 gal

3.785 liter/gal

550,559 liter

Operations Assumptions

Operating costs are taken from the life cycle cost estimate.	
Operation	
Loading	6 yr
Holding	49 yr
Shipping	5 yr

Interim Storage Facility Option, Prepared by Byron L. Blackley, R.A., December 24, 1997.	
Labor:	8.5
Cannisters	16000
Power	500 kW

Radiation worker annual dose is based on the average annual dose received at ICCP during the last three years (see attached memorandum)

Effluents:

Sanitary wastewater = 77,563 gal/yr = 293,574 liters/yr
(based on 25 gal/day per worker, facility occupied year-round)

Solid Wastes:

Sanitary/Industrial trash = 62 yd³/yr 47 m³/yr
(based on 7.25 yd³/person-year... Bob Skinner [cuber facility])

Product canisters = 576 m³/yr
(based on 16,000 canisters @ 0.72 m³/canister)

Total rad waste = 3,456 m³

Water Usage:

Domestic water usage = same as sanitary wastewater rate.

Energy Requirements

Electric power usage = 4,368 MWh/yr
(based on 500kW)

D&D Labor

D&D Labor

Crew #	Crew Function	Total MH/day	Total \$/day	Material \$/day	Equipment \$/day	Total \$/day	D&D Cost Allocated	Total MH	Man-hours/yr	
D	Documentation	18	\$1,136	\$114	\$ -	\$1,250	\$ 3,990,000	57,456	19,152	
1	Characterization	44	\$2,302	\$460	\$691	\$3,453	\$ 5,987,000	76,290	25,430	
2	Rad Demolition-Systems	77	\$4,091	\$818	\$1,023	\$5,932	\$ -	-	-	
2A	Rad Demolition-Building	99	\$5,319	\$1,064	\$1,596	\$7,979	\$ -	-	-	
3	Demolition-Systems	72	\$3,762	\$752	\$941	\$5,455	\$ 29,470,000	388,972	129,657	\$ 5,083,643
3A	Demolition-Building	88	\$4,808	\$962	\$1,442	\$7,212	\$ 58,930,000	719,057	239,686	\$ 11,782,732
4	Asbestos Abatement	77	\$3,753	\$375	\$188	\$4,316	\$ -	-	-	
5	Decontamination	77	\$3,753	\$751	\$1,126	\$5,630	\$ -	-	-	
6	Prep/Fabrication	61	\$3,217	\$643	\$965	\$4,826	\$ 10,400,000	131,455	43,818	
7	RADCON Surveys	50	\$2,596	\$519	\$779	\$3,894	\$ 5,720,000	73,446	24,482	
Total							\$ 114,497,000	1,446,675	482,225	\$ 16,866,374
vailable							\$ 114,497,000			22,488

Notes:

- 1 Crew functions and daily estimates are from the D&D program (Dave Haycraft)
- 2 Total costs are based on life cycle estimate by R. Turk
- 3 Assume all workers in crews 2, 2A, 5, and 7 are rad workers
- 4 Assume a man-year is 1800 hours.

Decommission	10500000	
Documentation	40%	4,200,000
Characterization	60%	6,300,000
Demolition	103997000	
Demolition-Systems	35%	36,398,950
Demolition-Building	50%	51,998,500
Prep/Fabrication	10%	10,399,700
RADCON Surveys	5%	5,199,850
Decontamination	0	

D D Assumptions

Duration of D & D = 3 years

No decontamination of the storage facility will be required.

D & D labor requirements are taken from D & D labor and equipment spreadsheet.

D & D costs come from the life cycle cost estimate.

1 manyear of labor = 1800 manhours

Heavy Equipment	# Used	Hours/day	Days/wk	Wks/yr	Hours/yr
Mobile Crane	2	5	5	45	2,250
Roll-Off Truck	4	8	5	45	7,200
Dozer	3	6	5	45	4,050
Loader	4	8	5	45	7,200
Scabbler (w/ Vacuum System) **	0	6	5	45	-
Pneumatic Ram	1	8	5	45	1,800
Demolition Machine (Remote Control) **	0	4	4	45	-
** Not needed, contamination not expected					
Total hours/yr					22,500

Total heavy equipment hours = 67,500

Assume each piece of equipment uses 6 gallon of diesel fuel per hour. Consumption rate from John Deere

Web Site (Construction Equipment - <http://www.deere.com/ind/product/product.html>)

No. of gallons of fuel used during D & D = 405,000 gal = 1,532,925 liters (total)

Assume each roll-off truck makes 3 trips per day to RWMC

No. of trips = 12

Miles traveled @ 12 miles/round trip= 144

Acres disturbed and duration of disturbance

Acreage disturbed is the same as for construction = 9.0 acres

Air emissions

HEPA filter ventilation is not required during D&D.

Air emissions from fuel are based on the diesel emissions spreadsheet.

Effluents

No decontamination solution required during D&D.

Sanitary wastewater = 1,506,953 gal/yr = 17,111,456 liters (total)
(based on 25 gal/day per worker, 225 day/yr)

Lube oil = 12,774 liters (total)
(based on 3 gal for every 60 hours of operation)

Solid wastes:

The following factors from Dave Kenoyer are based on a contaminated building. The storage facility is not expected to be contaminated. Therefore, all items identified as LLW will be included with the non-contaminated waste. These factors are used for consistency in waste volumes with facilities which are contaminated.

Solid Waste Generation (factors from Dave Kenoyer - D&D Program)

Waste Type	Waste Type	Factor (cu.ft./sq.ft.)	Sq.Ft. in Facility	Cu.Ft. of Waste	Cu. Meters
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D D Assumptions

WERF-LLW Combustible PPEs	0.167	158,494	26,468	756		
WERF-LLW Combustible Building	0.128	158,494	20,287	580		
WERF-LLW Compactable Building	0.195	158,494	30,906	883		
RWMC-LLW Non-Compactable Equipment	0.513	158,494	81,307	2,323		
RWMC-LLW Non-Compt Building Debris	0.684	158,494	108,410	3,097		
RWMC-LLW Non-Compt Concrete Rubble *	3.44	158,494	545,219	15,578		
RWMC-LLW Non-Compt Scrap Metal	0.778	158,494	123,308	3,523		
RWMC-LLW Asbestos/ACM Covered Pipe	0	158,494	-			
CFA Landfill Non-Compt Building Debris	1.99	158,494	315,403	9,012		
CFA Landfill Non-Compt Concrete Rubble *	2.454	158,494	388,944	11,113		
CFA Landfill Asbestos	0	158,494	-			
HWSF Hazardous Mtrls (Hg/PCBs/etc)	0.002	158,494	317	9		
Metal Recycle	0.022	158,494	3,487	100		
Non-Rad =			1,640,254	46,864	1,174	2,700
Hazardous =			317	9		
Metal =			3,487	100		

* (Factor used is twice that given by Dave Kenoyer due to use of concrete for shielding)

Hazardous/toxic chemicals and wastes (type)

Mixed waste = 26,445 gal (total) = 909 m3 (total)
(based on an assumed 5 55-gallon drums generated per week... work only 225 days/yr)

Water Usage

Domestic water use is assumed to be the same as sanitary waste.

Energy requirements:

Electric power usage = 156,000 kWh/yr 156 MWh/yr
(based on 3,000 kWh/wk - John Duggan)

Fossil Fuels = 1,532,925 liters

Estimate of Diesel Engine Emissions CWO

Bases & Assumptions:

1. Air to fuel ratio = 25:1 (Mass Basis)
2. Diesel fuel density = 7.5 lbs./gal.
3. Air is 21% O₂, 79% N₂, with a pseudomolecular weight of 29.
4. Combustion is simulated as: $C_9H_{18} + 13.5O_2 \longrightarrow 9CO_2 + 9H_2O$
5. Particulates = 5 mg/scf
6. CO = 2,500 ppmv
7. NO_x = 2,000 ppmv
8. Unburned hydrocarbons = 100 ppmv
9. Diesel fuel (# 2 fuel oil) contains 1 wt. % sulfur
10. Combustion is about 99% efficient.

from Wark, K. and C.F.
Warner, Air Pollution, Its
Origin and Control, IEP,
New York, 1976, p. 446,
423

Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 336

Lbs. Of Construction Fuel	1,090,107
Lbs. Of Operations Fuel	-
Lbs. Of D&D Fuel	3,035,192
Total Lbs. of Fuel Used	4,125,299

Lb-Moles of Construction Fuel	8,652
Lb-Moles of Operations Fuel	-
Lb-Moles of D&D Fuel	24,089
Total Lb-Moles of Fuel (as C₉H₁₈)	32,740

Lbs of Air for Construction Fuel (based on air-to-fuel ratio)	27,252,678
Lbs. of Air for Operations Fuel (based on air-to-fuel ratio)	-
Lbs. of Air for D&D Fuel (based on air-to-fuel ratio)	75,879,788
Total Lbs. of Air Added	103,132,466

Lb-Moles of Air for Combustion Fuel	939,748
Lb-Moles of Air for Operations Fuel	-
Lb-Moles of Air for D&D Fuel	2,616,544
Total Lb- Moles of Air	3,556,292

Grand Total of Materials Fed, Lbs.	107,257,764
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Exhaust Gases, Construction Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	3,391,790	1,696	77,086	27,673,927
H ₂ O	1,387,551	694	77,086	27,673,927
O ₂	2,614,968	1,307	81,718	29,336,676
N ₂	20,787,215	10,394	742,401	266,521,795
Subtotal of Major Gases	28,181,525	14,091	978,291	351,206,324
SO ₂	21,802	10.9		
Particulates	3,868	1.9		
CO	68,480	34.2		
NO _x (assumed NO)	58,697	29.3		
Unburned Hydrocarbons	12,326	6.2		
Subtotal of Contaminants	165,174	83		

Exhaust Gases, Operations Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	-	-	-	-
H ₂ O	-	-	-	-
O ₂	-	-	-	-
N ₂	-	-	-	-
Subtotal of Major Gases	-	-	-	-
SO ₂	-	-		
Particulates	-	-		
CO	-	-		
NO _x (assumed NO)	-	-		
Unburned Hydrocarbons	-	-		
Subtotal of Contaminants	-	-		

Exhaust Gases, D&D Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	9,443,782	4,722	214,631	77,052,672
H ₂ O	3,863,365	1,932	214,631	77,052,672
O ₂	7,280,871	3,640	227,527	81,682,274
N ₂	57,877,962.05	28,939	2,067,070	742,078,156
Subtotal of Major Gases	78,465,980	39,233	2,723,860	977,865,774
SO ₂	58,807	29.4		
Particulates	10,769	5.4		
CO	190,670	95.3		
NO _x (assumed NO)	163,432	81.7		
Unburned Hydrocarbons	34,321	17.2		
Subtotal of Contaminants	457,999	229		

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ENGINEERING DESIGN FILE

Function File Number -- SPR-01
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Hot Isostatic Press Waste Option

Construction Assumptions

Construction costs are from the detailed cost estimate (R. Adams)

Interim Storage Facility Option, Prepared by Byron L. Blakely, R.A., December 24, 1997.		
Construction duration =	3 years	
Labor =	92 new workers/yr	
1 man-year of labor =	1800 manhours	
Square footage =	78,432 sq.ft =	7,287 m ²
Acres disturbed =	3 acres (previous)	

Excavation: Excavated earth will be spread in a spoil area adjacent to ICPP, except for backfill soil.

Air Emissions:

Dust during construction = 1.2 tons/month-acre = 108 tons (total)
(from USEPA Office of Air Quality Planning and Standards)

Air emissions from fuel usage are based on the diesel emissions spreadsheet.

Effluents:

Sanitary Wastewater = 517,500 gal/yr = 5,876,213 liters (total)
(based on 25 gal/person-day and 225 days/year of construction)

(Benefield, LD and C.W. Randall, Biological Process Design for Wastewater Treatment, InPrint, Inc., 1987, p. 104 - wastewater generation = 15-30 gal/day-person)

Assume 3 gallons of lubricating oil and hydraulic fluid generated for every 60 hours of operation of heavy equipment = 1,541 liter (total)
(Heavy equipment hrs are calculated below.)

Solid Wastes:

Construction trash = 4,278 yd³ (total) = 3,272 m³ (total)
(Use 15.5 yd³/yr per capita. This is twice the generation rate of trash from site operations)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste generation = 275 gal/week = 217 m³ (total)
(based on an assumed generation rate of 5 55-gallon drums of waste per week)

Hazardous waste storage = 3300 gal = 13 m³
(Assume waste is accumulated for 12 weeks [84 days] in a 90-day accumulation area, then

Water Usage:

Water used for dust control =	
Area	3 acres (previous)
	43,560 sq ft/acre
assume 0.05" water per week to control dust	0.05 in water/wk
	0.08333 ft/in
	28.320 liter/ft ³
assume dust control required 20 weeks	20 wk/yr
Length of Construction	3 yr
	<hr/> 771,012 liter

Construction Assumptions

Domestic water use is assumed to be the same as sanitary waste.

Energy Requirements:

Electrical usage assumed to be 3,000 kWh (from John Duggan)
156 MWh/yr

Fossil Fuel Use

Concrete:

Amount used =	1,360 yd ³	Tunnel
(Detailed Cost Estimate)	15,050 yd ³	Building
	3,375 yd ³	Charge Face Slab
	<hr/> 19,785 yd ³	Total Concrete

Number of truckloads = 899 (based on 22 yd³/load... tandem trailers)
Fuel usage = 19,785 gal (assumes 5 mpg and round trip of 110 miles)

Materials delivery:

Number of truckloads = 450 (assume 1/2 the loads of concrete)
Fuel usage = 13,490 gal (assumes 5 mpg and round trip of 150 miles)

Construction Equipment:

Construction Equipment Cost \$565,076 (Detailed Cost Estimate)
\$75 per hr

7,534 hr

Labor Hours 454,293 (Detailed Cost Estimate)
750 labor hr/equipment hr

606 hr

Total Equipment Hours = 8,140 hr

Equipment fuel usage (see <http://www.deere.com/ind>) = 6 gal/hr
Total heavy equipment fuel usage = 48,840 gal

Total heavy equipment and materials delivery fuel used =

Concrete Delivery	19,785 gal
Materials Delivery	13,490 gal
Heavy Equipment	48,840 gal
	<hr/> 82,115 gal
	3.785 liter/gal
	<hr/> 310,806 liter

Operations Assumptions

Operating costs are taken from the life cycle cost estimate.	
Operation	
Loading	23 yr
Holding	37 yr
Shipping	5 yr

Interim Storage Facility Option, Prepared by Byron L. Blakely, R.A., December 24, 1997.	
Labor:	6.5
Cannisters	5700
Power	500 kW

Radiation worker annual dose is based on the average annual dose received at ICCP during the last three years (see attached memorandum)

Effluents:

Sanitary wastewater = 59,313 gal/yr = 224,498 liters/yr
(based on 25 gal/day per worker, facility occupied year-round)

Solid Wastes:

Sanitary/Industrial trash = 47 yd³/yr 36 m³/yr
(based on 7.25 yd³/person-year... Bob Skinner [cuber facility])

Product canisters = 205 m³/yr
(based on 5700 canisters @ 0.72 m³/canister)

Total rad waste = 4,720 m³

Water Usage:

Domestic water usage = same as sanitary wastewater rate.

Energy Requirements

Electric power usage = 4,368 MWh/yr
(based on 500 kW)

D&D Labor

D&D Labor

							Years		From D&D
									3 Assumptions
Crew #	Crew Function	Total MH/day	Total \$/day	Material \$/day	Equipment \$/day	Total \$/day	D&D Cost Allocated	Total MH	Man-hours/yr
D	Documentation	18	\$1,136	\$114	\$ -	\$1,250	\$ 2,765,000	39,816	13,272
1	Characterization	44	\$2,302	\$460	\$691	\$3,453	\$ 4,145,000	52,818	17,606
2	Rad Demolition-Systems	77	\$4,091	\$818	\$1,023	\$5,932	\$ -	-	-
2A	Rad Demolition-Building	99	\$5,319	\$1,064	\$1,596	\$7,979	\$ -	-	-
3	Demolition-Systems	72	\$3,762	\$752	\$941	\$5,455	\$ 14,460,000	190,856	63,619
3A	Demolition-Building	88	\$4,808	\$962	\$1,442	\$7,212	\$ 28,920,000	352,879	117,626
4	Asbestos Abatement	77	\$3,753	\$375	\$188	\$4,316	\$ -	-	-
5	Decontamination	77	\$3,753	\$751	\$1,126	\$5,630	\$ -	-	-
6	Prep/Fabrication	61	\$3,217	\$643	\$965	\$4,826	\$ 8,674,000	109,638	36,546
7	RADCON Surveys	50	\$2,596	\$519	\$779	\$3,894	\$ 6,550,000	84,104	28,035
Total							\$ 65,514,000	830,110	276,703
vailable							\$ 65,514,000		

Notes:

- 1 Crew functions and daily estimates are from the D&D program (Dave Haycraft)
- 2 Total costs are based on life cycle estimate by R. Turk
- 3 Assume all workers in crews 2, 2A, 5, and 7 are rad workers
- 4 Assume a man-year is 1800 hours.

D D Assumptions

Duration of D & D = 3 years

No decontamination of the storage facility will be required.

D & D labor requirements are taken from D & D labor and equipment spreadsheet.

D & D costs come from the life cycle cost estimate.

1 manyear of labor = 1800 manhours

Heavy Equipment	# Used	Hours/day	Days/wk	Wks/yr	Hours/yr
Mobile Crane	1	3	4	45	540
Roll-Off Truck	3	8	4	45	4,320
Dozer	2	6	4	45	2,160
Loader	3	8	4	45	4,320
Scabbler (w/ Vacuum System)**	0	6	4	45	-
Pneumatic Ram	1	3	4	45	540
Demolition Machine (Remote Control)**	0	4	4	45	-

** Not needed, contamination not expected

Total hours/yr 11,880

Total heavy equipment hours = 35,640

Assume each piece of equipment uses 6 gallon of diesel fuel per hour. Consumption rate from John Deere Web Site (Construction Equipment - <http://www.deere.com/ind/product/product.html>)

No. of gallons of fuel used during D & D = 213,840 gal = 809,384 liters (total)

Assume each roll-off truck makes 3 trips per day to RWMC

No. of trips = 9

Miles traveled @ 12 miles/round trip= 108

Acres disturbed and duration of disturbance

Acreage disturbed is the same as for construction = 2.5 acres

Air emissions

HEPA filter ventilation is not required during D&D.

Air emissions from fuel are based on the diesel emissions spreadsheet.

Effluents

No decontamination solution required during D&D. - liters (total)

Sanitary wastewater = 864,698 gal/yr = 9,818,650 liters (total)
(based on 25 gal/day per worker, 225 day/yr)

Lube oil = 6,745 liters (total)
(based on 3 gal for every 60 hours of operation)

Solid wastes:

The following factors from Dave Kenoyer are based on a contaminated building. The storage facility is not expected to be contaminated. Therefore, all items identified as LLW will be included with the non-contaminated waste. These factors are used for consistency in waste volumes with facilities which are contaminated.

Solid Waste Generation (factors from Dave Kenoyer - D&D Program)

Waste Type	Waste Type	Factor (cu.ft./sq.ft.)	Sq.Ft. in Facility	Cu.Ft. of Waste	Cu. Meters
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D D Assumptions

WERF-LLW Combustible PPEs	0.167	78,432	13,098	374
WERF-LLW Combustible Building	0.128	78,432	10,039	287
WERF-LLW Compactable Building	0.195	78,432	15,294	437
RWMC-LLW Non-Compactable Equipment	0.513	78,432	40,236	1,150
RWMC-LLW Non-Compt Building Debris	0.684	78,432	53,647	1,533
RWMC-LLW Non-Compt Concrete Rubble *	3.44	78,432	269,806	7,709
RWMC-LLW Non-Compt Scrap Metal	0.778	78,432	61,020	1,743
RWMC-LLW Asbestos/ACM Covered Pipe	0	78,432	-	
CFA Landfill Non-Compt Building Debris	1.99	78,432	156,080	4,459
CFA Landfill Non-Compt Concrete Rubble *	2.454	78,432	192,472	5,499
CFA Landfill Asbestos	0	78,432	-	
HWSF Hazardous Mtrls (Hg/PCBs/etc)	0.002	78,432	157	4
Metal Recycle	0.022	78,432	1,726	49
Non-Rad =			811,693	23,191
Hazardous =			157	4
Metal =			1,726	49

* (Factor used is twice that given by Dave Kenoyer due to use of concrete for shielding)

Hazardous/toxic chemicals and wastes (type)

Hazardous Waste = 26,445 gal (total) = 909 m3 (total)
(based on an assumed 5 55-gallon drums generated per week... work only 225 days/yr)

Water Usage

Domestic water use is assumed to be the same as sanitary waste.

Energy requirements:

Electric power usage = 156,000 kWh/yr 156 MWh/yr
(based on 3,000 kWh/wk - John Duggan)

Fossil Fuels = 809,384 liters

Estimate of Diesel Engine Emissions Interim Storage Facility - HIP

Bases & Assumptions:

1. Air to fuel ratio = 25:1 (Mass Basis)
2. Diesel fuel density = 7.5 lbs./gal.
3. Air is 21% O₂, 79% N₂, with a pseudomolecular weight of 29.
4. Combustion is simulated as: $C_9H_{18} + 13.5O_2 \longrightarrow 9CO_2 + 9H_2O$
5. Particulates = 5 mg/scf
6. CO = 2,500 ppmv
7. NO_x = 2,000 ppmv
8. Unburned hydrocarbons = 100 ppmv
9. Diesel fuel (# 2 fuel oil) contains 1 wt. % sulfur
10. Combustion is about 99% efficient.

from Wark, K. and C.F.
Warner, Air Pollution, Its
Origin and Control, IEP,
New York, 1976, p. 446,
423

Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 336

Lbs. Of Construction Fuel	310,806
Lbs. Of Operations Fuel	-
Lbs. Of D&D Fuel	1,602,581
Total Lbs. of Fuel Used	1,913,387

Lb-Moles of Construction Fuel	2,467
Lb-Moles of Operations Fuel	-
Lb-Moles of D&D Fuel	12,719
Total Lb-Moles of Fuel (as C₉H₁₈)	15,186

Lbs of Air for Construction Fuel (based on air-to-fuel ratio)	7,770,150
Lbs. of Air for Operations Fuel (based on air-to-fuel ratio)	-
Lbs. of Air for D&D Fuel (based on air-to-fuel ratio)	40,064,528
Total Lbs. of Air Added	47,834,678

Lb-Moles of Air for Combustion Fuel	267,936
Lb-Moles of Air for Operations Fuel	-
Lb-Moles of Air for D&D Fuel	1,381,535
Total Lb- Moles of Air	1,649,472

Grand Total of Materials Fed, Lbs.	49,748,065
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Exhaust Gases, Construction Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	967,051	484	21,978	7,890,255
H ₂ O	395,612	198	21,978	7,890,255
O ₂	745,567	373	23,299	8,364,330
N ₂	5,926,749	2,963	211,670	75,989,392
Subtotal of Major Gases	8,034,979	4,017	278,925	100,134,232
SO ₂	6,216	3.1		
Particulates	1,103	0.6		
CO	19,525	9.8		
NO _x (assumed NO)	16,736	8.4		
Unburned Hydrocarbons	3,514	1.8		
Subtotal of Contaminants	47,094	24		

Exhaust Gases, Operations Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	-	-	-	-
H ₂ O	-	-	-	-
O ₂	-	-	-	-
N ₂	-	-	-	-
Subtotal of Major Gases	-	-	-	-
SO ₂	-	-		
Particulates	-	-		
CO	-	-		
NO _x (assumed NO)	-	-		
Unburned Hydrocarbons	-	-		
Subtotal of Contaminants	-	-		

Exhaust Gases, D&D Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	4,986,317	2,493	113,325	40,683,811
H ₂ O	2,039,857	1,020	113,325	40,683,811
O ₂	3,844,300	1,922	120,134	43,128,241
N ₂	30,559,563.96	15,280	1,091,413	391,817,267
Subtotal of Major Gases	41,430,037	20,715	1,438,198	516,313,129
SO ₂	31,050	15.5		
Particulates	5,686	2.8		
CO	100,674	50.3		
NO _x (assumed NO)	86,292	43.1		
Unburned Hydrocarbons	18,121	9.1		
Subtotal of Contaminants	241,823	121		

Project File Number 02BJ0

Project/Task Waste Treatment Project Feasibility
Studies

Subtask Interim Storage Study

Title: Modification of FPR for Interim Storage of HLW

Summary: This summary briefly defines the problem or activity to be addressed in the Engineering Design File (EDF), gives a summary of the activities performed in addressing the problem, and states the conclusions, recommendations, or results arrived at from this task.

High-level radioactive waste (HLW) stored at the Idaho Chemical Processing Plant (ICPP) in the form of calcine and liquid will be processed to provide a stable waste form and prepare the waste to be transported to a permanent repository. Because a permanent repository will not be available when the waste is processed, the waste must be stored at ICPP in an Interim Storage Facility (ISF). This EDF documents consideration of the Fuel Processing Restoration (FPR) facility as an ISF for each of the processing options.

Distribution (complete package): Included in Appendix A of *Interim Storage Study Report*, INEEL/EXT-97-01393, February 1998.

Distribution (summary package only):

Author	Dept.	Reviewed	Date	Approved	Date
4130	LMITCO Review	Date 2/10/98	LMITCO Approval	Date 2/10/98

See Management Control Procedure (MCP) 6 for instructions on use of this form.

Modification of FPR for Interim Storage of HLW

ABSTRACT

High-level radioactive waste (HLW) stored at ICPP in the form of calcine and liquid will be processed to provide a stable waste form and prepare the waste to be transported to a permanent repository. Because a permanent repository will not be available when the waste is processed, the waste must be stored at ICPP in an ISF. This EDF documents consideration of the Fuel Processing Restoration (FPR) facility as an ISF for each of the processing options.

SUMMARY

Disposal of radioactive wastes now stored at the Idaho Chemical Processing Plant (ICPP) at the Idaho National Engineering and Environmental Laboratory (INEEL) is mandated under a "Settlement Agreement" between the Department of Energy (DOE) and the State of Idaho. Among other things, the Settlement Agreement requires that existing inventory of liquid HLW be calcined by June 30, 1998, and SBW by the end of 2012, and the target date for all waste to be ready to ship from the INEEL is 2035.

The Department of Energy Idaho Operations Office (DOE-ID) is preparing the High-Level Waste and Facilities Disposition Environmental Impact Statement (HLW&FD EIS), in accordance with the National Environmental Policy Act, to support the decision-making process regarding HLW management at the INEEL. Fluor Daniel Corporation and Lockheed Martin Idaho Technologies Company (LMITCO) are studying waste treatment options. Because a repository for the waste will not be available as processing is performed, an ISF is required for storage for the period of time between processing and when a permanent repository is available.

This EDF documents a study that investigated the design, costs, and environmental impacts for modification of the Fuel Processing Restoration (FPR) facility at ICPP for an ISF for each of the processing options.

Conclusions

This study has investigated the modification of the FPR for storage of HLW that results from processing the waste at ICPP. The processing options are discussed in separate reports. This study determined that FPR can hold a maximum of 9,344 canisters and only those processing options that produce fewer canisters can be accommodated in the FPR. It is concluded that FPR can be modified and placed into operation to store the waste in canisters for the Full and TRU/Class A Separations Option and the Hot Isostatic Processed (HIP) Option for the period from processing until the time a permanent repository is available for receipt of this waste. The schedules and costs associated with interim storage for these processing options are presented in the body of this EDF.

Recommendations

The potential for additional costs and a longer schedule that would result from Nuclear Regulatory Commission (NRC) licensing of the FPR for interim storage should be studied further. The NRC does not have the structure in place to review and license an existing facility for interim storage of HLW.

Also, the FPR has not been built to the requirements that would be required by NRC. The cost included in this study for licensing was based on a reasonable assumption of the complexities involved without the benefit of a detailed study that is recommended.

A future study should be conducted to determine if a standard 15-ft long "Hanford" canister should be substituted for the 10-ft Savannah River Site (SRS) canister assumed in this study. Use of a 15-ft canister would increase the interim storage construction costs but would reduce the operation (handling) costs, and greatly reduce offsite transportation and disposal costs. A large net cost saving, primarily as a result of reduced transportation and disposal costs, could be realized by using the 15-ft canister.

ACKNOWLEDGMENTS

The assistance of Steven W. Hills and David E. Keller who designed the FPR Interim Storage Facility presented in this EDF is greatly appreciated. Rick D. Adams prepared the project cost estimates and Robert J. Turk prepared the Life-Cycle Costs. Jennifer Quigley and Rod R. Kimmitt prepared the Project Data Sheets. Karen Williams was the Project Lead. Technical editing was performed by Stephen Lortie.

ACRONYMS

CFR	Code of Federal Regulations
DOE	Department of Energy
DOE-ID	DOE Idaho Operations Office
DOT	Department of Transportation
EIS	Environmental Impact Statement
FPR	Fuel Processing Restoration
HAW	high-activity radioactive waste
HIP	Hot Isostatic Press
HLW&FD	High-Level Waste and Facilities Disposition
HLW	high-level radioactive waste
ICPP	Idaho Chemical Processing Plant
INEEL	Idaho National Engineering and Environmental Laboratory
ISF	Interim Storage Facility
LAW	low-activity waste
LMITCO	Lockheed Martin Idaho Technologies Company
NRC	Nuclear Regulatory Commission
RCRA	Resource Conservation and Recovery Act
SBW	sodium-bearing waste
SNF	spent nuclear fuel
TRU	Transuranic
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

1.1 Background

The Idaho Chemical Processing Plant (ICPP) located at the Idaho National Engineering and Environmental Laboratory (INEEL) has been used for reprocessing spent nuclear fuel (SNF) since 1953. SNF was reprocessed to recover fissile uranium; however, changing world events have diminished the need to recover and recycle this material. In April 1992, the Department of Energy (DOE) discontinued reprocessing SNF and shifted its focus toward continued management and disposing of waste accumulated from previous reprocessing activities. ICPP waste treatment activities produce a granular solid waste (calcine) that contains dissolved fission products and fuel cladding material. Decontamination activities at the ICPP produce liquid radioactive, sodium-bearing waste (SBW), and ongoing operations at the ICPP produce liquid waste that contains low levels of radioactivity. The treatment of radioactive wastes for transfer out of Idaho is mandated under a "Settlement Agreement" between DOE and the State of Idaho.¹ The Settlement Agreement requires that existing inventory of liquid high-level radioactive waste (HLW) be calcined by June 30, 1998, and SBW by the end of 2012, and the target date for all waste to be ready to ship from the INEEL is 2035.

The Department of Energy Idaho Operations Office (DOE-ID) is preparing the High-Level Waste and Facilities Disposition Environmental Impact Statement (HLW&FD EIS), in accordance with the National Environmental Policy Act, to support the decision-making process regarding HLW management at the INEEL. The Fluor Daniel Corporation and the INEEL operating contractor, Lockheed Martin Idaho Technologies Company (LMITCO), have been tasked with performing studies that provide the basis for portions of the EIS. Waste treatment options include dissolving the calcine; both the dissolved calcine and the liquid SBW would then be separated into high-activity waste (HAW) and low-activity waste (LAW). The HAW would be mixed with a glass matrix and poured into canisters. This is termed the "Separations Option." Alternative options that do not involve a separation step are termed the "Nonseparations Option." The Waste Treatment Studies consider the several alternative processes for preparing the calcine and liquid waste for ultimate removal from the INEEL: Separations [Full and Transuranic (TRU)] and Nonseparations (Vitrified, Hot Isostatic Press, Cementitious, and Direct Cementitious). Fluor Daniel Corporation is studying the Full Separations alternative and the others are being studied by LMITCO. The product of each of the processes will be waste in a storage canister that is ready for shipment to a permanent repository. Because the repositories will not be capable to receive the canisters at the time they are produced, storage will be required at the INEEL. This EDF documents cost, schedule, and environmental impact for storage of the waste generated by the above processes in the existing Fuel Processing Restoration (FPR) facility after modification for an Interim Storage Facility (ISF). Interim storage in a new facility is documented in EDF-IS-001.

1.2 Objective and Scope of Work

The objective of this study is to explore alternatives for a modified existing facility for interim storage of the waste in canisters that result from HLW processing of the calcine and liquid waste at ICPP. Table 1 gives the processing options and associated data that are included in this study:

Table 1. Waste processing options and study data.

	Storage Type	Number of Canisters	Production Rate, Number/Shift	Dose Rate at Contact, R/hr	Heat Output, Watts/Canister
Separations Options					
Full Separations	Modified Existing Facility	780		2.4-2500	25-220
TRU/Class A Separations	Modified Existing Facility	170	1/month	160,000	12,350
Nonseparations Options:					
Vitrified	Modified Existing Facility	14,000	6	6.1-172	0.6-14.7
Direct Cementitious	Modified Existing Facility	18,000	35	6.9-287	0.4-16.4
Cementitious	Modified Existing Facility	16,000	32	140	8.9
	HIP Preliminary Plan	32,000 drums	32	140	8.9
HIP	Modified Existing Facility	5,700	9	14-580	1.7-61

The objective of this study was to determine the cost, schedule, and environmental impacts for the storage of the waste canisters that result from each of the processing options in Table 1. A modified existing facility (FPR) was studied that incorporates appropriate design features from the Fluor Daniel Corporation design for interim storage presented in their document, *Waste Treatment Facilities, Feasibility Study Report*, December 12, 1997 (see Reference 2). The TRU/Class A Separations option would generate three waste streams designated as LLW: LAW, HAW, and TRU waste. All of these waste streams are actually considered HLW. It is expected that the LAW and TRU meet the definition of NRC LLW Class A and TRU, respectively. However, these wastes do not conform to the existing classification scheme for radioactive waste. Therefore, they will need the evaluation and concurrence of appropriate government authorities (NRC and DOE) for reclassification. Only the HAW will require interim storage. The LAW is assumed to go directly to a Class A waste disposal site and the TRU waste to go directly to the Waste Isolation Pilot Plant (WIPP). The TRU/Class C Separations Option does not require interim storage.

A preliminary plan for the Cementitious Option is under consideration. The resulting grout would be placed into drums within a 5-year period and placed into the ISF. Over a 20-year period, the drums would be subjected to a Hot Isostatic Press (HIP) process that would further reduce the volume. This alternative was included in this study.

2.0 DESIGN BASIS, KEY ASSUMPTIONS, AND REQUIREMENTS

2.1 Design Basis

A facility is required near the processing facility to store the HLW from the time it leaves the processing facility until it can be moved to a permanent waste repository. The quantities of canisters and their characteristics given in Table 1 result from the studies for the processing alternatives. The design life for the facilities is from 40 to 60 years.

The Savanna River Site (SRS) HLW canister and the West Valley Demonstration Project HLW canister meet the repository Waste Acceptance Criteria (WAC) for dimensions, although there are significant differences in these canisters' physical makeup. The SRS canister is used as the baseline for this study because it was selected in the ICPP Waste Treatment Facilities Feasibility Study Report.² However, the DOE Hanford Facility has adopted a 4.5-m (15-ft) long canister for containing immobilized HLW. This longer canister is apparently acceptable for co-disposal at the repository, and therefore should be considered before finalizing the canister size. Consideration of the 4.5-m (15-ft) canister is addressed in the recommendations in Section 9. Some cost increase would result because the head height for handling the longer canisters is greater, and depth of excavation, equipment capacities, etc., increase. Cost increases would also occur because of the increase in the ISF transport tunnel height, canister handling machine size and capacity, and the ceiling height. However, smaller interim storage facilities may be adequate with fewer canisters, and handling, shipping, and final disposal operations with fewer canisters would offset the cost increases if the longer canisters were adopted. The net result of the cost changes is unknown.

Transport of the waste to the interim storage facility is included, however the transport from the facility is not included in this study. Equipment for handling the canisters for movement into and from the facility is included.

A passive cooling system is desired. The additional safety issues and operating costs of an active system would thus be avoided.

2.2 Key Assumptions

The following assumptions formed the framework, i.e., and the directed charter, for this study. Therefore, although some of these assumptions are likely to change, and such changes may have a significant impact on the results of this study, it is beyond the scope of this study to predict such changes or evaluate the associated risk.

1. The quantities and characteristics of waste to be stored are as tabulated in Table 1.
2. The waste will be stored in the SRS canister described in EDF-DPC-001, Appendix E of *DPC Loading Feasibility Study Report*, INEEL/EXT-97-01251, November 1997. All canisters will be sealed and radiologically clean.
3. The NRC will license the facility in accordance with the requirements of 10 CFR Part 72. Existing facilities may not have been built to these requirements and replacement or upgrading of the components may not be possible. In these cases, it is assumed that NRC will consider equivalence or alternative approaches and issues the license.

4. The processed waste is not Resource Conservation and Recovery Act (RCRA) hazardous waste as a result of delisting before processing and by virtue of processing when all "listed" hazardous and characteristic constituents are treated to the Land Disposal Regulation standards, then the waste is no longer classed as RCRA waste.
5. The LAW and TRU waste will be reclassified as LLW Class A and TRU, respectively.
6. The processing facilities will not have lag storage. If the ISF cannot handle the canisters at the rate produced by the facility as given in Table 1, the ISF must have the capability to store them in a lag storage area. This lag storage would only be used if the processing facility releases the canisters in a batch or for maintenance of the canister handling equipment in the ISF.
7. The handling equipment will interface with an MP-187 cask for canister shipment from the ISF.
8. Physical security requirements are enveloped by those for SNF.
9. The maximum weight of a canister is 5,300 lb.
10. Others will provide the proposed rail spur.
11. The transfer cart systems are described in the process facility options.
12. Shipments from the facility will be on a licensed rail shipping cask at grade and shipments to the facility are on a transfer cart in a belowgrade shielded transfer tunnel.
13. Storage of canisters shall be stacked as deep as four high inside sealed carbon steel tubes supported by support stools on the vault floor, both spaced for forced cooling and optimizing storage inside shielded concrete vaults.
14. A charged face floor system shall be used to maximize storage capacity, shielding, and strength while minimizing floor weight and contractibility concerns.
15. The same low profile gantry crane used in the proposed Interim Storage Facility Study at ICPP by Fluor Daniel Corporation² shall be used for placing the canisters and transferring them for future shipments.
16. The assumed transfer cask on the gantry crane is to be similar to that of a bottom loading Peach Bottom cask.

2.3 Requirements

2.3.1 Regulations

The NRC in accordance with 10 CFR Part 72 will license the storage facility, however the cost for this licensing is not included in this report. It is assumed that the canisters, as received from the processing facility, will meet Department of Transportation (DOT), NRC, and/or HLW Repository WAC requirements and require no further conditioning, testing, treatment, marking, etc. This requires that the waste will be excluded from RCRA hazardous waste management requirements at the INEEL due to successful delisting and/or treatment.

The ISF will be licensed to meet 10 CFR Part 72 for HLW; therefore the receipt, handling, packaging, and storage of canisters of waste must also be governed under 10 CFR Part 72. Changes required to the facility license must be evaluated through a 10 CFR 72.48 evaluation, issuance of a Safety Analysis Report, and licensing documentation amendments. It is assumed that DOE-ID will continue to implement the quality assurance program described in DOE-RW-0333P, *Quality Assurance Requirements and Description*³ and will apply it to this effort as well. The impact of implementing DOE-RW-0333P is reflected in the capital and operating cost estimates generated by this feasibility study.

2.3.2 HLW Repository WAC

The requirements of the potential future repository waste acceptance will be satisfied by the processing facility before the canisters being released to the ISF. The ISF will not provide any capability to process, modify, or change the waste or canisters.

2.3.3 Applicable Codes and Standards

The NRC licenses and regulates waste storage facilities in accordance with 10 CFR Part 72. DOE requirements that are included in 10 CFR Part 72 will be superseded by them, however, any DOE requirements that are not covered by 10 CFR Part 72 will also apply.

3.0 INTERIM STORAGE FACILITY DESIGNS

Waste canisters would come into the FPR facility for interim storage via an underground transport cart from the waste processing plant. The waste-handling machine in the facility would access the transport cart from above and bring the canister up into its bottom loading shielded cask. The waste handling machine would then take the canister to its designated storage sleeve in the facility, remove the sleeve plug, place the canister in the sleeve, and replace the plug. Four canisters would be stacked in each sleeve with cushioning material between them. See drawings FS-A-3, TRUA-A-16, and HWO-A-17 in Appendix 2.

When the waste canisters are removed for shipment to permanent storage, the process is reversed except that the canisters are placed in a cask on a rail car rather than the transport cart. This requires that the rail car be belowgrade, under the waste-handling machine.

3.1 Processing Facility Siting

The studies for the processing facilities for the various processing options are documented in the following reports:

Full Separations Option – *Idaho Chemical Processing Plant, Waste Treatment Facilities, Feasibility Study Report*, Prepared by Fluor Daniel, Inc., December 12, 1997 (Reference 2).

TRU Separations Option – *TRU Separations Option Study Report*, INEEL/EXT-01428, by William H. Landman, February 1998 (Reference).

Hot Isostatic Press Waste Option (HIP) – *Hot Isostatic Press Waste Option Report*, INEEL/EXT-01392, by Neal E. Russell, February 1998 (see Reference 5).

These facilities have been sited at a location in these studies that is convenient to the calcine storage units but is away from the other facilities. Because a new interim storage facility is assumed in the studies, this siting is acceptable for the ISF. It can be located in a convenient location near the processing facility. If the FPR is used for the interim storage as documented in this study, the processing facility should be located in a different location that would be closer to the FPR and still convenient to the calcine storage units. For this reason, the processing facility has been located near the FPR in this study as shown in the drawings in Appendix 2. The siting issues have not been studied for this study and must be considered further if FPR is given further consideration as an interim storage facility for HLW.

3.2 Modification for Transportation of Canisters

The existing truck air lock and loading ramp on the east side of the FPR facility would be removed and replaced with a 21-m (69-ft) wide by 21.3-m (70-ft) long extension of the building. The abovegrade portion of the building extension would include a roof and floor at the same level as the maintenance area of the FPR facility. See drawings FS-A-1, FS-A-2, TRUA-A-14, TRUA-A-15, HWO-A-14, HWO-A-15, and HWO-A-16 in Appendix 2 for sketches showing this concept. The overhead crane rail would be extended into this new area and new rails would be installed for the waste-handling machine. Belowgrade construction would include the waste transfer tunnel and the waste-shipping tunnel as shown in the drawings. The waste-handling machine would retrieve canisters from the cart or place canisters on the rail car through access ports in the floor of the new building extension. The waste transfer tunnel is the termination of the tunnel from the waste processing plant and the waste shipping tunnel would emerge onto a 305-m (1,000-ft) long ramp to pull the rail car up to grade on a new rail spur.

3.3 Modification for Storage of Canisters

Because the various processing options produce a different number of canisters, modifications to the FPR facility for storage of the canisters would vary for each option, whereas the transportation modifications would be the same for all the options.

A quick look was made to determine the maximum number of canisters that can be stored in the FPR. This was determined by placing the maximum number of 26-inch diameter storage sleeves tightly packed in the largest area that could possibly be created in the facility. If all the inner cell walls for cells 1 through 12 and the pump and valve corridor were removed to form one large cell, 2,336 sleeves could be installed. With four canisters in each sleeve, a maximum of 9,344 canisters could be stored. Therefore, only those options with fewer than 9,344 canisters were considered for storage in the FPR. The use of FPR to store part of the canisters produced by some of the options was also not pursued. A new facility would be required to store the remainder of the canisters. The duplication of facilities would result in a higher cost than building a new storage facility with a capacity for all the canisters.

3.3.1 HIP Process

Approximately 5,700 canisters would be produced by the HIP option. Drawing HWO-A-14 in Appendix 2 is a plan view of the facility that shows the storage sleeves in the original process cell areas. The configuration as shown would accommodate 1,474 sleeves, each of which could store four canisters. Therefore, the number of canisters that could be stored is 5,896. This concept requires considerable modification of the facility. The concrete walls between cells 1 through 9 and the concrete floor between the hatches to the pump and valve corridor must be cut out. A steel grid arrangement would be installed on the floor of the cells to level and position the storage sleeves and steel lining would be installed on the east walls to provide the necessary shielding. The storage sleeves are 66-cm (26-inch) diameter schedule 10 carbon steel pipes that are 13.9 m (45.5 ft) long. The bottoms of the pipes would be sealed

with steel plate and the tops would be closed with 30.5-cm (12-inch) thick steel plugs. Spacers of 30.5-cm (12-inch) thick steel would be used at the top of the pipes to position them and provide radiation shielding. The spacers and the pipes would be welded together to provide adequate air sealing so the fans can force the flow of cooling air from east to west as shown in drawing HWO-HV-2 (Appendix 2). The east-west rows of pipes are spaced about 4.3 cm (1.7 inch) apart in the north-south direction to allow the air to flow. The combinations of spacers and pipe plugs form a flat floor in the whole area.

The decay heat per canister in this option would range from 1.7 watts to 61 watts with the average at 23.2 watts. Without forced air cooling the inside temperature of the exterior concrete walls would exceed 250°F and the interior concrete wall between the cells and the pump and valve corridor would exceed 500°F. Sustained temperatures greater than 200°F cause significant structural degradation of concrete, mainly by dehydration. Because of this, forced air-cooling would be required. An airflow rate of 21,000 lb/hr (4,600 SCFM) would remove this heat with an inlet to outlet temperature difference of 100°F. A hot day at the INEEL would be 100°F, which means the outlet temperature would be 200°F. For 200°F air flowing across a storage sleeve with the hottest canisters (61 watts) inside, the centerline temperature of the waste would be approximately 220°F. Drawing HWO-HV-2 shows six fans, three pulling and three pushing, to overcome the pressure drop across the storage area.

The waste handling machines would be similar to the design proposed by Fluor Daniel Corporation.² Rails would be installed on the floor of the maintenance area and would extend into the new part of the building over the waste transfer and waste shipping tunnels. Since the canisters would be transferred into the interim storage at the rate of nine per shift, two waste handling machines would be used to provide redundancy of operation. When a waste-handling machine requires maintenance it would be parked at one end of the facility to allow the other machine to place the waste canisters.

3.3.2 Separation Process Options

The full separation option would produce 780 canisters of waste and the TRU/Class A separation option would produce 170 canisters of waste. For these options, a configuration similar to the one for the HIP option could be used except that all FPR process cell walls would be left intact. Drawings FS-A-1 and TRUA-A-14 in Appendix 2 show the layout for storage of 780 canisters and 170 canisters. The sleeve and plug design would remain the same but the pipes would be spaced at the top with two layers of steel plate with steel shot between the layers for radiation shielding. The sleeves would be spaced further apart to allow more airflow to remove the higher heat generation rate. Ventilation of the cells would be accomplished through the ducts originally designed into the process cells. Cells 5 and 6 were chosen to take advantage of the shielding provided by the thicker south wall and the additive effect of one or more adjacent cell walls. Adjacent cells and the pump and valve corridor would have restricted access. If unlimited access is required in adjacent cells, additional steel lining could be added to the cell walls. Only one waste-handling machine would be required for these storage alternatives because the production rate of one canister per month would allow any required maintenance of the machine to be done between receipt of canisters.

4.0 TOTAL PROJECT, LIFE-CYCLE, AND D&D COSTS

Cost estimates for modification of FPR for the storage options are in Appendix 1. The costs are summarized in Table 2.

Table 2. Project Costs

Cost Item	Separations Options		Non-separations Options
	Full Separations	TRU/Class A	Hot Isostatic Pressed
	Modified Existing Facility	Modified Existing Facility	Modified Existing Facility
	\$	\$	\$
OPC (unescalated)	13,941,000	13,168,000	16,228,000
OPC Escalation	4,469,000	4,747,000	4,605,000
OPC Mgmt Reserve	0	0	0
OPC Contingency	4,590,000	4,484,000	5,166,000
Total OPC	23,000,000	22,400,000	26,000,000
TEC (unescalated)	89,245,000	77,219,000	197,722,000
TEC Escalation	44,166,000	34,353,000	70,977,000
TEC Mgmt Reserve	9,188,000	7,686,000	19,374,000
TEC Contingency	19,901,000	16,942,000	37,827,000
Total TEC	162,500,000	136,200,000	325,900,000
TPC (unescalated)	103,186,000	90,387,000	213,950,000
TPC Escalation	48,634,000	39,100,000	75,583,000
TPC Mgmt Reserve	9,188,000	7,686,000	19,374,000
TPC Contingency	24,491,000	21,426,000	42,993,000
Total TPC	185,500,000	158,600,000	351,900,000
Operations (unescalated)	45,526,000	45,431,000	87,239,000
Operations Escalation	90,825,000	88,164,000	111,240,000
Operations Contingency	40,905,000	40,079,000	59,544,000
Total Operations	177,257,000	173,674,000	258,022,000
Post Operations (unescalated)	29,049,000	25,399,000	58,729,000
Post Operations Escalation	182,326,000	159,413,000	368,613,000
Post Operations Contingency	63,413,000	55,444,000	128,203,000
Total Post Operations	274,788,000	240,256,000	555,544,000
Total Cost (unescalated)	177,761,000	161,217,000	359,918,000
Total Cost (w/escalation, mgt reserve, and contingency)	637,545,000	572,529,000	1,165,466,000
Discounted Cost (escalated)	105,247,000	97,808,000	230,745,000

5.0 PROJECT SCHEDULE

Figure 2 for each processing option and interim storage alternative shows the schedules for the installation or modification of the storage facilities.

6.0 RISK ASSESSMENT

High-level risks identified in this study are categorized below. The assumptions in Section 2.2 provide the framework for this list. The highest risk is rated at “4” (out of “9”). Data Sheets for all the identified risks are included in Appendix 3, along with an explanation of the Risk Rating calculation method.

1. The quantities and characteristics of the waste are different than assumed in the study. Risk = 3 (Probability = 3, Impact = 1).
2. Waste will not be stored in the SRS canister. Risk = 2 (Probability = 2, Impact = 1).
3. The facility would have to be redesigned if the waste is classified as a RCRA waste after processing. Risk = 3 (Probability = 1, Impact = 3).
4. The obtaining of the NRC license for the FPR would be more difficult than assumed. Risk = 4 (Probability = 2, Impact = 2).
5. A storage canister will be mishandled or dropped during waste transfer to, from, or in the facility. Risk = 2 (Probability = 1, Impact = 2).
6. A catastrophic flood could flood the FPR facility. Risk = 2 (Probability = 1, Impact = 2).
7. The facility might not be operational when needed. Risk = 2 (Probability = 1, Impact = 2).

Many risks including environmental, safety, and health risks were not identified in this study.

Figure 2. Project Schedule.

Figure 2. (continued).

Figure 2. (continued).

7.0 CONSTRUCTION AND OPERATIONAL ENVIRONMENTAL IMPACTS

The Product Data Sheets that summarize the construction and operational environmental impacts for the interim storage facilities that support the waste processing options are in Table 3. Data are presented for the construction, operation, and decommissioning of the project. Estimates are included for the following parameters:

- Cost
- Schedule
- Air emissions
- Liquid effluents
- Solid wastes
- Utilities used
- Manpower requirements
- Regulatory requirements.

Because this project is at a very preliminary stage of design, much of the information presented in the Project Data Sheets is based on representative literature values, existing laboratory data, and engineering judgment. The cost data in Table 3 were obtained from the cost estimates in Appendix 1 and the supporting information for the remainder of the data is in Appendix 4.

The Product Data Sheets are presented in the following order in Table 3:

Processing Option	Project Data Sheet Title
Full Separations – IS in the FPR	PDS for Storage at FPR for WFS
TRU/Class A Separations – IS in the FPR	PDS for Storage at FPR for TRU
Hot Isostatic Press – IS in the FPR	PDS for Storage at FPR for HWO

Table 3. Project Data Sheets.

Project Data Sheet for Storage at FPR for WFS

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Full Separations Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	5,853 m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	FPR Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and contingency.

Conceptual Design	\$3,170,000
Management for Project Development	\$4,501,000
Permitting and Documentation	\$3,629,000
SO Test & Start-Up	\$7,110,000
Contingency	\$4,590,000
Total Preconstruction	\$23,000,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$20,965,000
Management (PM/CM)	\$20,566,000
Construction	\$85,690,000
G&A/PIF	\$5,332,000
Procurement Fees, Management Reserve and Contingency	\$29,947,000
Total Construction (TEC)	\$162,500,000
Schedule start/end: Preconstruction	January 1999 through December 2001
Schedule start/end: Construction	January 2011 through December 2014
Schedule start/end: SO Test & Start-up	January 2015 through December 2015

Number of workers each year of construction (new/existing)

Nonradiation	161 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes,
Trips (construction materials delivery)	702
Hours of operation	14,769 hours (total)

Acres disturbed and duration of disturbance

January 2011 through December 2014	
New	None
Previous	155 acres

Table 3. (continued).

Project Data Sheet for Storage at FPR for WFS

Revegetated	None
<u>Air emissions</u>	
Dust	4,464 tons (total)
Major gases (CO ₂ , H ₂ O, O ₂ , N ₂) from diesel exhaust	10,261 tons (total)
Contaminants (Particulates, CO, NO _x , SO ₂ , hydrocarbons) from diesel exhaust.	60 tons (total)
Total air emissions	14,785 tons (total)
<u>Effluents</u>	
Sanitary wastewater	6,855,581 liters (total)
Lube Oil	2,795 liters (total)
<u>Solid wastes</u>	
Type - construction trash	3,817 m ³ (total)
Radioactive wastes	None
<u>Hazardous/toxic chemicals and wastes (type)</u>	
Storage/inventory	13 m ³
Hazardous waste (construction)	217 m ³ (total)
Pits/Ponds created (m ²)	None
<u>Water usage:</u>	
Dust control	31,868,496 liters (total)
Domestic water	6,855,581 liters (total)
<u>Energy requirements</u>	
Electrical (MWh/yr)	150 MWh/yr
Fossil fuel (liters)	0 liters (total)
Permits needed for construction	NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.
Operational Information	
Cost (\$): Operations (unescalated)	
Facility/Administration	\$6,721,000
Operations/Process Facility	\$18,940,000
Procurement, materials, utilities, maintenance	\$19,864,000
Total operations	\$45,525,000
Schedule start/end	January 2015 through December 2068
<u>Number of workers each year of operation (new/existing)</u>	

Table 3. (continued).

Project Data Sheet for Storage at FPR for WFS

Operations	3
Maintenance	1
Support	3
Total	7
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker

Heavy Equipment None

Air Emissions

Radioactive off-gas None

Effluents

Sanitary Wastewater 241,767 liters/yr

Solid Wastes

Sanitary/Industrial Trash 39 m³/yr

Radioactive wastes (canisters) 147 m³/yr

Hazardous/toxic chemicals and wastes

Pits/Ponds used (m²) None

Water usage:

Domestic water 241,767 liters/yr

Energy Requirements:

Electrical (MWh/yr) 4,368 MWh/yr

Steam 56,000,000 lb/yr
NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and

Permits needed (for facility operations)

Decontamination & Decommissioning (D&D) Information

Cost (\$): D&D (unescalated)

Decommission \$4,284,000

Decontamination \$0

Demolition \$24,785,000

Total D&D \$29,069,000

Schedule start/end: D&D January 2069 through December 2071

Number of workers each year of D&D (new/existing) 68 New workers/yr

Number of radiation workers (D&D) 7 New workers/yr

Average annual worker radiation dose (rem/yr) 0.19 rem/yr per worker

Heavy equipment:

Equipment used Mobile Cranes, Roll-off trucks, Dozers, Loaders

Project Data Sheet for Storage at FPR for WFS

Trips Roll-off trucks
Hours of operation (all heavy equipment)

6 per day
14,280 Hours

Acres disturbed and duration of disturbance

January 2074 through December 2076

New

None

Previous

165 acres

Revegetated

None

Air emissions

non-radioactive Fuel combustion gases (CO₂, H₂O, O₂, N₂)

8,300 tons (total)

non-radioactive Fuel combustion contaminants (CO,
particulates, NO_x, SO₂, hydrocarbons)

48 tons (total)

radioactive HEPA filtered off-gas

None tons (total)

Effluents

radioactive Spent decontamination solution

None liters (total)

non-radioactive Sanitary wastewater

4,364,496 liters (total)

non-radioactive Lube oil

2,702 liters (total)

Solid wastes:

radioactive

18,628 m³

Non-radioactive (industrial)

4 m³

Hazardous

40 m³

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

None m³ (total)

Pits/Ponds created (m²)

None

Hazardous waste

909 m³ (total)

Water usage:

Domestic water

4,364,496 liters (total)

Source of water

ICPP site wells

Energy requirements:

Electrical (MWh/yr)

156 MWh/yr

Fossil fuel (liters)

324,299 liters (total)

Permits needed (e.g. for facility closures, physical characteristics
and quantities of radioactive and hazardous materials remaining
after closure)

Work will be done under closure provisions of
existing permits.

Table 3. (continued).

Project Data Sheet for Storage at FPR for TRU

Generic Information

Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.

TRU Separations Waste Option
Treated HLW calcine.

Description/function

EIS Alternatives (A, B, etc.)

Project type or waste stream

Action type

New

Structure type

Size (m²)

5,853 m²

Other features (e.g. pits, ponds, power/water/sewer lines)

None

Location

Inside/outside of fence

Inside ICPP fence

Inside/outside of building

FPR Facility

Candidate for privatization?

Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation and

Conceptual Design \$2,470,000

Management for Project Development \$3,470,000

Permitting and Documentation \$2,728,000

SO Test & Start-Up \$4,500,000

Contingency \$3,332,000

Total Preconstruction \$16,500,000

Cost (\$): Construction with escalation and contingency.

ED&I \$12,352,000

Management (PM/CM) \$11,858,000

Construction \$49,408,000

G&A/PIF \$3,107,000

Procurement Fees, Management Reserve and Contingency \$18,075,000

Total Construction (TEC) \$94,800,000

Schedule start/end: Preconstruction

January 1999 through December 2001

Schedule start/end: Construction

January 2010 through December 2013

Schedule start/end: SO Test & Start-up

January 2014 through December 2014

Number of workers each year of construction (new/existing)

Nonradiation

155 New workers/yr

Number of radiation workers (construction)

None

Average annual worker radiation dose (rem/yr)

None

Heavy equipment

Equipment used

Excavator, dump trucks, cranes, cement trucks, grader, material delivery

Trips (construction materials delivery)

702

Hours of operation

14,740 hours (total)

Acres disturbed and duration of disturbance

New

January 2010 through December 2013

Previous

None

155 acres

ENGINEERING DESIGN FILE

Table 3. (continued).

Project Data Sheet for Storage at FPR for TRU

Revegetated

None

Air emissions

Dust

4,464 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

5,174 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

30 tons (total)

Total air emissions

9,668 tons (total)

Effluents

Sanitary wastewater

6,600,094 liters (total)

Lube Oil

2,790 liters (total)

Solid wastes

Type - construction trash

3,675 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)

Pits/Ponds created (m²)

None

Water usage:

Dust control

31,868,496 liters (total)

Domestic water

6,600,094 liters (total)

Energy requirements

Electrical (MWh/yr)

150 MWh/yr

Fossil fuel (liters)

0 liters (total)

Permits needed for construction

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$7,007,000

Operations/Process Facility

\$19,746,000

Procurement, materials, utilities, maintenance

\$18,677,000

Total operations

\$45,430,000

Schedule start/end

January 2014 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).

Project Data Sheet for Storage at FPR for TRU

Operations	3
Maintenance	1
Support	3
Total	7
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker

Heavy Equipment None

Air Emissions

Radioactive off-gas None

Effluents

Sanitary Wastewater 241,767 liters/yr

Solid Wastes

Sanitary/Industrial Trash 39 m³/yr

Radioactive wastes (canisters) 141 m³/yr

Hazardous/toxic chemicals and wastes

Pits/Ponds used (m²) None

Water usage:

Domestic water 241,767 liters/yr

Energy Requirements:

Electrical (MWh/yr) 4,368 MWh/yr

Steam 56,000,000 lb/yr

HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Permits needed (for facility operations)

Decontamination & Decommissioning (D&D) Information

Cost (\$): D&D (unescalated)

Decommission \$3,706,000

Decontamination \$0

Demolition \$21,693,000

Total D&D \$25,399,000

Schedule start/end: D&D January 2069 through December 2071

Number of workers each year of D&D (new/existing) 60 New workers/yr

Number of radiation workers (D&D) 6 New workers/yr

Average annual worker radiation dose (rem/yr) 0.19 rem/yr per worker

Heavy equipment:

Equipment used Mobile Cranes, Roll-off trucks, Dozers, Loaders

Table 3. (continued).

Project Data Sheet for Storage at FPR for TRU

Trips	Roll-off trucks	6 per day
Hours of operation (all heavy equipment)		13,200 Hours
<u>Acres disturbed and duration of disturbance</u>		January 2069 through December 2071
New		None
Previous		155.0 acres
Revegetated		None
<u>Air emissions</u>		
non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	7,672 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	45 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)
<u>Effluents</u>		
radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	3,813,258 liters (total)
non-radioactive	Lube oil	2,498 liters (total)
<u>Solid wastes:</u>		
radioactive		18,628 m ³ Ci
Non-radioactive (industrial)		4 m ³
Hazardous		40 m ³
<u>Hazardous/toxic chemicals and wastes (type)</u>		
Storage/inventory		None m ³ (total)
Pits/Ponds created (m ²)		None
Hazardous waste		909 m ³ (total)
<u>Water usage:</u>		
Domestic water		3,813,258 liters (total)
Source of water	ICPP site wells	
<u>Energy requirements:</u>		
Electrical (MWh/yr)		156 MWh/yr
Fossil fuel (liters)		299,772 liters (total)
Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)	Work will be done under closure provisions of existing permits.	

Table 3. (continued).

Project Data Sheet for Storage at FPR for HWO

Generic Information

Description/function	Provide Long-term storage for road-ready containers awaiting shipment to a permanent repository.
EIS Alternatives (A, B, etc.)	Hot Isostatic Pressing Waste Option
Project type or waste stream	Treated HLW calcine.
Action type	New
Structure type	
Size (m ²)	5,853. m ²
Other features (e.g. pits, ponds, power/water/sewer lines)	None
Location	
Inside/outside of fence	Inside ICPP fence
Inside/outside of building	FPR Facility
Candidate for privatization?	Yes

Construction Information

Cost (\$): Pre-Operations (Other Project Costs) with escalation an

Conceptual Design	\$5,000,000
Management for Project Development	\$4,000,000
Permitting and Documentation	\$2,728,000
SO Test & Start-Up	\$4,500,000
Contingency	\$4,072,000
Total Preconstruction	\$20,300,000

Cost (\$): Construction with escalation and contingency.

ED&I	\$24,604,000
Management (PM/CM)	\$31,699,000
Construction	\$132,077,000
G&A/PIF	\$8,021,000
Procurement Fees, Management Reserve and Contingency	\$43,999,000
Total Construction (TEC)	\$240,400,000
Schedule start/end: Preconstruction	January 2004 through December 2005
Schedule start/end: Construction	January 2007 through December 2011
Schedule start/end: SO Test & Start-up	January 2012 through December 2012

Number of workers each year of construction (new/existing)

Nonradiation	152 New workers/yr
Number of radiation workers (construction)	None
Average annual worker radiation dose (rem/yr)	None

Heavy equipment

Equipment used	Excavator, dump trucks, cranes, cement trucks, grader, material delivery
Trips (construction materials delivery)	702
Hours of operation	27,414 hours (total)

Acres disturbed and duration of disturbance

New	January 2007 through December 2011
Previous	None 155 acres

Table 3. (continued).

Project Data Sheet for Storage at FPR for HWO

Revegetated

None

Air emissions

Dust

6,696 tons (total)

Major gases (CO₂, H₂O, O₂, N₂) from diesel exhaust

17,610 tons (total)

Contaminants (Particulates, CO, NO_x, SO₂, hydrocarbons) from diesel exhaust.

103 tons (total)

Total air emissions

24,409 tons (total)

Effluents

Sanitary wastewater

9,708,525 liters (total)

Lube Oil

5,188 liters (total)

Solid wastes

Type - construction trash

5,406 m³ (total)

Radioactive wastes

None

Hazardous/toxic chemicals and wastes (type)

Storage/inventory

13 m³

Hazardous waste (construction)

217 m³ (total)

Pits/Ponds created (m²)

None

Water usage:

Dust control

47,802,744 liters (total)

Domestic water

9,708,525 liters (total)

Energy requirements

Electrical (MWh/yr)

150 MWh/yr

Fossil fuel (liters)

0 liters (total)

Permits needed for construction

NEPA documentation (prior to start of Title II construction); New stationary sources/PTC/NOC/PSD for non-rad air emissions; HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply; RCRA Part A and Part B permits.

Operational Information

Cost (\$): Operations (unescalated)

Facility/Administration

\$5,039,000

Operations/Process Facility

\$18,299,000

Procurement, materials, utilities, maintenance

\$63,902,000

Total operations

\$87,240,000

Schedule start/end

January 2012 through December 2068

Number of workers each year of operation (new/existing)

Table 3. (continued).

Project Data Sheet for Storage at FPR for HWO

Operations	3
Maintenance	1
Support	3
Total	7
Number of radiation workers	2.5 (included in above total)
Average annual work radiation dose (rem/yr)	0.19 rem/yr per worker

Heavy Equipment None

Air Emissions

Radioactive off-gas None

Effluents

Sanitary Wastewater 241,767 liters/yr

Solid Wastes

Sanitary/Industrial Trash 39 m³/yr

Radioactive wastes (canisters) 4,309 m³/yr

Hazardous/toxic chemicals and wastes

Pits/Ponds used (m²) None

Water usage:

Domestic water 241,767 liters/yr

Energy Requirements:

Electrical (MWh/yr) 4,368 MWh/yr

Steam 56,000,000 lb/yr

HAP's and TAP's and RCRA (part AA,BB, and CC for air) for hazardous air emissions; air operating permit; NESHAP's, NPDES, NESHAP's subpart H for rad air emissions; approval of Engineering Plans; Cross Connection Control Plans; report and specifications for drinking water supply;RCRA Part A and Part B permits.

Permits needed (for facility operations)

Decontamination & Decommissioning (D&D) Information

Cost (\$): D&D (unescalated)

Decommission \$7,381,000

Decontamination \$0

Demolition \$51,348,000

Total D&D \$58,729,000

Schedule start/end: D&D January 2069 through December 2071

Number of workers each year of D&D (new/existing) 138 New workers/yr

Number of radiation workers (D&D) 14 New workers/yr

Average annual worker radiation dose (rem/yr) 0.19 rem/yr per worker

Heavy equipment:

Equipment used Mobile Cranes, Roll-off trucks, Dozers, Loaders

Project Data Sheet for Storage at FPR for HWO

Trips	Roll-off trucks	6 per day
Hours of operation (all heavy equipment)		29,700 Hours

Acres disturbed and duration of disturbance

January 2069 through December 2071

New	None
Previous	155 acres
Revegetated	None

Air emissions

non-radioactive	Fuel combustion gases (CO ₂ , H ₂ O, O ₂ , N ₂)	17,263 tons (total)
non-radioactive	Fuel combustion contaminants (CO, particulates, NO _x , SO ₂ , hydrocarbons)	101 tons (total)
radioactive	HEPA filtered off-gas	None tons (total)

Effluents

radioactive	Spent decontamination solution	None liters (total)
non-radioactive	Sanitary wastewater	8,806,174 liters (total)
non-radioactive	Lube oil	5,621 liters (total)

Solid wastes:

radioactive	18,628 m ³	Ci
Non-radioactive (industrial)	4 m ³	
Hazardous	40 m ³	

Hazardous/toxic chemicals and wastes (type)

Storage/inventory	None m ³ (total)
Pits/Ponds created (m ²)	None
radioactive (mixed waste)	None m ³ (total)

Water usage:

Domestic water	8,806,174 liters (total)
Source of water	ICPP site wells

Energy requirements:

Electrical (MWh/yr)	156 MWh/yr
Fossil fuel (liters)	674,487 liters (total)

Permits needed (e.g. for facility closures, physical characteristics and quantities of radioactive and hazardous materials remaining after closure)	Work will be done under closure provisions of existing permits.
---	---

8.0 PROJECT-SPECIFIC OPTIONS

No project-specific options were assigned, identified, or evaluated.

9.0 RECOMMENDATIONS

The additional costs and a longer schedule that would result from NRC licensing of the FPR for interim storage should be studied further. The NRC does not have the structure in place to review and license an existing facility for interim storage of HLW. Also, the FPR has not been built to the requirements that would be required by NRC.

A future study should be conducted to determine if a standard 15-ft long "Hanford" canister should be substituted for the 10-ft SRS canister assumed in this study. Use of a 15-ft canister would increase the interim storage construction costs but would reduce the operation (handling) costs, and greatly reduce offsite transportation and disposal costs. A large net cost saving, primarily as a result of reduced transportation and disposal costs, could be realized by using the 15-ft canister.

10.0 CONCLUSIONS

This study has investigated the modification of the FPR for storage of HLW that results from processing the waste at ICPP. The processing options are discussed in separate reports. This study determined that FPR can hold a maximum of 9,344 canisters and only those processing options that produce fewer canisters can be accommodated in the FPR. It is concluded that FPR can be modified and placed into operation to store the waste in canisters for the Full and TRU/Class A Separations Option and the HIP Option for the period from processing until the time a permanent repository is available for receipt of this waste. The schedules and costs associated with interim storage for these processing options are presented in the body of this EDF.

11.0 REFERENCES

1. *Consent Order and Settlement Agreement between DOE and the State of Idaho Regarding Spent Fuel and Nuclear Waste Issues*, October 17, 1995.
2. *Waste Treatment Facilities, Feasibility Study Report*, Fluor Daniel Corporation, December 12, 1997.
3. DOE/RW-0333P, U. S. Department of Energy, *Office of Civilian Radioactive Waste Management, Quality Assurance Requirements and Description (QARD)*.
4. William H. Landman, *TRU Separations Option Study Report*, INEEL/EXT-01428, February 1998.
5. Neal E. Russell, *Hot Isostatic Press Waste Option Report*, INEEL/EXT-01392, February 1998.

12.0 APPENDICES

Appendix 1 – Cost Estimate

Appendix 2 – Drawings

Appendix 3 –Risk Assessment/Data Sheets

Appendix 4 – Background Information for Project Data Sheets.

Appendix 1

Cost Estimates

The cost estimates for modification of the FPR for Interim Storage Facilities (ISFs) are contained in this appendix in the same order as in the following summary table (see estimates attached to the letter RDA-3-98):

Summary Table of Cost Estimates.

Waste Option	Not Escalated			Escalated		
	Total Estimate d Cost, K\$	Other Project Cost, K\$	Total Project Cost, K\$	Total Estimate d Cost, K\$	Other Project Cost, K\$	Total Project Cost, K\$
Full Separations	109,300	17,400	126,700	162,500	23,000	185,500
TRU/Class A Separations	94,800	16,500	111,300	136,200	22,400	158,600
Hot Isostatic Press	240,400	20,300	260,700	325,900	26,000	351,900

The Life-Cycle Cost Estimate for the Full Separations Option is attached to the letter “Economic and Life-Cycle Analysis conducted for the High-Level Waste (HLW) WTS Interim Storage Facility – RJT-25-98,” dated February 3, 1998.

The Life-Cycle Cost Estimate for the TRU/Class A Separations Option is attached to the letter, “Economic and Life-Cycle Analysis conducted for the High Level Waste (HLW) in FPR Interim Storage Facility-TRU – RJT-24-98,” dated February 3, 1998.

The Life-Cycle Cost Estimate for the Hot Isostatic Press Option is attached to the letter “Economic and Life Cycle Analysis conducted for the Hot Isostatic Pressing (HIP) Storage Facility in FPR – RJT-17-98,” dated January 30, 1998.

Lockheed Martin Idaho Technologies Company

INTERDEPARTMENTAL COMMUNICATION

Date: January 28, 1998

To: J. K. Rawlins MS 3765 6-4303

From: R. D. Adams *RDA* MS 3655 6-2963

Subject: INTERIM STORAGE STUDY - RDA-3-98

Cost Estimating has prepared Planning Cost Estimates for the subject project. These estimates were based on information received from you, your design team and reviewers from November 11, 1997 through January 23, 1998.

These estimates include permitting costs, direct and indirect construction costs, G&A, Performance Incentive Fee (PIF), procurement fee, Engineering costs, Inspection costs, Project Management costs, Construction Management costs, escalation and contingency. The estimated costs have been escalated to the midpoint of the anticipated schedule. For more detailed information, please refer to the Cost Estimate Support Data Recapitulation forms.

Attached for your review are the Summary Estimate sheets, the Cost Estimate Support Data Recapitulation form, detailed estimate sheets, Contingency Analysis sheets G&A/PIF Adder Calculation Sheets.

Also attached are the schedules.

Please refer to the attached table for a summary of the subject estimates.

If you have any questions regarding this estimate, please contact me at 526-2963.

RDA

Attachments:

cc: Estimate File #2421 *RDA*
R. D. Adams File

INTERIM STORAGE OPTIONS							
	TEC		OPC		TPC		
	Unescalated	Escalated	Unescalated	Escalated	Unescalated	Escalated	
VWO	\$459,500,000	\$626,200,000	\$23,800,000	\$25,500,000	\$483,300,000	\$651,700,000	
HWO	\$271,500,000	\$368,600,000	\$20,300,000	\$25,700,000	\$291,800,000	\$394,300,000	
CWO	\$500,000,000	\$681,900,000	\$20,300,000	\$25,600,000	\$520,300,000	\$707,500,000	
DCWO	\$540,400,000	\$738,000,000	\$20,300,000	\$25,500,000	\$560,700,000	\$763,500,000	
TRU	\$81,000,000	\$117,300,000	\$19,000,000	\$24,200,000	\$100,000,000	\$141,500,000	
HWO IN FPR	\$240,400,000	\$325,900,000	\$20,300,000	\$26,000,000	\$260,700,000	\$351,900,000	
TRU IN FPR	\$94,800,000	\$136,200,000	\$16,500,000	\$22,400,000	\$111,300,000	\$158,600,000	
WTS IN FPR	\$109,300,000	\$162,500,000	\$17,400,000	\$23,000,000	\$126,700,000	\$185,500,000	

COST ESTIMATE SUPPORT DATA RECAPITULATIONProject Title: WTS-IS IN FPREstimator: R. D. AdamsDate: 1/28/98File: 2421-FFPR PLANNINGApproved By: **I. SCOPE OF WORK:** *Brief description of the proposed project.*

This facility will unload, store in vertical tubes and load out canisters containing High Level Waste (HLW) from the proposed Waste Treatment System(WTS) designed by Fluor Daniel Northwest Inc.

II. BASIS OF THE ESTIMATE: *Drawings, Design Report, Engineers Notes and/or other documentation upon which the estimate is originated.*

Draft sketches, a draft EDF, information from WINCO estimate 93108 and the SNF Canister Storage Building Final Design Estimate from Fluor Daniel Northwest, Inc. were used as the basis for this estimate.

III. ASSUMPTIONS: *Conditions statements accepted or supposed true without proof of demonstration. An assumption has a direct impact on total estimated cost.*

1. The Interim Storage Facility will be located within 100 feet of the WTS grouting facility.
2. Rock will not be encountered during excavation.
3. The estimates include both present day costs summaries and contingency analysis and escalated summaries and contingency analysis. The escalated summaries and contingency analysis reflect the attached schedule. All activities are escalated to the appropriate schedule mid-point.
4. FPR will have to be brought up to life safety code as reflected in estimate 93108. It is assumed that the same materials and equipment available in storage for FPR when estimate was done are still available.
5. Most quantities used for this estimate were obtained by preliminary take offs from the draft sketches.
6. The storage tube costs, gantry crane cost and associated rail system costs were used from the Fluor estimate of a facility which is approximately eighty percent complete.
7. All assumptions and information included in the draft "New Interim Storage Facility for Interim Storage of HLW" apply to the estimate.
8. Where quantities could not be determined from the draft sketches, factors or the estimator used assumed quantities.

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: <u>WTS-IS IN FPR</u>	Estimator: <u>R. D. Adams</u>
Date: <u>1/28/98</u>	File: <u>2421-FFPR PLANNING</u>
Approved By: _____	

9. Sufficient construction craft will be available to support this project.

10. Markups on direct construction costs to get the construction costs listed on the summary sheet are as follows:

Labor indirects, overheads and profit(OH&P)	50% of labor
Material & equipment OH&P	5% of material and equipment
Subcontract OH&O	10% of subcontract cost
Construction equipment allowance	10% of labor
NQA-1 quality requirements	30% of material
DOE/RW/0333P quality requirements	10% of material
Subcontractor procurement	1% of material and equipment
Bond	2% of everything

12. The below grade railroad track within the railroad access structure to the WTS Interim Storage Facility is included in this estimate the remainder of the branch line is included in the infrastructure estimate.

13. All utilities are assumed to be available at the facility wall.

14. The concrete that is removed from the existing FPR structure will be cut into blocks by diamond wire cutting or similar method. It will not be rubblized with the building

IV. **CONTINGENCY GUIDELINE IMPLEMENTATION:** *The percentage used for contingency as determined by the contingency allowance guidelines can be altered to reflect the type of construction and conditions that may impact the total estimated cost.*

A large portion of the estimated costs is based on actual costs from Fluor's SNF Canister Storage Building. The majority of the remaining costs are for standard construction activities. The activities involved with locating this structure inside an existing building carry a higher contingency than the standard construction tasks. For these reasons, the contingency is lower than would be experienced for a processing type facility at this stage of development.

V. **OTHER COMMENTS/CONCERNS SPECIFIC TO THE ESTIMATE:**

1. All FY'98 and later projects are to be assessed a Procurement Fee of 1%, a G&A Fee of 23%, with a \$500,000 ceiling per year, and a Performance Incentive Fee (PIF) of 5.5%. See the attached G&A/PIF calculation sheet for the method used to calculate these fees.

COST ESTIMATE SUPPORT DATA RECAPITULATIONProject Title: WTS-IS IN FPREstimator: R. D. AdamsDate: 1/28/98File: 2421-EFPR PLANNING

Approved By: _____

2. A procurement fee of one percent of construction was used to cover the operating contractor support to DOE-ID for their contract administration. It is felt that one percent is sufficient for jobs of this size.

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **WFS (FLUOR) - INTERIM STORAGE
FACILITY IN FPR - ESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **2421FFPR**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **28-Jan-1998**
TIME: **09:07:48**

CHECKED BY: *SMW*

APPRD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$20,965,100
1.1.1	DESIGN ENGINEERING TITLE I & II	11,425,000	5,255,500	16,680,500
1.1.2	TITLE III INSPECTION	2,856,400	1,428,200	4,284,600
1.2	<u>MANAGEMENT COSTS</u>			>> \$20,566,350
1.2.1	PROJECT MANAGEMENT	7,998,000	3,999,000	11,997,000
1.2.2	CONSTRUCTION MANAGEMENT	5,712,900	2,856,450	8,569,350
1.3	<u>CONSTRUCTION</u>			>> \$85,690,320
1.3.1	GENERAL CONDITIONS	1,443,834	721,917	2,165,751
1.3.2	SITework	2,816,665	1,408,332	4,224,997
1.3.3	CONCRETE	9,870,250	4,935,125	14,805,375
1.3.5	METALS	2,280,396	1,140,198	3,420,594
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	115,117	345,351
1.3.8	DOORS & WINDOWS	64,695	32,348	97,043
1.3.9	FINISHES	352,187	176,094	528,281
1.3.13	SPECIAL CONSTRUCTION	32,405,842	16,202,921	48,608,763
1.3.14	CONVEYING SYSTEMS	7,156,751	3,578,376	10,735,127
1.3.15	MECHANICAL	266,810	133,405	400,215
1.3.16	ELECTRICAL	239,215	119,608	358,823
1.5	<u>G&A/PIF</u>			>> \$5,332,001
1.5.1	G&A/PIF ADDER	3,554,667	1,777,334	5,332,001
1.5.2	PROCUREMENT FEES	571,269	285,634	>> \$856,903
	SUBTOTAL INCLUDING ESCALATION	89,245,115	44,165,559	>> \$133,410,674
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$9,187,922
	CONTINGENCY			>> \$19,901,404
	TOTAL ESTIMATED COST			>> \$162,500,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= **24.00%**

CONTINGENCY= **21.80%**

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **WFS (FLUOR) - INTERIM STORAGE
FACILITY IN FPR - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**
COST ESTIMATE SUMMARY

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421FFPR**
 PREPARED BY: **R. D. ADAMS**
 REPORT NAME: **Cost Estimate Summary**

 DATE: **28-Jan-1998**
 TIME: **09:09:57**
 CHECKED BY: **SAW**
 APPRD BY: **hdy**

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$14,281,400
1.1.1	DESIGN ENGINEERING TITLE I & II	11,425,000	0	11,425,000
1.1.2	TITLE III INSPECTION	2,856,400	0	2,856,400
1.2	<u>MANAGEMENT COSTS</u>			>> \$13,710,900
1.2.1	PROJECT MANAGEMENT	7,998,000	0	7,998,000
1.2.2	CONSTRUCTION MANAGEMENT	5,712,900	0	5,712,900
1.3	<u>CONSTRUCTION</u>			>> \$57,126,879
1.3.1	GENERAL CONDITIONS	1,443,834	0	1,443,834
1.3.2	SITEWORK	2,816,665	0	2,816,665
1.3.3	CONCRETE	9,870,250	0	9,870,250
1.3.5	METALS	2,280,396	0	2,280,396
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0	230,234
1.3.8	DOORS & WINDOWS	64,695	0	64,695
1.3.9	FINISHES	352,187	0	352,187
1.3.13	SPECIAL CONSTRUCTION	32,405,842	0	32,405,842
1.3.14	CONVEYING SYSTEMS	7,156,751	0	7,156,751
1.3.15	MECHANICAL	266,810	0	266,810
1.3.16	ELECTRICAL	239,215	0	239,215
1.5	<u>G&A/PIF</u>			>> \$3,554,667
1.5.1	G&A/PIF ADDER	3,554,667	0	3,554,667
1.5.2	PROCUREMENT FEES	571,269	0	>> \$571,269
	SUBTOTAL INCLUDING ESCALATION	89,245,115	0	>> \$89,245,115
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$6,125,282
	CONTINGENCY			>> \$13,929,603
	TOTAL ESTIMATED COST			>> \$109,300,000

PROJECT COST PARAMETERS

 EDI AS A % OF CONST. + GFE= **25.00%**

 CONTINGENCY= **22.47%**

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421FFPR

PREPARED BY: R. D. ADAMS

PAGE # 1

DATE 28-Jan-1998

TIME: 09:06:42

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

Rev. 6/96

FACILITY IN FPR

REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING

PREPARED BY: R. D. ADAMS

DATE 28-Jan-1998

TIME: 09:06:42

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MAT'L UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	GENERAL CONDITIONS											
	SUPERVISION @ 5% OF LABOR HOURS	1	LOT		CARF GEN	10390.0	10,390	358,351				358,351
	TRAINING @ 3% OF LABOR HOURS	1	LOT		SSWK GEN	6230.00	6,230	229,326				229,326
	SMALL TOOLS & CONSUMABLES @ 4% OF LABOR DOLLARS	1	LOT	280,000.00	GEN	0.000				280,000		280,000
	GENERAL CONDITIONS S/T						16,620	\$587,677		\$280,000		\$867,677
1.3.2	SITEWORK											
	TUNNEL & RR STRUCTURE EXCAVATION	61,100	CY		ENGR GEN	0.012	733	23,132	122,200			145,332
	Includes all earthwork for new addition.											
	TUNNEL & RR STRUCTURE BACKFILL	37,000	CY		ENGR GEN	0.060	2,220	70,041	74,000			144,041
	HAUL AWAY EXCESS	24,100	CY		ENGR GEN	0.020	482	15,207	48,200			63,407
	SITEWORK S/T						3,435	\$108,381	\$244,400			\$352,781
1.3.2.1	DEMOLITION											
	SAWCUT AND REMOVE REINFORCED CONCRETE WLLS, SLABS	18,300	CF		SKWK GEN	1.500	27,450	908,870	549,000			1,457,870
	DEMO EXISTING BUILDING PORTION FOR NEW ADDITION	1	LOT		SKWK GEN	1200.00	1,200	39,732	12,000			51,732
	DEMO WASTE TRANSFER CRANE, MAIN CRANE RAILS & AIR LOCK DOORS	1	LOT		SKWK GEN	2000.00	2,000	66,220	20,000			86,220
	CORE DRILL FOR VAULT VENT DUCTS	1	LOT		GEN	0.000					5,000	5,000

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: **PLANNING**

PROJECT NO.: 2421FFPR

PREPARED BY: R. D. ADAMS

PAGE # 3

DATE 28-Jan-1998

TIME: 09:06:42

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

Rev. 6/96

FACILITY IN FPR

INEEL/ICPP

J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING

PREPARED BY: R. D. ADAM

PREPARED BY: R. D. ADAMS

4

28-Jan-1998

09:06:42

Detail Cost Estimate Sheet

[illegible]

TYPE OF ESTIMATE: **PLANNING**

PROJECT NO.: 2421FFPR

PREPARED BY: **R. D. ADAMS**

[illegible]

Lockheed Martin Idaho Technologies Co.

Rev. 6/96
 PROJECT NAME: WFS (FLUOR) - INTERIM STORAGE
 FACILITY IN FPR
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
 PROJECT NO.: 2421FFPR
 PREPARED BY: R. D. ADAMS

PAGE # 6

DATE 28-Jan-1998
 TIME: 09:06:42
 REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.16	ELECTRICAL											
	SWITCHGEAR AND TRANSFORMERS	1	LOT	44,000.00	ELEC	110.000	110	3,664		44,000		47,664
Memo:	For new addition only.				GEN							
	LIGHTING	5,600	SF		ELEC	0.000					15,400	15,400
Memo:	For new addition only.				GEN							
	RACEWAYS & ENCLOSURES	1	LOT	10,400.00	ELEC	280.000	280	9,327		10,400		19,727
Memo:	For new addition only.				GEN							
	CONDUCTORS & GROUNDING	1	LOT	21,300.00	ELEC	375.000	375	12,491		21,300		33,791
Memo:	For new addition only.				GEN							
	WIRING DEVICES & SPECIAL SYSTEMS	1	LOT	27,800.00	ELEC	50.000	50	1,666		27,800		29,466
Memo:	For new addition only.				GEN							
	INSTRUMENTATION & CONTROLS	1	LOT	830.00	ELEC	40.000	40	1,332		830	1,060	3,222
Memo:	For new addition only.				GEN							
	TESTING	1	LOT		ELEC	60.000	60	1,999				1,999
Memo:	For new addition only.				GEN							
	ELECTRICAL S/T						915	\$30,479		\$104,330	\$16,460	\$151,269
1.5.1	G&A/PIF ADDER											
00701000	G&A	1	LOT			0.000					361,392	361,392
	PIF	1	LOT			0.000					3,193,275	3,193,275
	G&A/PIF ADDER S/T						0				\$3,554,667	\$3,554,667
	PROJECT SUBTOTAL						224,358	\$35,569,107	\$1,085,223	\$11,921,599	\$24,800,927	\$73,376,856

Lockheed Martin Idaho Technologies Co.

Rev. 6/95

PROJECT NAME: WFS (FLUOR) - INTERIM STORAGE
FACILITY IN FPR - UNESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 2421FFPR
PREPARED BY: R. D. ADAMS

DATE: 28-Jan-1998
TIME: 09:10:03

REPORT NAME: Contingency Analysis

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. Frpm Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	11,425,000	12.80	20	35	2.56	4.48	3.777%	16.79%	3,367,032	14,792,032
1.1.2	TITLE III INSPECTION	2,856,400	3.20	20	30	0.64	0.96	0.800%	3.56%	713,392	3,569,792
1.2.1	PROJECT MANAGEMENT	7,998,000	8.96	20	35	1.79	3.14	2.644%	11.75%	2,357,070	10,355,070
1.2.2	CONSTRUCTION MANAGEMENT	5,712,900	6.40	20	30	1.28	1.92	1.600%	7.11%	1,426,808	7,139,708
1.3.1	GENERAL CONDITIONS	1,443,834	1.62	20	35	0.32	0.57	0.477%	2.12%	425,509	1,869,343
1.3.2	SITEWORK	2,816,665	3.16	20	40	0.63	1.26	1.073%	4.77%	956,716	3,773,381
1.3.3	CONCRETE	9,870,250	11.06	20	30	2.21	3.32	2.765%	12.29%	2,465,115	12,335,365
1.3.5	METALS	2,280,396	2.56	20	35	0.51	0.89	0.754%	3.35%	672,050	2,952,446
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0.26	20	30	0.05	0.08	0.064%	0.29%	57,501	287,735
1.3.8	DOORS & WINDOWS	64,695	0.07	20	20	0.01	0.01	0.012%	0.05%	10,341	75,036
1.3.9	FINISHES	352,187	0.39	20	35	0.08	0.14	0.116%	0.52%	103,792	455,979
1.3.13	SPECIAL CONSTRUCTION	32,405,842	36.31	20	20	7.26	7.26	5.810%	25.83%	5,179,792	37,585,634
1.3.14	CONVEYING SYSTEMS	7,156,751	8.02	20	25	1.60	2.00	1.644%	7.31%	1,465,679	8,622,430
1.3.15	MECHANICAL	266,810	0.30	20	30	0.06	0.09	0.075%	0.33%	66,636	333,446
1.3.16	ELECTRICAL	239,215	0.27	20	25	0.05	0.07	0.055%	0.24%	48,990	288,205
1.5.1	G&A/PIF ADDER	3,554,667	3.98	5	20	0.20	0.80	0.697%	3.10%	621,450	4,176,117
1.5.2	PROCUREMENT FEES	571,269	0.64	20	25	0.13	0.16	0.131%	0.58%	116,994	688,263
	ESCALATION	0	0.00	20	25	0.00	0.00	0.000%	0.00%	18	18
SUBTOTAL		89,245,115	100.00					22.494%			
CALCULATED CONTINGENCY		20,074,778									
RESULTANT TEC		109,319,893									
ROUNDED TEC		109,300,000									
PROJECT CONTINGENCY		20,054,885						22.47%			
MANAGEMENT RESERVE		6,125,282									
CONTINGENCY		13,929,603									
TOTAL ESTIMATED COST		109,300,000								20,054,885	109,300,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
Experimental/Special Conditions.....Up to 50%
Conceptual 15% -- 25%
Experimental/Special Conditions.....Up to 40%
TITLE I 10% -- 20%
TITLE II 5% -- 15%
TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

CONTINGENCY ANALYSIS

PROJECT NAME: WFS (FLUOR) - INTERIM STORAGE
 FACILITY IN FPR - ESCALATED
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
 PROJECT NO: 2421FFPR
 PREPARED BY: R. D. ADAMS

DATE: 28-Jan-1998
 TIME: 09:07:54

REPORT NAME: Contingency Analysis

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	11,425,000	8.56	20	35	1.71	3.00	2.526%	11.57%	3,365,798	14,790,798
1.1.2	TITLE III INSPECTION	2,856,400	2.14	20	30	0.43	0.64	0.535%	2.45%	713,130	3,569,530
1.2.1	PROJECT MANAGEMENT	7,998,000	6.00	20	35	1.20	2.10	1.769%	8.10%	2,356,206	10,354,206
1.2.2	CONSTRUCTION MANAGEMENT	5,712,900	4.28	20	30	0.86	1.28	1.071%	4.90%	1,426,285	7,139,185
1.3.1	GENERAL CONDITIONS	1,443,834	1.08	20	35	0.22	0.38	0.319%	1.46%	425,353	1,869,187
1.3.2	SITWORK	2,816,665	2.11	20	40	0.42	0.84	0.718%	3.29%	956,365	3,773,030
1.3.3	CONCRETE	9,870,250	7.40	20	30	1.48	2.22	1.850%	8.47%	2,464,211	12,334,461
1.3.5	METALS	2,280,396	1.71	20	35	0.34	0.60	0.504%	2.31%	671,803	2,952,199
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0.17	20	30	0.03	0.05	0.043%	0.20%	57,480	287,714
1.3.8	DOORS & WINDOWS	64,695	0.05	20	20	0.01	0.01	0.008%	0.04%	10,337	75,032
1.3.9	FINISHES	352,187	0.26	20	35	0.05	0.09	0.078%	0.36%	103,754	455,941
1.3.13	SPECIAL CONSTRUCTION	32,405,842	24.29	20	20	4.86	4.86	3.886%	17.80%	5,177,893	37,583,735
1.3.14	CONVEYING SYSTEMS	7,156,751	5.36	20	25	1.07	1.34	1.100%	5.04%	1,465,141	8,621,892
1.3.15	MECHANICAL	266,810	0.20	20	30	0.04	0.06	0.050%	0.23%	66,612	333,422
1.3.16	ELECTRICAL	239,215	0.18	20	25	0.04	0.04	0.037%	0.17%	48,972	288,187
1.5.1	G&A/PIF ADDER	3,554,667	2.66	5	20	0.13	0.53	0.466%	2.14%	621,222	4,175,889
1.5.2	PROCUREMENT FEES	571,269	0.43	20	25	0.09	0.11	0.088%	0.40%	116,951	688,220
	ESCALATION	44,165,559	33.10	20	25	6.62	8.28	6.787%	31.08%	9,041,813	53,207,372
SUBTOTAL		133,410,674	100.00					21.834%			
CALCULATED CONTINGENCY		29,128,718									
RESULTANT TEC		162,539,392									
ROUNDED TEC		162,500,000									
PROJECT CONTINGENCY		29,089,326						21.80%			
MANAGEMENT RESERVE		9,187,922									
CONTINGENCY		19,901,404									
TOTAL ESTIMATED COST		162,500,000								29,089,326	162,500,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

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PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

G&A/PIF ADDER CALCULATION SHEET

PROCUREMENT FEE:

CONSTRUCTION =	\$57,126,879	
GFE =	\$0	
Subtotal	\$57,126,879	
FEE @ 1% =	\$57,126,879 * 0.01 =	\$571,268.79

G&A @ 23% (with a ceiling of \$500,000 imposed per year)

CONSTRUCTION OR CEILING * 2 YEARS =	\$1,000,000	
GFE =	\$0	
PROCUREMENT FEE =	\$571,269	
Subtotal	\$1,571,269	
FEE @ 23% =	\$1,571,269 * 0.23 =	\$361,392

PIF @ 5.5%

CONSTRUCTION =	\$57,126,879	
GFE =	\$0	
PROCUREMENT FEE =	\$571,269	
G&A =	\$361,392	
Subtotal	\$58,059,540	
FEE @ 5.5% =	\$58,059,540 * 0.055 =	\$3,193,275

TOTAL PROCUREMENT FEE:	\$571,269
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TOTAL G&A FEE:	\$361,392
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TOTAL PIF:	\$3,193,275
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Lockheed Martin Idaho Technologies Co.

Rev. 5/96

PROJECT NAME: WTS(FLUOR) - INTERIM STORAGE
FACILITY IN FPR - OPC - ESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 242108
PREPARED BY: R. D. ADAMS
REPORT NAME: Cost Estimate Summary

DATE: 28-Jan-1998
TIME: 09:18:21
CHECKED BY: *[Signature]*
APPRD BY: *[Signature]*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> <u>\$3,170,604</u>
1.1.1	CONCEPTUAL DESIGN	2,856,400	314,204	3,170,604
1.2	<u>MANAGEMENT COSTS</u>			>> <u>\$4,500,604</u>
1.2.1	PM FOR PROJECT DEVELOPMENT	2,856,400	314,204	3,170,604
1.2.2	SAFETY REVIEWS	1,000,000	330,000	1,330,000
1.3	<u>PERMITTING</u>			>> <u>\$3,628,815</u>
1.3.1	PERMITTING	2,728,432	900,383	3,628,815
1.4	<u>TURNOVER</u>			>> <u>\$7,110,000</u>
1.4.1	SO TEST & STARTUP	4,500,000	2,610,000	7,110,000
1.5.2	PROCUREMENT FEES	0	0	>> <u>\$0</u>
	SUBTOTAL INCLUDING ESCALATION	13,941,232	4,468,791	>> \$18,410,023
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$4,589,977
	TOTAL ESTIMATED COST			>> \$23,000,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 30.00%

CONTINGENCY= 24.93%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: WTS(FLUOR) - INTERIM STORAGE
FACILITY IN FPR - OPC - UNESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 242108
PREPARED BY: R. D. ADAMS
REPORT NAME: Cost Estimate Summary

DATE: 28-Jan-1998
TIME: 09:16:07
CHECKED BY: *SW*
APPROD BY:

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
<u>1.1</u>	<u>DESIGN & DEVELOPMENT</u>			>> <u>\$2,856,400</u>
1.1.1	CONCEPTUAL DESIGN	2,856,400	0	2,856,400
<u>1.2</u>	<u>MANAGEMENT COSTS</u>			>> <u>\$3,856,400</u>
1.2.1	PM FOR PROJECT DEVELOPMENT	2,856,400	0	2,856,400
1.2.2	SAFETY REVIEWS	1,000,000	0	1,000,000
<u>1.3</u>	<u>PERMITTING</u>			>> <u>\$2,728,432</u>
1.3.1	PERMITTING	2,728,432	0	2,728,432
<u>1.4</u>	<u>TURNOVER</u>			>> <u>\$4,500,000</u>
1.4.1	SO TEST & STARTUP	4,500,000	0	4,500,000
1.5.2	PROCUREMENT FEES	0	0	>> <u>\$0</u>
	SUBTOTAL INCLUDING ESCALATION	13,941,232	0	>> \$13,941,232
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$3,458,768
	TOTAL ESTIMATED COST			>> \$17,400,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 40.00%

CONTINGENCY= 24.81%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **WTS(FLUOR) - INTERIM STORAGE**

FACILITY IN FPR - OPC

LOCATION 1: **INEEL/ICPP**

REQUESTOR: **J. K. RAWLINS**

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: **PLANNING**

PROJECT NO.: **242108**

PREPARED BY: **R. D. ADAMS**

PAGE # **1**

DATE **28-Jan-1998**

TIME: **09:15:03**

REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.1.1	CONCEPTUAL DESIGN											
	DESIGN	1	LOT		LIMITCO	0.000		2,856,400				2,856,400
	CONCEPTUAL DESIGN S/T						0	\$2,856,400				\$2,856,400
1.2.1	PM FOR PROJECT DEVELOPMENT ACDC/SOW, CPDS, PEP, DC/SOW & REVIEWS	1	LOT		LIMITCO	0.000		2,856,400				2,856,400
	PM FOR PROJECT DEVELOPMENT S/T						0	\$2,856,400				\$2,856,400
1.2.2	SAFETY REVIEWS PSAR & SAR	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SAFETY REVIEWS S/T						0	\$1,000,000				\$1,000,000
1.3.1	PERMITTING SITING AGREEMENT	1	LOT		Z-4170	640.000	640	48,512				48,512
	HWMA/RCRA PERMIT	1	LOT		Z-4170	6800.00	6,800	515,440				515,440
	PERMIT TO CONSTRUCT	1	LOT		Z-4170	3600.00	3,600	272,880				272,880
	CWA, STORM WATER, HISTORICAL, OTHER REG. COMPLIANCE	1	LOT		Z-4170	2000.00	2,000	151,600				151,600
	P.E. CERTIFICATION	1	LOT			0.000					40,000	40,000
	HEALTH & SAFETY ISSUES	1	LOT			0.000					1,200,000	1,200,000

Lockheed Martin Idaho Technologies Co.
Rev. 6/96
PROJECT NAME: WTS(FLUOR) - INTERIM STORAGE
FACILITY IN FPR - OPC
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET
TYPE OF ESTIMATE: PLANNING
PROJECT NO.: 242108
PREPARED BY: R. D. ADAMS

PAGE # 2
DATE 28-Jan-1998
TIME: 09:15:03
REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	PERMITTING QUALITY REVIEWS	1	LOT			0.000					500,000	500,000
	PERMITTING S/T						13,040	\$988,432			\$1,740,000	\$2,728,432
1.4.1	SO TEST & STARTUP											
	ORR	1	LOT			0.000		2,000,000				2,000,000
	SO TEST & TRAINING	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SO TEST & STARTUP S/T						0	\$3,000,000				\$3,000,000
1.4.1.1	PROJECT SUPPORT SUPPORT DURING DESIGN, CONSTRUCTION & STARTUP	1	LOT		LIMITCO	0.000		1,500,000				1,500,000
	PROJECT SUPPORT S/T						0	\$1,500,000				\$1,500,000
	PROJECT SUBTOTAL						13,040	\$12,201,232	\$0	\$0	\$1,740,000	\$13,941,232

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **WTS(FUOR) - INTERIM STORAGE
FACILITY IN FPR - OPC - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242108**
 PREPARED BY: **R. D. ADAMS**

DATE: **28-Jan-1998**
 TIME: **09:16:12**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	2,856,400	20.49	20	30	4.10	6.15	5.122%	20.49%	708,662	3,565,062
1.2.1	PM FOR PROJECT DEVELOPMENT	2,856,400	20.49	20	30	4.10	6.15	5.122%	20.49%	708,662	3,565,062
1.2.2	SAFETY REVIEWS	1,000,000	7.17	20	30	1.43	2.15	1.793%	7.17%	248,096	1,248,096
1.3.1	PERMITTING	2,728,432	19.57	20	30	3.91	5.87	4.893%	19.57%	676,914	3,405,346
1.4.1	SO TEST & STARTUP	4,500,000	32.28	20	30	6.46	9.68	8.070%	32.28%	1,116,433	5,616,433
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	0	0.00	20	30	0.00	0.00	0.000%	0.00%	1	1
SUBTOTAL		13,941,232	100.00					25.000%			
CALCULATED CONTINGENCY		3,485,308									
RESULTANT TEC		17,426,540									
ROUNDED TEC		17,400,000									
PROJECT CONTINGENCY		3,458,768						24.81%			
MANAGEMENT RESERVE		0									
CONTINGENCY		3,458,768									
TOTAL ESTIMATED COST		17,400,000								3,458,768	17,400,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **WTS(FLUOR) - INTERIM STORAGE
FACILITY IN FPR - OPC - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242108**
 PREPARED BY: **R. D. ADAMS**

DATE: **28-Jan-1998**
 TIME: **09:18:28**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	2,856,400	15.52	20	30	3.10	4.65	3.879%	15.52%	712,156	3,568,556
1.2.1	PM FOR PROJECT DEVELOPMENT	2,856,400	15.52	20	30	3.10	4.65	3.879%	15.52%	712,156	3,568,556
1.2.2	SAFETY REVIEWS	1,000,000	5.43	20	30	1.09	1.63	1.358%	5.43%	249,319	1,249,319
1.3.1	PERMITTING	2,728,432	14.82	20	30	2.96	4.45	3.705%	14.82%	680,251	3,408,683
1.4.1	SO TEST & STARTUP	4,500,000	24.44	20	30	4.89	7.33	6.111%	24.44%	1,121,938	5,621,938
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	4,468,791	24.27	20	30	4.85	7.28	6.068%	24.27%	1,114,157	5,582,948
SUBTOTAL		18,410,023	100.00					25.000%			
CALCULATED CONTINGENCY		4,602,506									
RESULTANT TEC		23,012,529									
ROUNDED TEC		23,000,000									
PROJECT CONTINGENCY		4,589,977						24.93%			
MANAGEMENT RESERVE		0									
CONTINGENCY		4,589,977									
TOTAL ESTIMATED COST		23,000,000								4,589,977	23,000,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE III/AFC Market Conditions

**WTS (FLUOR)
INTERIM STORAGE FACILITY IN FPR**

Project: 2421-WTS.MPP
Date: Wed 1/28/98

Task

Summary

Rolled Up Progress

Progress

Rolled Up Task

Milestone

Rolled Up Milestone

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: <u>TRU-IS IN FPR</u>	Estimator: <u>R. D. Adams</u>
Date: <u>1/28/98</u>	File: <u>2421-TFPR PLANNING</u>
Approved By: <u>[Signature]</u>	

I. SCOPE OF WORK: *Brief description of the proposed project.*

This facility will unload, store in vertical tubes and load out canisters containing High Level Waste (HLW) from the proposed TRU Separations – Class A Grout Option.

II. BASIS OF THE ESTIMATE: *Drawings, Design Report, Engineers Notes and/or other documentation upon which the estimate is originated.*

Draft sketches, a draft EDF, information from WINCO estimate 93108 and the SNF Canister Storage Building Final Design Estimate from Fluor Daniel Northwest, Inc. were used as the basis for this estimate.

III. ASSUMPTIONS: *Conditions statements accepted or supposed true without proof of demonstration. An assumption has a direct impact on total estimated cost.*

1. The Interim Storage Facility will be located within 100 feet of the TRU grouting facility.
2. Rock will not be encountered during excavation.
3. The estimates include both present day costs summaries and contingency analysis and escalated summaries and contingency analysis. The escalated summaries and contingency analysis reflect the attached schedule. All activities are escalated to the appropriate schedule mid-point.
4. FPR will have to be brought up to life safety code as reflected in estimate 93108. It is assumed that the same materials and equipment available in storage for FPR when estimate was done are still available.
5. Most quantities used for this estimate were obtained by preliminary take offs from the draft sketches.
6. The storage tube costs, gantry crane cost and associated rail system costs were used from the Fluor estimate of a facility which is approximately eighty percent complete.
7. All assumptions and information included in the draft "New Interim Storage Facility for Interim Storage of HLW" apply to the estimate.
8. Where quantities could not be determined from the draft sketches, factors or the estimator used assumed quantities.
9. Sufficient construction craft will be available to support this project.

COST ESTIMATE SUPPORT DATA RECAPITULATIONProject Title: TRU-IS IN FPREstimator: R. D. AdamsDate: 1/28/98File: 2421-TFPR PLANNING

Approved By: _____

10. Markups on direct construction costs to get the construction costs listed on the summary sheet are as follows:

Labor indirects, overheads and profit(OH&P) 50% of labor
Material & equipment OH&P 5% of material and equipment
Subcontract OH&O 10% of subcontract cost
Construction equipment allowance 10% of labor
NQA-1 quality requirements 30% of material
DOE/RW/0333P quality requirements 10% of material
Subcontractor procurement 1% of material and equipment
Bond 2% of everything

12. The below grade railroad track within the railroad access structure to the WTS Interim Storage Facility is included in this estimate the remainder of the branch line is included in the infrastructure estimate.

13. All utilities are assumed to be available at the facility wall.

14. The concrete that is removed from the existing FPR structure will be cut into blocks by diamond wire cutting or similar method. It will not be rubblized with the building

IV. **CONTINGENCY GUIDELINE IMPLEMENTATION:** *The percentage used for contingency as determined by the contingency allowance guidelines can be altered to reflect the type of construction and conditions that may impact the total estimated cost.*

A large portion of the estimated costs is based on actual costs from Fluor's SNF Canister Storage Building. The majority of the remaining costs are for standard construction activities. The activities involved with locating this structure inside an existing building carry a higher contingency than the standard construction tasks. For these reasons, the contingency is lower than would be experienced for a processing type facility at this stage of development.

V. **OTHER COMMENTS/CONCERNS SPECIFIC TO THE ESTIMATE:**

1. All FY'98 and later projects are to be assessed a Procurement Fee of 1%, a G&A Fee of 23%, with a \$500,000 ceiling per year, and a Performance Incentive Fee (PIF) of 5.5%. See the attached G&A/PIF calculation sheet for the method used to calculate these fees.

2. A procurement fee of one percent of construction was used to cover the operating contractor support to DOE-ID for their contract administration. It is felt that one percent is sufficient for jobs of this size.

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: **TRU CLASS A GROUT - INTERIM STORAGE
FACILITY IN FPR - ESCALATED
INEEL/ICPP**
 LOCATION 1:
 REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-TFPR**
 PREPARED BY: **R. D. ADAMS**
 REPORT NAME: **Cost Estimate Summary**

DATE: **28-Jan-1998**
 TIME: **09:36:22**
 CHECKED BY: *SMW*
 APPRD BY: *bat*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$17,515,120
1.1.1	DESIGN ENGINEERING TITLE I & II	9,882,000	4,051,620	13,933,620
1.1.2	TITLE III INSPECTION	2,470,000	1,111,500	3,581,500
1.2	<u>MANAGEMENT COSTS</u>			>> \$17,193,810
1.2.1	PROJECT MANAGEMENT	6,917,000	3,112,650	10,029,650
1.2.2	CONSTRUCTION MANAGEMENT	4,940,800	2,223,360	7,164,160
1.3	<u>CONSTRUCTION</u>			>> \$71,641,308
1.3.1	GENERAL CONDITIONS	1,299,960	584,982	1,884,942
1.3.2	SITWORK	2,797,124	1,258,706	4,055,830
1.3.3	CONCRETE	9,782,042	4,401,919	14,183,961
1.3.5	METALS	1,868,228	840,702	2,708,930
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	103,605	333,839
1.3.8	DOORS & WINDOWS	64,695	29,113	93,808
1.3.9	FINISHES	316,869	142,591	459,460
1.3.13	SPECIAL CONSTRUCTION	25,385,871	11,423,642	36,809,513
1.3.14	CONVEYING SYSTEMS	7,156,751	3,220,538	10,377,289
1.3.15	MECHANICAL	266,810	120,064	386,874
1.3.16	ELECTRICAL	239,215	107,647	346,862
1.5	<u>G&A/PIF</u>			>> \$4,505,354
1.5.1	G&A/PIF ADDER	3,107,141	1,398,213	4,505,354
1.5.2	PROCUREMENT FEES	494,078	222,335	>> \$716,413
SUBTOTAL INCLUDING ESCALATION		77,218,818	34,353,187	>> \$111,572,005
PROJECT CONTINGENCY				
MANAGEMENT RESERVE				>> \$7,686,308
CONTINGENCY				>> \$16,941,687
TOTAL ESTIMATED COST				>> \$136,200,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 24.00%

CONTINGENCY= 22.07%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **TRU CLASS A GROUT - INTERIM STORAGE
FACILITY IN FPR - UNESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **2421-TFPR**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **28 Jan-1998**
TIME: **09:33:24**
CHECKED BY: **JNW**
APPR'D BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$12,352,000
1.1.1	DESIGN ENGINEERING TITLE I & II	9,882,000	0	9,882,000
1.1.2	TITLE III INSPECTION	2,470,000	0	2,470,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$11,857,800
1.2.1	PROJECT MANAGEMENT	6,917,000	0	6,917,000
1.2.2	CONSTRUCTION MANAGEMENT	4,940,800	0	4,940,800
1.3	<u>CONSTRUCTION</u>			>> \$49,407,799
1.3.1	GENERAL CONDITIONS	1,299,960	0	1,299,960
1.3.2	SITWORK	2,797,124	0	2,797,124
1.3.3	CONCRETE	9,782,042	0	9,782,042
1.3.5	METALS	1,868,228	0	1,868,228
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0	230,234
1.3.8	DOORS & WINDOWS	64,695	0	64,695
1.3.9	FINISHES	316,869	0	316,869
1.3.13	SPECIAL CONSTRUCTION	25,385,871	0	25,385,871
1.3.14	CONVEYING SYSTEMS	7,156,751	0	7,156,751
1.3.15	MECHANICAL	266,810	0	266,810
1.3.16	ELECTRICAL	239,215	0	239,215
1.5	<u>G&A/PIF</u>			>> \$3,107,141
1.5.1	G&A/PIF ADDER	3,107,141	0	3,107,141
1.5.2	PROCUREMENT FEES	494,078	0	>> \$494,078
	SUBTOTAL INCLUDING ESCALATION	77,218,818	0	>> \$77,218,818
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$5,300,902
	CONTINGENCY			>> \$12,280,280
	TOTAL ESTIMATED COST			>> \$94,800,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 25.00%

CONTINGENCY= 22.77%

Rev. 6/96

PROJECTNAME: THE SEASIDE CEMETERY
FACILITY IN FPR

REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-TFPR**
PREPARED BY: **R. D. ADAMS**

DATE 28-Jan-1998

TIME: 09:31:59

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-TFPR

PREPARED BY: R. D. ADAMS

PAGE # 2

DATE 28-Jan-1998

TIME: 09:31:59

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

Lockheed Martin Idaho Technologies Co.

DETAILED COST ESTIMATE SHEET

PAGE # 3

Rev. 6/96
PROJECT NAME: TRU CLASS A GROUT - INTERIM STORAGE
FACILITY IN FPR
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
PROJECT NO.: 2421-TFPR
PREPARED BY: R. D. ADAMS

DATE 28-Jan-1998
TIME: 09:31:59
REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.2.1	DEMOLITION SAWCUT AND REMOVE REINFORCED CONCRETE WLLS, SLABS	18,300	CF		SKWK GEN	1.500	27,450	908,870	549,000			1,457,870
	DEMOLITION S/T						30,900	\$1,023,099	\$581,000			\$1,604,099
1.3.3	CONCRETE											
	TUNNEL CONCRETE	1,360	CY	126.10	SKWK GEN	12.300	16,728	553,864	34,340	171,496		759,700
	RR STRUCTURE CONCRETE	8,300	CY	126.10	SKWK GEN	12.300	102,090	3,380,200	209,575	1,046,630		4,636,405
	BUILDING CONCRETE	630	CY	126.10	SKWK GEN	12.300	7,749	256,569	15,908	79,443		351,920
	HATCH PLUGS - ALLOW	3	EA		GEN	0.000					225,000	225,000
	PLUG ALL PENETRATIONS INTO VAULT AREA - ALLOW	1	LOT	20,000.00	SKWK GEN	1000.00	1,000	33,110		20,000		53,110
	CONCRETE S/T						127,567	\$4,223,743	\$259,823	\$1,317,569	\$225,000	\$6,026,135
1.3.5	METALS											
	TUBE SUPPORT FRAME	30	TON	2,500.00	IRON GEN	100.000	3,000	110,430		75,000		185,430
	FLOOR LEVELING FRAME	40	TON	2,000.00	IRON GEN	20.000	800	29,448		80,000		109,448
	SPACERS & PEDESTALS - ALLOW	10	TON	2,000.00	IRON GEN	50.000	500	18,405		20,000		38,405
	BUILDING STRUCTURAL STEEL	150	TON	1,200.00	IRON GEN	10.000	1,500	55,215		180,000		235,215
	GANTRY CRANE RAILS, EMBEDS, ETC.	580	LF	161.00	IRON GEN	3.850	2,233	82,197		93,380		175,577
	RAILROAD TRACKS - WITHIN STRUCTURE	2,000	LF	92.00	IRON GEN	2.000	4,000	147,240		184,000		331,240

Rev. 6/96

FACILITY IN FPR

ICATION 1: INEEL/ICPP

QUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-TFPR

PREPARED BY: R. D. ADAMS

DATE 28-Jan-1998

TIME: 09:31:59

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

Rev. 6/96

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-TFPR**
PREPARED BY: **R. D. ADAMS**

DATE 28-Jan-1998
TIME: 09:31:59

REPORT NAME: **Detail Cost Estimate Sheet**

[illegible]

PROJECT NAME: TRU CLASS A GROUT - INTERIM STORAGE

FACILITY IN FPR

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-TFPR

PREPARED BY: R. D. ADAMS

PAGE # 6

DATE 28-Jan-1998

TIME: 09:31:59

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
3.16	ELECTRICAL											
	SWITCHGEAR AND TRANSFORMERS	1	LOT	44,000.00	ELEC	110.000	110	3,664		44,000		47,664
Memo:	For new addition only.				GEN							
	LIGHTING	5,600	SF		ELEC	0.000					15,400	15,400
Memo:	For new addition only.				GEN							
	RACEWAYS & ENCLOSURES	1	LOT	10,400.00	ELEC	280.000	280	9,327		10,400		19,727
Memo:	For new addition only.				GEN							
	CONDUCTORS & GROUNDING	1	LOT	21,300.00	ELEC	375.000	375	12,491		21,300		33,791
Memo:	For new addition only.				GEN							
	WIRING DEVICES & SPECIAL SYSTEMS	1	LOT	27,800.00	ELEC	50.000	50	1,666		27,800		29,466
Memo:	For new addition only.				GEN							
	INSTRUMENTATION & CONTROLS	1	LOT	830.00	ELEC	40.000	40	1,332		830	1,060	3,222
Memo:	For new addition only.				GEN							
	TESTING	1	LOT		ELEC	60.000	60	1,999				1,999
Memo:	For new addition only.				GEN							
	ELECTRICAL S/T						915	\$30,479		\$104,330	\$16,460	\$151,269
4.5.1	G&A/PIF ADDER											
00701000	G&A	1	LOT			0.000					343,638	343,638
	PIF	1	LOT			0.000					2,763,503	2,763,503
	G&A/PIF ADDER S/T						0				\$3,107,141	\$3,107,141
	PROJECT SUBTOTAL						202,638	\$31,000,449	\$1,085,223	\$7,987,099	\$24,348,401	\$64,421,171

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: TRU CLASS A GROUT - INTERIM STORAGE
 FACILITY IN FPR - UNESCALATED
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: PLANNING
 PROJECT NO: 2421-TFPR
 PREPARED BY: R. D. ADAMS

DATE: 28-Jan-1998
 TIME: 09:33:30

REPORT NAME: Contingency Analysis

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	9,882,000	12.80	20	35	2.56	4.48	3.775%	16.57%	2,913,655	12,795,655
1.1.2	TITLE III INSPECTION	2,470,000	3.20	20	30	0.64	0.96	0.800%	3.51%	617,175	3,087,175
1.2.1	PROJECT MANAGEMENT	6,917,000	8.96	20	35	1.79	3.14	2.643%	11.60%	2,039,440	8,956,440
1.2.2	CONSTRUCTION MANAGEMENT	4,940,800	6.40	20	30	1.28	1.92	1.600%	7.02%	1,234,549	6,175,349
1.3.1	GENERAL CONDITIONS	1,299,960	1.68	20	35	0.34	0.59	0.497%	2.18%	383,286	1,683,246
1.3.2	SITWORK	2,797,124	3.62	20	40	0.72	1.45	1.232%	5.41%	950,521	3,747,645
1.3.3	CONCRETE	9,782,042	12.67	20	30	2.53	3.80	3.167%	13.90%	2,444,222	12,226,264
1.3.5	METALS	1,868,228	2.42	20	35	0.48	0.85	0.714%	3.13%	550,837	2,419,065
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0.30	20	30	0.06	0.09	0.075%	0.33%	57,528	287,762
1.3.8	DOORS & WINDOWS	64,695	0.08	20	20	0.02	0.02	0.013%	0.06%	10,346	75,041
1.3.9	FINISHES	316,869	0.41	20	35	0.08	0.14	0.121%	0.53%	93,427	410,296
1.3.13	SPECIAL CONSTRUCTION	25,385,871	32.88	20	20	6.58	6.58	5.260%	23.09%	4,059,600	29,445,471
1.3.14	CONVEYING SYSTEMS	7,156,751	9.27	20	25	1.85	2.32	1.900%	8.34%	1,466,361	8,623,112
1.3.15	MECHANICAL	266,810	0.35	20	30	0.07	0.10	0.086%	0.38%	66,667	333,477
1.3.16	ELECTRICAL	239,215	0.31	20	25	0.06	0.08	0.064%	0.28%	49,013	288,228
1.5.1	G&A/PIF ADDER	3,107,141	4.02	5	20	0.20	0.80	0.704%	3.09%	543,463	3,650,604
1.5.2	PROCUREMENT FEES	494,078	0.64	20	25	0.13	0.16	0.131%	0.58%	101,233	595,311
	ESCALATION	0	0.00	20	25	0.00	0.00	0.000%	0.00%	(141)	(141)
SUBTOTAL		77,218,818	100.00					22.780%			
CALCULATED CONTINGENCY		17,590,590									
RESULTANT TEC		94,809,408									
ROUNDED TEC		94,800,000									
PROJECT CONTINGENCY		17,581,182						22.77%			
MANAGEMENT RESERVE		5,300,902									
CONTINGENCY		12,280,280									
TOTAL ESTIMATED COST		94,800,000								17,581,182	94,800,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90% probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

CONTINGENCY ANALYSIS

PROJECT NAME: TRU CLASS A GROUT - INTERIM STORAGE
 FACILITY IN FPR - ESCALATED
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
 PROJECT NO: 2421-TFPR
 PREPARED BY: R. D. ADAMS

DATE: 28-Jan-1998
 TIME: 09:36:28

REPORT NAME: Contingency Analysis

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	9,882,000	8.86	20	35	1.77	3.10	2.613%	11.47%	2,824,795	12,706,795
1.1.2	TITLE III INSPECTION	2,470,000	2.21	20	30	0.44	0.66	0.553%	2.43%	598,352	3,068,352
1.2.1	PROJECT MANAGEMENT	6,917,000	6.20	20	35	1.24	2.17	1.829%	8.03%	1,977,242	8,894,242
1.2.2	CONSTRUCTION MANAGEMENT	4,940,800	4.43	20	30	0.89	1.33	1.107%	4.86%	1,196,899	6,137,699
1.3.1	GENERAL CONDITIONS	1,299,960	1.17	20	35	0.23	0.41	0.344%	1.51%	371,597	1,671,557
1.3.2	SITWORK	2,797,124	2.51	20	40	0.50	1.00	0.852%	3.74%	921,533	3,718,657
1.3.3	CONCRETE	9,782,042	8.77	20	30	1.75	2.63	2.192%	9.62%	2,369,680	12,151,722
1.3.5	METALS	1,868,228	1.67	20	35	0.33	0.59	0.494%	2.17%	534,038	2,402,266
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0.21	20	30	0.04	0.06	0.052%	0.23%	55,774	286,008
1.3.8	DOORS & WINDOWS	64,695	0.06	20	20	0.01	0.01	0.009%	0.04%	10,030	74,725
1.3.9	FINISHES	316,869	0.28	20	35	0.06	0.10	0.084%	0.37%	90,578	407,447
1.3.13	SPECIAL CONSTRUCTION	25,385,871	22.75	20	20	4.55	4.55	3.640%	15.98%	3,935,792	29,321,663
1.3.14	CONVEYING SYSTEMS	7,156,751	6.41	20	25	1.28	1.60	1.315%	5.77%	1,421,641	8,578,392
1.3.15	MECHANICAL	266,810	0.24	20	30	0.05	0.07	0.060%	0.26%	64,634	331,444
1.3.16	ELECTRICAL	239,215	0.21	20	25	0.04	0.05	0.044%	0.19%	47,518	286,733
1.5.1	G&A/PIF ADDER	3,107,141	2.78	5	20	0.14	0.56	0.487%	2.14%	526,889	3,634,030
1.5.2	PROCUREMENT FEES	494,078	0.44	20	25	0.09	0.11	0.091%	0.40%	98,145	592,223
	ESCALATION	34,353,187	30.79	20	25	6.16	7.70	6.312%	27.71%	7,582,858	41,936,045
SUBTOTAL		111,572,005	100.00					22.078%			
CALCULATED CONTINGENCY		24,632,993									
RESULTANT TEC		136,204,998									
ROUNDED TEC		136,200,000									
PROJECT CONTINGENCY		24,627,995						22.07%			
MANAGEMENT RESERVE		7,686,308									
CONTINGENCY		16,941,687									
TOTAL ESTIMATED COST		136,200,000								24,627,995	136,200,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

G&A/PIF ADDER CALCULATION SHEET

PROCUREMENT FEE:

CONSTRUCTION =	\$49,407,799	
GFE =	\$0	
Subtotal	\$49,407,799	
FEE @ 1% =	\$49,407,799 * 0.01 =	\$494,077.99

G&A @ 23% (with a ceiling of \$500,000 imposed per year)

CONSTRUCTION OR CEILING * 2 YEARS =	\$1,000,000	
GFE =	\$0	
PROCUREMENT FEE =	\$494,078	
Subtotal	\$1,494,078	
FEE @ 23% =	\$1,494,078 * 0.23 =	\$343,638

PIF @ 5.5%

CONSTRUCTION =	\$49,407,799	
GFE =	\$0	
PROCUREMENT FEE =	\$494,078	
G&A =	\$343,638	
Subtotal	\$50,245,515	
FEE @ 5.5% =	\$50,245,515 * 0.055 =	\$2,763,503

TOTAL PROCUREMENT FEE:	\$494,078
TOTAL G&A FEE:	\$343,638
TOTAL PIF:	\$2,763,503

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: TRU - INTERIM STORAGE
FACILITY IN FPR - OPC - ESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 242107
PREPARED BY: R. D. ADAMS
REPORT NAME: Cost Estimate Summary

DATE: 28-Jan-1998
TIME: 09:40:14

CHECKED BY: *SW*
APPR'D BY: *SW*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> <u>\$3,013,400</u>
1.1.1	CONCEPTUAL DESIGN	2,470,000	543,400	3,013,400
1.2	<u>MANAGEMENT COSTS</u>			>> <u>\$4,343,400</u>
1.2.1	PM FOR PROJECT DEVELOPMENT	2,470,000	543,400	3,013,400
1.2.2	SAFETY REVIEWS	1,000,000	330,000	1,330,000
1.3	<u>PERMITTING</u>			>> <u>\$3,628,815</u>
1.3.1	PERMITTING	2,728,432	900,383	3,628,815
1.4	<u>TURNOVER</u>			>> <u>\$6,930,000</u>
1.4.1	SO TEST & STARTUP	4,500,000	2,430,000	6,930,000
1.5.2	PROCUREMENT FEES	0	0	>> <u>\$0</u>
	SUBTOTAL INCLUDING ESCALATION	13,168,432	4,747,183	>> \$17,915,615
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$4,484,385
	TOTAL ESTIMATED COST			>> \$22,400,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 29.00%

CONTINGENCY= 25.03%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: **TRU - INTERIM STORAGE
FACILITY IN FPR - OPC - UNESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **242107**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **28-Jan-1998**
TIME: **09:38:20**
CHECKED BY: **SNW**

APPR'D BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> \$2,470,000
1.1.1	CONCEPTUAL DESIGN	2,470,000	0	2,470,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$3,470,000
1.2.1	PM FOR PROJECT DEVELOPMENT	2,470,000	0	2,470,000
1.2.2	SAFETY REVIEWS	1,000,000	0	1,000,000
1.3	<u>PERMITTING</u>			>> \$2,728,432
1.3.1	PERMITTING	2,728,432	0	2,728,432
1.4	<u>TURNOVER</u>			>> \$4,500,000
1.4.1	SO TEST & STARTUP	4,500,000	0	4,500,000
1.5.2	PROCUREMENT FEES	0	0	>> \$0
	SUBTOTAL INCLUDING ESCALATION	13,168,432	0	>> \$13,168,432
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$3,331,568
	TOTAL ESTIMATED COST			>> \$16,500,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= **34.00%**

CONTINGENCY= **25.30%**

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: TRU - INTERIM STORAGE

FACILITY IN FPR - OPC

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 242107

PREPARED BY: R. D. ADAMS

PAGE # 1

DATE 28-Jan-1998

TIME: 09:37:28

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.1.1	CONCEPTUAL DESIGN											
	DESIGN	1	LOT		LMITCO	0.000		2,470,000				2,470,000
	CONCEPTUAL DESIGN S/T						0	\$2,470,000				\$2,470,000
1.2.1	PM FOR PROJECT DEVELOPMENT ACDC/SOW, CPDS, PEP, DC/SOW & REVIEWS	1	LOT		LMITCO	0.000		2,470,000				2,470,000
	PM FOR PROJECT DEVELOPMENT S/T						0	\$2,470,000				\$2,470,000
1.2.2	SAFETY REVIEWS PSAR & SAR	1	LOT		LMITCO	0.000		1,000,000				1,000,000
	SAFETY REVIEWS S/T						0	\$1,000,000				\$1,000,000
1.3.1	PERMITTING SITING AGREEMENT	1	LOT		Z-4170	640.000	640	48,512				48,512
	HWMA/RCRA PERMIT	1	LOT		Z-4170	6800.00	6,800	515,440				515,440
	PERMIT TO CONSTRUCT	1	LOT		Z-4170	3600.00	3,600	272,880				272,880
	CWA, STORM WATER, HISTORICAL, OTHER REG. COMPLIANCE	1	LOT		Z-4170	2000.00	2,000	151,600				151,600
	P.E. CERTIFICATION	1	LOT			0.000					40,000	40,000
	HEALTH & SAFETY ISSUES	1	LOT			0.000					1,200,000	1,200,000

PROJECT NAME: TRU - INTERIM STORAGE

FACILITY IN FPR - OPC

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 242107

PREPARED BY: R. D. ADAMS

PAGE # 2

DATE 28-Jan-1998

TIME: 09:37:28

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
L3.1	<u>PERMITTING</u> QUALITY REVIEWS	1	LOT			0.000					500,000	500,000
	PERMITTING S/T						13,040	\$988,432			\$1,740,000	\$2,728,432
L4.1	<u>SO TEST & STARTUP</u>											
	ORR	1	LOT			0.000		2,000,000				2,000,000
	SO TEST & TRAINING	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SO TEST & STARTUP S/T						0	\$3,000,000				\$3,000,000
L4.1.1	<u>PROJECT SUPPORT</u> SUPPORT DURING DESIGN, CONSTRUCTION & STARTUP	1	LOT		LIMITCO	0.000		1,500,000				1,500,000
	PROJECT SUPPORT S/T						0	\$1,500,000				\$1,500,000
	PROJECT SUBTOTAL						13,040	\$11,428,432	\$0	\$0	\$1,740,000	\$13,168,432

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **TRU - INTERIM STORAGE
FACILITY IN FPR - OPC - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242107**
 PREPARED BY: **R. D. ADAMS**

DATE: **28-Jan-1998**
 TIME: **09:38:26**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	2,470,000	18.76	20	30	3.75	5.63	4.689%	18.76%	624,902	3,094,902
1.2.1	PM FOR PROJECT DEVELOPMENT	2,470,000	18.76	20	30	3.75	5.63	4.689%	18.76%	624,902	3,094,902
1.2.2	SAFETY REVIEWS	1,000,000	7.59	20	30	1.52	2.28	1.898%	7.59%	252,997	1,252,997
1.3.1	PERMITTING	2,728,432	20.72	20	30	4.14	6.22	5.180%	20.72%	690,284	3,418,716
1.4.1	SO TEST & STARTUP	4,500,000	34.17	20	30	6.83	10.25	8.543%	34.17%	1,138,485	5,638,485
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	0	0.00	20	30	0.00	0.00	0.000%	0.00%	(2)	(2)
SUBTOTAL		13,168,432	100.00					25.000%			
CALCULATED CONTINGENCY		3,292,108									
RESULTANT TEC		16,460,540									
ROUNDED TEC		16,500,000									
PROJECT CONTINGENCY		3,331,568						25.30%			
MANAGEMENT RESERVE		0									
CONTINGENCY		3,331,568									
TOTAL ESTIMATED COST		16,500,000								3,331,568	16,500,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE III/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

CONTINGENCY ANALYSIS

PROJECT NAME: TRU - INTERIM STORAGE
 FACILITY IN FPR - OPC - ESCALATED
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
 PROJECT NO: 242107
 PREPARED BY: R. D. ADAMS

DATE: 28-Jan-1998
 TIME: 09:40:20

REPORT NAME: Contingency Analysis

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	2,470,000	13.79	20	30	2.76	4.14	3.447%	13.79%	618,256	3,088,256
1.2.1	PM FOR PROJECT DEVELOPMENT	2,470,000	13.79	20	30	2.76	4.14	3.447%	13.79%	618,256	3,088,256
1.2.2	SAFETY REVIEWS	1,000,000	5.58	20	30	1.12	1.67	1.395%	5.58%	250,306	1,250,306
1.3.1	PERMITTING	2,728,432	15.23	20	30	3.05	4.57	3.807%	15.23%	682,943	3,411,375
1.4.1	SO TEST & STARTUP	4,500,000	25.12	20	30	5.02	7.54	6.279%	25.12%	1,126,377	5,626,377
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	4,747,183	26.50	20	30	5.30	7.95	6.624%	26.50%	1,188,247	5,935,430
SUBTOTAL		17,915,615	100.00					25.000%			
CALCULATED CONTINGENCY		4,478,904									
RESULTANT TEC		22,394,519									
ROUNDED TEC		22,400,000									
PROJECT CONTINGENCY		4,484,385						25.03%			
MANAGEMENT RESERVE		0									
CONTINGENCY		4,484,385									
TOTAL ESTIMATED COST		22,400,000								4,484,385	22,400,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE II/AFC Market Conditions

**TRU CLASS A GROUT
INTERIM STORAGE FACILITY IN FPR**

Project: 2421-IFPR.MPP
Date: Wed 1/28/98

Task

Summary

Rolled Up Progress

Progress

Rolled Up Task

Milestone

Rolled Up Milestone

COST ESTIMATE SUPPORT DATA RECAPITULATION

Project Title: HLW INTERIM STORAGE FACILITY IN FPR - HWO
Type of Estimate: PROJECT SUPPORT
File No: 2421-FPR

Estimator: RDA
Date: 1/28/98
Approved By: RDA

I. SCOPE OF WORK: *Brief description of the proposed project.*

This facility will unload, store in vertical tubes and load out canisters containing High Level Waste (HLW) from the proposed Hot Isokinetic Press Waste Option (HWO).

II. BASIS OF THE ESTIMATE: *Drawings, Design Report, Engineers notes, and/or other documentation upon which the estimate is originated.*

Draft sketches, a draft EDF, and the SNF Canister Storage Building Final Design Estimate from Fluor Daniel Northwest, Inc. were used as the basis for this estimate.

III. ASSUMPTIONS: *Condition statements accepted or supposed true without proof or demonstration. An assumption has a direct impact on total estimated cost.*

1. The Interim Storage Facility will be located within 100 feet of the HWO facility.
2. Rock will not be encountered during excavation.
3. The estimates include both present day costs summaries and contingency analysis and escalated summaries and contingency analysis. The escalated summaries and contingency analysis reflect the attached schedule. All activities are escalated to the appropriate schedule mid-point.
4. FPR will have to be brought up to life safety code as reflected in estimate 93108. It is assumed that the same materials and equipment available in storage for FPR when estimate was done are still available.
5. Most quantities used for this estimate were obtained by preliminary take offs from the draft sketches.
6. The storage tube costs, gantry crane cost and associated rail system costs were used from the Fluor estimate of a facility which is approximately eighty percent complete.
7. All assumptions and information included in the draft "New Interim Storage Facility for Interim Storage of HLW" apply to the estimate.
8. Where quantities could not be determined from the draft sketches, factors or assumed quantities were used by the estimator.
9. Since the storage tubes and conveying equipment represent such a large percentage of this facility's cost, lower design, inspection, Project Management and turnover costs are used in the estimate.
10. Sufficient construction craft will be available to support this project.
11. Markups on direct construction costs to get the construction costs listed on the summary sheet are as follows:

Labor indirects, overheads and profit (OH&P)	50% of labor
Material & equipment OH&P	5% of material and equipment
Subcontract OH&O	10% of subcontract cost
Construction equipment allowance	10% of labor
NQA-1 quality requirements	30% of material
DOE/RW/0333P quality requirements	10% of material
Subcontractor procurement	1% of material and equipment
Bond	2% of everything

**COST ESTIMATE SUPPORT DATA RECAPITULATION
(CONTINUATION)**

File No: 2396

Page 2 of 2

III. **ASSUMPTIONS:** (Continued)

12. Only the railroad track within the storage facility is included in this estimate. The remainder of the branch line is included in the infrastructure estimate.
13. All utilities are assumed to be available at the facility wall.
14. The concrete that is removed from the existing FPR structure will be cut into blocks by diamond wire cutting or similar method. It will not be rubblized with the building.

IV. **CONTINGENCY GUIDELINE IMPLEMENTATION:** *The percentage used for contingency as determined by the contingency allowance guidelines can be altered to reflect the type of construction and conditions that may impact the total estimated cost.*

A large portion of the estimated costs is based on actual costs from Fluor's SNF Canister Storage Building. The majority of the remaining costs are for standard construction activities. For these reasons, the contingency is lower than would be experienced for a processing type facility at this stage of development.

V. **OTHER COMMENTS/CONCERNS SPECIFIC TO THE ESTIMATE:**

1. All FY'98 and later projects are to be assessed a Procurement Fee of 1%, a G&A Fee of 23%, with a \$500,000 ceiling per year, and a Performance Incentive Fee (PIF) of 5.5%. See the attached G&A/PIF calculation sheet for the method used to calculate these fees.
2. A procurement fee of one percent of construction was used to cover the operating contractor support to DOE-ID for their contract administration. It is felt that one percent is sufficient for jobs of this size.

Lockheed Martin Idaho Technologies Co.
Rev. 6/96

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY IN FPR - ESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **2421-FPR**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **28-Jan-1998**
TIME: **08:45:22**
CHECKED BY: **SNP**
APPR'D BY: **RA**

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$32,267,343
1.1.1	DESIGN ENGINEERING TITLE I & II	18,000,000	5,220,000	23,220,000
1.1.2	TITLE III INSPECTION	6,603,900	2,443,443	9,047,343
1.2	<u>MANAGEMENT COSTS</u>			>> \$42,687,579
1.2.1	PROJECT MANAGEMENT	18,491,000	6,102,030	24,593,030
1.2.2	CONSTRUCTION MANAGEMENT	13,207,700	4,886,849	18,094,549
1.3	<u>CONSTRUCTION</u>			>> \$180,945,388
1.3.1	GENERAL CONDITIONS	3,041,928	1,125,513	4,167,441
1.3.2	SITework	6,524,508	2,414,068	8,938,576
1.3.3	CONCRETE	10,575,913	3,913,088	14,489,001
1.3.5	METALS	7,196,529	2,662,716	9,859,245
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	85,187	315,421
1.3.8	DOORS & WINDOWS	64,695	23,937	88,632
1.3.9	FINISHES	611,189	226,140	837,329
1.3.13	SPECIAL CONSTRUCTION	91,982,003	34,033,341	126,015,344
1.3.14	CONVEYING SYSTEMS	11,272,944	4,170,989	15,443,933
1.3.15	MECHANICAL	337,767	124,974	462,741
1.3.16	ELECTRICAL	239,215	88,510	327,725
1.5	<u>G&A/PIF</u>			>> \$10,989,226
1.5.1	G&A/PIF ADDER	8,021,333	2,967,893	10,989,226
1.5.2	PROCUREMENT FEES	1,320,769	488,685	>> \$1,809,454
	SUBTOTAL INCLUDING ESCALATION	197,721,627	70,977,363	>> \$268,698,990
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$19,374,407
	CONTINGENCY			>> \$37,826,603
	TOTAL ESTIMATED COST			>> \$325,900,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= **18.00%**

CONTINGENCY= **21.29%**

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY IN FPR - UNESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **2421-FPR**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **28-Jan-1998**
TIME: **08:43:02**
CHECKED BY: *SW*
APPR'D BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>ENGINEERING, DESIGN AND INSPECTION</u>			>> \$24,603,900
1.1.1	DESIGN ENGINEERING TITLE I & II	18,000,000	0	18,000,000
1.1.2	TITLE III INSPECTION	6,603,900	0	6,603,900
1.2	<u>MANAGEMENT COSTS</u>			>> \$31,698,700
1.2.1	PROJECT MANAGEMENT	18,491,000	0	18,491,000
1.2.2	CONSTRUCTION MANAGEMENT	13,207,700	0	13,207,700
1.3	<u>CONSTRUCTION</u>			>> \$132,076,925
1.3.1	GENERAL CONDITIONS	3,041,928	0	3,041,928
1.3.2	SITEWORK	6,524,508	0	6,524,508
1.3.3	CONCRETE	10,575,913	0	10,575,913
1.3.5	METALS	7,196,529	0	7,196,529
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0	230,234
1.3.8	DOORS & WINDOWS	64,695	0	64,695
1.3.9	FINISHES	611,189	0	611,189
1.3.13	SPECIAL CONSTRUCTION	91,982,003	0	91,982,003
1.3.14	CONVEYING SYSTEMS	11,272,944	0	11,272,944
1.3.15	MECHANICAL	337,767	0	337,767
1.3.16	ELECTRICAL	239,215	0	239,215
1.5	<u>G&A/PIF</u>			>> \$8,021,333
1.5.1	G&A/PIF ADDER	8,021,333	0	8,021,333
1.5.2	PROCUREMENT FEES	1,320,769	0	>> \$1,320,769
	SUBTOTAL INCLUDING ESCALATION	197,721,627	0	>> \$197,721,627
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$14,141,903
	CONTINGENCY			>> \$28,536,470
	TOTAL ESTIMATED COST			>> \$240,400,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 19.00%

CONTINGENCY= 21.59%

Rev. 6/96

LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-FPR**
PREPARED BY: **R. D. ADAMS**

DATE 28-Jan-1998

REPORT NAME: **Detail Cost Estimate Sheet**[illegible]

Lockheed Martin Idaho Technologies Co.
 Rev. 6/96
 PROJECT NAME: HIP FACILITY - INTERIM STORAGE
 FACILITY IN FPR
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
 PROJECT NO.: 2421-FPR
 PREPARED BY: R. D. ADAMS

PAGE # 2

DATE 28-Jan-1998
 TIME: 08:41:26
 REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MAT'L UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
3.1	GENERAL CONDITIONS											
	SUPERVISION @ 5% OF LABOR HOURS	1	LOT		CARF GEN	21700.0	21,700	748,433				748,433
	TRAINING @ 3% OF LABOR HOURS	1	LOT		SSWK GEN	13000.0	13,000	478,530				478,530
	SMALL TOOLS & CONSUMABLES @ 4% OF LABOR DOLLARS	1	LOT	601,500.00	GEN	0.000				601,500		601,500
	GENERAL CONDITIONS S/T						34,700	\$1,226,963		\$601,500		\$1,828,463
3.2	SITWORK											
	TUNNEL & RR STRUCTURE EXCAVATION <small>Includes all earthwork for new addition.</small>	61,100	CY		ENGR GEN	0.012	733	23,132	122,200			145,332
	TUNNEL & RR STRUCTURE BACKFILL	37,000	CY		ENGR GEN	0.060	2,220	70,041	74,000			144,041
	HAUL AWAY EXCESS	24,100	CY		ENGR GEN	0.020	482	15,207	48,200			63,407
	SITWORK S/T						3,435	\$108,381	\$244,400			\$352,781
3.2.1	DEMOLITION											
	SAWCUT AND REMOVE REINFORCED CONCRETE WLLS, SLABS	49,100	CF		SKWK GEN	1.500	73,650	2,438,552	1,473,000			3,911,552
	DEMO EXISTING BUILDING PORTION FOR NEW ADDITION	1	LOT		SKWK GEN	1200.00	1,200	39,732	12,000			51,732
	DEMO WASTE TRANSFER CRANE, MAIN CRANE RAILS & AIR LOCK DOORS	1	LOT		SKWK GEN	2000.00	2,000	66,220	20,000			86,220
	CORE DRILL FOR VAULT VENT DUCTS	1	LOT		GEN	0.000					25,000	25,000

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY IN FPR**

LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**
DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-FPR**
PREPARED BY: **R. D. ADAMS**

PAGE # **3**

DATE **28-Jan-1998**
TIME: **08:41:26**
REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.2.1	DEMOLITION REMOVE CELL HATCH COVERS	1	LOT		SKWK GEN	2500.00	2,500	82,775				82,775
	DEMOLITION S/T						79,350	\$2,627,279	\$1,505,000		\$25,000	\$4,157,279
1.3.3	CONCRETE											
	TUNNEL CONCRETE	1,360	CY	126.10	SKWK GEN	12.300	16,728	553,864	34,340	171,496		759,700
	RR STRUCTURE CONCRETE	8,300	CY	126.10	SKWK GEN	12.300	102,090	3,380,200	209,575	1,046,630		4,636,405
	BUILDING CONCRETE	630	CY	126.10	SKWK GEN	12.300	7,749	256,569	15,908	79,443		351,920
	HATCH PLUGS - ALLOW	3	EA		GEN	0.000					225,000	225,000
	PLUG ALL PENETRATIONS INTO VAULT AREA - ALLOW	1	LOT	200,000.00	SKWK GEN	10000.0	10,000	331,100		200,000		531,100
	CONCRETE S/T						136,567	\$4,521,733	\$259,823	\$1,497,569	\$225,000	\$6,504,125
1.3.5	METALS											
	TUBE SUPPORT FRAME	250	TON	2,500.00	IRON GEN	100.000	25,000	920,250		625,000		1,545,250
	FLOOR LEVELING FRAME	360	TON	2,000.00	IRON GEN	20.000	7,200	265,032		720,000		985,032
	SPACERS & PEDESTALS - ALLOW	100	TON	2,000.00	IRON GEN	50.000	5,000	184,050		200,000		384,050
	SHIELDING PLATES	370	TON	1,200.00	IRON GEN	15.000	5,550	204,296		444,000		648,296
	BUILDING STRUCTURAL STEEL	150	TON	1,200.00	IRON GEN	10.000	1,500	55,215		180,000		235,215
	GANTRY CRANE RAILS, EMBEDS, ETC.	580	LF	161.00	IRON GEN	3.850	2,233	82,197		93,380		175,577
	RAILROAD TRACKS - WITHIN STRUCTURE	2,000	LF	92.00	IRON GEN	2.000	4,000	147,240		184,000		331,240

Rev. 6/96

FACILITY IN FPR

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-FPR

PREPARED BY: R. D. ADAMS

PAGE # 4

DATE 28-Jan-1998

TIME: 08:41:26

REPORT NAME: **Detail Cost Estimate Sheet**[illegible]

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: HIP FACILITY - INTERIM STORAGE

FACILITY IN FPR

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-FPR

PREPARED BY: R. D. ADAMS

PAGE # 5

DATE 28-Jan-1998

TIME: 08:41:26

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.13	SPECIAL CONSTRUCTION											
	SUPPORT BUILDING	3,600	SF			0.000					540,000	540,000
	VAULT TUBE ASSEMBLIES	1,473	EA	25,000.00	GEN IRON	100.000	147,300	5,422,113		36,825,000		42,247,113
	BRING EXISTING BUILDING UP TO LIFE SAFETY CODES - ALLOW	1	LOT		GEN	0.000					20,000,000	20,000,000
	SPECIAL CONSTRUCTION S/T						147,300	\$5,422,113		\$36,825,000	\$20,540,000	\$62,787,113
1.3.14	CONVEYING SYSTEMS											
	GANTRY CRANE	2	EA	2,500,000.00	SKWK GEN	1000.00	2,000	66,220		5,000,000		5,066,220
	TRANSFER CART IN TUNNEL	1	EA	300,000.00	SKWK GEN	500.000	500	16,555		300,000		316,555
	5 TON DECONTAMINATABLE BRIDGE CRANE	2	EA	250,000.00	SKWK GEN	300.000	600	19,866		500,000		519,866
	CASK MANUVERING HYDRAULIC PLATFORM	1	EA	1,000,000.00	SKWK GEN	1000.00	1,000	33,110		1,000,000		1,033,110
	CONVEYING SYSTEMS S/T						4,100	\$135,751		\$6,800,000		\$6,935,751
1.3.15	MECHANICAL											
	MISC. PIPING FOR NEW ADDITION- ALLOW	1	LOT		GEN	0.000					75,000	75,000
	FIRE PROTECTION- NEW ADDITION	5,600	SF		GEN	0.000					19,600	19,600
	HVAC - NEW ADDITION	5,600	SF	11.20	SHEE GEN	0.180	1,008	34,937		62,720		97,657
	VAULT VENT BLOWERS	6	EA	3,100.00	SHEE GEN	40.000	240	8,318		18,600		26,918

DETAILED COST ESTIMATE SHEET

PAGE # 6

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO.: **2421-FPR**
PREPARED BY: **R. D. ADAMS**

DATE: 28-Jan-1998
TIME: 08:41:26
REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
<u>3.15</u>	<u>MECHANICAL</u> VAULT VENT BLOWER DUCTS	250	LF	12.00	SHEE GEN	1.500	375	12,998		3,000		15,998
	<u>MECHANICAL S/T</u>						1,623	\$56,253		\$84,320	\$94,600	\$235,173
<u>3.16</u>	<u>ELECTRICAL</u>											
	SWITCHGEAR AND TRANSFORMERS	1	LOT	44,000.00	ELEC GEN	110.000	110	3,664		44,000		47,664
Memo:	For new addition only.											
	LIGHTING	5,600	SF		ELEC GEN	0.000					15,400	15,400
Memo:	For new addition only.											
	RACEWAYS & ENCLOSURES	1	LOT	10,400.00	ELEC GEN	280.000	280	9,327		10,400		19,727
Memo:	For new addition only.											
	CONDUCTORS & GROUNDING	1	LOT	21,300.00	ELEC GEN	375.000	375	12,491		21,300		33,791
Memo:	For new addition only.											
	WIRING DEVICES & SPECIAL SYSTEMS	1	LOT	27,800.00	ELEC GEN	50.000	50	1,666		27,800		29,466
Memo:	For new addition only.											
	INSTRUMENTATION & CONTROLS	1	LOT	830.00	ELEC GEN	40.000	40	1,332		830	1,060	3,222
Memo:	For new addition only.											
	TESTING	1	LOT		ELEC GEN	60.000	60	1,999				1,999
Memo:	For new addition only.											
	<u>ELECTRICAL S/T</u>						915	\$30,479		\$104,330	\$16,460	\$151,269
<u>5.1</u> 1701000	<u>G&A/PIF ADDER</u> G&A	1	LOT			0.000					648,777	648,777
	PIF	1	LOT			0.000					7,372,556	7,372,556
	<u>G&A/PIF ADDER S/T</u>						0				\$8,021,333	\$8,021,333

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: HIP FACILITY - INTERIM STORAGE
FACILITY IN FPR

LOCATION 1: INEEL/ICPP

REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING

PROJECT NO.: 2421-FPR

PREPARED BY: R. D. ADAMS

PAGE # 7

DATE 28-Jan-1998

TIME: 08:41:26

REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
	PROJECT SUBTOTAL						468,143	\$72,567,098	\$2,009,223	\$48,436,299	\$29,287,593	\$152,300,213

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: HIP FACILITY - INTERIM STORAGE
 FACILITY IN FPR - UNESCALATED
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: PLANNING
 PROJECT NO: 2421-FPR
 PREPARED BY: R. D. ADAMS

DATE: 28-Jan-1998
 TIME: 08:43:08

REPORT NAME: Contingency Analysis

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	18,000,000	9.10	20	35	1.82	3.19	2.686%	12.44%	5,309,282	23,309,282
1.1.2	TITLE III INSPECTION	6,603,900	3.34	20	30	0.67	1.00	0.835%	3.87%	1,650,752	8,254,652
1.2.1	PROJECT MANAGEMENT	18,491,000	9.35	20	35	1.87	3.27	2.759%	12.78%	5,454,107	23,945,107
1.2.2	CONSTRUCTION MANAGEMENT	13,207,700	6.68	20	30	1.34	2.00	1.670%	7.74%	3,301,479	16,509,179
1.3.1	GENERAL CONDITIONS	3,041,928	1.54	20	35	0.31	0.54	0.454%	2.10%	897,247	3,939,175
1.3.2	SITWORK	6,524,508	3.30	20	40	0.66	1.32	1.122%	5.20%	2,218,033	8,742,541
1.3.3	CONCRETE	10,575,913	5.35	20	30	1.07	1.60	1.337%	6.19%	2,643,621	13,219,534
1.3.5	METALS	7,196,529	3.64	20	35	0.73	1.27	1.074%	4.97%	2,122,689	9,319,218
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0.12	20	30	0.02	0.03	0.029%	0.13%	57,551	287,785
1.3.8	DOORS & WINDOWS	64,695	0.03	20	20	0.01	0.01	0.005%	0.02%	10,350	75,045
1.3.9	FINISHES	611,189	0.31	20	35	0.06	0.11	0.091%	0.42%	180,276	791,465
1.3.13	SPECIAL CONSTRUCTION	91,982,003	46.52	20	20	9.30	9.30	7.443%	34.48%	14,715,130	106,697,133
1.3.14	CONVEYING SYSTEMS	11,272,944	5.70	20	25	1.14	1.43	1.169%	5.41%	2,310,641	13,583,585
1.3.15	MECHANICAL	337,767	0.17	20	30	0.03	0.05	0.043%	0.20%	84,430	422,197
1.3.16	ELECTRICAL	239,215	0.12	20	25	0.02	0.03	0.025%	0.11%	49,032	288,247
1.5.1	G&A/PIF ADDER	8,021,333	4.06	5	20	0.20	0.81	0.710%	3.29%	1,403,543	9,424,876
1.5.2	PROCUREMENT FEES	1,320,769	0.67	20	25	0.13	0.17	0.137%	0.63%	270,721	1,591,490
	ESCALATION	0	0.00	20	25	0.00	0.00	0.000%	0.00%	(511)	(511)
SUBTOTAL		197,721,627	100.00					21.588%			
CALCULATED CONTINGENCY		42,684,657									
RESULTANT TEC		240,406,284									
ROUNDED TEC		240,400,000									
PROJECT CONTINGENCY		42,678,373						21.59%			
MANAGEMENT RESERVE		14,141,903									
CONTINGENCY		28,536,470									
TOTAL ESTIMATED COST		240,400,000								42,678,373	240,400,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY IN FPR - ESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**
CONTINGENCY ANALYSIS

 TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **2421-FPR**
 PREPARED BY: **R. D. ADAMS**

 DATE: **28-Jan-1998**
 TIME: **08:45:28**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	DESIGN ENGINEERING TITLE I & II	18,000,000	6.70	20	35	1.34	2.34	1.976%	9.28%	5,306,794	23,306,794
1.1.2	TITLE III INSPECTION	6,603,900	2.46	20	30	0.49	0.74	0.614%	2.88%	1,649,978	8,253,878
1.2.1	PROJECT MANAGEMENT	18,491,000	6.88	20	35	1.38	2.41	2.030%	9.53%	5,451,551	23,942,551
1.2.2	CONSTRUCTION MANAGEMENT	13,207,700	4.92	20	30	0.98	1.47	1.229%	5.77%	3,299,931	16,507,631
1.3.1	GENERAL CONDITIONS	3,041,928	1.13	20	35	0.23	0.40	0.334%	1.57%	896,827	3,938,755
1.3.2	SITWORK	6,524,508	2.43	20	40	0.49	0.97	0.826%	3.88%	2,216,993	8,741,501
1.3.3	CONCRETE	10,575,913	3.94	20	30	0.79	1.18	0.984%	4.62%	2,642,382	13,218,295
1.3.5	METALS	7,196,529	2.68	20	35	0.54	0.94	0.790%	3.71%	2,121,694	9,318,223
1.3.7	THERMAL & MOISTURE PROTECTION	230,234	0.09	20	30	0.02	0.03	0.021%	0.10%	57,524	287,758
1.3.8	DOORS & WINDOWS	64,695	0.02	20	20	0.00	0.00	0.004%	0.02%	10,345	75,040
1.3.9	FINISHES	611,189	0.23	20	35	0.05	0.08	0.067%	0.32%	180,192	791,381
1.3.13	SPECIAL CONSTRUCTION	91,982,003	34.23	20	20	6.85	6.85	5.477%	25.71%	14,708,234	106,690,237
1.3.14	CONVEYING SYSTEMS	11,272,944	4.20	20	25	0.84	1.05	0.860%	4.04%	2,309,558	13,582,502
1.3.15	MECHANICAL	337,767	0.13	20	30	0.03	0.04	0.031%	0.15%	84,391	422,158
1.3.16	ELECTRICAL	239,215	0.09	20	25	0.02	0.02	0.018%	0.09%	49,009	288,224
1.5.1	G&A/PIF ADDER	8,021,333	2.99	5	20	0.15	0.60	0.522%	2.45%	1,402,886	9,424,219
1.5.2	PROCUREMENT FEES	1,320,769	0.49	20	25	0.10	0.12	0.101%	0.47%	270,594	1,591,363
	ESCALATION	70,977,363	26.42	20	25	5.28	6.60	5.415%	25.42%	14,542,127	85,519,490
SUBTOTAL		268,698,990	100.00					21.301%			
CALCULATED CONTINGENCY		57,235,016									
RESULTANT TEC		325,934,006									
ROUNDED TEC		325,900,000									
PROJECT CONTINGENCY		57,201,010						21.29%			
MANAGEMENT RESERVE		19,374,407									
CONTINGENCY		37,826,603									
TOTAL ESTIMATED COST		325,900,000								57,201,010	325,900,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

G&A/PIF ADDER CALCULATION SHEET

PROCUREMENT FEE:

CONSTRUCTION =	\$132,076,925	
GFE =	\$0	
Subtotal	\$132,076,925	
FEE @ 1% =	\$132,076,925 * 0.01 =	\$1,320,769.25

G&A @ 23% (with a ceiling of \$500,000 imposed per year)

CONSTRUCTION OR CEILING * 3 YEARS =	\$1,500,000	
GFE =	\$0	
PROCUREMENT FEE =	\$1,320,769	
Subtotal	\$2,820,769	
FEE @ 23% =	\$2,820,769 * 0.23 =	\$648,777

PIF @ 5.5%

CONSTRUCTION =	\$132,076,925	
GFE =	\$0	
PROCUREMENT FEE =	\$1,320,769	
G&A =	\$648,777	
Subtotal	\$134,046,471	
FEE @ 5.5% =	\$134,046,471 * 0.055 =	\$7,372,556

TOTAL PROCUREMENT FEE:	\$1,320,769
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TOTAL G&A FEE:	\$648,777
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TOTAL PIF:	\$7,372,556
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Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
FACILITY IN FPR - OPC - ESCALATED**
LOCATION 1: **INEEL/ICPP**
REQUESTOR: **J. K. RAWLINS**

COST ESTIMATE SUMMARY

TYPE OF ESTIMATE: **PLANNING**
PROJECT NO: **242103**
PREPARED BY: **R. D. ADAMS**
REPORT NAME: **Cost Estimate Summary**

DATE: **28-Jan-1998**
TIME: **08:14:10**
CHECKED BY: *[Signature]*
APPRD BY: *[Signature]*

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
1.1	<u>DESIGN & DEVELOPMENT</u>			>> \$6,100,000
1.1.1	CONCEPTUAL DESIGN	5,000,000	1,100,000	6,100,000
1.2	<u>MANAGEMENT COSTS</u>			>> \$4,880,000
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	660,000	3,660,000
1.2.2	SAFETY REVIEWS	1,000,000	220,000	1,220,000
1.3	<u>PERMITTING</u>			>> \$3,328,687
1.3.1	PERMITTING	2,728,432	600,255	3,328,687
1.4	<u>TURNOVER</u>			>> \$6,525,000
1.4.1	SO TEST & STARTUP	4,500,000	2,025,000	6,525,000
1.5.2	PROCUREMENT FEES	0	0	>> \$0
	SUBTOTAL INCLUDING ESCALATION	16,228,432	4,605,255	>> \$20,833,687
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$5,166,313
	TOTAL ESTIMATED COST			>> \$26,000,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 62.00%

CONTINGENCY= 24.80%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

COST ESTIMATE SUMMARY

PROJECT NAME: HIP FACILITY - INTERIM STORAGE
FACILITY IN FPR - OPC - UNESCALATED
LOCATION 1: INEEL/ICPP
REQUESTOR: J. K. RAWLINS

TYPE OF ESTIMATE: PLANNING
PROJECT NO: 242103
PREPARED BY: R. D. ADAMS
REPORT NAME: Cost Estimate Summary

DATE: 28-Jan-1998
TIME: 08:08:41
CHECKED BY: *[Signature]*
APPRD BY: _____

WBS Element	Cost Estimate Element	Total Unescalated	Escalation	Total Incl Escalation
<u>1.1</u>	<u>DESIGN & DEVELOPMENT</u>			>> <u>\$5,000,000</u>
1.1.1	CONCEPTUAL DESIGN	5,000,000	0	5,000,000
<u>1.2</u>	<u>MANAGEMENT COSTS:</u>			>> <u>\$4,000,000</u>
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	0	3,000,000
1.2.2	SAFETY REVIEWS	1,000,000	0	1,000,000
<u>1.3</u>	<u>PERMITTING</u>			>> <u>\$2,728,432</u>
1.3.1	PERMITTING	2,728,432	0	2,728,432
<u>1.4</u>	<u>TURNOVER</u>			>> <u>\$4,500,000</u>
1.4.1	SO TEST & STARTUP	4,500,000	0	4,500,000
1.5.2	PROCUREMENT FEES	0	0	>> <u>\$0</u>
	SUBTOTAL INCLUDING ESCALATION	16,228,432	0	>> \$16,228,432
	PROJECT CONTINGENCY			
	MANAGEMENT RESERVE			>> \$0
	CONTINGENCY			>> \$4,071,568
	TOTAL ESTIMATED COST			>> \$20,300,000

PROJECT COST PARAMETERS

EDI AS A % OF CONST. + GFE= 69.00%

CONTINGENCY= 25.09%

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

 PROJECT NAME: **HIP FACILITY - INTERIM STORAGE**
FACILITY IN FPR - OPC

 LOCATION 1: **INEEL/ICPP**

 REQUESTOR: **J. K. RAWLINS**
DETAILED COST ESTIMATE SHEET

 TYPE OF ESTIMATE: **PLANNING**

 PROJECT NO.: **242103**

 PREPARED BY: **R. D. ADAMS**

 PAGE # **1**

 DATE **28-Jan-1998**

 TIME: **08:07:27**

 REPORT NAME: **Detail Cost Estimate Sheet**

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.1.1	CONCEPTUAL DESIGN											
	DESIGN	1	LOT		LIMITCO	0.000		5,000,000				5,000,000
	CONCEPTUAL DESIGN S/T						0	\$5,000,000				\$5,000,000
1.2.1	PM FOR PROJECT DEVELOPMENT ACDC/SOW,CPDS,PEP,DC/SOW & REVIEWS	1	LOT		LIMITCO	0.000		3,000,000				3,000,000
	PM FOR PROJECT DEVELOPMENT S/T						0	\$3,000,000				\$3,000,000
1.2.2	SAFETY REVIEWS PSAR & SAR	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SAFETY REVIEWS S/T						0	\$1,000,000				\$1,000,000
1.3.1	PERMITTING SITING AGREEMENT	1	LOT		Z-4170	640.000	640	48,512				48,512
	HWMA/RCRA PERMIT	1	LOT		Z-4170	6800.00	6,800	515,440				515,440
	PERMIT TO CONSTRUCT	1	LOT		Z-4170	3600.00	3,600	272,880				272,880
	CWA, STORM WATER, HISTORICAL, OTHER REG. COMPLIANCE	1	LOT		Z-4170	2000.00	2,000	151,600				151,600
	P.E. CERTIFICATION	1	LOT			0.000					40,000	40,000
	HEALTH & SAFETY ISSUES	1	LOT			0.000					1,200,000	1,200,000

Lockheed Martin Idaho Technologies Co.
 Rev. 6/96
 PROJECT NAME: HIP FACILITY - INTERIM STORAGE
 FACILITY IN FPR - OPC
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

DETAILED COST ESTIMATE SHEET

TYPE OF ESTIMATE: PLANNING
 PROJECT NO.: 242103
 PREPARED BY: R. D. ADAMS

PAGE # 2

DATE 28-Jan-1998
 TIME: 08:07:27
 REPORT NAME: Detail Cost Estimate Sheet

CODE	DESCRIPTION	QTY	UOM	MATL UNIT COST	CREW SUB	UNIT LAB HOURS	TOTAL LAB HRS	LABOR	CONST. EQUIP.	MAT'L	S/C (OTHER 1)	TOTAL COST
1.3.1	PERMITTING QUALITY REVIEWS	1	LOT			0.000					500,000	500,000
	PERMITTING S/T						13,040	\$988,432			\$1,740,000	\$2,728,432
1.4.1	SO TEST & STARTUP											
	ORR	1	LOT			0.000		2,000,000				2,000,000
	SO TEST & TRAINING	1	LOT		LIMITCO	0.000		1,000,000				1,000,000
	SO TEST & STARTUP S/T						0	\$3,000,000				\$3,000,000
1.4.1.1	PROJECT SUPPORT SUPPORT DURING DESIGN, CONSTRUCTION & STARTUP	1	LOT		LIMITCO	0.000		1,500,000				1,500,000
	PROJECT SUPPORT S/T						0	\$1,500,000				\$1,500,000
	PROJECT SUBTOTAL						13,040	\$14,488,432	\$0	\$0	\$1,740,000	\$16,228,432

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: **HIP FACILITY - INTERIM STORAGE
 FACILITY IN FPR - OPC - UNESCALATED**
 LOCATION 1: **INEEL/ICPP**
 REQUESTOR: **J. K. RAWLINS**

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: **PLANNING**
 PROJECT NO: **242103**
 PREPARED BY: **R. D. ADAMS**

DATE: **28-Jan-1998**
 TIME: **08:09:47**

 REPORT NAME: **Contingency Analysis**

PROBABLE % VARIATION									PROJECT CONTINGENCY		SUMMARY
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	30.81	20	30	6.16	9.24	7.703%	30.81%	1,254,455	6,254,455
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	18.49	20	30	3.70	5.55	4.622%	18.49%	752,673	3,752,673
1.2.2	SAFETY REVIEWS	1,000,000	6.16	20	30	1.23	1.85	1.541%	6.16%	250,891	1,250,891
1.3.1	PERMITTING	2,728,432	16.81	20	30	3.36	5.04	4.203%	16.81%	684,539	3,412,971
1.4.1	SO TEST & STARTUP	4,500,000	27.73	20	30	5.55	8.32	6.932%	27.73%	1,129,010	5,629,010
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	0	0.00	20	30	0.00	0.00	0.000%	0.00%	0	0
SUBTOTAL		16,228,432	100.00					25.000%			
CALCULATED CONTINGENCY		4,057,108									
RESULTANT TEC		20,285,540									
ROUNDED TEC		20,300,000									
PROJECT CONTINGENCY		4,071,568						25.09%			
MANAGEMENT RESERVE		0									
CONTINGENCY		4,071,568									
TOTAL ESTIMATED COST		20,300,000								4,071,568	20,300,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% - 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% - 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% - 20%
 TITLE II 5% - 15%
 TITLE II/AFC Market Conditions

Lockheed Martin Idaho Technologies Co.

Rev. 6/96

PROJECT NAME: HIP FACILITY - INTERIM STORAGE
 FACILITY IN FPR - OPC - ESCALATED
 LOCATION 1: INEEL/ICPP
 REQUESTOR: J. K. RAWLINS

CONTINGENCY ANALYSIS

TYPE OF ESTIMATE: PLANNING
 PROJECT NO: 242103
 PREPARED BY: R. D. ADAMS

DATE: 28-Jan-1998
 TIME: 08:14:15

REPORT NAME: Contingency Analysis

PROBABLE % VARIATION								PROJECT CONTINGENCY		SUMMARY	
WBS Element	Cost Estimate Element	Total Cost w/o Contingency	% Total Cost	Prob. % Var. From Est.		Wt. % of Prob.		Contingency	%	Cost	Total Cost by Element
				-	+	-	+				
1.1.1	CONCEPTUAL DESIGN	5,000,000	24.00	20	30	4.80	7.20	6.000%	24.00%	1,239,894	6,239,894
1.2.1	PM FOR PROJECT DEVELOPMENT	3,000,000	14.40	20	30	2.88	4.32	3.600%	14.40%	743,936	3,743,936
1.2.2	SAFETY REVIEWS	1,000,000	4.80	20	30	0.96	1.44	1.200%	4.80%	247,979	1,247,979
1.3.1	PERMITTING	2,728,432	13.10	20	30	2.62	3.93	3.274%	13.10%	676,593	3,405,025
1.4.1	SO TEST & STARTUP	4,500,000	21.60	20	30	4.32	6.48	5.400%	21.60%	1,115,905	5,615,905
1.5.2	PROCUREMENT FEES	0	0.00	5	20	0.00	0.00	0.000%	0.00%	0	0
	ESCALATION	4,605,255	22.10	20	30	4.42	6.63	5.526%	22.10%	1,142,006	5,747,261
SUBTOTAL		20,833,687	100.00					25.000%			
CALCULATED CONTINGENCY		5,208,422									
RESULTANT TEC		26,042,109									
ROUNDED TEC		26,000,000									
PROJECT CONTINGENCY		5,166,313						24.80%			
MANAGEMENT RESERVE		0									
CONTINGENCY		5,166,313									
TOTAL ESTIMATED COST		26,000,000								5,166,313	26,000,000

CONFIDENCE LEVEL AND ASSUMED RISKS:

The Lockheed Idaho Technologies Co. Cost Estimate Contingency Analysis Model is based on the applied contingency and the assumptions upon which the estimate was predicated. The model is applied with a suggested risk level of 18% and a level of confidence of 90% the estimate will fall within the bid range. The Contingency Analysis is based on a weighted average to provide a 90 % probability of underrun and a 10% probability of overrun.

CONTINGENCY ANALYSIS GUIDE BY TYPE OF ESTIMATE

Guidelines established by DOE/FM 50, Cost Estimating Guide, Vol. 6, Cost Guide, and as presented in the INEL Cost Estimating Guide.

PLANNING 20% -- 30%
 Experimental/Special Conditions.....Up to 50%
 Conceptual 15% -- 25%
 Experimental/Special Conditions.....Up to 40%
 TITLE I 10% -- 20%
 TITLE II 5% -- 15%
 TITLE II/AFC Market Conditions

HIP OPTION INTERIM STORAGE FACILITY IN FPR

Project: 2421-FPR.MPP
Date: Wed 1/28/98

Task

Summary

Rolled Up Progress

Progress

Rolled Up Task

Milestone

Rolled Up Milestone

Lockheed Martin Idaho Technologies Company**INTERDEPARTMENTAL COMMUNICATION****Date:** February 3, 1998**To:** John K. Rawlins MS 3765 6-4304**From:** R. J. Turk MS 3875 6-3611**Subject:** ECONOMIC AND LIFE CYCLE ANALYSIS CONDUCTED for the HIGH LEVEL WASTE (HLW) WTS INTERIM STORAGE FACILITY RJT-25-98**Purpose:**

As requested an Economic and Life-Cycle Cost (LCC) has been conducted to evaluate for the HLW-WTS INTERIM STORAGE FACILITY. The storage facility was evaluated based on a scoping study that incorporate appropriate design features from the Flour Daniel Corp. design for interim storage. This storage facility will be used to house canisters resulting from the HLW production option until final repository disposition.

This economic analysis is based on information provided by J. K. Rawlins, and K. L. Williams. R. D. Adams provided cost estimates. B.L. Blakely and D.E. Keller provided process personnel modeling.

Methodology:

The Economic Evaluation assumed a 73-year period (1999-2071) since this is the estimated time required to complete all of the anticipated remediation activities. The LCC identified and evaluated the initial development, construction, operating and post operating costs over the life-cycle. A discounted LCC analysis assumes a 1998-dollar basis, discounted 6.3% annually per the Office of Management and Budget (OMB) Circular A-94 for escalated costs. All costs are conservatively discounted assuming the end-of-year convention.

Assumptions:

The scope of work and requirements of all related activities are vague at this time. Facility and processing costs were developed from historical experience associated with DD&D work at the INEEL. The LCC analysis was generated to match cost estimating cost structure. These costs include Permitting, Direct and Indirect Construction, G&A, Procurement Fee, Engineering, Inspection, Project Management, Construction Management, Escalation and Contingency costs.

The design period is assumed to be accomplished in five-years with construction completed in two-years. Labor rates were assumed as follows: Managers, \$125/hr; Engineers, \$108 \$/hr; Other Technicians \$ 85/hr; Administration/support staff \$ 65/hr; Operators and Maintenance personnel \$ 65/hr. The operational period for this facility was assumed to be twenty years, to match the appropriate operating facility. This period is followed by five years for shipping to the repository, followed by three years of post-operations activities. Due to this project's lack of complexity and non-radioactive contaminated environment, this analysis assumed a decommissioning cost equal to 10% of the non-escalated engineering design cost, decontamination costs equal to 0% of non-escalated total pre-operation cost, and demolition costs equal to 8% of the non-escalated total pre-operation cost. Utilities were calculated assuming a \$.0824 per kWh. Surveillance and Monitoring costs were calculated at \$65,000 per year for manned security during operations then reduced to \$10,000 for remote surveillance during non-operation periods.

Results:

The HLW-WTS INTERIM STORAGE FACILITY has a discounted LCC of \$ 105 million.

Attachments:

cc: R. J. Turk File

escalated HLW WTS Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year counting year Escalation Factor	1999 1	2000 2	2001 3	2002 4	2003 5	2004 6	2005 7	2006 8	2007 9	2008 10
1.024	1.053	1.082	1.112	1.144	1.176	1.209	1.242	1.277	1.313		
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting		3,147	3,147	3,147							
Testing and Start-up											
Total OPC (unescalated)		3,147	3,147	3,147	0	0	0	0	0	0	0
plus escalation of		1,009	1,009	1,009	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		1,036	1,036	1,036	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		5,192	5,192	5,192	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
TKle Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, O&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		3,147	3,147	3,147	0	0	0	0	0	0	0
plus escalation of		1,009	1,009	1,009	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		1,036	1,036	1,036	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		5,192	5,192	5,192	0	0	0	0	0	0	0
Operations 2080 hr-shit/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @ \$125 /hr.											
Engineers 0 FTE @ \$108 /hr.											
Other Tech. 0.5 FTE @ \$85 /hr.											
Administration/Support 0.5 FTE @ \$65 /hr.											
Operations/Process Facility 6											
Managers 0 FTE @ \$125 /hr.											
Engineers 0 FTE @ \$108 /hr.											
Other Tech. 0 FTE @ \$85 /hr.											
Supervisors 1.5 FTE @ \$85 /hr.											
Administration/Support 1 FTE @ \$65 /hr.											
Operators 2 FTE @ \$65 /hr.											
Maintenance 1 FTE @ \$65 /hr.											
Utilities 525 kw \$0.0824 /kwh											
Maintenance 2.00% of \$1,253											
Monitoring/Surveillance 2.00											
Operations subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demoition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)		3,147	3,147	3,147	0	0	0	0	0	0	0
Total Cost (w/ escalation, mgt reserve, & contingency)		5,192	5,192	5,192	0	0	0	0	0	0	0
Cumulative Total LCC (escalated)		5,192	10,384	15,576	15,576	15,576	15,576	15,576	15,576	15,576	15,576
discount factor @ OMB discount rate of 6.30% for escalated costs		1.063	1.130	1.201	1.277	1.357	1.443	1.534	1.630	1.733	1.842
Discounted Annual Cost		\$4,884	\$4,595	\$4,322	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cumulative Discounted LCC		4,884	9,479	13,802	13,802	13,802	13,802	13,802	13,802	13,802	13,802

escalated HLW WTS Interim Storage Facility
Life-Cycle Cost (LCC) Analysis
(ALL COST X1000)

fiscal year
counting year
Escalation Factor

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	11	12	13	14	15	16	17	18	19	20
	1.350	1.387	1.426	1.466	1.507	1.550	1.593	1.638	1.683	1.730
Other Project Cost (OPC)										
OPC unescalated										
Conceptual Design, Project Mgt, & Permitting							4,500			
Testing and Start-up							4,500			
Total OPC (unescalated)	0	0	0	0	0	0	4,500	0	0	0
plus escalation of	0	0	0	0	0	0	1,442	0	0	0
plus management reserve of	0	0	0	0	0	0	0	0	0	0
plus contingency of	0	0	0	0	0	0	1,482	0	0	0
Total OPC including escalation, mgt reserve, & contingency	0	0	0	0	0	0	7,424	0	0	0
Total Estimated Cost (TEC)										
TEC unescalated										
Title Design, Inspection			3,570	10,711						
Project mgt			615	2,481						
Construction Mgt					2,481	2,481				
Construction, Equip, G&A & Procurement					2,856	2,856				
Total TEC (unescalated)	0	0	4,186	13,172	35,944	35,944	0	0	0	0
plus escalation of	0	0	2,071	6,519	17,788	17,788	0	0	0	0
plus management reserve of	0	0	431	1,356	3,700	3,700	0	0	0	0
plus contingency of	0	0	633	2,937	8,015	8,015	0	0	0	0
Total TEC including escalation, mgt reserve, contingency	0	0	7,621	23,984	65,447	65,447	0	0	0	0
Total Project Cost (TPC)										
TPC unescalated	0	0	4,186	13,172	35,944	35,944	4,500	0	0	0
plus escalation of	0	0	2,071	6,519	17,788	17,788	1,442	0	0	0
plus management reserve of	0	0	431	1,356	3,700	3,700	0	0	0	0
plus contingency of	0	0	633	2,937	8,015	8,015	1,482	0	0	0
Total TPC including esc, mgt res, contingency	0	0	7,621	23,984	65,447	65,447	7,424	0	0	0
Operations	2080 hr-shift/yr.									
Facility/Administration	1.5									
Managers	0.5 FTE @	\$125 /hr.					65	130	130	130
Engineers	0 FTE @	\$108 /hr.					0	0	0	0
Other Tech.	0.5 FTE @	\$85 /hr.					44	88	88	88
Administration/Support	0.5 FTE @	\$65 /hr.					34	68	68	68
Operations/Process Facility	6									
Managers	0 FTE @	\$125 /hr.					0	0	0	0
Engineers	0 FTE @	\$108 /hr.					0	0	0	0
Other Tech.	0 FTE @	\$85 /hr.					0	0	0	0
Supervisors	1.5 FTE @	\$85 /hr.					133	265	265	265
Administration/Support	1 FTE @	\$65 /hr.					68	135	135	135
Operators	2 FTE @	\$65 /hr.					135	270	270	270
Maintenance	1 FTE @	\$65 /hr.					68	135	135	135
Utilities	525 kw	\$0.0824 /kwh					45	90	90	90
Maintenance	2.00% of	\$1,253					613	613	613	613
Monitoring/Surveillance	2.00	\$65,000.00 yr					65	130	130	130
Operations subtotal (unescalated)			0	0	0	0	1,269	1,925	1,925	1,925
plus Escalation			0	0	0	0	752	1,227	1,315	1,406
plus Operations Contingency @ 30.0%			0	0	0	0	608	945	972	999
Total Operations (w/ escalation & contingency)			0	0	0	0	2,627	4,097	4,212	4,329
Post Operations										
Decommission	10.00% of	Engineering costs								
Decontamination	0.00% of	Pre-operation Costs								
Demo/Ilion	8.00% of	Pre-operation Costs								
Post-Operations Subtotal (unescalated)			0	0	0	0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)			0	0	0	0	0	0	0	0
Total Cost (unescalated)			0	0	4,186	13,172	35,944	5,769	1,925	1,925
Cumulative Total LCC (unescalated)			9,441	9,441	13,827	26,799	62,743	104,455	106,379	110,228
Total Cost (w/ escalation, mgt reserve, & contingency)			0	0	7,621	23,984	65,447	10,051	4,097	4,329
Cumulative Total LCC (escalated)			15,576	15,576	23,107	47,181	112,629	188,127	192,224	200,765
discount factor @ OMB discount rate of 8.30%			1.958	2.082	2.213	2.352	2.500	2.658	2.825	3.003
Discounted Annual Cost			\$0	\$0	\$3,444	\$10,197	\$26,175	\$24,624	\$3,557	\$1,319
Cumulative Discounted LCC			13,802	13,802	17,246	27,442	53,618	78,242	81,799	85,758

escalated HLW WTS Interim Storage Facility			fiscal year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Life-Cycle Cost (LCC) Analysis			counting year	21	22	23	24	25	26	27	28	29	30
(ALL COST X1000)			Escalation Factor	1.779	1.829	1.880	1.933	1.987	2.042	2.100	2.158	2.219	2.281
Other Project Cost (OPC)													
OPC unescalated													
Conceptual Design, Project Mgt, & Permitting													
Testing and Start-up													
Total OPC (unescalated)				0	0	0	0	0	0	0	0	0	0
plus escalation of				0	0	0	0	0	0	0	0	0	0
plus management reserve of				0	0	0	0	0	0	0	0	0	0
plus contingency of				0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency				0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)													
TEC unescalated													
Title Design, Inspection													
Project mgt													
Construction Mgt													
Construction, Equip, G&A & Procurement													
Total TEC (unescalated)				0	0	0	0	0	0	0	0	0	0
plus escalation of				0	0	0	0	0	0	0	0	0	0
plus management reserve of				0	0	0	0	0	0	0	0	0	0
plus contingency of				0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency				0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)													
TPC unescalated				0	0	0	0	0	0	0	0	0	0
plus escalation of				0	0	0	0	0	0	0	0	0	0
plus management reserve of				0	0	0	0	0	0	0	0	0	0
plus contingency of				0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency				0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shift/yr.													
Facility/Administration 1.5													
Managers 0.5 FTE @ \$125 /hr.				130	130	130	130	130	130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.				0	0	0	0	0	0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.				88	88	88	88	88	88	88	88	88	88
Administration/Support 0.5 FTE @ \$65 /hr.				68	68	68	68	68	68	68	68	68	68
Operations/Process Facility 6													
Managers 0 FTE @ \$125 /hr.				0	0	0	0	0	0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.				0	0	0	0	0	0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.				0	0	0	0	0	0	0	0	0	0
Supervisors 1.5 FTE @ \$85 /hr.				265	265	265	265	265	265	265	265	265	265
Administration/Support 1 FTE @ \$65 /hr.				135	135	135	135	135	135	135	135	135	135
Operators 2 FTE @ \$65 /hr.				270	270	270	270	270	270	270	270	270	270
Maintenance 1 FTE @ \$65 /hr.				135	135	135	135	135	135	135	135	135	135
Utilities 525 kw \$0.0824 /kwh				90	90	90	90	90	90	90	90	90	90
Maintenance 2.00% of \$1,253				613	613	613	613	613	613	613	613	613	613
Monitoring/Surveillance 2.00				130	130	130	130	130	130	130	130	130	130
Operations subtotal (unescalated)				1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925
plus Escalation				1,499	1,595	1,693	1,785	1,899	2,008	2,116	2,229	2,345	2,465
plus Operations Contingency @ 30.0%				1,027	1,058	1,085	1,116	1,147	1,179	1,212	1,248	1,281	1,317
Total Operations (w/ escalation & contingency)				4,451	4,575	4,703	4,835	4,970	5,110	5,253	5,400	5,551	5,706
Post Operations													
Decommission 10.00% of Engineering costs													
Decontamination 0.00% of Pre-operation Costs													
Demolition 8.00% of Pre-operation Costs													
Post-Operations Subtotal (unescalated)				0	0	0	0	0	0	0	0	0	0
plus Escalation				0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%				0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)				0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)				1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925
Cumulative Total LCC (unescalated)				112,153	114,077	116,002	117,928	119,851	121,775	123,700	125,624	127,549	129,473
Total Cost (w/ escalation, mgt reserve, & contingency)				4,451	4,575	4,703	4,835	4,970	5,110	5,253	5,400	5,551	5,706
Cumulative Total LCC (escalated)				205,215	209,781	214,484	219,329	224,300	229,409	234,662	240,062	245,613	251,319
discount factor @ OMB discount rate of 6.30% for escalated costs				3,607	3,835	4,078	4,333	4,606	4,898	5,205	5,533	5,881	6,252
Discounted Annual Cost				\$1,234	\$1,193	\$1,154	\$1,118	\$1,079	\$1,044	\$1,009	\$978	\$944	\$913
Cumulative Discounted LCC				88,892	88,185	87,339	86,455	85,534	84,578	83,587	82,563	81,507	80,420

escalated HLW WTS Interim Storage Facility	fiscal year	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Life-Cycle Cost (LCC) Analysis	counting year	31	32	33	34	35	36	37	38	39	40
(ALL COST X1000)	Escalation Factor	2.345	2.410	2.478	2.547	2.619	2.692	2.767	2.845	2.924	3.006
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated											
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shft/yr.											
Facility/Administration 1.5											
Managers	0.5 FTE @	\$125 / hr.	130	130	130	130	130				
Engineers	0 FTE @	\$108 / hr.	0	0	0	0	0				
Other Tech.	0.5 FTE @	\$85 / hr.	88	88	88	88	88				
Administration/Support	0.5 FTE @	\$65 / hr.	68	68	68	68	68				
Operations/Process Facility 8											
Managers	0 FTE @	\$125 / hr.	0	0	0	0	0				
Engineers	0 FTE @	\$108 / hr.	0	0	0	0	0				
Other Tech.	0 FTE @	\$85 / hr.	0	0	0	0	0				
Supervisors	1.5 FTE @	\$85 / hr.	265	265	265	265	265				
Administration/Support	1 FTE @	\$65 / hr.	135	135	135	135	135				
Operators	2 FTE @	\$65 / hr.	270	270	270	270	270				
Maintenance	1 FTE @	\$65 / hr.	135	135	135	135	135				
Utilities	525 kw	\$0.0824 / kwh	90	90	90	90	90				
Maintenance	2.00% of	\$1,253	613	613	613	613	613				
Monitoring/Surveillance	2.00	\$85,000.00 yr	130	130	130	130	130	10	10	10	10
Operations subtotal (unescalated)			1,925	1,925	1,925	1,925	1,925	10	10	10	10
plus Escalation			2,588	2,714	2,844	2,978	3,115	17	18	19	20
plus Operations Contingency @ 30.0%			1,354	1,392	1,431	1,471	1,512	8	9	9	9
Total Operations (w/ escalation & contingency)			5,868	6,030	6,199	6,373	6,551	35	38	37	38
Post Operations											
Decommission	10.00% of	Engineering costs									
Decontamination	0.00% of	Pre-operation Costs									
Demolition	8.00% of	Pre-operation Costs									
Post-Operations Subtotal (unescalated)			0	0	0	0	0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)			0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)			1,925	1,925	1,925	1,925	1,925	10	10	10	10
Total Cost (w/ escalation, mgt reserve, & contingency)			131,398	133,322	135,247	137,172	139,096	139,106	139,126	139,136	139,146
Cumulative Total LCC (escalated)			5,868	6,030	6,199	6,373	6,551	35	38	37	38
discount factor @ OMB discount rate of 6.30% for escalated costs			257,185	263,216	269,415	275,788	282,339	282,374	282,410	282,485	282,524
Discounted Annual Cost			6,646	7,064	7,509	7,982	8,485	9,020	9,588	10,192	10,834
Cumulative Discounted LCC			\$883	\$854	\$826	\$798	\$772	\$744	\$718	\$694	\$670
			97,302	98,156	99,081	99,780	100,552	100,556	100,560	100,563	100,570

escalated HLW WTS Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year counting year Escalation Factor	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
		41	42	43	44	45	46	47	48	49	50
		3.090	3.177	3.266	3.357	3.451	3.548	3.647	3.750	3.855	3.962
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection Project mgt Construction Mgt Construction, Equip, Q&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated											
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shft/yr.											
Facility/Administration 1.5											
Managers	0.5 FTE @	\$125	/hr.								
Engineers	0 FTE @	\$108	/hr.								
Other Tech.	0.5 FTE @	\$85	/hr.								
Administration/Support	0.5 FTE @	\$65	/hr.								
Operations/Process Facility 6											
Managers	0 FTE @	\$125	/hr.								
Engineers	0 FTE @	\$108	/hr.								
Other Tech.	0 FTE @	\$85	/hr.								
Supervisors	1.5 FTE @	\$85	/hr.								
Administration/Support	1 FTE @	\$65	/hr.								
Operators	2 FTE @	\$65	/hr.								
Maintenance	1 FTE @	\$65	/hr.								
Utilities	525 kw	\$0.0824	/kwh								
Maintenance	2.00% of	\$1,253									
Monitoring/Surveillance	2.00	\$85,000.00	yr	10	10	10	10	10	10	10	10
Operations subtotal (unescalated)				10	10	10	10	10	10	10	10
plus Escalation				21	22	23	24	25	26	27	28
plus Operations Contingency @ 30.0%				9	10	10	10	11	11	12	12
Total Operations (w/ escalation & contingency)				40	41	42	44	45	46	49	50
Post Operations											
Decommission	10.00% of	Engineering costs									
Decontamination	0.00% of	Pre-operation Costs									
Demolition	8.00% of	Pre-operation Costs									
Post-Operations Subtotal (unescalated)				0	0	0	0	0	0	0	0
plus Escalation				0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%				0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)				0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)		10	10	10	10	10	10	10	10	10	10
Total Cost (w/ escalation, mgt reserve, & contingency)		139,156	139,166	139,176	139,186	139,196	139,206	139,216	139,226	139,236	139,246
Cumulative Total LCC (escalated)		40	41	42	44	45	46	47	49	50	52
discount factor @ OMB discount rate of 6.30% for escalated costs		282,564	282,606	282,648	282,692	282,737	282,783	282,830	282,879	282,929	282,981
Discounted Annual Cost		12,242	13,014	13,833	14,705	15,631	16,616	17,663	18,776	19,959	21,216
Cumulative Discounted LCC		\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$2
		100,573	100,577	100,580	100,583	100,585	100,588	100,591	100,593	100,596	100,598

fiscal year	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	Escalation Factor	
											counting year	(ML COST X1000)
associated HLW WTS Interim Storage Facility												
Life-Cycle Cost (LCC) Analysis												
Other Project Cost (OPC)												
OPC unescalated												
Conceptual Design, Project Mgt, & Permitting												
Total OPC (unescalated)												
plus escalation of												
plus management reserve of												
plus contingency of												
Total OPC including escalation, mgt reserve, & contingency												
Total Estimated Cost (TEC)												
TEC unescalated												
TEC Design, Inspection												
Construction Mgt												
Construction, Equip, O&A & Procurement												
Total TEC (unescalated)												
plus escalation of												
plus management reserve of												
plus contingency of												
Total TEC including escalation, mgt reserve, contingency												
Total Project Cost (TPC)												
TPC unescalated												
plus escalation of												
plus management reserve of												
plus contingency of												
Total TPC including esc, mgt res, contingency												
Operations												
Facility/Administration												
Managers												
0.5 FTE @												
\$125 /hr.												
Managers												
0 FTE @												
\$108 /hr.												
Enginere												
0.5 FTE @												
\$85 /hr.												
Other Tech												
0.5 FTE @												
\$85 /hr.												
Administration/Support												
0.5 FTE @												
\$85 /hr.												
Managers												
0 FTE @												
\$125 /hr.												
Operations/Process Facility												
0 FTE @												
\$108 /hr.												
Enginere												
0.5 FTE @												
\$85 /hr.												
Other Tech												
0.5 FTE @												
\$85 /hr.												
Administration/Support												
2 FTE @												
\$85 /hr.												
Operators												
1 FTE @												
\$85 /hr.												
Utilities												
525 kw												
\$0.0824 /kwh												
Maintenance												
2.00% of												
\$65,000.00 /yr												
Workforce												
Operations subtotal (unescalated)												
plus Escalation												
plus Operations Contingency @												
30.0%												
Total Operations (w/ escalation & contingency)												
Post Operations												
Decommission												
10.00% of Engineering costs												
0.00% of Pre-operation costs												
8.00% of Pre-operation costs												
plus Escalation												
plus Post-Operations Contingency @												
30.0%												
Total Post-Operations (w/ escalation & contingency)												
Total Cost (unescalated)												
Cumulative Total LCC (unescalated)												
Total Cost (w/ escalation, mgt reserve, & contingency)												
Cumulative Total LCC (escalated)												
discount factor @ OMB discount rate of												
Cumulative Annual Cost												
Cumulative Discounted LCC												

escalated HLW WTS Interim Storage Facility LMA-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor	2059 61 5.389	2060 62 5.519	2061 63 5.674	2062 64 5.833	2063 65 5.996	2064 66 6.164	2065 67 6.336	2066 68 6.514	2067 69 6.696	2068 70 6.884
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
TKM Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations				2060 hr-shr/yr.										
Facility/Administration				1.5										
Managers				0.5 FTE @	\$125					130	130	130	130	130
Engineers				0 FTE @	\$108					0	0	0	0	0
Other Tech.				0.5 FTE @	\$85					68	68	68	68	68
Administration/Support				0.5 FTE @	\$85					68	68	68	68	68
Operations/Process Facility				6										
Managers				0 FTE @	\$125					0	0	0	0	0
Engineers				0 FTE @	\$108					0	0	0	0	0
Other Tech.				0 FTE @	\$85					0	0	0	0	0
Supervisors				1.5 FTE @	\$85					265	265	265	265	265
Administration/Support				1 FTE @	\$85					135	135	135	135	135
Operators				2 FTE @	\$85					270	270	270	270	270
Maintenance				1 FTE @	\$85					135	135	135	135	135
Utilities				525 kw	\$0.0824 / kWh					90	90	90	90	90
Maintenance				2.00% of	61,253					613	613	613	613	308
Monitoring/Surveillance				2.00	\$65,000.00 yr					130	130	130	130	130
Operations subtotal (unescalated)						10	10	10	10	1,025	1,025	1,025	1,025	1,618
plus Escalation						44	45	47	48	9,038	10,270	10,611	10,962	9,521
plus Operations Contingency @				30.0%		18	17	17	18	3,559	3,658	3,761	3,868	3,342
Total Operations (w/ escalation & contingency)						70	72	74	76	15,421	15,853	16,297	16,753	14,481
Post Operations														
Decommission				10.00% of Engineering costs										
Decontamination				0.00% of Pre-operation Costs										
Demolition				8.00% of Pre-operation Costs										
Post-Operations Subtotal (unescalated)						0	0	0	0	0	0	0	0	0
plus Escalation						0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @				30.0%		0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)						0	0	0	0	0	0	0	0	0
Total Cost (unescalated)						10	10	10	10	1,025	1,025	1,025	1,025	1,618
Cumulative Total LCC (unescalated)						139,358	139,368	139,378	139,388	141,321	143,245	145,170	147,094	148,712
Total Cost (w/ escalation, mgt reserve, & contingency)						70	72	74	76	15,421	15,853	16,297	16,753	14,481
Cumulative Total LCC (escalated)						283,652	283,724	283,797	283,873	299,372	315,225	331,522	348,275	362,757
discount factor @ OMB discount rate of				6.30%	for escalated costs	41,548	44,163	46,046	48,003	53,047	58,369	63,718	67,732	71,999
Discounted Annual Cost						\$2	\$2	\$2	\$2	\$1	\$273	\$264	\$256	\$247
Cumulative Discounted LCC						100,620	100,622	100,624	100,625	100,627	100,600	101,185	101,420	101,688

escalated HLW WTS Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor	2069 71 7.076	2070 72 7.275	2071 73 7.478	Total Cost
Other Project Cost (OPC)								
OPC unescalated								
Conceptual Design, Project Mgt, & Permitting								9,441
Testing and Start-up								4,500
Total OPC (unescalated)					0	0	0	13,941
plus escalation of					0	0	0	4,469
plus management reserve of					0	0	0	0
plus contingency of					0	0	0	4,580
Total OPC including escalation, mgt reserve, & contingency					0	0	0	23,000
Total Estimated Cost (TEC)								
TEC unescalated								
TKM Design, Inspection								14,281
Project mgt								7,988
Construction Mgt								5,713
Construction, Equip, G&A & Procurement								81,253
Total TEC (unescalated)					0	0	0	89,245
plus escalation of					0	0	0	44,166
plus management reserve of					0	0	0	9,188
plus contingency of					0	0	0	18,901
Total TEC including escalation, mgt reserve, contingency					0	0	0	162,500
Total Project Cost (TPC)								
TPC unescalated					0	0	0	103,188
plus escalation of					0	0	0	48,634
plus management reserve of					0	0	0	9,188
plus contingency of					0	0	0	24,481
Total TPC including esc, mgt res, contingency					0	0	0	185,500
Operations								
Facility/Administration 2080 hr-shift/yr. 1.5								
Managers 0.5 FTE @ \$125 /hr.								3,055
Engineers 0 FTE @ \$108 /hr.								0
Other Tech. 0.5 FTE @ \$85 /hr.								2,077
Administration/Support 0.5 FTE @ \$85 /hr.								1,589
Operations/Process Facility 6								
Managers 0 FTE @ \$125 /hr.								0
Engineers 0 FTE @ \$108 /hr.								0
Other Tech. 0 FTE @ \$85 /hr.								0
Supervisors 1.5 FTE @ \$85 /hr.								6,232
Administration/Support 1 FTE @ \$85 /hr.								3,177
Operators 2 FTE @ \$85 /hr.								6,354
Maintenance 1 FTE @ \$85 /hr.								3,177
Utilities 525 kW \$0.0824 /kwh								2,115
Maintenance 2.00% of \$1,253								14,394
Monitoring/Surveillance 2.00 of \$65,000.00 yr								3,355
Operations subtotal (unescalated)					0	0	0	45,528
plus Escalation					0	0	0	90,825
plus Operations Contingency @ 30.0%					0	0	0	40,605
Total Operations (w/ escalation & contingency)					0	0	0	177,257
Post Operations								
Decommission 10.00% of Engineering costs					1,428	1,428	1,428	4,284
Decontamination 0.00% of Pre-operation Costs					0	0	0	0
Demolition 8.00% of Pre-operation Costs					8,255	8,255	8,255	24,785
Post-Operations Subtotal (unescalated)					9,683	9,683	9,683	29,049
plus Escalation					58,839	60,758	62,730	182,328
plus Post-Operations Contingency @ 30.0%					20,557	21,132	21,724	63,413
Total Post-Operations (w/ escalation & contingency)					89,079	91,573	94,137	274,788
Total Cost (unescalated)					9,683	9,683	9,683	177,761
Cumulative Total LCC (unescalated)					158,385	168,078	177,761	
Total Cost (w/ escalation, mgt reserve, & contingency)					89,079	91,573	94,137	637,545
Cumulative Total LCC (escalated)					451,835	543,408	637,545	
discount factor @ OMB discount rate of 6.30% for escalated costs					78,535	81,357	86,483	
Discounted Annual Cost					\$1,184	\$1,128	\$1,089	105,247
Cumulative Discounted LCC					103,033	104,158	105,247	

CUMULATIVE DISCOUNTED LCC HLW WTS INTERIM STORAGE FACILITY

TOTAL ANNUAL COST (escalated) HLW WTS INTERIM STORAGE FACILITY

TOTAL ANNUAL COST (escalated) HLW WTS INTERIM STORAGE FACILITY

Lockheed Martin Idaho Technologies Company**INTERDEPARTMENTAL COMMUNICATION****Date:** February 3, 1998**To:** John K. Rawlins MS 3765 6-4304**From:** R. J. Turk MS 3875 6-3611**Subject:** ECONOMIC AND LIFE CYCLE ANALYSIS CONDUCTED for the HIGH LEVEL WASTE (HLW) in FPR INTERIM STORAGE FACILITY-TRU
RJT-24-98**Purpose:**

As requested an Economic and Life-Cycle Cost (LCC) has been conducted to evaluate for the HLW-TRU (in FPR) INTERIM STORAGE FACILITY. The storage facility was evaluated based on a scoping study that incorporate appropriate design features from the Flour Daniel Corp. design for interim storage. This storage facility will be used to house canisters resulting from the TRU-HLW production option until final repository disposition.

This economic analysis is based on information provided by J. K. Rawlins, and K. L. Williams. R. D. Adams provided cost estimates. B.L. Blakely and D.E. Keller provided process personnel modeling.

Methodology:

The Economic Evaluation assumed a 73-year period (1999-2071) since this is the estimated time required to complete all of the anticipated remediation activities. The LCC identified and evaluated the initial development, construction, operating and post operating costs over the life-cycle. A discounted LCC analysis assumes a 1998-dollar basis, discounted 6.3% annually per the Office of Management and Budget (OMB) Circular A-94 for escalated costs. All costs are conservatively discounted assuming the end-of-year convention.

Assumptions:

The scope of work and requirements of all related activities are vague at this time. Facility and processing costs were developed from historical experience associated with DD&D work at the INEEL. The LCC analysis was generated to match cost estimating cost structure. These costs include Permitting, Direct and Indirect Construction, G&A, Procurement Fee, Engineering, Inspection, Project Management, Construction Management, Escalation and Contingency costs.

The design period is assumed to be accomplished in five-years with construction completed in two-years. Labor rates were assumed as follows: Managers, \$125/hr; Engineers, \$108 \$/hr; Other Technicians \$ 85/hr; Administration/support staff \$ 65/hr; Operators and Maintenance personnel \$ 65/hr. The operational period for this facility was assumed to be twenty years, to match the appropriate operating facility. This period is followed by five years for shipping to the repository, followed by three years of post-operations activities. Due to this project's lack of complexity and non-radioactive contaminated environment, this analysis assumed a decommissioning cost equal to 10% of the non-escalated engineering design cost, decontamination costs equal to 0% of non-escalated total pre-operation cost, and demolition costs equal to 8% of the non-escalated total pre-operation cost. Utilities were calculated assuming a \$.0824 per kWh. Surveillance and Monitoring costs were calculated at \$65,000 per year for manned security during operations then reduced to \$10,000 for remote surveillance during non-operation periods.

Results:

The HLW-TRU (in FPR) INTERIM STORAGE FACILITY has a discounted LCC of \$ 97.8 million.

Attachments:

cc: R. J. Turk File

escalated HLW Interim Storage Facility-TRU(In FPR) Life-Cycle Cost (LCC) Analysis (ALL COST \$1000)	fiscal year counting year Escalation Factor	1999 1	2000 2	2001 3	2002 4	2003 5	2004 6	2005 7	2006 8	2007 9	2008 10
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting		2,889	2,889	2,889							
Testing and Start-up											
Total OPC (unescalated)		2,889	2,889	2,889	0	0	0	0	0	0	0
plus escalation of		1,042	1,042	1,042	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		984	984	984	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		4,915	4,915	4,915	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
Title Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		2,889	2,889	2,889	0	0	0	0	0	0	0
plus escalation of		1,042	1,042	1,042	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		984	984	984	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		4,915	4,915	4,915	0	0	0	0	0	0	0
Operations 2080 hr-shft/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @ \$125 /hr.											
Engineers 0 FTE @ \$108 /hr.											
Other Tech. 0.5 FTE @ \$85 /hr.											
Administration/Support 0.5 FTE @ \$85 /hr.											
Operations/Process Facility 6											
Managers 0 FTE @ \$125 /hr.											
Engineers 0 FTE @ \$108 /hr.											
Other Tech. 0 FTE @ \$85 /hr.											
Supervisors 1.5 FTE @ \$85 /hr.											
Administration/Support 1 FTE @ \$85 /hr.											
Operators 2 FTE @ \$85 /hr.											
Maintenance 1 FTE @ \$85 /hr.											
Utilities 525 kw \$0.0824 /kwh											
Maintenance 2.00% of \$3,009											
Monitoring/Surveillance 2.00 \$85,000.00 /yr											
Operations subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)		2,889	2,889	2,889	0	0	0	0	0	0	0
Cumulative Total LCC (unescalated)		2,889	5,779	8,668	8,668	8,668	8,668	8,668	8,668	8,668	8,668
Total Cost (w/ escalation, mgt reserve, & contingency)		4,915	4,915	4,915	0	0	0	0	0	0	0
Cumulative Total LCC (escalated)		4,915	9,830	14,745	14,745	14,745	14,745	14,745	14,745	14,745	14,745
discount factor @ OMB discount rate of 6.30% for escalated costs		1.063	1.130	1.201	1.277	1.357	1.443	1.534	1.630	1.733	1.842
Discounted Annual Cost		\$4,824	\$4,350	\$4,092	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cumulative Discounted LCC		4,824	8,974	13,066	13,066	13,066	13,066	13,066	13,066	13,066	13,066

escalated HLW Interim Storage Facility-TRU(in FPR) Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor	2009 11 1.350	2010 12 1.387	2011 13 1.426	2012 14 1.466	2013 15 1.507	2014 16 1.550	2015 17 1.593	2016 18 1.638	2017 19 1.683	2018 20 1.730
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting Testing and Start-up										4,500				
Total OPC (Unescalated)					0	0	0	0	0	4,500	0	0	0	0
plus escalation of					0	0	0	0	0	1,622	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	1,532	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	7,655	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection						3,088	9,284							
Project mgt						578	2,306	2,306	1,729					
Construction Mgt								2,470	2,470					
Construction, Equip, G&A & Procurement								26,505	26,505					
Total TEC (unescalated)					0	3,664	11,570	31,281	30,704	0	0	0	0	0
plus escalation of					0	1,630	5,147	13,916	13,680	0	0	0	0	0
plus management reserve of					0	385	1,152	3,114	3,058	0	0	0	0	0
plus contingency of					0	804	2,538	6,883	6,738	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	6,483	20,407	55,173	54,157	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	3,664	11,570	31,281	30,704	4,500	0	0	0	0
plus escalation of					0	1,630	5,147	13,916	13,680	1,622	0	0	0	0
plus management reserve of					0	385	1,152	3,114	3,058	0	0	0	0	0
plus contingency of					0	804	2,538	6,883	6,738	1,532	0	0	0	0
Total TPC including esc, mgt res, contingency					0	6,483	20,407	55,173	54,157	7,655	0	0	0	0
Operations				2080 hr-shift/yr.										
Facility/Administration				1.5										
Managers				0.5 FTE @	\$125 / hr.					65	130	130	130	130
Engineers				0 FTE @	\$108 / hr.					0	0	0	0	0
Other Tech.				0.5 FTE @	\$85 / hr.					44	88	88	88	88
Administration/Support				0.5 FTE @	\$85 / hr.					34	68	68	68	68
Operations/Process Facility				8										
Managers				0 FTE @	\$125 / hr.					0	0	0	0	0
Engineers				0 FTE @	\$108 / hr.					0	0	0	0	0
Other Tech.				0 FTE @	\$85 / hr.					0	0	0	0	0
Supervisors				1.5 FTE @	\$85 / hr.					133	265	265	265	265
Administration/Support				1 FTE @	\$85 / hr.					68	135	135	135	135
Operators				2 FTE @	\$85 / hr.					135	270	270	270	270
Maintenance				1 FTE @	\$85 / hr.					68	135	135	135	135
Utilities				525 kw	\$0.0824 / kwh					45	90	90	90	90
Maintenance				2.00% of	\$3,009					530	530	530	530	530
Monitoring/Surveillance				2.00	\$65,000.00 yr					65	130	130	130	130
Operations subtotal (unescalated)						0	0	0	0	1,186	1,842	1,842	1,842	1,842
plus Escalation						0	0	0	0	652	1,092	1,174	1,259	1,346
plus Operations Contingency @				30.0%		0	0	0	0	551	880	905	930	958
Total Operations (w/ escalation & contingency)						0	0	0	0	2,389	3,815	3,921	4,031	4,144
Post Operations														
Decommission				10.00% of	Engineering costs					0	0	0	0	0
Decontamination				0.00% of	Pre-operation Costs					0	0	0	0	0
Demolition				8.00% of	Pre-operation Costs					0	0	0	0	0
Post-Operations Subtotal (unescalated)						0	0	0	0	0	0	0	0	0
plus Escalation						0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @				30.0%		0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)						0	0	0	0	0	0	0	0	0
Total Cost (unescalated)						0	3,664	11,570	31,281	30,704	5,686	1,842	1,842	1,842
Cumulative Total LCC (unescalated)						6,668	12,333	23,903	55,183	85,887	91,573	93,415	95,257	98,942
Total Cost (w/ escalation, mgt reserve, & contingency)						0	6,483	20,407	55,173	54,157	10,044	3,815	4,031	4,144
Cumulative Total LCC (escalated)						14,745	21,209	41,615	96,789	150,945	160,889	164,804	168,725	172,756
discount factor @ OMB discount rate of				6.30%	for escalated costs	1.958	2.082	2.213	2.352	2.500	2.658	2.825	3.003	3.193
Discounted Annual Cost						\$0	\$3,105	\$9,222	\$23,456	\$21,660	\$3,779	\$1,350	\$1,306	\$1,263
Cumulative Discounted LCC						13,088	16,171	25,393	48,849	70,509	74,288	75,638	76,944	78,207

escalated HLW Interim Storage Facility-TRU(In FPR) Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year counting year Escalation Factor	2019 21 1.779	2020 22 1.829	2021 23 1.880	2022 24 1.933	2023 25 1.987	2024 26 2.042	2025 27 2.100	2026 28 2.158	2027 29 2.219	2028 30 2.281
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
TKle Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, O&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shif/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @ \$125 /hr.		130	130	130	130	130	130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.		0	0	0	0	0	0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.		88	88	88	88	88	88	88	88	88	88
Administration/Support 0.5 FTE @ \$65 /hr.		68	68	68	68	68	68	68	68	68	68
Operations/Process Facility 6											
Managers 0 FTE @ \$125 /hr.		0	0	0	0	0	0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.		0	0	0	0	0	0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.		0	0	0	0	0	0	0	0	0	0
Supervisors 1.5 FTE @ \$85 /hr.		265	265	265	265	265	265	265	265	265	265
Administration/Support 1 FTE @ \$65 /hr.		135	135	135	135	135	135	135	135	135	135
Operators 2 FTE @ \$65 /hr.		270	270	270	270	270	270	270	270	270	270
Maintenance 1 FTE @ \$65 /hr.		135	135	135	135	135	135	135	135	135	135
Utilities 525 kw \$0.0824 /kwh		90	90	90	90	90	90	90	90	90	90
Maintenance 2.00% of \$3,009		530	530	530	530	530	530	530	530	530	530
Monitoring/Surveillance 2.00 \$65,000.00 yr		130	130	130	130	130	130	130	130	130	130
Operations subtotal (unescalated)		1,842	1,842	1,842	1,842	1,842	1,842	1,842	1,842	1,842	1,842
plus Escalation		1,435	1,527	1,621	1,718	1,818	1,920	2,025	2,134	2,245	2,359
plus Operations Contingency @ 30.0%		883	1,011	1,039	1,068	1,098	1,129	1,160	1,193	1,226	1,260
Total Operations (w/ escalation & contingency)		4,260	4,379	4,502	4,628	4,758	4,891	5,028	5,168	5,313	5,482
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)		1,842	1,842	1,842	1,842	1,842	1,842	1,842	1,842	1,842	1,842
Cumulative Total LCC (unescalated)		100,784	102,626	104,468	106,310	108,152	109,994	111,836	113,678	115,520	117,362
Total Cost (w/ escalation, mgt reserve, & contingency)		4,260	4,379	4,502	4,628	4,758	4,891	5,028	5,168	5,313	5,482
Cumulative Total LCC (escalated)		181,180	185,539	190,041	194,669	199,427	204,318	209,345	214,514	219,827	225,289
discount factor @ OMB discount rate of 6.30% for escalated costs		3.607	3.835	4.076	4.333	4.606	4.896	5.205	5.533	5.881	6.252
Discounted Annual Cost		\$1,181	\$1,142	\$1,104	\$1,068	\$1,033	\$999	\$968	\$934	\$903	\$874
Cumulative Discounted LCC		60,609	61,751	62,855	63,923	64,958	65,955	66,921	67,855	68,758	69,632

escalated HLW Interim Storage Facility-TRU(In FPR)

Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Escalation Factor					31	32	33	34	35	36	37	38	39	40
					2.345	2.410	2.478	2.547	2.619	2.692	2.767	2.845	2.924	3.008
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting														
Testing and Start-up														
Total OPC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt														
Construction Mgt														
Construction, Equip, G&A & Procurement														
Total TEC (unescalated)					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					0	0	0	0	0	0	0	0	0	0
plus escalation of					0	0	0	0	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shif/yr.														
Facility/Administration 1.5														
Managers 0.5 FTE @ \$125 /hr.					130	130	130	130	130					
Engineers 0 FTE @ \$108 /hr.					0	0	0	0	0					
Other Tech. 0.5 FTE @ \$85 /hr.					88	88	88	88	88					
Administration/Support 0.5 FTE @ \$85 /hr.					88	88	88	88	88					
Operations/Process Facility 6														
Managers 0 FTE @ \$125 /hr.					0	0	0	0	0					
Engineers 0 FTE @ \$108 /hr.					0	0	0	0	0					
Other Tech. 0 FTE @ \$85 /hr.					0	0	0	0	0					
Supervisors 1.5 FTE @ \$85 /hr.					285	285	285	285	285					
Administration/Support 1 FTE @ \$85 /hr.					135	135	135	135	135					
Operators 2 FTE @ \$85 /hr.					270	270	270	270	270					
Maintenance 1 FTE @ \$85 /hr.					135	135	135	135	135					
Utilities 525 kw \$0.0824 /kwh					90	90	90	90	90					
Maintenance 2.00% of \$3,069					530	530	530	530	530					
Monitoring/Surveillance 2.00 of \$85,000.00 yr					130	130	130	130	130	10	10	10	10	10
Operations subtotal (unescalated)					1,842	1,842	1,842	1,842	1,842	10	10	10	10	10
plus Escalation					2,477	2,598	2,722	2,850	2,982	17	18	18	19	20
plus Operations Contingency @ 30.0%					1,298	1,332	1,369	1,408	1,447	8	8	9	9	9
Total Operations (w/ escalation & contingency)					5,615	5,772	5,934	6,100	6,271	35	38	37	38	39
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					1,842	1,842	1,842	1,842	1,842	10	10	10	10	10
Cumulative Total LCC (unescalated)					119,204	121,046	122,889	124,731	126,573	128,583	128,593	128,603	128,613	128,623
Total Cost (w/ escalation, mgt reserve, & contingency)					5,615	5,772	5,934	6,100	6,271	35	38	37	38	39
Cumulative Total LCC (escalated)					230,804	238,878	242,810	248,710	254,981	255,015	255,051	255,088	255,126	255,166
discount factor @ OMB discount rate of 6.30% for escalated costs					6,648	7,064	7,509	7,982	8,485	9,020	9,588	10,182	10,834	11,517
Discounted Annual Cost					\$845	\$817	\$790	\$764	\$739	\$4	\$4	\$4	\$4	\$3
Cumulative Discounted LCC					90,477	91,294	92,084	92,848	93,587	93,591	93,595	93,599	93,602	93,606

escalated HLW Interim Storage Facility-TRU(In FPR)	fiscal year	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
Life-Cycle Cost (LCC) Analysis	counting year	41	42	43	44	45	46	47	48	49	50
(ALL COST X1000)	Escalation Factor	3.090	3.177	3.266	3.357	3.451	3.548	3.647	3.750	3.855	3.962
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
TKle Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated											
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shift/yr.											
Facility/Administration 1.5											
Managers	0.5 FTE @	\$125	/hr.								
Engineers	0 FTE @	\$108	/hr.								
Other Tech.	0.5 FTE @	\$85	/hr.								
Administration/Support	0.5 FTE @	\$85	/hr.								
Operations/Process Facility 6											
Managers	0 FTE @	\$125	/hr.								
Engineers	0 FTE @	\$108	/hr.								
Other Tech.	0 FTE @	\$85	/hr.								
Supervisors	1.5 FTE @	\$85	/hr.								
Administration/Support	1 FTE @	\$85	/hr.								
Operators	2 FTE @	\$85	/hr.								
Maintenance	1 FTE @	\$85	/hr.								
Utilities	525 kw	\$0.0824	/kwh								
Maintenance	2.00% of	\$3,009									
Monitoring/Surveillance	2.00	\$65,000.00	yr								
Operations subtotal (unescalated)		10		10	10	10	10	10	10	10	10
plus Escalation		21		22	23	24	25	26	27	29	30
plus Operations Contingency @ 30.0%		9		10	10	10	11	11	11	12	12
Total Operations (w/ escalation & contingency)		40		41	42	44	46	47	49	50	52
Post Operations											
Decommission	10.00% of	Engineering costs									
Decontamination	0.00% of	Pre-operation Costs									
Demolition	0.00% of	Pre-operation Costs									
Post-Operations Subtotal (unescalated)		0		0	0	0	0	0	0	0	0
plus Escalation		0		0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0		0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0		0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)		126,833		126,843	126,853	126,863	126,873	126,883	126,893	126,903	126,913
Total Cost (w/ escalation, mgt reserve, & contingency)		40		41	42	44	46	47	49	50	52
Cumulative Total LCC (escalated)		255,206		255,247	255,289	255,333	255,378	255,424	255,472	255,520	255,570
discount factor @ OMB discount rate of 6.30%		12.242		13.014	13.833	14.705	15.631	16.616	17.663	18.776	19.959
Discounted Annual Cost		\$3		\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$2
Cumulative Discounted LCC		93,609		93,612	93,615	93,618	93,621	93,624	93,626	93,629	93,634

escalated HLW Interim Storage Facility-TRU(In FPR)				fiscal year		2049	2050	2051	2052	2053	2054	2055	2056	2057	2058
Life-Cycle Cost (LCC) Analysis				counting year		51	52	53	54	55	56	57	58	59	60
(ALL COST X1000)				Escalation Factor		4.073	4.187	4.305	4.425	4.549	4.677	4.807	4.942	5.080	5.223
Other Project Cost (OPC)															
OPC unescalated															
Conceptual Design, Project Mgt, & Permitting															
Testing and Start-up															
Total OPC (unescalated)						0	0	0	0	0	0	0	0	0	0
plus escalation of						0	0	0	0	0	0	0	0	0	0
plus management reserve of						0	0	0	0	0	0	0	0	0	0
plus contingency of						0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency						0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)															
TEC unescalated															
Title Design, Inspection															
Project mgt															
Construction Mgt															
Construction, Equip, G&A & Procurement															
Total TEC (unescalated)						0	0	0	0	0	0	0	0	0	0
plus escalation of						0	0	0	0	0	0	0	0	0	0
plus management reserve of						0	0	0	0	0	0	0	0	0	0
plus contingency of						0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency						0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)															
TPC unescalated						0	0	0	0	0	0	0	0	0	0
plus escalation of						0	0	0	0	0	0	0	0	0	0
plus management reserve of						0	0	0	0	0	0	0	0	0	0
plus contingency of						0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency						0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shr/yr.															
Facility/Administration 1.5															
Managers 0.5 FTE @ \$125 /hr.															
Engineers 0 FTE @ \$108 /hr.															
Other Tech. 0.5 FTE @ \$85 /hr.															
Administration/Support 0.5 FTE @ \$85 /hr.															
Operations/Process Facility 8															
Managers 0 FTE @ \$125 /hr.															
Engineers 0 FTE @ \$108 /hr.															
Other Tech. 0 FTE @ \$85 /hr.															
Supervisors 1.5 FTE @ \$85 /hr.															
Administration/Support 1 FTE @ \$85 /hr.															
Operators 2 FTE @ \$85 /hr.															
Maintenance 1 FTE @ \$85 /hr.															
Utilities 525 kw \$0.0824 /kwh															
Maintenance 2.00% of \$3,009															
Monitoring/Surveillance 2.00 \$65,000.00 yr						10	10	10	10	10	10	10	10	10	10
Operations subtotal (unescalated)						10	10	10	10	10	10	10	10	10	10
plus Escalation						31	32	33	34	35	37	38	39	41	42
plus Operations Contingency @ 30.0%						12	13	13	13	14	14	14	15	15	16
Total Operations (w/ escalation & contingency)						53	54	56	58	59	61	62	64	66	68
Post Operations															
Decommission 10.00% of Engineering costs															
Decontamination 0.00% of Pre-operation Costs															
Demolition 8.00% of Pre-operation Costs															
Post-Operations Subtotal (unescalated)						0	0	0	0	0	0	0	0	0	0
plus Escalation						0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%						0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)						0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)						10	10	10	10	10	10	10	10	10	10
Cumulative Total LCC (unescalated)						126,733	126,743	126,753	126,763	126,773	126,783	126,793	126,803	126,813	126,823
Total Cost (w/ escalation, mgt reserve, & contingency)						53	54	56	58	59	61	62	64	66	68
Cumulative Total LCC (escalated)						255,875	255,729	255,785	255,843	255,902	255,963	256,025	256,089	256,156	256,223
discount factor @ OMB discount rate of 6.30% for escalated costs						22.553	23.973	25.484	27.089	28.796	30.610	32.538	34.588	36.767	39.084
Discounted Annual Cost						\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
Cumulative Discounted LCC						93,636	93,639	93,641	93,643	93,645	93,647	93,649	93,651	93,652	93,654

escalated HLW Interim Storage Facility-TRU(in FPR) Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year counting year Escalation Factor	2059 61 5.369	2060 62 5.519	2061 63 5.674	2062 64 5.833	2063 65 5.998	2064 66 6.164	2065 67 6.338	2066 68 6.514	2067 69 6.696	2068 70 6.884
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
TKle Design, Inspection Project mgt Construction Mgt Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations 2080 hr-shft/yr.											
Facility/Administration 1.5											
Managers 0.5 FTE @ \$125 /hr.							130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.							0	0	0	0	0
Other Tech. 0.5 FTE @ \$85 /hr.							88	88	88	88	88
Administration/Support 0.5 FTE @ \$85 /hr.							88	88	88	88	88
Operations/Process Facility 8											
Managers 0 FTE @ \$125 /hr.							0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.							0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.							0	0	0	0	0
Supervisors 1.5 FTE @ \$85 /hr.							265	265	265	265	265
Administration/Support 1 FTE @ \$85 /hr.							135	135	135	135	135
Operators 2 FTE @ \$85 /hr.							270	270	270	270	270
Maintenance 1 FTE @ \$85 /hr.							135	135	135	135	135
Utilities 525 kw \$0.0824 /kwh							90	90	90	90	90
Maintenance 2.00% of \$85,000.00 yr							530	530	530	530	265
Monitoring/Surveillance 2.00							130	130	130	130	130
Operations subtotal (unescalated)		10	10	10	10	10	1,842	1,842	1,842	1,842	1,577
plus Escalation 44		44	45	47	48	50	9,512	9,830	10,157	10,493	9,270
plus Operations Contingency @ 30.0%		16	17	17	17	18	3,408	3,502	3,600	3,700	3,257
Total Operations (w/ escalation & contingency)		70	72	74	76	78	14,781	15,174	15,599	16,035	14,113
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)		0	0	0	0	0	0	0	0	0	0
plus Escalation 0		0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%		0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)		0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)		10	10	10	10	10	1,842	1,842	1,842	1,842	1,577
Cumulative Total LCC (unescalated)		126,833	126,843	126,853	126,863	126,873	128,715	130,557	132,399	134,241	135,818
Total Cost (w/ escalation, mgt reserve, & contingency)		70	72	74	76	78	14,781	15,174	15,599	16,035	14,113
Cumulative Total LCC (escalated)		250,293	250,365	250,439	250,515	250,592	271,353	286,527	302,126	318,181	332,274
discount factor @ OMB discount rate of 6.30%		41,546	44,183	46,946	49,903	53,047	56,389	59,942	63,718	67,732	71,999
Discounted Annual Cost		\$2	\$2	\$2	\$2	\$1	\$262	\$253	\$245	\$237	\$198
Cumulative Discounted LCC		93,658	93,658	93,659	93,661	93,662	93,924	94,177	94,422	94,659	94,855

escalated HLW Interim Storage Facility-TRU(In FPR) Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year counting year Escalation Factor	2069 71 7.076	2070 72 7.275	2071 73 7.478	Total Cost
Other Project Cost (OPC)					
OPC unescalated					
Conceptual Design, Project Mgt, & Permitting					6,668
Testing and Start-up					4,500
Total OPC (unescalated)		0	0	0	13,168
plus escalation of		0	0	0	4,747
plus management reserve of		0	0	0	0
plus contingency of		0	0	0	4,484
Total OPC including escalation, mgt reserve, & contingency		0	0	0	22,400
Total Estimated Cost (TEC)					
TEC unescalated					
TRU Design, Inspection					12,352
Project mgt					6,817
Construction Mgt					4,941
Construction, Equip, G&A & Procurement					53,009
Total TEC (unescalated)		0	0	0	77,219
plus escalation of		0	0	0	34,353
plus management reserve of		0	0	0	7,686
plus contingency of		0	0	0	16,942
Total TEC including escalation, mgt reserve, contingency		0	0	0	136,200
Total Project Cost (TPC)					
TPC unescalated		0	0	0	90,387
plus escalation of		0	0	0	39,100
plus management reserve of		0	0	0	7,686
plus contingency of		0	0	0	21,426
Total TPC including esc, mgt res, contingency		0	0	0	158,600
Operations 2080 hr-shr/yr.					
Facility/Administration 1.5					
Managers 0.5 FTE @ \$125 / hr.					3,165
Engineers 0 FTE @ \$108 / hr.					0
Other Tech. 0.5 FTE @ \$85 / hr.					2,166
Administration/Support 0.5 FTE @ \$65 / hr.					1,656
Operations/Process Facility 8					
Managers 0 FTE @ \$125 / hr.					0
Engineers 0 FTE @ \$108 / hr.					0
Other Tech. 0 FTE @ \$85 / hr.					0
Supervisors 1.5 FTE @ \$85 / hr.					6,497
Administration/Support 1 FTE @ \$65 / hr.					3,312
Operators 2 FTE @ \$65 / hr.					6,625
Maintenance 1 FTE @ \$65 / hr.					3,312
Utilities 525 kw \$0.0824 /kwh					2,205
Maintenance 2.00% of \$3,009					12,987
Monitoring/Surveillance 2.00 \$85,000.00 yr					3,465
Operations subtotal (unescalated)		0	0	0	45,431
plus Escalation		0	0	0	88,164
plus Operations Contingency @ 30.0%		0	0	0	40,079
Total Operations (w/ escalation & contingency)		0	0	0	173,674
Post Operations					
Decommission 10.00% of Engineering costs		1,235	1,235	1,235	3,706
Decontamination 0.00% of Pre-operation Costs		0	0	0	0
Demolition 8.00% of Pre-operation Costs		7,231	7,231	7,231	21,693
Post-Operations Subtotal (unescalated)		8,466	8,466	8,466	25,399
plus Escalation		51,445	53,122	54,647	159,413
plus Post-Operations Contingency @ 30.0%		17,973	18,477	18,894	55,444
Total Post-Operations (w/ escalation & contingency)		77,884	80,065	82,307	240,258
Total Cost (unescalated)		8,466	8,466	8,466	161,217
Cumulative Total LCC (unescalated)		144,284	152,750	161,217	
Total Cost (w/ escalation, mgt reserve, & contingency)		77,884	80,065	82,307	572,529
Cumulative Total LCC (escalated)		410,158	490,223	572,529	
discount factor @ OMB discount rate of 6.30% for escalated costs		78,535	81,357	86,483	
Discounted Annual Cost		\$1,018	\$984	\$952	97,808
Cumulative Discounted LCC		95,872	86,856	97,808	

**CUMULATIVE DISCOUNTED LCC
HLW INTERIM STORAGE FACILITY-TRU (in FPR)**

**TOTAL ANNUAL COST (escalated)
HLW INTERIM STORAGE FACILITY-TRU (in FPR)**

Lockheed Martin Idaho Technologies Company

INTERDEPARTMENTAL COMMUNICATION

Date: January 30, 1998**To:** John K. Rawlins MS 3765 6-4304**From:** R. J. Turk MS 3875 6-3611**Subject:** ECONOMIC AND LIFE CYCLE ANALYSIS CONDUCTED for the HOT ISOSTATIC PRESSING (HIP) STORAGE FACILITY in FPR- RJT-17-98**Purpose:**

As requested an Economic and Life-Cycle Cost (LCC) has been conducted to evaluate the INTERIM STORAGE FACILITY in FPR. The storage facility was evaluated based on information received by your team. This storage facility will be used to house canisters resulting from the HIP production option until final repository disposition.

This economic analysis is based on information provided by J. K. Rawlins, and K. L. Williams. R. D. Adams provided cost estimates. D. Keller provided process personnel modeling.

Methodology:

The Economic Evaluation assumed a 69-year period (2003-2071) since this is the estimated time required to complete all of the anticipated remediation activities. The LCC identified and evaluated the initial development, construction, operating and post operating costs over the life-cycle. A discounted LCC analysis assumes a 1998-dollar basis, discounted 6.3% annually per the Office of Management and Budget (OMB) Circular A-94 for escalated costs. All costs are conservatively discounted assuming the end-of-year convention.

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Assumptions:

The scope of work and requirements of all related activities are vague at this time. Facility and processing costs were developed from historical experience associated with DD&D work at the INEEL. The LCC analysis was generated to match cost estimating cost structure. These costs include Permitting, Direct and Indirect Construction, G&A, Procurement Fee, Engineering, Inspection, Project Management, Construction Management, Escalation and Contingency costs.

The design period is assumed to be accomplished in five-years with construction completed in six-years. Labor rates were assumed as follows: Managers, \$125/hr; Engineers, \$108 \$/hr; Other Technicians \$ 85/hr; Administration/support staff \$ 65/hr; Operators and Maintenance personnel \$ 65/hr. The operational period for this facility was assumed to be twenty years, to match the appropriate operating facility. This period is followed by five years for shipping to the repository, followed by three years of post-operations activities. Due to this project's lack of complexity and non-radioactive contaminated environment, this analysis assumed a decommissioning cost equal to 10% of the non-escalated engineering design cost, decontamination costs equal to 0% of non-escalated total pre-operation cost, and demolition costs equal to 8% of the non-escalated total pre-operation cost. Utilities were calculated assuming a \$.0824 per kWh. Surveillance and Monitoring costs were calculated at \$65,000 per employee per year for manned security during operations then reduced to \$10,000 for remote surveillance during non-operation periods.

Results:

The HOT ISOSTATIC PRESSING FACILITY INTERIM STORAGE in FPR has a discounted LCC of \$ 231 million.

Attachments:

cc: R. J. Turk File

[illegible]

escalated HOT ISOSTATIC PRESSING Interim Storage Facility				fiscal year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Life-Cycle Cost (LCC) Analysis				counting year	11	12	13	14	15	16	17	18	19	20
(ALL COST \$1000)				Escalation Factor	1.350	1.387	1.428	1.468	1.507	1.550	1.593	1.638	1.683	1.730
Other Project Cost (OPC)														
OPC unescalated														
Conceptual Design, Project Mgt, & Permitting								4,500						
Testing and Start-up								4,500						
Total OPC (unescalated)					0	0	0	4,500	0	0	0	0	0	0
plus escalation of					0	0	0	1,277	0	0	0	0	0	0
plus management reserve of					0	0	0	0	0	0	0	0	0	0
plus contingency of					0	0	0	1,433	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency					0	0	0	7,210	0	0	0	0	0	0
Total Estimated Cost (TEC)														
TEC unescalated														
Title Design, Inspection														
Project mgt					6,164	6,164	6,164							
Construction Mgt					4,403	4,403	4,403							
Construction, Equip, G&A & Procurement					47,140	47,140	47,140							
Total TEC (unescalated)					57,708	57,708	57,708	0	0	0	0	0	0	0
plus escalation of					20,715	20,715	20,715	0	0	0	0	0	0	0
plus management reserve of					5,655	5,655	5,655	0	0	0	0	0	0	0
plus contingency of					11,040	11,040	11,040	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency					95,115	95,115	95,115	0	0	0	0	0	0	0
Total Project Cost (TPC)														
TPC unescalated					57,708	57,708	57,708	4,500	0	0	0	0	0	0
plus escalation of					20,715	20,715	20,715	1,277	0	0	0	0	0	0
plus management reserve of					5,655	5,655	5,655	0	0	0	0	0	0	0
plus contingency of					11,040	11,040	11,040	1,433	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency					95,115	95,115	95,115	7,210	0	0	0	0	0	0
Operations														
2080 hr-ship/yr.														
Facility/Administration 1														
Managers 0.5 FTE @ \$125 / hr.								65	130	130	130	130	130	130
Engineers 0 FTE @ \$108 / hr.								0	0	0	0	0	0	0
Other Tech. 0 FTE @ \$85 / hr.								0	0	0	0	0	0	0
Administration/Support 0.5 FTE @ \$85 / hr.								34	68	68	68	68	68	68
Operations/Process Facility 5														
Managers 0 FTE @ \$125 / hr.								0	0	0	0	0	0	0
Engineers 0 FTE @ \$108 / hr.								0	0	0	0	0	0	0
Other Tech. 0 FTE @ \$85 / hr.								0	0	0	0	0	0	0
Supervisors 1 FTE @ \$85 / hr.								88	177	177	177	177	177	177
Administration/Support 1 FTE @ \$85 / hr.								88	135	135	135	135	135	135
Operators 2 FTE @ \$85 / hr.								135	270	270	270	270	270	270
Maintenance 1 FTE @ \$85 / hr.								88	135	135	135	135	135	135
Utilities 525 kW/hr \$0.0824 / kwh								45	90	90	90	90	90	90
Maintenance 2.00% of \$45,000.00 / yr								1,414	2,828	2,828	2,828	2,828	2,828	2,828
Monitoring/Surveillance 2.00 \$85,000.00 / yr								65	130	130	130	130	130	130
Operations subtotal (unescalated)					0	0	0	1,982	3,964	3,964	3,964	3,964	3,964	3,964
plus Escalation					0	0	0	924	2,011	2,178	2,350	2,527	2,709	2,895
plus Operations Contingency @ 30.0%					0	0	0	872	1,762	1,842	1,954	2,092	2,250	2,417
Total Operations (w/ escalation & contingency)					0	0	0	3,778	7,737	7,984	8,208	8,437	8,674	8,917
Post Operations														
Decommission 10.00% of Engineering costs														
Decontamination 0.00% of Pre-operation Costs														
Demolition 8.00% of Pre-operation Costs														
Post-Operations Subtotal (unescalated)					0	0	0	0	0	0	0	0	0	0
plus Escalation					0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%					0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)					0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)					57,708	57,708	57,708	6,482	3,964	3,964	3,964	3,964	3,964	3,964
Cumulative Total LCC (unescalated)					84,038	151,744	209,450	215,932	219,895	223,859	227,823	231,786	235,750	239,713
Total Cost (w/ escalation, mgt reserve, & contingency)					95,115	95,115	95,115	10,887	7,787	7,984	8,208	8,437	8,674	8,917
Cumulative Total LCC (escalated)					154,460	249,575	344,690	355,678	363,444	371,428	379,638	388,073	396,747	405,664
discount factor @ OMB discount rate of 8.30% for escalated costs					1.958	2.082	2.213	2.352	2.500	2.658	2.825	3.003	3.193	3.394
Discounted Annual Cost					\$48,572	\$45,693	\$42,885	\$40,671	\$38,106	\$35,604	\$33,205	\$30,899	\$28,717	\$26,627
Cumulative Discounted LCC					\$3,688	\$129,379	\$172,384	\$177,035	\$180,142	\$183,146	\$186,051	\$188,860	\$191,577	\$194,204

escalated HOT ISOSTATIC PRESSING Interim Storage Facility	fiscal year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Life-Cycle Cost (LCC) Analysis	In FPR	21	22	23	24	25	26	27	28	29	30
(ALL COST X1000)	Escalation Factor	1.779	1.829	1.880	1.933	1.987	2.042	2.100	2.158	2.219	2.281
Other Project Cost (OPC)											
OPC unescalated											
Conceptual Design, Project Mgt, & Permitting											
Testing and Start-up											
Total OPC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency		0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)											
TEC unescalated											
TKle Design, Inspection											
Project mgt											
Construction Mgt											
Construction, Equip, G&A & Procurement											
Total TEC (unescalated)		0	0	0	0	0	0	0	0	0	0
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency		0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)											
TPC unescalated											
plus escalation of		0	0	0	0	0	0	0	0	0	0
plus management reserve of		0	0	0	0	0	0	0	0	0	0
plus contingency of		0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency		0	0	0	0	0	0	0	0	0	0
Operations											
2080 hr-shft/yr.											
Facility/Administration 1											
Managers	0.5 FTE @	\$125 / hr.	130	130	130	130	130	130	130	130	130
Engineers	0 FTE @	\$108 / hr.	0	0	0	0	0	0	0	0	0
Other Tech.	0 FTE @	\$85 / hr.	0	0	0	0	0	0	0	0	0
Administration/Support	0.5 FTE @	\$85 / hr.	68	68	68	68	68	68	68	68	68
Operations/Process Facility 5											
Managers	0 FTE @	\$125 / hr.	0	0	0	0	0	0	0	0	0
Engineers	0 FTE @	\$108 / hr.	0	0	0	0	0	0	0	0	0
Other Tech.	0 FTE @	\$85 / hr.	0	0	0	0	0	0	0	0	0
Supervisors	1 FTE @	\$85 / hr.	177	177	177	177	177	177	177	177	177
Administration/Support	1 FTE @	\$85 / hr.	135	135	135	135	135	135	135	135	135
Operators	2 FTE @	\$85 / hr.	270	270	270	270	270	270	270	270	270
Maintenance	1 FTE @	\$85 / hr.	135	135	135	135	135	135	135	135	135
Utilities	525 kWhr	\$0.0824 / kWh	90	90	90	90	90	90	90	90	90
Maintenance	2.00% of	141,419	2,828	2,828	2,828	2,828	2,828	2,828	2,828	2,828	2,828
Monitoring/Surveillance	2.00	\$65,000.00 / yr	130	130	130	130	130	130	130	130	130
Operations subtotal (unescalated)			3,964	3,964	3,964	3,964	3,964	3,964	3,964	3,964	3,964
plus Escalation			3,087	3,285	3,488	3,696	3,911	4,131	4,358	4,591	4,831
plus Operations Contingency @ 30.0%			2,115	2,175	2,235	2,298	2,362	2,428	2,496	2,568	2,638
Total Operations (w/ escalation & contingency)			9,166	9,423	9,687	9,958	10,237	10,523	10,818	11,121	11,432
Post Operations											
Decommission 10.00% of Engineering costs											
Decontamination 0.00% of Pre-operation Costs											
Demolition 8.00% of Pre-operation Costs											
Post-Operations Subtotal (unescalated)			0	0	0	0	0	0	0	0	0
plus Escalation			0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%			0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)			0	0	0	0	0	0	0	0	0
Total Cost (unescalated)											
Cumulative Total LCC (unescalated)			3,964	3,964	3,964	3,964	3,964	3,964	3,964	3,964	3,964
Total Cost (w/ escalation, mgt reserve, & contingency)			243,677	247,640	251,604	255,567	259,531	263,495	267,458	271,422	275,385
Cumulative Total LCC (escalated)			9,166	9,423	9,687	9,958	10,237	10,523	10,818	11,121	11,432
discount factor @ OMB discount rate of 8.30% for escalated costs			414,830	424,253	433,940	443,897	454,134	464,658	475,476	486,597	498,029
Discounted Annual Cost			3,607	3,835	4,076	4,333	4,606	4,896	5,205	5,533	5,881
Cumulative Discounted LCC			\$2,541	\$2,457	\$2,376	\$2,298	\$2,222	\$2,149	\$2,079	\$2,010	\$1,944
			196,745	199,203	201,579	203,877	206,100	208,249	210,327	212,337	214,281

escalated HOT ISOSTATIC PRESSING Interim Storage Facility				fiscal year									
Life-Cycle Cost (LCC) Analysis in FPR				counting year									
(ALL COST X1000)				Escalation Factor									
				2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
				31	32	33	34	35	36	37	38	39	40
				2,345	2,410	2,478	2,547	2,619	2,692	2,767	2,845	2,924	3,006
Other Project Cost (OPC)													
OPC unescalated													
Conceptual Design, Project Mgt, & Permitting													
Testing and Start-up													
Total OPC (unescalated)				0	0	0	0	0	0	0	0	0	0
plus escalation of				0	0	0	0	0	0	0	0	0	0
plus management reserve of				0	0	0	0	0	0	0	0	0	0
plus contingency of				0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency				0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)													
TEC unescalated													
TKIE Design, Inspection													
Project mgt													
Construction Mgt													
Construction, Equip, G&A & Procurement													
Total TEC (unescalated)				0	0	0	0	0	0	0	0	0	0
plus escalation of				0	0	0	0	0	0	0	0	0	0
plus management reserve of				0	0	0	0	0	0	0	0	0	0
plus contingency of				0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency				0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)													
TPC unescalated				0	0	0	0	0	0	0	0	0	0
plus escalation of				0	0	0	0	0	0	0	0	0	0
plus management reserve of				0	0	0	0	0	0	0	0	0	0
plus contingency of				0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency				0	0	0	0	0	0	0	0	0	0
Operations				2080 hr-shift/yr.									
Facility/Administration				1									
Managers				0.5 FTE @	\$125 /hr.	130	130	130	130				
Engineers				0 FTE @	\$108 /hr.	0	0	0	0				
Other Tech.				0 FTE @	\$85 /hr.	0	0	0	0				
Administration/Support				0.5 FTE @	\$85 /hr.	68	68	68	68				
Operations/Process Facility				5									
Managers				0 FTE @	\$125 /hr.	0	0	0	0				
Engineers				0 FTE @	\$108 /hr.	0	0	0	0				
Other Tech.				0 FTE @	\$85 /hr.	0	0	0	0				
Supervisors				1 FTE @	\$85 /hr.	177	177	177	177				
Administration/Support				1 FTE @	\$85 /hr.	135	135	135	135				
Operators				2 FTE @	\$85 /hr.	270	270	270	270				
Maintenance				1 FTE @	\$85 /hr.	135	135	135	135				
Utilities				525 kW/yr	\$0.0824 /kwh	90	90	90	90				
Maintenance				2.00% of	\$85,000.00 /yr	2,828	2,828	2,828	2,828				
Monitoring/Surveillance				2.00		130	130	130	130	10	10	10	10
Operations subtotal (unescalated)						3,064	3,064	3,064	3,064	10	10	10	10
plus Escalation						5,330	5,590	5,858	6,133	16	17	18	20
plus Operations Contingency @ 30.0%						2,708	2,865	2,946	3,029	8	9	9	9
Total Operations (w/ escalation & contingency)						12,082	12,420	12,768	13,125	34	35	36	39
Post Operations													
Decommission				10.00% of Engineering costs									
Decontamination				0.00% of Pre-operation Costs									
Demolition				8.00% of Pre-operation Costs									
Post-Operations Subtotal (unescalated)						0	0	0	0	0	0	0	0
plus Escalation						0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%						0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)						0	0	0	0	0	0	0	0
Total Cost (unescalated)						3,064	3,064	3,064	3,064	10	10	10	10
Cumulative Total LCC (unescalated)						283,312	287,276	291,240	295,203	295,213	295,223	295,233	295,243
Total Cost (w/ escalation, mgt reserve, & contingency)						12,082	12,420	12,768	13,125	34	35	36	39
Cumulative Total LCC (escalated)						521,863	534,283	547,051	560,178	560,210	560,245	560,281	560,318
discount factor @ OMB discount rate of 6.30% for escalated costs						6,646	7,064	7,509	7,982	8,485	9,020	9,588	10,182
Discounted Annual Cost						\$1,818	\$1,758	\$1,700	\$1,644	\$4	\$4	\$4	\$4
Cumulative Discounted LCC						217,978	219,737	221,438	223,082	223,088	223,090	223,093	223,097

escalated HOT ISOSTATIC PRESSING Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)	fiscal year In FPR counting year Escalation Factor	2039 41 3.090	2040 42 3.177	2041 43 3.266	2042 44 3.357	2043 45 3.451	2044 46 3.548	2045 47 3.647	2046 48 3.750	2047 49 3.855	2048 50 3.962
Other Project Cost (OPC) OPC unescalated Conceptual Design, Project Mgt, & Permitting Testing and Start-up Total OPC (unescalated) plus escalation of plus management reserve of plus contingency of Total OPC including escalation, mgt reserve, & contingency		0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Total Estimated Cost (TEC) TEC unescalated TKle Design, Inspection Project mgt Construction Mgt Construction, Equip, G&A & Procurement Total TEC (unescalated) plus escalation of plus management reserve of plus contingency of Total TEC including escalation, mgt reserve, contingency		0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0
Total Project Cost (TPC) TPC unescalated plus escalation of plus management reserve of plus contingency of Total TPC including esc, mgt res, contingency		0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Operations 2080 hr-shift/yr. Facility/Administration 1 Managers 0.5 FTE @ \$125 /hr. Engineers 0 FTE @ \$108 /hr. Other Tech. 0 FTE @ \$85 /hr. Administration/Support 0.5 FTE @ \$65 /hr. Operations/Process Facility 5 Managers 0 FTE @ \$125 /hr. Engineers 0 FTE @ \$108 /hr. Other Tech. 0 FTE @ \$85 /hr. Supervisors 1 FTE @ \$85 /hr. Administration/Support 1 FTE @ \$65 /hr. Operators 2 FTE @ \$65 /hr. Maintenance 1 FTE @ \$65 /hr. Utilities 525 kW/hr \$0.0824 /kwh Maintenance 2.00% of 141,418 Monitoring/Surveillance 2.00 \$65,000.00 yr Operations subtotal (unescalated) plus Escalation plus Operations Contingency @ 30.0% Total Operations (w/ escalation & contingency)		10 10 21 9 40	10 10 22 10 41	10 10 23 10 42	10 10 24 10 44	10 10 25 10 45	10 10 25 11 46	10 10 26 11 47	10 10 27 11 49	10 10 29 12 50	10 10 30 12 52
Post Operations Decommission 10.00% of Engineering costs Decontamination 0.00% of Pre-operation Costs Demolition 8.00% of Pre-operation Costs Post-Operations Subtotal (unescalated) plus Escalation plus Post-Operations Contingency @ 30.0% Total Post-Operations (w/ escalation & contingency)		0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Total Cost (unescalated) Cumulative Total LCC (unescalated) Total Cost (w/ escalation, mgt reserve, & contingency) Cumulative Total LCC (escalated) discount factor @ OMB discount rate of 6.30% for escalated costs Discounted Annual Cost Cumulative Discounted LCC		10 295,273 40 560,435 12,242 \$3 223,107	10 295,283 41 560,478 13,014 \$3 223,110	10 295,293 42 560,519 13,833 \$3 223,114	10 295,303 44 560,562 14,705 \$3 223,116	10 295,313 45 560,607 15,631 \$3 223,118	10 295,323 46 560,653 16,616 \$3 223,122	10 295,333 47 560,701 17,663 \$3 223,125	10 295,343 48 560,749 18,776 \$3 223,127	10 295,353 49 560,800 19,959 \$3 223,130	10 295,363 50 560,851 21,216 \$2 223,132

[illegible]

escalated HOT ISOSTATIC PRESSING Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor		2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
						61 5.389	62 5.519	63 5.674	64 5.833	65 5.998	66 6.164	67 6.336	68 6.514	69 6.696	70 6.884
Other Project Cost (OPC)															
OPC unescalated															
Conceptual Design, Project Mgt, & Permitting															
Testing and Start-up															
Total OPC (unescalated)						0	0	0	0	0	0	0	0	0	0
plus escalation of						0	0	0	0	0	0	0	0	0	0
plus management reserve of						0	0	0	0	0	0	0	0	0	0
plus contingency of						0	0	0	0	0	0	0	0	0	0
Total OPC including escalation, mgt reserve, & contingency						0	0	0	0	0	0	0	0	0	0
Total Estimated Cost (TEC)															
TEC unescalated															
Title Design, Inspection															
Project mgt															
Construction Mgt															
Construction, Equip, G&A & Procurement															
Total TEC (unescalated)						0	0	0	0	0	0	0	0	0	0
plus escalation of						0	0	0	0	0	0	0	0	0	0
plus management reserve of						0	0	0	0	0	0	0	0	0	0
plus contingency of						0	0	0	0	0	0	0	0	0	0
Total TEC including escalation, mgt reserve, contingency						0	0	0	0	0	0	0	0	0	0
Total Project Cost (TPC)															
TPC unescalated						0	0	0	0	0	0	0	0	0	0
plus escalation of						0	0	0	0	0	0	0	0	0	0
plus management reserve of						0	0	0	0	0	0	0	0	0	0
plus contingency of						0	0	0	0	0	0	0	0	0	0
Total TPC including esc, mgt res, contingency						0	0	0	0	0	0	0	0	0	0
Operations 2060 hr-shif/yr.															
Facility/Administration 1															
Managers 0.5 FTE @ \$125 /hr.											130	130	130	130	130
Engineers 0 FTE @ \$108 /hr.											0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.											0	0	0	0	0
Administration/Support 0.5 FTE @ \$85 /hr.											68	68	68	68	68
Operations/Process Facility 5															
Managers 0 FTE @ \$125 /hr.											0	0	0	0	0
Engineers 0 FTE @ \$108 /hr.											0	0	0	0	0
Other Tech. 0 FTE @ \$85 /hr.											0	0	0	0	0
Supervisors 1 FTE @ \$85 /hr.											177	177	177	177	177
Administration/Support 1 FTE @ \$85 /hr.											135	135	135	135	135
Operators 2 FTE @ \$85 /hr.											270	270	270	270	270
Maintenance 1 FTE @ \$85 /hr.											135	135	135	135	135
Utilities 525 kWhr \$0.0824 /kwh											90	90	90	90	90
Maintenance 2.00% of 141,419											0	0	0	0	0
Monitoring/Surveillance 2.00 \$65,000.00 yr						10	10	10	10	10	130	130	130	130	130
Operations subtotal (unescalated)						10	10	10	10	10	1,135	1,135	1,135	1,135	1,135
plus Escalation						44	45	47	48	50	5,862	6,058	6,259	6,468	6,679
plus Operations Contingency @ 30.0%						18	17	17	17	18	2,099	2,158	2,218	2,280	2,344
Total Operations (w/ escalation & contingency)						70	72	74	76	78	9,096	9,351	9,613	9,882	10,159
Post Operations															
Decommission 10.00% of Engineering costs											0	0	0	0	0
Decontamination 0.00% of Pre-operation Costs											0	0	0	0	0
Demolition 8.00% of Pre-operation Costs											0	0	0	0	0
Post-Operations Subtotal (unescalated)						0	0	0	0	0	0	0	0	0	0
plus Escalation						0	0	0	0	0	0	0	0	0	0
plus Post-Operations Contingency @ 30.0%						0	0	0	0	0	0	0	0	0	0
Total Post-Operations (w/ escalation & contingency)						0	0	0	0	0	0	0	0	0	0
Total Cost (unescalated)						10	10	10	10	10	1,135	1,135	1,135	1,135	1,135
Cumulative Total LCC (unescalated)						295,473	295,483	295,493	295,503	295,513	296,648	297,783	298,918	300,054	301,189
Total Cost (w/ escalation, mgt reserve, & contingency)						70	72	74	76	78	9,096	9,351	9,613	9,882	10,159
Cumulative Total LCC (escalated)						581,522	581,594	581,668	581,744	581,822	570,918	580,269	589,681	599,763	609,822
discount factor @ OMB discount rate of 6.30% for escalated costs						41,546	44,163	46,946	49,903	53,047	56,389	59,942	63,716	67,732	71,999
Discounted Annual Cost						\$2	\$2	\$2	\$2	\$1	\$161	\$156	\$151	\$146	\$141
Cumulative Discounted LCC						223,154	223,156	223,158	223,159	223,161	223,322	223,478	223,629	223,775	223,916

escalated HOT ISOSTATIC PRESSING Interim Storage Facility Life-Cycle Cost (LCC) Analysis (ALL COST X1000)				fiscal year counting year Escalation Factor			Total Cost
in FPR				2069 71 7.078	2070 72 7.275	2071 73 7.478	
Other Project Cost (OPC)							
OPC unescalated							
Conceptual Design, Project Mgt, & Permitting							11,728
Testing and Start-up							4,500
Total OPC (unescalated)				0	0	0	16,228
plus escalation of				0	0	0	4,605
plus management reserve of				0	0	0	0
plus contingency of				0	0	0	5,160
Total OPC including escalation, mgt reserve, & contingency				0	0	0	26,000
Total Estimated Cost (TEC)							
TEC unescalated							
Title Design, Inspection							24,604
Project mgt							18,491
Construction Mgt							13,208
Construction, Equip, G&A & Procurement							141,419
Total TEC (unescalated)				0	0	0	197,722
plus escalation of				0	0	0	70,977
plus management reserve of				0	0	0	19,374
plus contingency of				0	0	0	37,827
Total TEC including escalation, mgt reserve, contingency				0	0	0	325,900
Total Project Cost (TPC)							
TPC unescalated				0	0	0	213,950
plus escalation of				0	0	0	75,583
plus management reserve of				0	0	0	19,374
plus contingency of				0	0	0	42,893
Total TPC including esc, mgt res, contingency				0	0	0	351,800
Operations 2080 hr-shift/yr.							
Facility/Administration 1							
Managers 0.5 FTE @ \$125 /hr.							3,315
Engineers 0 FTE @ \$108 /hr.							0
Other Tech. 0 FTE @ \$85 /hr.							0
Administration/Support 0.5 FTE @ \$85 /hr.							1,724
Operations/Process Facility 5							
Managers 0 FTE @ \$125 /hr.							0
Engineers 0 FTE @ \$108 /hr.							0
Other Tech. 0 FTE @ \$85 /hr.							0
Supervisors 1 FTE @ \$85 /hr.							4,508
Administration/Support 1 FTE @ \$85 /hr.							3,448
Operators 2 FTE @ \$85 /hr.							6,895
Maintenance 1 FTE @ \$85 /hr.							3,448
Utilities 525 kW/hr \$0.0824 /kwh							2,295
Maintenance 2.00% of 141,419							57,882
Monitoring/Surveillance 2.00 \$55,000.00 yr							3,825
Operations subtotal (unescalated)				0	0	0	87,239
plus Escalation				0	0	0	111,240
plus Operations Contingency @ 30.0%				0	0	0	59,544
Total Operations (w/ escalation & contingency)				0	0	0	258,022
Post Operations							
Decommission 10.00% of Engineering costs				2,460	2,460	2,460	7,381
Decontamination 0.00% of Pre-operation Costs				0	0	0	0
Demolition 8.00% of Pre-operation Costs				17,116	17,116	17,116	51,348
Post-Operations Subtotal (unescalated)				19,576	19,576	19,576	58,728
plus Escalation				118,958	122,835	126,822	368,613
plus Post-Operations Contingency @ 30.0%				41,580	42,723	43,820	128,203
Total Post-Operations (w/ escalation & contingency)				180,092	185,134	190,318	555,544
Total Cost (unescalated)				19,576	19,576	19,576	359,818
Cumulative Total LCC (unescalated)				320,765	340,342	359,918	
Total Cost (w/ escalation, mgt reserve, & contingency)				180,092	185,134	190,318	1,165,466
Cumulative Total LCC (escalated)				700,014	975,148	1,165,466	
discount factor @ OMB discount rate of 6.30% for escalated costs				78,535	81,357	84,483	
Discounted Annual Cost				\$2,353	\$2,276	\$2,201	230,745
Cumulative Discounted LCC				226,269	228,544	230,745	

TOTAL ANNUAL COST (escalated) HIP INTERIM STORAGE FACILITY IN FPR

CUMULATIVE DISCOUNTED LCC HIP INTERIM STORAGE FACILITY IN FPR

431.02#
06/17/97
Rev. #04

ENGINEERING DESIGN FILE

Function File Number – SPR-01
EDF Serial Number – EDF-IS-002

Appendix 2

Drawings

CONTENTS

The following drawings are included in this appendix:

Full Separations:	Site Plan	FS-C-1
	Floor Plan	FS-A-1
	Section	FS-A-2
	Storage Sleeve Detail	FS-A-3
TRU/Class A Separations:	Site Plan	TRUA-C-7
	Floor Plan	TRUA-A-14
	Section	TRUA-A-15
	Storage Sleeve Detail	TRUA-A-16
Hot Isostatic Press Waste Option:	Site Plan	HWO-C-2
	Floor Plan	HWO-A-14
	Section	HWO-A-15
	Section	HWO-A-16
	Storage Sleeve Detail	HWO-A-17
	Cooling System Plan	HWO-HV-2

A

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INT-01-REV 1

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5

SITE PLAN

DESIGN PHASE: SCOPING		QUALITY LEVEL: III	
FOR REVIEW/APPROVAL SIGNATURES		EFFECTIVE DATE:	
SEE DRAW NO.		SCALE: 1" = 200.0'	
PROJECT NO.		DWC-	
SPEC CODE		AREA 1: 0100 02 530	
DRAWING		DWC-	
DESIGNER		DWC-	
REQUESTER		DWC-	
SUBCONTRACT NO.		DWC-	
FOR DRAWING INDEX SEE DRAWING NO.		DWC-	
LOCKHEED MARTIN		DWC-	
ICPP		DWC-	
WASTE TREATMENT FACILITY		DWC-	
FULL SEPARATIONS OPTION		DWC-	
MODIFIED EXISTING FACILITY		DWC-	
SITE PLAN		DWC-	
REV		DWC-	
FS-C-1		DWC-

REV	DESCRIPTION	EFFECTIVE DATE
1	REVISIONS	

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User: MKG

Date: 01/28/98 - 12:02 P.M.

File: 3532-18.dwg

Path: P:\CFP-HLW

A

FLOOR PLAN

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN ICPP WASTE TREATMENT FACILITY FULL SEPARATIONS OPTION MODIFIED EXISTING FACILITY FLOOR PLAN	
10' 3' 5' 10' 20' SCALE: 1/16" = 1'-0"		REQUESTER: DESIGN: DRAWN: PROJECT NO. SPEC CODE: FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.			
DESIGN PHASE: SCOPING		EFFECTIVE DATE:		SCALE: 1/16" = 1'-0"	
QUALITY LEVEL: III				SHEET FS-A-1	

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A

4967'-11" TOP OF PARAPET

4917'-0" FIRST LEVEL

4887'-0" THIRD LEVEL

4872'-0" FOURTH LEVEL

User: MKG
Date: 01/28/98 - 12:04 P.M.

File: 3532-19.dwg
Plot: P:\CPP-HLW

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:		ICPP WASTE TREATMENT FACILITY FULL SEPARATIONS OPTION MODIFIED EXISTING FACILITY SECTION	
		DESIGN:			
		DRAWING:			
		PROJECT NO.			
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 200 0691 00 530 DWG- AREA TYPE: 00 530	
DESIGN PHASE: SCOPING		SEE DAR NO.		REV	
QUALITY LEVEL: III		EFFECTIVE DATE:		SCALE: 1/16" = 1'-0" SHEET FS-A-2	

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User: MKG

Date: 01/28/98 - 12:05 P.M.

IMPACT ABSORBER

STORAGE SLEEVE I

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.			
<p>SCALE: 1/4" = 1'-0"</p>		<p>REQUESTER:</p> <p>DESIGN:</p> <p>DRAWN:</p> <p>PROJECT NO.</p> <p>SPEC CODE</p>			
DESIGN PHASE: SCOPING		FOR REVIEW/APPROVAL SIGNATURES		<p>ICPP</p> <p>WASTE TREATMENT FACILITY</p> <p>FULL SEPARATIONS OPTION</p> <p>MODIFIED EXISTING FACILITY</p> <p>STORAGE SLEEVE DETAIL</p>	
QUALITY LEVEL: III		EFFECTIVE DATE:		<p>SIZE: D</p> <p>CAGE CODE: 01MF3</p> <p>INDEX CODE NUMBER: 200 0691 00 530</p> <p>AREA: 1 1/2" I & L 062</p> <p>DWG-REV</p>	
				<p>SCALE: 1/4" = 1'-0"</p> <p>SHEET FS-A-3</p>	

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User: MKG

Date: 01/28/98 - 12:41 P.M.

File: 3532-25.dwg

Path: P:\CPP-HLW

SITE PLAN

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN ICPP WASTE TREATMENT FACILITY TRU/CLASS A OPTION MODIFIED EXISTING FACILITY SITE PLAN			
REQUESTER: DESIGN: DRAFTER: PROJECT NO. SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. EFFECTIVE DATE:					
DESIGN PHASE: SCOPING QUALITY LEVEL: III				SCALE: 1"=200.0' SHEET TRUA-C-7			

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User: MKG
Date: 01/28/88 - 12:49 P.M.

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FLOOR PLAN

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN

REQUESTER:		ICPP WASTE TREATMENT FACILITY TRU/CLASS A OPTION MODIFIED EXISTING FACILITY FLOOR PLAN	
		DESIGN:			
		DRAWING:			
		PROJECT NO.:			
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 200 0691 00 530 DWG- SEE DAR NO.	
DESIGN PHASE: SCOPING		EFFECTIVE DATE:		SCALE: 1/16" = 1'-0" SHEET TRUA-A-14	
QUALITY LEVEL: III					

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4967'-11" TOP OF PARAPET

4917'-0" FIRST LEVEL

4887'-0" THIRD LEVEL

4872'-0" FOURTH LEVEL

User: MKG
Date: 01/28/98 - 1:01 P.M.

File: 3532-22.dwg
Path: P:\CPP-HLW

SECTION A
A-1

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:		ICPP WASTE TREATMENT FACILITY TRU/CLASS A OPTION MODIFIED EXISTING FACILITY SECTION	
		DESIGN:			
		DRAWING:			
		PROJECT NO.			
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE NUMBER: 200 0691 00 530 DWG- REV	
DESIGN PHASE: SCOPING		SEE DAR NO.		SCALE: 1/16" = 1'-0" SHEET TRUA-A-15	
QUALITY LEVEL: III		EFFECTIVE DATE:

TAIL

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN

SCALE: 1/4" = 1'-0"		REQUESTER:		ICPP WASTE TREATMENT FACILITY TRU/CLASS A OPTION MODIFIED EXISTING FACILITY STORAGE SLEEVE DETAIL			
		DESIGN:					
		DRAWN:					
		PROJECT NO.					
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE	CAGE CODE	INDEX CODE NUMBER	REV
DESIGN PHASE: SCOPING		SEE CAR NO.		D	01MF3	AREA TYPE G. 1 086	DWG-
QUALITY LEVEL: III		EFFECTIVE DATE:		SCALE: 1/4" = 1'-0"			
				SHEET TRUA-A-16

SITE PLAN

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION MODIFIED EXISTING FACILITY SITE PLAN	
300' 100' 50' 0' 200' SCALE: 1" = 200.0'		REQUESTER: DESIGN: DRAWN: PROJECT NO. SPEC CODE			
DESIGN PHASE: SCOPING		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D CAGE CODE: 01MF3 INDEX CODE: 200 10100 02 530 DWG-	
QUALITY LEVEL: III		EFFECTIVE DATE:		SCALE: 1" = 200.0' SHEET HWO-C-2	

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User: MKG
Date: 01/27/98 - 3:52 P.M.

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FLOOR PLAN

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN			
		REQUESTER:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION MODIFIED EXISTING FACILITY FLOOR PLAN			
		DESIGN:					
		DRAWING:					
		PROJECT NO.:					
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D	CAGE CODE: 01MF3	INDEX CODE: 0691	REV: 00
DESIGN PHASE: SCOPING		SEE DAR NO.		SCALE: 1/16" = 1'-0"		SHEET HWO-A-14	
QUALITY LEVEL: III		EFFECTIVE DATE:					

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User: MKG
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SECTION

A
A-1

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION MODIFIED EXISTING FACILITY SECTION	
		DESIGN:			
		DRAWING:			
		PROJECT NO.:			
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES		SIZE: D	CAGE CODE: 01MF3
DESIGN PHASE: SCOPING		SEE DAR NO.		INDEX CODE NUMBER: 200 0691 00 530	
QUALITY LEVEL: III		EFFECTIVE DATE:		SCALE: 1/16" = 1'-0"	
				DWG- SHEET HWO-A-15	

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User: MKG
Date: 01/27/88 - 4:03 P.M.

File: 3532-15.dwg
Path: P:\CPP-HLW

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REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

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A

SECTION

B
A-1

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
		REQUESTER:			
DESIGN PHASE: SCOPING		DESIGN:		SIZE: D 01MF3	
QUALITY LEVEL: III		DRAWN:			AREA: 200
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.		PROJECT NO.:		INDEX CODE NUMBER: 0691 00 530	DWG-
EFFECTIVE DATE:		SPEC CODE:		REV	
				SCALE 1/16\"/>	
				SHEET HWO-A-16	

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IMPACT ABSORBER

STORAGE SLEEVE D

User: MKG
Date: 01/27/98 - 4:05 P.M.

File: 3532-16.dwg
Path: P:\CPP-HLW

TAIL

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN	
REQUESTER:		DESIGN:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION MODIFIED EXISTING FACILITY STORAGE SLEEVE DETAIL	
DRAWN:		PROJECT NO.			
SPEC CODE:		FOR REVIEW/APPROVAL SIGNATURES			
DESIGN PHASE: SCOPING		SEE DAR NO.			
QUALITY LEVEL: III		EFFECTIVE DATE:		SCALE: 1/4" = 1'-0" SHEET HWO-A-17	

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COOLING SYSTEM BLOWERS
(CELL EXIT)

CELL 1 CELL 2 CELL 3 CELL 4 CELL 5 CELL

COOLING

ELEVATIC

User: MKG
Date: 01/27/98 - 4:07 P.M.

File: 3532-17.dwg
Path: P:\CPP-HLW

SYSTEM PLAN

4872'-0"

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		LOCKHEED MARTIN			
		REQUESTER:		ICPP WASTE TREATMENT FACILITY HIP WASTE OPTION MODIFIED EXISTING FACILITY COOLING SYSTEM PLAN			
		DESIGN:					
		DRAWING:					
		PROJECT NO.					
SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES		SIZE: CAGE CODE: INDEX CODE NUMBER D 01MF3		AREA TYPE G LOG 200 0691 530	
DESIGN PHASE: SCOPING		SEE DAR NO.		DWG-		REV	
QUALITY LEVEL: III		EFFECTIVE DATE:		SCALE 1/16" = 1'-0"		SHEET HWO-HV-2	

431.02#
06/17/97
Rev. #04

ENGINEERING DESIGN FILE

Function File Number – SPR-01
EDF Serial Number – EDF-IS-002

Appendix 3

Risk Assessment/Data Sheets

CONTENTS

Risk Assessment Summary	3-1
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FIGURES

3-1. Risk Martix	3-1
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TABLES

3-1. Risk Action Defination	3-2
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RISK ASSESSMENT SUMMARY

This appendix contains a data sheet for each of the following significant risk identified for the Interim Storage Facilities (ISFs):

1. The quantities and characteristics of the waste are different than assumed in the study. Risk = 3.
2. Waste will not be stored in the Savanna River Canister. Risk = 2.
3. The facility would have to be redesigned if the waste is classified as a RCRA waste after processing. Risk = 3.
4. The obtaining of the NRC license for the FPR would be more difficult than assumed. Risk = 4.
5. A storage canister will be mishandled or dropped during waste transfer to, from, or in the facility. Risk = 2.
6. A catastrophic flood could flood the FPR facility. Risk = 2.
7. The facility might not be operational when needed. Risk = 2.

As risks were evaluated, the probability of occurrence and the impact if the risk is realized were rated. The probability and impact were assigned numerical values of 3 for high, 2 for medium, and 1 for low, as shown on the data sheets. The equation for risk calculation is $\text{Risk} = \text{Probability} \times \text{Impact}$. The maximum risk rating is therefore 3. The risk matrix in Figure 3-1 shows what action to take as a function of the risk rating; these actions are defined in Table 3-1.

Probability	High (3)	Evaluate (3)	Contingency Plan (6)	Eliminate risk (9)
	Medium (2)	Monitor (2)	Contingency Plan (4)	Contingency Plan (6)
	Low (1)	Forget (1)	Monitor (2)	Evaluate (3)
		Low (1)	Medium (2)	High (3)
		Impact		
		Risk = Probability x Impact		

Figure 3-1. Risk Matrix.

Table 3-1. Risk Action Definition.

Risk Rating	Action
9	Any risk determined to be in this category will be mitigated through additional design or analysis until the risk is no longer in this category.
6 and 4	Risks in this category will be mitigated to the extent feasible within cost and schedule guidelines. For those risks that cannot be mitigated, contingency plans have been made to deal with the risk if it occurs.
3	Risks in this category will be evaluated during the project to identify if they are becoming problems.
2	These risks will be monitored, with no specific action identified.
1	These risks are noted for interest only.

Risk Assessment - Data Sheet

Risk Type ☒ Project ☐ Technical ☐ ESH

<p><u>RISK:</u></p> <p>The quantities and characteristics of the waste are different than assumed in the study</p>	<p><u>PREVENTIVE PLANS</u></p> <p>Interim storage facility sized to most current referenced information</p> <p>The new interim storage facility is based on a modular design concept allowing for additional storage to be readily incorporated</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Scoping study level of preliminary information</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>The facility design might have to be adjusted</p>
<div style="display: flex; justify-content: space-between;"> <div> <p><u>PROBABILITY</u></p> <p>☒ High (3)</p> <p>☐ Medium (2)</p> <p>☐ Low (1)</p> </div> <div> <p><u>IMPACT</u></p> <p>☐ High (3)</p> <p>☐ Medium (2)</p> <p>☒ Low (1)</p> </div> </div> <p>Risk = 3</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>Redesign of facility during conceptual and title phases</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Evaluate continuing studies for facility design adequacy</p>

Risk Assessment - Data Sheet

Risk Type ☐ Project ☒ Technical ☐ ESH

<p><u>RISK:</u></p> <p>Waste will not be stored in the Savannah River Canister</p>	<p><u>PREVENTIVE PLANS</u></p> <p>The facility is designed to be flexible. The new facility design would be adjusted to accept the new canister</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Different canister identified due to additional study</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p>
<div style="display: flex; justify-content: space-between;"> <div> <p><u>PROBABILITY</u></p> <p>☐ High (3)</p> <p>☒ Medium (2)</p> <p>☐ Low (1)</p> </div> <div> <p><u>IMPACT</u></p> <p>☐ High (3)</p> <p>☐ Medium (2)</p> <p>☒ Low (1)</p> </div> </div> <p>Risk = 2</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>Facility redesign during conceptual and title phases.</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Monitor continuing studies to identify the canister to be selected</p>

Risk Assessment - Data Sheet

Risk Type ☒ Project ☐ Technical ☐ ESH

<p><u>RISK:</u></p> <p>The facility would have to be redesigned if the waste is classified as a RCRA waste after processing</p>	<p><u>PREVENTIVE PLANS</u></p> <p>None</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>The delisting of the waste after processing is not approved</p> <p>Re-evaluation of the waste determines that it should be classified as RCRA waste after processing</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>The facility would have to be redesigned. The costs for the facility would increase.</p>
<div style="display: flex; justify-content: space-between;"> <div> <p><u>PROBABILITY</u></p> <p>☐ High (3)</p> <p>☐ Medium (2)</p> <p>☒ Low (1)</p> </div> <div> <p><u>IMPACT</u></p> <p>☒ High (3)</p> <p>☐ Medium (2)</p> <p>☐ Low (1)</p> </div> </div> <p>Risk = 3.</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>None</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Continue to monitor the status of the option to delist the waste</p>

Risk Assessment - Data Sheet

Risk Type ☒ Project ☐ Technical ☐ ESH

<p><u>RISK:</u></p> <p>The obtaining of the NRC license for the FPR would be more difficult than assumed</p>	<p><u>PREVENTIVE PLANS</u></p> <p>Identify during the conceptual design as many of the required issues and include adequate contingency to cover later issues</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>An NRC license could be difficult to obtain for a modified existing facility that was not originally designed to licensing criteria.</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>The interim storage might not be operational when required</p>
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><u>PROBABILITY</u></p> <div style="border: 1px solid black; padding: 5px;"> <p>☐ High (3)</p> <p>☒ Medium (2)</p> <p>☐ Low (1)</p> </div> </div> <div style="width: 45%;"> <p><u>IMPACT</u></p> <div style="border: 1px solid black; padding: 5px;"> <p>☐ High (3)</p> <p>☒ Medium (2)</p> <p>☐ Low (1)</p> </div> </div> </div> <p>Risk = 4</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>None</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Detailed study of the compatibility of the FPR to meet the NRC licensing criteria during pre-conceptual design.</p>

Risk Assessment - Data Sheet

Risk Type ☐ Project ☒ Technical ☐ ESH

<p><u>RISK:</u></p> <p>A storage canister will be mishandled or dropped during waste transfer to, from, or in the facility.</p>	<p><u>PREVENTIVE PLANS</u></p> <p>Facility will be designed to be able to recover from these accidents</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Possible scenario include</p> <ol style="list-style-type: none"> 1. Canister falls from the transfer cart in the tunnel 2. Canister is dropped during transfer from the transfer cart 	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>Additional design for new equipment</p>
<div style="display: flex; justify-content: space-between;"> <div> <p><u>PROBABILITY</u></p> <p>☐ High (3)</p> <p>☐ Medium (2)</p> <p>☒ Low (1)</p> </div> <div> <p><u>IMPACT</u></p> <p>☐ High (3)</p> <p>☒ Medium (2)</p> <p>☐ Low (1)</p> </div> </div> <p>Risk = 2</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>None</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Ongoing review of the facility during design reviews, SAR preparation, etc.</p>

Risk Assessment - Data Sheet

Risk Type ☒ Project ☐ Technical ☐ ESH

<p><u>RISK:</u></p> <p>A catastrophic flood could flood the FPR facility</p>	<p><u>PREVENTIVE PLANS</u></p> <p>Existing INEEL flood prevention planning</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Large storm</p> <p>High snow pack year</p> <p>Failure of Mackay Dam</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>Flooding of the facility</p>
<div style="display: flex; justify-content: space-between;"> <div> <p><u>PROBABILITY</u></p> <p>☐ High (3)</p> <p>☐ Medium (2)</p> <p>☒ Low (1)</p> </div> <div> <p><u>IMPACT</u></p> <p>☐ High (3)</p> <p>☒ Medium (2)</p> <p>☐ Low (1)</p> </div> </div> <p>Risk = 2</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>Aggressive measures to prevent local flooding of the facility such as sandbags, berms, pumps, etc.</p>
<p>Probability Definition</p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p>Impact Definition</p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>Continue to monitor for potential for flooding</p>

Risk Assessment - Data Sheet

Risk Type ☒ Project ☐ Technical ☐ ESH

<p><u>RISK:</u></p> <p>The facility might not be operational when needed</p>	<p><u>PREVENTIVE PLANS</u></p> <p>Fund both the process and the storage facilities at the same time</p> <p>Evaluate and resolve NRC and construction problems during design</p>
<p><u>PROBABLE CAUSE(S):</u></p> <p>Lack of funding</p> <p>NRC licensing issues</p> <p>Construction problems</p>	<p><u>CONSEQUENCES IF RISK NOT RESOLVED</u></p> <p>The process facility would not be able to operate creating a delay in the process schedule</p>
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><u>PROBABILITY</u></p> <div style="border: 1px solid black; padding: 5px;"> ☐ High (3) ☐ Medium (2) ☒ Low (1) </div> </div> <div style="width: 45%;"> <p><u>IMPACT</u></p> <div style="border: 1px solid black; padding: 5px;"> ☐ High (3) ☒ Medium (2) ☐ Low (1) </div> </div> </div> <p>Risk = 2</p> <p>Risk = Probability x Impact</p>	<p><u>CONTINGENCY PLAN(S) IF RISK IS REALIZED:</u></p> <p>None</p>
<p><u>Probability Definition</u></p> <p>High - Likely to occur during the project.</p> <p>Medium - Has the potential to occur during the project.</p> <p>Low - Has little potential to occur during the project.</p> <p><u>Impact Definition</u></p> <p>High - Likely to cause significant disruption of schedule, increase in cost, or degradation of performance.</p> <p>Medium - Has the potential to cause some disruption to schedule, increase in cost, or degradation of performance.</p> <p>Low - Has little potential to cause disruption to schedule, increase in cost, or degradation of performance.</p>	<p><u>TRIGGER POINT(S) FOR EARLY RISK IDENTIFICATION:</u></p> <p>None</p>

Appendix 4

Background Information for Project Data Sheets

CONTENTS

Background information for the Project Data Sheets are included in this appendix in the following order:

1. Full Separations Option
2. TRU/Class A Option
3. Hot Isostatic Press Waste Option.

The background information includes:

1. Construction Assumptions
2. Operations Assumptions
3. D&D Labor
4. D&D Assumptions
5. Estimate of Diesel Engine Emissions.

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06/17/97
Rev. #04

ENGINEERING DESIGN FILE

Function File Number – SPR-01
EDF Serial Number – EDF-IS-002

Full Separations Option

Construction Assumptions

Construction costs are from the detailed cost estimate (R. Adams)

Existing Interim Storage Facility Option, Prepared by Dave Keller.		
Construction duration =	2 years	
Labor =	161 new workers/yr	
1 man-year of labor =	1800 manhours	
Square footage =	63,000 sq.ft =	5,853 m ²
Acres disturbed =	155 acres (previous)	

Excavation: Excavated earth will be spread in a spoil area adjacent to ICPP, except for backfill soil.

Excess Material = 24,100 yd³
(from Detailed Cost Estimate)

Air Emissions:

Dust during construction = 1.2 tons/month-acre = 4,464 tons (total)
(from USEPA Office of Air Quality Planning and Standards)

Air emissions from fuel usage are based on the diesel emissions spreadsheet.

Effluents:

Sanitary Wastewater = 905,625 gal/yr = 6,855,581 liters (total)
(based on 25 gal/person-day and 225 days/year of construction)
(Benefield, LD and C.W. Randall, Biological Process Design for Wastewater Treatment, InPrint, Inc., 1987, p. 104 - wastewater generation = 15-30 gal/day-person)

Assume 3 gallons of lubricating oil
and hydraulic fluid generated for
every 60 hours of operation = 2,795 liter (total)
(Heavy equipment hrs are
calculated below.)

Solid Wastes:

Construction trash = 4,991 yd³ (total) = 3,817 m³ (total)
(Use 15.5 yd³/yr per capita. This is twice the generation rate of trash from site operations)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste generation = 275 gal/week = 217 m³ (total)
(based on an assumed generation rate of 5 55-gallon drums of waste per week)

Hazardous waste storage = 3300 gal = 13 m³
(Assume waste is accumulated
for 12 weeks [84 days] in a 90-
day accumulation area, then
picked up for disposal.)

Water Usage:

Water used for dust control =
Area 155 acres (previous)
43,560 sq ft/acre

assume 0.05" water per week to
control dust 0.05 in water/wk
0.08333 ft/in

Construction Assumptions

	28.320 liter/ft ³
assume dust control required 20 weeks	20 wk/yr
Length of Construction	2 yr
	31,868,496 liter

Domestic water use is assumed to be the same as sanitary waste.

Energy Requirements:

Electricity

150 MWh/yr

Fossil Fuel Use

Concrete:

Amount used =	1,360 yd ³	Tunnel
	8,300 yd ³	RR Structure
(Detailed Cost Estimate)	630 yd ³	Building
	10,290 yd ³	Total Concrete

Number of truckloads = 468 (based on 22 yd³/load... tandem trailers)
 Fuel usage = 10,290 gal (assumes 5 mpg and round trip of 110 miles)

Materials delivery:

Number of truckloads = 234 (assume 1/2 the loads of concrete)
 Fuel usage = 7,016 gal (assumes 5 mpg and round trip of 150 miles)

Construction Equipment:

Construction Equipment Cost \$1,085,223 (Detailed Cost Estimate)
 \$75 per hr
 14,470 hr

Labor Hours 224,358 (Detailed Cost Estimate)
 750 labor hr/equipment hr
 299 hr

Total Equipment Hours = 14,769 hr

Equipment fuel usage (see <http://www.deere.com/ind>) = 6 gal/hr
 Total heavy equipment fuel usage = 88,613 gal
 or 335,399 liters (total)

Total heavy equipment and materials delivery fuel used =

Concrete Delivery	10,290 gal
Materials Delivery	7,016 gal
Heavy Equipment	88,613 gal
	105,919 gal
	3.785 liter/gal
	400,902 liter

Operations Assumptions

Operating costs are taken from the life cycle cost estimate.

Operation	
Loading	24 yr
Holding	27 yr
Shipping	5 yr

Existing Interim Storage, Prepared by Dave Keller.

Labor:	7
Operations	3
Maintenance	1
Support	3
Rad Workers	2.5 Included above
Cannisters	170
Electrical	4368.0 MWhr/yr
Steam	5.60E+07 lb/yr

Radiation worker
annual dose is
based on the

Effluents:

Sanitary wastewater = 63,875 gal/yr = 241,767 liters/yr
(based on 25 gal/day per worker, facility occupied year-round)

Solid Wastes:

Sanitary/Industrial trash = 51 yd³/yr 39 m³/yr
(based on 7.25 yd³/person-year... Bob Skinner [cuber facility])

Product canisters = 6 m³/yr
(based on 0.72 m³/canister)

Total rad waste = 147 m³

Water Usage:

Domestic water usage = same as sanitary wastewater rate.

Energy Requirements

Electric power usage = 4368.0 MWhr/yr
Steam = 5.60E+07 lb/yr

D&D Labor

D&D Labor								Years	From D&D Assumptions
									3
Crew #	Crew Function	Total MH/day	Total \$/day	Material \$/day	Equipment \$/day	Total \$/day	D&D Cost Allocated	Total MH	Man-hours/yr
D	Documentation	18	\$1,136	\$114	\$ -	\$1,250	\$ 1,540,000	22,176	7,392
1	Characterization	44	\$2,302	\$460	\$691	\$3,453	\$ 2,310,000	29,435	9,812
2	Rad Demolition-Systems	77	\$4,091	\$818	\$1,023	\$5,932	\$ -	-	-
2A	Rad Demolition-Building	99	\$5,319	\$1,064	\$1,596	\$7,979	\$ -	-	-
3	Demolition-Systems	72	\$3,762	\$752	\$941	\$5,455	\$ 6,200,000	81,833	27,278
3A	Demolition-Building	88	\$4,808	\$962	\$1,442	\$7,212	\$ 12,400,000	151,303	50,434
4	Asbestos Abatement	77	\$3,753	\$375	\$188	\$4,316		-	-
5	Decontamination	77	\$3,753	\$751	\$1,126	\$5,630	\$ -	-	-
6	Prep/Fabrication	61	\$3,217	\$643	\$965	\$4,826	\$ 3,715,000	46,957	15,652
7	RADCON Surveys	50	\$2,596	\$519	\$779	\$3,894	\$ 2,904,000	37,288	12,429
Total							\$ 29,069,000	368,993	122,998
vailable							\$ 29,069,000		

Notes:

- 1 Crew functions and daily estimates are from the D&D program (Dave Haycraft)
- 2 Total costs are based on life cycle estimate by R. Turk
- 3 Assume all workers in crews 2, 2A, 5, and 7 are rad workers
- 4 Assume a man-year is 1800 hours.

D D Assumptions

Duration of D & D = 3 years

No decontamination of the storage facility will be required.

D & D labor requirements are taken from D & D labor and equipment spreadsheet.

D & D costs come from the life cycle cost estimate.

1 manyear of labor = 1800 manhours

Assume that the D&D cost estimates are for the modified portion of the FPR facility. D&D of the entire FPR is not addressed.

Heavy Equipment	# Used	Hours/day	Days/wk	Wks/yr	Hours/yr
Mobile Crane	1	3	5	20	300
Roll-Off Truck	2	8	5	20	1,600
Dozer	1	6	5	20	600
Loader	2	8	5	20	1,600
Scabbler (w/ Vacuum System) **	1	6	3	20	360
Pneumatic Ram	1	3	5	20	300
Demolition Machine (Remote Control) **	0	4	4	45	-
** Not needed, contamination not expected					4,760

Total hours/yr

Total heavy equipment hours = 14,280

Assume each piece of equipment uses 6 gallon of diesel fuel per hour. Consumption rate from John Deere Web Site (Construction Equipment - <http://www.deere.com/ind/product/product.html>)

No. of gallons of fuel used during D & D = 85,680 gal = 324,299 liters (total)

Assume each roll-off truck makes 3 trips per day to RWMC

No. of trips = 6

Miles traveled @ 12 miles/round trip= 72

Acres disturbed and duration of disturbance

Acreage disturbed is 10 more than for construction = 165.0 acres

Air emissions

HEPA filter ventilation is not required during D&D.

Air emissions from fuel are based on the diesel emissions spreadsheet.

Effluents

No decontamination solution required during D&D.

Sanitary wastewater = 384,368 gal/yr = 4,364,496 liters (total)
(based on 25 gal/day per worker, 225 day/yr)

Lube oil = 2,702 liters (total)
(based on 3 gal for every 60 hours of operation)

Solid wastes:

The following factors from Dave Kenoyer are based on a contaminated building. The storage facility is not expected to be contaminated. Therefore, all items identified as LLW will be included with the non-contaminated waste. These factors are used for consistency in waste volumes with facilities which are contaminated.

D D Assumptions

Solid Waste Generation (factors from Dave Kenoyer - D&D Program)

Waste Type	Waste Type	Factor (cu.ft./sq.ft.)	Sq.Ft. in Facility	Cu.Ft. of Waste	Cu. Meters
WERF-LLW					
Combustible PPEs		0.167	63,000	10,521	301
WERF-LLW					
Combustible Building					
Debris		0.128	63,000	8,064	230
WERF-LLW					
Compactable Building					
Debris		0.195	63,000	12,285	351
RWMC-LLW Non-					
Compactable		0.513	63,000	32,319	923
RWMC-LLW Non-					
Compt Building Debris		0.684	63,000	43,092	1,231
RWMC-LLW Non-					
Compt Concrete Rubble		3.44	63,000	216,720	6,192
RWMC-LLW Non-					
Compt Scrap Metal		0.778	63,000	49,014	1,400
RWMC-LLW					
Asbestos/ACM Covered		0	63,000	-	
CFA Landfill Non-Compt					
Building Debris		1.99	63,000	125,370	3,582
CFA Landfill Non-Compt					
Concrete Rubble *		2.454	63,000	154,602	4,417
CFA Landfill Asbestos		0	63,000	-	
HWSF Hazardous Mtrls					
(Hg/PCBs/etc)		0.002	63,000	126	4
Metal Recycle		0.022	63,000	1,386	40
Non-Rad =				651,987	18,628
Hazardous =				126	4
Metal =				1,386	40

* (Factor used is twice that given by Dave Kenoyer due to use of concrete for shielding)

Hazardous/toxic chemicals and wastes (type)

Mixed waste = 26,445 gal (total) = 909 m3 (total)
(based on an assumed 5 55-gallon drums generated per week... work only 225 days/yr)

Water Usage

Domestic water use is assumed to be the same as sanitary waste.

Energy requirements:

Electric power usage = 156,000 kWh/yr 156 MWh/yr
(based on 3,000 kWh/wk - John Duggan)

Fossil Fuels = 324,299 liters

Estimate of Diesel Engine Emissions Storage at FPR - Separations

Bases & Assumptions:

1. Air to fuel ratio = 25:1 (Mass Basis)
2. Diesel fuel density = 7.5 lbs./gal.
3. Air is 21% O₂, 79% N₂, with a pseudomolecular weight of 29.
4. Combustion is simulated as: $C_9H_{18} + 13.5O_2 \longrightarrow 9CO_2 + 9H_2O$
5. Particulates = 5 mg/scf
6. CO = 2,500 ppmv
7. NO_x = 2,000 ppmv
8. Unburned hydrocarbons = 100 ppmv
9. Diesel fuel (# 2 fuel oil) contains 1 wt. % sulfur
10. Combustion is about 99% efficient.

from Wark, K. and C.F.
Warner, Air Pollution, Its
Origin and Control, IEP,
New York, 1976, p. 446,
423

Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 336

Lbs. Of Construction Fuel	793,786
Lbs. Of Operations Fuel	-
Lbs. Of D&D Fuel	642,112
Total Lbs. of Fuel Used	1,435,897

Lb-Moles of Construction Fuel	6,300
Lb-Moles of Operations Fuel	-
Lb-Moles of D&D Fuel	5,096
Total Lb-Moles of Fuel (as C₉H₁₈)	11,396

Lbs of Air for Construction Fuel (based on air-to-fuel ratio)	19,844,647
Lbs. of Air for Operations Fuel (based on air-to-fuel ratio)	-
Lbs. of Air for D&D Fuel (based on air-to-fuel ratio)	16,052,791
Total Lbs. of Air Added	35,897,437

Lb-Moles of Air for Combustion Fuel	684,298
Lb-Moles of Air for Operations Fuel	-
Lb-Moles of Air for D&D Fuel	553,545
Total Lb- Moles of Air	1,237,843

Grand Total of Materials Fed, Lbs. **37,333,335**

Exhaust Gases, Construction Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	2,469,808	1,235	56,132	20,151,388
H ₂ O	1,010,376	505	56,132	20,151,388
O ₂	1,904,148	952	59,505	21,362,156
N ₂	15,136,675	7,568	540,596	194,073,800
Subtotal of Major Gases	20,521,007	10,261	712,364	255,738,732
SO ₂	15,876	7.9		
Particulates	2,817	1.4		
CO	49,865	24.9		
NO _x (assumed NO)	42,742	21.4		
Unburned Hydrocarbons	8,976	4.5		
Subtotal of Contaminants	120,275	60		

Exhaust Gases, Operations Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	-	-	-	-
H ₂ O	-	-	-	-
O ₂	-	-	-	-
N ₂	-	-	-	-
Subtotal of Major Gases	-	-	-	-
SO ₂	-	-	-	-
Particulates	-	-	-	-
CO	-	-	-	-
NO _x (assumed NO)	-	-	-	-
Unburned Hydrocarbons	-	-	-	-
Subtotal of Contaminants	-	-	-	-

Exhaust Gases, D&D Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	1,997,884	999	45,406	16,300,921
H ₂ O	817,316	409	45,406	16,300,921
O ₂	1,540,309	770	48,135	17,280,339
N ₂	12,244,404.42	6,122	437,300	156,990,757
Subtotal of Major Gases	16,599,914	8,300	576,248	206,872,937
SO ₂	12,441	6.2	-	-
Particulates	2,278	1.1	-	-
CO	40,337	20.2	-	-
NO _x (assumed NO)	34,575	17.3	-	-
Unburned Hydrocarbons	7,261	3.6	-	-
Subtotal of Contaminants	96,892	48	-	-

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ENGINEERING DESIGN FILE

Function File Number – SPR-01
EDF Serial Number – EDF-IS-002

TRU Class A Option

Construction Assumptions

Construction costs are from the detailed cost estimate (R. Adams)

Existing Interim Storage Facility Option, Prepared by Dave Keller.		
Construction duration =	2 years	
Labor =	155 new workers/yr	
1 man-year of labor =	1800 manhours	
Square footage =	63,000 sq.ft =	5,853 m ²
Acres disturbed =	155.0 acres (previous)	

Excavation: Excavated earth will be spread in a spoil area adjacent to ICPP, except for backfill soil.

Excess Material = 24,100 yd³

(from Detailed Cost Estimate)

Air Emissions:

Dust during construction = 1.2 tons/month-acre = 4,464 tons (total)

(from USEPA Office of Air Quality Planning and Standards)

Air emissions from fuel usage are based on the diesel emissions spreadsheet.

Effluents:

Sanitary Wastewater = 871,875 gal/yr = 6,600,094 liters (total)

(based on 25 gal/person-day and 225 days/year of construction)

(Benefield, LD and C.W. Randall, Biological Process Design for Wastewater Treatment, InPrint, Inc., 1987, p. 104 - wastewater generation = 15-30 gal/day-person)

Assume 3 gallons of lubricating oil and hydraulic fluid generated for every 60 hours of operation of heavy equipment =

2,789.51 liter (total)

(Heavy equipment hrs are calculated below.)

Solid Wastes:

Construction trash = 4,805 yd³ (total) = 3,675 m³ (total)

(Use 15.5 yd³/yr per capita. This is twice the generation rate of trash from site operations)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste generation = 275 gal/week = 217 m³ (total)

(based on an assumed generation rate of 5 55-gallon drums of waste per week)

Hazardous waste storage = 3300 gal = 13 m³

(Assume waste is accumulated for 12 weeks [84 days] in a 90-day accumulation area, then

Water Usage:

Water used for dust control =

Area

155 acres (previous)

43,560 sq ft/acre

assume 0.05" water per week to control dust

0.05 in water/wk

0.08333 ft/in

28.320 liter/ft³

assume dust control required 20 weeks

20 wk/yr

Length of Construction

2 yr

31,868,496 liter

Domestic water use is assumed to be the same as sanitary waste.

Construction Assumptions

Energy Requirements:

Electricity

150 MWh/yr

Fossil Fuel Use

Concrete:

Amount used =

1,360 yd³

Tunnel

8,300 yd³

RR Structure

(Detailed Cost Estimate)

630 yd³

Building

10,290 yd³

Total Concrete

Number of truckloads =

468 (based on 22 yd³/load... tandem trailers)

Fuel usage =

10,290 gal (assumes 5 mpg and round trip of 110 miles)

Materials delivery:

Number of truckloads =

234 (assume 1/2 the loads of concrete)

Fuel usage =

7,016 gal (assumes 5 mpg and round trip of 150 miles)

Construction Equipment:

Construction Equipment Cost

\$1,085,223 (Detailed Cost Estimate)

\$75 per hr

14,470 hr

Labor Hours

202,638 (Detailed Cost Estimate)

750 labor hr/equipment hr

270 hr

Total Equipment Hours =

14,740 hr

Equipment fuel usage (see <http://www.deere.com/ind>) =

6 gal/hr

Total heavy equipment fuel usage =

88,439 gal

or

334,741 liters (total)

Total heavy equipment and materials delivery fuel used =

Concrete Delivery

10,290 gal

Materials Delivery

7,016 gal

Heavy Equipment

88,439 gal

105,745 gal

3.785 liter/gal

400,244 liter

Operations Assumptions

Operating costs are taken from the life cycle cost estimate.	
Operation	
Loading	23 yr
Holding	31 yr
Shipping	5 yr

Exisiting Interim Storage, Prepared by Dave Keller.	
Labor:	7
Operations	3
Maintenance	1
Support	3
Rad Workers	2.5 Included above
Cannisters	170
Electrical	4368.0 MWhr/yr
Steam	5.60E+07 lb/yr

Radiation worker annual dose is based on the average annual dose received at ICCP during the last three years (see attached memorandum)

Effluents:

Sanitary wastewater = 63,875 gal/yr = 241,767 liters/yr
(based on 25 gal/day per worker, facility occupied year-round)

Solid Wastes:

Sanitary/Industrial trash = 51 yd³/yr 39 m³/yr
(based on 7.25 yd³/person-year... Bob Skinner [cuber facility])

Product canisters = 6 m³/yr
(based on 0.72 m³/canister)

Total rad waste = 141 m³

Water Usage:

Domestic water usage = same as sanitary wastewater rate.

Energy Requirements

Electric power usage = 4368.0 MWhr/yr
Steam = 5.60E+07 lb/yr

D&D Labor

D&D Labor								Years	From D&D 3 Assumptions
Crew #	Crew Function	Total MH/day	Total \$/day	Material \$/day	Equipment \$/day	Total \$/day	D&D Cost Allocated	Total MH	Man-hours/yr
D	Documentation	18	\$1,136	\$114	\$ -	\$1,250	\$ 1,339,000	19,282	6,427
1	Characterization	44	\$2,302	\$460	\$691	\$3,453	\$ 2,000,000	25,485	8,495
2	Rad Demolition-Systems	77	\$4,091	\$818	\$1,023	\$5,932	\$ -	-	-
2A	Rad Demolition-Building	99	\$5,319	\$1,064	\$1,596	\$7,979	\$ -	-	-
3	Demolition-Systems	72	\$3,762	\$752	\$941	\$5,455	\$ 5,420,000	71,538	23,846
3A	Demolition-Building	88	\$4,808	\$962	\$1,442	\$7,212	\$ 10,850,000	132,390	44,130
4	Asbestos Abatement	77	\$3,753	\$375	\$188	\$4,316	\$ -	-	-
5	Decontamination	77	\$3,753	\$751	\$1,126	\$5,630	\$ -	-	-
6	Prep/Fabrication	61	\$3,217	\$643	\$965	\$4,826	\$ 3,250,000	41,080	13,693
7	RADCON Surveys	50	\$2,596	\$519	\$779	\$3,894	\$ 2,540,000	32,614	10,871
Total							\$ 25,399,000	322,389	107,463
vailable							\$ 25,399,000		

Notes:

- 1 Crew functions and daily estimates are from the D&D program (Dave Haycraft)
- 2 Total costs are based on life cycle estimate by R. Turk
- 3 Assume all workers in crews 2, 2A, 5, and 7 are rad workers
- 4 Assume a man-year is 1800 hours.

D D Assumptions

Duration of D & D = 3 years

No decontamination of the storage facility will be required.

D & D labor requirements are taken from D & D labor and equipment spreadsheet.

D & D costs come from the life cycle cost estimate.

1 manyear of labor = 1800 manhours

Assume that the D&D cost estimates are for the modified portion of the FPR facility. D&D of the entire FPR is not addressed.

Heavy Equipment	# Used	Hours/day	Days/wk	Wks/yr	Hours/yr
Mobile Crane	1	3	5	20	300
Roll-Off Truck	2	8	5	20	1,600
Dozer	1	6	5	20	600
Loader	2	8	5	20	1,600
Scabbler (w/ Vacuum System) **	0	6	3	20	-
Pneumatic Ram	1	3	5	20	300
Demolition Machine (Remote Control) **	0	4	4	45	-
** Not needed, contamination not expected					4,400

Total hours/yr

Total heavy equipment hours = 13,200

Assume each piece of equipment uses 6 gallon of diesel fuel per hour. Consumption rate from John Deere Web Site (Construction Equipment - <http://www.deere.com/ind/product/product.html>)

No. of gallons of fuel used during D & D = 79,200 gal = 299,772 liters (total)

Assume each roll-off truck makes 3 trips per day to RWMC

No. of trips = 6

Miles traveled @ 12 miles/round trip= 72

Acres disturbed and duration of disturbance

Acreage disturbed is the same as for construction = 155.0 acres

Air emissions

HEPA filter ventilation is not required during D&D.

Air emissions from fuel are based on the diesel emissions spreadsheet.

Effluents

No decontamination solution required during D&D.

Sanitary wastewater = 335,822 gal/yr = 3,813,258 liters (total)
(based on 25 gal/day per worker, 225 day/yr)

Lube oil = 2,498 liters (total)
(based on 3 gal for every 60 hours of operation)

D D Assumptions

Solid wastes:

The following factors from Dave Kenoyer are based on a contaminated building. The storage facility is not expected to be contaminated. Therefore, all items identified as LLW will be included with the non-contaminated waste. These factors are used for consistency in waste volumes with facilities which are contaminated.

Solid Waste Generation (factors from Dave Kenoyer - D&D Program)

Waste Type	Waste Type	Factor (cu.ft./sq.ft.)	Sq.Ft. in Facility	Cu.Ft. of Waste	Cu. Meters
WERF-LLW Combustible PPEs		0.167	63,000	10,521	301
WERF-LLW Combustible Building		0.128	63,000	8,064	230
WERF-LLW Compactable Building		0.195	63,000	12,285	351
RWMC-LLW Non-Compactable Equipment		0.513	63,000	32,319	923
RWMC-LLW Non-Compt Building Debris		0.684	63,000	43,092	1,231
RWMC-LLW Non-Compt Concrete Rubble *		3.44	63,000	216,720	6,192
RWMC-LLW Non-Compt Scrap Metal		0.778	63,000	49,014	1,400
RWMC-LLW Asbestos/ACM Covered Pipe		0	63,000	-	
CFA Landfill Non-Compt Building Debris		1.99	63,000	125,370	3,582
CFA Landfill Non-Compt Concrete Rubble *		2.454	63,000	154,602	4,417
CFA Landfill Asbestos		0	63,000	-	
HWSF Hazardous Mtrls (Hg/PCBs/etc)		0.002	63,000	126	4
Metal Recycle		0.022	63,000	1,386	40
Non-Rad =				651,987	18,628
Hazardous =				126	4
Metal =				1,386	40

* (Factor used is twice that given by Dave Kenoyer due to use of concrete for shielding)

Hazardous/toxic chemicals and wastes (type)

Mixed waste = 26,445 gal (total) = 909 m3 (total)
(based on an assumed 5 55-gallon drums generated per week... work only 225 days/yr)

Water Usage

Domestic water use is assumed to be the same as sanitary waste.

Energy requirements:

Electric power usage = 156,000 kWh/yr 156 MWh/yr
(based on 3,000 kWh/wk - John Duggan)

Fossil Fuels = 299,772 liters

Estimate of Diesel Engine Emissions Storage at FPR - TRU

Bases & Assumptions:

1. Air to fuel ratio = 25:1 (Mass Basis) 2. Diesel fuel density = 7.5 lbs./gal. 3. Air is 21% O₂, 79% N₂, with a pseudomolecular weight of 29. 4. Combustion is simulated as: $C_9H_{18} + 13.5O_2 \longrightarrow 9CO_2 + 9H_2O$ 5. Particulates = 5 mg/scf 6. CO = 2,500 ppmv 7. NO_x = 2,000 ppmv 8. Unburned hydrocarbons = 100 ppmv 9. Diesel fuel (# 2 fuel oil) contains 1 wt. % sulfur 10. Combustion is about 99% efficient.	<p>from Wark, K. and C.F.
Warner, Air Pollution, Its
Origin and Control, IEP,
New York, 1976, p. 446,
423</p> <p>Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 336</p> |
|---|--|

Lbs. Of Construction Fuel	400,244
Lbs. Of Operations Fuel	-
Lbs. Of D&D Fuel	593,549
Total Lbs. of Fuel Used	993,793

Lb-Moles of Construction Fuel	3,177
Lb-Moles of Operations Fuel	-
Lb-Moles of D&D Fuel	4,711
Total Lb-Moles of Fuel (as C₉H₁₈)	7,887

Lbs of Air for Construction Fuel (based on air-to-fuel ratio)	10,006,107
Lbs. of Air for Operations Fuel (based on air-to-fuel ratio)	-
Lbs. of Air for D&D Fuel (based on air-to-fuel ratio)	14,838,714
Total Lbs. of Air Added	24,844,821

Lb-Moles of Air for Combustion Fuel	345,038
Lb-Moles of Air for Operations Fuel	-
Lb-Moles of Air for D&D Fuel	511,680
Total Lb- Moles of Air	856,718

Grand Total of Materials Fed, Lbs.	25,838,614
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Exhaust Gases, Construction Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	1,245,331	623	28,303	10,160,773
H ₂ O	509,454	255	28,303	10,160,773
O ₂	960,113	480	30,004	10,771,268
N ₂	7,632,244	3,816	272,580	97,856,273
Subtotal of Major Gases	10,347,142	5,174	359,190	128,949,087
SO ₂	8,005	4.0		
Particulates	1,420	0.7		
CO	25,143	12.6		
NO _x (assumed NO)	21,551	10.8		
Unburned Hydrocarbons	4,526	2.3		
Subtotal of Contaminants	60,645	30		

Exhaust Gases, Operations Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	-	-	-	-
H ₂ O	-	-	-	-
O ₂	-	-	-	-
N ₂	-	-	-	-
Subtotal of Major Gases	-	-	-	-
SO ₂	-	-	-	-
Particulates	-	-	-	-
CO	-	-	-	-
NO _x (assumed NO)	-	-	-	-
Unburned Hydrocarbons	-	-	-	-
Subtotal of Contaminants	-	-	-	-

Exhaust Gases, D&D Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	1,846,784	923	41,972	15,068,078
H ₂ O	755,503	378	41,972	15,068,078
O ₂	1,423,815	712	44,494	15,973,422
N ₂	11,318,357.02	5,659	404,227	145,117,506
Subtotal of Major Gases	15,344,458	7,672	532,666	191,227,085
SO ₂	11,500	5.8	-	-
Particulates	2,106	1.1	-	-
CO	37,287	18.6	-	-
NO _x (assumed NO)	31,960	16.0	-	-
Unburned Hydrocarbons	6,712	3.4	-	-
Subtotal of Contaminants	89,564	45	-	-

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ENGINEERING DESIGN FILE

Function File Number – SPR-01
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Hot Isostatic Press Waste Option

Construction Assumptions

Construction costs are from the detailed cost estimate (R. Adams)

Existing Interim Storage Facility Option, Prepared by Dave Keller.		
Construction duration =	3 years	
Labor =	152 new workers/yr	
1 man-year of labor =	1800 manhours	
Square footage =	63,000 sq.ft =	5,853 m ²
Acres disturbed =	155 acres (previous)	

Excavation: Excavated earth will be spread in a spoil area adjacent to ICPP, except for backfill soil.

Excess Material= 24,100 yd³
(from Detailed Cost Estimate)

Air Emissions:

Dust during construction = 1.2 tons/month-acre = 6,696 tons (total)
(from USEPA Office of Air Quality Planning and Standards)

Air emissions from fuel usage are based on the diesel emissions spreadsheet.

Effluents:

Sanitary Wastewater = 855,000 gal/yr = 9,708,525 liters (total)
(based on 25 gal/person-day and 225 days/year of construction)

(Benfield, LD and C.W. Randall, Biological Process Design for Wastewater Treatment, InPrint, Inc., 1987, p. 104 - wastewater generation = 15-30 gal/day-person)

Assume 3 gallons of lubricating oil and hydraulic fluid generated for every 60 hours of operation of heavy equipment = 5,188 liter (total)
(Heavy equipment hrs are calculated below.)

Solid Wastes:

Construction trash = 7,068 yd³ (total) = 5,406 m³ (total)
(Use 15.5 yd³/yr per capita. This is twice the generation rate of trash from site operations)

Hazardous/toxic chemicals and wastes (type)

Hazardous waste generation = 275 gal/week = 217 m³ (total)
(based on an assumed generation rate of 5 55-gallon drums of waste per week)

Hazardous waste storage = 3300 gal = 13 m³
(Assume waste is accumulated for 12 weeks [84 days] in a 90-day accumulation area, then

Water Usage:

Water used for dust control =	
Area	155 acres (previous)
	43,560 sq ft/acre
assume 0.05" water per week to control dust	0.05 in water/wk
	0.08333 ft/in
	28.320 liter/ft ³
assume dust control required 20 weeks	20 wk/yr
Length of Construction	3 yr
	<hr/> 47,802,744 liter

Domestic water use is assumed to be the same as sanitary waste.

Construction Assumptions

Energy Requirements:

Electricity

150 MWh/yr

Fossil Fuel Use

Concrete:

Amount used =

1,360 yd³

Tunnel

8,300 yd³

RR Structure

(Detailed Cost Estimate)

630 yd³

Building

10,290 yd³

Total Concrete

Number of truckloads =

468 (based on 22 yd³/load... tandem trailers)

Fuel usage =

10,290 gal (assumes 5 mpg and round trip of 110 miles)

Materials delivery:

Number of truckloads =

234 (assume 1/2 the loads of concrete)

Fuel usage =

7,016 gal (assumes 5 mpg and round trip of 150 miles)

Construction Equipment:

Construction Equipment Cost

\$2,009,223 (Detailed Cost Estimate)

\$75 per hr

26,790 hr

Labor Hours

468,143 (Detailed Cost Estimate)

750 labor hr/equipment hr

624 hr

Total Equipment Hours =

27,414 hr

Equipment fuel usage (see <http://www.deere.com/ind>) =

6 gal/hr

Total heavy equipment fuel usage =

164,483 gal

or

622,568 liters (total)

Total heavy equipment and materials delivery fuel used =

Concrete Delivery

10,290 gal

Materials Delivery

7,016 gal

Heavy Equipment

164,483 gal

181,789 gal

3.785 liter/gal

688,071 liter

Operations Assumptions

Operating costs are taken from the life cycle cost estimate.

Operation

Loading	23 yr
Holding	31 yr
Shipping	5 yr

Existing Interim Storage, Prepared by Dave Keller.

Labor:	7
Operations	3
Maintenance	1
Support	3
Rad Workers	2.5 Included above
Cannisters	5700
Electrical	4,368 MWh/yr
Steam	5.60E+07 lb/yr

Radiation worker annual dose is based on the average annual dose received at ICCP during the last three years (see attached memorandum)

Effluents:

Sanitary wastewater = 63,875 gal/yr = 241,767 liters/yr
(based on 25 gal/day per worker, facility occupied year-round)

Solid Wastes:

Sanitary/Industrial trash = 51 yd³/yr 39 m³/yr
(based on 7.25 yd³/person-year... Bob Skinner [cuber facility])

Product canisters = 205 m³/yr
(based on 0.72 m³/canister)

Total rad waste = 4,720 m³

Water Usage:

Domestic water usage = same as sanitary wastewater rate.

Energy Requirements

Electric power usage = 4,368 MWh/yr

D&D Labor

D&D Labor							Years		From D&D 3 Assumptions
Crew #	Crew Function	Total MH/day	Total \$/day	Material \$/day	Equipment \$/day	Total \$/day	D&D Cost Allocated	Total MH	Man-hours/yr
D	Documentation	18	\$1,136	\$114	\$ -	\$1,250	\$ 2,650,000	38,160	12,720
1	Characterization	44	\$2,302	\$460	\$691	\$3,453	\$ 3,990,000	50,843	16,948
2	Rad Demolition-Systems	77	\$4,091	\$818	\$1,023	\$5,932	\$ -	-	-
2A	Rad Demolition-Building	99	\$5,319	\$1,064	\$1,596	\$7,979	\$ -	-	-
3	Demolition-Systems	72	\$3,762	\$752	\$941	\$5,455	\$ 12,840,000	169,474	56,491
3A	Demolition-Building	88	\$4,808	\$962	\$1,442	\$7,212	\$ 25,674,000	313,271	104,424
4	Asbestos Abatement	77	\$3,753	\$375	\$188	\$4,316	\$ -	-	-
5	Decontamination	77	\$3,753	\$751	\$1,126	\$5,630	\$ -	-	-
6	Prep/Fabrication	61	\$3,217	\$643	\$965	\$4,826	\$ 7,700,000	97,327	32,442
7	RADCON Surveys	50	\$2,596	\$519	\$779	\$3,894	\$ 5,875,000	75,437	25,146
Total							\$ 58,729,000	744,511	248,170
available							\$ 58,729,000		

Notes:

- 1 Crew functions and daily estimates are from the D&D program (Dave Haycraft)
- 2 Total costs are based on life cycle estimate by R. Turk
- 3 Assume all workers in crews 2, 2A, 5, and 7 are rad workers
- 4 Assume a man-year is 1800 hours.

D D Assumptions

Duration of D & D = 3 years

No decontamination of the storage facility will be required.

D & D labor requirements are taken from D & D labor and equipment spreadsheet.

D & D costs come from the life cycle cost estimate.

1 manyear of labor = 1800 manhours

Assume that the D&D cost estimates are for the modified portion of the FPR facility. D&D of the entire FPR is not addressed.

Heavy Equipment	# Used	Hours/day	Days/wk	Wks/yr	Hours/yr
Mobile Crane	1	3	5	45	675
Roll-Off Truck	2	8	5	45	3,600
Dozer	1	6	5	45	1,350
Loader	2	8	5	45	3,600
Scabblar (w/ Vacuum System) **	0	6	3	45	-
Pneumatic Ram	1	3	5	45	675
Demolition Machine (Remote Control) **	0	4	4	45	-
** Not needed, contamination not expected					9,900
Total hours/yr					

Total heavy equipment hours = 29,700

Assume each piece of equipment uses 6 gallon of diesel fuel per hour. Consumption rate from John Deere Web Site (Construction Equipment - <http://www.deere.com/ind/product/product.html>)

No. of gallons of fuel used during D & D = 178,200 gal = 674,487 liters (total)

Assume each roll-off truck makes 3 trips per day to RWMC

No. of trips = 6

Miles traveled @ 12 miles/round trip= 72

Acres disturbed and duration of disturbance

Acreage disturbed is the same as for construction = 155.0 acres

Air emissions

HEPA filter ventilation is not required during D&D.

Air emissions from fuel are based on the diesel emissions spreadsheet.

Effluents

No decontamination solution required during D&D.

Sanitary wastewater = 775,533 gal/yr = 8,806,174 liters (total)
(based on 25 gal/day per worker, 225 day/yr)

Lube oil = 5,621 liters (total)
(based on 3 gal for every 60 hours of operation)

Solid wastes:

D D Assumptions

The following factors from Dave Kenoyer are based on a contaminated building. The storage facility is not expected to be contaminated. Therefore, all items identified as LLW will be included with the non-contaminated waste. These factors are used for consistency in waste volumes with facilities which are contaminated.

Solid Waste Generation (factors from Dave Kenoyer - D&D Program)

Waste Type	Waste Type	Factor (cu.ft./sq.ft.)	Sq.Ft. in Facility	Cu.Ft. of Waste	Cu. Meters
WERF-LLW Combustible PPEs		0.167	63,000	10,521	301
WERF-LLW Combustible Building		0.128	63,000	8,064	230
WERF-LLW Compactable Building		0.195	63,000	12,285	351
RWMC-LLW Non-Compactable					
Equipment		0.513	63,000	32,319	923
RWMC-LLW Non-Compt Building					
Debris		0.684	63,000	43,092	1,231
RWMC-LLW Non-Compt Concrete					
Rubble *		3.44	63,000	216,720	6,192
RWMC-LLW Non-Compt Scrap Metal		0.778	63,000	49,014	1,400
RWMC-LLW Asbestos/ACM Covered					
Pipe		0	63,000	-	
CFA Landfill Non-Compt Building					
Debris		1.99	63,000	125,370	3,582
CFA Landfill Non-Compt Concrete					
Rubble *		2.454	63,000	154,602	4,417
CFA Landfill Asbestos		0	63,000	-	
HWSF Hazardous Mtrls (Hg/PCBs/etc)		0.002	63,000	126	4
Metal Recycle		0.022	63,000	1,386	40
Non-Rad =				651,987	18,628
Hazardous =				126	4
Metal =				1,386	40

* (Factor used is twice that given by Dave Kenoyer due to use of concrete for shielding)

Hazardous/toxic chemicals and wastes (type)

Mixed waste = 26,445 gal (total) = 909 m3 (total)
(based on an assumed 5 55-gallon drums generated per week... work only 225 days/yr)

Water Usage

Domestic water use is assumed to be the same as sanitary waste.

Energy requirements:

Electric power usage = 156,000 kWh/yr 156 MWh/yr
(based on 3,000 kWh/wk - John Duggan)

Fossil Fuels = 674,487 liters

Estimate of Diesel Engine Emissions Storage at FPR - HWO

Bases & Assumptions:

1. Air to fuel ratio = 25:1 (Mass Basis)
2. Diesel fuel density = 7.5 lbs./gal.
3. Air is 21% O₂, 79% N₂, with a pseudomolecular weight of 29.
4. Combustion is simulated as: $C_9H_{18} + 13.5O_2 \longrightarrow 9CO_2 + 9H_2O$
5. Particulates = 5 mg/scf
6. CO = 2,500 ppmv
7. NO_x = 2,000 ppmv
8. Unburned hydrocarbons = 100 ppmv
9. Diesel fuel (# 2 fuel oil) contains 1 wt. % sulfur
10. Combustion is about 99% efficient.

from Wark, K. and C.F.
Warner, Air Pollution, Its
Origin and Control, IEP,
New York, 1976, p. 446,
423

Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 446
Wark and Warner, p. 336

Lbs. Of Construction Fuel	1,362,381
Lbs. Of Operations Fuel	-
Lbs. Of D&D Fuel	1,335,484
Total Lbs. of Fuel Used	2,697,865

Lb-Moles of Construction Fuel	10,813
Lb-Moles of Operations Fuel	-
Lb-Moles of D&D Fuel	10,599
Total Lb-Moles of Fuel (as C₉H₁₈)	21,412

Lbs of Air for Construction Fuel (based on air-to-fuel ratio)	34,059,513
Lbs.of Air for Operations Fuel (based on air-to-fuel ratio)	-
Lbs.of Air for D&D Fuel (based on air-to-fuel ratio)	33,387,107
Total Lbs. of Air Added	67,446,619

Lb-Moles of Air for Combustion Fuel	1,174,466
Lb-Moles of Air for Operations Fuel	-
Lb-Moles of Air for D&D Fuel	1,151,280
Total Lb- Moles of Air	2,325,745

Grand Total of Materials Fed, Lbs.	70,144,484
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Exhaust Gases, Construction Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	4,238,950	2,119	96,340	34,585,975
H ₂ O	1,734,116	867	96,340	34,585,975
O ₂	3,268,103	1,634	102,128	36,664,025
N ₂	25,979,187	12,990	927,828	333,090,288
Subtotal of Major Gases	35,220,355	17,610	1,222,636	438,926,264
SO ₂	27,248	13.6		
Particulates	4,834	2.4		
CO	85,585	42.8		
NO _x (assumed NO)	73,358	36.7		
Unburned Hydrocarbons	15,405	7.7		
Subtotal of Contaminants	206,429	103		

Exhaust Gases, Operations Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	-	-	-	-
H ₂ O	-	-	-	-
O ₂	-	-	-	-
N ₂	-	-	-	-
Subtotal of Major Gases	-	-	-	-
SO ₂	-	-	-	-
Particulates	-	-	-	-
CO	-	-	-	-
NO _x (assumed NO)	-	-	-	-
Unburned Hydrocarbons	-	-	-	-
Subtotal of Contaminants	-	-	-	-

Exhaust Gases, D&D Fuel	Total Lbs.	Total Tons	Total Moles	Total SCF
CO ₂	4,155,264	2,078	94,438	33,903,176
H ₂ O	1,699,881	850	94,438	33,903,176
O ₂	3,203,583	1,602	100,112	35,940,200
N ₂	25,466,303.30	12,733	909,511	326,514,389
Subtotal of Major Gases	34,525,031	17,263	1,198,498	430,260,941
SO ₂	25,875	12.9	-	-
Particulates	4,739	2.4	-	-
CO	83,895	41.9	-	-
NO _x (assumed NO)	71,910	36.0	-	-
Unburned Hydrocarbons	15,101	7.6	-	-
Subtotal of Contaminants	201,519	101	-	-