ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 646870

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental ○ Direct Revision ◉ Change ECN ○ Temporary ○ Standby ○ Supersedure ○ Cancel/Void ○	J. R. Robertson, River Corridor Project L1-04, 376-8162	○ Yes ◉ No	March 2000
	6. Project Title/No./Work Order No.: 300 Area Special-Case Waste	7. Bldg./Sys./Fac. No.: 324, 325, 327, 340	8. Approval Designator: E
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.): HNF-5068, Rev. 0	10. Related ECN No(s).: n/a	11. Related PO No.: n/a

12a. Modification Work	12b. Work Package No.	12c. Modification Work Completed	12d. Restored to Original Condition (Temp. or Standby ECNs only)
○ Yes (fill out Blk. 12b) ◉ No (NA Blks. 12b, 12c, 12d)	n/a	n/a Design Authority/Cog. Engineer Signature & Date	n/a Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? ○ Yes ◉ No

Revision of document to incorporate comments from U.S. Department of Energy, Richland Operations Office and all contractors responsible for completion of Tri-Party Agreement interim milestones M-92-13, -14, -15, and -16.

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14a. Justification (mark one)	14b. Justification Details
Criteria Change ○ Design Improvement ○ Environmental ○ Facility Deactivation ◉ As-Found ○ Facilitate Const. ○ Const. Error/Omission ○ Design Error/Omission ○	Comments from U.S. Department of Energy, Richland Operations Office needed to be resolved prior to their submittal to Washington State Department of Ecology for completion of Tri-Party Agreement interim milestone M-92-13.

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

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MAR 20 2000 DATE: HANFORD RELEASE STA: 15 ID:

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 646870

16. Design Verification Required: ( ) Yes (●) No

17. Cost Impact

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Delay ( ) ______

19. 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 13. Enter the affected document number in Block 20.

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	☐	Tickler File	☐
Environmental Report	☐	Inspection Plan	☐	______	☐
Environmental Permit	☐	Inventory Adjustment Request	☐	______	☐

20. 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
N/A		

21. Approvals

	Signature	Date		Signature	Date
Design Authority	R. L. Hobart		Design Agent		
Cog. Eng.	[signature]	3-15-00	PE		
Cog. Mgr.	T. L. Erickson [signature]	3/15/00	QA		
QA			Safety		
Safety			Design		
Environ.	D. E. Rasmussen [signature]	3/15/00	Environ.	J. R. Robertson [signature]	3/14/00
Other			Other		
	D. J. McBride [signature]	3-14-00			
	M. W. McCoy for [signature]	3-15-00			

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Signature or a Control Number that tracks the Approval Signature

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Project Management Plan for the 300 Area Special-Case Waste

D. Internet Address

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1. Is document potentially Classified? (●) No ( ) Yes (MANDATORY)

   ____ Manager's Signature Required

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H. Author/Requestor

J. R. Robertson [signature] 3/20/00
(Print and Sign)

Responsible Manager

T. L. Erickson / [signature]
(Print and Sign)

I. Reviewers

	Yes	Print	Signature	Public Y/N (If N, complete J)
General Counsel	[ ]			Y / N
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A-6001-401 (02/98)

HNF-5068
Revision 1

Project Management Plan for the 300 Area Special-Case Waste

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200
Fluor Hanford
P.O. Box 1000
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Revision 1

Project Management Plan for the 300 Area Special-Case Waste

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Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

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P.O. Box 1000
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Key Words: 324 Building, 325 Building, 327 Building, special-case waste, Tri-Party Agreement, Interim Milestone M-92-13, Interim Milestone M-92-14, Interim Milestone M-92-15, Interim Milestone M-92-16

Abstract: This project management plan is a culmination of the information developed during disposition alternative analysses for the 324, 325, and 327 Buildings. It satisfies the requirements for Tri-Party Agreement Interim Milestone M-92-13.

RECORD OF REVISION	(1) Document Number HNF-5068	Page 1

(2) Title
Project Management Plan for the 300 Area Special-Case Waste

Change Control Record

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
1 RS	(7) Replaced entire document. ECN-646870	RL Hobart	TL Erickson 3/15/00

RELEASE AUTHORIZATION

Document Number:	HNF-5068, Rev. 1
Document Title:	Project Management Plan for the 300 Area Special-Case Waste

This document, reviewed in accordance with DOE Order 241.1, "Scientific and Technical Information Management,"and 241.1-1, "Guide to the Management of Scientific and Technical Information," does not contain classified or sensitive unclassified information and is:

APPROVED FOR PUBLIC RELEASE

Janis Aardal 3-20-2000
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Reviewed for Applied Technology, Business Sensitive, Classified, Copyrighted, Export Controlled, Patent, Personal/Private, Proprietary, Protected CRADA, Trademark, Unclassified Controlled Nuclear Information.

EXECUTIVE SUMMARY

This project management plan (PMP) is a culmination of the information developed during disposition alternative analyses for the 324, 325, and 327 Buildings and during development of PMPs for the 324 and 340 Buildings. This PMP satisfies the requirements for the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement [TPA]) Interim Milestone M-92-13. The PMP also satisfies the requirements of TPA Section 11.5. The key objectives of this PMP include:

- identifying the 300 Area special-case waste (SCW) inventories subject to TPA Interim Milestones M-92-14, M-92-15, and M-92-16
- providing the disposition pathway for each of these SCW streams as determined by alternative analysis
- providing detailed descriptions for Phases I, II, and III SCW removal, transport, and storage.

To date, over 98% of the total curies of 300 Area SCW that are subject to the M-92-00 interim milestones have been dispositioned. The Federal Republic of Germany borosilicate glass logs that contained 6.86 MCi of the total 6.974 MCi were packaged and shipped to the Central Waste Complex for storage in 1998. An additional 9.551 kCi were removed from the 324 Building when three of the strontium filters used during cleanout of the building's high-level vault tanks were transferred to the Pacific Northwest National Laboratory for endpoint use as a ^{90}Y generator. This high-energy beta emitter will be used for cancer treatment in conjunction with other compounds. Completion of these transfers satisfied the requirements of TPA Interim Milestone M-92-14. The remaining 96.1 kCi will be tracked to show completion of the two remaining interim milestones.

A schedule with key deliverables and products to show the baseline for managing the subprojects and for fulfilling TPA milestones for 300 Area SCW disposition is included with this PMP.

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ACRONYMS AND ABBREVIATIONS

AGT	above-ground storage tanks
ASTM	American Society for Testing and Materials
BWR	boiling water reactor
CAA	Clean Air Act of 1955
CERCLA	*Comprehensive Environmental Response Compensation, Recovery and Liability Act of 1980*
CFR	Code of Federal Regulations
CH	contact-handled
CWC	Central Waste Complex
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EBR-II	Experimental Breeder Reactor-II
ECN	Engineering Change Notice
Ecology	U.S. Department of Ecology
EPA	U.S. Environmental Protection Agency
ERC	Environmental Restoration Contractor
FGE	fissile gram equivalent
FRG	Federal Republic of Germany
FY	fiscal year
GTC3	Greater-Than-Category-3
HEPA	high-efficiency particulate air
HIC	high-integrity container
HLV	high-level vault
HSRCM	Hanford Site Radiological Control Manual
IAMIT	Inter Agency Management Integration Team
ISA	interim storage area
ISB	interim safety basis
IX	ion exchange
LLBG	low-level burial grounds
LLC	limited liability corporation
LLW	low-level waste
MLLW	mixed low-level waste
MFP	mixed fission products
MOU	memorandum of understanding
MW	mixed waste
NDA	nondestructive analysis
NEPA	National Environmental Policy Act of 1969
NRC	U.S. Nuclear Regulatory Commission
PCB	polychlorinated biphenyl
PHMC	Project Hanford Management Contract
PMCS	Project Management Control System
PMP	Project Management Plan
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium Uranium Extraction Facility
PWR	pressurized water reactor
RCRA	Resource Conservation Recovery Act of 1976

REC	Radiochemical Engineering Cells
RH	remote-handled
RLWS	radioactive liquid waste system
SARP	Safety Analysis Report for Packaging
SCW	special-case waste
SEP	Safety Evaluation for Packaging
SERF	Shielded Environmental Radiometallurgy Facility
SMF	Shielded Materials Facility
SNF	spent nuclear fuel
SNM	special nuclear material
SWDB	steel waste disposal box
Tk	tank
TPA	*Hanford Federal Facility Agreement and Consent Order*, also known as the Tri-Party Agreement
TRU	transuranic
TRU/M	transuranic mixed waste
TSCA	Toxic Substances Control Act of 1976
TSD	treatment, storage, and disposal
TWRS	Tank Waste Remediation System
WAC	Washington Administrative Code
WBS	Work Breakdown Structure
WESF	Waste Encapsulation and Storage Facility
WMH	Waste Management Federal Services of Hanford

1.0 INTRODUCTION

1.1 PROJECT GOALS AND OBJECTIVES

This project management plan (PMP) addresses the 300 Area special-case waste (SCW) disposition strategy. Several facilities in the 300 Area contain significant quantities of high-dose-rate nuclear material and waste requiring storage or disposal outside of the 300 Area. The facilities are operated by the U.S. Department of Energy (DOE), Richland Operations Office (RL), and co-operated by the Project Hanford Management Contract (PHMC) or the Pacific Northwest National Laboratory (PNNL). Due to the high activity levels of the waste and difficulties in characterizing, classifying, and packaging the waste to meet the Hanford Site Solid Waste Acceptance Criteria, the materials were listed as SCW under the *Hanford Facility Agreement and Consent Order* (Tri-Party Agreement [TPA]) major Milestone M-33-00, and subsequently under major Milestone M-92-00. The interim milestones and target dates under major milestone M-92-00 and M-89-00 that relate to the 300 Area SCW are identified in Appendix A, Table A-1. This PMP satisfies the requirements for TPA Interim Milestone M-92-13.

This PMP also satisfies the requirements of Section 11.5 of the TPA for the contents of a PMP, as demonstrated in Table 1-1. This PMP includes all plan elements required by TPA Action Plan Section 11.5, including but not limited to

- 300 Area SCW wastes and materials inventory (Buildings 325, 327, and other 300 Area buildings and facilities)
- characterization and hazardous waste designation results associated with inventory wastes and materials
- detailed descriptions of Phases I, II, and III SCW removal, transport, and storage
- an analysis of the sufficiency of site-wide SCW storage capabilities.

The goals of this PMP include:

- identifying the 300 Area SCW inventory subject to TPA Interim Milestones M-92-14, M-92-15, and M-92-16
- providing the disposition pathway for each of these SCW streams as determined by alternative analysis
- providing detailed descriptions for Phases I, II, and III SCW removal, transport, and storage.

1.2 RESPONSIBILITIES

The RL has primary responsibility for completing major TPA Milestone M-92-00, including quarterly milestone reviews by the Inter-Agency Management Integration Team (IAMIT), and for other TPA requirements. The RL office managers agree that assignment and completion of TPA Interim Milestones M-92-14, M-92-15, and M-92-16 shall be in accordance with the provisions of the PHMC.

Table 1-1. Location of TPA Section 11.5 Requirements in this Document.

TPA Section 11.5 Requirements for PMPs	Location in this SCW PMP
Project Goals and Objectives: a brief and concise statement documenting project objectives and requirements.	Project goals and objectives: Section 1.1
Background: a description of key history, considerations, actions, and decisions leading to establishment of the project schedule. Elements will include the following: i) waste stream physical information ii) commercial disposition activities iii) component and stream stability, and instances of contaminant migration iv) summary of earlier management and disposition option evaluations v) applicable regulatory requirements and expected impacts	Background: Sections 1.1, 2.2, and 3.3.1 i) Sections 2.3 and 2.4 ii) Section 3.1 iii) Section 2.4; contaminant migration discussion not pertinent iv) Sections 2.2, 3.1, and 3.2 v) Section 3.3
Project Scope, including i) facility description ii) description of planned actions iii) top-level WBS iv) projected TSD capability relevant to management and disposition of each component.	*Project Scope: Section 4.0* i) Sections 4.1 and 4.3 ii) Sections 2.3 and 4.2 iii) Sections 6.0, 6.1; Appendix D vi) Section 4.3
Project Constraints, including established Agreement milestones	Sections 5.1, 5.2; Appendices A, B, and C
Schedule and Critical Path Analysis	Sections 5.2 and 6.1; Appendix C
Key Deliverables/Products: a description of key deliverables and products resulting from each top-level WBS element including critical performance parameters.	Section 5.3
Performance Measurement: documentation and description of specific performance measures (e.g. milestones and accomplishments) necessary to assess progress toward achieving project and management plan objectives.	Section 5.4
Project Control: identification of requirements and a summary description of the approach for each of the following: Project interface control; reporting and notification requirements and processes.	Section 6.1
Change Management: identification of change control requirements (e.g., thresholds). To include a summary description of the change control process, participants *including their roles and responsibilities, and documentation.*	*Section 6.1*

The RL Office of Regulatory Liaison and Office of Site Services shall support RL programs in attaining compliance with all terms of TPA Milestone M-92-00 and all of its subsidiary interim milestones.

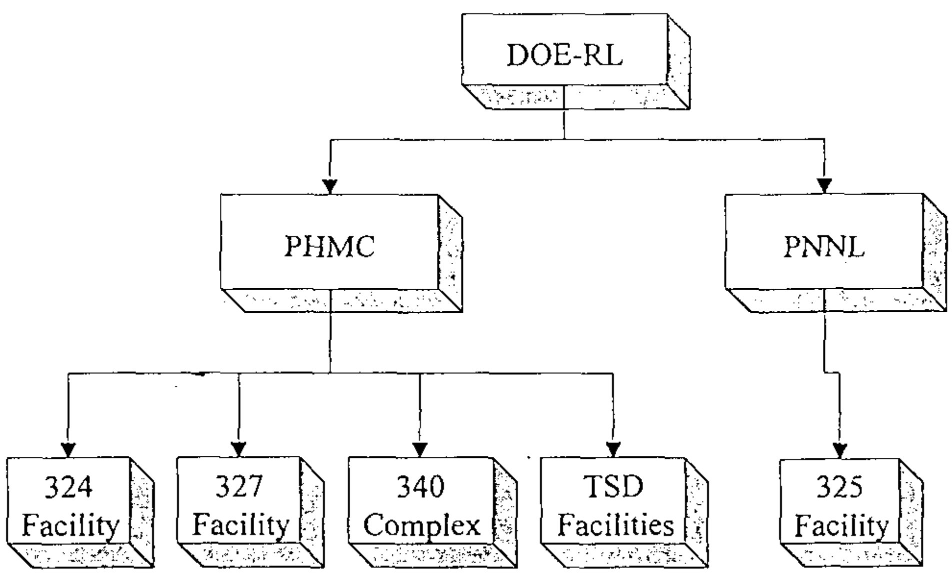
Consistent with the terms of the PHMC, Fluor Hanford, Inc. shall have integration responsibility for all activities required for completing TPA Milestone M-92-00 and all of its interim milestones. This integration responsibility shall be consistent with the following excerpt from the PHMC and shall include the following actions and directives: "The PHMC shall manage and integrate all site resources for optimal achievement of site goals. The contractor shall prepare documentation for its own work activities as well as coordinate and integrate budget documentation for all Project Hanford work." The contractor agrees to plan, integrate, and perform work under this contract in accordance with RL direction concerning implementation of the TPA. The PHMC will provide a plan outlining the deliverables, milestones, and report format at the start of each fiscal year (FY).

As required by their contract, PNNL "shall provide, as appropriate, information required by the PHMC to integrate the Hanford Site budgets, systems engineering, technology development, and analytical services and...other areas deemed appropriate by RL. The information provided shall be in the format and content as requested by the PHMC."

Each identified co-operating contractor is responsible for preparing and packaging the SCW in their respective facilities in a manner acceptable for transport and storage/disposal. The PHMC is responsible for preparing and packaging the waste from the 324, 327, and 340 Buildings, and PNNL is responsible for preparing and packaging the waste from the 325 Building. The facility that generates the waste must meet the Waste Acceptance Criteria of the facility receiving the waste. The PHMC waste management organization (which includes the waste receiving organizations) will provide verification of all packaging activities, perform waste acceptance reviews, and transport waste for interim and/or final disposition.

The responsibilities for completing TPA Interim Milestones M-92-14, M-92-15, and M-92-16 are shown in Figure 1-1.

Figure 1-1: Responsibilities for Completion of TPA Milestones M-92-14, M-92-15, and M-92-16.



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2.0 300 AREA SPECIAL-CASE WASTE BACKGROUND

2.1 SPECIAL-CASE WASTE DEFINITION

Special-case waste is defined in TPA Change Control Form M-92-96-01 (Appendix B – TPA Change Requests) as "radioactive waste generated by DOE-funded activities for which there is no economic disposal or storage pathway provided via the most recent version of HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria.* Typical types of SCW in the 300 Area include:

- Greater-than-Category-3 low-level waste (GTC3-LLW)
- high-activity, high-dose rate streams of
  - mixed low-level waste (MLLW)
  - transuranic (TRU) and transuranic mixed waste (TRU/M)
- residual material from testing irradiated fuel. These residues are comprised of fuel pin fragments, dispersed particulate, and/or chemically altered fuel that cannot be readily retrieved and packaged with the fuel assemblies and intact pins.

2.2 OTHER PERTINENT DOCUMENTS AND STUDIES

Several documents facilitated delineation of the 300 Area SCW streams and preparation of this PMP. These documents are described below.

- DOE/RL-96-73, *324 Building Radiochemical Engineering Cells, High-Level Vault, Low-Level Vault, and Associated Areas Closure Plan.* This document describes the disposition path for mixed waste (MW) streams in the 324 Building areas pursuant to the Resource Conservation Recovery Act of 1976 (RCRA) closure requirements for interim status treatment, storage, and disposal (TSD) units as documented in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1996) as milestones (Milestones M-89-00 and M-20-55).
- HNF-1730, Rev. 2, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis.* This document provides the alternative analysis and disposition path for the SCW streams associated with the 324 and 327 Buildings.
- PNNL-13016, Rev. 0, *325 Building Special-Case Waste Assessment and Disposition Alternatives Analysis.* This document addresses the disposition strategy related to the SCW managed by PNNL. All of PNNL's SCW currently resides in the 325 Building. Due to the high activity levels of the waste and the difficulties in characterizing, classifying, and packaging the waste to meet the Hanford Site Solid Waste Acceptance Criteria, the materials were listed as SCW under major TPA Milestone M-33-00, and subsequently under major TPA Milestone M-92-00.

- *325 Building In-Cell Nondestructive Analysis (NDA) Instrument Pod.*[1] This draft document provides the radiological data for the 1-gal waste cans of LLW and TRU waste located in the 325 Building hot cells.

- HNF-2230, *340 Waste Handling Complex: Deactivation Project Management Plan.* This document provides the planning basis for deactivation of the 340 Complex.

- HNF-IP-1289, Rev. 3, *324/327 Buildings Stabilization/Deactivation Project – Project Management Plan.* This document provides the planning basis for deactivation of the 324 and 327 Buildings.

2.3 Determination of Special-case Waste Subject to M-92-14, -15, and -16

The initial inventory of 300 Area SCW streams relevant to the M-92-00 milestones and dispositioning through this PMP was defined in 1996 and is identified in TPA Change Control Form M-92-96-01 (Appendix B – TPA Change Requests). The inventory was developed through consultation with staff responsible for the materials and with environmental support staff. The 1996 inquiry focused on areas that were judged to be likely locations for SCW (such as hot cells), although non-hot cell facilities were also included.

Material covered under other existing and currently proposed milestones (e.g., TPA Milestones M-89-00, M-90-00, M-91-00) or under other portions of TPA Milestone M-92-00 (e.g., unirradiated uranium, spent nuclear fuel, cesium, and/or strontium capsules) were omitted from the SCW inventory. However, in some cases, waste and material were originally listed as SCW because characterization was not complete or an exact determination was not made of curie content, volume, or classification of waste versus material. As characterization data for the SCW streams has improved and waste classifications have been identified, the number of SCW streams without clearly defined disposition strategies has been reduced.

This subsection of the document provides 300 Area waste inventory information in tabular format. Three tables are presented. Table 2-1 lists the high activity waste streams that will be generated by the 324, 327, 325, and 340 Buildings. This table includes the waste stream description, associated TPA milestone, substreams, curie content, and status; the information is current as of October 1, 1999. Table 2-2 provides a listing of the SCW streams subject to TPA milestones M-92-14, M-92-15, and M-92-16. The table also provides updated curie estimates for these SCW streams, current as of October 1, 1999. The curie estimates in this table will be used to measure performance against TPA milestones M-92-14, M-92-15, and M-92-16. Table 2-3 provides an informative comparison of SCW stream curie estimates; estimates as identified in the original TPA M-92-96-01 stream listing are compared to updated estimates (as shown in the previous table) resulting from rebaselining these same streams.

[1] This document is a draft and is not yet publicly available.

Table 2-1. 300 Area High-Activity Waste Streams.

Waste Stream	TPA Milestone	Substream	Activity (kCi)	Status
324 Building				
B-Cell and MW Closure	M-89-00	B-Cell Dispersibles	179.83 (HNF-1730, Section 2.1.1.1)	Seven engineered containers loaded with dispersibles are staged in B-Cell. Samples of dispersibles are stored in B-Cell and D-Cell. Additional dispersibles will be packaged as B-Cell clean-up progresses. This material will be packaged for disposition as RH-TRU/M.
		Radiochemical Engineering Cells (REC) Airlock Pipe Trench Sludge	10	An estimated 0.42 m^3 (15 ft^3) of sludge containing ~10 kCi of activity is located in the REC airlock pipe trench. This material will be packaged for disposition as RH-TRU/M.
		B-Cell Tanks and Heels	8	The tanks located on Equipment Racks 1A and 1B have been size reduced and placed in grout containers for disposal as RH-LLW since no heel was found. Only Tank-116 (TK-116) and TK-118 remain to be size reduced. These tanks will be disposed of as RH-LLW if no heel is present. Presence of a heel will cause that section of the tank and associated piping to be disposed of as RH-TRU/M.
		Three MW Grout Containers (HNF-1730, Section 2.1.2)	~10.4	Waste segregation is needed to remove high dose MW items from these grout containers. The high dose MW components will be packaged in 20.4-metric ton (22-½-ton) boxes for disposal.
		Waste Boxes on Equipment Rack 2A	~50	Three waste boxes are stored on Equipment Rack 2A. A melter feed can is suspected of being stored in one of the boxes. Items found to be high dose MW, will be packaged in a 20.4-metric ton (22-½-ton) box for disposal.
High-Level Vault (HLV) Filters and Columns	M-92-14, -15, and -16	Two Strontium Filters	0.113	Three filters (SR-1, SR-2, and SR-3) have been transferred to PNNL for ^{90}Y generation. Filters SR-4 and SR-5 are staged in B-Cell waiting to be packaged for disposal as RH-TRU/M.
		Nine Cesium IX Columns	30.378	The cesium columns are staged in D-Cell waiting to be packaged for disposal as RH-LLW.
		One TRU Filter	2.053	The TRU filter is staged in D-Cell waiting to be packaged for disposal as RH-TRU/M.
		20 Metal Filters	24.332	The filters are staged in a grout container in B-Cell waiting to be packaged for disposal as RH-TRU/M.
Spent Fuel Fragments and Rod Sections – B-Cell and D-Cell	M-92-14, -15, and -16	D-Cell	23.7	Fuel pieces and fragments in various containers have been consolidated in D-Cell (previously located in D- and B-Cells).

Table 2-1. 300 Area High-Activity Waste Streams.

Waste Stream	TPA Milestone	Substream	Activity (kCi)	Status
Future 324 Building SCW Streams	N/A	Deactivation Operations	TBD	Residual wastes in ducts, tanks, piping and secondary wastes from deactivation operations (high-efficiency particulate air [HEPA] filters, dry chemical foams, rags, etc.) will be generated in the future as the 324 Building undergoes final cleanout and deactivation.
	M-89-00	C-Cell Radioactive Liquid Waste System (RLWS)	~50	(refer to HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Table 2-8)
Dispositioned 324 Building SCW	M-89-02	B-Cell Dispersibles/Melter Feed	236.6	Two shipments containing dispersibles and melter feed were shipped to the Plutonium Uranium Extraction Facility (PUREX) tunnels in 1996. The total activity shipped (including ^{137}Cs, ^{137m}Ba, ^{90}Sr, ^{90}Y, and other miscellaneous isotopes) was 236.6 kCi.
	M-92-04, -05	10 Nordian Capsules and Other CsCl materials	107.8	Shipped to the Waste Encapsulation and Storage Facility (WESF) (~1.07 kCi residual waste remains in the Shielded Material Facility [SMF] South Cell).
		16 Swollen WESF Capsules	530	Capsules packaged and shipped to WESF in 1997. Seven returned to the 324 Building were repackaged and shipped to WESF in 1998.
	M-92-14, -15, and -16	Neptunium Oxide Powder from basement	3×10^{-5}	Transferred to PNNL's 325 Building in 1998 for future use. DOE and PNNL are coordinating final disposition.
		Federal Republic of Germany (FRG) Borosilicate Vitrified Logs from A-Cell	6,860	Shipped to the Central Waste Complex (CWC) in 1998.

Table 2-1. 300 Area High-Activity Waste Streams.

Waste Stream	TPA Milestone	Substream	Activity (kCi)	Status
Other 324 Building Wastes Not Considered to be SCW	N/A	B-Cell Expendables	N/A	This stream includes equipment needed during clean up of B-Cell. Includes cables, tools, cameras, Labounty Cutter, clamshells, funnels, dust stops, 113.5-L (30-gal) drum of plastics, etc.
		B-Cell Dunnage and Sifted Debris	N/A	The debris removed from the floor is rinsed with water, as necessary, to remove any dispersible material, and is placed into a grout container. Equipment Racks 1A and 1B have been cut up and placed into grout containers for disposal. Equipment Rack 2A is still in place, at the time of issuance of this document, and will be size reduced and disposed of in grout containers.
	M-89-00	Partial Glass Log and Fragment	N/A	Grout Container-88 contains a ~0.6-m (~2-ft) section of a spray calcined glass log that is LLW. It also has some fragments of FRG glass that was chipped from the melter after the final run. The activity level of this glass log section and other glass fragments is estimated at 22 kCi..
		B-Cell Lead	N/A	Lead was used to stabilize the racks and as shielding around the rack service piping. This lead will be separated from the racks and packaged for disposal as RH-MLLW or CH-MLLW.
		B-Cell Particulate Filters	N/A	B-Cell contains multiple spent HEPA filters and electrostatic precipitators. These filters and precipitators will be packaged for disposal as LLW or TRU.
		Legacy Grout Containers	TBD	These are six grout containers -- four grouted, one partially grouted, and one not grouted. Dose profiling will be performed to characterize the waste before disposal.
		HLV/Low-Level Vault Tanks	N/A	These tanks will be decontaminated using the RLWS. The degree of decontamination is dependent on the ability to remove any heel.
		HLV Process Skid	N/A	The HLV process skid was used to process water from the initial decontamination of the HLV tanks and consists of the equipment, piping, and dunnage used to support the processing equipment.
	N/A	Special Nuclear Fuel (SNF), Intact Fuel Rods, and Assemblies (B-Cell and D-Cell)	~700	All of the intact fuel rods and assemblies have been classified as SNF (located in B- and D-Cells).
		Inactive Disconnected Lead-Lined Glove Box	N/A	Decontaminate for reuse – this item was included in a previous SCW study (HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Table 2-7).

Table 2-1. 300 Area High-Activity Waste Streams.

Waste Stream	TPA Milestone	Substream	Activity (kCi)	Status
327 Building				
3.8-L (1-Gal) Buckets	M-92-14, -15, and -16	Included fines of fuel from A-Cell, solvent wipes from F-Cell, waste buckets from other hot cells, and a concrete box in the basement of 327 Building	11.4	In FY1998, 236 3.8-L (1-gal) waste buckets (legacy and newly generated) were removed. In FY1999, 147 additional buckets (legacy and newly generated) were removed. This reduced the 327 curie inventory by 8.5 kCi. The remaining 130 legacy waste buckets are estimated to contain 2.9 kCi of activity, using an average of 22 Ci/bucket. Additional waste buckets will be generated during 327 Building deactivation activities, but will not be subject to SCW milestones..
Fuel Pool Spent Ion Exchange (IX) Column	M-92-14, -15, and -16	N/A	0.170	Stored in the 327 Building fuel pool waiting to be packaged (HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Sec. 2.2).
Fuel Pellets/Metallurgical Mounts	M-92-14, -15, and -16	Originally included three substreams by cell	4.6	Path forward exists (using Experimental Breeder Reactor [EBR]-II casks or lead-lined drums) (HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Sec. 2.2).
Previously Shipped Fuel Pins/Pellets	N/A	N/A	N/A	SNF. EBR-II shipments made in September 1997.
325 Building				
Federal and Commercial Reactor Spent Fuel Pieces and Fragments	M-92-14, -15, and -16	Yankee Fuel from B-Cell	0.220	Stored in hot cell. Waiting to be packaged.
		Saxton Fuel from B-Cell	0.0005	Stored in hot cell. Waiting to be packaged.
		Shippingport Fuel from B-Cell	0.455	Stored in hot cell. Waiting to be packaged. Shippingport component included in pieces stream.
		Commercial Reactor Fuel Pieces	1.95	Spent fuel powder and fragments stored in hot cell. Waiting to be packaged.
		Unirradiated N Reactor Fuel	2.158	Stored in hot cell. Waiting to be packaged.
LLW	M-92-14, -15, and -16	31 3.8-L (1-Gal) Cans of LLW	0.0584	Waste cans are located in hot cells.
TRU Waste	M-92-14, -15, and -16	42 3.8-L (1-Gal) Cans of TRU	0.5472	Waste cans are located in hot cells.

Table 2-1. 300 Area High-Activity Waste Streams.

Waste Stream	TPA Milestone	Substream	Activity (kCi)	Status
Other 325 Building Wastes Not Considered SCW	N/A	Irradiated N Reactor Fuel	0.754	
		^{137}Np Nitrate	2.3×10^{-5}	
		PCS Fuel, Fines	0.156	Originally included in TPA Change Number M-92-96-01. Removed from SCW.
		RH-TRU Hot Cell Dry Waste and Fuel Pieces	0.130	Disposition is discussed in the draft document *Project Management Plan for TRU/TRUM Waste per Tri-Party Agreement M-91-03* (scheduled to be issued June 2000).
		Hot Cell Wastes and Cladding Wipes Without Fuel	0.010	From Tank Waste Remediation System (TWRS) Tank Characterization
		1.8-m-Long (6-ft-Long) Fuel Bundles (seven segments each)	0.650	Not included in original TPA list; may be SNF and is excluded.
		Dissolved N Reactor Fuel in Nitric Acid	0.754	Legacy not considered SCW.
340 Complex				
Heels from Vault Tanks and Ancillary Equipment	M-92-14, -15, and -16	N/A	0.1 kCi total for all tanks	Pumped as low as possible. Tank heels are scheduled to be removed during 340 Complex Phase II deactivation; however, heels may be removed prior to Phase II deactivation/tank removal.
Heels from 340-A Building Above-Ground Storage Tanks (AGT)		N/A		Tank heels have been removed; tanks have been drained and rinsed. Tanks to be decontaminated and inspected to determine if they can meet the alternate debris standard allowing them to be left in place.

Table 2-2. 300 Area Radionuclide Inventory for TPA Milestones M-92-14, -15, and -16.

Description	Baseline Curie Estimate (kCi)	M-92 Curie Percent	Curies Shipped (kCi)	Shipment Documentation	Curies Remaining (kCi)	Comments
324 Building						
FRG Borosilicate Vitrified Logs	6,860	98.37%	6,860	HTA-VTA-40, HTA-VTA-44, HTA-VTA-45, HTA-VTA-46, HTA-VTA-47, HTA-VTA-48, HTA-VTA-49	0	Shipped to the CWC sheltered storage pad.
Neptunium Oxide Powder	3×10^{-5}	0.00%	3×10^{-5}	N/A	0	Transferred to PNNL's 325 Building. RL and PNNL are coordinating final disposition. No longer considered SCW.
HLV Filters/ IX Columns	66.427	0.95%	9.551	N/A	56.876	Three strontium filters were shipped to PNNL for ^{90}Ygeneration. Two strontium filters, nine cesium columns, one TRU column, and 20 metal filters remain.
D-Cell Fuel Fragments, Pieces, and Pins (Including Those Previously in B-Cell)	23.7	0.34%	0	N/A	23.7	These include cesium/strontium and other nuclides. Calculations were performed on material given the make up and decay rate.
327 Building						
3.8-L (1-Gal) Waste Buckets	11.4	0.16%	8.5	103614, 103616, 103617, 103619, 103620, 103621, 103622, 103623, 103624, 103625, 103475, 103604, 103606, 103609	2.9	Curie values are mixed fission products (MFP)/SNM. MFPs assume 10-year decay SNM.
Fuel Pellets/ Metallurgical Mounts	4.6	0.07%	0	N/A	4.6	Curie values are MFP/SNM. MFPs assume 10-year decay SNM.
Fuel Pool IX Column Assembly and Resin	0.170	0.00%	0	N/A	0.170	Cesium. The IX column is stored in the 327 Building waste storage basin waiting to be packaged.
325 Building						
B-Cell Yankee	0.220	0.00%	0	N/A	0.220	MFP. 1.7 kg—Power. Assume 130 Ci/kg fuel for power fuel (MFPs)
B-Cell Saxton – Plutonium	5×10^{-4}	0.00%	0	N/A	5×10^{-4}	MFP. 5.7 gm –Power.
Shippingport Fuel	0.455	0.01%	0	N/A	0.455	MFP. 3.5 kg—Power. Assume 130 Ci/kg fuel for power fuel (MFPs).

Table 2-2. 300 Area Radionuclide Inventory for TPA Milestones M-92-14, -15, and -16.

Description	Baseline Curie Estimate (kCi)	M-92 Curie Percent	Curies Shipped (kCi)	Shipment Documentation	Curies Remaining (kCi)	Comments
530 N Fuel Inner Elem. Unirradiated	2.158	0.03%	0	N/A	2.158	MFP. 16.6 kg – Assume 130 Ci/kg power fuel (MFP).
Commercial Reactor Fuel Pieces (Spent Fuel Powder and Fragments)	1.95	0.03%	0	N/A	1.95	MFP. 17 pipe capsules Est. 15 kg (assume 130 Ci/kg fuel for power fuel [MFPs]).
LLW	0.0584	0.00%	0	N/A	0.0584	MFP. Although 23 cans were reported in the 325 Building SCW Disposal Alternative Analysis, updated information indicates this stream actually includes 31 cans. The quantity increase does not alter the outcome of the 325 SCW Disposal Alternative Analysis.
TRU	0.5472	0.01%	0	N/A	0.5472	MFP. Although 57 cans were reported in the 325 SCW Disposal Alternative Analysis, updated information indicates this stream actually includes 42 cans. The quantity decrease does not alter the outcome of the 325 SCW Disposal Alternative Analysis.
340 Complex						
340 Vault Tank and 340-A Building AGT Heels	0.100	0.00%	0	N/A	0.1	Other nuclides. Includes heels in the subsurface vault and grade-level tanks.
Total kCi Shipped	6,880.651			**kCi Remaining**	93.735	
Total % Shipped	98.66%			**% Remaining**	1.34%	

Table 2-3. Curie Estimate Comparison between the Original TPA M-92-96-01 Streams and the New Baseline M-92-14, -15, and -16 SCW Streams.

Description	Original Curie Estimate (kCi)	New Baseline Curie Estimate (kCi)	Notes
324 Building			
FRG Borosilicate Vitrified Logs	8,300	6,860	Actual amount shipped from the facility. Difference is due to decay.
Neptunium Oxide Powder	3×10^{-5}	3×10^{-5}	No change.
HLV Filters/Columns	N/A	66.427	A summary of assumptions and approximations for calculating the content of the HLV filters/columns was compiled by Gary Sevigny[2] of PNNL.
D-Cell Fuel Fragments, Pieces, and Pins	N/A	23.7	These include cesium/strontium and other nuclides. Calculations performed on material given the makeup and decay rate.
327 Building			
Waste Buckets from Hot Cells	Only Volume Estimate	11.4	MFP/SNM. Based on actual NDA of packaged buckets and 22.2 curies per bucket for non-NDA buckets.
Fuel Clad Mounts, Pieces	Only Volume Estimate	4.6	MFP/SNM. Additional information provided based on 400 pieces of irradiated samples.
Fuel Pool IX Column Assembly and Resin	Only Volume Estimate	0.170	Cesium. Calculations performed on IX material and dose rate information.
325 Building			
Yankee (B-Cell)	0.0018	0.220	MFP. Calculation based on 130 Ci/kg for power fuel (MFPs).
Saxton - Pu (B-Cell)	0.0005	0.0005	MFP. No change.
Shippingport Fuel	N/A	0.455	MFP. Calculation based on 130 Ci/kg for power fuel (MFPs).
N Fuel Inner Elem. Unirradiated (Rm. 530)	16.6 kg	2.158	MFP. Calculation based on 130 Ci/kg for power fuel (MFPs).
Commercial Reactor Fuel Pieces (Spent Fuel Powder and Fragments)	Only Volume Estimate	1.95	MFP. Calculation based on 130 Ci/kg for power fuel (MFPs).
LLW	31 Containers	0.0584	New dose profiling for waste cans.
TRU Waste	42 Containers	0.5472	New dose profiling for waste cans.
340 Complex			
340 Vault Tank and 340-A Building AGT Heels	N/A	0.1	Other nuclides. Based on more current information.

[2] Memo from GJ Sevigny, PNNL, to MM O'Neill, PNNL, "Summary of Assumptions/Approximations for Calculating the Contents of Metals Filters, Strontium Filters, and Ion-Exchange Columns from the HLV Process," dated March 18, 1997.

As disposition of the 300 Area SCW progresses, the inventory may need to be updated. Such changes to the SCW inventory may be driven by revisions to HNF-EP-0063, *Hanford Solid Waste Acceptance Criteria*; identification of additional 300 Area wastes and materials during planned facility assessments, or during disposition activities for other identified wastes and materials; and completion of disposition of a SCW stream.

2.3.1 300 Area High-Activity Waste Streams

To support identification of the SCW streams subject to TPA Interim Milestones M-92-14, M-92-15, and M-92-16, Table 2-1 provides a listing of high activity waste streams that will be generated by the 324, 327, 325, and 340 Buildings. This table includes the waste stream description, associated TPA milestone, substreams, curie content, and status. From this table, the SCW streams can be clearly delineated and discussed as applicable to this PMP.

Other waste streams in the 300 Area facilities are not subject to TPA Interim Milestones M-92-14, M-92-15, and M-92-16. In the 324 Building, the B-Cell SCW and future SCW streams will be dispositioned to meet the requirements of TPA Milestone M-89-00. Other miscellaneous LLW streams from the 324 Building do not fall under the authority of the TPA. The 325 Building contains legacy waste that is not considered SCW and is not subject to TPA Interim Milestones M-92-14, M-92-15, and M-92-16. Some of these streams were included in the original listing of SCW in TPA Change Number M-92-96-01 (Appendix B- TPA Change Requests), but have subsequently been determined to not meet the definition of SCW.

2.3.2 M-92-14, -15, and -16 SCW Streams

The SCW streams in Table 2-1 that are applicable to TPA Interim Milestones M-92-14, M-92-15, and M-92-16 and this PMP are summarized in Table 2-2. This table provides an updated curie estimate of the waste streams covered under these interim milestones. These updated estimates are based on waste shipment records, more recent survey and characterization information, and updated curie calculations. The waste stream quantities (in kilograms) are well established and the updated calculations of curie content were performed using survey data or established practices for conversion of mass to activity of the primary radionuclides. Therefore, the values listed for curie content are estimates to be used as the metric of progress for compliance to the TPA milestones.

Additional, more sophisticated calculations or NDA may be conducted to support shipping and safety documentation. In many cases, the actual curies shipped will change from those listed on the table due to radiological decay or the result of NDA analysis. However, for the purposes of measuring success to these major and interim milestones, the values from Table 2-2 will be used in the report of progress.

Table 2-3 provides a comparison of the original curie estimate to the current curie estimate for the SCW to be managed by this PMP and the rationale for updating the estimates.

2.4 DETAILED DESCRIPTIONS OF M-92-14, -15, AND -16 SPECIAL-CASE WASTE STREAMS

This section provides detailed descriptions of the SCW streams to be managed by TPA Interim Milestones M-92-14, -15, and -16.

2.4.1 Previously Dispositioned M-92-14, -15, and -16 Special-Case Waste

Since the development of the original SCW list, disposition of the neptunium oxide and FRG borosilicate glass logs has been completed, and the inventory of two other SCW streams (HLV strontium filters and 327 Building 3.8-L [1-gal] waste buckets) has been reduced. This section describes these waste streams and the progress made to complete disposition.

2.4.1.1 Neptunium Oxide Powder

Approximately 48 g (1.7 oz) of neptunium oxide powder (^{237}Np) containing 0.03 Ci of activity was obtained in 1977 for a planned program that was never executed. The neptunium oxide, in its original form, was stored in the basement of the 324 Building in the original shipping package (inside a 0.81 m^3 [55-gal] shielded drum) until it was transferred to the 325 Building in 1998. This product remains under the custody of PNNL, which is coordinating with RL to determine final disposition.

2.4.1.2 324 Building FRG Borosilicate Glass Logs in Canisters

This waste stream consisted of sealed isotopic heat sources that were manufactured during three production runs in the 324 Building's B-Cell. These sources contain radioactive borosilicate glass, which was formed into glass logs in 34 canisters (30.5 cm [12 in.] in diameter and 1.2 m [47 in.] long encased in stainless steel with welded lids). These FRG canisters were stored in the 324 Building's A-Cell. Activity averages were about 150 kCi for ^{137}Cs and 95 kCi for ^{90}Sr per canister, with a cumulative heat generation rate of up to 1,350 W as of September 1996. Shipping records indicate that a total of 6.86 MCi of activity was removed from the REC with the shipment of the FRG canisters to the CWC. HNF-SD-TP-SARP-022, *Safety Analysis Report for Packaging [Onsite] for the GNS-12 Packaging*, documents the curie content, heat load, and radiation levels of the FRG canisters.

A reinforced concrete pad for interim storage of the canisters was constructed adjacent to the existing alkali metals storage pad at the CWC. An environmental assessment (DOE 1997) was developed to determine the potential environmental impacts of this path forward. A finding of no significant impact was issued by DOE, which has allowed the relocation and storage of the canisters. The canisters were shipped to this storage pad at the CWC in 1997. Further details of the pad, relocation, and storage path forward can be found in the *FRG Sealed Isotopic Heat Sources Project (C-229) Project Management Plan* (Metcalf 1997).

2.4.1.3 Strontium Filters

Three (Sr-1, Sr-2, and Sr-3) of the five strontium filters used during the HLV tank cleanout skid were shipped to the 325 Building on January 26, 1998, for an endpoint use as an ^{90}Y generator. This high-energy beta emitter is used for cancer treatment in conjunction with other compounds. A summary of assumptions and approximations for calculating the contents of the strontium filters from the HLV process has been compiled. The total activity level in the three filters is documented as 9.551 kCi (HNF-1730).

2.4.1.4 327 Building 3.785412-L (1-Gal) Waste Buckets

In FY 1998, 236 3.8-L (1-gal) waste buckets (legacy and newly generated) were removed from the 327 Building hot cells and packaged in shielded drums for storage at the CWC. The shipping manifests for these shipments indicate that 4.7 kCi of activity was removed from the

327 Building. An additional 147 buckets (legacy and newly generated) were removed from the 327 Building in FY 1999. This accounted for an additional 3.8 kCi of activity. As of October 1, 1999, 130 legacy waste buckets remained in the 327 Building hot cells and basement. Additional waste buckets will be generated during 327 Building deactivation activities, but will not be subject to SCW milestones.

2.4.2 Descriptions of 324 Building Special-Case Waste Subject to M-92-14, -15, and -16

This section provides a description of the SCW currently at the 324 Building (as of October 1, 1999) subject to the TPA Interim Milestones M-92-14, M-92-15, and M-92-16.

2.4.2.1 324 Building High-Level Vault Cleanout Filters/Ion Exchange Columns

The 324 Building HLV Interim Removal Action Project was established to address TPA Interim Milestone M-89-01, "Complete Removal of the 324 Building HLV Tank MW (e.g., TK-104, TK-105, TK-107) with the Exception of Residues Which May Remain Following Flushing and Draining to the Extent Possible." The process skid consisted of 20 metal filters, five strontium filters, one TRU column, and nine cesium IX columns. These filters and columns were used in the treatment process along with process tanks for neutralization (TK-112) to remove solids with the metal filters, carbonate precipitation to remove strontium, TRU removal, and IX to remove cesium. Effluent evaporation was not required, as effluent solution was discharged directly to the 340 Complex for loadout to the 200 Area tank farms. Table 2-4 summarizes the characteristics of the HLV cleanout filters and IX columns that are discussed in the following sections.

Table 2-4. 324 Building HLV Filters and IX Columns Characteristics.

Waste Stream Characteristic	Strontium Filters*	Cesium IX Columns	Metal Filters	TRU Filter
Total Volume	0.10 ft^3	7.3 ft^3	11.8 ft^3	0.54 ft^3
Total Curie Content (kCi)	0.0753 kCi (Sr-4) 0.0377 kCi (Sr-5) 0.113 kCi total	30.378	20.995 kCi (^{90}Sr) 2.277 kCi (^{137}Cs) 1.060 kCi (other) 24.332 kCi total	2.053 kCi (including 2.032 kCi of ^{90}Sr)
Dose Rate	High	High	High	High
Dangerous Waste	Chromium, Cadmium	None	Lead, Barium, Chromium, Cadmium	Chromium
Gas Generation	Yes (Sr-4 and Sr-5 only)	No	Yes	Yes
Waste Classification	RH-TRU/M for Sr-4 and Sr-5	RH-CAT3-LLW	RH-TRU/M	RH-TRU/M

* The total curie content of the five strontium filters was 9.664 kCi. Three filters (Sr-1, Sr-2, and Sr-3) containing 9.551 kCi were transferred to PNNL for ^{90}Y production.

2.4.2.1.1 Strontium Filters

Three (Sr-1, Sr-2, and Sr-3) of the five strontium filters were shipped to the 325 Building on January 26, 1998, for use as an ^{90}Y generator. This high-energy beta emitter will be used for cancer treatment in conjunction with other compounds. The remaining two filters (Sr-4 and Sr-5) will be packaged and dispositioned as TRU/M waste.

Volume

The strontium filter dimensions are 7.3 cm (2.875 in.) in diameter x 31.75 cm (12.5 in.) in length, yielding a volume of 0.0013 m^3 (0.05 ft^3) each. The total volume for the two remaining strontium filters (Sr-4 and Sr-5) is estimated to be 0.0026 m^3 (0.10 ft^3).

Radiological Data

A summary of assumptions and approximations for calculating the contents of the strontium filters from the HLV process has been compiled (HNF-1730), documenting the activity level in Filter Sr-4 as 0.0753 kCi and Filter Sr-5 as 0.0377 kCi for a total of 0.113 kCi.

Dangerous Waste Constituents/Waste Classification

The RCRA, as amended (42 U.S.C. 6901 et seq.), regulates the generation, transportation, storage, treatment, and disposal of solid and hazardous waste. The RCRA is implemented in Washington State through *Washington Administrative Code* (WAC) 173-303, which governs the management of dangerous waste. Dangerous wastes are defined as those solid wastes designated in WAC 173-303-070 through 173-303-100 as dangerous, or extremely hazardous or mixed waste. They include the wastes regulated under RCRA Federal standards, as well as some additional state-only regulated wastes.

Three strontium filters (Sr-1, Sr-2, and Sr-3) are designated for beneficial use for medical isotopes. The sample results from the process feed solutions documented in the *Summary of Assumptions/Approximations for Calculating the Contents of Metal Filters, Strontium Filters, and Ion-Exchange Columns from HLV Process*[3] indicate that strontium Filters Sr-4 and Sr-5 contain TRU and dangerous waste (cadmium and chromium). The strontium filters not used for medical isotopes should be classified as RH-TRU/M based on the curie content and volume of each filter. (Refer to HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Appendix B.)

Special-Case Waste Stream Stability

Physical, chemical, and radiological stability of each SCW stream are important criteria to consider to ensure cogent waste stream packaging and storage dispositions.

- **Physical Stability** - The physical stability of each waste stream depends on whether the waste is in a solid or liquid phase. The waste temperature and/or the ambient temperature may, therefore, play a role in the physical stability of the waste.
- **Chemical Stability** – This criterion addresses the explosive, shock-sensitive, pyrophoric, oxidation, heat-generating, and gas- (steam, methane, hydrogen, etc., from radiolytic or biological decay) producing properties of each waste stream.
- **Radiological Stability** – This criterion addresses the potential concentration and/or configuration of packaged waste that may cause a criticality.

The strontium filters will be packaged in a container configuration that is compatible with the waste stream and that meets the packaging requirements discussed in Sections 3.3.2 and 4.3. Containers used for shipping, storage, and disposal of waste must be in good condition with no visible flaws that could compromise integrity of performance. The packaging material should be resistant to degradation by microbiological action, moisture, radiation effects, or chemical reactions with the waste. Gas generation from radiolytic or biological decomposition of containerized waste must be controlled to prevent pressurization exceeding 1.5 atmospheres (152 kilopascals absolute pressure) and combustibles gas (e.g., hydrogen, methane)

[3] Memo from GJ Sevigny, PNNL, to MM O'Neill, PNNL, "Summary of Assumptions/Approximations for Calculating the Contents of Metals Filters, Strontium Filters, and Ion-Exchange Columns from the HLV Process," dated March 18, 1997.

concentrations exceeding the lower explosive limit for up to 20 years of storage before disposal. Use of a Nucfil 013™ filter or equivalent will be employed to mitigate gas buildup.

2.4.2.1.2 Cesium Ion Exchange Columns

The nine cesium IX columns were transferred into D-Cell for separation. Ion exchange Column 4 (IX-4) was not placed into service according to the process logs and records for HLV operations. Column IX-9 was used only for polishing/rinsing and did not accumulate significant radionuclides.

The operation history of the filters used in D-Cell is documented in the HLV Operations Log. Pertinent information includes transfers to D-Cell from B-Cell, including batch information, filter or column change outs, location and identification of samples taken, and any abnormal occurrences (spills, leaks, alarms, equipment failure, etc.). (Refer to HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Appendix B, for core sample results.)

Volume

The cesium IX column dimensions are 21.9 cm (8.625 in.) in diameter x 61 cm (24.0 in.) long, yielding a volume of 0.023 m^3 (0.81 ft^3) each. The total volume of the cesium IX columns is estimated to be 0.121 m^3 (7.3 ft^3).

Radiological Data

A summary of assumptions and approximations for calculating the content of the cesium IX columns from the HLV process was compiled (HNF-1730), documenting the total activity for all nine cesium IX columns to be 30.378 kCi and 5.383 kCi maximum for IX-2. Because the cesium IX columns were downstream of the TRU filters, the TRU waste concentrations in these columns are assumed to be negligible (TRU constituents below 100 nCi/g). This assumption is supported by the process feed solution sample results.

Dangerous Waste Constituents/Waste Classification

The cesium IX columns do not contain any dangerous waste or TRU. (Refer to HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Appendix B, for core sample results.) Based on the curie content and volume, the cesium IX columns will be designated as Category 3 LLW.

Special-Case Waste Stream Stability

The cesium IX columns will be packaged in a container configuration that is compatible with the waste stream and meets the packaging requirements discussed in Sections 3.3.2 and 4.3. Containers used for shipping, storage, and disposal of waste must be in good condition with no visible flaws that could compromise integrity of performance. The packaging material should be resistant to degradation by microbiological action, moisture, radiation effects, or chemical reactions with the waste.

2.4.2.1.3 Metal Filters

Twenty metal filters were used to remove heavy metals from the flush solution used to clean out the HLV tanks. These filters are stored in B-Cell waiting to be packaged for disposition as RH-TRU/M waste.

Volume

The metal filters are 21.9 cm (8.625 in.) in diameter x 44.5 cm (17.5 in.) high, yielding a volume of 0.016 m^3 (0.59 ft^3) each. The total volume of the 20 metal filters is 0.33 m^3 (11.8 ft^3).

Radiological Data

Activity levels for the 20 metal filters are documented on HLV Data Sheet 3, the Metal Filter Loading Log (September 9, 1996, to October 5, 1996), and HLV operating Logbook BNW-56293. No activity level for the tank that used Metal Filter 14 is available. A summary of assumptions and approximations for calculating the content of the metal filters from the HLV process was compiled (HNF-1730), documenting the activities of each metal filter as derived from data sheets and calculation. The total activity for the metal filters is 20.995 kCi of ^{90}Sr, 2.277 kCi of ^{137}Cs, and 1.060 kCi of other isotopes including 0.764 kCi of alpha isotopes.

Dangerous Waste Constituents/Waste Classification

The metal filters are tentatively categorized as TRU/M based on tank rinsate analysis showing transuranic levels at 110 nCi/g and the presence of hazardous constituents. (Refer to HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Appendix B, for sample results.)

Special-Case Waste Stream Stability

The metal filters will be packaged in a container configuration that is compatible with the waste stream and that meets the packaging requirements discussed in Sections 3.3.2 and 4.3. The SCW stream stability requirements are the same as those presented above for the strontium filters.

2.4.2.1.4 TRU Filter

A single TRU filter was used to remove any residual alpha from the HLV feed before the feed was sent to the cesium IX columns.

Volume

The TRU filter dimensions are 21.9 cm (8.625 in.) in diameter x 40.6 cm (16.0 in.) long, yielding a total volume of 0.015 m^3 (0.54 ft^3).

Radiological Data

A summary of assumptions and approximations for calculating the contents of the TRU filter from the HLV process was compiled (HNF-1730), estimating the total activity of the TRU filter to be 2.053 kCi, including 2.032 kCi of ^{90}Sr.

Dangerous Waste Constituents/Waste Designation

The TRU filter is categorized the same as the metal filters (TRU/M) based on the sample results. (Refer to HNF-1730, *324/327 Buildings Special-Case Waste Assessment and Disposition Alternatives Analysis*, Appendix B for sample results.)

Special-Case Waste Stream Stability

The TRU filter will be packaged in a container configuration that is compatible with the waste stream and that meets the packaging requirements discussed in Sections 3.3.2 and 4.3. The SCW stream stability requirements are the same as those presented above for the strontium filters.

2.4.2.2 324 Building Fragments, Pieces, and Fuel Rod Sections

Currently, fragments, pieces, and fuel rod sections from various fuels are located in the 324 Building in B-Cell and D-Cell. The fuel rod assemblies and intact fuel rods (consolidated in B-Cell), classified as SNF, will be sent to an interim storage area (ISA) for storage. The other miscellaneous containers holding the fuel pins and pieces (consolidated in D-Cell) will be managed as RH-TRU by placing the containers in casks and shipping them to a 200 West Area waste management site for temporary storage. Table 2-5 provides quantitative information on the fragments, pieces, rods, and assemblies.

Table 2-5. 324 Building Fuel Fragments, Pieces, and Sections.

Location	Classification	Description	Existing Packaging
D-Cell	SCW (RH-TRU)	Consolidated Spent Fuel Pieces	Pieces in capped Swagelok piping, loaded in the engineered container, approximately 1.2 m x 30.5 cm x 35.6 cm (4 ft x 12 in.-14 in.).
D-Cell	SCW (RH-TRU)	Unclad Fuel Fragments	Fuel fragments in various small cans, loaded into a stainless steel container, which is in turn loaded into a 113.7-L (30-gal) drum
D-Cell	SCW (RH-TRU)	Sections of Spent Fuel Rods Up to 1/3 Rod Length	Rods in Swagelok piping, with the piping packed in an engineered container (~2.4 m [8 ft] x 6 fuel widths wide) – container design keeps the rod packs coaxially oriented
D-Cell	SNF	Intact Fuel Rods	Nine intact fuel rods are placed in a metal storage container. Six short boiling water reactor (BWR) fuel rods from the segmented rod program are in a short length of pipe with end cap.
B-Cell	SNF	Intact Fuel Rods	The intact rods are located in a "Gatling gun" holder in B-Cell. The 17 intact pressurized water reactor (PWR) fuel rods that were removed from the PWR fuel assembles remain in their as-removed condition.
B-Cell	SNF	Fuel Assemblies	Five PWR and two BWR fuel assemblies are currently located in thimbles on a temporary fuel storage rack along the west wall of the B-Cell.

2.4.3 Descriptions of 325 Building Special-Case Waste Subject to M-92-14, -15, and -16

The 325 Building SCW consists of spent nuclear fuel pieces and fragments, LLW in 3.8-L or 4.7-L (4 or 5 quart) cans, and TRU waste in 3.8-L (1-gal) buckets.

2.4.3.1 325 Building Spent Fuel Pieces and Fragments

The SCW considered in this section includes the reactor-irradiated nuclear fuel inventory at the 325 Building that was generated by a variety of government and commercial sources. The fuel is in a variety of physical shapes and sizes, largely the result of differing research activities. Some of the pieces have been sectioned or sampled for study, some have been ground or crushed to a powdered state, and others are in their original configuration with the cladding partially or fully intact. Since the spent fuel pieces and fragments originated from power production reactor cores or from breeding experiments, they do not meet the definition of LLW. Although the fuel originated from both commercial and DOE reactors, all was used as part of RL programs, and RL (through PNNL) is responsible for dispositioning all of the irradiated fuel stored in the 325 Building hot cells.

The current inventory of spent fuel pieces and fragments in the 325 Building is provided in Table 2-6. While the radionuclide content and mass of the material are unlikely to change in the near future, consolidation activities have changed the container configurations. For convenience of handling and accounting and for safety reasons, some of the fuel pieces have been consolidated into a number of steel pipes and welded shut. The total external volume of the pipe containers is known to slightly exceed 0.0136 m^3 (0.48 ft^3 or 828 in^3). The actual volume of fuel is expected to be a fraction of this volume. Further consolidation of fuel is possible to reduce the total volume, unless criticality safety becomes a concern.

Reliable radiological data does not exist for all of this material at this time. Activities for characterizing this waste are under way. However, the material is expected to exhibit the radiological characteristics of aged fission products.

Individual cans were recently measured in an in-cell configuration. The highest reading (approximating a contact dose rate) observed was 260 R/hr. It is assumed that these readings are heavily influenced by other sources within the cell.

Spent fuel fragments that have not been chemically altered are regulated solely by the Atomic Energy Act. Therefore, any dangerous waste characteristics are not applicable.

The data currently available on the sampled fuel was collected for research purposes. The waste described in this section is assumed to be fragments of SNF. However, the waste may be approved for management as TRU waste in the near future.

2.4.3.2 Low-Level Radioactive Waste

Low-level radioactive waste is radioactive waste that is not high-level radioactive waste, SNF, TRU waste, byproduct material (as defined in Section 11e.(2) of the Atomic Energy Act of 1954, as amended), or naturally occurring radioactive material. (adapted from the Nuclear Waste Policy Act of 1982, as amended). A test specimen of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as LLW provided the concentration of transuranic material is less than 100 nanocuries per gram (DOE 1999).

Detailed Description

Low-level radioactive wastes in the 325 Building hot cells originated predominately from hot cell work on SNF. Contact with, or proximity to, SNF during research activities in the hot cells contaminated the wastes in this category. Contaminated in such a manner, the LLW is assumed to consist primarily of MFP. One significant exception to that assumption is the vitrification test materials that were heavily spiked with ^{90}Sr and ^{137}Cs. This material is mostly incorporated into a glass matrix.

Table 2-6. 325 Building Federal and Commercial Reactor Fuel Pieces.

Material/Waste and Description	Location	Designation	Existing Container	Number of Containers	Volume/ Mass	Activity	Dose Rate	Hazardous Constituents	Notes
Yankee Fuel	325A - B-Cell	SNF or SCW	7.6-cm x 0.9-m (3-in. x 3-ft) pipe	1	254.3 in.^{3}/ 1.7 kg	220 Ci	High	None	1.7 kg (power)
Saxton Fuel Plutonium	325A - B-Cell	SNF or SCW	5-cm x 0.3-m (2-in. x 1-ft) pipe	1	37.7 in.^{3}/ 5.7 g	0.5 Ci	High	None	5.7 g (power)
Shippingport Fuel	325A - B-Cell	SNF	Bundle with 25 pins, two separate pins, and three pieces of pins.	~ 28 pins equivalents	3.5 kg	455 Ci	High	None	3.5 kg (power)
Oxides of pieces of irradiated fuel (UO_2) from commercial reactors., Material Characterization Center fuel, unused fuel submitted for analysis	Shielded Analytical Laboratory	SCW or SNF	2.5-cm x 7.6-cm (1-in. to 3-in.) x 15.2-cm x 30.5-cm (6-into 12-in.) pipes	17	536 in.^{3}	1.95 kCi		None	17 pipe capsules (15 kg estimated)
N Reactor Fuel (Unirradiated Fuel)	325A – 530	Fuel			16.6 kg	2158 Ci	TBD	None	

Volume

All waste in this category is sealed in approximately 31 paint cans having volumes of either 3.8 L or 4.7 L (4 or 5 quarts [U.S.]). The masses or volumes of the actual wastes are not well characterized. The 1-gal cans have external dimensions of 0.168 m (6.625 in.) in diameter x 0.19 m (7.5 in.) in height giving an individual can volume of 4.24×10^{-3} m^3 (0.15 ft^3 or 258.54 $in.^3$). The 5-quart cans measure 0.168 m (6.625 in.) in diameter x 0.24 m (9.5 in.) in height giving an individual can volume of 5.37×10^{-3} m^3 (0.19 ft^3 or 327.5 $in.^3$). Since a ratio of 4- to 5-quart cans is not known, the 5-quart can volume was used to determine a total volume of 0.166 m^3 (5.89 ft^3 or 10,152.5 $in.^3$).

Radiological Data

Characterization activities are currently ongoing. However, the radioactive material is expected to involve aged MFP, with significant quantities of ^{90}Sr and ^{137}Cs radioisotopes. Initial results from characterization of the LLW can indicate the cans contain approximately 58.4 Ci of activity.

Dangerous Waste Constituents

This material is not expected to contain dangerous waste constituents.

Waste Classification

Current data indicate this material is low-level radioactive waste with characteristics that could potentially exceed Category 3 wastes.

Special-Case Waste Stream Stability

The 325 Building LLW will be packaged in a container configuration that is compatible with the waste stream and that meets the packaging requirements discussed in Sections 3.3.2 and 4.3. Containers used for shipping, storage, and disposal of waste must be in good condition with no visible flaws that could compromise integrity of performance. The packaging material should be resistant to degradation by microbiological action, moisture, radiation effects, or chemical reactions with the waste. Gas generation from radiolytic or biological decomposition of containerized waste must be controlled to prevent pressurization exceeding 1.5 atmospheres (152 kilopascals absolute pressure) and combustibles gas (e.g., hydrogen, methane) concentrations exceeding the lower explosive limit for up to 20 years of storage before disposal. Use of a Nucfil 013™ filter or equivalent will be employed to mitigate gas buildup.

2.4.3.3 325 Building Transuranic Waste

Detailed Description

A small volume of TRU waste is stored in Cell 1 of the 325-B Building. The waste is anticipated to exceed a dose rate of 200 mrem/hr (contact) in a primary container, classifying it as RH as currently packaged.

The RH-TRU waste is packaged in 1-gal paint cans with fitted lids. Actual volumes and masses of the waste are unknown. Some of the wastes were examined and sorted in 1997 and additional activities are ongoing. Currently, 42 cans of TRU are included in the SCW category in the 325 Building hot cells.

Volume

The 3.8-L (1-gal) cans have external dimensions of 0.168 m (6.625 in.) in diameter x 0.19 m (7.5 in.) in height giving an individual can volume of 4.24×10^{-3} m^3 (0.15 ft^3 or 258.545 $in.^3$). Assuming 42 cans, the calculated total volume of RH-TRU waste is approximately 0.178 m^3 (6.3 ft^3 or 10,860 $in.^3$).

Radiological Data

This waste originated from a variety of processes, including destructive examination of SNF. In addition, approximately ten cans contain TWRS tank wastes. As such, the material is anticipated to contain aged MFP in addition to TRU radioisotopes. Initial results from characterization of the TRU waste cans indicate that the cans contain approximately 547 Ci of activity.

Dangerous Waste Constituents

Approximately ten cans of the RH-TRU waste originated from TWRS. This waste, therefore, has a number of dangerous waste constituents. This material is in a dry solid waste form.

Waste Classification

TRU waste is expected to be classified as RH-TRU or RH-TRU/M in its current package configuration. Repackaging in a shielded container may decrease the external exposure rate to below 200 mrem/hr, resulting in a contact-handled (CH) situation.

Special-Case Waste Stream Stability

The TRU waste will be packaged in a container configuration that is compatible with the waste stream and that meets the packaging requirements discussed in Sections 3.3.2 and 4.3. The SCW stream stability requirements are the same as those presented for the 325 Building LLW.

2.4.4 Descriptions of 327 Building Special-Case Waste Subject to M-92-14, -15, and -16

The 327 Building SCW consists of 1-gal waste buckets, fuel-pool IX column, fuel pellets, and metallurgical mounts. A detailed description of each of these waste streams is included in the following sections. A summary of the SCW in the 327 Building is provided in Table 2-7.

2.4.4.1 327 Building 1-Gal Waste Buckets

Detailed Description

The 1-gal legacy waste buckets containing waste contaminated with nuclear fuel fines are currently stored in the 327 Building hot cells and in a concrete box in the basement. In FY1998 and FY1999, a total of 383 waste buckets were removed from the 327 Building (including both hot cell legacy waste buckets and newly generated buckets). These waste buckets were packaged in lead-lined or concrete-lined waste drums and transported to the CWC for storage. The current legacy waste bucket inventory at the 327 Building consists of 100 waste buckets in the hot cells and 30 waste buckets recently relocated to the hot cells from a concrete box in the basement of the 327 Building. These and other waste buckets generated during the clean-up activities at the 327 Building will continue to be packaged in lead- or concrete-lined drums for storage at CWC until final disposition.

Table 2-7. Summary of 327 Building Special-Case Waste.

Waste Stream	Location	Designation	Existing Containers	Number of Containers	Volume /Mass	Activity	Dose Rate	Hazardous Constituents	Status
327 Building 3.8-L (1-Gal) Waste Buckets	Shipped in FY1998 to CWC	RH-TRU or RH-LLW	3.8-L (1-Gal) Buckets in Drums	236 waste buckets in concrete- and lead-lined drums	1.02 m^3 (35.9 ft^3)	4.7 kCi	Varied	None Expected	In FY1998, 236 3.8-L (1-gal) waste buckets were removed (legacy and newly generated). In FY1999, 147 additional buckets (legacy and newly generated) were removed. This reduced the 327-curie inventory by 8.5 kCi. The remaining 130 legacy waste buckets are estimated to contain 2.9 kCi of activity, using an average of 22 kCi/bucket. Additional waste buckets will be generated during 327 Building deactivation activities, but these will not be subject to SCW milestones.
	Shipped in FY 1999 to CWC	RH-TRU or RH-LLW	3.8-L (1-Gal) Buckets in Drums	147 waste buckets in concrete- and lead-lined drums	0.63 m^3 (22.4 ft^3)	3.8 kCi			
	327 Bldg Hot Cells	RH-TRU or RH-LLW	3.8-L (1-Gal) Buckets	100 legacy waste buckets in hot cells	0.43 m^3 (15.2ft^3)	2.2 kCi (~22 Ci/ bucket)			
	327 Bldg Basement	RH-TRU or RH-LLW	3.8-L (1-Gal) Buckets	30 waste buckets from concrete box	0.13 m^3 (4.6 ft^3)	0.7 kCi (~22 Ci/ bucket)			
Fuel Pool IX Column	327 Bldg Fuel Pool	RH-TRU or RH-LLW	IX Columns	1 – Cation and 1 – Anion	0.4 m^3 (14.6 ft^3)	170 Ci	91 R/hr max.	Cation – None Expected Anion – None Expected	The IX column is stored in the 327 Building waste storage basin waiting to be packaged.
Fuel Pellets/ Metallurgical Mounts in Hot Cells and Dry Storage Racks	327 Bldg Hot Cells and Dry Storage Carousel	RH-TRU	Soup Can-Sized Containers and Pin Tubes	~300cans and five pin tubes	6.95kg	4.6 kCi	High	None Expected	The fuel pellets and metallurgical mounts remain in storage.

Volume

The total waste volume in the 513 buckets (paint cans 16.8 cm [6-5/8 in.] in diameter x 19.4 cm [7-5/8 in.] high) is estimated to be 2.21 m^3 (78.0 ft^3). The volume of the 130 remaining legacy waste buckets is estimated to be 0.56 m^3 (19.8 ft^3). Crushing the waste buckets before loading them into waste containers is expected to reduce the total disposal volume. However, many of the last buckets loaded and those from the Shielded Environmental Radiometallurgy Facility (SERF) cell are not expected to compact. Additional waste buckets will also be generated during hot cell clean-out activities.

Radiological Data

The 327 Building waste characterization sheets do not provide the curie content for each bucket. Assay will be required to determine TRU concentrations. For this PMP, an average activity level of 22.2 curies per bucket is assumed for those buckets remaining in the hot cells and the concrete box. This concentration per bucket is based on the actual curie content and number of buckets shipped in FY1998 and FY1999. The curie content of the 383 1-gal waste buckets removed in FY1998 and FY1999 are documented as 8.5 kCi on the waste manifests. The remaining legacy waste buckets in the hot cells and concrete box (130 buckets) are estimated to contain 2.9 kCi.

Dangerous Waste Constituents

The inventory for each waste bucket is provided in its individual 327 Building waste characterization sheet. No dangerous waste constituents are anticipated based upon process knowledge of hot cell operations and physical inventory of over 300 of the actual waste buckets.

Waste Classification

Tentative waste classifications are given for each bucket on its 327 Building waste characterization sheet (TRU or LLW). These sheets contain information about the contents of each bucket. A verification process was started in FY1998 to verify the contents of the waste buckets (Rasmussen and Serkowski 1999). Any prohibited or MW items found during the inspections are placed in a satellite accumulation area and managed as MW. Nondestructive assay will be required to determine the alpha content and total activity level for each waste container after the cans are loaded into sleeves and 0.81 m^3 (55-gal) drums. The TRU classification for each drum will be based on the gamma/neutron can assay.

Special-Case Waste Stream Stability

The 327 Building waste buckets will be packaged in a container configuration that is compatible with the waste stream and that meets the packaging requirements discussed in Sections 3.3.2 and 4.3. Containers used for shipping, storage, and disposal of waste must be in good condition with no visible flaws that could compromise integrity of performance. The packaging material should be resistant to degradation by microbiological action, moisture, radiation effects, or chemical reactions with the waste. Gas generation from radiolytic or biological decomposition of containerized waste must be controlled to prevent pressurization exceeding 1.5 atmospheres (152 kilopascals absolute pressure) and combustibles gas (e.g., hydrogen, methane) concentrations exceeding the lower explosive limit for up to 20 years of storage before disposal. Use of a Nucfil 013™ filter or equivalent may be employed to mitigate gas buildup.

2.4.4.2 327 Building Spent Ion Exchange Column

Detailed Description

The IX column is currently located in the water storage basin inside the 327 Building. The IX system consists of two vessels (cation and anion), each 40.6 cm (16 in.) in outer diameter x 1.8 cm (6 ft) long. The column flanges are 50.87 cm (20 in.) in outer diameter (refer to drawing number H-3-22583). They are installed with cation above the anion in a steel rack vertically in the 327 Building pool.

The IX columns were originally installed with regeneration equipment and were not regenerated immediately prior to their removal from service. Each bed has 2.5 cm (1 in.) diameter piping to and from the feed point and discharge point. Blanks have been installed on these lines above the water level.

Volume

Each section of the IX column dimensions are approximately 41 cm (16 in.) in diameter x 1.8 m (6 ft) high, yielding a volume of 0.2 m^3 (7.3 ft^3) (refer to drawing numbers H-3-22583 and H-3-22584).

Radiological Data

Based on the results of the column radiological survey (P000699) and the computer analysis conducted using the WISE/SIMPLE code, the column is estimated to contain approximately 170 Ci of radioactive constituents. The WISE/SIMPLE code calculates the amount of activity the column would need to contain to produce the external dose rates measured on the outside of the column.

For purposes of the computer simulation, the radiation source was assumed to be ^{137}Cs. Results of the column radiological survey showed the dose rates next to the lower anion column housing to be negligible compared to the cation upper housing. This is interpreted to mean that almost all the activity associated with the system resides in the cation housing. For this reason, only the upper housing was used for the simulation. Dose rate measurements for the upper cation housing ranged from 100 mR/hr to 91 R/hr. For the simulation, a dose rate of 29 R/hr, which is the average of the upper housing measurements, was assumed to be uniformly distributed along the entire length of the upper housing. The housing was assumed to be Schedule 40 stainless steel, and the resin bed inside the column was assumed to have the density of water.

Dangerous Waste Constituents

The resin and other constituents of the column are not expected to contain any hazardous constituents, so the waste classification of the column is expected to be either LLW or TRU.

Waste Classification

The IX column was originally installed in the water storage basin at the 327 Building to remove cesium contaminants from the basin water. Because the 327 Building fuel pool was used to store failed fuel and likely contained TRU contamination, the IX system, which was used to process the pool water, could have retained some TRU. The spent IX column is currently categorized as nondangerous SCW, which will be either LLW or TRU waste based on activity level. Waste designation is based on process knowledge regarding 1) the original resin makeup, 2) the resin use, and 3) the regeneration procedures for the resin (HNF-3590).

Special-Case Waste Stream Stability

The 327 Building spent IX column will be packaged in a specialty container configuration that is compatible with the waste stream and that meets the packaging requirements discussed in Sections 3.3.2 and 4.3. Containers used for shipping, storage, and disposal of waste must be in good condition with no visible flaws that could compromise integrity of performance.
The packaging material should be resistant to degradation by microbiological action, moisture, radiation effects, or chemical reactions with the waste. Gas generation from radiolytic or biological decomposition of containerized waste must be controlled to prevent pressurization exceeding 1.5 atmospheres (152 kilopascals absolute pressure) and combustibles gas (e.g., hydrogen, methane) concentrations exceeding the lower explosive limit for up to 20 years of storage before disposal. Use of a Nucfil 013™ filter or equivalent may be employed to mitigate gas buildup.

2.4.4.3 327 Building Nuclear Fuel Pellets/Metallurgical Mounts in Hot Cells and Dry Storage Racks

Detailed Description

The nuclear fuel examination mission at the 327 Building has resulted in the accumulation of a significant quantity of fuel pieces and segments and fuel-like material scraps inside the facility. Historically, EBR-II fuel, Light Water Reactor fuel, Fast Flux Test Facility fuel, Pacific Nuclear Corporation fuel, and N Reactor fuel pins and pellets were sectioned and some fuel samples were mounted in a polyester resin or epoxy material (metallurgical mounts) in preparation for metallographic and/or ceramographic examination. Leftover segments and intact fuel pieces (shipped to CWC in FY 1997) were stored in the 327 Building water basin. Other scraps and mounted specimens are stored in the hot cells and dry storage racks (carousel). In general, most of the pieces now stored in the 327 Building dry storage carousel are in the form of metallurgical mounts, while most of the pieces in the hot cells are *not* in metallurgical mounts. The physical condition of the mounted specimens cannot be determined until they are retrieved.

Volume

It is estimated that approximately 7 kg of waste material is present in the approximately 300 soup can-sized containers and the five pin tubes.

Radiological Data

The 327 Building staff has estimated that approximately 4.6 kCi of activity is associated with the nuclear fuel pellets and metallurgical mounts contained in the dry storage cell.

Dangerous Waste

No dangerous waste constituents are anticipated based upon process knowledge of hot cell operations.

Waste Classification

RL has determined that the fuels examination legacy material located in the 327 Building that is in the form of cut elements and fragments can be classified and managed as RH-TRU or SNF, as documented in *Classification of Nuclear Materials in the 327 Building*[4]. The pieces and fragments addressed in this section in addition have been labeled "orphan materials" by the National Spent Nuclear Fuel Committee, which also allows for management as SNF or RH-TRU (Sellers 1997). During FY1997, it was determined that the fuel fragments and pieces could be packaged in EBR-II casks and managed as RH-TRU, consistent with similar waste previous packaged (34 casks of this type were in storage at the CWC at that time). It was determined that the remaining fuel fragments and pieces could also be managed in the same manner. The loaded casks would be shipped to the 200 West Area for interim storage as RH-TRU on the storage pad located in Trench 1 in the 218-W-4C burial ground. Since then, the PHMC waste management organization has evaluated and approved packaging the material in lead-lined drums for storage at CWC.

Special-Case Waste Stream Stability

This 327 Building SCW stream will be packaged in a specialty container configuration that is compatible with the waste stream and that meets the packaging requirements discussed in Sections 3.3.2 and 4.3. Containers used for shipping, storage, and disposal of waste must be in good condition with no visible flaws that could compromise integrity of performance. The packaging material should be resistant to degradation by microbiological action, moisture, radiation effects, or chemical reactions with the waste. Gas generation from radiolytic or biological decomposition of containerized waste must be controlled to prevent pressurization exceeding 1.5 atmospheres (152 kilopascals absolute pressure) and combustibles gas (e.g., hydrogen, methane) concentrations exceeding the lower explosive limit for up to 20 years of storage before disposal. Use of a Nucfil 013™ filter or equivalent may be employed to mitigate gas buildup.

[4] Letter, ED Sellers, RL, to HJ Hatch, Fluor Daniel Hanford, Inc., "Contract No. DE-AC06-96RL1320 – Classification of Nuclear Materials in the 327 Building," dated April 21, 1997.

2.4.5 Descriptions of 340 Complex Special-Case Waste Subject to M-92-14, -15, and -16

The inventory of SCW at the 340 Complex consists of heels in the 340-A AGT, in the 340 Complex vault tanks, and in ancillary equipment. The 340-A Building contains six 30,000-L (8,000-gal) tanks. The 340 Complex vault contains two 57,000-L (15,000-gal) tanks that were the primary storage location for the RLWS. The radiological inventory of these tanks is estimated at approximately 100 curies.

Document HNF-2230, *340 Waste Handling Complex: Deactivation Project Management Plan*, describes the following path forward for managing this waste. The 340 Complex vault tanks and ancillary equipment will be removed and shipped to an approved TSD facility for treatment and/or storage and disposal, during Phase II of the 340 Complex deactivation. The 340-A Building tanks will be rinsed (decontaminated) to remove their waste inventories. Once the heels are removed, the tanks could be inspected to determine if they meet the alternate debris standard that would allow them to remain in place. The Environmental Restoration Contractor (ERC) would then be responsible for demolition and disposal of these tanks as nondangerous waste or for finding another use for the tanks. If the tanks do not meet the alternate debris standard, they will also need to be removed and shipped to a TSD facility for treatment and disposal. The method of removal for these tanks has not yet been determined. Further analysis will need to be performed to determine the final disposition of the tanks.

Acceleration of some activities described in the 340 Complex PMP may be pursued, as resources allow. For example, completion of a project currently underway would remove the heels from the 340 Complex vault tanks by October 1, 2000. Under this project, the heels will be sampled, designated, removed from the tanks by a methodology still to be determined, and disposed of. Project planning calls for disposal of the heels to the 200 Area Double-Shell Tank Farms; however, the actual disposition will depend on the results of heel sampling and analysis. The vault tanks will remain in place at the end of the project, to be dispositioned during Phase II of the 340 Complex deactivation.

Because resources allocated to support accelerated 340 Complex deactivation activities are not secure, this SCW PMP reflects commitments for 340 Complex path forward as documented in the *340 Waste Handling Complex: Deactivation Project Management Plan*.

It should be noted that tank flushing/removal of the waste from the tanks (not removal of the tanks from the 340 Complex) is required to meet the SCW M-92 milestones. However, if the required standards for cleaning the tanks can not be met for any reason, then removal of the tanks would be required to meet the SCW M-92 milestones.

3.0 SPECIAL-CASE WASTE DISPOSITION ALTERNATIVES

3.1 COMMERCIAL OFFSITE LOW-LEVEL BURIAL GROUNDS/RESOURCE CONSERVATION RECOVERY ACT OF 1976 TREATMENT, STORAGE, AND DISPOSAL FACILITIES

The disposal of SCW at commercial disposal sites is considered improbable because of the high activity levels in the waste and issues associated with offsite transfer of the wastes.
The combination of waste characterization and dose rates makes these waste streams unsuitable for commercial disposal at a low-level burial ground (LLBG) or RCRA landfill off the Hanford Site. The commercial LLBG and RCRA TSD facilities evaluated and considered for the disposition of each SCW stream are as follows:

Waste Control Specialists, Limited Liability Corporation (LLC) accepts low-level and mixed radioactive waste materials at the Andrews Facility in Andrews County, Texas. However, the license limits for ^{137}Cs (20 kCi) and ^{90}Sr (2 kCi) are not sufficient for receipt of the SCW from Hanford's 300 Area facilities.

Chemical Nuclear Systems, LLC accepts low-level radioactive material and/or waste for processing at the Chem-Nuclear Consolidation Facility at 16043 Dunbarton Boulevard, Barnwell, South Carolina, 29812. The permit requirements for cesium and strontium concentration in the waste package will significantly increase the number of waste packages needed for storage. This site will not be considered for receipt of the SCW due to the high percentage of SCW with hazardous constituents, and the LLW would require additional packaging and transportation costs.

Envirocare of Utah accepts low-level and mixed radioactive waste materials at its Clive site located in Utah's west desert approximately 75 miles west of Salt Lake City. Since the facility's permit limits for radionuclides are insufficient for receipt of the SCW from Hanford's 300 Area facilities, this site will not be considered for receipt of the SCW.

The **U.S. Ecology** site on the Hanford Site offers one of only two full service Class A, B, and C low-level radioactive waste disposal facilities in the nation. However, some of the waste packages will exceed these categories and will not meet acceptance for disposal because of the presence of hazardous constituents.

3.2 ALTERNATIVE SUMMARY

Table 3-1 provides a summary of the alternative disposition pathways considered in the alternatives analysis for each of the SCW streams subject to TPA Interim Milestones M-92-14, M-92-15, and M-92-16.

3.3 REGULATORY REQUIREMENTS

3.3.1 Environmental Compliance

This section summarizes the regulatory framework and management strategy for the disposition of the 300 Area SCW. Significant environmental drivers considered include the TPA, RCRA, the *Clean Air Act of 1955* (CAA) strategy, the *Clean Water Act of 1977* strategy, the *Safe Drinking Water Act of 1974* strategy, the *National Environmental Policy Act of 1969* (NEPA), and the *National Historic Preservation Act of 1966*.

Table 3-1. Special-Case Waste Alternative Analysis Summary.

Building	SCW Stream	Alternative	Notes
324	HLV Metal Filters	PUREX Tunnel	The HLV metal filters will be packaged in a 20.4-metric ton (22-½-ton) box (steel waste disposal box [SWDB]) prior to disposal as RH-TRU/M.
		CWC Storage	
	HLV Strontium Filters	PUREX Tunnel	The HLV strontium filters will be packaged in a 20.4-metric ton (22-½-ton) box (SWDB) prior to disposal as RH-TRU/M.
		CWC Storage	
	HLV TRU Filters	PUREX Tunnel	The HLV TRU column will be packaged in a 20.4-metric ton (22-½-ton) box (SWDB) prior to disposal as RH-TRU/M.
		CWC Storage	
	HLV Cesium IX Columns	Burial at LLBG	The IX columns are designated as LLW and will be packaged in grout containers for burial in the LLBG as RH-LLW.
	Spent Fuel Pieces and Fragment (SNF)	Hanford Site Storage in EBR-II Shielded Cask	This alternative was the only one considered because the Hanford Site has prior and recent experience managing small amounts of spent fuel pieces and fragments in this way. The waste will be turned over to the waste management contractor for interim storage.
325	Spent Fuel Pieces and Fragment (SNF)	Hanford Site Storage in EBR-II Shielded Cask	This alternative was the only one considered because the Hanford Site has prior and recent experience managing small amounts of spent fuel pieces and fragments in this way. The waste will be turned over to the waste management contractor for interim storage.
	Low-Level Radioactive Waste	Disposal in LLBG	Either of these alternatives is a viable option that is dependent on the waste meeting the facility acceptance criteria. The waste will be packaged in a shielded 0.81 m^3 (55-gal) drum and turned over to the waste management contractor for burial or storage in one of these facilities.
		Storage at CWC, T-Plant, or Waste Receiving and Processing (WRAP) Facilities	
		Storage in PUREX Storage Tunnel	Storage in the PUREX storage tunnel was not evaluated because the waste removal schedule does not coincide with tunnel availability.
	TRU	Storage at CWC, T-Plant, or WRAP Facilities	The waste will be packaged in a shielded 0.81 m^3 (55-gal) drum and turned over to the waste management contractor for interim storage in one of the 200 West Area waste management facilities.
		Storage in PUREX Storage Tunnel	Storage in the PUREX storage tunnel was not evaluated because the waste removal schedule does not coincide with tunnel availability.
327	Hot Cell 1-Gal Waste Buckets	PUREX Tunnels	This option was not considered because of the viability of sending the waste buckets to CWC.
		CWC Storage	This is the option that has been used to disposition 383 1-gal waste buckets (236 in FY1998 and 147 in FY1999) and will be used for the remaining legacy waste buckets.
	Fuel Pool IX Column	PUREX Tunnels	This option requires the development and procurement of a disposal box(es) that the columns would fit into. A safety analysis report for processing (SARP) would also be required for moving the box to tunnel.
		CWC Storage/Burial Grounds	This option requires the development and procurement of a container(s) large enough and with adequate shielding for handling either one or two columns. A SARP for shipment and waste assessment for storage at CWC are also required.
	Fuel Pellets/ Metallurgical Mounts in Hot Cells and Dry Storage Rack	PUREX Tunnels	This option will not be considered because of the viability of shipping the waste buckets to CWC.
		CWC Storage	This option calls for the fuel pellets/metallurgical mounts to be packaged into shielded waste drums for storage at the CWC.

Table 3-1. Special-Case Waste Alternative Analysis Summary.

Building	SCW Stream	Alternative	Notes
340	Heels from 340-A Building AGT	N/A	The tanks have been drained and rinsed. They will be decontaminated and inspected to verify that they meet the alternate debris standard allowing them to remain in place and transitioned to the ERC.
	Heels from 340 Building Vault Tanks and Ancillary Equipment	Remove Tanks for Burial.	Phase II 340 Complex deactivation activities currently require detailed planning including disposition strategy and alternatives analysis. These items will be tracked in the project schedule.

3.3.1.1 Tri-Party Agreement Milestones

The TPA consists of an agreement among DOE, the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) to complete cleanup of the Hanford Site as required by RCRA and the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). The TPA terms and conditions provide the legal framework, required actions, and schedules (milestones) for site cleanup. The purpose of the TPA is to require DOE compliance with RCRA requirements for TSD facilities, and RCRA and CERCLA requirements for interim and final remedial actions.

Amendment 4 to the TPA (January 1994) resulted in major Milestone M-33-00, which requires that the RL accomplish the following:

- Identify a path forward for disposition of Hanford Site solid waste and materials.
- Submit a TPA change package to add milestones for acquisition of the necessary TSD facilities to implement the path forward.

The waste streams that were considered in the scope of TPA Milestone M-33-00 included the 300 Area SCW that did not have a clearly defined disposition pathway.

In negotiations among RL, Ecology, and EPA in 1995 and 1996, the three parties agreed that major TPA Milestone M-33-00 would be replaced by a series of decision point milestones for disposition of each major waste stream. The decisions ultimately would lead to specific interim milestones and target dates for acquiring the necessary TSD facilities.

Amendment 5 to the TPA also resulted in major Milestone M-89-00 and associated interim milestone and target dates for closure of the nonpermitted MW units located in the 324 Building and for compliance actions required under RCRA for the same MW units. The specific areas of the 324 Building that are considered MW units are the REC B-Cell, D-Cell, and the HLV.

Major TPA Milestone M-92-00 and its associated interim milestones and target dates were established to govern the acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities needed to store, treat, and dispose of Hanford Site cesium and strontium, unirradiated uranium, bulk sodium, and 300 Area SCW (Ecology, et al. 1996).
The interim milestones and target dates under major TPA Milestone M-92-00 that relate to the 300 Area SCW are identified in Appendix A, Table A-1. The 300 Area SCW subject to M-92-00 is described in Section 2.1.

3.3.1.2 Resource Conservation Recovery Act of 1976 Status/Strategy

The RCRA, implemented in Washington State through WAC 173-303, regulates the generation, transportation, storage, treatment, and disposal of solid and dangerous waste. The RCRA provisions govern cleanup of dangerous waste constituents released to the environment from dangerous or solid waste management units.

3.3.1.3 Clean Air Act Status/Strategy

Section V of the CAA, adopted in the 1990 amendments to the CAA, establishes a federal permitting program that will be administered by the states. Any 'major source' of CAA criteria pollutants or CAA hazardous air pollutants will require a permit to be obtained to operate the source. Existing air permits are adequate to allow packaging of the SCW in the 324, 325, and 327 Buildings. Once the final disposition method is determined for the 340 Complex SCW, the existing air permits will need to be reviewed for adequacy. Radioactive emissions from the CWC are not expected to change as waste is received, provided that the waste is packaged in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*. A Notice of Construction would not be required to ship SCW to the CWC or the LLBG.

3.3.1.4 National Environmental Protection Act/State Environmental Policy Act Status and Strategy

The NEPA is a review and documentation process, promulgated under 10 Code of Federal Regulations (CFR) 1021, "DOE NEPA Regulations," and 40 CFR 1508.27, and executed pursuant to DOE Order 5440.1E, "Implementation of the National Environmental Policy Act," Chapter V. Appropriate NEPA review(s) will be conducted before commencement of activities in accordance with applicable regulations (10 CFR 1201, et seq.) and DOE orders. Should any activity be beyond the scope of existing NEPA documentation, additional NEPA documentation requirements will be evaluated and planned prior to activity initiation.

3.3.2 Packaging Requirements

General packaging requirements for the transportation and storage of radioactive waste address three safety functions: containment, shielding, and subcriticality. The packaging requirements for transportation and transient operation can be more restrictive because the transportation environment includes dynamic stresses not present during storage. In contrast, storage requirements must consider the safety of the facility and the life of the package over the long term. These basic requirements apply to both onsite and offsite transportation of radioactive materials.

Packaging requirements and approvals for offsite transportation are enforceable by the U.S. Department of Transportation (DOT) and the U.S. Nuclear Regulatory Commission (NRC). Onsite packaging is approved for use only on Hanford roadways subject to the controls specified in the SARP or Safety Evaluation for Packaging (SEP). Hanford Site road access is restricted during such shipments. Onsite shipping is referenced in HNF-PRO-154, *Responsibilities and Procedures for All Hazardous Material*, and is regulated by 40 CFR 263, "Standards Applicable to Supporters of Hazardous Waste." Radioactive material packaging systems used exclusively on the Hanford Site (onsite packaging) are analyzed and engineered to provide thermal dissipation, shielding, containment, and assurance of subcriticality.

The SCW streams are expected to include the following waste categories: LLW, GTC3 LLW, GTC3 MLLW, RH-TRU, and RH-TRU/M. The waste categories do not specifically dictate the packaging requirements for transportation. The necessary packaging features to control dose rates and contain the material are determined by the activity levels and the physical and chemical form of the payload. For much of the waste, the packaging and characterization processes are assumed to limit the fissile isotope content (^{233}U, ^{235}U, ^{238}Pu, ^{239}Pu, and ^{241}Pu) of each package to fissile exempted limits (49 CFR 173); for those wastes, the issue of criticality does not require evaluation or special packaging controls. However, some of the waste packages do exceed the 40 CFR 173 exemption limits. Shipment of these wastes is performed in accordance with approved packaging and transportation safety analysis documentation. Therefore, no individual requirements exist for packaging each waste type.

Containers used for shipping, storage, and disposal of waste must be in good condition with no visible flaws that could compromise integrity or performance. The packaging material should be resistant to degradation by microbiological action, moisture, radiation effects, or chemical reactions with the waste. The overall package must provide a method for venting hydrogen generated by radiolysis. The packaging requirements for sending the SCW to the selected TSD are described in Section 4.3.

3.3.2.1 Packaging Availability

Table 3-2 lists the containers described in this PMP along with their nominal volumes and shielding thicknesses. Cost data are also included.

3.3.3 Transportation Requirements

This section provides regulatory and administrative requirements associated with the various modes of transportation that are anticipated or available.

3.3.3.1 Shipment of Casks by Truck

Shipment of casks by truck will be controlled by the safety documentation that applies to the packaging system. The onsite packaging safety documentation (SARP or SEP) specifies the transportation requirements for each packaging system. These requirements and administrative controls may address the type of equipment used (i.e., tractor-trailer configurations, special lifting requirements, special radiological controls for transport, road closures, speed limits, times of travel, special routing, inclement weather restrictions, and engineered tie-down requirements).

3.3.3.2 Shipment of Boxes by Truck

Shipping boxes or special packages by truck has requirements similar to those discussed in Section 3.3.3.1. Because boxes and other containers typically provide less shielding, radiological controls associated with the shipment of these types of packages may be more restrictive.

Table 3-2. Packaging Availability.

	Availability	Vol. (ft^3)	Shielding	Venting	Cost/unit ($)	Reference
208.1976-metric ton (22-1/2-ton) Box SWDB	One box and five liners at the 324 Building. Additional SWDBs/liners need to be purchased.	70.1	22.86-cm (9-in.) steel	Yes	Fabrication of new liners: $10,000/each Cost of complete SWDB with liner: $100,000	PNNL, 1988, *Safety Analysis Report (SAR) for the Steel Waste Package*, PNL-MA-651, Rev. 1, Pacific Northwest Laboratory, Richland, Washington
Concrete Burial Boxes	Need to Purchase	1440	10.16-cm (4-in.) concrete	Optional		WHC-SD-TP-SARP-005, *Safety Analysis Report for Packaging (Onsite) for the Modified Fuel Spacer Burial Box*, Westinghouse Hanford Company, Richland, Washington
Type A Boxes	Need to Purchase	225	None	Optional	$750 to $7,000 (depending on size and shielding) SARP Engineering Change Notice (ECN): $40,000	WHC-SD-TP-SARP-018, *Safety Analysis Report for Packaging (Onsite) for Type B Quantities of Radioactive Material in Type A Boxes*, Waste Management Federal Services of Hanford, Richland, Washington
Lead-Lined Drum	Need to Purchase	0.55	15.24-cm (6-in.) lead	Yes	$15,000/each SARP ECN: $20,000	WHC-SD-WM-SARP-001, *Safety Analysis Report for Packaging (Onsite) Lead Lined Drum/21-PF-1 Packaging System*, Waste Management Federal Services of Hanford, Richland, Washington
Concrete-Shield ed Drum	Need to Purchase	0.68	17.018-cm (6.7-in.) concrete	Yes	$5,000/each SEP ECN: $20,000	HNF-SD-TP-SEP-051, *Safety Evaluation for Packaging (Onsite) for the Concrete-Shielded RH TRU Drum for the 327 Postirradiation Testing Laboratory*, Waste Management Federal Services of Hanford, Richland, Washington
Mark III Concrete Box	Need to Purchase	50	12.7-cm (5-in.) concrete	Yes	$14,000/each SARP: $75,000	None
HN 200/3-82B Liner	Need to Purchase		None	Yes	$7,000/each SARP ECN: $50,000	HNF-3786, *Safety Analysis Report for Packaging (Onsite) ATG Nuclear Services 3-82B Cask*, Waste Management Federal Services of Hanford, Richland, Washington.

4.0 PROJECT SCOPE

4.1 FACILITY DESCRIPTIONS

The 324 Building is a Hazard Category II nonreactor nuclear facility designed to be highly adaptable and able to accommodate the study of chemical processes, from laboratory to pilot scale, at levels of radiation, from background to megacuries. The 324 Building also was used for the examination and mechanical testing of irradiated test specimens. The 324 Building contains the laboratory, support buildings, and offices used to pursue technical laboratory operations. More detailed descriptions are found in HNF-1289, *324/327 Buildings Stabilization/Deactivation Project – Project Management Plan.*

The 325 Building is a Hazard Category II nonreactor nuclear facility designed to provide shielded, ventilated, and specially equipped laboratories for the physical and metallurgical examination and testing of irradiated fuels, concentrated fission products, and irradiated structural materials. More detailed descriptions are found in PNNL-13016, *325 Building Special-Case Waste Assessment and Disposition Alternatives Analysis.*

The 327 Building is a Hazard Category II nonreactor nuclear facility designed to provide shielded, ventilated, and specially equipped laboratories for the physical and metallurgical examination and testing of irradiated fuels, concentrated fission products, and irradiated structural materials. More detailed descriptions are found in HNF-1289, *324/327 Buildings Stabilization/Deactivation Project – Project Management Plan.*

The 340 Complex consists of several buildings. The SCW is contained within the RLWS tanks located in the 340 vault and 340-A Building. The 340 vault is below grade and contains two 57,000-L (15,000-gal) tanks that were the primary storage for the RLWS. The RLWS consists of underground piping and ancillary equipment which connect the 300 Area liquid waste generators to the 340 vault tanks. The 340-A Building houses six 30,000-L (8,000-gal) above-ground tanks for auxiliary RLWS storage. Transfers to the 340-A Building tanks were from the 340 vault tanks only. The 340 vault tanks last received waste in 1998. The 340 Complex is now isolated from further waste receipts via the RLWS lines. More detailed descriptions are found in HNF-2230, *340 Waste Handling Complex: Deactivation Project Management Plan.*

A description of the receiving TSD facilities is provided in Section 4.3.

4.2 PLANNED APPROACH

The recommended approach for storage of the 300 Area SCW based on the alternative analysis performed for each waste stream is presented in Table 4-1.

Table 4-1. Recommendations.

Waste Stream	*Storage Option*	*Container*	**Schedule Available**	*Justification*
324 Building HLV Metal Filters	CWC	SWDB	FY 2000	Lowest cost. Does not preclude future retrieval/processing.
324 Building HLV TRU Column	CWC	SWDB	FY 2000	Lowest cost. Does not preclude future retrieval/processing.
324 Building HLV Strontium Filters	CWC	SWDB	FY 2000	Lowest cost. Does not preclude future retrieval/processing.
324 Building HLV IX columns	LLBG	Grout Container	FY 2000	Lowest cost. Final disposition.
324 Building Spent Fuel Fragments/Pieces	LLBG-TRU Pad	EBR-II Shielded Cask	Prompt Start	Existing path exists (over 40 existing containers of this type at LLBG). Does not preclude future retrieval/processing.
325 Building Spent Fuel Fragments /Pieces	LLBG-TRU Pad	EBR-II Shielded Cask	Prompt Start	Existing path exists (over 40 existing containers of this type at LLBG). Does not preclude future retrieval/processing.
325 Building LLW	LLBG	Shielded 0.81 m^3 (55-Gal) Drum	Prompt Start	Lowest cost. Final disposition.
325 Building TRU Waste	Storage at a 200 West Area Waste Management Facility	Shielded 0.81 m^3 (55-Gal) Drum	Prompt Start	Lowest cost. Does not preclude future retrieval for processing.
327 Building 1-Gal Waste Buckets	CWC TRU Pad	Lead- or Concrete-Lined Drums	Ongoing	Does not preclude future retrieval/processing.
327 Building IX Column	CWC/LLBG	Concrete Box	FY 2004	Lowest cost. Does not preclude future retrieval/processing.
327 Fuel Pellets and Metallurgical Mounts	LLBG-TRU Pad	Lead- or Concrete-Lined Drums	FY ~2003	Does not preclude future retrieval/processing.
Heels from 340 Complex	TWRS/CWC	LR-56 (if TWRS)/ Shielded Container (if CWC)	FY ~2006	Waste volume reduction. Allows for lowest cost interim surveillance and maintenance pending decontamination and decommissioning.

4.3 TREATMENT, STORAGE, AND DISPOSAL CAPABILITY

This section provides a description of each of the TSD facilities proposed for the disposition of the 300 Area SCW. This includes a facility description and function, prohibited wastes, physical and chemical criteria, radiological criteria, and packaging criteria for each facility. Detailed descriptions are not provided for TSD facilities (e.g., T Plant) that were eliminated as disposition alternatives during the alternatives evaluation.

4.3.1 Central Waste Complex Capability

This section reflects the acceptance criteria for the CWC as depicted in HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*. Some of the requirements for storage at the CWC were clarified in letter WMH-9953340, "Receipt and Storage of 22-Ton Steel Waste Boxes in the Central Waste Complex."[5]

4.3.1.1 Facility Description and Function

The CWC is a storage unit for MLLW, *Toxic Substances Control Act of 1976* (TSCA) polychlorinated biphenyl (PCB) waste, TRU waste, TRU/M, and other waste requiring treatment before disposal (e.g., nonregulated low-level organic liquids, unstable chelating compounds, and CH LLW waste that exceeds radiological disposal criteria). Waste stored at CWC will be treated and repackaged as required for disposal, as treatment capabilities become available.

The CWC manages waste having characteristic waste codes D001 through D043, all listed discarded chemical product waste codes (U- and P-listed waste), certain F-listed waste (codes F001 through F005, F020 through F023, F026 through F028, and F039), and all Washington State-only waste codes. In addition, the CWC manages TSCA PCB waste from Hanford Site generators in accordance with 40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions." The CWC also can store waste from CERCLA cleanup activities.

4.3.1.2 Prohibited Waste

The following waste types are not acceptable at the CWC:

- waste having dangerous waste codes other than those listed on the CWC Part A, Form 3, permit application. The prohibited waste codes are F006 through F019, F024, F025, F032 through F038, and all K waste codes (DOE-RL-88-21).
- explosive waste
- shock-sensitive waste
- pyrophoric waste
- Class IV oxidizer waste
- waste that reasonably might be expected to become unstable, explosive, generate excessive heat or toxic gases, or for any reason cannot be stored safely over a 20-year period
- waste that might generate toxic gases, vapors, or fumes in concentrations that reasonably could be expected to exceed occupational exposure limits and/or air emission standards during storage (HNF-SD-WM-ISB-007)
- compressed gases at pressures in excess of 1.5 atmospheres (152 kilopascals absolute pressure) at 20°C (68°F) or waste that might pressurize to exceed 1.5 atmospheres over a 20-year storage life (HNF-SD-WM-ISB-007, *Central Waste Complex Interim Safety Basis*)
- waste that exceeds the radiological limits of Section 4.3.1.4
- liquid waste, except for lab-packed and overpacked liquids that could be accepted in quantities of 57 L (15 gals) per outer container (HNF-SD-WM-ISB-007)
- infectious/biohazard waste.

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[5] Letter from LT Blackford, Waste Management Hanford, to A Clark, B&W Hanford Company, "Receipt and Storage of 22-Ton Steel Waste Boxes in the Central Waste Complex," dated June 10, 1999 (WMH-9953340).

4.3.1.3 Physical/Chemical Criteria

The following are the physical and chemical acceptance criteria for the CWC.

Chemical Compatibility

All waste in a given container shall be chemically compatible (WAC 173-303-630).

Liquids and Liquid-Containing Waste

Sorption of liquids is allowed, but must be compatible with the treatment methods anticipated for disposal. HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria,* Appendix E, and the applicable Waste Specification Record specify the appropriate sorbent material to be used for various waste streams. For waste that could form condensate during storage, sufficient sorbent shall be added to the container to absorb any condensate formed.

Asbestos-Containing Waste

Asbestos-containing waste material shall be packaged in accordance with 40 CFR 61.150. Wetting with water is allowed as long as the liquid does not exceed applicable free liquid requirements.

Heat Generation

If heat generation from radiological decay in the waste package exceeds 3.5 W per cubic meter (0.1 W per ft^3), the package must be evaluated to ensure that the heat does not affect the integrity of the container or surrounding containers. This evaluation must be approved by the PHMC waste acceptance organization.

Gas Generation

Gas generation from radiolytic or biological decomposition of containerized waste must be controlled to prevent pressurization exceeding 1.5 atmospheres (152 kilopascals absolute pressure) and combustibles gas (e.g., hydrogen, methane) concentrations exceeding the lower explosive limit for up to 20 years of storage before disposal. If a waste generates sufficient gas to exceed these limits, the following mitigating measures (or alternative measures approved by the PHMC waste acceptance organization) must be used:

- Control of hydrogen from radiolytic decomposition: Use a Nucfil 013™ filter or equivalent. All container liners and inner bags must be closed in a manner that allows gas to reach the vent filter (e.g., twist and tape method for bags). In addition to filtering, palladium or platinum catalyst packs must be used to control hydrogen concentrations in the container when filtering alone is insufficient to maintain hydrogen gas concentrations below the lower explosive limit.

- Control of gases from biological decomposition: Waste containing readily decomposable organic materials (e.g., vegetation) must be vented with a Nucfil 013™ filter or equivalent. In addition to filtering, a mixture of 10% by weight slaked lime in 90% inorganic absorbent could be required for waste that is expected to decompose rapidly.

4.3.1.4 Radiological Criteria

The following are the radiological acceptance criteria for the CWC.

Criticality Safety Limits

Each container is required to have no more than 100 fissile gram equivalents (FGE) for normal acceptance into CWC. Containers with greater than 100 FGE but less than 1,000 FGE must be approved in advance of shipment on a case-by-case basis (per letter WMH-9953340).

Container Dose-Equivalent Curie Limits

Up to 35 Dose equivalent-Ci per container is acceptable at the CWC as a routine shipment. Quantities up to 150 dose equivalent-Ci per container can be evaluated on a case-by-case basis for acceptability at the CWC (HNF-SD-WM-ISB-007). Dose-equivalent curie calculations provide a method of normalizing the radiotoxicity of various radionuclides to ^{239}P for use in establishing the safety basis for certain Hanford Site waste management units.

Note: Per the radiological characterization for the 20.4-metric ton (22-½-ton) boxes, this equates to a maximum curie content of 100,000 Ci (approximately 145 dose equivalent-Ci) for the box, per letter WMH-9953340.

Waste Exceeding Category 3

Waste having radionuclide concentrations exceeding Category 3 levels (except TRU waste) requires RL approval for acceptance.

Package Removable Contamination Limits

Removable contamination on accessible surfaces of waste packages shall not exceed the limits of the *Hanford Site Radiological Control Manual* (HSRCM), Table 2-2.

Package Dose Rate Limits

Waste containers shall not exceed 1 mSv/hr (100 mrem/hr) at 30 cm (approximately 11.8 in.) from the waste package or 2 mSv/hr (200 mrem/hr) at any point on the surface of the package (HSRCM).

Overpacking the waste containers and/or spot shielding (i.e., lead blankets) for hot spots exceeding either of these two limits are acceptable means for reducing the observed dose rates to meet the limits and must be approved in advance of shipment by the PHMC waste management organization on a case-by-case basis (WMH-9953340).

4.3.1.5 Packaging Criteria

The following are the packaging criteria for acceptance of waste at the CWC.

Container Selection

The packages for stored waste shall meet applicable Title 49 of the CFR, "Transportation," container requirements for the hazard class/division of the waste, except that packaging for onsite transfers under an approved packaging safety analysis might be allowed where cost or technical constraints make the use for the DOT-compliant package unfeasible. If the waste does not meet the definition of any DOT hazard class, a strong tight container is adequate.

All containers must be vented. This applies to all parts of the 20.4-metric ton (22-½-ton) box assembly as well as all inner containers, including the engineered containers (per letter WMH-9953340).

Protective Coatings and Liners

The packaging for MW shall include coatings and/or liners sufficient to maintain the integrity for the containment system during the anticipated storage life of the waste as follows:

- The exterior coating of containers shall be alkyd enamel, galvanized, or an alternative coating with performance equivalent to or better than alkyd enamel.

- The interior coatings and liners shall be chemically compatible with the waste and shall protect the containment system from corrosion over the anticipated storage life of the waste (WAC 173-303-630). Unless otherwise specified by the PHMC waste acceptance organization, the storage life should be assumed to be 20 years. For containers procured under Hanford Site container procurement specifications, HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix D, defines preferred coating and liner options.

Noncombustible Containers

Outer containers shall be constructed of noncombustible materials.

Condition of Containers

Outer containers shall be in good condition, with no visible cracks, holes, dents, bulges, pit or scale corrosion, or other damage that could compromise integrity (WAC 173-303-630). Minor external surface rust that could be sanded or brushed off will be acceptable. Containers having some pit or scale corrosion could be acceptable for storage provided the integrity of the container is confirmed by nondestructive examination.

Securing Waste and Shielding

Large, heavy items must be secured in containers by bracing, blocking, or other means to prevent damage to the container during handling and transportation. When shielding is used to reduce the surface dose rate of a waste container, the shielding and waste must be secured to prevent shifting during handling and transportation.

Package Size and Weight Limits

Drums or boxes not exceeding 2.74 m long x 1.6 m wide x 1.7 m high (nominally 9 ft long x 5.25 ft wide x 5.5 ft high) should be used whenever possible to facilitate receipt verification. When a larger container is required, the PHMC waste acceptance organization must be notified before packaging.

The "footprint" of the outmost container/overpack for each container assembly will not exceed 2000 lb/ft^2 (per letter WMH-9953340).

Stacking

Packages must be designed to withstand the weight of two layers of (0.81 m^3) (55-gal) drums weighing 454 kg (1,000 lb) each stacked on top.

Labeling

Packages shall be labeled according to instructions contained in HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria,* Appendix C.

4.3.2 Capability of the Unlined Portion of the Low-Level Burial Grounds

The following criteria define baseline requirements to comply with the regulatory, permitting, safety, environmental, and operational requirements for the unlined portions of the LLBG. For criteria related to the lined portions of the LLBG, refer to Section 4.3.3 of this document.

4.3.2.1 Facility Description and Function

The LLBGs are a land disposal unit for controlled burial of low-level radioactive waste. The LLBGs include a number of unlined disposal trenches that accept only radioactive waste not regulated under 40 CFR 261, "Identification and Listing of Hazardous Waste"; WAC 173-303, "Dangerous Waste Regulations"; or 40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions."
The LLBGs also include two disposal trenches (Trenches 31 and 34) for disposal of mixed waste. This chapter relates only to the acceptance criteria for the unlined portions of LLBG. Acceptance criteria for Trenches 31 and 34 are provided in Section 4.3.3.3.

4.3.2.2 Prohibited Waste

The following types of waste are not disposed in the unlined portions of the LLBG:

- Waste that is dangerous or extremely hazardous as defined by WAC 173-303, "Dangerous Waste Regulations," or as hazardous waste as defined by 40 CFR 261,"Identification and Listing of Hazardous Waste" (HNF-SD-EN-WAP-002)
- TSCA-regulated PCB waste (HNF-SD-EN-WAP-002)
- Waste generated from CERCLA cleanup activities, unless specific approval (e.g., a Record of Decision) has been granted by EPA to manage the waste on the Hanford Site
- Waste containing free liquids, except as allowed in Section 4.3.2.3 (HNF-SD-EN-WAP-002)
- Gaseous waste packaged at pressures exceeding 1.5 atmospheres (152 kilopascals absolute pressure) at 20°C (68°F)
- Unstabilized organic liquids (including absorbed organic liquids) exceeding 1% of the waste by weight
- Unstabilized chelating compounds exceeding 1% of the waste by weight
- Infectious waste
- Transuranic waste and waste that exceeds Class C, and other radiological limits of Section 4.3.2.4
- Waste that might generate toxic gases, vapors, or fumes in concentrations that reasonably could be expected to exceed occupational exposure limits and/or air emission standards before disposal.

4.3.2.3 Physical/Chemical Criteria

The following are the physical/chemical criteria for acceptance of waste at the LLBG.

Liquids and Liquid-Containing Waste

All free liquids must be absorbed or stabilized in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix E, or otherwise removed from the waste, except as specifically allowed as follows. Containerized free liquids are allowed in the following situations, but cannot exceed 1% of the volume of the waste (HNF-SD-EN-WAP-002):

- Free liquids in a very small container, such as an ampule
- Small articles that contain free liquids required for the article to function

- For liquid-containing waste where condensate could form in inner plastic packaging (e.g., bags) subsequent to packaging, the condensate shall be eliminated to the maximum extent practical by placing sorbents within the inner plastic packaging (HNF-SD-EN-WAP-002). The type and amount of sorbent required shall be in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix E. In any case, the amount of liquid cannot exceed 1% of the volume of the waste or 0.5% of waste processed to a stable form.
- Residual liquids in large debris items shall be sorbed or removed. In cases where it is not practical to remove suspected liquids and it is impossible to sample to determine if liquids are present, the liquids shall be removed to the maximum extent possible by draining suspected liquids at low points and placing an adequate amount of sorbent around each item (HNF-SD-EN-WAP-002). In any case, the amount of liquid cannot exceed 1% of the volume of the waste.

Land Disposal Restrictions

Waste that is initially subject to regulation under RCRA can be disposed in the LLBG with a determination that the waste is no longer dangerous waste and the waste meets the applicable treatment standards of 40 CFR 268, "Land Disposal Restrictions." These waste types include the following:

- Hazardous debris that is exempted from regulation under 40 CFR 261.3(f).
- Waste that originally was designated only with characteristic waste numbers D001 through D043 that is no longer hazardous and that meets all of the applicable treatment standards of 40 CFR 268, "Land Disposal Restrictions."

A copy of the applicable notification to the EPA Regional Administrator, as specified in 40 CFR 268.7, and data supporting this notification must be provided to the PHMC waste acceptance organization.

Solidification or Stabilization of Organic Liquids and Chelating Compounds

Organic liquids and chelating compounds exceeding 1% of the waste by weight must be solidified or stabilized to a form that immobilizes the organic and chelating compounds. Selection and use of solidification and stabilization agents shall be in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix E.

Asbestos-Containing Waste

Asbestos-containing waste material shall be packaged in accordance with 40 CFR 61.150. Wetting with water is allowed as long as it does not exceed applicable free liquid requirements.

Heat Generation

If heat generation from radiological decay in the waste package exceeds 3.5 W per m^3 (0.1 W per ft^3), the package must be evaluated to ensure that the heat does not affect the integrity of the container or surrounding containers in the LLBG. This evaluation must be approved by the PHMC waste acceptance organization.

Gas Generation

Gas generation from radiolytic or biological decomposition of containerized waste must be controlled to prevent pressurization exceeding 1.5 atmospheres (152 kilopascals absolute pressure) and combustible gas (e.g., hydrogen, methane) concentrations exceeding the lower explosive limit during handling before disposal. If a waste generates sufficient gas to exceed these limits, the following mitigating measures (or alternative measures approved by the PHMC waste acceptance organization) must be used:

- Control of hydrogen from radiolytic decomposition: Use a Nucfil 013™ filter or equivalent. All container liners and inner bags must be closed in a manner that allows gas to reach the vent filter (e.g., twist and tape method for bags). In addition to filtering, palladium, or platinum, catalyst packs could be used to control hydrogen concentrations in the container.

- Control of gases from biological decomposition: Waste containing readily biodegradable organic materials (e.g., animal waste, and vegetation) must be vented with a Nucfil 013™ filter or equivalent. In addition, a mixture of 10% by weight slaked lime in 90% inorganic sorbent shall be added to the waste to reduce biological decomposition if filtering alone is not sufficient to control combustible gas concentrations.

4.3.2.4 Radiological Criteria

The following are the radiological criteria for acceptance of waste at the LLBG.

Radiological Concentration Limits

The methodology for classification of the radionuclide content of waste against the various limits listed in the following sections are provided in HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix A. A waste must meet all of the following conditions to be disposed in the LLBG.

- TRU content limit - TRU content (as calculated by HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix A, Method A.1) shall not exceed 100 nanocuries per gram of waste

- Waste category (as calculated by HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix A, Methods A.4 and A.5) shall not exceed Category 3 levels, except with an analysis coordinated by the PHMC waste acceptance organization demonstrating that the LLBG performance assessment conditions are met (WHC-EP-0645, WHC-SD-WM-TI-730).

- Category 3 waste (as calculated by HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix A, Methods A.4 and A.5) can be disposed of only if the waste meets one of the following waste form stability criteria (WHC-EP-0645, HNF-SD-WM-TI-730):

  - Packaging in a high-integrity container (HIC) that meets the testing requirements of WHC-S-0486, *Hanford High Integrity Container, 300 Year Specification*.
  - Packaging in a HIC approved by the PHMC waste acceptance organization. (A list of approved HICs is available on the Hanford Site Solid Waste Acceptance Program Web page (http://www.hanford.gov/wastemgt/wac/index.htm).
  - Stabilization in concrete or other stabilization agents. The stabilized waste must meet the leach index and compression strength criteria of the NRC Technical Position Paper on Waste Form, Section C.2 (NRC 1991) and HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix A.
  - Inherently stable waste that meets the stability requirements of 10 CFR 61.56 and the NRC Technical Position Paper on Waste Form (NRC 1991).

- Mobile radionuclides - If the concentration of any mobile radionuclide exceeds the Mobile Radionuclide Reporting Limit of HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix A, Table A-2, stabilization could be required (WHC-EP-0645, HNF-SD-WM-TI-730). The PHMC waste management organization will perform a case-by-case evaluation against the LLBG performance assessment (WHC-EP-0645, HNF-SD-WM-TI-730) to determine whether the waste requires stabilization to meet the groundwater pathway dose criteria. Stabilization normally would consist of placement of the waste container in a HIC, but additional stabilization might be required based on a number of factors such as waste form and radionuclide content. The PHMC waste acceptance organization will coordinate this evaluation.

- NRC Class C limit - Waste shall not exceed the NRC Class C limits (as calculated in HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix A, Method A.6).

- Interim safety basis (ISB) limits - Waste must meet the applicable ISB limits for the LLBG (as calculated in HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix A, Method A-7), with the following exception: If a combustible waste exceeds the combustible waste limit, but does not exceed the noncombustible waste limit, the PHMC waste acceptance organization can coordinate an evaluation to determine whether segregation or stabilization can be used to mitigate the combustibility hazard (*Solid Waste Burial Grounds Interim Safety Basis*, HNF-SD-WM-ISB-002).

Criticality Safety Limits

The limits for fissile and fissionable material are provided in HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix B (CPS-SW-149-00003).

Package External Contamination Limits

Removable contamination on accessible surfaces of waste packages shall not exceed the limits of HSRCM, Table 2-2.

Package Dose Rate Limits

CH waste shall not exceed 1 mSv/hr (100 mrem/hr) at 30 cm (11.8 in.) from the waste package and 2 mSv/hr (200 mrem/hr) on the surface of the package. A package larger than 0.81 m^3 (55 gal) may have a marked point on the bottom or side with a surface dose rate of up to 10 mSv/hr (1,000 mrem/hr) as long as the 30 cm (11.8 in.) dose rate limit is not exceeded (HSRCM).

RH waste shall meet the applicable dose rate restrictions of DOT or an approved packaging safety analysis. RH waste shall be configured for unloading such that personnel exposures are maintained as low as reasonably achievable, and, in no case, shall exceed 100 mrem/hr exposure rate.

4.3.2.5 Packaging Criteria

The following are the packaging criteria for acceptance at the LLBG.

Outer Packages

Outer packages that meet one of the following criteria will provide adequate containment for disposal:

- Packages that meet the applicable DOT requirements of Title 49 of the CFR, "Transporation." If the waste does not meet the definition of any DOT hazard class, a strong tight container is adequate.
- Packages that have been evaluated through an approved packaging safety analysis.
- Drums or boxes not exceeding 2.74 m long x 1.6 m wide x 1.7 m high (nominally 9 ft long x 5.25 ft wide x 5.5 ft high) should be used whenever possible to facilitate receipt verification. When a larger container is required, the PHMC waste acceptance organization must be notified before packaging.

Package Construction

All outer packages shall be nonflammable or constructed of fire-retardant materials. All exterior surfaces of wooden packages shall be treated with a fire-retardant material having a maximum flame-spread index of 25 when tested to American Society for Testing and Materials (ASTM) E-84-96, *ASTM Standard Test Method for Surface Burning Characteristics of Building Materials*. Cardboard containers are not acceptable for disposal. Packages and sacrificial rigging shall not contain regulated materials, such as lead.

Condition of Containers

Outer containers shall be in good condition, with no visible cracks, holes, bulges, substantial corrosion, or other damage that could compromise integrity.

Securing Waste and Shielding

Large, heavy items must be secured in containers by bracing, blocking, or other means to prevent damage to the container during handling and transportation. When shielding is used to reduce the surface dose rate of a waste container, the shielding and waste must be secured to prevent shifting during handling and transportation.

Handling of Packages

All packages must be configured for safe unloading by forklift or crane. Alternate means of unloading could be allowed with approval from the TSD facility manager or designee. Packages that must be unloaded by crane shall be equipped with a lifting system designed to safely lift the fully loaded package. All slings and lifting devices shall meet the requirements of DOE-RL-92-36, *Hanford Site Hoisting and Rigging Manual*. For packages that have special unloading requirements, information must be provided to the PHMC waste acceptance organization concerning the methods for unloading before the shipment is scheduled. Sacrificial rigging shall be provided for RH waste packages. Rigging shall not contain regulated materials, such as lead.

Minimization of Subsidence

All waste shall be packaged in a form that minimizes settling and subsidence of the LLBG to the maximum extent feasible (WHC-EP-0645, HNF-SD-WM-TI-730). The following forms will be considered to meet these criteria:

- Inherently stable waste that will not subside in the disposal environment
- Waste stabilized by grouting or packaging in a HIC
- Containerized waste that fills at least 90% of the internal volume of the container.
  To calculate the volume of void spaces in the waste, only voids exceeding 5.1 cm (2 in.) in all dimensions need be considered. Any void filler must be selected and used in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix E.

Labeling

Waste containers shall be labeled in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix C. Bulk waste and RH waste containers that are removed from reusable overpacks are exempt from labeling requirements at the LLBG. For unusual waste forms, special labeling provisions can be arranged with the PHMC waste acceptance organization.

4.3.3 Capability of Lined Portion of the Low-Level Burial Grounds

The following criteria define baseline requirements to comply with the regulatory, permitting, safety, environmental, and operational requirements of the LLBG Trenches 31 and 34.[6]

4.3.3.1 Facility Description and Function

Trenches 31 and 34 of the 218-W-5 Burial Ground are lined, RCRA-compliant units for disposal of certain MLLW. Currently, only LLW originally designated with RCRA characteristic numbers D001 through D043; certain listed waste numbers (F001 through F005, and F039 derived from F001 through F005 waste); and Washington State-only dangerous waste (except waste number WSC2) are accepted in Trenches 31 and 34. All waste accepted at Trenches 31 and 34 must meet the applicable land disposal restrictions treatment standards of 40 CFR 268, "Land Disposal Restrictions," and WAC 173-303-140. There also are safety-based and environmentally-based limits on the radionuclide concentrations of waste received.

4.3.3.2 Prohibited Waste

The following types of waste are not disposed in Trenches 31 and 34:

- waste designated with any RCRA U, P, or K waste numbers; any F-listed waste other than F001, F002, F003, F004, F005, or F039; and WSC2 (DOE/RL-88-21, *Hanford Site Facility Dangerous Waste Part A Permit Application*). F039 waste is limited to waste derived from F001, F002, F003, F004, and/or F005 waste.
- TSCA-regulated PCB waste (HNF-SD-EN-WAP-002)
- waste generated from CERCLA cleanup activities, unless specific approval (e.g., a Record of Decision) has been granted by the EPA to manage the waste on the Hanford Site
- waste that does not meet all applicable treatment standards of 40 CFR 268, "Land Disposal Restrictions," and WAC 173-303-140
- free liquids, as determined by the Paint Filter Liquids Test (SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, Method 9095), except as allowed by Section 4.3.3.3 of this PMP (40 CFR 264.314, HNF-SD-EN-WAP-002)
- gaseous waste packaged at pressures exceeding 1.5 atmospheres (152 kilopascals absolute pressure) at 20°C (68°F)
- unstabilized chelating compounds exceeding 1% of the waste by weight
- infectious waste
- TRU waste and waste that exceeds Class C levels, and other radiological limits of Section 4.3.3.4
- waste that might generate toxic gases, vapors, or fumes in concentrations that reasonably could be expected to exceed occupational exposure limits and/or air emission standards before disposal

[6] For this analysis, it was assumed that lined LLBG Trenches 31 or 34 would be used. However, these criteria will also apply to other lined mixed waste trenches to be used in the future, if Trenches 31 or 34 become unavailable.

- waste that poses substantial hazards because of formation of excessive heat generation from radiological decay
- waste that is incompatible with the trench liner, as defined in Section 4.3.3.3 (40 CFR 264.301; WAC 173-303-665; HNF-SD-EN-WAP-002).

4.3.3.3 Physical/Chemical Criteria

The following are the physical/chemical criteria for acceptance of waste at Trenches 31 and 34.

Liquids and Liquid-Containing Waste

All free liquids must be absorbed or stabilized in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix E, or otherwise removed from the waste, except as specifically allowed as follows:

- Containerized free liquids are allowed in the following situations, but cannot exceed 1% of the volume of the waste (40 CFR 264.314, HNF-SD-EN-WAP-002):

  - Free liquids in a very small container, such as an ampule.
  - Small articles that contain free liquids required for the article to function (e.g., batteries or capacitors).

- For liquid-containing waste where condensate could form in inner plastic packaging (e.g., bags) subsequent to packaging, the condensate shall be eliminated to the maximum extent practical by placing sorbents within the inner plastic packaging (HNF-SD-EN-WAP-002). The type and amount of sorbent required shall be in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria,* Appendix E. In any case, the amount of liquid may not exceed 1% of the volume of the waste or 0.5% of waste processed to a stable form.

- Residual liquids in large debris items shall be absorbed or removed. In cases where it is not practical to remove suspected liquids and it is impossible to sample to determine if liquids are present, the liquids shall be removed to the maximum extent possible by draining suspected liquids at low points and placing an adequate amount of sorbent around each item (HNF-SD-EN-WAP-002). In any case, the amount of liquid cannot exceed 1% of the volume of the waste.

Land Disposal Restrictions

All waste subject to RCRA land disposal restrictions (40 CFR 268) and/or the Washington State land disposal restrictions (WAC 173-303-140) must be demonstrated to meet all applicable treatment standards and requirements. For waste that has concentration-based treatment standards for specific hazardous constituents under 40 CFR 268, the waste must be tested at a Hanford Site laboratory or an other independent laboratory in accordance with 40 CFR 268. For waste that has treatment standards that are not concentration-based, the generator and/or treatment facility must demonstrate that the waste meets the applicable treatment standards using process knowledge and/or by waste analysis, as required by the applicable sections of 40 CFR 268 and WAC 173-303-140 (HNF-SD-EN-WAP-002).

Compatibility of Waste with Liner

All waste disposed in Trenches 31 and 34 must be compatible with the landfill liner system (HNF-SD-EN-WAP-002). A variety of chemical constituents have been evaluated for compatibility with the liner system, and it is believed that waste that meets land disposal restriction requirements and the other acceptance criteria of this chapter will be compatible (HNF-SD-EN-WAP-002, HNF-SD-WM-TI-714). An assessment will be performed by the PHMC waste acceptance organization on each waste stream to confirm the compatibility of the waste with the liner. In cases where a waste contains constituents that have not been evaluated previously for liner compatibility, testing by SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, Method 9090, could be required.

Note: Table 4-2 lists certain chemical constituents, in concentrated form, that have been evaluated and determined to be incompatible with the liner.

Table 4-2. Chemical Constituents Known to be Incompatible With Liner System.

Chemical Constituent	Chemical Abstract Service Number(s)	Chemical Constituent	Chemical Abstract Service Number(s)
Aqua regia	8007-56-5	Diethyl benzene	105-05-5, 135-01-3, 141-93-5
Bromic acid	7789-31-3	Diethyl ether	60-29-7
Bromine (elemental)	7726-95-6	Chloroethane (ethyl chloride)	75-00-3
Bromobenzene	108-86-1	Fluorine (elemental)	7782-41-4
Bromoform	75-25-2	Nitrobenzene	98-95-3
Calcium bisulfite	13780-03-5	Sulfur trioxide	7446-11-9
Calcium sulfide	20548-54-3	Sulfuric acid, fuming	8014-95-7
Chlorine (elemental)	7782-50-5	Tetrachloroethylene	127-18-4
1-Chloropentane (amyl chloride)	543-59-9	Thionyl chloride	7719-09-7
1,1-Dichloroethylene (vinylidene chloride)	75-35-4	Trichloroethylene	79-01-6, 52037-46-4
1,2-Dichloropropane (propylene dichloride)	78-87-5	Source: HNF-SD-WM-TI-714	

Solidification and Stabilization of Chelating Compounds

Chelating compounds exceeding 1% of the waste by weight must be solidified or stabilized to a form that immobilizes chelating compounds. Selection and use of solidification and stabilization agents shall be in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Appendix E.

Asbestos-Containing Waste

Requirements are identical to those in Section 4.3.2.3.

Heat Generation

Requirements are identical to those in Section 4.3.2.3.

Gas Generation

Requirements are identical to those in Section 4.3.2.3.

4.3.3.4 Radiological Criteria

The following are the radiological criteria for acceptance of waste in Trenches 31 and 34.

Radiological Concentration Limits

Requirements are identical to those in Section 4.3.2.4.

Criticality Safety Limits

The fissile and fissionable material limits are provided in HNF-EP-0063, Appendix B. For Trenches 31 and 34, nonexempt quantities of uranium bearing waste exceeding 1% enrichment can be accepted only with a case-by-case evaluation demonstrating that the uranium is in an insoluble or stabilized form. (Refer to HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria,* Appendix B, Table B-3, Footnote 1; HNF-SD-WM-SARR-028.)

Package External Contamination Limits

Requirements are identical to those in Section 4.3.2.4.

Package Dose Rate Limits

Requirements are identical to those in Section 4.3.2.4.

4.3.3.5 Packaging Criteria

The following are packaging criteria for acceptance in Trenches 31 and 34.

Outer Packages

Metal drums and HICs are acceptable for disposal in Trenches 31 and 34. Other containers must be evaluated by the PHMC waste acceptance organization for structural stability and containment on a case-by-case basis. Outer packages that meet one of the following criteria will provide adequate containment for disposal:

- Packages that meet the applicable requirements of Title 49 of the CFR, "Transportation." If the waste does not meet the definition of any DOT hazard class, a strong tight container is adequate.
- Packages that have been evaluated through an approved packaging safety analysis.

Drums or boxes not exceeding 2.74 m long x 1.6 m wide x 1.7 m high (nominally 9 ft long x 5.25 ft wide x 5.5 ft high) should be used whenever possible to facilitate receipt verification. When a larger container is required, the PHMC waste acceptance organization must be notified before packaging.

Condition of Containers

Outer containers shall be in good condition, with no visible cracks, holes, bulges, substantial corrosion, or other damage that could compromise integrity.

Package Construction

All outer packages shall be nonflammable or constructed of fire-retardant materials. Cardboard containers are not acceptable for disposal. Packages and sacrificial rigging shall not contain regulated materials, such as lead.

Containers shall be compatible with the waste and maintain containment during handling and storage before disposal. Where required, an appropriate combination of protective coatings and liners shall be used to prevent loss of container integrity. Packages and sacrificial rigging shall not contain regulated materials, such as lead.

Securing Waste and Shielding

Large heavy items must be secured in containers by bracing, blocking, or other means to prevent damage to the container during handling and transportation. When shielding is used to reduce the surface dose rate of a waste container, the shielding and waste must be secured to prevent shifting during handling and transportation.

Handling of Packages

Handling requirements are the same as shown in Section 4.3.2.5.

Minimization of Subsidence

The requirements for minimization of subsidence are the same as those shown in Section 4.3.2.5.

Labeling

Waste containers shall be labeled in accordance with HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria,* Appendix C. Bulk waste and RH waste containers that are removed from reusable overpacks are exempt from labeling requirements at Trenches 31 and 34.

5.0 PROJECT SCHEDULE

A summary level project schedule is provided for dispositioning the SCW from the 300 Area facilities (Appendix C). The schedule shows project activities completed by September 30, 2006. Major milestones (i.e., TPA milestones) within this project are presented in the schedule and are discussed in Section 5.1. A brief description of the project schedule and associated critical path is provided in the following sections.

5.1 PROJECT CONSTRAINTS AND SUMMARY OF PERFORMANCE AGAINST MILESTONES

The constraints for the 300 SCW Disposition Project consist of the interim milestones added under major TPA Milestone M-92-00. TPA Interim Milestone M-92-14 requires the complete removal, transfer, and storage of Phase I 300 Area SCWs and materials. The Phase I inventory consists of, at a minimum, one-third the total curie content of all 300 Area SCW. The shipment of the FRG borosilicate glass logs to the CWC and transfer of the neptunium oxide and strontium filters to PNNL met the requirements of this interim milestone in 1998. These shipments reduced the activity level of the 300 Area SCW by more than 98.6%.

The remaining inventory of SCW (93.735 kCi) will need to be dispositioned to satisfy TPA Interim Milestones M-92-15 and M-92-16. Milestone M-92-15 requires the removal, transfer, and storage of Phase II 300 Area SCWs and materials. Phase II inventory will consist of, at minimum, half of the remaining curie content of 300 Area SCW and materials. Hence, at least 46.868 kCi of inventory will need to be shipped to meet Milestone M-92-15. Milestone M-92-16 requires the removal, transfer, and storage of Phase III 300 Area SCWs and materials. Phase III inventory will consist of the remaining curie content of 300 Area SCW and materials.

5.2 PROJECT SCHEDULE AND CRITICAL PATH ANALYSIS

The requirements, schedule, and project accountability for completion of TPA Interim Milestones M-92-14, M-92-15, and M-92-16 have been assigned to the various owners of the SCW streams. Therefore, the project schedule is comprised of individual waste streams organized by facility. The overall schedule and critical path for a given waste stream, facility, or funded project is coordinated with the activities/priorities within that facility/project.

Critical path for any project is defined as the longest time path through a network from the initial project activity to the final project completion milestone. The critical path method in project management is most valuable as a project measurement tool when the critical path chain is defined by hard logic or hard interface constraints between the subproject activities. In the event that a project is comprised of multiple differing subprojects, much like TPA Milestone M-92-00 where there are few physical or hard interfaces, each subproject will have a critical path within the subproject. Further, the SCW streams are activities within the subprojects, which can further be evaluated for critical path.

The schedule presented in this document contains information from these facilities/projects to be used for presentation and performance status. This status will be noted and presented at a minimum quarterly to the IAMIT meetings for TPA Milestone M-92-00. In the event schedule issues arise or where requested, the individual subprojects or waste stream subproject managers will provide additional detailed status information derived for the facility or project schedules containing the waste stream at issue.

5.3 Key Deliverables/Products

The key deliverables for this PMP are the disposition of the 300 Area SCW such that the requirements of the TPA Interim Milestones M-92-14, M-92-15, and M-92-16 are met. The SCW dispositioned to date consisted of more than 98.6% of the activity in the 300 Area SCW. This satisfies the requirements for TPA Interim Milestone M-92-14. The remaining SCW inventory, which contains 96.715 kCi, needs to be moved to an approved storage location to meet the requirements for M-92-15 and M-92-16. A minimum of 49 kCi will need to be moved by September 30, 2004, and the remaining SCW by September 30, 2006.

5.4 Performance Measurement

Project-level metrics for disposition of the 300 Area SCWs have been developed to track, manage, and control project progress. The metrics will be monitored throughout the project to ensure that the commitments for TPA Interim Milestones M-92-14, M-92-15, and M-92-16 are met. The metrics are provided in Table 5-1 with a brief description of the metric and its purpose. The metrics will be updated as necessary to account for changes in the SCW list throughout the duration of this project.

Table 5-1 – Project Metrics

Metric Title	Description
Curie Reduction	This metric will track the progress on the total number of curies removed/fixed associated with the 300 Area buildings. The basis of the metric will be the quantity of curies remaining in the building. The estimation of residual curies will be based on Table 2.2.
Cost Variance	Budget and actuals will be tracked on the y-axis and FYs will be tracked on the x-axis. A baseline will be represented on the graphic that is consistent with the PMP integrated schedule (see Chapter 6.0 for monthly analysis).
Schedule Variance	Budget and actuals will be tracked on the y-axis and FYs will be tracked on the x-axis. A baseline will be represented on the graphic that is consistent with the PMP integrated schedule (see Chapter 6.0 for monthly analysis).

6.0 PROJECT MANAGEMENT AND CONTROLS

This section provides an overview of the project management and control systems that are used in the management of the various subprojects that comprise the 300 Area SCW Disposition Project. Project management will be coordinated waste stream by waste stream or at a facility level, as required. Project reporting for the purposes of overall status of TPA Milestone M-92-00 will be consolidated at a minimum of a quarterly basis for presentation to the IAMIT.

The following are key elements of project management and control:

- Project Management Control System (PMCS)
  - work breakdown structure (WBS)
  - baseline development/update
  - scheduling
  - performance measurement and reporting
  - change control.

- Interface Control

- Information and Reporting
  - project status
  - cost performance
  - special reviews.

6.1 Project Management Control System

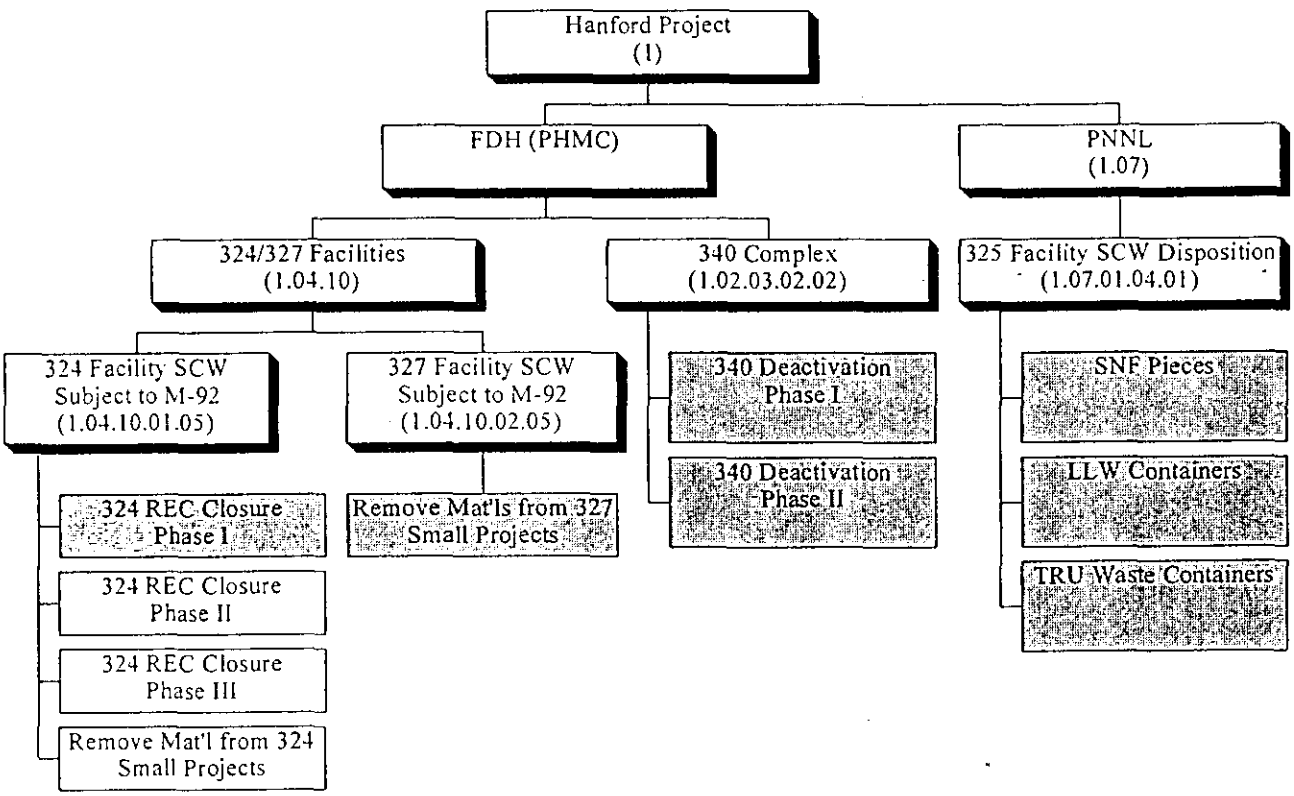
The PMCS primary goal is to ensure that planning and implementation of the TPA Milestone M-92-00 overall project, and in this case project elements, are conducted in a manner that is technically sound, timely, and cost effective. In addition, the system allows for an upward flow of integrated, summarized information to management, regulators, and stakeholders.
The following principles govern the establishment of a sound PMCS and will be used at the waste stream level to manage these project elements:

- Develop an integrated plan and accomplish the project objectives in a cost-effective manner using demonstrated and innovative technology where appropriate.
- Provide a WBS that defines the project in a disciplined manner from the top project level to the detailed, manageable work packages. A technical scope of effort and associated schedule and budget are established and responsibility for performance is assigned for each scheduled task.
- Ensure that the PMCS is capable of organizing, planning, scheduling, budgeting, accounting, and reporting work in a timely, consistent manner.
- Obtain technical, schedule, cost, and funding information in the format and to the level of detail necessary to meet management and reporting needs.
- Integrate the submitted data to compare the project status and progress to planned accomplishments.
- Evaluate and analyze the resulting information; identify key problems that require management decision and corrective actions be taken.
- Correlate the project funding profile with planned commitments, expenditures, and work accomplished to date.
- Prepare and control changes that affect established work scope, budgets, and schedules.

6.1.1 Work Breakdown Structure

Each waste stream and/or facility as required has developed a WBS and WBS dictionary for disposition of SCW streams. The WBS hierarchy for the removal of the special case waste from the 300 Area facilities is provided graphically in Figure 6-1. The WBS elements that pertain to the disposition of the 300 Area SCW are highlighted. The WBS dictionary for these activities is provided in Appendix D.

Figure 6-1. 300 Area SCW WBS Hierarchy.



6.1.2 Baseline Development/Update

Subproject baselines have been prepared for each of the facilities containing SCW. These documents will be updated to reflect changes in scope, schedule, or budget where required to maintain the baseline activities. The following steps will be used as a guide in developing or updating the project and subproject baselines:

- Define the scope/change.
- Determine whether the baseline change/addition requires updating the project baseline or multiple subproject baselines, or whether it is a scope change requiring the addition of one or more subprojects.
- Draft the new or modified WBS.
- Develop WBS descriptions, assumptions, and resource requirements.
- Update the subproject plan.
- Document project scope, cost, and schedule changes in a baseline change request (as required).

6.1.3 Scheduling

Developing and maintaining the project schedule will be in accordance with the approved operating contractor procedure (i.e., HNF-PRO-519, *Schedule Development*). The subproject management team will develop subproject schedules at a level that allows for performance measurement and making decisions (i.e., inter- or intra-subproject prioritization). The subproject scheduler, along with the subproject manager, will update schedules daily, weekly, or monthly, to effectively manage and integrate inter- and intra-subproject activities.

6.1.4 Performance Measurement and Reporting

The subproject manager will communicate subproject technical issues and accomplishments, schedule performance, cost and schedule issues, and corrective action plans, as appropriate, in accordance with established formats for the IAMIT. Critical performance indicators also include

- quarterly baseline projected costs/schedule versus actual costs/schedule for each waste stream/facility
- fiscal year baseline projected costs/schedule versus actual costs/schedule for each waste stream/facility
- reference baseline and projected/actual curie shipments.

6.1.5 Change Control-

Project changes will be processed in accordance with established change control processes for the Hanford Site (i.e., HNF-PRO-553, *Change Control*) which establishes change control requirements and tolerances. These processes also define the integrated, comprehensive, change control process for changes that might impact TPA milestones.

6.2 Interface Control

The objective of interface control is to facilitate communication and understanding of technical requirements across internal and external boundaries. System integration includes the management of interface data. Disposition of the SCW requires the generating facility to interface with the receiving facility to ensure the waste is packaged, shipped, and stored per applicable regulations and acceptance criteria. A Memorandum of Understanding (MOU) between facility/contractors may be used where appropriate to document acceptable waste handling procedures. If an MOU is not used, the facility will use the established waste management processes for waste profiles and shipping/handling agreements.

6.3 INFORMATION AND REPORTING

The primary transfer of information and reports will be through the established IAMIT quarterly meeting. Additional information requests on a waste stream and/or facility basis should be requested at the IAMIT meeting. The TPA Milestone M-92-00 IAMIT presentation will detail and summarize performance and provide status issues and corrective actions, if required, for the technical, schedule, and cost baselines.

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APPENDIX A - TRI-PARTY AGREEMENT MILESTONES

A.1 TRI-PARTY AGREEMENT MILESTONES

Table A-1 contains a listing of the TPA milestones that apply to the disposition of the 300 Area special-case waste (SCW).

Table A-1. M-89-00 and M-92-00 Interim Milestones and Target Dates that Relate to 300 Area Special-Case Waste.

Milestone	Description	Target Date
M-89-00	Complete closure of nonpermitted mixed waste units in the 324 Building REC [Radiochemical Engineering Cell] B-Cell, REC D-Cell, and the high-level vault [HLV].	October 2005
M-89-01A	DOE [U.S. Department of Energy] will submit to Ecology a report identifying the preferred option for management of liquid MW [mixed waste] in the HLV tanks.	March 1995
M-89-03	Achieve compliance with interim status facility standards at nonpermitted 324 Building MW units. Because of high radiation fields associated with MW stored in the REC and HLV tanks, alternative compliance measures for some interim status requirements are expected. In these instances DOE will propose alternative measure for Ecology approval no later than March 31, 1995.	March 1995
M-89-04	Submit to Ecology a report identifying MW management alternatives and DOE's proposal for achieving clean closure of the 324 Building REC B-Cell, D-Cell and HLV. This report will aid development of the 324 Closure Plan required by milestone M-20-55. The proposal will outline a feasible and cost effective program to achieve clean closure of the nonpermitted storage units and compliance management of the MW currently stored in them.	June 1995
M-20-55	Submit closure plan for nonpermitted mixed waste units located in the 324 Building REC B-Cell, REC D-Cell, and HLV.	December 1995
M-89-01	Complete removal of 324 Building HLV tank MW (e.g., TK-104 [Tank-104], TK-105, and TK-107) with the exception of residues that may remain following flushing and draining to the extent possible.	October 1996
M-89-05	Complete 324 Facility SCW assessment in support of 324 closure.	June 1998
M-89-02	Complete removal of 324 Building REC B-Cell MW and equipment. Actions under this milestone include containment and removal of all B-Cell dispersible materials, excess equipment and debris. Containerized MW will be managed in compliance with WAC [Washington Administrative Code] 173.303 WAC, thereby reducing risks to human health and the environment. Any remaining residues following removal actions will be managed through the final closure process. DOE's 324 Building REC B-Cell clean-out project (BCCP) will be used as a guide for containerizing dispersible MW and removing unnecessary equipment and materials from B-Cell.	May 1999

Table A-1. M-89-00 and M-92-00 Interim Milestones and Target Dates that Relate to 300 Area Special-Case Waste.

Milestone	Description	Target Date
M-92-00	Complete acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for the storage, treatment/processing, and disposal of Hanford Site cesium and strontium capsules (Cs/Sr), bulk sodium (Na), and 300 Area Special Case Waste (SCW).	TBE
M-92-02	Submit Hanford Site Cs/Sr Project Management Plan (PMP) to Ecology pursuant to Agreement Action Plan Section 11.5. The Hanford Site Cs/Sr PMP will include all plan elements required by Agreement Action Plan Section 11.5 (to include a final feasibility evaluation and determination regarding vitrification of 300 Area Cs/Sr at the 324 melter). Approval of the Cs/Sr PMP and accompanying Agreement change requests will establish all major project tasks and deliverables for treatment, storage, and disposal of Hanford Cs/Sr including commercial sector management activities, modification of existing facilities, and/or construction of new facilities.	September 1997
M-92-03	Submit modified Hanford facility Part A permit application to Ecology incorporating all Hanford Site Cs/Sr capsules (300 Area and unencapsulated salts) for which a commercialization contract has not been executed.	December 1997
M-92-04	Complete transfer of all 300 Area Cs/Sr to WESF [Waste Encapsulation and Storage Facility] and/or an approved storage location.	December 1998
M-92-13	Submit 300 Area SCW Project Management Plan (PMP) to Ecology pursuant to Agreement Action Plan Section 11.5. The 300 Area SCW PMP will include all plan elements required by the Agreement Action Plan Section 11.5, including but not limited to: (i) 300 Area SCW wastes and materials inventory (Buildings 325, 327, and other 300 Area buildings/facilities); (ii) Characterization and hazardous waste designation results associated with inventory wastes and materials; (iii) Detailed descriptions of Phases I, II, and III SCW removal, transport, and storage; and (iv) An analysis of the sufficiency of Site-wide SCW storage capabilities.	September 2000
M-92-14	Complete removal and transfer, and initiate storage of Phase I 300 Area SCW waste and materials. Phase I inventory will consist of, at minimum, one-third the total curie content of all 300 Area SCW.	September 2002
M-92-05	Inclusion of Hanford Site Cs/Sr "treatment and/or repackaging parameters" in DOE TWRS [Tank Waste Remediation System] Phase II Request for Proposals (treatment and/or repackaging of all remaining Cs/Sr).	June 2003

Table A-1. M-89-00 and M-92-00 Interim Milestones and Target Dates that Relate to 300 Area Special-Case Waste.

Milestone	Description	Target Date
M-92-15	Complete removal and transfer, and initiate storage of Phase II 300 Area SCW waste and materials. Phase II inventory will consist of, at minimum, half of the remaining curie content of 300 Area SCW.	September 2004
M-92-12	Complete acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for consolidated storage prior to disposal of Hanford Site 300 Area Special Case Waste (SCW).	September 2006
M-92-16	Complete removal and transfer and initiate storage of Phase III 300 Area SCW wastes and materials. Phase III inventory will consist of any remaining 300 Area SCW wastes and materials.	September 2006
M-92-01	Complete commercial disposition and/or acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for sitewide consolidation, and storage prior to commercial use, or treatment and/or repackaging by DOE TWRS. Completion of this milestone requires the completion of commercial disposition and/or all construction, internal/external facility(s) modifications, and startup activities necessary for the treatment/processing, repackaging (if necessary), and storage of Cs/Sr (to include unencapsulated salts) located at the: 1) ARECO facility in Lynchburg, VA (25 capsules); 2) Hanford 300 Area (13 capsules at the 327 pool facility and excess Cs/Sr salts at the 324 Facility); and 3) Hanford Waste Encapsulation and Storage Facility (WESF) in the 200 East Area.	December 2009

APPENDIX B - TPA CHANGE REQUESTS

FEDERAL FACILITY AGREEMENT AND CONSENT ORDER

CHANGE CONTROL FORM

CHANGE NUMBER

M-92-96-01

Change Number M-92-96-01	Federal Facility Agreement and Consent Order Change Control Form Do not use blue ink. Type or print using black ink.	Date June 14, 1996

Originator
Ecology/DOE

Phone

Class of Change
[X] I - Signatories [ ] II - Executive Manager [ ] III - Project Manager

Change Title
Creation of new Major milestone M-92-00 and its sub-elements governing the acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for the storage, treatment/processing, and disposal of Hanford site Cesium and Strontium capsules (Cs/Sr), Unirradiated Uranium (UU), Bulk Sodium (Na), and 300 Area Special Case Waste (SCW).

Description/Justification of Change
Agreement Milestone M-33-00 was established to: (1) prompt the development of milestones necessary for the storage, treatment/processing and disposal of Hanford site solid wastes and hazardous materials not yet covered under the Hanford Federal Facility Agreement and Consent Order (Agreement), and (2) prompt the development and incorporation of Agreement modifications designed to aid in achieving integrated management of all aspects of Hanford site "cleanup" (including but not limited to waste and materials management, remedial action, and site closure).

Impact of Change
These M-92-96-01 agreements are made in partial fulfillment of Land Disposal Restriction (LDR) treatment requirements of Agreement milestone M-26-00 (which constitutes an existing Agreement or Order for treatment of mixed waste for purposes of the Federal Facility Compliance Act of 1992 (FFCA)), and as companion documentation to Land Disposal Restriction (LDR) documents submitted by DOE pursuant to Agreement milestone M-26-00. The Parties recognize and agree to establishment of additional schedules and milestones for completion of facility acquisition and for completion of treatment and disposal processes, as adequate information becomes available as determined by the lead regulatory agency or DOE.

Approval of this change request by the Parties establishes a new major milestone, and associated interim milestones and target dates governing the acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities for the storage, treatment/processing, and disposal of Hanford site Cesium and Strontium capsules (Cs/Sr), Unirradiated Uranium (UU), Bulk Sodium (Na), and 300 Area Special Case Waste (SCW). On approval, Hanford site planning and budget development documents (e.g., Sitewide System Engineering control documents, Project Management Plans, and Multi Year Work Plans) will be modified accordingly.

Affected Documents
Hanford Federal Facility Agreement and Consent Order, as amended by its Sixth Amendment, February 1996), Hanford site internal planning and budget documents (e.g., Sitewide System Engineering control documents, Project Management Plans, and Multi Year Work Plans).

Approvals

Signature	Date		
[signature] John D. Wagoner — DOE	12/16/96	✓ Approved	___ Disapproved
[signature] — EPA	12/31/96	✓ Approved	___ Disapproved
[signature] Mary Riveland — Ecology	12/24/96	✓ Approved	___ Disapproved

M-92-96-01 Description/Justification of change cont.
June 14, 1996
Page 2.

To meet these objectives the Parties have negotiated Agreement modifications under change request numbers L-96-01, M-90-96-01, M-91-96-01, and M-92-96-01.

This M-92-96-01 change request establishes a new major milestone (M-92-00 and its sub-elements) governing the acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for the storage, treatment/processing, and disposal of Hanford site Cesium and Strontium capsules (Cs/Sr). Unirradiated Uranium (UU), Bulk Sodium (Na), and 300 Area Special Case Waste (SCW). Cs/Sr, Na, and SCW Project Management Plans (PMP) described here have been agreed to based on the Parties recognition that milestones established by this M-92-96-01 change request will remain as constraints on PMP design and management of the projects themselves. It is also noted that in the instance of Hanford site Cs/Sr capsules (see milestones M-92-01 through M-92-05) such capsules would not be solid wastes when they can be shown to be recycled by being used or reused as effective substitutes for commercial products as provided in chapter 173.303.017 WAC.

Major and interim milestones, and associated target dates established by approval of this change request are as follows:

M-92-00	Complete acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for the storage, treatment/processing, and disposal of Hanford site Cesium and Strontium capsules (Cs/Sr), bulk Sodium (Na), and 300 Area Special Case Waste (SCW).	TBE (by October 1998)

<u>CESIUM AND STRONTIUM CAPSULES (Cs/Sr)</u>

M-92-01	Complete commercial disposition and/or acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for sitewide consolidation, and storage prior to commercial use, or treatment and/or repackaging by DOE TWRS. Completion of this milestone requires the completion of commercial disposition and/or all construction, internal/external facility(s) modifications, and startup activities necessary for the treatment /processing, repackaging (if necessary), and storage of Cs/Sr (to include unencapsulated salts) located at the: (1) ARECO facility in Lynchberg VA (25 capsules), (2) Hanford 300 Area (13 capsules at the 327 pool facility and excess Cs/Sr salts at the 324 facility), and (3) Hanford Waste Encapsulation and Storage Facility (WESF) in the 200 East Area.	December 2009

M-92-95-01 Description/Justification of change cont.
June 14, 1996
Page 3.

M-92-02	Submit Hanford Site Cs/Sr Project Management Plan (PMP) to Ecology pursuant to Agreement Action Plan section 11.5. The Hanford Site Cs/Sr PMP will include all plan elements required by Agreement Action Plan section 11.5 (to include a final feasibility evaluation and determination regarding vitrification of 300 Area Cs/Sr at the 324 melter). Approval of the Cs/Sr PMP and accompanying Agreement change requests will establish all major project tasks and deliverables for treatment, storage, disposal of Hanford Cs/Sr including commercial sector management activities, modification of existing facilities, and/or construction of new facilities.	September 1997
M-92-03	Submit modified Hanford facility Part A permit application to Ecology incorporating all Hanford site Cs/Sr capsules (300 Area and unencapsulated salts) for which a commercialization contract has not been executed.	December 1997
M-92-04	Complete transfer of all 300 Area Cs/Sr to WESF and/or an approved storage location.	December 1998
M-92-05	Inclusion of Hanford site Cs/Sr "treatment and/or repackaging parameters" in DOE TWRS phase II Request For Proposals (treatment and/or repackaging of all remaining Cs/Sr).	June 2003
	UNIRRADIATED URANIUM	
MX-92-06-T01	Complete commercial disposition and/or the acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for storage, treatment/processing, and disposal/disposition of all Hanford site UU. This target date includes all UU located in 300 Area Fuel Supply Facilities (Uranium dioxide powder and pellets stored in cans, pins, assemblies, and drums), Uranium Trioxide (UO3) powder stored in T-hoppers adjacent to the U Plant, depleted UO3 stored in 55 gallon drums in the 200 West Area and the 4713 building.	December 2000
MX-92-07-T01	Submit Hanford Site UU Project Management Plan (PMP) to Ecology pursuant to Agreement Action Plan section 11.5. The UU PMP and accompanying Agreement change requests will establish all major project tasks and deliverables for treatment, storage, disposal of Hanford UU including sale or commercial sector management activities, modification of existing facilities, and/or construction of new facilities.	December 1997

M-92-96-01 Description/Justification of change cont.
June 14, 1996
Page 4.

MX-92-08-T01	Submit Hanford site UU Disposition Assessment Report. The Hanford Site UU Disposition Assessment Report shall include a facility needs assessment should UU treatment, repackaging, and/or consolidation be necessary. This report shall also include an assessment of expected impacts on other Agreement projects.	June 1998
	SODIUM	
M-92-09	Complete acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for storage, treatment/processing, and disposal of Hanford site sodium.	TBE (by October 1998)
M-92-10	Submit Hanford Site Sodium Project Management Plan (PMP) to Ecology pursuant to Agreement Action Plan section 11.5. The Hanford Site Sodium PMP will include all plan elements required by Agreement Action Plan section 11.5. Should DOE determine (pursuant to the Hanford Site Sodium PMP and Agreement interim milestone M-50-03) that TWRS use of Hanford Site radioactive sodium (FFTF, Hallam & Sodium Reaction Experiment) is warranted, it shall specify in its TWRS, High Level Waste Vitrification Plant Request For Proposal(s) that use of Hanford site radioactive sodium is a requirement. Should the Hanford Site PMP and findings pursuant to Agreement interim milestone M-50-03 determine that TWRS use of Hanford site radioactive sodium is not warranted DOE shall issue accompanying proposed Agreement change requests for alternate Hanford Site radioactive sodium disposition (e.g., necessary milestones and target dates associated with the construction of the sodium reaction facility). See also Agreement target date M-81-02-T01.	October 1998
MX-92-11-T01	Complete disposition options for all Hanford non-radioactive sodium.	March 2002

M-92-95-01 Description/Justification of change cont.
June 14, 1996
Page 5.

________	Associated interim milestones and/or target dates established under other Agreement major milestones.	
M-81-02-T01 (Revised)	Submit Final Sodium Disposition Evaluation Report/ Decision Point	June 1998
From TPA Amendment V	Under this target DOE will submit its final report following evaluation of the acceptable sodium product form for the TWRS tank sludge pretreatment process (i.e., caustic washing). This evaluation will be conducted in concert with TWRS TPA milestone M-50-03 (due date March 31, 1998). This Hanford Site radioactive (FFTF, Hallam, and Sodium Reaction Experiment) sodium evaluation will address other conversion options for disposal of the sodium if the product use for TWRS is not viable. Regardless of which option is selected, a new sodium reaction facility will be constructed adjacent to the sodium storage facility to convert the bulk metallic sodium to the appropriate chemical form. This report will include a decision on the final disposition of the Hanford Site radioactive sodium (e.g., disposal or reuse). Appropriate milestones and target dates will be established for construction and operation of the sodium reaction facility based on the option selected.	
	300 AREA SPECIAL CASE WASTE* * *(See attached inventory listing for description)*	
M-92-12	Complete acquisition of new facilities, modification of existing facilities, and/or modification of planned facilities necessary for consolidated storage prior to disposal of Hanford site 300 Area Special Case Waste (SCW).	September 2006
M-92-13	Submit 300 Area SCW Project Management Plan (PMP) to Ecology pursuant to Agreement Action Plan section 11.5. The 300 Area SCW PMP will include all plan elements required by Agreement Action Plan section 11.5. including but not limited to: (i) 300 Area SCW wastes and materials inventory (buildings 325, 327, and other 300 Area buildings/facilities), (ii) characterization and hazardous waste designation results associated with inventory wastes and materials, (iii) detailed descriptions of phases I,II, and III SCW removal, transport and storage, and (iv) an analysis of the sufficiency of site wide SCW storage capabilities.	September 2000
M-92-14	Complete removal and transfer, and initiate storage of phase I 300 Area SCW waste and materials. Phase I inventory will consist of, at minimum, one-third the total curie content of all 300 Area SCW.	September 2002

M-92-96-01 Description/Justification of change cont.
June 14, 1996
Page 6.

M-92-15	Complete removal and transfer, and initiate storage of phase II 300 Area SCW waste and materials. Phase II inventory will consist of, at minimum, half of the remaining curie content of 300 Area SCW.	September 2004
M-92-16	Complete removal and transfer, and initiate storage of phase III 300 Area SCW wastes and materials. Phase III inventory will consist of any remaining 300 Area SCW wastes and materials.	September 2005
________	Associated interim milestones established under other TPA major milestones.	
M-89-05 (Reference TPA Amendment V)	Complete 324 Facility SCW Assessment in support of 324 closure.	June 1998

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LISTING OF SPECIAL WASTES AND MATERIALS IN THE 300 AREA CATEGORIZED AS "300 AREA SPECIAL CASE WASTE" UNDER THE TPA M-92 MILESTONE
JUNE 13, 1996

The attached list describes the inventory of wastes and materials in the 300 Area which are subject to the requirements of the M-92 milestones for "300 Area Special Case wastes" (SCW). For purposes of developing this inventory, SCW is considered to be radioactive waste generated by DOE-funded activities for which there is no economic disposal or storage pathway provided via the most recent version of the "Hanford Site Solid Waste Acceptance Criteria", WHC-EP-0063. Material residues in building systems (such as particulates in ventilation systems which are still active) are not included. Typical SCW types in the 300 Area include:

- - >Cat3 Low-level Waste (GTC3LLW)
- High-activity, high dose rate streams of:
  - Low-level mixed waste (LLMW)
  - Transuranic and transuranic mixed waste (TRU/TRUM)
- Residual material from the testing of irradiated fuel. These residues are comprised of fuel pin fragments, dispersed particulate, and/or chemically altered fuel that cannot be readily retrieved and packaged with the fuel assemblies and intact pins.

The inventory was developed through consultation with staff responsible for the materials and with environmental support personnel. The inquiry was focused on areas (such as hot cells) which were judged to be likely locations for SCW, although non-hot cell facilities were also queried.

The inventory reflects best judgement as to which materials meet the definition of SCW. For instance, several fuel assembly-type materials in inventory are not shown because it is believed that the fuel can be readily retrieved, packaged with their assemblies, and managed pursuant to the requirements for spent fuel.

Omitted from this inventory is any material covered under other existing and currently proposed milestones, such as M-89, M-90, M-91, or covered under other portions of M-92 (e.g., 324 B-Cell and HLV tank wastes, unirradiated uranium, spent nuclear fuel, cesium and/or strontium capsules).

This 300 Area SCW inventory will be updated as necessary. Updates may be necessary in the event that the WHC-EP-0063 acceptance criteria are revised or that additional 300 Area wastes and materials are identified during the planned facility waste and material assessments or during disposition activities for the identified wastes and materials. As a result, this inventory list may increase or decrease over time.

Summary Information for Proposed M-92 Milestones on Special Case Waste In The 300 Area
(May 30, 1996)

300 Area Location	Location in Building	Waste/Material	Approximate Wt/Vol/Ci	Risk	Comment
324 Bldg	A-Cell	German Glass Logs	34 cans, 12 in X 48 in, 8.3 MCi total	low	Funding is in place from Germany to remove.
	D-Cell	Nonfuel Bearing Hardware		low	Funding for removal is in place.
	Basement	Neptunium Oxide Powder (basement)	0.05 Kg	low	
325 Bldg. 325-A Cells					
	B-Cell	Pieces of Fuel Rod Material and Fines From Fuel Rods-- (Shippingsport, Yankee, and Saxton Fuel)	1.2 Kg, 1.1 Ci		In a 2" Swagelock Nipple labeled as B-Cell Blend
	B-Cell	Fragments of Yankee Fuel	1.7 Kg, 1.8 Ci		3" x 3' Pipe
	B-Cell	Saxton Fuel-derived Plutonium	5.7 g, 0.5 Ci		2" x 1' Pipe labeled as Saxton Fuel
	B-Cell	Np-237	23 mCi		In TK-13 (A tank under the tray in B-Cell). A nitrate solution.
	Gloveboxes	Dissolved N-Reactor Fuel (unirradiated)	5.8 Kg		Room 516-- 5.8 Kg in Nitric Acid

300 Area Location	Location in Building	Waste/Material	Approximate Wt/Vol/Ci	Risk	Comment
325 Bldg. 325-B Cells (Note: These cells are part of the 325 HWTUs, an *interim* status storage and treatment unit)	Cell 1	1. RH-TRU mixed waste from TWRS *tank characterization* 2. RH-TRU miscellaneous hot cell dry waste with fuel pieces mixed in. 3. High dose rate hot cell waste, incl. cladding, cell wipes, misc.	1. (20) 5-quart containers 2. (30) 1-gallon containers. 3. (35) 4&5 quart containers.		1. Dose rate precludes economical packaging for transfer to CWC. 2. ~1/3 of containers grouted. ~2/3 of containers not grouted. 3. High dose rate LLW and/or TRU waste. No hazardous constituents.
	Cell 3	*Oxides of pieces of irradiated* fuel.	17 sections of pipe with diameters 1-3", length 6-12".		Fragmented fuel segments, includes chopped up cladding.
327 Bldg	A-Cell	Fines of fuel.	~150+ 1-gallon buckets.		Stored throughout hot cells.
	D-Cell	Pieces of irradiated fuel pellets.	Stored in Al tubes 3/4" diam, 1-2' long.		Fuel originally from Peachbottom, HB Robinson, Turkey Point.
	E-Cell	Pieces of irradiated fuel pellets.	Stored in Al tubes 3/4" diam, 1-2' long.		Fuel originally from Peachbottom, HB Robinson, Turkey Point.
	F-Cell	Solvent-contaminated wipers, sorbents, etc.	1-2 1-gallon cans		Waste isolated from fuel cans in A-Cell

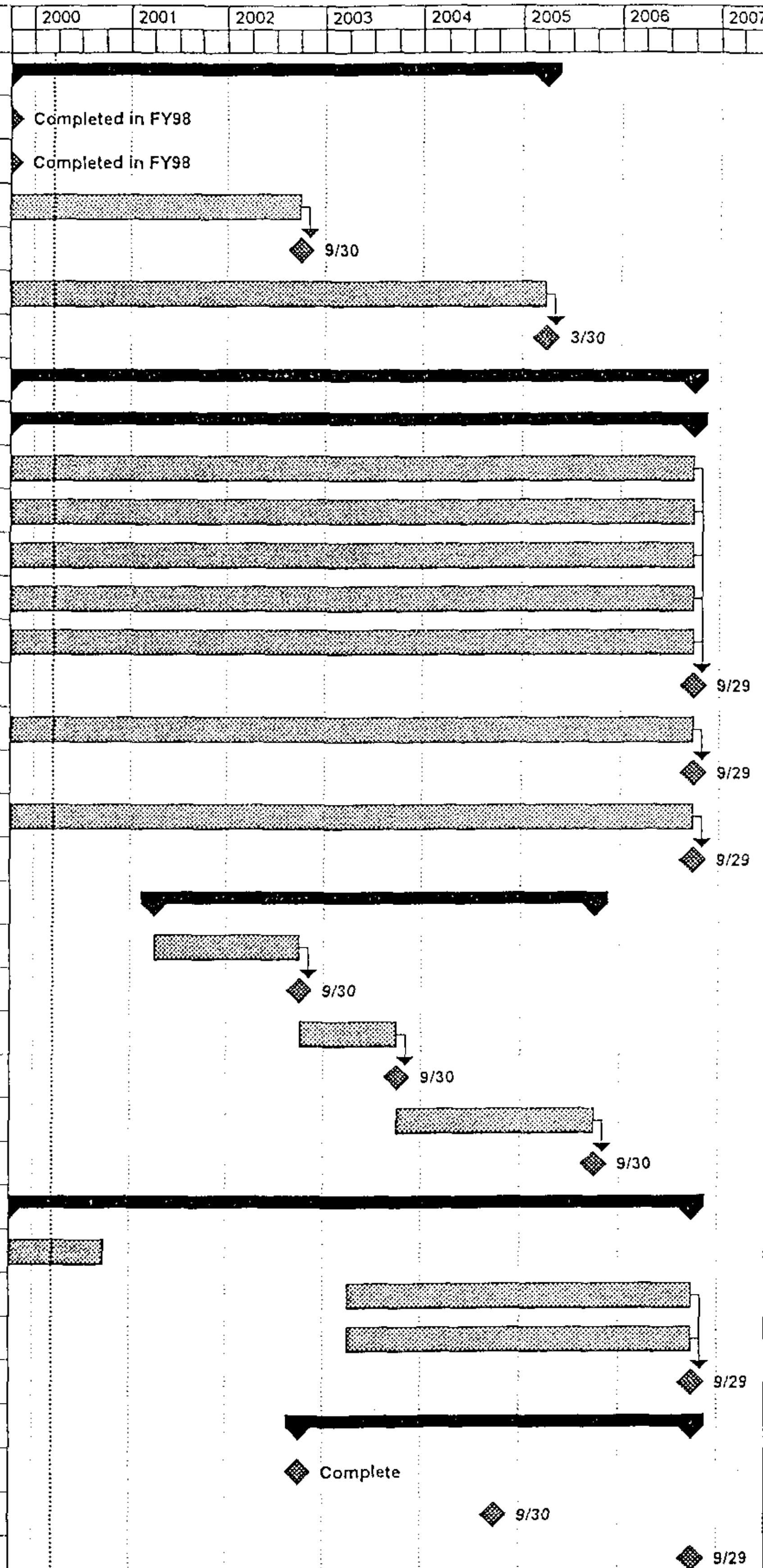
300 Area Location	Location in Building	Waste/Material	Approximate Wt/Vol/Ci	Risk	Comment
	Water Storage Basin	Spent ion exchange column.	SS pipe, 16' long, 2' diameter, dose rate ~200 R/hr.	low	Column used for removal of Cs-134, Cs-137, possible TRU.
	Dry Storage Cell	1. Pieces of irradiated fuel pellets. 2. *Pieces of irradiated fuel* pellets. 3. Pieces of irradiated fuel pellets embedded in resin blocks.	1. ~100 small tin cans. Cans limited to 7g fissile. 2. Stored in Al tubes 3/4" diam, 1-2' long. 3. ~400 small cans, ~1.5g *fuel material per* resin block, <7 g material per can.		1. Pellets and pieces are stored in Al tubes within cans. 2. Fuel originally from Peachbottom, HB Robinson, Turkey Point. 3. Each resin block contains ~ half a fuel pellet.
NonPNNL Bldgs in 300 Area					
340	Throughout	*Tank heels and heels in ancillary* equipment and containment structures (and/or *decontamination* waste resulting from future closure activities)	TBD	low	This system is still in service, but will be closed at a date to be determined soon. Removal from service is expected in or before 1999, at which time closure activities would begin.
340-A	Throughout	Tank heels (sludge) which has settled out from waste held in the tanks	60-120 ft³	low	The sludge in these tanks is category 3 TRU-mixed waste.

APPENDIX C - 300 AREA SCW PMP SUMMARY LEVEL SCHEDULE

Appendix C

300 Area SCW PMP Summary Level Schedule

ID	Task Name
1	324 BUILDING
2	FRG Vitrified Logs
3	Neptunium Oxide Powder
4	HLV Filter/IX Columns
5	HLV Filter/IX Column Complete
6	Fuel fragments/pieces/pins
7	Fuel fragments/pieces/pins Complete
8	325 BUILDING
9	SNF Pieces
10	B-Cell Yankee Fuel
11	B-Cell Saxton Fuel
12	Shippingport Fuel
13	Unirradiated N Fuel (530 N)
14	Commercial Reactor Fuel Pieces
15	SNF Complete
16	LLW Containers
17	LLW Complete
18	TRU Waste Containers
19	TRU Complete
20	327 BUILDING
21	Remaining 1-Gallon waste buckets
22	1-Gallon waste buckets Complete
23	Fuel Pellets/Met Mounts
24	Fuel Pellets/Met Mounts Complete
25	Fuel Pool IX Column
26	Fuel Pool IX Column Complete
27	340 BUILDING
28	340 SCW Assessment & Disposition Analysis
29	340 Vault Tank Heels
30	340A Tank Heels
31	340 Tank Heels Complete
32	TPA MILESTONES
33	TPA Interim Milestone M-92-14
34	TPA Interim Milestone M-92-15
35	TPA Interim Milestone M-92-16



Project: SCWPMP
Date: Mon 3/13/00

Task | Milestone | Summary

APPENDIX D - WORK BREAKDOWN STRUCTURE DICTIONARY

Table D-1. 324 Building Work Breakdown Structure For Special-Case Waste Disposition.

WBS Number	WBS Title	Scope of Work
1.04.10.01.05.01.01	Phase I Project Management	This task covers the specific actions necessary to provide for the management of the BCCP (B-Cell Cleanup Project) in accordance with client requirements, good industry practices, and all applicable DOE (U.S. Department of Energy) orders. This task provides management oversight, decision making, direction, and allocation of project resources to ensure the successful completion of the project's technical and administrative objectives. This task includes the following activities: • Performing daily management of the project • Providing direct interaction with the DOE and B&W Hanford Company management • Prioritizing and allocating resources to establish and maintain the project team and support staff • Developing and maintaining the project planning • Providing ESH&Q (Environmental, Safety, Health, and Quality) support. Project management activities will provide an emphasis on identifying and managing project risk in the following areas: ALARA (as low as reasonably achievable); ESH&Q; regulatory; external communication; cost; and schedule. (1K4BA1) This task also covers the specific actions necessary to provide for the implementation and maintenance of the project management system, including the project technical, cost, and schedule baseline. This task includes the measurement of progress towards established objectives, identifying and evaluating project variances and variance trends, recommending alternative courses of action to the management team, monitoring the effectiveness of corrective actions, and managing and administering change control. (1K4BA2)
1.04.10.01.05.01.05	B-Cell Spent Fuel Transfer	This basis of estimate (BOE) covers the activities necessary to remove, process, and repackage the irradiated fuel materials inventory currently located in the 324 Facility B-Cell and D-Cell. The current inventory includes 5 PWR (pressurized water reactor) fuel assemblies, 2 BWR (boiling water reactor) fuel assemblies, and 32 intact fuel rods. There are also approximately 16 rod-equivalent BWR and PWR fuel rod segments, and 21 kilograms of PWR fuel pellet fragments located in the D-Cell of the 324 Facility. All of these materials were irradiated in commercial electric power reactors and were discharged from their parent reactors as spent fuel at the end of their life cycles. After discharge, DOE acquired the materials for the fuels examination program. Material irradiation levels range from 27.5 to 42.7 GWD/MTU (gigawatt day per metric tonne uranium). The preparation activities covered under this task include the initial engineering and administrative support activities and material acquisitions necessary to perform the scope of the follow-on task, SNF (spent nuclear fuel) Removal task. The preparation task includes the following major activities: • Development of necessary procedures, engineering studies, criticality studies, safety analysis studies, design specifications, and/or other supporting documentation • Completion of required training to support the operations • Design, construction, and acquisition of tools and equipment necessary for performing the activities • Renegotiate/reestablish MOU (memorandum of understanding). Based on a preliminary review of the available packaging and storage alternatives, including the information presented in *Assessment of Alternative Management Options for 300 Area Light Water Reactor Spent Nuclear Fuel* (HNF-1867, Rev. 0), the path forward that has been selected for the technical baseline described in this BOE is to: (1) Transfer the fuel assemblies and intact fuel rods to A-Cell for temporary storage and then transport them in Nuclear Assurance Corporation

WBS Number	WBS Title	Scope of Work
		(NAC)-1 transportation casks, in welded inner containers, to the 200 East Area ISA (interim storage area) for interim storage (up to 40 years) as SNF. The Spent Nuclear Fuel Project will assume ownership of the casks. (2) Transfer the fuel segments and fragments to D-Cell for temporary storage and then ship the material in EBR-II (Experimental Breeder Reactor-II) casks, in welded inner containers, to the 200 Area for interim storage as RH-TRU (remote-handled transuranic waste). The Waste Management Project will assess the BCCP a fee for acceptance of the casks. The selected path forward is based on the best available information. Additional studies will be required to verify that this path forward is the most cost effective and that it satisfies all regulatory and DOE program requirements. The additional studies will consist of an engineering study and a criticality safety evaluation and will be budgeted and prepared under this task. For the fuel assemblies and intact fuel rods, the additional studies will build on the results presented in HNF-1867 and will evaluate alternative methods for loading the fuel assemblies and intact fuel rods into the NAC-1 casks in the 324 Facility. The studies will determine whether 6 or 7 NAC-1 casks will be used and will identify a preferred path forward for loadout and removal of the casks from the 324 Facility. For the fuel segments and fragments, the studies will determine whether the material should be classified and managed as SNF or RH-TRU and will identify a preferred path forward for packaging and removing the material from the 324 Facility and transporting it to an approved storage facility for interim storage. After the additional studies are completed, a change request will be prepared for this BOE, if necessary, to provide consistency with the preferred path forward identified in the studies. (1K4BC1, 1K4BC2, 1K4BC3, and 1K4BC4)
1.04.10.01.05.01.07	B-Cell Mixed Waste Removal	This basis of estimate covers the activities necessary to prepare, remove, process, and repackage the mixed waste currently located in the 324 Facility B-Cell and D-Cell. The inventory included under this task is comprised of the following streams: • Dispersible material and debris remaining on the floor of the B-Cell (during and after equipment removal) • Containerized dispersible material (from 1B, 1A, and 2A Rack Removal tasks) • Sample containers from historical sampling events (currently located in D-Cell) • HLV (high-level vault) tank filters and columns • B-Cell tank heels/residuals (if present in rack tanks 116, and 118) Included in this task are the following subtasks: • Preparation - include all of the initial engineering and administrative support necessary to perform the scope of the follow-on task, Mixed Waste Removal. (1K4BD1) • Mixed Waste Removal – includes the specific actions to necessary to remove, and package the B-Cell and Vault tanks waste and to collect and package the dispersible debris from the B-Cell floor (1K4BD2) • Mixed Waste Sampling and Analysis – includes the activities necessary to sample, ship, and analyze the waste associated with the Mixed Waste Removal task, the Rack Removal tasks, and the Routine Cell Maintenance task to ensure compliance with all applicable requirements (WAC 173-303 and WHC-EP-0063). Sampling activities associated with the Cell Cleaning task are not included (1K4BD3) • Mixed Waste In-Cell Support - covers the in-cell activities necessary to support work associated with the B-Cell Cleaning Task. The in-cell support activities include maintenance, repair, modification, and replacement of the in-cell master-slave manipulators and packaging systems. (1K4BD4)

WBS Number	WBS Title	Scope of Work
		• Mixed Waste – Waste Removal and Disposition - covers the management of waste disposition activities so that they comply with all applicable requirements (WAC 173-303 and WHC-EP-0063). (1K4BD5)
1.04.10.01.05.01.11	B-Cell Maintenance	This basis of estimate covers the specific actions necessary to ensure that the facility and equipment are maintained in a safe operating condition. This task includes the activities necessary to conduct routine maintenance and repair of equipment or systems, and procure spare and replacement parts for equipment or systems. The activities described in this task are derived from historical experience at B-Cell. These activities will provide the necessary effort to maintain B-Cell in support of deactivation.

Table D-2. 325 Building Work Breakdown Structure for Special-Case Waste Disposition.

WBS	Title	Scope of Work
1.07.01.04.01.03.01.01	FY-00 - High Dose Waste Disposal	FY-00 work scope includes procurement of additional shielded drums to remove the 41 containers of RH-TRU from the 325 Building hot cells. These loaded shielded drums, as well as the shielded drums which are planned to be loaded with the 31 containers of HD-LLW (high dose low-level waste) at the end of FY-99, will be shipped to the Hanford Site CWC (Central Waste Complex). Additionally, planning the disposition of ~6 kg of SNF will be finalized. The EBR-II casks and associated liners and loading equipment will be procured, required cask loading procedures and equipment will be developed, and staff will be trained and qualified to perform the SNF packaging work in accordance with the procedures. Completion of FY-00 work scope assumes FY-99 work scope was completed as scheduled. Efforts to develop EBR-II loading equipment and procedures are assumed to be minimal based on information that these can be obtained from B&W Hanford Company (BWHC) staff.
1.07.01.04.01.03.01.01	FY-01 - High Dose Waste Disposal	Approximately 6 kg of SNF consisting of sections, fragments, and fines from a variety of fuel types, will be loaded into 3 EBR-II casks and shipped to the Hanford Site CWC for long-term storage. This assumes the SNF is designated as RH-TRU waste, which is consistent with past practice and current BWHC planning for disposition of the SNF sections, fragments, and fines located in the 324 Building D-Cell.

Table D-3. 327 Building Work Breakdown Structure for Special-Case Waste Disposition.

WBS	Title	Scope of Work
1.04.10.02.05	Remove Materials from 327 Building	Remove the nuclear materials from the 327 Building for treatment or disposition.
1.04.10.02.05.07	Remove Materials from 327 Small Projects	The 327 Facility Small Project Stabilization task includes the removal and disposition of legacy fuel, experiments and waste remaining in the facility from past operations to allow for deactivation and decommissioning, this also includes the design, construction and plant modifications for the 327 Liquid Waste Handling System. The specific subtasks covered under the Small Projects are as follows: The 327 Legacy Waste/Fuel Removal subproject is a multi-year effort. The fuel characterization activities in the 327 Building resulted in the accumulation of a significant quantity of radioactive material. Consolidation and disposal of legacy fuel and materials currently located at the 327 Building. The activity will package fuel, fuel segments, fuel pins, and residue material; characterize existing and resultant waste material; and prepare containers for transport to the 200 Area CWC. The subproject includes: • 327 currently has an inventory of 1 gal waste containers (RH-TRU/LLW "cans") have accumulated inside the hot cells (352 legacy containers as of September 1997). The containers contain paper, plastic, tools, and residual radiological contamination resulting from years of destructive fuel testing and characterization inside the hot cells. Some of these waste containers are required to have 100% of their contents verified prior to packaging based on packaging date. Following verification the containers will be compacted and packaged into either concrete lined waste drums or lead lined waste drums and shipped to the CWC for disposal. • Retrieval and packaging of the remaining fuel remnants from the hot cells and storage carousel for shipment to the 200 Area CWC as RH-TRU waste. These remnants are mounted in an epoxy resin that will required to be removed prior to packaging. Following the removal of the epoxy the fuel will be placed in Special Form Containers (SFC) and packaged into EBR-II casks and shipped to the CWC for storage awaiting final disposition. • The 327 Building continues to conduct programmatic fuels examination work for the DOE SNF Project and fuel examination for other entities as approved by DOE. The SNF Project will remove all N Reactor fuel and associated equipment/waste. This subproject is funded by the SNF Project. • The 327 Building Liquid Waste Handling subproject will include engineering analysis, design, and physical modifications to the 327 Building RLWS. Previously, the 327 Building RLWS was collected from the point of generation and transferred to the 327 Building basement sump for transfer to the external RLWS piping system, through a series of steam-jet-assisted or gravity-flow lines. This subproject covers any required modifications to the building or plant systems. These modifications include piping installation to allow for collection of the RLWS, interim storage tanks until waste treatment. The treatment will utilize a vendor-supplied treatment skid.
1.04.10.02.05.07.03	327 Legacy Waste Removal	The 327 Waste Removal task covers the specific actions necessary to remove the legacy waste from the 327 Facility hot cells. This task includes the activities required to retrieve, compact, package, and dispose of the waste buckets; and to retrieve, break the epoxy mounting, decontaminate, and ship the metallurgical samples stored in the 327 Facility. Legacy material stored in the 327 Facility from past research and development activities on fuel elements and materials from Hanford's production reactors must be disposed. A portion of the legacy material is in the form of waste buckets stored in the 327 Facility hot cells. There are 10 hot cells, including the SERF (Shielded Environmental Radiometallurgy Facility) cell, which houses over 350 loaded waste buckets. Additional legacy material in the hot cells is in the form of hundreds of metallurgical samples stored in the 327 Facility Hot Cells. The waste buckets must be retrieved, inventoried, and packaged in either lead-lined or concrete-lined waste drums before they can be shipped for final disposal. The path forward for removal of the waste buckets include the following:

Table D-3. 327 Building Work Breakdown Structure for Special-Case Waste Disposition.

WBS	Title	Scope of Work
		• Transfer the waste buckets into C-Cell using the SERF Cask or Waste Cask. • Segregate and inventory the waste buckets • Transfer the waste buckets into A-Cell using the SERF Cask or Waste Cask • Compact the waste buckets • Package the waste buckets into inner containers • Load the inner containers into the waste drums • Seal the waste drums and prepare for shipping • Ship the waste drums to the 200 Area CWC The metallurgical samples must be broken for segregation of fuel pieces from epoxy mounting material. The pathforward for removal of the metallurgical samples include the following. • Retrieve samples from storage locations • Break and segregate metallurgical mounts • Package samples into 1 in. tubes and decontaminate • Ship metallurgical pieces to 324 Facility SMF (Shielded Materials Facility) for loading in special form containers. • Package the samples into 4" inner containers, 5" outer containers and then into an EBR-II cask. Ship EBR-II casks to the CWC for long-term storage.
1.04.10.02.05.07.03.01	327 Met Sample Project Management and Preparation	The SERF cell houses hundreds of metallurgical samples. The metallurgical samples must be broken for segregation of fuel pieces from epoxy mounting material. This BOE (1K7SF1) includes activities related to project support and facility preparation for removal of the legacy material from the 327 Facility. These activities include: • Weld program development • Procurement and fabrication of the 4 in. and 5 in. inner containers
1.04.10.02.05.07.03.03	327 Legacy Material, Met. Sample Retrieval and Packaging	This BOE (1K7SF2) includes activities related to the legacy waste retrieval and packaging. The activities associated with this BOE include the following. • Retrieve samples from storage locations • Breaking and segregating metallurgical mounts • Package samples into 1 in. tubes • Ship metallurgical pieces to SMF for loading in special form containers • Load in EBR-II casks.
1.04.10.02.05.07.03.05	327 Met Sample Shipment and Disposal	This BOE (1K7SF3) includes activities related to project support and facility preparation for removal of the legacy material from the 327 Facility. Subtasks associated with this BOE include the following. • Preparing shipping/disposal documentation for EBR-II Casks • Shipping and disposal of EBR-II casks.

Table D-3. 327 Building Work Breakdown Structure for Special-Case Waste Disposition.

WBS	Title	Scope of Work
1.04.10.02.05.07.03.07	327 Waste Bucket Project Management and Preparation	The SERF cell houses over 350 loaded waste buckets. The waste buckets must be retrieved, inventoried and packaged in either lead-lined or concrete-lined waste drums before they can be shipped for final disposal. This BOE (1K7SF4) includes activities related to project support and facility preparation for removal of the legacy material from the 327 Facility. Some of the major activities associated with this BOE include the following. This will be a continuation of the waste bucket processing that occurred in FY-98, the preparation for this phase should be minimal. • Hot Cell preparation • Waste container procurement • Preparation of A-Cell welder and compactor • Review and reissue procedure
1.04.10.02.05.07.03.09	327 Waste Bucket Retrieval and Packaging	This BOE (1K7SF5) includes activities related to project support and facility preparation for removal of the legacy material from the 327 Facility. Some of the major activities associated with this BOE include the following. • Transfer the waste buckets into C-Cell using the SERF Cask or Waste Cask • Segregate and inventory the waste buckets • Transfer the waste buckets into A-Cell using the SERF Cask or Waste Cask Compact the waste buckets • Package the waste buckets into inner containers • Load the inner containers into the waste drums • Seal the waste drums and prepare for shipping
1.04.10.02.05.07.03.11	327 Waste Bucket Shipment and Disposal	This BOE (1K7SF6) includes activities related to project support and facility preparation for removal of the legacy material from the 327 Facility. Some of the major activities associated with this BOE include the following. • Prepare and approve required waste drum shipment documentation • Prepare the waste drums for shipment • Ship the waste drums to the 200 Area CWC

Table D-4. 340 Complex Work Breakdown Structure for Special-Case Waste Disposition.

WBS	Title	Scope of Work
Phase I Task 5.0	340-A Building Deactivation	Background The 340-A Building sits partially below grade and houses six 30,000 liter (8,000 gal) stainless steel tanks within a concrete berm. During routine operations these tanks were used as backup storage for the vault tanks. Activities conducted in FY-98 include tank rinsing and draining to eliminate sediment buildup inside the tanks. Cost, schedule, and WBS are based on obtaining a clean surface determination for the internal surfaces of the six tanks and to establish the TSCA impact relative to the existing tank liquids. If a clean surface determination cannot be obtained, the 340-A Building will be dismantled and the tanks will be removed and transported to a TSD (treatment, storage, and disposal) facility for final disposition. Approach Remove all unattached material and equipment. Decontaminate building interior to facilitate tank system deactivation. Clean and flush tank heels to vault tanks. Disconnect tank discharge and vent lines. Clean tank drain lines to vault tanks and sump drain lines with high-pressure nozzle spray system and inspect with video camera. Package tank interconnecting piping for transportation to TSD unit for treatment and disposal. Conduct radiological survey of the building interior and post conditions. Seal building penetrations and openings to prevent contamination migration and vermin intrusion. Isolate building electrical power, except lighting and outlets needed for surveillance. Implement access control requirements and initiate interim monitoring program.
Phase I Task 6.0	340 Vault Decon	Background The 340 Vault is an underground, reinforced-concrete structure containing two stainless steel tanks and associated pumps, valving and piping. The valve pit is integral to the vault, though both have separate access locations. During routine operations, RLWS (Radioactive Liquid Waste System) wastes routed to the vault tanks were sampled and discharged to rail tank car via the 340-B East load-out station. The vault and tanks are serviced by a common ventilation system, K1. Phase I activities are intended to prepare the vault and tanks for closure activities scheduled for Phase II. Removing or fixing contamination in the vault should allow for the initial coverblock removal in Phase II to occur prior to erection of the greenhouse needed for disconnecting piping. Approach The vault interior surfaces will be decontaminated with conventional techniques and methods (washing, rinsing, and wiping). Rinse liquids will be collected in the sump and pumped into the vault tank. These solutions may be prefiltered (with solids drummed for disposal) to preclude pluggage of the waste transporter or the solids could be left in the tanks for eventual Phase II processing at the TSD facility. Any residual contamination will be coated in place. Decontamination is intended to eliminated and fix removable contamination so that the operation of the K1 stack is no longer required, and to facilitate initial vault access during Phase II tank retrieval and vault scabbling tasks. It is possible that there will be a need for continued operation of the K1 system during Phase II as a minor stack. The option of mothballing part or all of this filtration exhaust system for possible use during Phase II tank removal and vault decon work will also be considered prior to taking any nonreversible deactivation steps. The RLWS fill and return lines between the vault tanks and the 340-B load-out station will be decontaminated using a high-pressure nozzle spray system followed by inspection with video camera. The high-pressure spray liquids will drain back to the vault tank. The remaining liquid in the vault tanks will then be pumped via an alternate path into a truck tank trailer for shipment to the designated TSD facility in the 200 area. There are alternatives such as leaving a heel in the tank to either evaporate, if K1 ventilation is maintained, and/or for co-shipment within the tanks to the TSD during Phase II. A green house with portable exhaust filter unit will be installed over the K1 HEPA (high-efficiency particulate air) filters to facilitate their removal. All duct openings and the stack outlet will be sealed to prevent contamination migration. A safety evaluation and radiological survey will be conducted and all hazards posted. The vault will be locked, and interim monitoring will be initiated and remain in effect until Phase II of 340 Complex deactivation.

Table D-4. 340 Complex Work Breakdown Structure for Special-Case Waste Disposition.

WBS	Title	Scope of Work
Phase II Task 1.0	Administrative and Engineering Documentation	The task consists of the administrative and engineering support needed to write the following engineering documentation: • Surveillance and Maintenance Plan – to be developed, negotiated with, and approved by the ERC • Final Endpoint Criteria Document – to be developed, negotiated with, and approved by the ERC • 340 Waste Handling Complex: Deactivation PMP Revision • Notice of Construction for tank removal and vault decon • Final Fire Hazards Analysis • Roof and structure analysis • Asbestos assessment • Final safety basis.
Phase II Task 2.0	Vault and Valve Pit Deactivation (Tank to TSD)	The scope of work for this task was tentatively established and estimated in HNF-2230. The vault tanks will be decontaminated and moved to a TSD facility as waste. The vault will be decontaminated and left in place for final disposition by the ERC (Environmental Restoration Contractor).