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Estimated Replacement Costs for Hanford Site Treatment, Storage, and Disposal Units

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Prepared for the U.S. Department of Energy
Assistant Secretary for Defense Programs



Westinghouse
Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

**ESTIMATED REPLACEMENT COSTS FOR HANFORD SITE
TREATMENT, STORAGE, AND DISPOSAL UNITS**

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WESTINGHOUSE HANFORD COMPANY

ENVIRONMENTAL DIVISION

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INTRODUCTION

The Hanford Site is operated by the U.S. Department of Energy-Richland Operations Office (DOE-RL). The Hanford Site produces radioactive, dangerous, and mixed waste. Waste is produced from operations involved in the recovery and purification of special nuclear materials from reactor fuel elements, research and development of advanced nuclear reactor concepts, and non-nuclear projects. The radioactive waste is interpreted by the U.S. Department of Energy to be regulated under the Atomic Energy Act (1954). The nonradioactive dangerous and mixed waste is interpreted to be regulated under the Resource Conservation and Recovery Act (RCRA 1976).

The dangerous waste permit identification number issued to the Hanford Site by the U.S. Environmental Protection Agency and the Washington State Department of Ecology is "U.S. Environmental Protection Agency/State Identification Number WA 7890008967". This identification number encompasses 58 Treatment, Storage, and Disposal (TSD) waste management units within the Hanford Site. These units are co-operated by DOE-RL and two of its major contractors (Westinghouse Hanford Company and Pacific Northwest Laboratories).

For regulatory purposes, the entire Hanford Site is considered to be one TSD facility.

The Washington State Dangerous Waste Regulations (WAC-173-303-805) states:

"In no event shall changes be made to a TSD facility under the interim status permit which amount to reconstruction of the facility. Reconstruction occurs when the capital investment in the changes to the facility exceeds fifty percent of the capital cost of a comparable entirely new facility."

Estimated replacement costs will be used to determine the interim status expansion limit for the Hanford Site under RCRA. Interim status expansion allows for the construction of new and expansion of existing TSD Units at Hanford without first obtaining a final RCRA Permit. This allows potential construction delays, due to permit preparation, to be avoided. Expansion under interim status will not exempt a facility from eventually obtaining a final RCRA Permit for the expanded or new units.

An estimate of the replacement costs for Hanford TSD Units was recently completed by the Project Control & Integration Group of WHC. This report discusses the methodology used to determine this estimate, and the results of the evaluation.

APPROACH

The replacement cost estimate for each TSD unit at the Hanford Site was determined by using historical cost information, current financial data, various reports, and the Freiman Analysis for System Technique Parametric Estimate System (FAST).

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The primary source for the historic cost information was the Richland Property Record System (RL-PS). The RL-PS is an automated data processing system. This system contains cost information applicable to the acquisition, identity, use, and location of all Hanford Site capital assets. Historic cost data obtained from the RL-PS were converted to 1988 dollars.

Data reflecting the cost of recently completed TSD units, work-in-progress, and miscellaneous facility enhancements were acquired from the current Financial Data System and Projects Department records.

Two reports were used to help determine the replacement cost of the soil column disposal units. These documents are "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989 and "Hanford Site Waste Management Units Report," DOE/RL 88-30, 1989.

Replacement cost of the Low-Level Burial Grounds was estimated by determining the cost to construct RCRA compliant mixed waste burial grounds. The cost was divided by the approximate amount of mixed waste that the burial grounds could contain and an approximate cost to dispose of a cubic foot of waste was calculated. This cost was multiplied by the volume of permitted and previously buried mixed waste to estimate the replacement cost of the mixed waste portion of the Low-Level Burial Grounds.

Cost changes based solely on differences in economic indices serve only as a very general guide to replacement cost. Published indices do not reflect the result of changing regulatory, safety, and technical requirements. These requirements continue to escalate the cost of replacing facilities. To compensate for regulatory, technological, and safety related requirements, the FAST program was used to adjust acquisition costs converted to 1988 dollars.

The FAST program is a universal system designed to develop costs for any assortment of hardware, equipment, and construction projects. This program has been used by the U.S. Department of Energy for cost estimations for approximately ten years. Program procedures are tailored to reflect specific technologies and work scopes. Reference factors (PLTFM and ENTYP) are used to calibrate and adjust the program to different types of projects. The reference factors used are conservative and are selected based on experience and cost histories.

The variable PLTFM represents the cost of additional effort necessitated by special application, quality, and working environment. These conditions usually affect reliability, maintenance, safety, and performance of the equipment. The numerical values used in the FAST program for PLTFM range from 1.0 to 2.5. Table 1 shows typical PLTFM values for general types of facilities.

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TABLE 1. TYPICAL PLTFM VALUES

<u>Value</u>	<u>Facility Type</u>
1.0	Commercial
1.3	Nuclear
1.4	Mobile, Shipborne
1.7	Commercial Airborne
1.8	Military Airborne
1.9	Nuclear Hardened Avionics
2.0	Unmanned Space
2.5	Manned Space

The numerical values used in this cost estimation range from 1.0 for commercial facilities to 1.3 for nuclear operating units.

The variable ENTTYPE reflects cost based on the technical sophistication of a facility. ENTTYPE values in the FAST program range from 40 indicating high technology to 140 indicating low technology. Table 2 shows the seven basic types of technology and the corresponding values considered by the program.

TABLE 2. GENERAL ENTTYPE VALUES

<u>Technology</u>	<u>Value</u>
Electronic	40 to 47
Electrical	47 to 55
Heat	55 to 65
Motion	60 to 70
Mechanical Control	65 to 75
Containment	75 to 100
Supportive	100 to 140

The numerical values used in this cost estimation range from 70 to 110.

All of the TSD units with existing RCRA Part A permit applications were considered in determining the replacement cost estimate for the Hanford Site and are listed in Table 3. However, nine units with RCRA permit applications were not used in the cost estimate calculations. These include six units with relatively negligible costs, two units that had the Part A permit applications withdrawn, and one unit that has not yet been built. One unit has been partially completed and only the cost of the completed portion is included. These units are designated in Table 3.

A request for withdrawal of the Part A Permit Application for five TSD units at the Hanford Site has been submitted to the Washington State Department of Ecology (Ecology). A request for Treatment By Generator (TBG) has also been submitted to Ecology for five units. The TBG request for two of the units (PUREX and 222-S Laboratories) only includes a portion of each unit. If these requests are granted, costs for these units, or a portion of a unit,

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in Table 3. Two of the withdrawal requests were granted by Ecology on August 17, 1989.

Soil column liquid waste disposal will be phased out at the Hanford Site by June 1995 (Hanford Federal Facility Agreement and Consent Order). Therefore, the TSD units that have used soil column methods for treatment or disposal would be replaced with alternative treatment and disposal units. The document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989, lists the effluent streams and outlines the costs to construct alternative treatment and disposal units. The affected TSD units listed in this report were associated with the effluent streams using the document "Hanford Site Waste Management Units Report," DOE/RL 88-30, 1989. These TSD units are designated in Table 3. Appendix A shows the relationship of the TSD units to the effluent streams and the cost of the treatment facility shown in "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989.

RESULTS

Tables 3 and 4 summarize the results of the replacement cost estimations for the Hanford Site. Table 3 shows the replacement cost for individual TSD units in the different Hanford Site areas. Table 4 gives the total cost for the different areas and the total for the Hanford Site. The original costs and the replacement costs of the soil column disposal units, that will be replaced by alternative treatment and disposal units, have been combined. The total replacement cost for the Hanford Site TSD units is approximately 6.3 billion dollars.

Appendix B indicates what each TSD unit is (treatment, storage, or disposal) and describes the considerations used in determining the cost estimations. A full description of each unit can be found in the document "Hanford Site Dangerous Waste Part A Permit Application," DOE/RL 88-21, 1988.

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TABLE 3.1 REPLACEMENT COSTS FOR TSD UNITS

(Dollars in Millions)

100 Area Facilities

APPENDIX PAGE NO.	FACILITY	Acquisition In	Factors Used		Replacement In
		1988 Dollars	In Estimations	PLTFM	ENTYPE
		<u>COST</u>			<u>COST</u>
B-2	1324-N Surface Impoundment	Included in the last entry of this table			
B-2	105-DR Large Sodium Fire Facility	\$.1	See Appendix B		\$ 1.3
B-2	*1706-KE Waste Treatment System	.1	1.3	90	.2
B-2	183-H Solar Evaporation Basins	1.6	1.0	100	1.6
B-2	+1301-N Liquid Waste Disposal Facility	Included in the last entry of this table			
B-3	+1325-N Liquid Waste Disposal Facility	Included in the last entry of this table			
B-3	+1324-NA Percolation Pond	Included in the last entry of this table			
B-3	+100-D Ponds	Included in the last entry of this table			
	Total	\$ 1.8			\$ 3.1

200 Area Facilities

APPENDIX PAGE NO.	FACILITY	<u>COST</u>	<u>PLTFM</u>	<u>ENTYPE</u>	<u>COST</u>
B-4	*221-T Containment Systems Test Facility	\$ 4.7	1.3	90	\$ 15.1
B-4	#Ashpit Site	<.1	---	---	<.1
B-4	#E-8 Borrow Pit	<.1	---	---	<.1
B-4	242-A Evaporator	34.4	1.3	90	54.7
B-4	Grout Treatment Facility	196.9	1.3	70	197.2
B-5	*T Plant Treatment Tank (TK-15-1)	2.5	1.3	80	7.7
B-5	*241-Z Treatment Tank (D-5)	4.1	1.3	90	5.2
B-5	B Plant	436.5	1.3	75	1,668.6
B-5	*222-S Laboratories Treatment Tank and Storage	2.5	1.3	90	3.2

200 Area Facilities - (continued)APPENDIX
PAGE NO.

	<u>FACILITY</u>	<u>COST</u>	<u>PLTFM</u>	<u>ENTYPE</u>	<u>COST</u>
B-5	*204-AR Waste Unloading Station	\$ 4.3	1.3	80	\$ 6.9
B-6	*PUREX	61.1	1.3	75	157.6
B-6	#Hanford Waste Vitrification Plant	---	---	---	---
B-6	2727-S Storage Facility	.1	1.1	100	.1
B-7	Double-Shell Tank Farms	238.3	1.3	90	446.4
B-7	Hexone Storage and Treatment	3.4	1.3	80	10.8
B-7	*2727-WA SRE Sodium Storage Building	---	Part A Permit Application Withdrawn		---
B-7	PUREX Tunnels 1 and 2	4.4	1.3	80	16.5
B-8	TRUSAF	8.5	1.3	80	33.0
B-8	@Hanford Central Waste Complex	2.1	This unit partially completed		2.1
B-8	Single-Shell Tanks	679.9	1.3	90	1,803.1
B-8	Low-Level Burial Grounds	1,607.2	See explanation in text		1,607.2
B-9	+216-S-10 Pond and Ditch		Included in the last entry of this table		
B-9	+2101-M Pond		Included in the last entry of this table		
B-9	+216-A-29 Ditch		Included in the last entry of this table		
B-10	+216-B-3 Pond		Included in the last entry of this table		
B-10	+216-B-63 Trench		Included in the last entry of this table		
B-10	+216-A-10 Crib		Included in the last entry of this table		
B-11	+216-U-12 Crib		Included in the last entry of this table		
B-11	+216-A-36B Crib		Included in the last entry of this table		
	Total	\$ 3,290.9			\$ 6,035.4

300 Area Facilities

APPENDIX
PAGE NO.

	<u>FACILITY</u>	<u>COST</u>	<u>PLTFM</u>	<u>ENTYPE</u>	<u>COST</u>
B-11	3718-F Alkali Metal Treatment & Storage Facility	\$.5	1.3	80	\$ 1.3
B-11	*324 Sodium Removal Pilot Plant	1.6	1.3	70	2.6
B-11	304 Concretion Facility	.4	1.3	90	.7
B-12	300 Area Solvent Evaporator	.1	1.0	100	.1
B-12	300 Area Waste Acid Treatment System	1.5	1.1	100	1.5
B-12	303-M Oxide Facility	1.2	1.3	90	2.0
B-12	#325 Waste Treatment Facility	1.9	1.3	100	2.4
B-12	#Biological Treatment Test Facilities	<.1	---	---	<.1
B-12	#Physical and Chemical Treatment Test Facilities	<.1	---	---	<.1
B-12	Thermal Treatment Test Facilities	3.9	1.3	90	3.9
B-13	311 Tanks	.6	1.2	100	1.0
B-13	303-K Storage Facility	.5	1.3	100	.6
B-13	305-B Storage Facility	4.9	1.2	100	4.9
B-13	*332 Storage Facility	---	Part A Permit Application Withdrawn		---
B-13	+300 Area Process Trenches	Included in the last entry of this table			
	Total	\$ 17.1			\$ 21.0

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400 Area Facilities

APPENDIX
PAGE NO.

	<u>FACILITY</u>	<u>COST</u>	<u>PLTFM</u>	<u>ENTYPE</u>	<u>COST</u>
B-13	Maintenance & Storage Facility (MASF)	\$ 37.2	1.3	80	\$ 37.2
B-14	4843 Alkali Metal Storage Facility	.1	1.0	100	.1
	Total	\$ 37.3			\$ 37.3

600 Area Facilities

<u>APPENDIX PAGE NO.</u>	<u>FACILITY</u>	<u>COST</u>	<u>PLTFM</u>	<u>ENTYPE</u>	<u>COST</u>
B-14	#Hanford Patrol Academy Demolition Site	<.1	---	---	<.1
B-14	616 Storage Facility	\$ 1.0	1.2	90	\$ 1.0
B-14	Nonradioactive Dangerous Waste Landfill	<u>1.0</u>	1.1	100	<u>2.1</u>
	Total	\$ 2.0			\$ 3.1

1100 Area Facilities

<u>APPENDIX PAGE NO.</u>	<u>FACILITY</u>	<u>COST</u>	<u>PLTFM</u>	<u>ENTYPE</u>	<u>COST</u>
B-14	#Simulated High Level Waste Slurry Treatment and Storage	<.1	---	---	<.1

All Areas (Liquid Soil Disposal Units Only)

<u>APPENDIX PAGE NO.</u>	<u>FACILITY</u>	<u>COST</u>	<u>PLTFM</u>	<u>ENTYPE</u>	<u>COST</u>
A-1	Total of all Liquid Soil Disposal Units listed above (designated by †)	12.9	---	---	166.6

* A request for the withdrawal of the Part A permit application and a request for Treatment By Generator have been submitted to the Washington State Department of Ecology for these units. If the request is granted the replacement costs for these units will be deleted.

† Indicates a liquid soil disposal unit that would be replaced by a treatment unit. Replacement cost of all liquid soil disposal units determined as a total from "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-1, September 1988. Replacement cost shown in the last entry in Table 3.

Indicates a unit that was not built at the time of the estimations or a unit with insignificant costs <.1 million. Costs for these units were not considered.

@ Indicates a unit that is partially completed.

TABLE 4. SUMMARY OF TSD UNITS

(Dollars in Millions)

	Acquistion in 1988 dollars	Replacement in 1988 dollars
	<u>COST</u>	<u>COST</u>
100 Area	\$ 1.8	\$ 3.1
200 Area	3,290.9	6,035.4
300 Area	17.1	21.0
400 Area	37.3	37.3
600 Area	2.0	3.1
1100 Area	---	---
All Areas (liquid soil disposal Units)	<u>12.9</u>	<u>166.6</u>
Hanford Site Total	\$ 3,361.0	\$ 6,266.5

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REFERENCES

DOE, 1989, Hanford Site Waste Management Units Report, DOE/RL 88-30, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

Ecology, 1989, Dangerous Waste Regulations, WAC-173-303, Washington State Department of Ecology, Olympia, Washington.

Ecology, EPA, and DOE, 1989, Hanford Federal Facility Agreement and Consent Order, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy-Richland Operations Office, Richland, Washington.

Millikin E. J., 1989, Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site, WHC-EP-0196-2, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A

Appendix A shows the relationship of the TSD units used for soil column treatment, storage, or disposal to the effluent streams and treatment facility costs listed in "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989.

TSD UNIT	EFFLUENT STREAM	CAPITAL COST \$000
216-A-36B Crib	PUREX ammonia scrubber condensate	1,743
216-A-10 Crib	PUREX process condensate	12,651
	242-A Evaporator process condensate	17,000
216-A-29 Ditch	PUREX chemical sewer	2,779
"	PUREX steam condensate	0
216-U-12 Crib	UO ₃ Plant process condensate	1,360
	UO ₃ Plant wastewater	630
216-B-3 Pond	B Plant process condensate	15,010
"	B Plant steam condensate	0
216-B-63 Trench	B Plant chemical sewer	11,360
1301-N Liquid Waste Disposal, replaced by 1325-N	N Reactor effluent	40,000
1324-N and 1324-NA	163-N Demineralizer wastewater	600
300 Area Process Trenches	300 Area laboratory and chemical sewer	3,500
2101-M Pond	2101-M Laboratory wastewater*	-----
216-S-10 Pond and Ditch	222-S Laboratory wastewater	0
"	S Plant wastewater*	-----
Facilities listed above	Treated effluent	60,000
TOTAL		<u>166,633</u>

* Costs included in treated effluent

APPENDIX B

Appendix B indicates what each waste management unit is (treatment, storage, or disposal). A full description of the unit can be found in the document "Hanford Site Dangerous Waste Part A Permit Application," DOE/RL 88-21, 1988. Appendix B also contains the considerations or assumptions used to help estimate the replacement cost of the TSD unit.

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WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
1324-N Surface Impoundment	Treatment Unit/Neutralization and storage pond.	Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.
105-DR Large Sodium Fire Facility	Treatment Unit/Experimental waste treatment facility. Location in 105-DR for space utilization only.	Facility housed in portion of reactor building. Estimated replacement cost based on 3718-F Alkali Metal Treatment and Storage Facility.
B-2 1706-KE Waste Treatment System	Treatment Unit/Acid and caustic waste treatment and evaporation system.	Similar process configuration, additional monitoring and safety requirements. Would be required to meet regulations for tank systems.
183-H Solar Evaporation Basins	Treatment Unit/River water filter plant converted to solar evaporation basin.	Designed and constructed to meet containment criteria at time of construction. Assumes replacement facility requirements would be the same as original construction.
1301-N Liquid Waste Disposal Facility	Disposal Unit/Liquid waste disposal facility.	A liquid waste processing facility would replace the crib. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.

WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
1325-N Liquid Waste Disposal Facility	Disposal Unit/Liquid waste disposal unit.	A liquid waste processing facility would replace the crib. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.
1324-NA Percolation Pond	Disposal Unit/Neutralization and storage pond.	A liquid waste processing facility would replace the percolation pond. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.
100-D Ponds	Disposal Unit/Liquid waste disposal unit.	A liquid waste processing facility would replace the disposal pond. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.

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WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
221-T Containment Systems Test Facility	<p>Treatment Unit/Chemical Processing Facility (Canyon). The T-Plant complex includes the following ancillary facilities:</p> <p>221-T Canyon Building 221-TA Vent Fan House 271-T office Building 277-T RR Tunnel entrance 291-T Stack and Sand Filters 2706-T Equipment Decon Facility</p> <p>The canyon includes a total of 39 process cells, 2 cells are occupied by the Containment System Test Facility.</p>	<p>Similar process configuration. New containment building would require category I construction parameters. Containment System Test Facility occupies 5.13% of the T-Plant processing space available.</p>
Ashpit Site	Treatment Unit/Used to detonate explosive waste.	Cost less than .1 million.
E8 Borrow Pit	Treatment Unit/Used to detonate explosive waste.	Cost less than .1 million.
242-A Evaporator	Treatment Unit/Facility designated to treat double-shell tank slurry feed. Concentrates and reduces volume of waste.	New facility would require automated process controls. Would be required to meet regulations for tank systems.
Grout Treatment Facility	Treatment Unit/Treats liquid radioactive waste by mixing with grout forming solids.	Same as above with minor operability changes.

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WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS																	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS																
T Plant Treatment Tank (TK-15-1)	Treatment Unit/See 221-T Containment Systems Test Facility.	Process similar with automated control changes. The Treatment Tank occupies about 2.5% of the T-Plant processing space available. Would be required to meet regulations for tank systems.																
241-Z Treatment Tank (D-5)	Treatment Unit/Waste treatment and storage tank.	Similar process configuration. May require installation of automated process controls. Would be required to meet regulations for tank systems.																
B Plant	<p>Treatment and Storage Unit/Chemical Processing Facility (Canyon). B-Plant complex includes the following ancillary facilities:</p> <table border="0"> <tr> <td>221-B</td> <td>212-B</td> <td>221-BA</td> <td>2902-B</td> </tr> <tr> <td>221-BB</td> <td>221-BE</td> <td>271-B</td> <td>291-B</td> </tr> <tr> <td>272-B</td> <td>272-BA</td> <td>272-BB</td> <td>291-BD</td> </tr> <tr> <td>276-B</td> <td>282-B</td> <td>282-BA</td> <td>292-B</td> </tr> </table>	221-B	212-B	221-BA	2902-B	221-BB	221-BE	271-B	291-B	272-B	272-BA	272-BB	291-BD	276-B	282-B	282-BA	292-B	<p>New containment building would be constructed to category I design parameters. Process equipment and controls would reflect state-of-the-art operational requirements. Would be required to meet regulations for tank systems.</p>
221-B	212-B	221-BA	2902-B															
221-BB	221-BE	271-B	291-B															
272-B	272-BA	272-BB	291-BD															
276-B	282-B	282-BA	292-B															
222-S Laboratories Treatment Tank and Storage Pad	Treatment and Storage Unit/Treatment and storage for laboratory waste.	New containment facility constructed to category I standards. New process tanks, automatic controls and double containment discharge piping would be necessary. Would be required to meet regulations for tank systems.																
204-AR Waste Unloading Station	Treatment Unit/May treat waste during transfer to double-shell tanks.	Facility was designed and constructed to meet operational parameters. Probably replace in kind with minor operating changes. Would be required to meet regulations for tank systems.																

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WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS																					
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS																				
PUREX	<p>Treatment and Storage Unit/The treatment portion consists of Concentrator E-F11, Tank TK-E5, Tank G7, Tank F15, Tank F16, Tank F18, Tank U3, and Tank U4.</p> <p>Chemical Processing Facility (Canyon). The PUREX complex includes the following ancillary facilities:</p> <table border="0"> <tr> <td>202-A</td> <td>211-A</td> <td>212-A</td> <td>213-A</td> </tr> <tr> <td>291-A</td> <td>291-AD</td> <td>293-A</td> <td>293-AA</td> </tr> <tr> <td>2714-A</td> <td>2701-AB</td> <td>292-A</td> <td>294-A</td> </tr> <tr> <td>295-AD</td> <td>295-AB</td> <td>295-A</td> <td>275-EA</td> </tr> <tr> <td>203-A</td> <td>205-A</td> <td></td> <td></td> </tr> </table> <p>The PUREX Canyon includes a total of 78 equipment positions. Eight positions are occupied by TSD equipment.</p>	202-A	211-A	212-A	213-A	291-A	291-AD	293-A	293-AA	2714-A	2701-AB	292-A	294-A	295-AD	295-AB	295-A	275-EA	203-A	205-A			<p>Assume similar process configuration. New containment building would require category I construction parameters. The designated TSD facilities occupy about 10.3% of the processing space available. Would be required to meet regulations for tank systems.</p>
202-A	211-A	212-A	213-A																			
291-A	291-AD	293-A	293-AA																			
2714-A	2701-AB	292-A	294-A																			
295-AD	295-AB	295-A	275-EA																			
203-A	205-A																					
Hanford Waste Vitrification Plant	Treatment Unit/Treatment of mixed waste.	This facility was not built at the time of the estimation and is not considered in the Hanford Site TSD replacement costs.																				
2727-S Storage Facility	Storage Unit/Storage of nonradioactive dangerous waste.	This facility is not listed in RL-PS. Used minimum significant cost.																				

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WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
Double-Shell Tank Farms	Storage Unit/Mixed waste storage.	Replacement of ancillary equipment would include additional automatic monitoring and control systems. Would be required to meet regulations for tank systems.
Hexone Storage and Treatment	Treatment and Storage Unit/Waste storage.	Designed and constructed to meet containment criteria appropriate at time of construction. Would have to meet double-shell tank containment criteria.
2727-WA SRE Sodium Storage Building	Storage Unit/Waste storage.	Part A Permit Application withdrawal request was approved.
PUREX Tunnels 1 and 2	Storage Unit/Storage of radioactive waste.	Designed and built to meet containment criteria appropriate at time of construction. Would have to meet category I construction criteria for double containment, spill containment and retrieval, active ventilation and automatic monitoring/alarm systems.

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WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
TRUSAF	Storage Unit/Nondestructive analysis of transuranic waste containers.	The TRUSAF process was designed to current requirements. New containment facility constructed to category I standards would be built. Redundant automatic controls and spill containment and retrieval system. An active ventilation and alarm system would be required.
Hanford Central Waste Complex	Storage Unit/Mixed waste storage complex.	This facility is only partially completed. Only the cost of the completed portion was considered in this study.
Single-Shell Tanks	Storage Unit/Mixed waste storage.	Would have to meet category I construction criteria for containment, active ventilation, and automatic monitoring and alarm systems. Would be required to meet regulations for tank systems.
Low-Level Burial Grounds	Disposal Unit/Disposal of solid low-level mixed waste.	Burial trenches would have to meet RCRA requirements. The estimated replacement cost was determined from the cost of constructing a RCRA compliant mixed waste burial ground and the amount of mixed waste permitted and previously buried (see text).

WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
216-S-10 Pond and Ditch	Disposal Unit/Liquid waste disposal.	A liquid waste processing facility would replace the disposal pond and ditch. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site, "WHC-EP-0196-2, 1989. See Appendix A.
2101-M Pond	Disposal Unit/Liquid waste disposal.	This unit is not listed in RL-PS. A liquid waste processing facility would replace the disposal pond. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.
216-A-29 Ditch	Disposal Unit/Liquid waste disposal.	This unit is not listed in RL-PS. A liquid waste processing facility would replace the disposal ditch. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.

WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
216-B-3 Pond	Disposal Unit/Liquid waste disposal.	A liquid waste processing facility would replace the disposal pond. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.
216-B-63 Trench	Disposal Unit/Liquid waste disposal.	Facility not listed in RL-PS. A liquid waste processing facility would replace the disposal pond. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.
216-A-10 Crib	Disposal Unit/Liquid waste disposal.	A liquid waste processing facility would replace the crib. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.

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WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
216-U-12 Crib	Disposal Unit/Liquid waste disposal.	A liquid waste processing facility would replace the crib. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.
216-A-36B Crib	Disposal Unit/Liquid waste disposal.	A liquid waste processing facility would replace the crib. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site," WHC-EP-0196-2, 1989. See Appendix A.
3718-F Alkali Metal Treatment and Storage Facility	Treatment and Storage Unit/Alkali metals treatment and disposal facility.	Would require new process enclosure. Would be required to conform with present disposal requirements for alkali metals.
324 Sodium Removal Pilot Plant	Treatment Unit/Sodium removal and alkali metal cleaning facility.	Similar process configuration, may need additional monitoring and process control instrumentation to confirm operations within design parameters. May require new process enclosure.
304 Concretion Facility	Treatment Unit/Mixed waste treatment.	Similar process configuration, expect additional monitoring and process control instrumentation to confirm operations within design parameters. Would require new process enclosure.

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WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
300 Area Solvent Evaporator	Treatment Unit/Treatment of radioactively contaminated spent solvents.	Not in RL-PS system. Minimum cost assumed.
300 Area Waste Acid Treatment System	Treatment Unit/Mixed waste treatment and storage.	Equipment costs extracted from RL-PS system. Would probably be replaced in kind. May require some process control and monitoring instrumentation.
303-M Oxide Facility	Treatment Unit/Processes mixed waste.	Designed to meet waste disposal criteria at time of construction. Process equipment would probably be replaced in kind. May require process control and monitoring upgrades to verify operations within design parameters. Would require air monitoring system. May require new process enclosure.
325 Waste Treatment Facility	Treatment Unit/Treatment of small quantities of diverse chemical and mixed waste.	Located in building 325. Occupies approximately 2% of building 325.
Biological Treatment Test Facilities	Treatment Unit/Treatment of mixed waste and hazardous waste by R&D biological treatment processes.	Cost less than .1 million.
Physical and Chemical Treatment Test Facilities	Treatment Unit/Treatment of mixed waste and hazardous waste by various physical and chemical R&D processes.	Cost less than .1 million.
Thermal Treatment Test Facilities	Treatment Unit/Multiple facilities designed to test waste disposal techniques.	Would probably be replaced in kind.

WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
311 Tanks	Storage Unit/Used for the treatment and storage of mixed waste.	Would be replaced by double-shell tanks. May need control and monitoring instrumentation upgrades. Would be required to meet regulations for tank systems.
303-K Storage Facility	Storage Unit/Storage of mixed waste (liquid and solid) in steel drums.	Would probably be replaced in kind. May require some status monitoring and alarms.
305-B Storage Facility	Storage Unit/Storage for waste in steel drums.	Would be replaced in kind. May need control and monitoring instrumentation upgrades.
332 Storage Facility	Storage Unit/Storage of small quantities of flammable materials.	Part A Permit Application withdrawal request was approved.
300 Area Process Trenches	Disposal Unit/Liquid waste disposal.	This facility is not listed in RL-PS. A liquid waste processing unit would replace the trenches. Replacement costs determined from the document "Annual Status Report of the Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site, "WHC-EP-0196-2, 1989. See Appendix A.
Building Maintenance and Storage Facility (MASF)	Treatment Unit/Removal of residual sodium from dangerous waste.	Built to category I containment standards. Would probably be replaced in kind.

WASTE MANAGEMENT UNIT	REPLACEMENT COST CONSIDERATIONS	
	TYPE OF UNIT/ORIGINAL FUNCTION	ASSUMPTIONS
4843 Alkali Metal Storage Facility	Storage Unit/Storage warehouse for reactive alkali metal waste.	May need minor control and monitoring system upgrades.
Hanford Patrol Academy Demolition Site	Treatment Unit/Detonate explosive waste.	Cost less than .1 million.
616 Storage Facility	Storage Unit/Container storage for nonradioactive waste.	Would be replaced in kind.
Nonradioactive Dangerous Waste Landfill	Disposal Unit/Conventional landfill facility.	Would require lining and leachate collection system.
Simulated High-Level Waste Slurry Treatment and Storage	Treatment and Storage Unit/A one time treatment facility for mixed waste.	Cost less than .1 million.

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