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To	From	Page 1 of 1
Distribution	Solid Waste Projects	Date 5/18/94
Project Title/Work Order		EDT No.
Project W-026, Waste Receiving and Processing (WRAP) Facility Module 1: Maximum Possible Fire Loss (MPFL) Decontamination and Cleanup Estimates		ECN No. 164065

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
RR Ames	N3-13	X			
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JP Payne	G6-46	X			
RJ Roberts	N3-13	X			
JA Swenson	G6-45	X			
WRAP DMC	G3-15	X			

ENGINEERING CHANGE NOTICE

1. ECN 164065

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	A.W. Hinkle, Solid Waste Project's, G6-46, 376-0219		5/12/94
	5. Project Title/No./Work Order No. Waste Receiving and Processing Facility, Module 1 (WRAP 1) Project W-026	6. Bldg./Sys./Fac. No. N/A	7. Impact Level N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-W026-TI-006 REV 0	9. Related ECN No(s). N/A	10. Related PO No. N/A

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

Substantial rewrite of WHC-SD-W026-TI-001 Rev 0 for decontamination and cleanup costs for WRAP 1.

13a. Justification (mark one)							
As-Found	[]	Facilitate Const.	[]	Const. Error/Omission	[]	Design Error/Omission	[]
Criteria Change	[]	Design Improvement	[X]	Environmental	[]		

13b. Justification Details

Document is to be revised to incorporate DOE-RL comments on environmental cleanup costs associated with the WRAP I postulated Maximum Possible Fire Loss (MPFL).

14. Distribution (include name, MSIN, and no. of copies)

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A-7900-013-2 (06/92) GEF095

ENGINEERING CHANGE NOTICE

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15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[ ] Yes	Additional	[ ] $	Additional	[ ] $	Improvement	[ ]
[X] No	Savings	[ ] $	Savings	[ ] $	Delay	[ ]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]		[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog Engineer AW Hinkle	6/8/94	PE	
Cog. Mgr. DR Lucas	6/8/94	QA	
QA		Safety	
Safety CB Evans	6/27/94	Design	
Security		Environ.	
Environ.		Other	
Projects/Programs RJ Bottenus	6/10/94		
Tank Waste Remediation System			
Facilities Operations		DEPARTMENT OF ENERGY	
Restoration & Remediation		Signature or Letter No.	
Operations & Support Services			
IRM		ADDITIONAL	
Other MA Mihalic	6.15.94		

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Author/Requestor (Printed/Signature) Date
AW Hinkle AW Hinkle 5/12/94

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Responsible Manager (Printed/Signature) Date
DR Lucas DR Lucas 5/12/94

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BD-7600-062 (08/91) WEF074

Part 1

SUPPORTING DOCUMENT

1. Total Pages 2223

2. Title	3. Number	4. Rev No.
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5. Key Words	6. Author
WRAP, Maximum Possible Fire Loss (MPFL), TRU, LLW, Contamination, Environmental Cleanup	Name: AW Hinkle Signature Organization/Charge Code 7FD30/A414A

7. Abstract

Project W-026, Waste Receiving and Processing (WRAP) Facility Module 1, a 1991 Line Item, is planned for completion and start of operations in the spring of 1997. WRAP Module 1 will have the capability to characterize and repackage newly generated, retrieved and stored transuranic (TRU), TRU mixed, and suspect TRU waste for shipment to the Waste Isolation Pilot Plant (WIPP). In addition, the WRAP Facility Module 1 will have the capability to characterize low-level mixed waste for treatment in WRAP Module 2A. This report documents the assumptions and cost estimates for decontamination and clean-up of a Maximum Possible Fire Loss (MPFL) as defined by DOE Order 5480.7A, FIRE PROTECTION. The Order defines MPFL as "The value of property, excluding land, within a fire area, unless a fire hazards analysis demonstrates a lesser (or greater) loss potential. This assumes failure of both automatic fire suppression systems and manual fire fighting efforts." Estimates were developed for demolition, disposal, decontamination, and rebuilding. Total costs were estimated to be approximately $98M.

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Project W-026, Waste Receiving and Processing (WRAP) Facility Module 1: Maximum Possible Fire Loss (MPFL) Decontamination and Cleanup Estimates

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~~RS~~ 1	Revision per ECN 164065	AW Hankle	

Project W-026
Waste Receiving and Processing (WRAP) Facility Module 1

Maximum Possible Fire Loss (MPFL)
Decontamination and Cleanup Estimates

WHC-SD-W026-TI-006
Revision 1

P. H. Jacobsen
D. R. Lucas

ABSTRACT

Project W-026, Waste Receiving and Processing (WRAP) Facility Module 1, a 1991 Line Item, is planned for completion and start of operations in the spring of 1997. WRAP Module 1 will have the capability to characterize and repackage newly generated, retrieved and stored transuranic (TRU), TRU mixed, and suspect TRU waste for shipment to the Waste Isolation Pilot Plant (WIPP). In addition, the WRAP Facility Module 1 will have the capability to characterize low-level mixed waste for treatment in WRAP Module 2A. This report documents the assumptions and cost estimates for decontamination and clean-up of a Maximum Possible Fire Loss (MPFL) as defined by DOE Order 5480.7A, FIRE PROTECTION. The Order defines MPFL as "The value of property, excluding land, within a fire area, unless a fire hazards analysis demonstrates a lesser (or greater) loss potential. This assumes failure of both automatic fire suppression systems and manual fire fighting efforts." Estimates were developed for demolition, disposal, decontamination, and rebuilding. Total costs were estimated to be approximately $98M.

CONTENTS

Introduction

Project W-026, Waste Receiving and Processing (WRAP) Facility Module 1, a 1991 Line Item, is planned for completion and start of operations in the spring of 1997. WRAP Module 1 will have the capability to characterize and repackage newly generated, retrieved and stored transuranic (TRU), TRU mixed, and suspect TRU waste for shipment to the Waste Isolation Pilot Plant (WIPP). In addition, the WRAP Facility Module 1 will have the capability to characterize low-level mixed waste for treatment in WRAP Module 2A. This report documents the assumptions and cost estimates for decontamination and clean-up of a Maximum Possible Fire Loss (MPFL) as defined by DOE Order 5480.7A, FIRE PROTECTION. The Order defines MPFL as "The value of property, excluding land, within a fire area, unless a fire hazards analysis demonstrates a lesser (or greater) loss potential. This assumes failure of both automatic fire suppression systems and manual fire fighting efforts."

Background

WRAP 1 (WHC 1990) will provide examination, characterization, repackaging, certification, and shipping for standard waste boxes and drums of TRU waste, but only drums shall be opened and processed. Most low-level radioactive mixed waste will be characterized and repackaged pending processing in Module 2A (WHC 1990).

Portions of the waste to be processed in WRAP 1 will come from project W-113 as described below.

- Phase 1--Contact-Handled Transuranic Retrieval - Project W-113. Contact-Handled suspect TRU waste has been retrievable stored in 25 trenches since 1970. This facility will be used to retrieve suspect TRU and TRU mixed waste from these storage trenches. Phase 1 Retrieval, Project W-113, will be limited in scope to 1 of the 25 trenches where suspect TRU waste is stored. The integrity of the waste packages in this trench are assumed to be intact and are expected to have a low risk of contamination spread. The selected trench stores 10,000 suspect TRU drums. The trench typically contains drums, metal, plywood, and Fiberglass Reinforced Plywood (FRP) boxes.

  Retrieved waste will be processed through WRAP 1 to characterize and repackage the waste according to current criteria.

Portions of the waste to be processed in WRAP 1 are also stored in the Central Waste Complex (CWC) and the Transuranic Storage and Assay Facility (TRUSAF) as described below:

- CWC and TRUSAF Stored Transuranic Waste. The CWC and TRUSAF stored waste consists of low-level, transuranic, and mixed waste. TRU wastes stored in the CWC and TRUSAF are well characterized and will be processed through WRAP 1 for nondestructive examination and opened only if required for processing to meet transportation or WIPP acceptance criteria. Some percentage (e.g., 10%) of newly generated low-level mixed waste will be processed through WRAP 1 for verification.

Definitions

The following definitions are provided to clarify terms used in relation to the MPFL and are derived from DOE Order 5480.7A, FIRE PROTECTION.

- Improved Risk. An improved risk property is one that would qualify for complete insurance coverage industrial insurance companies that limit their underwriting to the best protected class of industrial risk. The most evident characteristic of an improved risk property is the existence of reliable, automatic fire extinguishing system through the buildings of combustible construction or content or where a large property loss from fire in the absence of an automatic fire extinguishing system.

- Maximum Possible Fire Loss. The value of property, excluding land, within a fire area, unless a fire hazards analysis demonstrates a lesser (or greater) loss potential. This assumes the failure of both automatic fire suppression systems and manual fire fighting efforts.

- Fire Loss. The dollar cost of restoring damaged property to its pre-fire condition (refer to DOE 5484.1). In determining loss, the estimated damage to the facility and contents shall include replacement cost, less salvage value. Losses will exclude costs of restoration of: (1) Property that is scheduled for demolition. (2) Property: (a) decommissioned and not carried on books as a value, or (b) where there is no loss potential. Include the cost of decontamination and cleanup, the loss of production or program continuity, the indirect costs of fire extinguishment (such as damaged fire department equipment), and consequent effects on related areas, in all property loss amounts.

The following section provides the basis for the postulated scenario used to determine the estimated costs in the event of an MPFL at the WRAP 1 Facility.

Scenario: Basis for Estimate

A fire initiator is assumed and no credit is taken for storage of materials in enclosed steel drum containers. This fire propagates through the drum storage array and then through two hour fire partitions (non-rated fire walls) to the rest of the facility. The fire associated with the WRAP 1 Maximum Possible Fire Loss is postulated to burn the entire facility to the ground, resulting in an area of 44,296 ft^2 of rubble three feet deep. The resultant facility contamination is postulated to be a 80%/20% Low Level Waste (LLW)/Transuranic Waste (TRU) distribution based on a total facility inventory of 5Kg of 20 year/12% ^{239}Pu.

The 5 kg estimate is based on the WRAP 1 Witness™ model (interactive Time & Motion Analysis) of the average drum loading of WRAP 1. The particular version of the model that was used is titled, "Replication Run 2, T2-RAM6, 1 Year Production." According to this model, WRAP 1 has been designed to handle 8 Standard Waste Boxes (SWB) as well as 281 drums at any one time (Appendix B).

Average gram loadings for drums and SWBs were taken from Anderson, et al. 1991, and were 11 grams and 52 grams, respectively. Using these numbers, the following formulas yield:

8 SWB X 52 =	416
281 drums X 11 =	3091
TOTAL	~3.5 kg

This number was rounded to 5 kg to estimate the potential inventory used to calculate the contamination area. The material limit for WRAP 1 is 5 Kg of radioactive material. This limitation will be administratively controlled through the use of NDA equipment and the facility control system. This limitation, if required, may be lowered or raised based on further technical justification. Newly-generated waste is fully characterized and includes grams of TRU, WRAP 1 will only verify this information. Retrieved wastes will be removed from the waste trenches and have gram loading levels determined by PAN assay in the W-113 project. This information will be used by the WRAP 1 operations to schedule waste receiving in light of facility gram loading restrictions as defined above.

A preliminary estimate of ground contamination area due to the WRAP 1 MPFL was requested of Safety Analysis and Engineering (Himes 1993). The analysis is based on an assumed a 5 kg inventory of Pu in the facility at the time of the fire. This analysis (Himes 1993) determined that the following areas of contamination would result from the fire, assuming the surface contamination was mixed with the top 1 cm of soil:

TRU Area	4.1 E+04 m^2
Low-level waste area	2.2 E+05 m^2
Contaminated area	5.9 E+05 m^2

The above was rounded to 1 Km^2 and used as a basis for the WRAP 1 MPFL cleanup ROM estimate (Appendix A). It is postulated the use of heavy excavation equipment will "mix" the soil in the TRU contaminated area to a level below 100 nCi/g and the resultant mixture will be classified as LLW.

Cost Estimate

An estimate for cleanup of the postulated WRAP 1 MPFL was requested by WRAP Project Engineering from Decommissioning Engineering. Decommissioning Engineering, redesignated as Decontamination & Decommissioning, provided the WRAP 1 MPFL cleanup ROM, which is included as Appendix A.

This estimate included decontamination and cleanup of the facility and the surrounding soil. The estimate is summarized on the following page.

WRAP 1 Facility Cleanup ROM Estimate

Item			Estimated Cost
Three Crews Two Years			10,433,280
Enclosure Design			800,000
Enclosure Structure			5,463,000
Site Prep. And Enclosure Structure Erection Cost			425,000
Exhausters			3,000,000
Electrical			210,000
Fire Protection			24,000
Consumable			2,880,000
Building Rubble Disposal	LLW		4,747,000
Building Rubble Disposal	TRU		5,292,000
Containers	LLW		1,885,000
Containers	TRU		240,000
Capital Equipment Over Two-Year Period			2,000,000
Stabilize Structural Area			29,000
Waste In Receiving, Process, And Loadout Area, Disposal		TRU	N/A
		LLW	N/A
Containers for repackaging existing stored waste		TRU	32,000
		LLW	54,600
Sub Total			34,515,680
G&A/CSP 27% Of All Costs			9,319,234
Sub-Total			43,834,914
Soil restoration costs			8,000,000
Sub-Total			51,834,914
Contingency 0% (Not included by customer request)			N/A
Total			51,834,914

Modular Structure To House Cleanup And Restoration Personnel:
(Office Space, Conference Rooms, Lunch Rooms, Change Rooms, Rest Rooms, etc.)

Design	128,000
Procurement	372,000
Sub-Total	500,000
G&A/CSP 27% Of All Costs	135,000
Sub-Total	635,000
Contingency 35% (Not included by customer request)	N/A
Total	635,000
Total Cleanup Cost	51,834,914
Total Modular Structure Cost	635,000
Total	$52,469,918

WRAP 1 STARTUP COSTS FOR RESTART OF FACILITY*

WRAP 1 Staffing Levels and Timing
-FY93-97 Total Staffing
-Temp-

Startup Manager and Support Staff	$1.55M
Operational Readiness Review Board	$2.13M
Startup Team (loaned portion)	$1.03M
TOTAL	$4.71M

*From J. G. Riddelle, "Operation Funding Plan," dated June 18, 1993.

NOTE: This full duration overstates the actual restart costs since this should just be reverification of the previous readiness review.

Summary and Conclusions

Restart costs associated with the MPFL of the WRAP 1 Facility are summarized below. Construction estimates are derived from the WRAP 1 100% Design Estimate by United Engineers & Constructors. Assumptions are listed with the associated costs.

WRAP 1 Facility MPFL Estimated Restart Costs

Item	Estimated Cost	Assumptions
Facility demolition and decontamination	<$45M	Does not include contingency, 1993 dollars, 80/20 LLW to TRU mix, no contamination cleanup
Soil decontamination	<$8M	Does not include contingency, assumes 1.0 km^2 contamination spread, accident response action, no final closure costs*, stabilization only using existing LLW burial trench.
Rebuild	<$40M**	Does not include contingency, site completion, foundations, underground piping, definitive design and overall project management of DD (25% reduction)
Startup Costs	<$5M	Includes personnel time for Operational Readiness Review (i.e., plant manager and review team).
TOTAL	~$98M	

*Putting this waste in an existing LLW trench where it is considered disposed, not including final closure costs of the Hanford Site LLW Burial Grounds.

**Costs taken from detailed cost estimate provided at the end of Title I design.

This estimate is within the Maximum Damage Limitation of $150M as set forth in DOE Order 5480.7A.

References

1. DOE Order 5480.7A, FIRE PROTECTION, U.S. Department of Energy, Washington, D.C., December 17, 1993.

2. WHC, 1990, Engineering Study for Waste Receiving and Processing Facility, Module 2, WHC-SD-W100-ES-001, February 7, 1990, Westinghouse Hanford Company, Richland, Washington.

3. Himes, D. A., 1993, Preliminary Estimate of Ground Contamination Areas Due to the Maximum Fire in WRAP 1, WHC-SD-W026-EE-001 Rev. 0, May 12, 1993, Westinghouse Hanford Company, Richland, Washington.

4. Anderson, B. C., et al., 1991, Contact-Handled Transuranic Waste Characterization Based on Existing Records, WHC-EP-0225, Rev. 1, September 1991, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

WRAP MODULE 1 FACILITY CLEANUP ROM ESTIMATE

Westinghouse Hanford Company — **Internal Memo**

From: D&D Projects — 85100-94-MAM-066
Phone: 373-1382 X5-55
Date: March 17, 1994
Subject: ESTIMATE FOR BUILDING CLEANUP OF WASTE RECEIVING AND PROCESSING FACILITY MODULE 1

To: D. R. Lucas G6-46

cc: G. J. Carter T7-05
W. M. Hayward T7-05
M. C. Hughes X5-55
J. A. Swenson G6-45
MAM File/LB

References: (1) Letter, L. L. Reed, WHC, to R. A. Holten, RL, "Waste Receiving and Processing Facility Module 1 Maximum Possible Fire Loss Issues," 9451038, dated February 10, 1994.

(2) WHC-SD-W026-EE-001, Preliminary Assessment of Ground Contamination Areas Due to Maximum Fire - WRAP 1, issued July 8, 1993.

(3) Internal Memo, D. R. Lucas to M. A. Mihalic, "Estimate for Cleanup of Grounds Resulting From Maximum Fire Loss," dated May 6, 1993.

Per reference 3, D&D Projects (formerly Decommissioning Engineering) was requested to provide a Rough Order of Magnitude (ROM) estimate for the decontamination of areas onsite resulting from a maximum fire loss of the WRAP 1 facility. A draft ROM was provided on May 17, 1993, for comment.

The comments received on June 1, 1993, and direction provided in reference 1, indicated that the original assumptions from the reference letter and marked up drawings be changed as follows:

- The transuranic (TRU) and low-level waste (LLW) split of 50/50 is too conservative and should be changed to 10/90. Based on plutonium handling experience, this split is considered unreasonable and has been compromised to 20/80 between TRU and LLW.
- The 281 drums of existing waste be removed from the estimate due to costs already associated with burial. However, repackaging in new burial containers will still be included.
- The cost of handling 4 inches of top soil in a 5 km^2 area be replaced with the cost of handling 4 inches of top soil in a 1 km^2 area based on final analysis provided in WHC-SD-W026-EE-001 REV 0 (reference 2).

Other notable comments received are as follows:

- There is no guidance to establish contingency thresholds for maximum possible fire loss. Estimation practices typically include contingency due to unknown details, but will be removed with a disclaimer.

- The schedule is based on the crew size and methodology of cleanup. The crew size and performance are based on field experience.

It should be understood that this cost estimate is based on a specific set of assumptions which are based on opinions and experience. If you have any further questions, please contact Mr. George Carter on 373-2141.

M. A. Mihalic, Manager
D&D Projects

cmj

Attachment

WRAP 1 FACILITY
CLEANUP ROM

A Rough Order of Magnitude (ROM) estimate for the WRAP 1 Facility decontamination has been requested. The ROM is to identify the cost associated with cleanup following a postulated Maximum Possible Fire Loss (MPFL). From this denotation, assumptions will need to be documented.

The MPFL is defined as the maximum possible loss that could occur in a single fire area assuming the failure of both automatic and manual fire extinguishing actions. Since there is no historical data available, this estimate is prepared based on the following assumptions, rates, and formulas.

Although numerous variables impact costs, primary decommissioning costs are dependent on the extent of contamination levels and cleanup levels required, the scenario will be bounded by a general assumption that the fire breaches containment and the structure collapses.

Overall Assumptions

These estimates do not account for time or costs involved with investigation, and if necessary, permitting activities required for field work to begin.

SECTION I - BUILDING

A. Establish Assumptions and Rates

1. Labor

   a) Crew size = 25

   b) Hours/year = 2080

   c) Cost/crew-hr= $836

2. Waste Disposal

   a) Low-Level Waste (LLW) Disposal Cost/ft^3 (Hanford = $47/ft^3$)

   b) Transuranic (TRU) Waste Disposal Cost/ft^3 (Hanford = $210/ft^3$)

   c) Nonradioactive Hazardous Waste Disposal Cost = $27/ft^3$

3. Waste Containers

   a) LLW - \$1400/75 ft^3 (usable) container with packing factor

   b) TRU - \$3200/75 ft^3 container with packing factor

4. Escalation

   a) 1993 dollars; no escalation due to unknown time of event.

5. Final Configuration

   a) Removal of rad-waste and structures to achieve $\leq$ 25 mR/yr after site release

6. Waste Volumes

   a) One floor can be demolished to a rubble volume equal to the area of the floor 3 ft deep.

   b) Rad-waste is equivalent to the waste volume multiplied by the (80% LLW and 20% TRU) levels.

7. Other factors

   a) Contingency rate of 35% has been removed from this estimate

   b) Ground disposal sites are not included

   c) Safety Analysis and Regulatory Support need to provide cost estimates for safety assessments and permitting cycles.

B. Formulas

1. Labor cost =

   a) (Estimated duration of project in years) x (2080 hr/yr) x (number of crews) x (labor rate per crew/hr)

2. Waste Volume =

   a) (Number of floors removed) x (floor area in ft^2) x (3 ft/floor) x (percent contaminated)

   b) LLW Volume = (rad-waste volume) x (80% LLW)

   c) TRU Volume = (rad-waste volume) x (20% TRU)

3. Disposal Costs =

   a) (LLW volume) x (LLW disposal rate) +

   b) (TRU volume) x (TRU disposal rate)

4. Containers Costs =

   a) $\frac{\text{LLW Volume}}{75\ ft^3/\text{container}}$ x \$1400/container +

   b) $\frac{\text{TRU Volume}}{75\ ft^3/\text{container}}$ x \$3200/container

5. Capital equipment and Consumable costs

   a) (0.20) x (labor + \$2,000,000 for capital equip. over 2 years)

6. Total Cost

   a) Costs for (labor + disposal + container + capital equipment) + G&A/CSP of 27% of all costs without contingency

SECTION II - SOIL

Based on the MPFL scenario provided by WHC-SD-W026-EE-001 REV 0, 1 km^2 of land will have radioactive surface contamination at levels which require disposal as LLW. For the purpose of this scenario, it is assumed that four inches of soil will be removed, transported to an existing trench or other designated area, consolidated and covered with clean soil.

Assumptions

1. Based on four recent projects, cost per ft^2 for removal, consolidation, and clean cover is \$0.75.
2. No waste burial charge will be assessed for the contaminated soil.
3. The areas where the soil is removed will be re-vegetated.
4. The cost includes personnel, equipment, fuel, maintenance, and supplies.
5. No soil is contaminated to TRU levels.

Calculations

1. (3280 ft/km) x (3280 ft/km) = 1.0758 X 10^7 ft^2/km
2. 1.0758 X 10^7 ft^2/km x 1 km^2 = 1.0758 X 10^7 ft^2
3. 1.0758 X 10^7 ft^2 x \$0.75/ft^2 = \$8.068 X 10^6 = \$8 million

WRAP 1 FACILITY
CLEANUP ROM

Three Crews Two Years			$10,433,280
Enclosure Design			800,000
Enclosure Structure			5,463,000
Site Prep. And Enclosure Structure Erection Cost			425,000
Exhausters			3,000,000
Electrical			210,000
Fire Protection			24,000
Consumable			2,880,000
Building Rubble Disposal	LLW		4,747,000
Building Rubble Disposal	TRU		5,292,000
Containers	LLW		1,885,000
Containers	TRU		240,000
Capital Equipment Over Two-Year Period			2,000,000
Stabilize Structural Area			29,000
Waste In Receiving, Process, And Loadout Area, Disposal		TRU	N/A
		LLW	N/A
Containers for repackaging existing stored waste		TRU	32,000
		LLW	54,600
Sub Total			34,515,680
G&A/CSP 27% Of All Costs			9,319,234
Sub-Total			43,834,914
Soil restoration costs			8,000,000
Sub-Total			51,834,914
Contingency 0% (Not included by customer request)			N/A
Total			$51,834,914

Modular Structure To House Cleanup And Restoration Personnel:
(Office Space, Conference Rooms, Lunch Rooms, Change Rooms, Rest Rooms, etc.)

Design	$ 128,000
Procurement	372,000
Sub-Total	500,000
G&A/CSP 27% Of All Costs	135,000
Sub-Total	635,000
Contingency 35% (Not included by customer request)	N/A
Total	635,000
Total Cleanup Cost	51,834,914
Total Modular Structure Cost	635,000
Total	$52,469,918

DECOMMISSIONING COST ESTIMATE

ASSUMPTIONS & SEQUENCE

Fire penetrates the fire-rated wall to the ventilation system and significant portions of the building roof. Due to concerns of wall and remaining roof collapse, this assumption will require two stage confinement. The immediate action will be to stabilized any loose contamination within and around the building site including contaminated soil by semi-remote, sprayed fixative application. The second stage will be to enclose work areas after industrial hazards of remaining, structure collapse are addressed.

Activity 1 - Staging

The objective of this activity is to status site condition by evaluating extent of contamination. Design, procurement, and construction of a dome to enclose the entire area will need to be planned which could be included in an emergency response plan. Individual greenhouses will be used to construct footings for enclosure dome. Site will be prepared for mobile change rooms, office units, and waste storage areas for routine work. This activity also includes document generation for field work activities to begin, assuming NEPA and other permitting will not delay work start.

Activity 2 - Establish Confinement

This activity is to prepare for clean-out work by eliminating the possibility of further contamination spread. The approach is to work towards higher contamination areas. Samples will be compared to process knowledge to bound significant fissile inventories. The plutonium contaminated work areas will be separately controlled, monitored for airborne and neutron levels, and protected from recontamination during packaging operations. Any non-fissile contaminated areas will be segregated to reduce TRU volumes and packaged, as required from characterization and process knowledge.

Activity 3 - Equipment & Storage Drum Removal

The equipment will be emptied, dismantled, and packaged using bag-out techniques within greenhouses. Detailed radiological surveys and sample analysis will be taken on each major item to evaluate handling requirements. The items will be characterized for segregation and packaging without decontamination.

Activity 4 - Soil Removal

Based on WHC-SD-W026-EE-001 REV 0, a 1 km^2 area of soil will be assumed to be contaminated to above LLW limits. The top four inches of soil will be required to be removed and replaced.

Activity 5 - Final Site Survey & Stabilization

Based on the independent contractor verification (ICV) overview, the final site status will be assessed and stabilized waiting future Operable Unit decisions and Closure Plan.

APPENDIX B
AVERAGE FACILITY WASTE CONTAINER LOADING FOR WRAP 1

AVERAGE FACILITY WASTE CONTAINER LOADING FOR WRAP 1

A. SUPPORTING DOCUMENTATION: To determine the average drum loading within the WRAP 1 facility, the WRAP 1 Witness model (interactive Time & Motion Analysis) was referenced. The model used is based on the 100% WRAP 1 design. This model was run for a three year warm-up period and then had its values reset to zero. The particular version of the model that was used is titled "Replication Run 2, T2-RAM6, 1 Year Production." Data referenced was accumulated during the first year following the three year warm-up period. Page numbers referenced refer to the T&M report.

B. SWB's: WRAP I was designed to store up to 8 SWB's simultaneously. The 8 SWB's include two that make up the particular weeks processing and 6 that might be brought in to be shipped. Due to the dose associated with these SWB's, one should not assume that the normal operation would be to bring in 6 SWB's for shipment at the same time you are evaluating 42 drums in the TRUPACT loading bay. Worst case would be 6 SWB's and 4 TRUPACT drum payloads on the TRUPACT conveyor.

SWB's in WRAP 1 (no drums in TRUPACT tractor/trailer) 8 SWB's

C. DRUMMED WASTE

1. S&R		
AS/RS average capacity (LAGIN + LAGOUT, pg 2)	154	drums
Infeed conveyor is heavily utilized - assume full CT 1 & CT2, pg 16	17	drums
Discharge conveyor is empty 83% of the time CT3, pg 16	0	drums
TRUPACT conveyor assume full with (5) 14-drum pallets	70	drums
2. NDE/NDA		
NDE/NDA units are utilized 50% of the time assume half are being used at any given time	3	drums
Buffer storage in NDE/NDA average capacity BS, pg 2	2	drums
AGV	1	drum
3. PROCESSING AREA		
Lag storage average capacity RWSTOR + PROCSTOR, pg 2	14	drums
Assume all gloveboxes are full		
TRU (entry, sorting, 4 exit)	6	drums
LLW (entry, two sorting, 6 exit)	9	drums
TRU RWM (entry, exit)	2	drums
TRU LLW (entry, exit)	2	drums
AGV	1	drum
WRAP 1 TOTAL DRUM COUNT	281	DRUMS