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Page 1 of 3

1. ECN **164056**

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2. ECN Category (mark one) Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Standby ☐ Supersedure ☐ Cancel/Void ☐		3. Originator's Name, Organization, MSIN, and Telephone No. O. L. Kruger, Restoration Projects/87330, H5-33, 372-1463		4. Date September 7, 1994	
		5. Project Title/No./Work Order No. WRAP Module 2A/W-100	6. Bldg./Sys./Fac. No.	7. Approval Designator N/A	
		8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-W100-RD-001, Rev. 0	9. Related ECN No(s). <i>EDT</i> 142127	10. Related PO No.	
11a. Modification Work ☐ Yes (fill out Blk. 11b) ☒ No (NA Blks. 11b, 11c, 11d)		11b. Work Package No. N/A	11c. Modification Work Complete N/A		11d. Restored to Original Condition (Temp. or Standby ECN only) N/A
		Cog. Engineer Signature & Date		Cog. Engineer Signature & Date	
12. Description of Change Update of the original WRAP 2A Feed Specification to include waste volume forecast data for 1993 and most recent SWITS information.					
13a. Justification (mark one)					
Criteria Change ☒		Design Improvement ☐		Environmental ☐	
As-Found ☐		Facilitate Const. ☐		Const. Error/Omission ☐	
13b. Justification Details An update of this document is planned each fiscal year to provide the most recent data on waste characteristics and volume projections for project design guidance.					
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1. EDT

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2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Restoration Projects	4. Related EDT No.: 142117, 142118, 142124
5. Proj./Prog./Dept./Div.: WRAP 2A/W100/87330	6. Cog. Engr.: O. L. Kruger	7. Purchase Order No.: N/A
8. Originator Remarks: For approval. Comments have been incorporated.		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: WRAP 2A
11. Receiver Remarks:		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

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16. KEY											
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E, S, O, D or N/A (see WHC-CM-3-5, Sec. 12.7)		1. Approval 2. Release 3. Information		4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)		1. Approved 2. Approved w/comment 3. Disapproved w/comment		4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged			
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1	1	Cog. Eng. OL Kruger	<i>OL Kruger</i>	8/26/94	H5-33	TL Yount	<i>TL Yount</i>	9-26-94	G6-47	1	1
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<i>OL Kruger</i> Signature of EDT Originator		Date		Authorized Representative Date for Receiving Organization		<i>T. L. Erickson</i> Cognizant Manager		Date		☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	

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Document Number: WHC-SD-W100-RD-001, REV. 1

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SUPPORTING DOCUMENT		1. Total Pages 178
2. Title Waste Receiving and Processing, Module 2A, Feed Specification	3. Number WHC-SD-W100-RD-001	4. Rev No. 1
5. Key Words WRAP Module 2A Feed Stream Specifications Feed Stream Volumes APPROVED FOR PUBLIC RELEASE	6. Author Name: O. L. Kruger and M. L. Sheriff <i>O.L. Kruger</i> <i>M.L. Sheriff</i> Signature Organization/Charge Code 87330/A530A	
7. Abstract <i>11/10/94 D. J. J. J.</i> Detailed descriptions of the various mixed low-level waste feed streams that will be processed in the Waste Receiving and Processing Facility, Module 2A (WRAP 2A) are provided. Feed stream descriptions are based on available reports, the solid waste information tracking system database, and the 1993 solid waste forecast data. Available chemical and physical attributes, radionuclide data, waste codes, and packaging information are shown for 15 feed streams. The information sources and methodology for obtaining projections for WRAP 2A expected feed stream volumes also are described.		
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9. Impact Level N/A		

CONTENTS

1.0	INTRODUCTION	1-1
2.0	DATA SOURCES AND RATIONALE	2-1
2.1	SWITS DATABASE	2-1
2.2	FORECAST DATA	2-3
2.3	OTHER INFORMATION SOURCES	2-3
3.0	FEED STREAM DEFINITION	3-1
3.1	PREVIOUS FEED STREAM DESIGNATIONS	3-1
3.2	NEW FEED STREAM DESIGNATIONS	3-1
4.0	WASTE DESCRIPTIONS	4-1
4.1	EXISTING WASTE	4-1
4.1.1	183-H Basin Waste	4-1
4.1.2	Other Heterogeneous Waste	4-2
4.2	NEWLY GENERATED WASTE	4-2
4.2.1	LETfs	4-2
4.2.3	Other Forecast Wastes	4-3
5.0	WASTE VOLUME PROJECTIONS	5-1
5.1	FORECAST DATABASE	5-1
5.2	WRAP MODULES 1 AND 2B	5-1
5.3	TOTAL VOLUME ESTIMATES	5-2
5.4	UNCERTAINTIES	5-4
6.0	FEED SPECIFICATION DATA	6-1
6.1	FORMAT AND FEED DESCRIPTIONS	6-1
6.2	RADIONUCLIDE DATA	6-3
6.3	BOX WASTE	6-3
6.4	REVISION IMPACTS	6-3
6.4.1	Major Changes	6-4
6.4.2	Minor Changes	6-6
7.0	SWITS DATA INTERROGATION UPGRADES	7-1
8.0	REFERENCES	8-1
9.0	GLOSSARY	GL-1

CONTENTS (cont)

APPENDIXES

A	METHODOLOGY FOR OBTAINING VOLUMES OF FEED STREAMS 5A1-A3, 5C1-C3, 9A, 9B, AND 9C	A-1
B	FISCAL YEAR 1993 FORECAST VOLUME SUMMARY	B-1
C	BREAKDOWN OF VOLUMES FOR EACH WASTE RECEIVING AND PROCESSING MODULE 2A FEED STREAM INCLUDING CONTRIBUTIONS FROM ALL SOURCES	C-1
D	SPECIFICATIONS FOR FEED STREAMS 1 THROUGH 9	D-1
E	RADIOLOGICAL DATA FOR FEED STREAMS 5 THROUGH 9	E-1

LIST OF FIGURES

2-1	Evaluation Methodology Used to Separate Thermal and Nonthermal Treatment Waste Using Solid Waste Information and Tracking System Data	2-2
2-2	Matrix of Waste Forms and Chemical Contaminants used to Screen Out Thermal Treatment Contact-Handled Mixed Low-Level Waste from Forecast Database	2-4
3-1	Schematic Diagram Showing Relationship Between Conceptual Design and Current Waste Receiving and Processing Module 2A Feed Streams with Associated Processing Alternatives	3-2
5-1	Comparison of Waste Receiving and Processing Module 2A Feed Stream Volumes	5-4
5-2	Percentage Distribution of Waste to be Processed as Drums and Boxes	5-5

LIST OF TABLES

5-1	Summary of Waste Receiving and Processing Module 2A, Feed Stream Volumes	5-3
6-1	Summary of Revision 1 Changes to Appendix D Feed Stream Data Sheets	6-5

WASTE RECEIVING AND PROCESSING, MODULE 2A, FEED SPECIFICATION

1.0 INTRODUCTION

The objective of this document is to provide descriptions of all Waste Receiving and Processing (WRAP) Module 2A feed streams, including physical and chemical attributes, and describe the pathway that was used to select data for volume estimates. This feed specification document is an essential part of the WRAP Module 2A technical basis documentation plan described in WHC-SD-W100-SD-001, *WRAP 2A Process Confirmation Plan* (Benar 1993). The feed specification directly supports WHC-SD-W100-ES-006, *Waste Receiving and Processing Facility, Module 2A, Process Selection Summary* (Sexton 1993), and product specifications and treatment and disposal compliance strategies (roadmaps) that will be prepared. Other project activities that have a strong dependence on the feed specification are development of process flow diagrams, process demonstration testing using surrogate waste, and formulation of the regulatory strategy to be used for waste form certification.

The WRAP Module 2A is being designed for nonthermal treatment of contact-handled (CH) mixed low-level waste (MLLW) Category 1 and Category 3 as defined in WHC-EP-0063-4, *Hanford Site Solid Waste Acceptance Criteria* (Willis 1993), herein referred to as Class 1 and Class 3, using U.S. Environmental Protection Agency (EPA)-accepted technologies. The amount of waste to be processed encompasses waste currently in storage, waste to be generated by Westinghouse Hanford Company (WHC) and Pacific Northwest Laboratory operations at the Hanford Site, and waste shipped to the Hanford Site from about 16 U.S. Department of Energy (DOE) sites. In addition, volumes to be processed include buried waste that is being reclaimed for sorting in the WRAP Module 1 (currently under construction) and is determined to be MLLW. All the waste will be received and stored in the 200 West Area Phase V storage complex before transport to WRAP Module 2A for treatment and disposal in a Hanford Site trench that meets *Resource Conservation and Recovery Act of 1976* (RCRA) requirements.

The WRAP Module 2A design will be based on immobilization and encapsulation treatment technologies using grout or polymer. Capabilities also will be available to treat limited quantities of waste containing mercury (elemental and low mercury category chemical waste), lead (elemental and chemicals), and contained liquids (lab packs) using developed and demonstrated EPA methods or other appropriate technologies for hazardous material disposal.

The overall plan for cost-effective disposal of waste at the Hanford Site is to take maximum advantage of the treatment methods available in WRAP Module 2A and minimize the amount of waste to be sent to a more costly incineration process. For planning purposes, when the waste container contents are uncertain and there is no indication the waste requires thermal treatment, the assumption is made that the waste can be routed to WRAP Module 2A. In accordance with this assumption, the WRAP Module 2A processing lines are being designed with sufficient flexibility to handle the maximum volume of waste and range of chemical components.

Descriptions for each of the WRAP Module 2A feed streams are needed in order to proceed with design, process demonstration, and regulatory activities. It is anticipated that this document will be updated periodically and the data will be modified as new information becomes available regarding waste contents and volume projections.

2.0 DATA SOURCES AND RATIONALE

The WRAP Module 2A feed streams encompass a wide range of materials and descriptions are based on information obtained from numerous sources. The primary information sources are the solid waste information and tracking system (SWITS) database that includes information for existing CH MLLW and the verified database used to prepare WHC-EP-0768, *Solid Waste 30-Year Volume Summary* (Valero 1994). The forecast database is a compilation from waste generators obtained in the summer and fall of 1993. Other sources of data include the 183-H Basin closure reports (DOE-RL 1988, DOE-RL 1991, and Powers et al. 1990), recent efforts to sample the 183-H Basin waste drums, Richland-Solid Waste Information Management System, and feed specification data based on flowsheets received directly from representatives for each of the Liquid Effluent Treatment Facilities (LETF). These data sources are discussed in the following sections.

Throughout this document, the volumes designated for a specific feed stream include the entire volume within the container and not the overpack. The containers, and in some cases the polyethylene liners, will be reduced in size and are expected to be disposed of as low-level waste or debris. No effort has been made to include the waste generated by operation of WRAP Module 2A because this waste is separate from the incoming feed streams and is included in the overall process design.

2.1 SWITS DATABASE

The SWITS database provides a relatively detailed description of the MLLW that is in storage at the Hanford Site. Efforts have been made to interrogate this database in order to obtain a better understanding of the different types of CH MLLW that will be processed in WRAP Module 2A.

In some cases, the SWITS data need to be supplemented by additional information available in the Storage Disposal Approval Record (SDAR) for a specific container or group of containers. This information provides details of the waste container, including how the waste was prepared, and may add clarification regarding specific constituents and attributes of the waste. The SDAR information could be important when decisions associated with grouping of containers (drums and/or boxes) into a lot are made or information is needed to answer specific questions on a waste type. Currently, the SDAR data are separate from SWITS and inquiries require the completion of additional paperwork to obtain a copy. In the future, the SDAR information will be included in the SWITS.

Presently there is no distinction in the SWITS database, other than waste codes, as to the specific waste that must be thermally treated. Therefore, the database must be evaluated, container by container, for waste codes, hazardous constituents, and other characteristics that indicate the waste will be suitable for processing in WRAP Module 2A or requires thermal treatment. The methodology that is used to separate the MLLW into thermal and nonthermal categories is shown in Figure 2-1. Composition and physical/chemical attributes (in addition to waste codes) that would lead to designation of a

MLLW	=	Mixed low-level waste	5A1	=	Elemental Mercury
SWITS	=	Solid waste information and tracking system	5A2	=	Mercury Chemicals/Solutions
T	=	Thermal Treatment Facility	5A3	=	Mercury-Contaminated Heterogeneous Solids
W	=	WRAP 2A	5C1	=	Elemental Lead
			5C2	=	Lead Chemicals/Solutions
			5C3	=	Lead-Contaminated Heterogeneous Solids
			9A	=	Particulate/Sludge
			9B	=	Heterogeneous Solids/Debris
			9C	=	Contained Liquids

2-2

specific container as requiring thermal treatment are evaluated. These attributes are relatively high concentrations of organics in a liquid form, such as solvents, oils, and insecticides; or the presence of organic chemicals that would not be amenable to immobilization using grout or polymer. Waste that is primarily debris that has been contaminated with small quantities of organics, in general, would be included in the feed for WRAP Module 2A. For this purpose, a somewhat arbitrary limit of <1 kg of low-vapor pressure organics is used for initial segregation of debris waste into thermal and nonthermal categories.

2.2 FORECAST DATA

Each year, the forecast database is updated using input from the Hanford Site and other DOE site generators. This database can be interrogated extensively and is suitable for grouping data by waste type and class to prepare many different types of tables. The data of most interest for CH MLLW volume projections are tables that group the volume by waste form, hazardous constituents, and container type. Figure 2-2 shows an example of a table filled out by waste generators that defines the percentages used to prepare various fields in a forecast database. Various types of waste screened out of the forecast and intended for thermal treatment or processing in other facilities are shown by the darkened boxes in Figure 2-2. The remaining boxes represent the percentages of specific waste forms and chemical constituents that are applied to the waste volume projections to obtain database volumes expected to be processed by nonthermal treatment. Waste generators are required to prepare yearly volume projections covering a 30-year period. This information is used to obtain feed stream total forecast volumes to be processed in WRAP Module 2A.

Forecast data are sufficient to provide a breakdown of the waste form into characteristics and EPA codes that can be related to specific treatment technologies such as immobilization, encapsulation, or other appropriate technologies including EPA treatment methods (see Figure 2-2). The forecast data also can be used to determine special treatments for mercury, lead, and contained liquids or lab packs that will be treated in WRAP Module 2A. In addition, the waste form and hazardous constituents information in conjunction with the container type provides further insight that is useful for determining processing requirements. These data include a breakdown into various types of inorganic particulates and debris; other waste forms such as lead, mercury, labpacks, soils, etc.; and shielding materials that are used to determine various feed stream volumes (drums and boxes) for equipment throughput considerations. The 1993 database was the first year container type could be related to waste form. This information is essential for WRAP Module 2A design to ensure the box breakdown area will have sufficient capacity and that the mechanisms for drum entry and handling are adequate.

2.3 OTHER INFORMATION SOURCES

A small portion of the feed to WRAP Module 2A is projected to come from WRAP Modules 1 and 2B when they are operational. The WRAP Module 1 facility will separate the MLLW from the transuranic waste obtained from the burial trench and package the MLLW for treatment in WRAP Module 2A. The volume of

CH LLMW I
And
CH LLMW III

Waste Forms & Hazardous Constituents

TABLE 3 Page 1 of 2
YEARS: 1994 TO 2024

STEP 1: CONTAINER TYPE A separate Table 3 and 3A must be completed for each container type you've identified in Table 2
Circle one: → 55 Gal Drums B-25 Box 4 X 4 X 8 Box Other - 1 Other - 2

STEP 2: WASTE FORMS Indicate below the volume % of waste form in container circled in Step 1		STEP 3: EPA WASTE CODES Indicate % present for each Waste Form												STEP 4: Are Waste Forms Segregated? Y/N	
		IGN (D001)	CORR (D002)	REAC (D003)	TC MET (D004 - D011)	TC PEST (D012 - D017)	TC ORG (D018 - D043)	SPENT SOLV (F001 - F005)	PLTG WST (F006 - F009)	ACUTELY HAZ (P001 - UXXX)	PCB's < 50	PCB's > 50			
%	Inorganic														
	Particulate														
	Absorbed liq/sludge														
	Other														
	Organic														
	Particulate														
	Absorbed liq/sludge														
	Other														
	Debris - Inorganic														
	Lead Metals														
	Other Metals														
	Construction Metals														
	Other														
	Debris - Organic														
	Non-Compactable														
	Compactable														
	Debris - Heterogeneous														
	Filters														
	Combustible														
	Non-Combustible														
	Other														

Waste form % should be totaled on Table 3 Page 2 of 2 and MUST equal 100%.

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Figure 2-2. Matrix of Waste Forms and Chemical Contaminants used to Screen Out Thermal Treatment Contact-Handled Mixed Low-Level Waste from Forecast Database. (sheet 1 of 2)

WHC-SD-M100-RD-001
Revision 1

**CH LLMW I
And
CH LLMW III**

Waste Forms & Hazardous Constituents

TABLE 3 Page 2 of 2
YEARS: 1994 TO 2024

Figure 2-2. Matrix of Waste Forms and Chemical Contaminants used to Screen Out Thermal Treatment Contact-Handled Mixed Low-Level Waste from Forecast Database. (sheet 2 of 2)

STEP 1: CONTAINER TYPE													
A separate Table 3 and 3A must be completed for each container type you've identified in Table 2													
Circle one: ☐ 55 Gal Drums ☐ B-25 Box ☐ 4 X 4 X 8 Box ☐ Other - 1 ☐ Other - 2													
STEP 2: WASTE FORMS		STEP 3: EPA WASTE CODES										Total 0 or 100%	STEP 4: Are Waste Forms Segregated? Y/N
Indicate below the volume % of waste form in container circled in Step 1		IGN (D001)	CORR (D002)	REAC (D003)	TC MET (D004 - D011)	TC PEST (D012 - D017)	TC ORG (D018 - D043)	SPENT SOLV (F001 - F005)	PLTG WST (F006 - F009)	ACUTELY HAZ (P001 - UXXX)	PCB's < 50		
%	Special												
	ELEMENTAL LEAD												
	ELEMENTAL MERCURY												
	LABPACKS/ CONTAIN LIQ												
	REACTIVE METALS												
	COMPRESSED GASES												
	BATTERIES												
	SOILS												
	OTHER												
Shielding													
	Stainless Steel												
	Concrete												
	Lead												
	Other												
100%													

OTHER COMMENTS : Thermal Treatment
Treatment not determined at this time

waste to be sent to WRAP Module 2A from WRAP Module 1 was taken from Solid Waste Projection Modeling results. Descriptions of the buried waste in the SWITS database were then used to determine the various types of waste that will be sent to WRAP Module 2A. An assumption was made that the WRAP Module 1 waste to be treated in WRAP Module 2A will be proportioned into approximately the same waste types as the waste in storage (SWITS). For these proportioning calculations (see Appendix A), certain cleanup waste streams were eliminated to obtain appropriate ratios and adjustments were made to account for a high portion of lead in storage from cleanup operations onsite and offsite.

The WRAP Module 2B mission will include repackaging of MLLW that is in containers too large or too heavy for WRAP Module 2A to handle. The container size limit for WRAP Module 2A is 1.5 m high by 1.5 m wide by 2.7 m long and the weight limit is 5,454 kg. The WRAP Module 2B feed stream to WRAP Module 2A is included in the SWITS database and the forecast data; therefore, no special adjustments were necessary.

The two LETFs at the Hanford Site are the Effluent Treatment Facility (ETF), Project C-018, which is being constructed in the 200 Area, and the Treated Effluent Disposal Facility (TEDF), Project L-045, under construction in the 300 Area. Engineers responsible for these facilities have been consulted for detailed descriptions of the LETF waste based on the latest flowsheet calculations and this information has been incorporated into the feed specification data. The amount of waste and chemical form (ammonium sulfate or sodium sulfate) from ETF depends on the current inventory of ammonia in the waste tanks and there is considerable uncertainty associated with the volume projection at this time. Based on the latest information, only a small quantity of ion-exchange resin from the TEDF is expected to be MLLW that will require processing in WRAP Module 2A.

3.0 FEED STREAM DEFINITION

The rationale for selection of the various feed streams for WRAP Module 2A is determined by several different factors. Some of the ramifications and logic are discussed further in the following sections.

3.1 PREVIOUS FEED STREAM DESIGNATIONS

Various feed streams were defined during the conceptual design phase for WRAP Module 2A in order to proceed with plant layout and determine process equipment requirements. These feed streams are shown at the top of Figure 3-1. Eight major feeds were defined with subvariations for the 183-H Basin waste, LETF secondary solids, and metals. Most of the feed streams were determined by the major sources of the waste at the Hanford Site and the treatment technologies specified by the EPA for special wastes such as lead, mercury, and lab packs.

A reactive metals stream also was identified for the WRAP Module 2A conceptual design. Subsequent consideration of the ramifications of processing reactive metals and examination of the records showed that this feed stream should be eliminated from processing in WRAP Module 2A. No reactive metals of uranium and zirconium turnings were found in the SWITS database. This situation is consistent with the practices in place at all DOE sites for many years of treating this waste type by burning and/or grout stabilization. Elemental sodium or sodium and potassium alloy at the Hanford Site will require special treatments that are not part of the WRAP Module 2A mission. Elemental uranium or zirconium in bulk form would not be classified as reactive metals, and would be processed along with other metals as debris.

Further investigation of the feed for WRAP Module 2A indicated that much of the waste is heterogeneous. The compactable and noncompactable solids are mixed and contain metals, concrete, glass, plastic, paper, and other materials. The mercury and lead wastes contain elemental mercury and lead intermixed with absorbent and miscellaneous materials including other metals. Quantities of elemental mercury contained within the drums are limited to a small portion of the drum contents. In addition, new feeds of lead and mercury chemicals and debris needed to be defined.

3.2 NEW FEED STREAM DESIGNATIONS

Based on the above information, the decision was made to redefine the feed streams in a manner that would better convey the heterogeneous nature of some of the waste to be processed in WRAP Module 2A. Another factor in determining the specific feed streams for WRAP Module 2A was the issuance of 57 FR 37194, "Land Disposal Restrictions for Newly Listed Wastes and Hazardous Debris," by the EPA in 1992. This "debris rule" recognized the difficulties in processing and certification sampling of certain types of heterogeneous solid waste and introduced alternate treatment technologies for consideration. Sampling of debris waste was eliminated as a requirement but specified treatments must be certified. Some of the feed streams for WRAP Module 2A were appropriately affected by the debris rule. For example, the LETF reverse

Figure 3-1. Schematic Diagram Showing Relationship Between Conceptual Design and Current Waste Receiving and Processing Module 2A Feed Streams with Associated Processing Alternatives.

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osmosis filter elements, compactable solids and noncompactable solids, and miscellaneous metals were combined into a single debris feed stream (see Figure 3-1). This feed definition also closely follows the breakdown of the forecast waste shown in Figure 2-2. The forecast debris waste includes inorganic debris (metals, construction materials, and other), organic debris (noncompactable and compactable), and heterogeneous debris (filters, combustables, noncombustables, and other). Also, the forecast shielding waste includes stainless steel, concrete, and other that are debris-type wastes. All the debris waste were combined into a single feed stream of heterogeneous solids/debris.

This combination of debris waste forms into one feed stream assumes many of the containers will have various combinations of materials and the WRAP Module 2A process line must be suitable for handling this wide range of constituents. If the debris waste is received as segregated materials, an effort will be made to combine these containers into subgroups for processing which could aid processing operations significantly.

The particulate 183-H Basin wastes and LETF secondary solids were kept as separate feed streams to retain all the detailed information on the different feed types for process testing and waste acceptance verification. However, the LETF feed stream of metal sludge (ferric hydroxide) from TEDF was eliminated based on further evaluation of the expected hazardous constituents. Each of these particulate feed streams is expected to be processed as separate lots or sublots in WRAP Module 2A versatile processing equipment.

Mercury and lead wastes were divided into several separate feed streams to emphasize the different technologies that will be required for treatment. At this time, the forecast data (see Figure 2-2) do not provide a breakdown of the lead and mercury into these various streams. Ratios based on the waste in storage were used to estimate the feed volumes in the different categories.

The absorbed solidified chemicals feed stream in the conceptual design report was identified for treatment of lab packs. This stream has been combined into a broader category of contained liquids which includes lab packs and some liquids known to be in containers packed within drums surrounded by absorbent materials. Lab packs are defined as a separate category in the forecast data, and this waste is included in the total volume for the contained liquids feed stream.

Current planning for MLLW that requires thermal treatment is to ship this waste to a private company. A Request for Proposal (RFP) has been issued and companies with appropriate technologies have responded. The RFP requires treatment to meet RCRA Land Disposal Restrictions and the waste form must be suitable for disposal in the Hanford Site RCRA trench. Therefore, the Thermal Treatment Facility ash waste was eliminated from the feed streams for processing in WRAP Module 2A.

The conceptual design report feed stream designated "contaminated soils" was combined into a new stream of particulates/sludges that includes a wide range of particulate materials with undefined characteristics. It is anticipated that this feed stream will be processed in the same equipment that

will be used to treat 183-H Basin and LETF particulate wastes; however, a wider chemical and physical characteristics variability can be anticipated in process lots.

In general, all the waste can be allocated to three major processing alternatives: (1) particulate including sludge, soil, spent resins, process condensate, coprecipitates, absorbent, etc.; (2) heterogeneous solid waste or debris; and (3) special treatment-type wastes such as lead- and mercury-contaminated materials and lab packs including contained liquids. Grouping of the various feed streams to the different processing options is shown in Figure 3-1.

4.0 WASTE DESCRIPTIONS

4.1 EXISTING WASTE

Waste in storage is made up of the 183-H Basin waste and other heterogeneous waste that is defined by waste codes. These codes are used to separate the various drums into specific categories or waste streams that can be further analyzed for constituents. The SWITS contains data for all the stored waste in considerable detail including the percentage of various constituents. A brief description of the 183-H Basin waste and other feed streams is provided in the following sections.

4.1.1 183-H Basin Waste

The 183-H Basin waste was generated from closure of four basins used from 1973 to 1985 for solar evaporation of neutralized acid etch solutions from N Reactor fuel fabrication. The closure activities resulted in generation of four feed streams for processing in WRAP Module 2A. Detailed descriptions of the various feed streams are based on the considerable amount of chemical and physical data that were obtained to determine constituents in the waste and meet regulatory requirements for closure. The four feed streams resulted from efforts to segregate the waste and provide treatment of the liquid waste before loading the waste into drums according to approved procedures.

Supernatant liquid from all four basins, consisting primarily of sodium nitrate, was transferred between basins and consolidated during closure efforts. This liquid was mixed with Sorbond^{*} LPC II solidification agents using a batch process and loaded into drums in 1988-89. The solidified drums constitute Feed Stream 1A, Solidified 183-H Basin Liquids, which is expected to be processed as a lot in WRAP Module 2A. These drums may require special techniques for removing waste from the drum and breaking up the solidified material to facilitate intimate mixing with grout or polymer into a waste form that meets certification requirements.

A distinct strata of relatively dry sodium nitrate crystalline solids occurred on the interior edges of Basins 1, 3, and 4 when the supernatant liquid was drained for solidification. This material was combined with sludge from Basin 1 and packaged into drums using layers of absorbent where needed. This waste is a separate feed stream for WRAP Module 2A designated 1B, Crystalline 183-H Basin Solids, which is expected to be processed as a single lot.

Sodium nitrate sludge and crystalline solids from Basins 3 and 4 also were removed from the basins and packaged together indiscriminately as a separate feed stream. Absorbent was used to retain any liquid present with this waste type. Once again, this waste is expected to be processed as a lot with the designation 1C, 183-H Basin Sludge.

*Sorbond is a trademark of American Colloid Company.

The remaining feed stream consists of sandblast grit and many different types of debris including liner material, gloves, boots, shovels, concrete, crushed tumbleweed, etc., that have been packaged into drums and boxes. This feed stream, designated 1D, Miscellaneous 183-H Basin Waste, is expected to require some sorting to remove the particulate fraction from the larger solids. It is not clear at this time if more than one lot will be necessary for processing in WRAP Module 2A.

All the 183-H Basin waste carries a waste code of U123 for a small quantity of formic acid that was routed to the basins and would normally require incineration for treatment. Efforts are in progress to sample the waste drums and obtain data that will support a petition for equivalent treatment using cement-based material to the EPA. The waste sampling effort also is expected to provide additional chemical and physical data that will be helpful in evaluating various processing steps required for all 183-H Basin waste.

4.1.2 Other Heterogeneous Waste

Most of the other waste in storage is within a broad category of heterogeneous waste and must be separated by waste code and characteristics into mercury, lead, contained liquid, particulate, and heterogeneous solids/debris waste. Each of the drums, and in some cases the SDAR, must be examined to determine the proper designation. This process was used to identify the waste types and volume estimates as provided in Appendix A. For mercury waste, a study was conducted (Pauly 1994) to determine the regulatory requirements and the treatment technologies that will be most suitable for final disposal. Assumptions used in selecting waste drums, methods used for calculating the waste volumes of the different waste streams, and other information on the amount of each waste type in the group of drums, including drum density, also are described in Appendix A.

To determine the volume of elemental mercury or lead within a drum or box, the weight of the drum contents for these elements was divided by the density. This information provided an estimate of the amount of elemental material available for processing. Ratios also were established for the amount of existing waste to be applied to the waste volumes coming from WRAP Module 1 and forecast waste projections. Estimated volumes for each of the lead and mercury waste streams are shown in Appendix A. Waste volumes, gross weight, weight of constituent, average density, and assumptions for contained liquids, particulate, and heterogeneous solids/debris wastes also are provided in Appendix A.

4.2 NEWLY GENERATED WASTE

4.2.1 LETFs

The ETF will treat Evaporator 242-A acidified process condensate and the composition of the ETF waste will vary depending on the waste being concentrated in the evaporator. Waste produced by the ETF is expected to be a sodium sulfate powdered solid (Feed Stream 2A) that will vary in composition

from 0% to 83% ammonium sulfate. The dry powdered material is produced from the operation of a thin-film dryer. This equipment is used to remove water from a major stream of liquid waste brine generated during processing reverse osmosis rejects and minor streams of filter back flush and ion-exchange regeneration. The ETF will generate relatively small volumes of spent ion-exchange resins that are used for deionization. Small quantities of debris-type waste also will be generated and are included in the waste volume projections for this waste type.

Process water from the 300 Area will be treated in the TEDF. Periodic refurbishment of the ion-exchange columns will produce small quantities of spent ion-exchange resin. For simplification, this ion-exchange resin stream has been combined with the resin from the ETF because the treatment used for both resins is expected to be similar.

4.2.3 Other Forecast Wastes

No specific information is readily available for the remaining forecast waste. The various waste forms and hazardous constituents used for collecting the data from generators, shown in Figure 3-1, in combination with container type and limited radionuclide data are used to format the forecast volumes into different types of reports. However, detailed information on the waste attributes is not available. Data showing amounts of drum and box waste by waste form and generator are available for further evaluation.

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5.0 WASTE VOLUME PROJECTIONS

5.1 FORECAST DATABASE

To arrive at the estimated volume for each waste stream, the data from all generator sources must be added together. A special query of the forecast database was run to generate waste volume tables by waste form for CH MLLW Classes 1 and 3 and these tables are shown in Appendix B. Note that the Appendix B forecast database excludes the ETF waste but does include about 1,270 m³ of environmental restoration waste. The Appendix B table shows the estimated waste generated by year from 1994 to 2023 and is divided into separate sections for Class 1 and Class 3 waste. Each waste form volume projection in this table is divided into separate estimates for the hazardous constituents. A separate table in Appendix A shows the total volumes for each waste form and how these volumes were combined into feed streams for WRAP Module 2A. As indicated above, new forecast volume data for the ETF were obtained and these projections were used for this feed stream in the following sections of this document.

The total volumes of nonthermally treatable Class 1 and Class 3 CH MLLW estimated by each waste generator also are shown in Appendix B. Addition of the ETF waste to the total amounts of Class 1 and Class 3 waste in Appendix B results in forecasted volumes of about 19,800 and 4,600 m³ for Class 1 and Class 3 waste, respectively. About 90% of the Class 1 waste will be generated by the following eight generators: Argonne National Laboratory-East; Paducah Energy Systems; Portsmouth; WHC 222-S Analytical Laboratory; WHC Tank Farms; WHC ETF; WHC T Plant; and WHC Environmental Restoration. A total of about 8,100 m³, or approximately 41% of the Class 1 waste, is expected to be received from offsite generators. In comparison, about 79% of the Class 3 waste will be generated at the Hanford Site.

Based on the Appendix B volume breakdown by waste generator, the Hanford Site is expected to generate about 63% of the total forecast waste volume. Most of the forecast waste will be under WHC control and this situation will provide the opportunity to obtain detailed information on waste attributes with minimum investment of time as WRAP Module 2A design progresses. Note, however, that a large portion of the WRAP Module 2A waste will be coming from offsite generators and as much detailed information as possible on waste attributes should be obtained as this waste is shipped to the Hanford Site.

The forecast volumes are expected to change with each yearly update. In general, the amount of CH MLLW forecasted by generators has shown a steady increase during the past several years even though there have been significant reductions in some activities during this time. The volume increase trend is expected to continue as the Hanford Site mission turns toward environmental cleanup and other DOE sites proceed with Federal Facility Compliance Act Site Treatment Plans.

5.2 WRAP MODULES 1 AND 2B

The volume of MLLW that is expected to come from the WRAP Module 1 facility has been estimated using a solid waste projection model computer

program. Based on evaluation of the data for currently buried drums that are to be sent to WRAP Module 1, 33% of the low-level waste is expected to be classified as MLLW and contain small but significant quantities of plutonium (<100 nCi/g). About 50% of this MLLW is thought to require thermal treatment and the rest would go to WRAP Module 2A. Use of these percentages, in conjunction with the records for buried waste volumes, provides the volume (approximately 411 m³) of MLLW coming from WRAP Module 1.

For WRAP Module 2B, the situation is more uncertain because no treatment technologies have been established for this project and little is known about the waste contents. It is anticipated that WRAP Module 2B may treat a fraction of the MLLW that is routed to this facility for repackaging. As indicated previously, some of the forecast waste will be in containers too large to be received by WRAP Module 2A and will be required to go to WRAP Module 2B for breakdown of the waste into drums. This fraction of the waste from WRAP Module 2B is already taken into consideration by use of the total volumes in the forecast tables (see Appendix B). The WRAP Module 2A is thought to be the best place to treat much of the lead shielding that will be used to reduce the radiation levels of remote-handled waste to be sent to WRAP Module 2B. There is considerable uncertainty regarding this waste stream and other alternatives exist for treatment including lead treatment using carbon dioxide blasting. Therefore, no attempt has been made to estimate the amount of this waste for the WRAP Module 2A feed specifications. Based on the above scenario, the projected elemental lead feed stream volumes for WRAP Module 2A could increase significantly at a later date when more information is available.

5.3 TOTAL VOLUME ESTIMATES

The total volume estimates for all years shown in the Appendix B tables were combined with the volumes calculated in Appendix A to obtain the total estimated volumes for each feed stream as shown in the feed stream breakdown in Appendix C. The breakdown in Appendix C shows how the feed stream volumes were developed from the different contributing sources.

A summary of the WRAP Module 2A feed stream volumes from Appendix C is provided in Table 5-1. As can be seen, the total volume of waste to be processed in WRAP Module 2A is estimated to be approximately 27,572.3 m³. Table 5-1 also shows that 183-H Basin, ETF, particulate, and heterogeneous solids/debris wastes are the major contributors to the total waste to be processed in WRAP Module 2A. Heterogeneous solids/debris wastes currently are expected to constitute about 57% of the total waste. A pie chart showing percentages of each feed stream is shown in Figure 5-1.

Elemental mercury, mercury chemicals/solutions, mercury-contaminated heterogeneous solids, and lead chemicals/solutions are expected to be minor streams with a total volume of approximately 80.5 m³. The bulk of the special waste to be treated in WRAP Module 2A is expected to be elemental lead, lead-contaminated heterogeneous solids, and contained liquids. Current plans are to treat a significant portion of the elemental lead at other Hanford Site facilities which could further reduce the amount of expected WRAP Module 2A special waste.

Table 5-1. Summary of Waste Receiving and Processing
Module 2A, Feed Stream Volumes.

Number	Stream title	Volume		Number	
		m ³	ft ³	Drum ^a	Box ^b
1A	Solidified 183-H Basin Liquids	580.9 ^c	20,510	2,767	0
1B	Crystalline 183-H Basin Solids	931.8 ^c	32,901	4,436	0
1C	183-H Basin Sludge	980.7 ^c	34,629	4,670	0
1D	Miscellaneous 183-H Basin Waste	149.3 ^c	5,273	409	14
2A	Ammonium/Sodium Sulfate Powder	1,000.0 ^d	35,310	5,400 ^d	--
2B	Ion-Exchange Resin	202.0	7,133	972	--
5A1	Elemental Mercury	21.0	742	89	1
5A2	Mercury Chemicals/Solutions	16.2	572	78	0
5A3	Mercury-Contaminated Heterogeneous Solids	25.9	916	125	0
5C1	Elemental Lead	971.0	34,287	1,148	202
5C2	Lead Chemicals/Solutions	17.4	616	84	0
5C3	Lead-Contaminated Heterogeneous Solids	869.4	30,697	1,712	142
9A	Particulate/Sludge	6,336.9	223,757	14,812	899
9B	Heterogeneous Solids/Debris	14,849.0	524,318	44,371	1,552
9C	Contained Liquid	654.7	23,117	3,147	0
TOTAL		27,606.2	974,777	84,220	2,810

^aDrum = standard of a 55-gal drum at 0.208 m³ or 7.35 ft³.

^bBox = standard of a 4 by 4 by 8 box at 3.62 m³ or 128 ft³.

^cSolid waste information and tracking system volume based on conversion factor of 0.21 m³/drum.

^dEstimated volume and number of drums from Effluent Treatment Facility Project.

WMC-SD-M100-RD-001
Revision 1

Figure 5-1. Comparison of Waste Receiving and Processing
Module 2A Feed Stream Volumes.

With regard to processing in WRAP Module 2A, it is now projected that the waste in incoming boxes will be distributed as shown in Figure 5-2. About 60% of the waste will be debris including lead-contaminated solids, 32% sludge/particulate, 7% elemental lead, and 1% other types of waste. The distribution of waste for drum opening (see Figure 5-2) will be as follows: about 55% debris including lead- and mercury-contaminated solids, 18% sludge/particulate, 15% 183-H Basin waste, 6% ammonium/sodium sulfate, and 7% other (resins, contained liquid, lead and mercury chemicals, etc.).

This information may be helpful in determining where emphasis needs to be placed for plant design. Because the percentages shown in Figure 5-2 can be expected to shift as the feed specification document is updated each year, further assessment is needed to determine the most reasonable throughput capabilities for design of processing lines.

5.4 UNCERTAINTIES

Although about 2 years have passed since the debris rule was implemented by the EPA, there is still uncertainty regarding the interpretation of this rule for certain types of waste. Encapsulation of debris in stainless steel or plastic high-integrity containers may be acceptable and generators could use this form of packaging in conjunction with compaction to reduce the amount of debris waste that will need to be treated in WRAP Module 2A. Another factor is much of the debris waste appears to have been contaminated with organic solvents but the amount of solvent remaining in the debris is unknown due to probable evaporation. The result could be the current criteria of accepting debris with <1 kg of solvents for treatment in WRAP Module 2A could possibly be increased to a higher value and this would increase the quantity of the debris feed stream.

Figure 5-2. Percentage Distribution of Waste
to be Processed as Drums and Boxes.

DRUMS

BOXES

Environmental restoration at the Hanford Site is expected to produce a considerable amount of particulate (soils) MLLW that could require treatment. Estimates of the volume are uncertain because efforts to remediate the specific sites where this waste is expected to be generated have not been initiated. Further evaluation of the environmental restoration waste generation could lead to a substantial increase in the volume projections for this type of waste.

Another consideration is that minor hazardous components of the ETF waste have not been thoroughly evaluated at this time. Immobilization testing is being conducted with a range of components to provide sufficient data for treatment assessment. Additional effort will probably need to be focused on this stream as the facility initiates operation and more characterization information becomes available.

6.0 FEED SPECIFICATION DATA

6.1 FORMAT AND FEED DESCRIPTIONS

The attribute format selected for all the feed streams is based primarily on the information needed for design and process flow diagrams and resulted from several discussions with Raytheon, the Architect-Engineer for WRAP Module 2A. Other considerations were data needed for the waste acceptance and testing activities that are being conducted by WHC for process verification, and the radionuclide information needed for the RCRA trench performance assessment for MLLW disposal.

The feed specification attributes for each of the WRAP Module 2A feed streams are provided in Appendix D. Attributes are grouped under the main headings of feed stream, generation, physical characteristics, radiological characteristics, chemical characteristics, and packaging description. Each of these main headings has several subheadings that include brief narrative descriptions of the waste, volumes, physical state and other properties, waste class, radionuclide content, dose rate, chemical constituents, waste codes, hazardous characteristics and components, container type, internal packaging, gross weight, and closure mechanisms. Efforts have been made to provide as much information as deemed necessary for design activities and waste acceptance.

The following information is provided to help clarify the Appendix D tables and provide information concerning waste codes and characteristics for various feed streams.

- Some of the feed stream specifications were compiled from computer searches of receipt records for MLLW stored at the Hanford Site. Because of the nature of these summaries, conclusions should be made carefully to avoid misinterpreting the data. For example, the waste code sections in the Appendix D tables summarize all the waste codes assigned to any of the containers included in a particular feed stream group; therefore, for Feed Streams 5 and above a specific waste container would not be expected to be designated for all these waste codes but this situation is not precluded.
- The feed specification represents current projections of wastes intended for treatment in WRAP Module 2A. Wastes identified in the future for treatment in WRAP Module 2A may have other codes.
- No individual wastes have yet been identified that bear all three codes (D001, D002, and D003). If any future wastes are identified for which incineration is the appropriate treatment, such wastes will not be treated in WRAP Module 2A.
- Each container in a feed stream group may contain more than one individual waste package and the waste codes on the drum and recorded constituent quantities for each drum summarize information on all the individual packages in that drum. It should not be presumed that each of the codes on a drum apply to all the individual waste packages in that drum or that the constituents in

- that drum are evenly distributed among the various individual packages within that drum.
- The computer searches of receipt records for mixed waste stored at the Hanford Site are limited by the quality of the data originally received with these containers. If a constituent is incorrectly identified or if the records are incomplete, it may not be possible to correct or complete the information after the fact without sampling.
 - The best management practices by which MLLW is packaged at the Hanford Site and at other sites for storage at the Hanford Site attempt to err on the side of conservatism. This practice may occasionally provide information that can be misinterpreted. For example, some procedures require that waste identified as corrosive be pH-adjusted to neutral, and that the waste code of D002 be retained on the waste even though it no longer meets the RCRA definition of corrosive waste.
 - The D001 code has six subcategories:
 - Ignitable liquids with high organic content
 - Ignitable liquids with low organic content
 - Ignitable liquid wastewater
 - Ignitable compressed gases
 - Ignitable reactives
 - Oxidizers.

Almost all the D001 wastes treated in WRAP Module 2A will be in the subcategory of oxidizers.

None of the D001 wastes intended for treatment at WRAP Module 2A will be in the three D001 subcategories for ignitable liquids (i.e., none of the wastes intended for treatment in WRAP Module 2A will have a flashpoint $<60^{\circ}\text{C}$). In addition, none of the D001 wastes intended for treatment at WRAP Module 2A will be in the D001 subcategory of ignitable compressed gases.

- The chemical characteristics narrative description in the Appendix D tables identifies the presence of "water-reactive substances" in Feed Stream 9C. The only water-reactive substances intended for treatment in WRAP Module 2A will be strong acids and bases packaged in lab pack-type quantities (because these wastes can react violently with water, they may be coded D003).
- No alkali metals will be treated in WRAP Module 2A.
- Although WRAP Module 2A is not intended to treat wastes such as oils, solvents, and alkali metals, it is expected that small quantities of these types of materials may occasionally be "discovered" during waste sorting. Upon discovery, such wastes will be repackaged and returned from WRAP Module 2A to storage. It is not intended that this consideration have significant impacts on the complexity or cost of WRAP Module 2A.

It should be recognized that with the exception of volume projections and the information that has been accumulated from other sources for the 183-H Basin and LETF wastes, a major portion of the data provided in the feed specification is based on waste in storage. From all indications, the variability of the existing waste in conjunction with the information on the other major feed streams and the issuing of the debris rule provide a reasonable basis for design and permitting of WRAP Module 2A.

6.2 RADIONUCLIDE DATA

Although some radionuclide information is presented along with the feed specification data, there may be need for a wider range of radionuclide values. The data available for Feed Streams 1 and 2 have been incorporated into the feed specification tables. A detailed listing of existing waste radionuclide data that cover a wide range of radionuclides for Feed Streams 5 through 9 is provided in Appendix E. The table shows the range (minimum and maximum), total, and count of containers with the radionuclide inventory for calculation of the average value. Detailed information of this type may be helpful for evaluations requiring more specific radionuclide data.

Based on information provided by waste generators and examination of the SWITS database, about 7% of the total waste volume is expected to contain alpha emitters, primarily plutonium. Admittedly, this information may not be reliable but from all indications the vast majority of the nonthermal treatable MLLW does not require stringent confinement to maintain the airborne radionuclides within acceptable limits.

6.3 BOX WASTE

The projected volume of boxes has increased substantially during the past several years. Based on current projections, as many as 90 to 100 boxes per year may require processing in WRAP Module 2A. Examination of existing data (see Figure 5-2) indicates that most of the box waste would be expected to be in the form of debris, particulate, and lead. This increase in boxes has caused a corresponding decrease in the projected number of drums to be treated thereby placing more emphasis on the design of the WRAP Module 2A box breakdown capabilities.

6.4 REVISION IMPACTS

The issuance of this revised feed specification presents some major and minor changes that have potential design implications which warrant discussion.

The major changes are as follows.

- Feed Streams 2C and 7 are deleted and Feed Stream 2A was reduced by 84%.
- The volume of boxes to be processed each year more than doubled over the previous estimate of 40 boxes per year.

- The volume ratio of debris to particulate has changed from approximately 40/60 to 60/40.
- The volume of special waste (i.e., mercury and lead) increased.

Additionally, there were a number of minor changes as follows:

- Radionuclide concentrations changed
- Chemical constituents added and concentrations changed
- Waste codes changed
- Bulk densities changed.

These minor changes have potential impact to the facility source term, treated waste performance assessment, the Waste Immobilization Demonstration (WID) program, and facility design media.

A summary of these changes by feed stream is provided by Table 6-1. The following discussion addresses the impacts of these changes to the WRAP-2A design.

6.4.1 Major Changes

1. Process flow diagrams (PFD) will not require immediate revision to accommodate the Feed Stream 2A reduction and the deletion of Feed Streams 2C and 7, but will be revised once sufficient changes have accumulated to warrant revision. This will require a minor supplemental design requirements document (SDRD) change. Although not required, equipment may be resized in the future to accommodate the reduced scope for particulate processing.
2. The additional burden on box breakdown can be accommodated by operating box breakdown on additional shifts if required. Also, incentives will be provided to generators to provide packaging configurations that will not require the use of box breakdown. No SDRD changes are contemplated based on this feed specification revision.
3. The volume shift from particulate to debris increases the burden on the vibro grout system. The changes in existing volume and drum contents of Feed Streams 9A, B, and C are the result of improved capabilities to evaluate the database and increases of 86, 62, and 37 drums containing particulate, debris, and contained liquid, respectively. The existing volume increase was considerably less than projected for the 1-year period, but backlog waste processed in the spring of 1994 is not included in the volume data. Increases in the forecast volumes occurred because of forecast data request improvements including box/drum information previously not available by feed stream. These increases are an example of the volatile nature of the forecast data that may occur from year to year (see earlier discussion in this document). Although the ratio of debris to particulate changed, a decision has been made to stay with the original design basis of 40% debris and 60% particulate for equipment sizing. If this increase in feed to vibro grout is

Table 6-1. Summary of Revision 1 Changes to Appendix D
Feed Stream Data Sheets. (sheet 1 of 2)

	Existing vol (m ³)		Forecast vol (m ³)		Rad change	Chem change	Miscellaneous changes
	Rev. 0	Rev. 1	Rev. 0	Rev. 1			
1A	575	581	0	0	--	--	--
1B	922	931	0	0	Np-237 curie reduction	Analysis added	Moisture: WAS dry, NOW damp to saturated. Waste code change: -D007, -WT01, +WT02. TCLP analysis added. Container weight range narrowed.
1C	971	980	0	0	Np-237 curie reduction	New analysis added	New hazardous component "formate" (no new waste codes). New information: rigid liner has metal ring on lid.
1D	148	149	0	0	--	Analysis added	Waste code change: -D007. TCLP analysis added.
2A	0.00	0.00	6,481	1,000	Radionuclide content table expanded	Chemical content table expanded	Ammonium sulfate changed: • WAS 95 wt% with 2 wt% sodium • NOW 0-83 wt% with 7-41 wt% sodium.
2B	0.00	0.00	405 (+ 75 max op)	202	Radionuclides increased in liquid	TEDF liquid analysis heavy metals	Density: WAS 54, NOW 43-87 (ETF, TEDF).
2C	0.00	0.00	3,964 (+ 232 max op)	0.00	--	--	--
5A1	1.7	4.3	9.5	16.7	Increased enriched uranium	New table	Density: WAS 30, NOW 36. Mercury content per drum increased as follows: • WAS 7 wt% and 0.2 vol% and 58 total kg • NOW 26 wt% and 1 vol% and 642 total kg. Dose rate change: WAS <1, NOW 0.1 - 55 mrem/h. Waste code change: +D005, +D008, +WL01. Container weight changed: WAS <454 kg, NOW 9.1-205 kg.
5A2	4.4	4.6	24	11.6	--	Table revised, new data, average deleted	Density: WAS 66, NOW 25. Waste code change: +WC02. Dose rate change: WAS <1, NOW 0.1 - 3 mrem/h.
5A3	7.4	7.3	40.1	18.6	Curie values increased	Table revised, new data, average and data deleted	Waste code change: -D008, +WC01.
5C1	110	114	613	856	Curies listed by element, Np deleted	New table	Density: WAS 74-97, NOW 58-92. Drum lead content reduced. Waste code change: +D002, +WT02. Additional container information.
5C2	0.2	9.5	1.2	7.9	Curie values increased	New table	Density: WAS 26, NOW 35. Waste code change: +(D002,4,5,6,7,9,10,11), +WC02, +WT01, +WP01.
5C3	17.3	25.8	97.5	843	Curie values increased Se added p. D-59	Table expanded and revised	Density: WAS 35, NOW 24-55. Drum lead chemical content reduced. Waste code change: +(F001,2,3,4,5), +(D005,6,9,10,11,37,40), +(WC02, WT02), -WP01.
7	0.00	0.00	2,043	0.00	--	--	--

Table 6-1. Summary of Revision 1 Changes to Appendix D
Feed Stream Data Sheets. (sheet 2 of 2)

	Existing vol (m ³)		Forecast vol (m ³)		Rad change	Chem change	Miscellaneous changes
	Rev. 0	Rev. 1	Rev. 0	Rev. 1			
9A	27.7	45.4	2,458	6,288	Curie values increased	Table revised and expanded average deleted	Density: WAS 68 avg, NOW 59 avg. New narrative description for composition and box use. Waste code change: +D009, -WP02. Container type notes possible use of "<3.62 m ³ ."
9B	26.5	39.3	7,864	14,803	Curie values changed	Table revised and expanded average deleted	Density: WAS 31, NOW 28. Narrative description notes percentage of boxes, concrete, and metals. Waste code change: +F004.
9C	9.3	17.1	415	637	Curie values changed	Table revised and expanded average deleted	Density: WAS 37, NOW 35. Narrative description notes labpacks change from 83% to 40%. Hazardous constituents changed from 9% to 13% (weight). Waste code change: +WC02, +WL02.

ETF = Effluent Treatment Facility
TCLP = Toxic characteristic leach procedure
TEDF = Treated Effluent Disposal Facility

realized, it can be accommodated by running additional shifts with no change to plant design. No SDRD changes are contemplated based on this feed specification revision.

4. Feed Stream 5A1 - The changes in elemental mercury waste volume and drum content are the result of improved capabilities to evaluate the database that resulted in an increase of 35 drums and 1 box containing mercury. This change for the most part should have no impact on the WID program or plant design because WHC-EP-0063, *Hanford Site Solid Waste Acceptance Criteria* (Willis 1994), requires all generators to amalgamate elemental mercury before storage.

Feed Streams 5C2 and 5C3 - Combined existing and projected volume increases for these feed streams of 78 drums for 5C2 and 1,160 drums and 142 boxes for 5C3 are the result of receiving a few new containers of this waste, but principally in improvements in the forecast requests for data from generators. The increase in the forecast lead debris feed stream (5C3) was expected because of associated increases in the overall debris waste.

6.4.2 Minor Changes

Source Term (Radionuclides)--The radiological changes in this WRAP 2A feed specification could have potential impacts on the radiological source term, the hazard categorization, and the waste category. The following discussion is a summary of these impacts for each feed stream with increased radionuclide content.

Feed Stream 2A--Radionuclide concentrations reduced - the old concentrations resulted in above Category 3 waste for the bounding 0% ammonium sulfate case. With the new radionuclide inventory, even the bounding case is not above Category 3.

Feed Stream 2B--Radionuclide content increased in liquid; no impact due to conservatism in source term assumptions.

Feed Stream 5A1--²³⁵U increased, dose rate increased; no impact due to conservatism in source term assumptions.

Feed Stream 5A2--Dose rate increased; no impact due to conservatism in source term assumptions.

Feed Stream 5A3--⁹⁹Tc levels increased by 1.0 E+5 - no impact because ⁹⁹Tc was a factor of 1.0 E-12 below the Category 3 waste limit and even farther from the DOE 1027 threshold quantities.

Feed Stream 5C1--²³⁷Np deleted, radionuclides defined; no impact due to conservatism in source term assumptions.

Feed Stream 5C2--⁹⁹Tc increased by 1.0 E+2, ¹²⁹I increased by 1.0 E+3; no impact because both radionuclides are still many orders of magnitude below Category 3 or threshold quantities.

Feed Stream 5C3--⁷⁹Se added (1.0E-10 Ci); no impact because the ⁷⁹Se Category 3 limit is 17 Ci/drum.

Feed Stream 9A--⁹⁹Tc and ¹²⁹I increased by 1.0 E+5; no impact.

Feed Stream 9B--Curie quantities changed slightly; no impact.

Feed Stream 9C--¹²⁹I quantity increased by 1.0 E+4, ⁷⁹Se content increased by 1.0 E+2; no impact.

Performance Assessment

The Paradox* computer program was used to interrogate the 1993 database and sum all the various radionuclides to determine if the changes were significant with regard to performance assessment. The major radionuclide of concern was ⁹⁹Tc. Based on this evaluation, the overall changes were insignificant and the ⁹⁹Tc content of the 183-H Basin waste (no change from Revision 0) still overshadows contributions from all other waste streams.

WID--Formulation development testing activities performed as part of the WID program use surrogate materials to represent the real waste. The surrogates have been prepared according to the recipes in WHC-SD-W100-TP-008, *WRAP 2A Surrogate Make-up Procedure* (Slaathaugh 1993), which references Revision 0 of WHC-SD-W100-RD-001 (Kruger and Sheriff 1993). The following text evaluates the altered feed streams in the Revision 1 feed specification that are within the WID scope and the resulting changes to the WID program.

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WHC-SD-W100-RD-001
Revision 1

The data that have been produced to date and the work that is in progress still represent valid and useful data. Additional scope will need to be added to the WID program to expand the envelope of constituent concentrations.

Feed Stream 1B--Previous WID work for Feed Stream 1B has used a surrogate recipe based on data reported in DOE-RL 88-04, *183-H Solar Evaporation Basins Closure, Post-Closure Plan* (DOE-RL 1991), and included in Revision 0 of the Feed Specification Data Sheets as part of Feed Stream 1C. The average and bounding concentrations of several constituents in the new 1B feed stream do not fall within the range previously investigated. Additional data should be collected to include the ranges and limits reflected in the revision. New scope should be added to the WID program to investigate this feed stream.

Feed Streams 1C, 1D--There are no impacts to the WID program from the new revision regarding Feed Streams 1C and 1D. This revision of WHC-SD-W100-RD-001 contains all the original data as well as new means and bounding values. The new mean and bounding values will be incorporated into the variability studies that are planned. Existing data from investigation of these feed streams, as well as Feed Stream 1B, remains valid because the basis for those surrogates is still in the feed specification. The surrogate recipes for old Feed Streams 1B and 1C fall within the bounds of the new Feed Stream 1C specification. Feed Stream 1C has chemical constituent data from the 183-H Basin Closure report and a 1994 sampling and analysis program. Because the 1994 program was more complete and comprehensive, these data will supercede the previous data reported in Revision 0 of the feed specification.

Feed Stream 2A--Surrogate recipes for this feed stream included the high ammonium case, and the no ammonium case. The 8.8% ammonium case has not been investigated and is not scoped in current planning.

Feed Stream 2B--The WID program will not be impacted by the changes in this revision of WHC-SD-W100-RD-001 regarding Feed Stream 2B. This stream is scoped for testing with the polyethylene extrusion system. The Feed Stream 2B surrogate has not yet been developed. When the WID program is ready to test this stream, a recipe will be written for Feed Stream 2B based on the most current revision of the feed specification.

Feed Streams 5A2, 5C2, and 9C--These streams are not a part of current WID scope. Changes have no impact. The changes in Revision 1 for these streams include identification of additional constituents listed in the Primary Components section under Chemical Characteristics, and changes in the amounts of some of the original constituents listed in Revision 0. These streams will be handled in the Special Waste Treatment area and will be handled on a case-by-case basis. Available information for these feed streams is now sufficient to begin investigation of treatment strategies, if desired.

Feed Stream 9A--This stream is scoped for testing with the agitated grout system. The Feed Stream 9A surrogate has not yet been developed. Because of the variety of constituents present in this feed stream, some of which are incompatible with cement, formulation development testing will be required. When the WID program is ready to test this stream, a recipe will be written for Feed Stream 2B based on the most current revision of the feed specification. The expanded list of constituents will not change the nature of testing required for this feed stream and will have no major impact on the WID

program. Available information for this feed stream is now sufficient to begin investigation of treatment strategies, if desired.

Design Media--The new values for density of several feed streams would require the updating of material balances on 1 overall block flow diagram and on 15 PFDs, if implemented. However, no changes to design equipment are contemplated as a result of these recalculations. It is recognized that operation of the plant will use campaign-specific flowsheets that are the most appropriate based on the information available at that time. Therefore, no change to the PFDs and block flow diagrams are contemplated as a result of this revision.

The additional waste codes shown in the revised feed specification will not create any change in the design.

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7.0 SWITS DATA INTERROGATION UPGRADES

Efforts to develop software for computer interrogation of the SWITS data for MLLW were completed during fiscal year 1994. This software was extremely helpful for grouping drums by waste code and evaluating the ranges of hazardous constituents and radionuclides in the existing waste. This software was used to update the feed specification attributes data provided in Appendix D.

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9.0 GLOSSARY

ABBREVIATIONS AND ACRONYMS

CH	contact handled
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ETF	Effluent Treatment Facility
LETF	Liquid Effluent Treatment Facility
MLLW	mixed low-level waste
PFD	process flow diagram
RCRA	Resource Conservation and Recovery Act
RFP	Request for Proposal
SDAR	Storage Disposal Approval Record
SDRD	supplemental design requirements document
SWITS	solid waste information and tracking system
TEDF	Treated Effluent Disposal Facility
WHC	Westinghouse Hanford Company
WID	waste immobilization demonstration
WRAP	Waste Receiving and Processing

WHC-SD-W100-RD-001
Revision 1

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APPENDIX A

**METHODOLOGY FOR OBTAINING VOLUMES OF
FEED STREAMS 5A1-A3, 5C1-C3, 9A, 9B, AND 9C**

CONTENTS

MERCURY WASTE TO BE PROCESSED IN WRAP MODULE 2A	A-3
LEAD WASTE TO BE PROCESSED IN WRAP MODULE 2A	A-6
HETEROGENEOUS SOLID WASTE TO BE PROCESSED IN WRAP MODULE 2A	A-9

APPENDIX A

METHODOLOGY FOR OBTAINING VOLUMES OF FEED STREAMS 5A1-A3, 5C1-C3, 9A, 9B, AND 9C

MERCURY WASTE TO BE PROCESSED IN WRAP MODULE 2A

Existing Data

Elemental mercury									
Volume (m ³)	Volume (ft ³)	Drum equiv.	Gross weight (kg)	Mercury (kg)	Hazardous constituent (wt%)	Drum density (lb/ft ³)	Drum density (kg/m ³)	Mercury (m ³)	% by Volume
4.3	152	21	2,454	642	26%	36	571	0.04724	1%

Assumptions

1. The waste in some of these drums may have already been amalgamated, and hazardous debris is frequently packaged in the same drums with the waste.
2. Twenty-six percent by weight of this lot is elemental mercury. The remaining 74% contains thermometers and containers of liquid or amalgamated mercury packaged with absorbents and hazardous debris.

Mercury chemicals							
Volume (m ³)	Volume (ft ³)	Drum equiv.	Gross weight (kg)	Mercury (kg)	Hazardous constituent (wt%)	Drum density (lb/ft ³)	Drum density (kg/m ³)
4.6	162	22	1,806	1	0.05%	24	393

Assumptions

1. The mercury-contaminated waste in these drums consists of batteries or primarily of lab-pack-type wastes.
2. The mercury makes up <1% by weight of the lot. The remaining 99% is containers, absorbents, and chemicals associated with batteries and contained/absorbed liquids.

Mercury-contaminated waste							
Volume (m ³)	Volume (ft ³)	Drum equiv.	Gross weight (kg)	Mercury (kg)	Hazardous constituent (wt%)	Drum density (lb/ft ³)	Drum density (kg/m ³)
7.3	259	35	4,109	33	0.80%	35	560

Assumptions

1. This inventory consists of fluorescent light tubes.
2. The mercury makes up <1% by weight of the lot. The other 99% is contaminated glass, chemicals, and packing material associated with the light tubes.

Calculations

Existing Data

Percent of mercury-coded waste to total volume of non-183-H existing waste:

$$16.2/268 \times 100 = 10.00\%$$

Percent by volume of elemental mercury to total mercury volume:

$$4.3/16.2 \times 100 = 26.48\%$$

Percent by volume of mercury chemicals to total mercury volume:

$$4.6/16.2 \times 100 = 28.33\%$$

Percent by volume of mercury-contaminated waste to total mercury volume:

$$7.3/16.2 \times 100 = 45.20\%$$

FORECAST DATA

CH_MLLW_I (See Appendix B)	5.7
CH_MLLW_III (See Appendix B)	0.1
Total forecast mercury (m ³)	5.8

	<u>Total (ft³)</u>	<u>Total (m³)</u>	<u>Mercury total (m³)</u>
WRAP Module 1	14,384 ^a	411	41.1 ^b

^aVolume based on solid waste projection modeling results.

^bBased on calculation of volume of mercury to volume of non-183-H existing waste (10.00%).

WHC-SD-W100-RD-001
Revision 1

Summary: Existing plus forecast plus WRAP Module 1 Volumes

Mercury*	Existing	Forecast	WRAP Module 1	Total (m ³)	Total (ft ³)	Total DE	Total BE
Elemental	4.3	5.8	10.9	21.0	742	89	1
chemicals	4.6	0.0	11.6	16.2	572	78	0
Hg cont.	7.3	0.0	18.6	25.9	916	125	0
Total	16.2	5.8	41.1	63.1	2,230	292	1

*Mercury breakdown using the above percentages of 26.48, 28.33, 45.20 for elemental, chemicals, and mercury-contaminated waste, respectively.

LEAD WASTE TO BE PROCESSED IN WRAP MODULE 2A

Existing Data

Elemental lead								
Volume (m ³)	Volume (ft ³)	Drum equiv.	Box equiv.	Gross weight (kg)	Lead (kg)	Hazardous constituent (wt%)	Lead (m ³)	% by Volume
114.4	4,041	237	18	137,600	113,950	83%	10.0	9%
Elemental lead (cont)								
Box density (lb/ft ³)		Box density (kg/m ³)		Drum density (lb/ft ³)		Drum density (kg/m ³)		
58		925		92		1,478		

Assumptions

1. Hazardous constituents include lead in the form of elemental lead or metal representative of the lead.
2. Eighty-three percent by weight of this lot is elemental lead. The remaining 17% is in the form of any combination of absorbent, polyethylene, paper, metal, asbestos, rubber, or cloth.

Lead chemicals/solution							
Volume (m ³)	Volume (ft ³)	Drum equiv.	Gross weight (kg)	Lead (kg)	Hazardous constituent (wt%)	Drum density (lb/ft ³)	Drum density (kg/m ³)
9.5	337	46	5,384	249	5%	35	564

Assumptions

1. Polyethylene, glass, or metal containers in which hazardous constituent is lead (i.e., PbO₂ in solution with various others) in a form of liquid surrounded by absorbent or as one of several possible absorbents saturated or nearly saturated with liquid containing lead.
2. The lead makes up 5% by weight of the lot. The remaining 95% is containers, absorbents, and chemicals.

Lead-contaminated waste										
Volume (m ³)	Volume (ft ³)	Drum equiv.	Box equiv.	Gross weight (kg)	Lead (kg)	Hazardous constituent (wt%)	Drum density (lb/ft ³)	Drum density (kg/m ³)	Box density (lb/ft ³)	Box density (kg/m ³)
25.8	909	106	1	21,011	10,586	50%	55	881	24	387

Assumptions

1. Hazardous constituents include lead in the form of any combination of cloth, diatomaceous earth, metal, filters, wire, stainless steel, paper, polyethylene, wood, absorbent, glass, rubber, or conwed pads.
2. The lead makes up 50% by weight of this lot. The remaining 50% is to be considered debris as defined above.

Calculations

Existing Data

Percent by volume of lead-coded waste to total volume of non-183-H existing waste:

$$149.7/280 \times 100 = 55.87\%$$

Percent by volume of elemental lead to total lead volume:

$$114.4/149.7 \times 100 = 76.43\%$$

Percent by volume of chemical/solution lead to total lead volume:

$$9.5/149.7 \times 100 = 6.37\%$$

Percent by volume of lead-contaminated waste to total lead volume:

$$25.8/149.7 \times 100 = 17.20\%$$

FORECAST DATA

CH MLLW I (See Appendix B)	581.0
CH MLLW III (See Appendix B)	<u>1,003.8</u>
Total forecast lead (m ³)	1,584.8

	<u>Total (ft³)</u>	<u>Total (m³)</u>	<u>Lead total (m³)</u>
WRAP Module 1	14,384 ^a	411.0	123.3 ^b

^aVolume based on solid waste projection modeling results..

^bBased on evaluation of the contents of WRAP Module 1 waste, a decision was made to reduce the amount of lead expected from WRAP Module 1 to 30%.

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WHC-SD-W100-RD-001
Revision 1

Summary: Existing plus forecast plus WRAP Module 1 Volumes

Lead*	Existing	Forecast	WRAP Module 1	Total (m ³)	Total (ft ³)	Total DE	Total BE
Elemental	114.4	762.4	94.2	971.0	34,287	1,148	202
Chemical/sol	9.5	0.0	7.9	17.4	616	84	0
Pb cont.	25.8	822.4	21.2	869.4	30,697	1,712	142
Total	149.7	1,584.8	123.3	1,857.8	65,600	2,944	344

*Lead breakdown using the above percentages of 76.43, 6.37, 17.20 for elemental, chemical/solution, and lead-contaminated waste, respectively.

HETEROGENEOUS SOLID WASTE TO BE PROCESSED IN WRAP MODULE 2A

Existing Data

Contained liquid									
Volume (m ³)	Volume (ft ³)	Drum equiv.	Gross weight (kg)	Constituent (kg)	Hazardous constituent (wt%)	Drum density (lb/ft ³)	Drum density (kg/m ³)	Minimum gross wt (kg)	Maximum gross wt (kg)
17.1	604	82	9,580	1,205	13%	35	560	7	441

Assumptions

1. Polyethylene, glass, or metal containers that have various hazardous constituents, excluding lead and mercury, in a form of liquid surrounded by absorbent or as one of several possible absorbents saturated or nearly saturated with liquid.
2. Thirteen percent by weight of this lot is hazardous constituents. The remaining 87% are containers and absorbents.
3. About 40% of the containers have "Y" for yes, in the lab pack flag designator (meaning they are reported to be lab packs) whereas the others were selected for this category based on waste characteristics information.

Particulates									
Volume (m ³)	Volume (ft ³)	Drum equiv.	Gross weight (kg)	Constituent (kg)	Hazardous constituent (wt%)	Drum density (lb/ft ³)	Drum density (kg/m ³)	Minimum gross wt (kg)	Maximum gross wt (kg)
45.5	1,607	219	42,849	15,970	37%	59	941	12	345

Assumptions

1. Containers that have various hazardous constituents, excluding lead in the form of liquid with absorbent (no mention of polyethylene), absorbent only, sludges (with or without absorbent), resins, chemicals, soils, clay, or asbestos material.
2. Thirty-seven percent by weight of this lot are hazardous constituents. The remaining 63% are absorbents, clay and polyethylene, metal or glass containers.
3. None of the containers have "Y" in the lab pack flag designator.
4. Fifteen containers have the D009 mercury code. The drums contain sludge from lab operations and have a combined concentration of 3 ppm mercury.

WHC-SD-W100-RD-001
Revision 1

Solid/debris waste									
Volume (m ³)	Volume (ft ³)	Drum equiv.	Gross weight (kg)	Constituent (kg)	Hazardous constituent (wt%)	Drum density (lb/ft ³)	Drum density (kg/m ³)	Minimum gross wt (kg)	Maximum gross wt (kg)
39.3	1,389	189	17,708	945	5%	28	450	5	395

Assumptions

1. Containers that have various hazardous constituents, excluding lead and mercury, in the form of any combination of cloth, diatomaceous earth, metal, paper, polyethylene, wood, absorbent, glass, rubber, conwed pads, stainless steel, or filters including high-efficiency particulate air filters.
2. Three percent by weight of this lot is hazardous constituents. The remaining 97% is debris-type waste as defined above.
3. Containers that have the "F" codes have <0.5% of that constituent on them and therefore are considered to be incidental contact containers.
4. Three of the containers have "Y" in the lab pack flag designator and appear to have contaminated equipment in them.

Calculations

Existing Data

Percent by volume of heterogeneous waste to total volume of non-183-H existing waste:

$$102.0/268 \times 100 = 38.04\%$$

Percent by volume of contained liquid to total heterogeneous volume:

$$17.1/102.0 \times 100 = 16.77\%$$

Percent by volume of particulate to total heterogeneous volume:

$$45.5/102.0 \times 100 = 44.64\%$$

Percent by volume of solid/debris to total heterogeneous volume:

$$39.3/102.0 \times 100 = 38.58\%$$

FORECAST DATA

Breakdown of ETF (C-018H) Waste into Various Designated Feed Streams (not included in forecast data in Appendix B)

Designated stream	Waste forms	CH_LLW_I	CH_LLW_III	Total	Box vol.	Drum vol.
	<u>Inorganic residue</u>					
2A	Particulate	0.0	1,000.0	1,000.0	0.0	1,000.0
2A	Abs liq/sludge	0.0	0.0	0.0	0.0	0.0
2A	Other	0.0	0.0	0.0	0.0	0.0
Subtotal		0.0	1,000.0	1,000.0	0.0	1,000.0
	<u>Organic residue</u>					
2B	Noncompactible	0.0	202.0	202.0	0.0	202.0
Subtotal		0.0	202.0	202.0	0.0	202.0
	<u>Debris-heterogeneous</u>					
9B	Filters	51.7	0.0	51.7	51.7	0.0
9B	Combustible	590.2	0.0	590.2	5.0	585.2
9B	Noncombustible	18.1	0.0	18.1	0.0	18.1
9B	Other	0.0	0.0	0.0	0.0	0.0
Subtotal		660.0	0.0	660.0	56.7	603.3
	<u>Total</u>	660.0	1,202.0	1,862.0	56.7	1,805.3

Breakdown of Remaining Forecast Data into Designated Feed Streams (see Appendix B)

Volume (m ³)						
Designated stream	Waste forms	CH_LLW_I	CH_LLW_III	Total	Box vol.	Drum vol.
	<u>Inorganic residue</u>					
9A	Particulate	1,833.2	308.0	2,141.2	310.3	1,830.9
9A	Abs liq/sludge	681.0	47.3	728.3	8.2	720.1
9A	Other	4.4	0.0	4.4	0.0	4.4
9A	Soils	3,164.1	143.3	3,307.4	2,937.6	369.8
Subtotal		5,682.7	498.6	6,181.3	3,256.1	2,925.2
	<u>Debris</u>					
9B	Other metal	2,446.8	228.0	2,674.8	2,364.9	309.9
9B	Construction metal	221.4	317.0	538.4	198.1	340.3
9B	Other	36.3	4.1	40.4	0.0	40.4
9B	Noncompactible	1,648.3	482.4	2,130.7	833.8	1,296.9
9B	Compactible	2,440.5	567.3	3,007.8	1,096.8	1,911.0
9B	Filters	853.5	206.7	1,060.2	385.8	674.4
9B	Combustible	2,000.2	129.3	2,129.5	41.0	2,088.5
9B	Noncombustible	104.1	0.0	104.1	23.0	81.1
9B	Other	6.5	0.0	6.5	0.0	6.5
9B	Stainless	0.0	0.0	0.0	0.0	0.0
9B	Concrete	2,362.2	0.0	2,362.2	619.6	1,742.6
Subtotal		12,119.8	1,934.8	14,054.6	5,563.0	8,491.6
	<u>Labpacks</u>					
9C	Labpack/ Contained liquid	424.5	171.7	596.2	0.0	596.2
Subtotal		424.5	171.7	596.2	0.0	596.2
	<u>Total</u>	18,227.0	2,605.1	20,832.1	8,819.1	12,013.0

WHC-SD-W100-RD-001
Revision 1

The C-018H volumes are accounted for as a separate stream in the Feed Specification Document. To obtain an accurate forecast amount, the debris volume for C-018H of 660.0 m³ was added to the total volume for debris to obtain an adjusted volume.

Total adjusted

Debris	14,054.6	660.0 ^a	14,714.6
Particulate	6,181.3	--	6,181.3
Cont. liquid	596.2	--	596.2
Total	20,832.1	660.0	21,492.1

Total (ft³) Total (m³) Heterogeneous total (m³)

WRAP Module 1 14,384^b 411.0 246.6^c

^aC-018H debris to be added to forecast debris.

^bVolume based on solid waste projection modeling results.

^cBased on percentage of lead (30%) plus percentage of mercury (10.0%) leaving 60.0%.

Summary: Existing plus Forecast plus WRAP Module 1 Volumes

Heterogeneous	Existing	Forecast	WRAP* Module 1	Total (m ³)	Total (ft ³)	Total DE	Total BE
C. liquid	17.1	596.2	41.4	654.7	23,117	3,147	0
Particulate	45.5	6,181.3	110.1	6,336.9	223,757	14,812	899
Solid/debris	39.3	14,714.6	95.1	14,849.0	524,318	44,371	1,552
Total	102.0	21,458.1	246.6	21,840.6	771,192	62,330	2,451

*Heterogeneous breakdown for WRAP Module 1 uses the existing stream percentages of 16.77, 44.64, and 38.58 for contained liquid, particulate, and solid/debris, respectively.

A.2 GLOSSARY

ABBREVIATIONS AND ACRONYMS

BE	box equivalent
CH	contact handled
DE	drum equivalent
ETF	Effluent Treatment Facility
WRAP	Waste Receiving and Processing

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APPENDIX B

FISCAL YEAR 1993 FORECAST VOLUME SUMMARY

CONTENTS

Fiscal Year 1993 Mixed Low-Level Waste Forecast Volume Summary - Nonthermally Treatable Volumes by Waste Class and Waste Generator	B-27
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3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 1a

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_1		-----													
=====															
IN ORG PART	IGN	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	CORR	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
	TC MET	57.6	195.7	49.1	35.0	35.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0
	ACUTELY HAZ	.3	.2	.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total IN ORG PART		59.1	197.2	50.5	36.3	36.3	58.2	58.2	58.2	58.2	58.1	58.1	58.1	58.1	58.1
IN ORG LQ/SLG	IGN	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
	CORR	5.4	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	TC MET	10.8	20.1	9.9	9.7	9.6	9.3	9.1	9.1	9.2	9.3	9.3	9.5	9.6	9.7
	ACUTELY HAZ	.3	.6	.2	.5	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WC	.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WP	.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WT	.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FILLER/ABSORB		6.0	6.0	7.2	8.9	8.9	8.9	8.9	8.9	8.9	8.4	8.5	8.5	8.5	8.5
Total IN ORG LQ/SLG		23.1	30.1	20.6	22.4	21.9	21.5	21.2	21.2	21.2	20.8	21.0	21.1	21.2	21.4
IN ORG OTH	CORR	.2	.9	.8	.8	.8	.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total IN ORG OTH		.2	.9	.8	.8	.8	.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D-IN LEAD MTL	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	CORR	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
	TC MET	8.0	2.4	2.8	5.5	5.8	7.5	18.5	18.1	16.3	7.6	8.0	7.6	8.0	2.3

WHC-SD-M100-RD-001
Revision 1

WHC-SD-W100-RD-001
Revision 1

PWF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMW_I																		
=====																		
IN ORG PART	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4
CORR		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	33.5
TC MET		57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	1796.2
ACUTELY HAZ		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	2.4
WC		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
WP		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
WT		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4
Total IN ORG PART		58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	58.1	1833.2
IN ORG LQ/SLG	IGN	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	15.5
CORR		2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	82.2
TC MET		9.8	10.0	10.1	10.2	10.4	10.5	10.7	10.9	11.1	11.3	11.4	11.7	11.8	12.1	12.3	12.5	321.0
ACUTELY HAZ		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.9
WC		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1
WP		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1
WT		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1
FILLER/ABSORB		8.5	8.5	8.5	8.5	8.5	8.6	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	260.2
Total IN ORG LQ/SLG		21.4	21.6	21.8	21.8	22.0	22.3	23.3	23.4	23.7	23.8	24.0	24.2	24.4	24.6	24.9	25.1	681.0
IN ORG OTH	CORR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
Total IN ORG OTH		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
D-IN LEAD MTL	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.9
CORR		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	3.3
TC MET		2.7	2.3	2.7	2.3	2.7	2.3	2.7	2.3	2.7	2.3	2.7	2.3	2.7	2.3	2.7	2.3	158.3

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 2a

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_I		-----													
=====															
D-IN LEAD MTL	TC ORG	.0	.0	.0	3.1	3.1	5.2	15.8	15.8	13.6	5.3	5.3	5.3	5.3	.0
	SPENT SOLV	.4	.4	.5	3.5	3.5	5.6	16.2	16.2	14.1	5.8	5.8	5.8	5.8	.5
	ACUTELY HAZ	.0	.0	.0	3.0	3.0	5.1	15.7	15.7	13.6	5.3	5.3	5.3	5.3	.0
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	Total D-IN LEAD MTL	8.6	3.0	3.4	15.2	15.6	23.6	66.3	65.9	57.8	24.2	24.6	24.2	24.6	3.0
D-IN OTH MTL B-5	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	CORR	.4	.6	.4	.3	.3	.5	.3	.5	.5	.5	1.1	1.1	1.7	1.7
	TC MET	3.2	118.6	4.1	23.0	21.9	34.0	95.4	95.7	82.9	33.1	33.8	33.8	34.5	2.7
	TC ORG	.0	.5	.4	18.5	18.5	31.1	94.7	94.7	81.9	32.1	32.2	32.2	32.3	.5
	SPENT SOLV	73.4	12.2	11.3	30.1	29.1	40.8	104.4	104.5	91.7	41.9	42.0	42.0	42.0	10.2
	ACUTELY HAZ	.7	1.9	.8	20.1	19.1	30.7	94.4	94.4	81.6	31.8	31.9	31.9	31.9	.1
	PCB < 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	Total D-IN OTH MTL	78.0	133.8	17.1	92.2	89.0	137.2	389.2	389.8	338.7	139.6	141.0	141.0	142.4	15.2
D-IN CONS MTL	IGN	.0	.5	.1	.1	.0	.4	.0	.4	.4	.4	1.3	1.3	2.1	2.1
	CORR	.2	2.1	.5	.5	.1	1.8	.2	1.8	1.8	1.8	5.2	5.2	8.6	8.6
	TC MET	.6	3.2	1.7	1.5	1.1	3.0	.8	2.6	2.6	2.6	6.4	6.4	10.3	10.3
	TC ORG	.0	.4	.4	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
	SPENT SOLV	.7	1.5	1.8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1
	ACUTELY HAZ	.0	.2	.1	.1	.0	.2	.0	.2	.2	.2	.6	.6	1.1	1.1

WHC-SD-W100-RD-001
Revision 1

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 2b

PWF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMW_I																		
=====																		
D-IN LEAD MTL	TC ORG	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	78.3
	SPENT SOLV	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	92.0
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	77.5
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
Total D-IN LEAD MTL		3.4	3.0	3.4	3.0	3.4	3.0	3.4	3.0	3.4	3.0	3.4	3.0	3.4	3.0	3.4	3.0	410.9
D-IN OTH MTL B-6	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.9
	CORR	1.7	1.7	.8	.5	.4	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	18.0
	TC MET	2.7	2.7	1.7	1.3	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	636.8
	TC ORG	.5	.5	.4	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	474.7
	SPENT SOLV	10.2	10.3	10.2	10.2	10.1	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	843.7
	ACUTELY HAZ	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	471.5
	PCB < 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.5
Total D-IN OTH MTL		15.2	15.3	13.1	12.4	12.1	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	2446.8
D-IN CONS MTL	IGN	2.1	2.1	.9	.4	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	15.3
	CORR	8.6	8.6	3.5	1.8	1.0	.3	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	63.7
	TC MET	10.3	10.3	4.5	2.6	1.7	.9	.7	.7	.6	.6	.6	.6	.6	.6	.6	.6	89.8
	TC ORG	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	8.2
	SPENT SOLV	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	35.3
	ACUTELY HAZ	1.1	1.1	.4	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.7

WHC-SD-W100-RD-001
Revision 1

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 3a

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_I															
=====															
D-IN CONS MTL	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total D-IN CONS MTL		1.7	7.9	4.6	3.7	2.8	7.1	2.6	6.6	6.6	6.6	15.0	15.0	23.5	23.5
D-IN OTH	CORR	0.0	.2	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WC	5.4	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Total D-IN OTH		5.4	1.2	1.1	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
D-ORG NON COMP	IGN	.3	.4	.3	.3	.2	.4	.1	.3	.3	.3	.8	.8	1.3	1.3
	CORR	.9	1.5	.8	.8	.6	1.5	.5	1.4	1.4	1.4	4.1	4.1	5.9	5.9
	REAC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	TC MET	6.7	8.9	5.9	8.5	5.8	4.9	3.8	4.9	4.9	4.7	7.9	7.9	10.1	10.1
	TC ORG	.1	.2	.2	.2	.2	.2	.1	.1	.1	.1	.9	.9	.9	.9
	SPENT SOLV	193.9	38.2	38.5	41.8	39.3	37.2	37.1	37.1	37.1	36.3	37.1	37.1	37.1	37.1
	ACUTELY HAZ	2.1	5.0	2.4	5.0	2.4	.3	.2	.2	.2	.2	.2	.2	.2	.2
	WC	.3	.3	.3	.4	.4	.4	.4	.4	.4	.3	.3	.3	.3	.3
	WP	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
	WT	.9	.6	.7	.8	.8	.8	.8	.8	.8	.7	.7	.7	.7	.7
Total D-ORG NON COMP		205.4	55.2	49.2	57.8	49.7	45.8	43.2	45.3	45.3	44.3	52.2	52.2	56.7	56.7
D-ORG COMP	IGN	.2	.5	.4	.4	.4	.5	.2	.3	.3	.3	.6	.6	.9	.9
	CORR	.9	1.5	1.1	1.1	.9	1.5	.7	1.3	1.3	1.2	2.7	2.7	3.8	3.8
	REAC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	TC MET	12.0	16.2	12.1	15.7	11.7	9.4	8.7	9.4	9.4	9.2	10.9	10.9	12.3	12.3

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WHC-SD-M100-RD-001
Revision 1

WHC-SD-W100-RD-001
Revision 1

PVF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMV_1 =====																		
D-IN CONS MTL		23.5	23.5	10.8	6.6	4.4	2.7	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	221.4
WC		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4
WP		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
WT		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.8
Total D-IN CONS MTL		23.5	23.5	10.8	6.6	4.4	2.7	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	221.4
D-IN OTH		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.3
WC		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	36.0
Total D-IN OTH		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	36.3
D-ORG NON COMP		1.3	1.3	.6	.3	.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	12.3
CORR		5.9	5.9	3.1	2.2	1.8	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	64.3
REAC		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
TC MET		10.1	10.1	6.7	5.6	5.0	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	183.7
TC ORG		.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	19.6
SPENT SOLV		37.1	37.3	37.3	37.3	37.3	38.5	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	1307.9
ACUTELY HAZ		.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	21.7
WC		.3	.3	.3	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	10.3
WP		.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	5.1
WT		.7	.7	.7	.7	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	23.2
Total D-ORG NON COMP		56.7	56.9	50.1	47.8	46.7	47.0	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	48.4	1648.3
D-ORG COMP		.9	.9	.4	.3	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	11.0
CORR		3.8	3.8	2.1	1.5	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	47.6
REAC		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.8
TC MET		12.3	12.3	10.2	9.5	9.2	8.9	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	313.9

PMF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_I															
=====															
D-ORG COMP	TC ORG	.1	2.1	2.1	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.7	1.7	1.7	1.7
	SPENT SOLV	283.3	51.6	49.8	55.6	51.8	48.8	48.7	48.7	48.7	48.7	48.2	48.2	48.2	48.2
	PLTG WST	3.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	ACUTELY HAZ	3.1	7.3	3.4	7.3	3.4	.3	.3	.3	.3	.2	.2	.2	.2	.2
	WC	.4	.4	.4	.5	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
	WP	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
	WT	.7	.7	.7	.9	.9	.9	.9	.9	.9	.8	.8	.8	.8	.8

Total D-ORG COMP		304.0	86.3	76.1	89.0	77.2	69.4	67.5	68.9	68.9	67.6	71.8	71.8	74.6	74.6

D-HET FILTERS	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	CORR	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
	TC MET	12.2	6.9	6.5	9.7	9.4	11.4	21.9	22.0	19.9	11.6	11.9	11.9	12.1	6.8
	TC ORG	.1	.6	.6	3.5	3.5	5.6	16.0	16.0	13.9	5.6	5.6	5.6	5.6	.3
	SPENT SOLV	19.9	4.2	4.0	7.1	6.9	8.7	19.3	19.3	17.2	8.9	8.9	8.9	8.9	3.6
	ACUTELY HAZ	11.0	5.7	5.4	8.8	8.5	10.4	21.0	21.0	18.9	10.6	10.6	10.6	10.6	5.3
	WC	4.4	.5	.3	6.5	.1	.0	3.4	.0	.0	3.4	.0	.0	3.4	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

Total D-HET FILTERS		47.7	18.0	17.0	35.7	28.6	36.3	81.8	78.5	70.0	40.2	37.1	37.1	40.8	16.2

D-HET COMB	IGN	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	CORR	4.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
	TC MET	2.2	3.0	3.1	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7
	TC ORG	.0	.8	.8	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
	SPENT SOLV	22.9	2.8	39.2	61.7	61.7	61.7	61.7	98.6	98.6	98.6	98.5	87.2	87.2	87.2
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 4b

PWF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMW_I																		
=====																		
D-ORG COMP	TC ORG	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	48.7
	SPENT SOLV	48.2	50.1	50.1	50.1	50.1	52.2	53.8	53.8	53.8	53.8	53.8	53.8	53.8	53.8	53.8	53.8	1766.4
	PLTG WST	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	176.2
	ACUTELY HAZ	.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	30.7
	WC	.4	.4	.4	.4	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	13.0
	WP	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	6.5
	WT	.8	.8	.8	.8	.8	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	25.7
Total D-ORG COMP		74.6	76.5	72.3	70.9	70.2	71.8	73.7	73.7	73.7	73.6	73.6	73.6	73.7	73.6	73.6	73.6	2440.5
D-HET FILTERS B-10	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.7
	CORR	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	3.0
	TC MET	6.8	6.8	6.4	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	274.7
	TC ORG	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	87.2
	SPENT SOLV	3.6	3.6	3.6	3.6	3.6	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	205.6
	ACUTELY HAZ	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	242.4
	WC	.0	3.4	.0	.0	3.4	.0	.0	3.4	.0	.0	3.4	.0	.0	3.4	.0	.0	39.2
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.6
Total D-HET FILTERS		16.2	19.6	15.8	15.6	18.9	15.6	15.7	19.1	15.7	15.7	19.1	15.7	15.7	19.1	15.7	15.6	853.5
D-HET COMB	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.6
	CORR	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	5.9
	TC MET	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	82.1
	TC ORG	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	16.1
	SPENT SOLV	87.2	92.3	92.3	49.8	49.8	49.7	49.8	49.8	49.8	49.8	49.8	49.8	49.8	49.8	49.8	49.8	1886.2
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4

WHC-SD-M100-RD-001
Revision 1

WHC-SD-W100-RD-001
Revision 1

PUF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_I															
=====															
D-HET COMB	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
	FILLER/ABSORB	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
Total D-HET COMB		29.8	7.1	43.5	65.4	65.4	65.4	65.4	102.3	102.3	102.2	102.1	90.8	90.8	90.8
D-HET NON-COMB	IGN	.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	CORR	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.0	.0	.0
	TC MET	1.2	1.2	1.3	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
	TC ORG	1.0	.9	.9	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
	SPENT SOLV	.7	2.2	2.5	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	FILLER/ABSORB	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
Total D-HET NON-COMB		3.4	4.9	5.1	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.3
D-HET OTH	TC MET	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	TC ORG	1.2	2.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total D-HET OTH		1.2	2.1	.2	.2	.2	.2	.2	.1	.1	.1	.1	.1	.1	.1
SP EL LEAD	TC MET	17.5	6.8	1.4	1.0	.8	1.5	.9	1.4	1.4	1.4	2.8	2.8	4.3	4.3

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

PWF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMW_I =====																		
D-HET COMB	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.8
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4
	WT	.1	.1	.1	.1	.1	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	1.6
	FILLER/ABSORB	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	6.0
Total D-HET COMB		90.8	95.9	95.9	53.4	53.5	53.3	53.4	53.4	53.5	53.4	53.4	53.4	53.5	53.4	53.4	53.4	2000.2
D-HET NON-COMB B-12	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.6
	CORR	.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	1.5
	TC MET	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	26.0
	TC ORG	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	17.4
	SPENT SOLV	1.7	1.7	1.7	1.7	1.7	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	51.1
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.8
	FILLER/ABSORB	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	6.0
Total D-HET NON-COMB		3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	104.1
D-HET OTH	TC MET	.0	.0	.0	.0	.0	.0	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.8
	TC ORG	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	5.5
	WC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.2
Total D-HET OTH		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	6.5
SP EL LEAD	TC MET	4.3	4.3	2.2	1.5	1.2	.9	.8	.8	.9	.9	.9	.9	.9	.9	1.0	1.0	71.6

WHC-SD-M100-RD-001
Revision 1

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 6a

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_I =====															
Total SP EL LEAD		17.5	6.8	1.4	1.0	.8	1.5	.9	1.4	1.4	1.4	2.8	2.8	4.3	4.3
SP EL MERCURY	TC MET	.6	2.6	.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
Total SP EL MERCURY		.6	2.6	.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
B-13	SP LAB/CONT LQ CORR	9.6	5.7	3.8	3.7	3.4	5.5	3.5	5.5	5.5	5.5	9.7	9.7	14.0	14.0
	REAC	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	TC MET	4.7	5.7	3.9	3.9	3.5	5.6	3.5	5.5	5.5	5.5	9.8	9.8	14.0	14.0
	PCB < 50	.0	.7	.1	.1	0.0	.7	.0	.7	.7	.7	2.1	2.1	3.5	3.5
	WC	.6	.4	.3	.3	.3	.2	.2	.2	.2	.2	.2	.2	.2	.2
	WP	.4	.3	.3	.3	.3	.2	.2	.2	.2	.2	.2	.2	.2	.2
	WT	1.0	.7	.7	.8	.8	.7	.7	.7	.7	.7	.7	.7	.7	.7
Total SP LAB/CONT LQ		16.6	13.6	9.2	9.2	8.2	13.0	8.3	12.9	12.9	12.9	22.8	22.8	32.7	32.7
SP BATTERIES	IGN	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	CORR	.1	.2	.2	.2	.2	.2	.0	.0	.0	.0	.0	.0	.0	.0
	TC MET	.3	.4	.4	.4	.4	.4	.1	.1	.1	.1	.1	.1	.1	.1
Total SP BATTERIES		.4	.7	.7	.7	.7	.7	.2	.2	.2	.2	.2	.2	.2	.2
SP SOILS	IGN	.3	59.6	.1	.1	.0	.4	.0	.4	.4	.4	1.3	1.3	2.1	2.1
	CORR	.6	2.1	.6	.5	.1	1.8	.2	1.8	1.8	1.8	5.2	5.2	8.6	8.6
	TC MET	482.5	135.7	86.9	38.6	38.2	54.6	158.9	160.7	139.4	56.4	60.2	60.2	64.1	11.0
	ACUTELY HAZ	.5	12.3	.3	30.6	30.5	51.6	157.4	157.6	136.3	53.4	53.8	53.8	54.2	1.2
	PCB < 50	469.5	78.4	78.4	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1

WHC-SD-M100-RD-001
Revision 1

PUF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLWV_I																		
=====																		
Total SP EL LEAD		4.3	4.3	2.2	1.5	1.2	.9	.8	.8	.9	.9	.9	.9	.9	.9	1.0	1.0	71.6
SP EL MERCURY TC MET		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	5.7
Total SP EL MERCURY		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	5.7
SP LAB/CONT LQ CORR		14.0	14.0	7.6	5.5	4.5	3.6	3.4	3.4	3.4	3.4	3.4	3.4	3.5	3.5	3.5	3.5	182.6
REAC		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.1
TC MET		14.0	14.0	7.6	5.5	4.5	3.6	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	178.1
PCB < 50		3.5	3.5	1.4	.7	.4	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.9
WC		.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	7.5
WP		.2	.2	.2	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	7.7
WT		.7	.7	.7	.7	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	22.6
Total SP LAB/CONT LQ		32.8	32.7	17.9	12.9	10.4	8.5	8.1	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	424.5
SP BATTERIES		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.8
CORR		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.5
TC MET		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	5.2
Total SP BATTERIES		.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	7.6
SP SOILS		2.1	2.1	.9	.4	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	74.5
CORR		8.6	8.6	3.5	1.8	1.0	.3	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	63.8
TC MET		11.0	11.0	5.3	3.4	2.4	1.7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1596.9
ACUTELY HAZ		1.2	1.2	.6	.4	.3	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	799.1
PCB < 50		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	627.7

B-14

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_I															
=====															
SP SOILS	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total SP SOILS		953.3	288.1	166.3	69.9	68.9	108.6	316.7	320.7	278.1	112.2	120.7	120.7	129.2	23.1
SP OTH	IGN	4.8	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	CORR	.3	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
	TC MET	.3	.3	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
	ACUTELY HAZ	.1	.5	.5	.5	.5	.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total SP OTH		5.5	3.2	3.1	3.1	3.1	3.1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SH CONCRETE	TC MET	0.0	0.0	0.0	6.1	6.1	10.2	31.5	31.5	27.2	10.6	10.6	10.6	10.6	0.0
	TC ORG	0.0	0.0	0.0	6.1	6.1	10.2	31.5	31.5	27.2	10.6	10.6	10.6	10.6	0.0
	SPENT SOLV	21.6	0.0	35.8	65.5	65.5	69.6	90.8	127.8	123.5	106.9	106.9	95.6	95.6	85.0
	ACUTELY HAZ	0.0	0.0	0.0	6.1	6.1	10.2	31.5	31.5	27.2	10.6	10.6	10.6	10.6	0.0
Total SH CONCRETE		21.6	0.0	35.8	83.7	83.7	100.4	185.2	222.1	205.1	138.7	138.7	127.4	127.4	85.0
SH LEAD	TC MET	1.3	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
Total SH LEAD		1.3	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
Total CH_LLMW_I		1784.3	863.1	506.1	590.9	557.5	697.4	1314.0	1401.5	1274.2	776.5	815.6	792.7	833.9	512.2

WHC-SD-M100-RD-001
Revision 1

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 7b

PWF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMW_I																		
=====																		
SP SOILS	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.6
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.2

Total SP SOILS		23.1	23.1	10.4	6.1	4.0	2.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3164.1
SP OTH	IGN	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	71.5
	CORR	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	4.8
	TC MET	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	2.9
	ACUTELY HAZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8

Total SP OTH		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	81.9
SH CONCRETE	TC MET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	154.9
	TC ORG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	154.9
	SPENT SOLV	85.0	85.0	85.0	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	1897.5
	ACUTELY HAZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	154.9

Total SH CONCRETE		85.0	85.0	85.0	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	2362.2
SH LEAD	TC MET	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	9.0

Total SH LEAD		.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	9.0

Total CH_LLMW_I		512.7	523.1	464.2	360.2	355.0	347.6	351.5	354.7	351.7	351.4	355.4	351.9	352.5	355.8	353.0	352.8	18813.7

MHC-SD-M100-RD-001
Revision 1

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 8a

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_III =====															
IN ORG PART	TC MET	61.6	61.6	61.6	61.6	61.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total IN ORG PART		61.6	61.6	61.6	61.6	61.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IN ORG LQ/SLG	CORR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.8	.4	1.1	.8
	TC MET	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.8	.4	1.1	.8
	FILLER/ABSORB	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
Total IN ORG LQ/SLG		.4	.3	.4	.4	.4	.4	.4	.4	.4	.4	1.9	1.1	2.6	2.0
D-IN LEAD MTL	CORR	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
B-17	TC MET	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
	TC ORG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SPENT SOLV	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total D-IN LEAD MTL		6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
D-IN OTH MTL	CORR	0.0	0.0	0.0	0.0	0.0	.1	0.0	.3	.3	.3	.9	.9	1.7	1.5
	TC MET	.1	.0	.0	.0	.0	.1	.0	.4	.4	.4	1.0	1.0	2.0	1.8
	TC ORG	0.0	0.0	0.0	0.0	0.0	.0	0.0	.0	.0	.0	.1	.1	.5	.2
	SPENT SOLV	7.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.5	2.2
	ACUTELY HAZ	0.0	0.0	0.0	0.0	0.0	.0	0.0	.0	.0	.0	.0	.0	.1	.1
	PCB < 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

WHC-SD-M100-RD-001
Revision 1

PUF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMW_III =====																		
IN ORG PART	TC MET	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	308.0
Total IN ORG PART		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	308.0
IN ORG LQ/SLG	CORR	.9	.8	1.5	.4	.9	.8	1.5	.4	1.3	.4	1.1	1.3	.9	.4	1.5	.4	17.4
TC MET		.9	.8	1.5	.4	.9	.8	1.5	.4	1.4	.4	1.1	1.3	.9	.4	1.5	.4	17.6
FILLER/ABSORB		.4	.4	.4	.4	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	12.2
Total IN ORG LQ/SLG		2.2	2.0	3.4	1.1	2.2	2.0	3.5	1.2	3.1	1.2	2.6	3.0	2.3	1.2	3.5	1.2	47.3
D-IN LEAD MTL	CORR	.0	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	86.5
TC MET		6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	198.0
TC ORG		0.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	18.5
SPENT SOLV		.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	18.8
ACUTELY HAZ		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
WC		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
WP		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
WT		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total D-IN LEAD MTL		6.6	14.9	14.8	14.9	14.8	14.9	14.8	14.9	14.8	14.9	14.8	14.9	14.8	14.9	14.8	14.9	322.0
D-IN OTH MTL	CORR	1.6	2.9	3.2	1.7	2.6	1.5	2.7	1.4	2.5	1.4	2.7	1.5	2.5	1.4	2.7	1.4	39.7
TC MET		1.9	4.1	4.8	2.7	4.1	2.4	4.1	2.3	3.9	2.3	4.1	2.4	3.9	2.3	4.1	2.3	59.2
TC ORG		.3	2.2	3.7	2.1	3.5	2.1	3.6	2.0	3.4	2.0	3.6	2.1	3.4	2.0	3.6	2.0	42.8
SPENT SOLV		2.4	2.4	2.6	2.3	2.4	3.5	3.8	3.4	3.6	3.4	3.8	3.5	3.6	3.4	3.8	3.4	85.8
ACUTELY HAZ		.1	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.5
PCB < 50		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

WHC-SD-W100-RD-001
Revision 1

PUF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLW_III															
=====															
Total D-IN OTH MTL		7.2	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.7	2.7	4.2	4.2	6.9	5.8
D-IN CONS MTL	IGN	0.0	0.0	0.0	0.0	0.0	0.0	.1	0.0	.4	.4	1.3	1.3	2.1	2.1
	CORR	0.0	0.0	0.0	0.0	0.0	0.0	.3	0.0	1.7	1.7	5.1	5.1	14.3	9.3
	TC MET	0.0	0.0	0.0	0.0	0.0	0.0	.4	0.0	1.9	1.9	5.7	5.7	15.3	10.4
	TC ORG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	.8
	SPENT SOLV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	.8
	ACUTELY HAZ	0.0	0.0	0.0	0.0	0.0	0.0	.0	0.0	.2	.2	.6	.6	1.1	1.1
Total D-IN CONS MTL		0.0	0.0	0.0	0.0	0.0	0.0	.9	0.0	4.2	4.2	12.8	12.8	44.3	24.6
D-IN OTH	WC	.9	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
Total D-IN OTH		.9	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
D-ORG NON COMP	IGN	.0	.0	.0	.0	.0	.0	.1	.0	.2	.2	.7	.7	1.1	1.1
	CORR	.1	.0	.0	.0	.0	.0	.2	.0	.9	.9	5.0	3.8	6.8	6.9
	REAC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	TC MET	.3	.1	.1	.1	.1	.1	.4	.1	1.3	1.3	5.8	4.6	8.1	8.1
	TC PEST	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TC ORG	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	2.3	1.1	2.3	2.3
	SPENT SOLV	18.3	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	7.8	6.6	7.8	7.8
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

PWF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMW_III																		
=====																		
Total D-IN OTH MTL		6.2	11.7	14.3	8.7	12.6	9.5	14.3	9.2	13.5	9.2	14.2	9.6	13.5	9.2	14.2	9.2	228.0
B-20	D-IN CONS MTL	IGN	2.1	2.1	.9	.4	.2	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.9
		CORR	11.3	9.3	9.2	1.7	3.6	1.0	6.2	0.0	2.8	0.0	5.8	1.6	2.8	0.0	5.8	100.2
		TC MET	12.3	10.3	9.6	1.9	3.7	1.0	6.2	0.0	2.8	0.0	5.8	1.6	2.8	0.0	5.8	107.1
		TC ORG	2.8	.8	5.8	0.0	2.8	.8	6.2	0.0	2.8	0.0	5.8	1.6	2.8	0.0	5.8	44.4
		SPENT SOLV	2.8	.8	5.8	0.0	2.8	.8	6.2	0.0	2.8	0.0	5.8	1.6	2.8	0.0	5.8	44.4
		ACUTELY HAZ	1.1	1.1	.4	.2	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0
Total D-IN CONS MTL		32.4	24.3	31.6	4.2	13.3	3.8	24.8	0.0	11.1	0.0	23.0	6.4	11.1	0.0	23.1	0.0	317.0
D-IN OTH	WC	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	4.1
Total D-IN OTH		.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	4.1
D-ORG NON COMP	IGN	1.1	1.1	.5	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.6
	CORR	6.9	6.9	5.4	2.0	2.8	2.4	3.6	1.1	3.6	1.1	2.3	3.6	2.3	1.1	3.6	1.1	75.1
	REAC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	TC MET	8.1	8.1	6.0	2.3	3.0	2.6	3.7	1.2	3.7	1.2	2.5	3.8	2.5	1.2	3.7	1.2	86.8
	TC PEST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1
	TC ORG	2.3	2.3	3.6	1.1	2.3	2.3	3.6	1.1	3.6	1.1	2.3	3.6	2.3	1.1	3.6	1.1	44.9
	SPENT SOLV	7.8	8.3	9.6	7.1	8.3	11.4	12.7	10.2	12.7	10.2	11.5	12.8	11.5	10.2	12.7	10.2	266.0
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.1

WHC-SD-W100-RD-001
Revision 1

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 10a

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_III															
=====															
Total D-ORG NON COMP		18.9	5.7	5.7	5.8	5.8	6.3	5.8	8.1	8.1	8.0	21.8	16.8	26.3	26.3
B-21	D-ORG COMP														
	IGN	0.0	0.0	0.0	0.0	0.0	.0	0.0	.1	.1	.1	.4	.4	.7	.7
	CORR	.0	.0	.0	.0	.0	.1	.0	.6	.6	.6	4.0	2.8	5.1	5.2
	TC MET	.4	.2	.2	.2	.2	.4	.2	.9	.9	.9	4.6	3.4	6.0	6.0
	TC PEST	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TC ORG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.1	2.3	2.3
	SPENT SOLV	27.3	8.2	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.3	10.6	9.4	10.6	10.6
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total D-ORG COMP		27.9	8.5	8.6	8.7	8.7	8.9	8.7	10.1	10.1	10.0	22.1	17.1	24.9	24.9
D-HET FILTERS	CORR	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	2.3	1.1	2.3	2.3
	TC MET	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	2.7	1.5	3.0	3.0
	TC ORG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.1	2.3	2.3
	SPENT SOLV	2.0	.5	.5	.5	.5	.5	.5	.5	.5	.5	2.9	1.6	2.8	2.9
	ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total D-HET FILTERS		2.0	.6	.6	.6	.6	.6	.6	.7	.7	.7	10.2	5.2	10.5	10.5
D-HET COMB	CORR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

WHC-SD-M100-RD-001
Revision 1

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 10b

PWF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMW_III																		
=====																		

Total D-ORG NON COMP		26.3	26.8	25.0	12.7	16.6	18.8	23.7	13.7	23.7	13.7	18.7	23.7	18.7	13.7	23.7	13.7	482.4
B-22	D-ORG COMP	IGN	.7	.7	.3	.1	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6
		CORR	5.1	5.2	4.7	1.6	2.6	2.4	3.6	1.1	3.6	1.1	2.3	3.6	2.3	1.1	3.6	63.8
		TC MET	6.0	6.1	5.2	2.0	2.9	2.6	3.8	1.3	3.8	1.3	2.6	3.8	2.6	1.3	3.8	75.1
		TC PEST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.1
		TC ORG	2.3	2.3	3.6	1.1	2.3	2.3	3.6	1.1	3.6	1.1	2.3	3.6	2.3	1.1	3.6	44.9
		SPENT SOLV	10.6	11.3	12.6	10.1	11.3	15.9	17.3	14.8	17.3	14.8	16.1	17.3	16.1	14.8	17.3	376.3
		ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
		WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.6
		WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.3
		WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.2
Total D-ORG COMP		24.9	25.6	26.4	15.0	19.3	23.4	28.4	18.4	28.4	18.4	23.4	28.4	23.4	18.4	28.4	18.4	567.3
D-HET FILTERS		CORR	2.3	2.3	3.6	1.1	2.3	2.3	3.6	1.1	3.6	1.1	2.3	3.6	2.3	1.1	3.6	45.2
		TC MET	3.0	3.0	3.8	1.2	2.4	2.3	3.6	1.1	3.6	1.1	2.3	3.6	2.3	1.1	3.6	49.6
		TC ORG	2.3	2.3	3.6	1.1	2.3	2.3	3.6	1.1	3.6	1.1	2.3	3.6	2.3	1.1	3.6	44.9
		SPENT SOLV	2.9	2.9	4.2	1.7	2.9	3.2	4.5	2.0	4.5	2.0	3.2	4.5	3.2	2.0	4.5	66.9
		ACUTELY HAZ	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
		WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
		WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
		WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total D-HET FILTERS		10.5	10.5	15.1	5.0	9.9	10.2	15.2	5.1	15.2	5.1	10.1	15.2	10.1	5.1	15.2	5.1	206.7
D-HET COMB	CORR	0.0	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	80.8

WHC-SD-W100-RD-001
Revision 1

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_III =====															
D-HET COMB	SPENT SOLV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total D-HET COMB		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SP EL LEAD	TC MET	.2	.2	.2	0.0	0.0	.1	0.0	.7	.7	.7	2.1	2.1	3.5	3.5
Total SP EL LEAD		.2	.2	.2	0.0	0.0	.1	0.0	.7	.7	.7	2.1	2.1	3.5	3.5
SP EL MERCURY	TC MET	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total SP EL MERCURY		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
B-23	SP LAB/CONT LQ CORR	1.2	.2	.2	.2	.2	.6	.2	2.3	2.3	2.3	6.5	6.5	10.8	10.8
	REAC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	TC MET	.2	.0	.0	.0	.0	.5	.0	2.2	2.2	2.2	6.4	6.4	10.7	10.7
	PCB < 50	0.0	0.0	0.0	0.0	0.0	.1	0.0	.7	.7	.7	2.1	2.1	3.5	3.5
	WC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WP	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
	WT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total SP LAB/CONT LQ		1.5	.3	.3	.3	.3	1.3	.3	5.2	5.2	5.2	15.1	15.1	25.0	25.0
SP SOILS	IGN	0.0	0.0	0.0	0.0	0.0	.1	0.0	.4	.4	.4	1.3	1.3	2.1	2.1
	CORR	0.0	0.0	0.0	0.0	0.0	.3	0.0	1.7	1.7	1.7	5.1	5.1	8.5	8.5
	TC MET	.3	.1	.1	.1	.1	.5	.1	2.0	2.0	2.0	5.8	5.8	9.7	9.7
	ACUTELY HAZ	0.0	0.0	0.0	0.0	0.0	.0	0.0	.2	.2	.2	.6	.6	1.1	1.1

WHC-SD-W100-RD-001
Revision 1

WHC-SD-W100-RD-001
Revision 1

PWF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLMQ_III =====																		
D-HET COMB	SPENT SOLV	0.0	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	48.5
Total D-HET COMB		0.0	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	129.3
SP EL LEAD	TC MET	3.5	3.5	1.4	.7	.4	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.8
Total SP EL LEAD		3.5	3.5	1.4	.7	.4	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.8
SP EL MERCURY	TC MET	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
Total SP EL MERCURY		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
SP LAB/CONT LQ	CORR	10.8	10.8	4.4	2.3	1.2	.4	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	75.3
REAC		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
TC MET		10.7	10.7	4.3	2.2	1.1	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	70.8
PCB < 50		3.5	3.5	1.4	.7	.4	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.2
WC		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.4
WP		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.5
WT		.0	.0	.0	.0	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	1.4
Total SP LAB/CONT LQ		25.0	25.0	10.2	5.2	2.7	.7	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	171.7
SP SOILS	IGN	2.1	2.1	.9	.4	.2	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.9
CORR		8.5	8.5	3.4	1.7	.9	.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.7
TC MET		9.7	9.7	3.9	2.0	1.1	.4	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	66.6
ACUTELY HAZ		1.1	1.1	.4	.2	.1	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0

3/23/94

Potential WRAP 2A Feed Stream (by PWF and HCDs)
Includes WHC_ENV_RES
(Volumes in cubic meters)

Page 12a

PWF Abbrev	HCD Abbrev	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
CH_LLMW_III															
=====															
Total SP SOILS		.3	.1	.1	.1	.1	1.0	.1	4.3	4.3	4.3	12.8	12.8	21.3	21.3
SH LEAD	TC MET	22.1	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9
Total SH LEAD		22.1	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9
=====															
Total CH_LLMW_III		149.6	107.9	108.1	108.1	108.1	50.3	46.5	65.2	65.2	65.0	131.7	115.8	193.9	172.6
=====															
Total for WRAP 2A		1933.9	971.0	614.2	699.0	665.6	747.7	1360.5	1466.7	1339.4	841.5	947.2	908.5	1027.8	684.8
=====															

B-25

WHC-SD-M100-RD-001
Revision 1

PUF Abbrev	HCD Abbrev	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CH_LLWU_III																		
=====																		
Total SP SOILS		21.3	21.3	8.6	4.4	2.2	.6	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	143.3
SH LEAD	TC MET	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	658.0
Total SH LEAD		21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	658.0
Total CH_LLWU_III																		
		181.0	196.5	181.6	102.5	124.7	114.5	155.8	93.6	141.0	93.6	137.9	132.3	125.1	93.6	153.9	93.6	3609.1
Total for WRAP 2A																		
		693.7	719.6	645.8	462.8	479.6	462.2	507.3	448.3	492.7	445.0	493.3	484.2	477.6	449.4	506.9	446.4	22422.8

**Fiscal Year 1993 Mixed Low-Level Waste Forecast Volume Summary -
Nonthermally Treatable Volumes by Waste Class and Waste Generator.**

Waste class	Waste generator	Total volume (m ³)
CH_MLLW_I	Ames Laboratory-Ames, Iowa	234.54
	Argonne Nat. Lab-East	1,694.51
	Bettis Atomic Power Laboratory	28.20
	Battelle Columbus Labs.	31.49
	Brookhaven	129.57
	Univ. of CA, Davis	1.48
	FERMI Nat. Accelerator Lab.	63.00
	General Atomics	8.50
	Lawrence Berkeley Lab	123.48
	Lawrence Livermore Natl Lab	409.11
	Paducah Energy Systems	1,788.40
	Paducah Utility Services	84.00
	Pacific Northwest Laboratories	131.84
	Portsmouth (Gaseous Diffusion Plant)	3,485.11
	Stanford Lin Accelerator Cntr	10.28
	ERO 100N Area	28.55
	K-Basin Operations	5.75
	ARD Large Sodium Fire Facility	0.60
	CP Purex & UO3-224U Facilities	9.76
	T-Plant Head End Cleanup	0.13
	T-Plant Bldg. 2706/221	468.55
	CP 222-S Laboratory	1,573.80
	B Plant/WESF Facilities	3.15
	CP Pu Finishing Plant	181.84
	Single-Shell Tank Farms	2,018.81
	Fuels Operations	13.69
	Liquid Waste Handling Facility	24.00
	Geo. Tech. Engineering Lab.	3.00
	Tank Farms Backlog Waste	515.82
	ENV Restoration Operations	657.03
	TWR/WTO Grout Facility	92.00
	PD Waste Vitrification Project	101.23
	DWM Low-Level Burial Grounds	34.00
	Purex 242A Condensate Treatment	660.0
	SST Retrieval (458 tanks)	51.58
	DWM Solid Waste Operations	2.90
	W320 Tank 241 Sluicing	138.13
	Tank Farm Restoration	4,647.37
	Environmental Projects	18.47
Total for CH_MLLW_I		19,473.66
CH_MLLW_III	Knolls Atomic Power Shipyards	657.00
	Lawrence Berkeley Lab	14.22
	Paducah Energy Systems	308.00
	Pacific Northwest Laboratories	198.00
	CP Purex and UO3-224U Facilities	0.60
	CP 222-S Laboratory	65.03
	Single-Shell Tank Farms	454.33
	ARD Fuel Fabrication Bldg.	0.20
	Tank Farms Backlog Waste	46.57
	ENV Restoration Operations	613.14
	TWR/WTO Grout Facility	761.52
	PD Waste Vitrification Project	364.87
	Purex 242A Condensate Treatment	1,202.0
	SST Retrieval (458 tanks)	125.63
Total CH_MLLW_III		4,811.11
Total for CH_MLLW_I and III		24,284.77

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APPENDIX C

**BREAKDOWN OF VOLUMES FOR EACH WASTE RECEIVING AND
PROCESSING MODULE 2A FEED STREAM INCLUDING
CONTRIBUTIONS FROM ALL SOURCES**

LIST OF TABLES

C-1 Breakdown of Volumes for Each Waste Receiving and Processing
Module 2A Feed Stream Including Contributions from all Sources . . . C-3

Table C-1. Breakdown of Volumes for Each Waste Receiving and Processing Module 2A Feed Stream
Including Contributions from all Sources. (sheet 1 of 2)

Number	Stream title	Existing waste				Forecast			
		m ³	ft ³	Drum	Box	m ³	ft ³	Drum	Box
1A	Solidified 183-H Basin Liquids	580.9 ^a	20,510	2,767	0	0	0	0	0
1B	Crystalline 183-H Basin Solids	931.8 ^a	32,901	4,436	0	0	0	0	0
1C	183-H Basin Sludge Waste	980.7 ^a	34,629	4,670	0	0	0	0	0
1D	Misc. 183-H Basin Waste	149.3 ^a	5,273	409	14	0	0	0	0
2A	Ammonium/Sodium Sulfate Powder	0	0	0	0	1,000.0 ^b	35,310 ^b	5,400 ^b	0
2B	Ion-Exchange Resin	0	0	0	0	202.0	7,133	972	0
5A1	Elemental Mercury	4.3	152	21	0	5.8	205	16	1
5A2	Mercury Chemicals	4.6	162	22	0	0.0	0	0	0
5A3	Mercury-Contam. Het. Solids	7.3	259	35	0	0.0	0	0	0
5C1	Elemental Lead	114.4	4,041	237	18	762.4	26,920	458	184
5C2	Lead Chemicals/Solutions	9.5	337	46	0	0.0	0	0	0
5C3	Lead-Contam. Het. Solids	25.8	909	106	1	822.4	29,039	1,504	141
9A	Particulate/Sludge	45.5	1,607	219	0	6,181.3	218,262	14,064	899
9B	Heterogeneous Solids/Debris	39.3	1,389	189	0	14,714.6	519,573	43,725	1,552
9C	Contained Liquid	17.1	604	82	0	596.2	21,052	2,866	0
TOTAL		2,910.6	102,773	13,239	33	24,284.7	857,494	69,005	2,777

Table C-1. Breakdown of Volumes for Each Waste Receiving and Processing Module 2A Feed Stream Including Contributions from all Sources. (sheet 2 of 2)

Number	Stream title	WRAP Module 1			Totals			
		m ³	ft ³	Drum	m ³	ft ³	Drum	Box
1A	Solidified 183-H Basin Liquids	0	0	0	580.9 ^a	20,510	2,767	0
1B	Crystalline 183-H Basin Solids	0	0	0	931.8 ^a	32,901	4,436	0
1C	183-H Basin Sludge Waste	0	0	0	980.7 ^a	34,629	4,670	0
1D	Misc. 183-H Basin Waste	0	0	0	149.3 ^a	5,273	409	14
2A	Ammonium/Sodium Sulfate Powder	0	0	0	1,000.0	35,310	5,400	0
2B	Ion-Exchange Resin	0	0	0	202.0	7,133	972	0
5A1	Elemental Mercury	10.9	385	52	21.0	742	89	1
5A2	Mercury Chemicals	11.6	410	56	16.2	572	78	0
5A3	Mercury-Contam. Het. Solids	18.6	657	90	25.9	916	125	0
5C1	Elemental Lead	94.2	3,326	453	971.0	34,287	1,148	202
5C2	Lead Chemicals/Solutions	7.9	279	38	17.4	616	84	0
5C3	Lead-Contam. Het. Solids	21.2	749	102	869.4	30,697	1,712	142
9A	Particulate/Sludge	110.1	3,888	529	6,336.9	223,757	14,812	899
9B	Heterogeneous Solids/Debris	95.1	3,358	457	14,849.0	524,318	44,371	1,552
9C	Contained Liquid	41.4	1,462	199	654.7	23,117	3,147	0
TOTAL		411.0	14,523	1,976	27,606.2	974,777	84,220	2,810

^aSolid waste information and tracking system volume based on conversion factor of 0.21 m³/drum.

^bEstimated volume and number of drums from Effluent Treatment Facility Project.

1 m³ = 35.31 ft³.

Drum = Standard of a 55-gal drum at 0.208 m³ or 7.35 ft³.

Box = Standard of a 4 by 4 by 8 box at 3.62 m³ or 128 ft³.

WMC-SD-M100-RD-001
Revision 1

WHC-SD-W100-RD-001
Revision 1

APPENDIX D

SPECIFICATIONS FOR FEED STREAMS 1 THROUGH 9

CONTENTS

D1.0	REFERENCES	D-79
D2.0	GLOSSARY	D-80

LIST OF TABLES

D-1	Specification for Feed Stream 1A, Solidified 183-H Basin Liquids, Including Physical, Chemical, and Radiological Characteristics	D-4
D-2	Specification for Feed Stream 1B, Crystalline 183-H Basin Solids, Including Physical, Chemical, and Radiological Characteristics	D-10
D-3	Specification for Feed Stream 1C, 183-H Basin Sludge, Including Physical, Chemical, and Radiological Characteristics	D-15
D-4	Specification for Feed Stream 1D, Miscellaneous 183-H Basin Waste, Including Physical, Chemical, and Radiological Characteristics	D-23
D-5	Specification for Feed Stream 2A, Ammonium/Sodium Sulfate Powder, Including Physical, Chemical, and Radiological Characteristics	D-28
D-6	Specification for Feed Stream 2B, Ion-Exchange Resin, Including Physical, Chemical, and Radiological Characteristics	D-34
D-7	Specification for Feed Stream 5A1, Elemental Mercury, Including Physical, Chemical, and Radiological Characteristics	D-40
D-8	Specification for Feed Stream 5A2, Mercury Chemicals, Including Physical, Chemical, and Radiological Characteristics	D-43
D-9	Specification for Feed Stream 5A3, Mercury-Contaminated Heterogeneous Solids, Including Physical, Chemical, and Radiological Characteristics	D-47
D-10	Specification for Feed Stream 5C1, Elemental Lead, Including Physical, Chemical, and Radiological Characteristics	D-50
D-11	Specification for Feed Stream 5C2, Lead Chemicals/Solutions, Including Physical, Chemical, and Radiological Characteristics	D-53

LIST OF TABLES (cont)

D-12	Specification for Feed Stream 5C3, Lead-Contaminated Heterogeneous Solids, Including Physical, Chemical, and Radiological Characteristics	D-58
D-13	Specification for Feed Stream 9A, Particulate/Sludge, Including Physical, Chemical, and Radiological Characteristics	D-62
D-14	Specification for Feed Stream 9B, Heterogeneous Solids/Debris, Including Physical, Chemical, and Radiological Characteristics . . .	D-68
D-15	Specification for Feed Stream 9C, Contained Liquid, Including Physical, Chemical, and Radiological Characteristics	D-74

APPENDIX D

SPECIFICATIONS FOR FEED STREAMS 1 THROUGH 9

Table D-1. Specification for Feed Stream 1A, Solidified 183-H Basin Liquids, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

CDR Identification Number 1A

Common Name Solidified 183-H Basin Liquids

Subset(s)

- 1 - Solidified liquids consolidated from original basin supernates.
- 2 - Solidified miscellaneous other liquids (well purge water, washdown water, seepage from crystals).

GENERATION

Narrative Description

The four 183-H basins were used from 1973 to 1985 for solar evaporation of neutralized acid etch solutions from N Reactor fuel fabrication activities. During closure of these basins, supernatant liquid was consolidated from all four basins. In 1988-89, the liquid was mixed with solidification agents in a batch reactor and packaged into drums. A ribbon-type blend was chosen so that proper waste-to-binder consistency and mixing homogeneity could be monitored and maintained. In 1990, additional solidified liquid drums (approximately 1,208 of the 2,767 drums) resulted from the solidification of well purge water, washdown water, and liquids that seeped from remaining crystal solids.

Generator(s) Westinghouse Hanford Company; Decontamination and Decommissioning Program

Existing Volume

1 - Solidified evaporated liquids:	1,559 drums
2 - Solidified seepage, purge well, and wash water:	<u>1,208 drums</u>
Total	2,767 drums

NOTE: The 2,767 drums represent the actual number of 208-L drums reported to SWITS.

The total volume is 580.9 m³.

Forecast No further generation of this waste is forecast.

PHYSICAL CHARACTERISTICS

Narrative Description

The solidified waste was generated in eight drum batches with a target ratio of approximately 132 kg of solidification agent and 151 L of liquid per drum.

Reference: WHC-SD-DD-TI-059, *Choice of Sorbond LPC II as a Solidifying Agent for 183-H Liquid Wastes* (Galbraith 1991).

Physical State

Hard monolith (e.g., broken titanium shaft core samplers) with consistency of a hard lime plaster to soft solid (e.g., "cheese-like center") similar to lime plaster putty.

Density

1,600 to 2,080 kg/m³.

Moisture Content

Before solidification: 57% by weight average.

Reference: WHC-SD-DD-TI-059, *Choice of Sorbond LPC II as a Solidifying Agent for 183-H Liquid Wastes* (Galbraith 1991).

NOTE: No free moisture is expected after solidification, but substantial amounts of water of hydration should be anticipated.

Particle Size

Before solidification, the Sorbond LPC II* particle size was reported as follows:

- 2% maximum retained on #100 sieve
- 5% maximum retained on #200 sieve
- 10% maximum retained on #325 sieve.

NOTE: Lumps up to 30 cm in diameter were encountered during the solidification operations.

References: WHC-SD-DD-TI-059, *Choice of Sorbond LPC II as a Solidifying Agent for 183-H Liquid Wastes* (Galbraith 1991).

Hardness

The performance specifications for the solidification agent include a cone penetrometer test for 50 to 65 mm. No data are available on solidified waste hardness.

Reference: WHC-SD-WM-ES-193, *Safety Evaluation of 183-H Grouted Drums* (Cain 1993).

*Sorbond LPC II is a trademark of American Colloid Company.

RADIOLOGICAL CHARACTERISTICSWaste Class

Class I waste.

Radionuclide Content

Nominal curie values per drum for drums containing the radionuclide:

⁹⁹ Tc	1.9 E-04
²³⁷ Np	1.3 E-10
U	6.3 E-06

Enriched uranium (1% ²³⁵U) content is approximately 18 g/drum average and maximum.

Total curie inventory:

⁹⁹ Tc	5.3 E-01
²³⁷ Np	3.5 E-07
U	1.8 E-02

No data are available for ¹²⁹I or ⁷⁹Se.

References: WHC-SD-WM-ES-193, *Safety Evaluation of 183-H Grouted Drums* (Cain 1993); DOE-RL 88-04, *183-H Solar Evaporation Basins Closure, Post-Closure Plan* (DOE-RL 1991); solid waste information and tracking system (SWITS) database.

Dose Rate

<1 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICSNarrative Description

Original waste consisted of inorganic acid etching solutions that were overneutralized with caustic. The consolidated liquids were the combined supernatant liquids from all the basins. The miscellaneous liquids include seepage, well purge water, and washdown water. The solidification agent (Sorbond LPC II) was a light grey powder consisting of the following primary components:

SiO ₂	14.4 - 15.6
Al ₂ O ₃	3.1 - 3.5
Fe ₂ O ₃	1.6 - 1.9
CaO	63.2 - 73.2
MgO	5.1 - 6.0
SO ₃	1.4 - 1.8
K ₂ O	0.4 - 0.7
Na ₂ O	0.8 - 1.2
CaCO ₃	0.3 - 0.5
Moisture	>10%

WHC-SD-W100-RD-001
Revision 1

Reference: WHC-SD-DD-TI-059, *Choice of Sorbond LPC II as a Solidifying Agent for 183-H Liquid Wastes* (Galbraith 1991).

Primary Components

Before solidification:

<u>Constituent</u>	<u>Average concentration (mg/L)</u>
Nitrate	380,000
Sodium	140,000
Sulfate	8,000
Fluorine	1,500
Nitrite ion	890
Zirconium	780
Potassium	720

<u>Trace constituents</u>	<u>Concentration</u>
Aluminum	36 mg/L
Boron	63 mg/L
Calcium	9 mg/L
Chlorine ion	290 mg/L
Chromium	20 mg/L
Cobalt	0.6 mg/L
Copper	410 mg/L
Iron	7 mg/L
Manganese	7 mg/L
Molybdenum	1 mg/L
Nickel	9 mg/L
Silver	1.8 mg/L
Strontium	0.6 mg/L
Tin	15 mg/L
Zinc	2.8 mg/L
Methylene chloride	6 ppb
Acetone	48 ppb
2-butanone	24 ppb
1,1,1-trichloroethane	21 ppb
Toluene	24 ppb
2-hexanone	19 ppb
Chloroform	<5 ppb
4-methyl-2-pentanone	<10 ppb

Reference: WHC-SD-DD-TI-059, *Choice of Sorbond LPC II as a Solidifying Agent for 183-H Liquid Wastes* (Galbraith 1991).

Waste Codes

This is a wastewater treatment residue coded as follows:

Listed Components:

P029 Copper cyanide
P030 Cyanide salts
P098 Potassium cyanide
P106 Sodium cyanide

P120 Vanadium pentoxide
U123 Formic acid

Characteristics:

D001 Ignitable - oxidizer (nitrates)
D007 Extraction procedure (EP) toxicity (chromium)

State Codes:

WT02 Toxic dangerous waste (DW) (for fluoride, copper nitrate, and copper sulfate)

NOTE: The original waste designation was performed in the closure plan; the D001 code was added later.

References: DOE/RL 88-09, *Final Status Post-Closure Permit Application 183-H Solar Evaporation Basins* (DOE-RL 1988); WHC-SA-0705-FP, *RCRA Closure Experience with Radioactive Mixed Waste 183-H Solar Evaporation Basins at the Hanford Site* (Powers et al. 1990); SWITS database; and *Washington Administrative Code 173-303-90, "Dangerous Waste Regulations."*

Hazardous Characteristics

The consolidated liquids were tested for land disposal restrictions criteria using the EP toxicity method; the only table constituent concentrations in waste extract (CCWE) wastewater concentration limits for toxic metals that was exceeded was D007 (chromium). This testing was performed before allowing evaporation of the liquids which resulted in the precipitation of the crystalline solids (Stream 1B), and before solidification of the liquids. Toxicity testing apparently was not performed on the miscellaneous liquids, and toxicity testing was not performed on any of the wastes after they had been solidified.

Hazardous Components

Listed waste codes are by virtue of the mixture rule; most listed components are expected to be non-detectable.

PACKAGING DESCRIPTION

Container Type

U.S. Department of Transportation 17H 208-L drums.
NOTE: At least two different suppliers for these drums were used; some drums had two rolling hoops and some had three rolling hoops.

A portion of the existing waste inventory for this stream has been overpacked into 322-L drums. By the startup of Waste Receiving and Processing (WRAP) Module 2A, the entire existing waste inventory may be overpacked.

Internal Packaging

0.25-mm polyethylene liner. Drums are expected to be filled with solidified waste to within 5 to 10 cm of the top of the drum. A layer of diatomaceous earth was added to retain any residual moisture.

NOTE: The liners were reportedly not long enough to use the normal "pigtail" sealing method so they were instead folded over and the "gap closed with tape."

Venting Mechanism

None.

Gross Weight

The minimum gross weight is 177.0 kg and maximum is 363.2 kg.

Closure Mechanism

Bolted lock ring.

NOTE: Up to 50% of the drums were distorted ("egg-shaped") during the filling and handling process and "some lids had to be pounded on."

Table D-2. Specification for Feed Stream 1B, Crystalline 183-H Basin Solids, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

CDR Identification Number 1B
Common Name Crystalline 183-H Basin Solids
Subset(s) None.

GENERATION

Narrative Description The four 183-H basins were used from 1973 to 1985 for solar evaporation of neutralized acid etch solutions from N Reactor fuel fabrication activities. Liquids from all four basins were consolidated into a single lined basin. As water evaporated off, some material precipitated out of the liquid in the form of crystalline sodium nitrate solids. This waste stream contains those crystalline solids which were mechanically removed from the basin floors and packaged into drums in 1990.

Generator(s) Westinghouse Hanford Company; Decontamination and Decommissioning Program

Existing Volume A total of 4,436 208-L drums.

NOTE: The 4,436 drums represent the actual number of 208-L drums reported to SWITS.

The total volume is 931.8 m³.

Forecast No further generation of this waste is forecast.

PHYSICAL CHARACTERISTICS

Narrative Description The crystal solids (sodium nitrate) were packaged by double bagging into drums; however, some drums could have rigid liners with thin bags inside.

Reference: WHC-SD-DD-TI-059, *Choice of Sorbond LPC II as a Solidifying Agent for 183-H Liquid Wastes* (Galbraith 1991).

Physical State Dry solids intermixed with diatomaceous earth that was added to absorb residual liquid.

Density 1,200 to 2,240 kg/m³.

Moisture Content Expected to be damp solids but some drum contents could be saturated.

Particle Size

Ranges from lumps of material to fine particulate (diatomaceous earth).

Hardness

Ranges from friable to hard salt cake (value of 2 on a scale of 1 to 10 where 1 is talc or soapstone and 10 is diamond).

RADIOLOGICAL CHARACTERISTICS

Waste Class

Class I.

Radionuclide Content

Nominal curie values per drum for drums containing radionuclides:

⁹⁹ Tc	2.8 E-04
²³⁷ Np	3.8 E-10
U	1.9 E-05

Enriched uranium (1% enriched) content ranges from 5 to 55 g/drum with an average of 54 g/drum.

Total curie inventory:

⁹⁹ Tc	1.2 E+00
²³⁷ Np	1.7 E-06*
U	8.5 E-02

*Preliminary results of recent drum sampling indicate ²³⁷Np will be 1.0 E-14.

Reference: SWITS database.

Dose Rate

<1 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description

The waste originally consisted of inorganic acid etching solutions that were overneutralized with caustic.

Reference: WHC-SD-DD-TI-059, *Choice of Sorbond LPC II as a Solidifying Agent for 183-H Liquid Wastes* (Galbraith 1991).

Primary Components

This waste consists primarily of sodium nitrate with minor concentrations of other constituents including diatomaceous earth.

<u>Attribute</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Percent solids	97.9	96.8-98.2
pH	11.3	10.4-11.7

<u>Constituent</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Chloride	32	31.8-32.3
Fluoride (IC)	2,740	2,230-3,750
Formate	697	65-741
Cyanide	0.26	0.26-0.26
Sulfate	13,000	11,700-16,300
Fluoride	1,710	1,100-2,170
Total nitrogen	143,500	118,000-151,000
Total organic carbon	378	347-456
Total phosphorus	16.7	8.8-28.4
Total inorganic carbon	567.5	245-805
Silver	0.36	0.29-0.65
Aluminum	375.5	218-513
Barium	2.3	1.4-3.4
Beryllium	0.02	0.01-0.02
Calcium	1,520	864-3,020
Cadmium	0.15	0.15-0.15
Cobalt	0.2	0.17-0.2
Chromium	4.5	3.1-4.9
Copper	156.5	118-192
Iron	275.5	117-415
Mercury**	0.03	0.03-0.06
Potassium	108.4	43.8-169
Magnesium	349.5	129-606
Manganese	4.1	2.4-6.2
Molybdenum**	1.5	1.5-1.5
Sodium	241,000	216,000-246,000
Nickel	1.5	0.83-1.7
Antimony	1.68	1.6-1.69
Selenium**	0.94	0.92-1.26
Silicon	440	244-727
Vanadium	0.90	0.21-1.1
Zinc	3.6	2.4-4.5
Zirconium	69.1	63.9-95.2
Technetium-99	120	100-140
Total U	25	17-29

*80% confidence interval.

**These constituent's concentration results are mostly if not all less than detection limits.

IC = Ion chromatography

Reference: Preliminary results of 183-H Basin Waste Drum/Box Sampling Program from J. L. Westcott and M. R. Kerns.

Waste Codes

Listed Components:

P029 Copper cyanide
P030 Cyanide salts
P098 Potassium cyanide

P106 Sodium cyanide
P120 Vanadium pentoxide
U123 Formic acid

Characteristics:

D001 Ignitable - oxidizer (nitrates)

State Codes:

WT02 Toxic DW (for fluoride, copper nitrate, and copper sulfate)

NOTE: The original waste designation was performed in the closure plan for the consolidated liquids; the D001 code was added later.

References: DOE/RL 88-09, *Final Status Post-Closure Permit Application 183-H Solar Evaporation Basins* (DOE-RL 1988); SWITS database; and WAC 173-303-90.

Hazardous Characteristics

Toxicity characteristic testing was performed using the EP toxicity method on the consolidated liquids before precipitation of the crystals. More recently toxic characteristic leach procedure (TCLP) testing has been done on the crystalline solid waste itself and these results are shown below.

<u>Constituent</u>	<u>TCLP Results</u>	
	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Silver	6.5	2.9-9
Arsenic	28.9	13.3-41.2
Barium	467	136-508
Cadmium	1.5	1.5-1.5
Chromium	72.9	63.4-98.8
Mercury	0.34	0.3-0.4
Lead	13.9	13.9-24.4
Selenium	63	25.6-63

*80% confidence interval

Reference: Preliminary results of 183-H Basin Waste Drum/Box Sampling Program from J. L. Westcott and M. R. Kerns.

Hazardous Components

Listed waste codes are by virtue of the mixture rule; most listed waste components are expected to be non-detectable.

PACKAGING DESCRIPTION

Container Type

U.S. Department of Transportation 17H 208-L drums.

Reference: WHC-SA-0705-FP, *RCRA Closure Experience with Radioactive Mixed Waste 183-H Solar Evaporation Basins at the Hanford Site* (Powers et al. 1990).

Internal Packaging

Waste was double bagged using about 0.2-mm plastic. For drums, the waste may be contained in a thin plastic bag within a 2.3-mm rigid polyethylene liner. Approximately 0.028 m³ of diatomaceous earth was placed in the bottom of the drum, followed by approximately 0.128 m³ of bagged waste and approximately 0.043 m³ of "mixed diatomaceous earth absorbents" on top of the waste. Recent drum sampling indicates the average absorbent volume is about 13% of the total volume.

Reference: WHC-SA-0705-FP, *RCRA Closure Experience with Radioactive Mixed Waste 183-H Solar Evaporation Basins at the Hanford Site* (Powers et al. 1990); preliminary results of 183-H Basin Waste Drum/Box Sampling Program from J. L. Westcott and M. R. Kerns.

Venting Mechanism

None.

Gross Weight

The minimum gross weight is 181.6 kg and the maximum is 230.2 kg.

Closure Mechanism

Bolted lock ring. NOTE: Several different brands of rigid liners may have been used, each having a different closure mechanism.

Table D-3. Specification for Feed Stream 1C, 183-H Basin Sludge, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

CDR Identification Number 1C

Common Name 183-H Basin Sludge Waste

Subset(s)

- 1 - Basin 3 sludge
- 2 - Basin 4 sludge
- 3 - Basin 3 or 4 sludge

GENERATION

Narrative Description

The four 183-H basins were used from 1973 to 1985 for solar evaporation of neutralized acid etch solutions from N Reactor fuel fabrication activities. Sludge subsequently precipitated to the bottom of each of the basins. A relatively dry crystalline solid comprised a distinct strata on the interior edges of Basins 1, 3, and 4. All the solids from Basins 1 and 2 were packaged in 1985 and 1986 (before the *Resource Conservation and Recovery Act of 1976* was applied to mixed waste); these wastes are considered disposed and are not candidates for the WRAP Module 2A facility. The sludge and crystal solids from Basins 3 and 4 were packaged together indiscriminantly. This waste stream consists of solids from Basin 3, which were packaged in 1987, and solids from Basin 4, which were packaged in 1988.

Generator(s) Westinghouse Hanford Company; Decontamination and Decommissioning Program

Existing Volume

- 1 - Basin 3 sludge: 3,182 208-L drums
- 2 - Basin 4 sludge: 1,407 208-L drums

An additional 81 drums may be from either Basin 3 or 4 (i.e., they cannot be specifically traced to one basin or the other) and contain mostly absorbent derived from repackaging operations occurring in the basin.

NOTE: The 4,670 drums represent the actual number of 208-L drums reported to SWITS.

The total volume is 980.7 m³.

Forecast No further generation of this waste is forecast.

PHYSICAL CHARACTERISTICSNarrative Description

The Basin 3 sludge was manually shovelled or scooped using a 19-L bucket into 0.25-mm bags within 2.3-mm drum liners (in 208-L drums) over a layer of diatomaceous earth. The Basin 4 sludge was placed into two 0.25-mm bags in the drums. When the drum was approximately 80% full, more diatomaceous earth was added. It is probable that the highly caustic nature of the sludge (pH >10) has resulted in some of the diatomaceous earth (predominately calcium silicate) being converted to sodium silicate (or metasilicate) which would be expected to be crystalline (lumps) rather than amorphous.

Reference: WHC-SA-0705-FP, *RCRA Closure Experience with Radioactive Mixed Waste 183-H Solar Evaporation Basins at the Hanford Site* (Powers et al. 1990).

Physical State

Wet to semidry sludge.

Density

Approximately 1,600 kg/m³.

Moisture Content

Basin 3 sludge: Range 35% to 51% by weight; median 42% by weight.

Basin 3 crystalline solids: Range 0.55% to 1.8% by weight; median 1.1% by weight.

Basin 4 sludge: Range 43% to 51% by weight; median 46% by weight.

Basin 4 crystalline solids: Range 1.1% to 25%; median 6.6% by weight.

Reference: DOE/RL 88-09, *Final Status Post-Closure Permit Application 183-H Solar Evaporation Basins* (DOE-RL 1988).

Particle Size

Ranges from lumps to fine particulate (diatomaceous earth).

Hardness

Not applicable.

RADIOLOGICAL CHARACTERISTICSWaste Class

Class I.

Radionuclide Content

Nominal curie values per drum for drums containing radionuclides:

⁹⁹ Tc	3.7 E-04
²³⁷ Np	2.1 E-09
U	1.0 E-04

Uranium

- 1 - Basin 3 sludge: 870 pCi/g dry weight (average), 320 to 1,560 pCi/g dry weight (range), 278 g/drum average
- 2 - Basin 4 sludge: 520 pCi/g dry weight (average), 44 to 820 pCi/g dry weight (range), 350 g/drum average; 10 g/drum minimum and 375 g/drum maximum
- 3 - Basin 3/4 sludge: <1 g/drum

Total curie inventory:

⁹⁹Tc 1.7 E+00
²³⁷Np 9.6 E-06*
 U 4.9 E-01

*Preliminary results of recent drum sampling indicate ²³⁷Np will be about 1.0 E-13.

References: DOE/RL 88-09, *Final Status Post-Closure Permit Application 183-H Solar Evaporation Basins* (DOE-RL 1988); SWITS database.

Dose Rate

<1 mrem/h at drum surface.

CHEMICAL CHARACTERISTICS

Narrative Description

The waste originally consisted of inorganic acid etching solutions that were overneutralized with caustic.

Reference: WHC-SD-DD-TI-059, *Choice of Sorbond LPC II as a Solidifying Agent for 183-H Liquid Wastes* (Galbraith 1991).

Primary Components

The primary components of the sludge waste are as follows:

<u>Constituent</u>	<u>Basin 3 sludge</u>	
	<u>Median</u>	<u>Range</u>
Nitrate ion	26%	17-29%
Sodium	23%	20-30%
Sulfate ion	3.7%	1.9-5.3%
Fluoride ion	1.3%	0.98-1.5%
Copper	11.2%	8.8-14%
Zirconium	8.7%	2.2-22%
Aluminum	8,900 mg/kg	1,100-17,000 mg/kg
Iron	710 mg/kg	540-1,000 mg/kg
Vanadium	<30 mg/kg	<30 mg/kg
Barium	6 mg/kg	<1-22 mg/kg
Cadmium	6 mg/kg	3.6-<9 mg/kg

<u>Constituent</u>	<u>Median</u>	<u>Range</u>
Chromium	390 mg/kg	290-530 mg/kg
Lead	<80 mg/kg	<80 mg/kg
Mercury	not analyzed	
Selenium	not analyzed	
Silver	190 mg/kg	120-290 mg/kg

Basin 3 crystalline solids

<u>Constituent</u>	<u>Median</u>	<u>Range</u>
Nitrate ion	<1%	all <1%
Sodium	42%	35-55%
Sulfate ion	20%	16-26%
Fluoride ion	3.6%	2.9-4.9%
Copper	9,900 mg/kg	4,200-18,000 mg/kg
Zirconium	6,200 mg/kg	560-15,000 mg/kg
Aluminum	810 mg/kg	780-880 mg/kg
Iron	97 mg/kg	48-180 mg/kg
Vanadium	not analyzed	
Barium	8 mg/kg	2.5-<10 mg/kg
Cadmium	not analyzed	
Chromium	21 mg/kg	6.6-40 mg/kg
Lead	<30 mg/kg	<30 mg/kg
Mercury	not analyzed	
Selenium	not analyzed	
Silver	11 mg/kg	<5-17 mg/kg

Basin 4 sludge

<u>Constituent</u>	<u>Median</u>	<u>Range</u>
Nitrate ion	22%	20-24%
Sodium	24%	23-26%
Sulfate ion	1.9%	1.3-3.9%
Fluoride ion	1.1%	0.98-1.2%
Copper	10.3%	9.7-12%
Zirconium	4.4%	0.34-13%
Aluminum	430 mg/kg	390-490 mg/kg
Iron	2,100 mg/kg	1,200-3,800 mg/kg
Vanadium	4 mg/kg	<2-<10 mg/kg
Barium	24 mg/kg	<1-39 mg/kg
Cadmium	3.8 mg/kg	2.9-4.5 mg/kg
Chromium	260 mg/kg	210-340 mg/kg
Lead	36 mg/kg	14-<50 mg/kg
Mercury	not analyzed	
Selenium	not analyzed	
Silver	170 mg/kg	140-220 mg/kg

Basin 4 crystalline solids

<u>Constituent</u>	<u>Median</u>	<u>Range</u>
Nitrate ion	46.6%	7.1-71%
Sodium	38%	30-50%
Sulfate ion	13%	1.5-31%
Fluoride ion	2.2%	0.28-5.8%
Copper	2,600 mg/kg	1,700-4,500 mg/kg
Zirconium	1,300 mg/kg	290-3,300 mg/kg
Aluminum	440 mg/kg	200-610 mg/kg
Iron	77 mg/kg	42-150 mg/kg
Vanadium	not analyzed	
Barium	2.3 mg/kg	0.96-3.4 mg/kg
Cadmium	not analyzed	
Chromium	5.8 mg/kg	3.4-11 mg/kg
Lead	14 mg/kg	<5-<20 mg/kg
Mercury	not analyzed	
Selenium	not analyzed	
Silver	11.6 mg/kg	1.6-32 mg/kg

Reference: DOE/RL 88-09, *Final Status Post-Closure Permit Application 183-H Solar Evaporation Basins* (DOE-RL 1988).

Basin 3 solids

<u>Attribute</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Percent solids	85	82.8-86.6
pH	11.6	11.5-12.1
<u>Constituent</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Chloride	82	16.2-144
Fluoride	43,900	37,900-47,600
Formate	366	214-392
Cyanide	1.61	0.60-3.05
Sulfate	171,000	147,000-202,000
Total nitrogen	27,700	22,800-31,000
Total organic carbon	1,330	1,060-1,360
Total phosphorus	218	47.2-779
Total inorganic carbon	1,650	950-1,900
Silver	174	144-200
Aluminum	9,270	4,400-11,700
Barium	177	123-239
Beryllium	2.31	1.5-3.2
Calcium	7,380	5,240-13,600
Cadmium	2.70	2.52-2.8
Cobalt	4.7	3.2-7.2
Chromium	202	178-210
Copper	86,500	72,500-96,800
Iron	3,550	2,230-4,270
Mercury	2.98	2.69-3.8

WHC-SD-W100-RD-001
Revision 1

<u>Constituent</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Potassium	440	326-474
Magnesium	1,060	737-1,840
Manganese	670	546-721
Molybdenum	5.8	5.7-6.0
Sodium	202,000	174,000-215,000
Nickel	74.9	60.9-81.9
Antimony	8.2	7.4-9.6
Selenium	0.415	0.35-0.52
Silicon	2,700	1,700-3,970
Vanadium	31.6	11.7-46.3
Zinc	253	212-273
Zirconium	23,800	19,200-28,900
Technetium-99	810	670-840
Total U	1,200	1,100-1,300

*80% confidence interval

<u>Attribute</u>	<u>Basin 4 Solids Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Percent solids	88.1	85.7-90.6
pH	9.5	9.3-9.9

<u>Constituent</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Chloride	140	136-146
Fluoride	40,100	35,000-43,600
Formate	89.6	72-161
Cyanide	0.52	0.28-1.5
Sulfate	143,000	115,000-169,000
Total nitrogen	80,900	68,900-87,900
Total organic carbon	1,525	1,160-2,090
Total phosphorus	45.5	17.2-59.9
Total inorganic carbon	4,415	2,270-5,150
Silver	170	135-200
Aluminum	428	319-736
Barium	4.4	3.4-4.6
Beryllium	4.3	3.8-4.5
Calcium	282	228-324
Cadmium	2.8	2.4-3.1
Cobalt	0.92	0.65-3.49
Chromium	169	144-192
Copper	81,700	62,700-90,700
Iron	1,470	1,240-1,620
Mercury	13.6	11.0-16.6
Potassium	535	409-815
Magnesium	14.7	2.07-64
Manganese	554	457-648
Molybdenum	5.2	0.78-5.8
Sodium	222,000	177,000-249,000

<u>Constituent</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Nickel	75.5	61.7-80.7
Antimony	10	6.7-22.75
Selenium	0.43	0.32-0.6
Silicon	3,080	2,130-3,860
Vanadium	1.15	0.23-3.22
Zinc	226	184-241
Zirconium	26,600	17,800-30,600
Technetium-99	1,800	1,300-2,200
Total U	670	490-770

All analytical data in the above two tables are on a dry basis.

*80% confidence interval

Reference: Preliminary Results of 183H Basin Waste Drum/Box Sampling Program from J. L. Westcott and M. R. Kerns. When completed and validated, this information will be considered the most appropriate for process design and development.

Waste Codes

Listed Components:

P029 Copper cyanide
P030 Cyanide salts
P098 Potassium cyanide
P106 Sodium cyanide
P120 Vanadium pentoxide
U123 Formic acid

Characteristics:

D001 Ignitable - oxidizer (nitrates)

State Codes:

WT01 Toxic extremely hazardous waste (EHW) (for fluoride, copper nitrate, and copper sulfate)

NOTE: The original waste designation performed in the closure plan did not include the D001 code.

References: DOE/RL 88-09, *Final Status Post-Closure Permit Application 183-H Solar Evaporation Basins* (DOE-RL 1988); SWITS database; and WAC 173-303-90.

Hazardous Characteristics

Toxicity characteristic testing was performed on these wastes using the EP toxicity method; wastes were below table CCWE nonwastewater concentration limits for all toxic metals D004 through D011.

Hazardous Components

Listed waste codes are by virtue of the mixture rule; most listed constituents other than vanadium and formate are expected to be nondetectable.

PACKAGING DESCRIPTION

Container Type

U.S. Department of Transportation 17H 208-L drums.

Reference: WHC-SA-0705-FP, *RCRA Closure Experience with Radioactive Mixed Waste 183-H Solar Evaporation Basins at the Hanford Site* (Powers et al. 1990).

Internal Packaging

2.3-mm rigid polyethylene liner and 0.25-mm plastic liner (primarily for Basin 3 solids and additional 81 drums) or two 0.25-mm bags (primarily for Basin 4 solids). The 2.3-mm rigid polyethylene liner has a polyethylene lid with a metal (probably galvanized) ring. There is about 12.7-mm annular space between the liner and the drum surfaces. In the vicinity of the lid, the liner necks down to create approximately a 5-cm annular spacing. This spacing is sufficient to allow manual removal of the bolt from the liner lid ring. Approximately 0.028 m³ of diatomaceous earth was placed in the bottom of the lined drum, followed by approximately 0.128 m³ of waste and approximately 0.043 m³ of "mixed diatomaceous earth absorbents" on top of the waste.

Reference: WHC-SA-0705-FP, *RCRA Closure Experience with Radioactive Mixed Waste 183-H Solar Evaporation Basins at the Hanford Site* (Powers et al. 1990); preliminary results of 183-H Basin Waste Drum/Box Sampling Program from J. L. Westcott and M. R. Kerns.

Venting Mechanism

None.

Gross Weight

The minimum gross weight is 113.4 kg and maximum is 362.9 kg.

Closure Mechanism

Bolted lock ring.

NOTE: Several different brands of rigid liners may have been used and each could have a different closure mechanism.

Table D-4. Specification for Feed Stream 1D, Miscellaneous 183-H Basin Waste, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	1D
<u>Common Name</u>	Miscellaneous 183-H Basin Waste
<u>Subset(s)</u>	1 - Drums of sandblast grit 2 - Drums of miscellaneous waste and liner material 3 - Boxes of miscellaneous waste and liner material

GENERATION

<u>Narrative Description</u>	The four 183-H basins were used from 1973 to 1985 for solar evaporation of neutralized acid etch solutions from N Reactor fuel fabrication activities. Miscellaneous wastes generated during the waste removal and cleanout process between 1985 and 1990 included old basin liner material, solidified liquids, sandblast grit, and expendable equipment and protective clothing.
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<u>Generator(s)</u>	Westinghouse Hanford Company; Decontamination and Decommissioning Program
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<u>Existing Volume</u>	1 - Sandblast grit: 189 208-L drums 2 - Miscellaneous waste: 220 208-L drums 3 - Miscellaneous waste: 14 1.52 m high by 1.22 m wide by 2.44 m long boxes
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NOTE: The 409 drums and 14 boxes represent the actual number of 208-L drums and 1.52 by 1.22 by 2.44-m boxes reported to SWITS.

The total volume is 149.3 m³.

<u>Forecast</u>	A small amount (about 100 drums) of this waste could be generated in the future if the Washington State Department of Ecology requires further cleanup.
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PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	All types of miscellaneous contaminated trash, old Hypalon* liner, gloves, boots, plastic, cloth, shovels, sand, concrete, crushed tumbleweeds, and 19-L buckets.
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*Hypalon is a trademark of E.I. DuPont DeNemours & Co., Inc.

Reference: DOE/RL 88-09, *Final Status Post-Closure Permit Application 183-H Solar Evaporation Basins* (DOE-RL 1988).

Physical State

Dry sand, small pieces of concrete, plastic, pieces of rubber, metal, and other dry heterogeneous solids.

Density

Sandblast grit: Approximately 1,600 kg/m³
Drums/boxes: 705 kg/m³

Moisture Content

Expected to be dry.

Particle Size

Sandblast grit: 0.1 to 0.4 mm
Miscellaneous waste: Not applicable

Hardness

Sandblast grit: Not applicable
Miscellaneous waste: May include some steel tools, such as shovels.

RADIOLOGICAL CHARACTERISTICS

Waste Class

Class I.

Radionuclide Content

Nominal curie values per drum for drums containing radionuclides:

⁹⁹ Tc	4.8 E-06
²³⁷ Np	7.9 E-12
U	4.0 E-07

Uranium

- 1 - Sandblast grit: 1.4 g/drum average; 1 g/drum minimum and 2 g/drum maximum
- 2 - Miscellaneous waste: Approximately 1 g/drum average; 7 g/drum maximum

Total curie inventory:

⁹⁹ Tc	2.0 E-03
²³⁷ Np	3.9 E-09
U	2.0 E-04

Dose Rate

<1 mrem/h at drum surface

CHEMICAL CHARACTERISTICS

Narrative Description

The Hypalon liner had been used to contain super-natant liquids which were consolidated from all the basins. Sandblasting was performed on the emptied basins to remove the surface layer of concrete which was in contact with the waste. Other miscellaneous materials primarily include the tools and equipment used to decommission the basins.

WHC-SD-W100-RD-001
Revision 1

Reference: WHC-SA-0705-FP, *RCRA Closure Experience with Radioactive Mixed Waste 183-H Solar Evaporation Basins at the Hanford Site* (Powers et al. 1990).

Primary Components

Sandblast grit and miscellaneous heterogeneous solids.

<u>Attribute</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Percent solids	94.7	82.6-96.4
pH	9.2	9.0-9.6
<u>Constituent</u>	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Chloride	53.2	33.7-79.6
Fluoride	79.1	61.3-104
Formate	3.3	1.3-3.5
Cyanide	0.27	0.25-0.28
Sulfate	348.5	95.9-441
Fluoride	72.3	56.5-113
Total nitrogen	89.2	0.63-108
Total organic carbon	670	492-1,060
Total phosphorus	109	81-150
Total inorganic carbon	348.5	23.8-1,880
Silver	2.05	0.63-2.07
Aluminum	1,290	8.15-1,960
Barium	15.9	2.25-25.9
Beryllium	0.27	0.13-0.8
Calcium	4,420	27.95-7,340
Cadmium	0.46	0.13-1.3
Cobalt	1.95	1.5-3.1
Chromium	7.1	1.65-9.4
Copper	88.9	1.65-409
Iron	3,310	9.05-4,530
Mercury	0.03	0.03-0.05
Potassium	216	123-443.5
Magnesium	681	35.75-1,350
Manganese	62.5	0.65-94
Molybdenum	1.3	0.3-2.8
Sodium	543	355-777
Nickel	3.2	1.6-4.6
Antimony	12.7	1.35-24
Selenium	0.14	0.13-1.3
Silicon	283	98.6-507
Vanadium	4.3	2.2-9.3
Zinc	37	6.3-60.1
Zirconium	131	14-351
Technetium-99	3.6	2.6-7.2
Total U	4.6	0.098-11

*80% confidence interval

Reference: Preliminary results of 183-H Basin Waste Drum/Box Sampling Program from J. L. Westcott and M. R. Kerns.

Waste Codes

Listed Components:

P029 Copper cyanide
P030 Cyanide salts
P098 Potassium cyanide
P106 Sodium cyanide
P120 Vanadium pentoxide
U123 Formic acid

Characteristics:

D001 Ignitable - oxidizer (presumably because of nitrates originally contained in the basins)

State Codes:

WT01 Toxic EHW (for fluoride, copper nitrate, and copper sulfate) - Basins 1, 3, and 4 only
WT02 Toxic DW for fluoride - Basin 2 only

Reference: SWITS database and WAC 173-303-90.

Hazardous Characteristics

During basin cleanout, the sandblast grit and heterogeneous solids were apparently not tested for toxicity characteristic. Recent results of TCLP testing are shown below.

<u>Constituent</u>	<u>TCLP Results</u>	
	<u>Mean (mg/kg)</u>	<u>Range* (mg/kg)</u>
Silver	2.1	2.1-2.1
Arsenic	10.8	10.8-10.8
Barium	287	140-792
Cadmium	3.85	1.3-11.9
Chromium	7.95	5.3-24
Mercury	0.05	0.05-0.05
Lead	10.3	10.3-58.2
Selenium	63	25.6-63

*80% confidence interval

Reference: Preliminary results of 183-H Basin Waste Drum/Box Sampling Program from J. L. Westcott and M. R. Kerns.

Hazardous Components

Listed waste codes are by virtue of the mixture rule; actual concentrations of listed components (e.g., cyanides) are expected to be negligible.

PACKAGING DESCRIPTION

Container Type

U.S. Department of Transportation 17H 208-L drums.
Boxes have dimensions of 1.52 by 1.22 by 2.44 m.

A portion of the existing waste inventory for this stream has been overpacked into 322-L drums. It is anticipated by the startup of WRAP Module 2A the entire existing waste inventory will be overpacked.

References: WHC-SA-0705-FP, *RCRA Closure Experience with Radioactive Mixed Waste 183-H Solar Evaporation Basins at the Hanford Site* (Powers et al. 1990); SWITS database.

Internal Packaging

2.3-mm rigid polyethylene liner and 0.25-mm plastic liner or two 0.25-mm bags in drums. Lining in boxes unknown. Recent drum sampling indicates the average absorbent volume is about 12% of the total volume.

Reference: Preliminary results of 183-H Basin Waste Drum/Box Sampling Program from J. L. Westcott and M. R. Kerns.

Venting Mechanism

None.

Gross Weight

	<u>Minimum (kg)</u>	<u>Maximum (kg)</u>
Sandblast grit drums:	261.4	472.7
Miscellaneous waste drums:	34.1	340.0
Miscellaneous waste boxes:	909.1	1,725.0

Closure Mechanism

Bolted lock ring on drums.

Table D-5. Specification for Feed Stream 2A, Ammonium/Sodium Sulfate Powder, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

CDR Identification Number 2A

Common Name Ammonium/Sodium Sulfate Powder

Subset(s)

- 1 - Ammonium sulfate powder
- 2 - Sodium sulfate powder

GENERATION

Narrative Description The 200 Area Effluent Treatment Facility (ETF) will treat acidified (sulfuric acid) process condensate from the 242-A Evaporator, primarily to remove dissolved solid contaminants. The ETF will operate at 568 L/min for its first 4 months to work off 242-A Evaporator process condensate that will have accumulated in the Liquid Effluent Retention Facility basins (covered surface impoundments). Thereafter, the ETF will treat process condensate from the 242-A Evaporator at a rate of 284 L/min, removing undissolved solids (particulates), dissolved solids, organics (destroyed by ultraviolet oxidation), and radionuclides. Secondary wastes will be dried to a powder in a thin-film dryer. Other wastes also may be treated in the ETF because it will have a total capacity of 568 L/min.

Generator(s) Westinghouse Hanford Company; 200 Area ETF

Existing Volume None.

Forecast A total of 1,000 m³ or 5,400 drums are expected to be generated by the ETF. This amount assumes the ETF treats process condensate from the 242-A Evaporator at an average rate of 284 L/min through the year 2023. Past the year 2000, the output is hard to predict. Alternative feeds to the ETF are being evaluated. New facilities to pretreat and vitrify the tank waste are also planned; these will generate process condensates requiring treatment. The ETF will likely operate in the future at its full 568 L/min capacity. This has the potential to double the production of secondary waste.

PHYSICAL CHARACTERISTICS

Narrative Description Powdered solids are produced from a thin-film dryer, which is used to dry liquid wastes, including brine, from reverse osmosis separation (up to 99% by weight) and mixed bed ion-exchange regenerate (as little as

1% by weight). Blowdown from rough ($>2 \mu\text{m}$) and fine (0.5 to $2.0 \mu\text{m}$) filters contributes a negligible amount.

Reference: V-C018HC1-001, *Design Construction Specification Project C-018H 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (Kelly 1991).

Physical State

Dry powder.

Density

Assumed to be about 993 kg/m^3 .

Moisture Content

The free liquid content is expected to be zero; there may be some hydrated water content.

Particle Size

Majority is expected to be less than 200 Mesh (Tyler) with the consistency of flour. There may be some agglomeration to larger sizes due to the likely hygroscopic nature of the solids.

Hardness

Not applicable (expected to be a fine powder).

RADIOLOGICAL CHARACTERISTICS

Waste Class

Class I.

Radionuclide Content

The following table summarizes the expected range of radionuclide activity in the secondary waste. Three cases are presented. The composition of the feed to the ETF will vary depending on the waste being concentrated in the 242-A Evaporator. As a result, the concentration of ammonium sulfate in the secondary waste may range from 0 wt% to 83 wt%. The average concentration is 8.8 wt%, based on a total of 24,100 kg NH_3 in the tank waste. Actual values may deviate significantly from the tabulated values. For calculation purposes, a drum of waste contains $1.89 \text{ E}+05 \text{ g}$.

<u>Radionuclide</u>	Activity (nCi/g)		
	at 83 wt% ammonium <u>sulfate</u>	at 8.8 wt% ammonium <u>sulfate</u>	at 0 wt% ammonium <u>sulfate</u>
Beta	2.0	11	12.0
Alpha	0.15	0.80	0.9
^3H	TBD	TBD	TBD
$^{14}\text{C}^{(a)}$	TBD	TBD	TBD
$^{79}\text{Se}^{(b)}$	TBD	TBD	TBD
^{90}Sr	3.4	18	20.0
^{90}Y	3.4	18	20.0
$^{99}\text{Tc}^{(c)}$	TBD	none	none
^{103}Ru	7.9	42	47.0

<u>Radionuclide</u>	Activity (nCi/g)		
	at 83 wt% ammonium sulfate	at 8.8 wt% ammonium sulfate	at 0 wt% ammonium sulfate
^{103m} Rh	7.9	42	47.0
¹⁰⁶ Ru	4.9	26	29.0
¹⁰⁶ Rh	4.9	26	29.0
¹¹³ Sn	0.34	1.8	2.0
^{113m} In	0.34	1.8	2.0
¹²⁹ I ^(d)	none	none	none
¹³⁴ Cs	none	none	none
¹³⁷ Cs	2.4	13	14.0
^{137m} Ba	2.4	13	14.0
¹⁴⁷ Pm	0.71	3.8	4.2
¹⁵⁵ Eu	none	none	none
²³⁷ Np ^(b)	0.054	0.29	0.32
²⁴¹ Pu	none	none	none
U (gross)	0.015	0.080	0.09
²³⁸ Pu	none	none	none
²³⁹ Pu	3.0 E-07	1.6 E-06	1.8 E-06
²⁴¹ Am	<u>none</u>	<u>none</u>	<u>none</u>
Total activity	38.0	202	224

^aBased on fraction in process condensate according to internal memo 7E320-94-006, *Ammonia in Waste to WRAP 2A* (Washenfelter 1994). Lost as CO₂ on acidification in ETF.

^bNot routinely analyzed for in 242-A process condensate. Normal operation in accordance with WHC-SD-WM-SAR-023, *242-A Evaporator Crystallizer Safety Analysis Report*, Table 4-11 (Lavender 1992) provides bounding case of 13, 69, and 76 nCi/g for 83, 8, and 0% ammonium sulfate, respectively.

^cBased on fraction in process condensate according to internal memo 7E320-94-006, *Ammonia in Waste to WRAP 2A* (Washenfelter 1994). Removed by reverse osmosis in ETF.

^dExpected to be volatile and removed in ETF.

Reference: V-C018HC1-001, *Design Construction Specification Project C-018H 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (Kelly 1991).

Dose Rate

Dose rates will be up to 100 mrem/h at contact.

CHEMICAL CHARACTERISTICS

Narrative Description

The powdered solids are generated in a dryer from a concentrate that is pH 4.

Reference: V-C018HC1-001, *Design Construction Specification Project C-018H 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (Kelly 1991).

Primary Components

Up to 83% will be ammonium sulfate with as little as 7% being sodium sulfate. At the other extreme, 0% will be ammonium sulfate with 41% being sodium sulfate. The sodium sulfate originates primarily from the regeneration of the ion-exchange columns. Minor cations include hydrogen ion, potassium, and calcium. Minor anions include silicate, nitrate, excess sulfate, carbonate, chloride, fluoride, and phosphate.

The following table (based on upper-level 90% confidence intervals and maximums where a 90% confidence level is not available) summarizes the expected range of constituents in the secondary waste. The numbers are based on three cases. With ammonia in the influent to the ETF, as much as 83% of the secondary waste will be ammonium sulfate. Without ammonia in the influent to the ETF, there will be 0% ammonium sulfate in the secondary waste. An intermediary case of 8.8 wt% ammonium sulfate is now postulated. Note that a drum of waste is expected to weigh about 200 kg. Actual values will depend on the character of the influent to the ETF. Therefore, actual values may deviate significantly from the tabulated values.

<u>Component</u>	<u>Wt fraction in secondary waste</u>		
	<u>at 83 wt% ammonium sulfate</u>	<u>at 8.8 wt% ammonium sulfate</u>	<u>at 0 wt% ammonium sulfate</u>
Na	0.023	0.12	0.135
K	0.0029	0.015	0.017
Ca	0.0012	0.0064	0.007
NH ₄	0.226	0.023	none
Si	0.0107	0.057	0.065
NO ₃	0.0010	0.0053	0.006
SO ₄	0.730	0.739	0.746
CO ₃	0.0035	0.019	0.021
Cl	0.00069	0.0037	0.004
F	0.00043	0.0023	0.003
PO ₄	0.0012	0.0064	0.007

Minor Components

Al	5.9 E-04	3.1 E-03	3.5 E-03
Ba	3.2 E-06	1.7 E-05	1.9 E-05
B	4.3 E-05	2.3 E-04	2.5 E-04
Cr	2.9 E-05	1.5 E-04	1.7 E-04
Cu	3.0 E-05	1.6 E-04	1.7 E-04

WHC-SD-W100-RD-001
Revision 1

<u>Component</u>	<u>Wt fraction in secondary waste</u>		
	<u>at 83 wt% ammonium sulfate</u>	<u>at 8.8 wt% ammonium sulfate</u>	<u>at 0 wt% ammonium sulfate</u>
Fe	5.8 E-05	3.1 E-04	3.4 E-04
Mg	6.8 E-05	3.6 E-04	4.0 E-04
Mn	2.2 E-06	1.2 E-05	1.3 E-05
Hg	1.4 E-07	7.4 E-07	8.1 E-07
Ni	6.6 E-06	3.5 E-05	3.9 E-05
V	3.0 E-06	1.6 E-05	1.7 E-05

References: *Design Construction Specification
Project C-018H 242-A Evaporator/PUREX Plant Process
Condensate Treatment Facility, V-C018HC1-001
(Kelly 1991).*

Waste Codes

Listed Components:

F001 1,1,1 Trichloroethane
F002 Methylene chloride
F003 Acetone; butyl alcohol; methyl isobutyl ketone
F004 Cresylic acid
F005 Methyleneethyl ketone; pyridine

Characteristics:

D007 Toxicity (chrome)
D009 Toxicity (mercury)

State Codes:

WT02 Toxic DW (ammonia)

NOTE: This waste may well be coded for toxic metals; the concentrations of toxic metals, such as barium, cadmium, and mercury, have not yet been verified or designated. Verification is expected to occur during initial operations of the ETF. However, based on the above table, chromium probably will be present in the secondary waste in sufficient concentrations to assign the code D007. It also should be noted that the secondary waste is ultimately derived from the double-shell tank wastes which are coded for D001 through D011, D018, D019, D022, D028 through D030, D033 through D036, D038 through D041, D043, and F001 through F005.

Hazardous Characteristics

Listed codes are by the derived-from rule; the actual concentrations for many of these constituents is expected to be nondetectable.

Hazardous Components

Listed waste codes are by the derived-from rule; most constituents are expected to be nondetectable.

PACKAGING DESCRIPTION

<u>Container Type</u>	U.S. Department of Transportation 17H or 17C 208-L drums.
<u>Internal Packaging</u>	2.3-mm rigid polyethylene liner.
<u>Venting Mechanism</u>	None.
<u>Gross Weight</u>	Average 227 kg.
<u>Closure Mechanism</u>	Bolted lock ring on drum.

Table D-6. Specification for Feed Stream 2B, Ion-Exchange Resin,
Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

CDR Identification Number 2B

Common Name Ion-Exchange Resin

Subset(s)

- 1 - 200 Area ETF also designated Project C-018H
- 2 - 300 Area Treated Effluent Disposal Facility (TEDF) also designated Project L-045H

GENERATION

Narrative Description This waste stream consists of spent resins generated by facilities that treat liquid waste. Resins may be regenerated several times before being discarded, but will probably not be regenerated the last time used. Any of several types of cation, anion, or mixed-bed resins may be generated. Resins will be of the styrene-divinyl benzene type. The 300 Area TEDF will not regenerate resin.

Generator(s) Westinghouse Hanford Company; 200 Area ETF and 300 Area TEDF

Existing Volume None.

Forecast

ETF: A total of 80 m³ or 385 drum equivalents (DE) through 2023

TEDF: A total of 122 m³ or 587 DEs through 2023

Totals: 202 m³ or 972 DEs through 2023

The ETF volume is based on an average feed rate of 284 L/minute (about one-half of the actual facility capacity) through the year 2023.

The volume projected for TEDF is based on routine operating flows. It is expected that two columns of resins (a column contains 4.36 m³) will be changed out every 2 years starting in 1997.

PHYSICAL CHARACTERISTICS

Narrative Description All resins will be versions of cross-linked styrene-divinyl benzene polymer; functional groups will vary with specific resin. Waste resin will be sluiced from the columns and drained before packaging. The TEDF will use PUROLITE S-920 resin. Ionac C-250 and Ionac ASB-1P (cation and anion-exchange resins sold by Sybron Chemicals, Inc.) have been specified for the 200 Area ETF.

Reference: Vendor publication.

Physical State

Solid beads.

Density

ETF: 865 kg/m³ for new Ionac C-250 (moisture content 37% to 43%). 689 kg/m³ for new Ionac ASB-1P (moisture content 50% to 56%).
TEDF: 720 kg/m³ shipping weight for dry, new resin. 1,394 kg/m³ for moist, spent resin, in Hg+2 state.

Reference: Vendor publication

Moisture Content

50% to 70% internal. The moisture content for ETF waste cannot be established at this time. It is assumed that nearly all the drainable water will be removed before shipment to WRAP Module 2A. NOTE: The complete removal of all drainable water may be difficult to attain. The degree of attainment is unknown at this time.

Reference: Vendor publication.

Particle Size

Depends on resin type and is expected to range from 0.3 to 1.2 mm.

Reference: Vendor publication.

Hardness

Unknown.

RADIOLOGICAL CHARACTERISTICS

Waste Class

Class I.

Reference: WHC-SD-L045H-SAD-001, *300 Area Treated Effluent Disposal Facility Preliminary Safety Analysis Document* (Bendixsen 1994) with some modifications to reflect latest design information.

Radionuclide Content

ETF resin: The following table is based on design information supplied by V-C018HC1-001, *Design Construction Specification Project C-018H 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (Kelly 1991). Actual values will depend on the character of the influent to the ETF. Therefore, actual values may deviate significantly from the tabulated values. It is conceivable that radionuclide concentrations could be 20 times higher or greater.

<u>Radionuclide or activity type</u>	<u>Ci/m³ of resin</u>
Beta	3.6 E-5
Alpha	2.7 E-6
³ H	6.3 E-3
⁹⁰ Sr	5.7 E-5
⁹⁰ Y	5.7 E-5
¹⁰³ Ru	1.4 E-4
^{103m} Rh	1.4 E-4
¹⁰⁶ Ru	8.6 E-5
¹⁰⁶ Rh	8.6 E-5
¹¹³ Sn	5.7 E-5
^{113m} In	5.7 E-5
¹²⁹ I	none
¹³⁴ Cs	none
¹³⁷ Cs	4.1 E-5
^{137m} Ba	4.1 E-5
¹⁴⁷ Pm	1.2 E-5
¹⁵⁵ Eu	none
²⁴¹ Pu	none
U (gross)	2.5 E-7
²³⁸ Pu	none
²³⁹ Pu	5.2 E-12
²⁴¹ Am	none
Total activity	6.7 E-4

TEDF resin:

<u>Constituent</u>	<u>Concentration (pCi/L)</u>
³ H	261
⁶⁰ Co	0.065
⁹⁰ Sr	0.487 (Sr total 1.36)
¹⁰⁶ Ru	1.95
¹³⁷ Cs	29.6
¹⁴⁷ Pm	5.79
Radium total	0.0975
U total	0.26
²³⁸ Pu	1.62 E-3
^{239/240} Pu	6.5 E-3
²⁴¹ Pu	1.3
²⁴¹ Am	0.0195

Reference: WHC-SD-L045H-SAR-001, 300 Area Treated Effluent Disposal Facility Process Information and Hazards Analysis (Bendixsen 1994).

Dose Rate

ETF - up to 100 mrem/h.

TEDF - probably below background.

CHEMICAL CHARACTERISTICS

Narrative Description

ETF: Ionac C-250 is a bead form strong acid gel polystyrene-sulfonated cation-exchange resin. It derives its exchange capacity from sulfonate functional groups. Ionac ASB-1P is a strong base anion-exchange resin with a gel structure of polystyrene cross-linked with divinyl benzene. It derives its exchange capacity from quaternary ammonium functional groups.

TEDF: PUROLITE S-290 resin is a macroporous polystyrenic-based chelating resin with thiouronium functional groups.

Primary Components

ETF: The following table contains the constituents expected to be on the ion-exchange resins used in the 200 Area ETF. NOTE: If the concentration of influent ammonia is reduced from the design basis, ammonium and sulfate loadings will be lower while all other constituent loadings will be higher. The degree to which they will be higher is unknown and will not be known until the actual waste is produced. However, it is not inconceivable the constituent concentrations could be 20 times higher or greater. Actual values will depend on the character of the influent to the ETF. Therefore, actual values may deviate significantly from the tabulated values.

<u>Inorganic constituent</u>	<u>Loading in g/m³ of resin</u>
Sodium	39,000
Potassium	50
Calcium	21
Ammonium	4,100 (if present in ETF feed)
Silicon	none
Nitrate	18
Sulfate	93,000 (if ammonia in feed to ETF)
Carbonate	4,300
Chloride	310
Fluoride	7.6
Phosphate	21

<u>Minor constituents</u>	<u>Loading in g/m³ of resin</u>
Aluminum	2.1
Barium	0.012
Boron	0.16
Chromium	0.11
Copper	0.11
Iron	0.21
Magnesium	0.25

WHC-SD-W100-RD-001
Revision 1

Manganese	0.008
Mercury	0.000051
Nickel	0.024
Vanadium	0.011

TEDF: The concentrations are $\mu\text{g/L}$. Only major constituents are listed.

Cadmium	2.48 E+5
Copper	1.42 E+5
Lead	6.91 E+5
Mercury	1.68 E+5
Nickel	1.77 E+5
Silver	2.89 E+5

Waste Codes

ETF: Listed Components:

F001 1,1,1 Trichloroethane
F002 Methylene chloride
F003 acetone; butyl alcohol; methyl isobutyl ketone
F004 Cresylic acid
F005 Methyleneethyl ketone; pyridine

State Codes:

WT02 DW (ammonia)

NOTE: Although this waste is not coded for toxic metals, the concentrations of toxic metals such as barium, cadmium, and mercury have not yet been verified. Verification is expected to occur during the initial operation of ETF. NOTE: The secondary waste is ultimately derived from the double-shell tank wastes which are coded for D001 through D011, D018, D019, D022, D028 through D030, D033 through D036, D038 through D041, D043, and F001 through F005.

TEDF: Unknown until toxic characteristics leach procedure test can be performed on the spent ion-exchange resin.

Hazardous Characteristics Unknown.

Hazardous Components ETF: See above table
TEDF: Arsenic, barium, beryllium, cadmium, lead, selenium, and silver

PACKAGING DESCRIPTION

Container Type ETF: The container for ETF resin is under evaluation. High-integrity containers with capacities ranging from 246 to 2,780 L that are entirely plastic or consist of a steel shell with a

plastic liner are being considered. The WRAP Module 2A processing favors use of a 208-L drum for containment of the ETF resin waste.
TEDF: U.S. Department of Transportation 17C or 17H 208-L drums for these resins.

Internal Packaging

ETF: Unknown.
TEDF: 2.3-mm polyethylene liner; absorbent mixed with the resin.

Venting Mechanism

None.

Gross Weight

ETF: 250 to 325 kg if the 322-L container is used. This could be slightly more or less depending on container weight and fill volume. A 208-L container would be about the same weight as for TEDF.
TEDF: 175 to 320 kg.

Closure Mechanism

ETF: Unknown.
TEDF: Snap-on lid for liner; lock ring for drum.

Table D-7. Specification for Feed Stream 5A1, Elemental Mercury,
Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	5A1
<u>Common Name</u>	Elemental Mercury
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums.

GENERATION

<u>Narrative Description</u>	Mercury was used throughout the Hanford Site and U.S. Department of Energy complex in vacuum pumps, gauges, and other applications.
<u>Generator(s)</u>	Most of the existing mercury waste comes from the Hanford Site but other U.S. Department of Energy sites also have forecasted small amounts of this waste type.
<u>Existing Volume</u>	Approximately 4.3 m ³ or 21 DEs are in the SWITS database.
<u>Forecast</u>	<p>The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is approximately 21 m³ or 89 DEs and 1 box.</p> <p>References: 1992 forecast data (see Appendixes A, B, and C); SWITS database.</p>

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	The elemental mercury is in glass or polyethylene containers surrounded by absorbent (diatomaceous earth or similar material) and possibly some padding. Some of the existing mercury has been amalgamated and most forecast mercury would be expected to be similarly treated.
<u>Physical State</u>	Mercury metal. The actual mercury content of the drums is only 642 kg or about 26% by weight and 1% by volume of the existing waste. Hazardous debris is frequently added to the drums containing the elemental mercury waste.
<u>Density</u>	13,590 kg/m ³ for the elemental mercury. The existing drums have an average density of about 571 kg/m ³ .
<u>Moisture Content</u>	None.

Particle Size Not applicable.

Hardness Not applicable.

RADIOLOGICAL CHARACTERISTICS

Waste Class Primarily Class I.

Radionuclide Content Existing waste total curie inventories of ^{99}Tc , ^{129}I , and ^{79}Se . The total enriched uranium content of existing waste is 5.1 E-02 g .

Dose Rate Existing waste drums have a minimum dose rate of 0.1 mrem/h and maximum of 55.0 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description Toxic fluid metallic substance.

Primary Components Mercury with absorbent and packaging material. Existing waste containers have a mercury content ranging from 0.0 to 105.0 kg with an average of 26.5 kg of mercury per container.

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Amalgamated mercury	2.8000 E-2	2.8000 E-2	2.8000 E-2	1
Barium oxide	2.0000 E+0	2.0000 E+0	2.0000 E+0	1
Lead	1.1340 E-1	1.1340 E-1	1.1340 E-1	1
Mercury	0.0000 E+0	1.0510 E+2	6.3768 E+2	24
Metallic mercury	3.9000 E+9	3.9000 E+0	3.9000 E+0	1
Zinc	2.5000 E-1	2.5000 E-1	2.5000 E-1	1

*Number of containers with specific hazardous constituent.

Waste Codes The codes shown below are for existing waste. Forecast waste could have additional codes.

Listed Components:

U151 Mercury

Characteristics:

D005 Barium
D008 Lead
D009 Mercury

State Codes:

WL01 Labpack EHW
WT01 Toxic EHW (mercury)

Reference: SWITS database.

Hazardous Characteristics Toxic.

Hazardous Components Elemental mercury.

PACKAGING DESCRIPTION

Container Type Primarily U.S. Department of Transportation 17H 208-L drums. Four 30.3-L drums and one 75.7-L drum are also shown in the SWITS database. The maximum size of the existing mercury containers within the 208-L drums is estimated to be about 1.9 L.

Internal Packaging 2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners. There is no evidence indicating the drums are concrete lined.

Venting Mechanism None.

Gross Weight The minimum gross weight is 8.7 kg and maximum is 204.5 kg.

Closure Mechanism Bolted lock ring for 208-L drums.

NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

Table D-8. Specification for Feed Stream 5A2, Mercury Chemicals,
Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	5A2
<u>Common Name</u>	Mercury Chemicals
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums.

GENERATION

<u>Narrative Description</u>	Mercury chemical waste is generated from a variety of sources throughout the Hanford Site. The mercury and other component contents of the waste are widely variable.
<u>Generator(s)</u>	Most of the existing mercury waste comes from the Hanford Site but other U.S. Department of Energy sites also have forecasted this type of waste.
<u>Existing Volume</u>	Approximately 4.6 m ³ or 22 DEs are in the SWITS database.
<u>Forecast</u>	<p>The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is approximately 16.2 m³ or 78 DEs.</p> <p>References: 1993 forecast data (see Appendixes A, B, and C); SWITS database.</p>

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	Mercury chemicals (salts, reagents, standards), sludge, batteries, and liquids in any combination with absorbent (diatomaceous earth or similar material and padding), polyethylene, glass, and possibly some metal.
<u>Physical State</u>	Primarily liquid/solid containers (lab packs) absorbent and batteries. The actual mercury content of the drums is <1% by weight.
<u>Density</u>	Average density of existing drums is about 393 kg/m ³ .
<u>Moisture Content</u>	Dry waste except for a few containers of mercury solutions.
<u>Particle Size</u>	Not applicable.
<u>Hardness</u>	Not applicable.

RADIOLOGICAL CHARACTERISTICS

<u>Waste Class</u>	Primarily Class I.
<u>Radionuclide Content</u>	Existing waste total curie inventories of ^{99}Tc , ^{129}I , and ^{79}Se for existing waste are 1.0 E-7 , 1.6 E-10 , and 2.9 E-9 , respectively. The total enriched uranium content of existing waste is 12 g.
<u>Dose Rate</u>	Existing waste drums have a minimum dose rate of 0.1 mrem/h and a maximum of 3.0 mrem/h at drum surface.
	Reference: SWITS database.

CHEMICAL CHARACTERISTICS

<u>Narrative Description</u>	Mercury chemicals, salts, and batteries combined with other toxic substances.
<u>Primary Components</u>	Primarily mercury chemicals with absorbent and other materials. The following list of constituent contents in existing containers is provided for information.

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Ammonium chloride	4.0000 E-2	3.5000 E-1	7.8080 E-1	5
Arsenic	2.0000 E-4	1.6500 E-2	1.6700 E-2	2
Barium	5.0000 E-4	1.5100 E-2	1.5600 E-2	2
Boron trifluoride	4.5000 E-3	4.5000 E-3	4.5000 E-3	1
Cadmium	0.0000 E+0	2.0500 E-1	2.2120 E-1	7
Cadmium hydroxide	2.0500 E-1	2.0500 E-1	2.0500 E-1	1
Chromium	1.0000 E-4	1.7000 E-3	4.1000 E-3	8
Cobalt hydroxide	2.0000 E-2	2.0000 E-2	2.0000 E-2	1
Hydrochloric acid	2.9330 E-1	1.1480 E+0	1.4413 E+0	2
Lead	0.0000 E+0	1.2800 E-2	1.6200 E-2	5
Manganese dioxide	9.5570 E-1	9.5570 E-1	9.5570 E-1	1
Mercuric hydroxide	2.0000 E-1	2.0000 E-1	2.0000 E-1	1
Mercury	0.0000 E+0	4.9990 E-1	8.3490 E-1	26
Nickel hydroxide	5.0000 E-4	3.8000 E-1	5.5350 E-1	3
Nitric acid	9.2800 E-1	9.2800 E-1	9.2800 E-1	1

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Potassium hydroxide	2.0000 E-2	3.7100 E-1	4.7600 E-1	3
Selenium	0.0000 E+0	1.9000 E-2	1.9000 E-2	6
Silver	2.0000 E-4	1.5100 E-2	1.7200 E-2	8
Sodium	2.0000 E-4	2.0000 E-4	2.0000 E-4	1
Sodium hydroxide	8.5000 E-2	8.5000 E-2	8.5000 E-2	1
Sulfamic acid	1.0000 E-2	1.0000 E-2	1.0000 E-2	1
Water	8.9990 E-1	8.9990 E-1	8.9990 E-1	1
Zinc	4.6000 E-2	4.9120 E-1	5.3720 E-1	2
Zinc chloride	2.8000 E-2	2.2000 E-1	6.2310 E-1	5

*Number of containers with specific hazardous constituent.

Reference: SWITS database.

Waste Codes

The codes shown below are for existing waste. Forecast waste could have additional codes.

Listed Components:

U151 Mercury

Characteristics:

D001 Ignitable
D002 Corrosive
D003 Reactive
D004 Arsenic
D005 Barium
D006 Cadmium
D007 Chromium
D008 Lead
D009 Mercury
D010 Selenium
D011 Silver

State Codes:

WC01 Carcinogenic EHW
WC02 Carcinogenic DW
WT01 Toxic EHW
WT02 Toxic DW

Reference: SWITS database.

Hazardous Characteristics Toxic, corrosive, reactive, and carcinogenic. No individual drums have been identified to date with all three codes of D001, D002, and D003.

Hazardous Components See previous list. Mercury concentration is expected in high and low subcategories.

PACKAGING DESCRIPTION

Container Type Primarily U.S. Department of Transportation 17H 208-L drums. Three 113.5- and three 18.9-L drums are shown in the SWITS database. There is no indication of the size of the inner containers; however, the maximum size is not expected to be much >3.8 L.

Internal Packaging 2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners.

Venting Mechanism None.

Gross Weight The minimum gross weight is 6.8 kg and maximum is 150.7 kg.

Closure Mechanism Bolted lock ring for 208-L drums.

NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

Table D-9. Specification for Feed Stream 5A3, Mercury-Contaminated Heterogeneous Solids, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	5A3
<u>Common Name</u>	Mercury-Contaminated Heterogeneous Solids
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums.

GENERATION

<u>Narrative Description</u>	Mercury waste is generated from a variety of sources throughout the Hanford Site. The mercury and other components are widely variable in composition.
<u>Generator(s)</u>	Most of the existing mercury waste comes from the Hanford Site but other U.S. Department of Energy sites also have forecasted this type of waste.
<u>Existing Volume</u>	Approximately 7.3 m ³ or 35 DEs are in the SWITS database.
<u>Forecast</u>	The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is approximately 25.9 m ³ or 125 DEs. References: 1993 forecast data (see Appendixes A, B, and C); SWITS database.

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	Current inventory consists primarily of fluorescent light tubes. The drums may contain any combination of cloth, diatomaceous earth or similar adsorbent, metal, paper, polyethylene, wood, glass, floor tile, rubber, cement, conwed* pads, and rock, contaminated with mercury mostly via incidental contact.
<u>Physical State</u>	Primarily fluorescent light tubes and heterogeneous solid waste including debris. The actual mercury content of the drums is <1% by weight.
<u>Density</u>	Average density of existing drums is about 560 kg/m ³ .
<u>Moisture Content</u>	None.
<u>Particle Size</u>	Not available.

*Conwed is a trademark of Leucadia, Inc.

Hardness

Not available.

RADIOLOGICAL CHARACTERISTICS

Waste Class

Primarily Class I.

Radionuclide Content

Nominal curie values per drum for drums of existing waste containing the radionuclide are:

^{99}Tc 2.0 E-8
 ^{129}I 2.0 E-13
 ^{79}Se 3.2 E-12
No ^{197}Np is reported.

Total curie inventories of ^{99}Tc , ^{129}I , and ^{79}Se for existing waste are 6.1 E-8, 4.1 E-13, and 6.4 E-12, respectively. The total enriched uranium content of existing waste is negligible.

Dose Rate

Existing waste drums have a minimum dose rate of 0.1 mrem/h and maximum of 1.0 mrem/h.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description

Wide variety of materials.

Primary Components

Debris-type materials. The following list of constituent contents in existing containers is provided for information:

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Ammonium chloride	4.0000 E-1	4.0000 E-1	4.0000 E-1	1
Antimony	2.0000 E-2	6.0000 E-2	8.0000 E-2	2
Barium	1.0000 E-2	3.8002 E+1	7.1562 E+1	14
Cadmium	6.0000 E-4	1.3290 E+1	3.3578 E+1	15
Calcium chlorofluorophosphate	8.5000 E-2	5.0711 E+0	2.7926 E+1	10
Manganese	2.0000 E-2	6.0000 E-2	8.0000 E-2	2
Mercury	1.0000 E-4	1.3290 E+1	3.2737 E+1	35
Potassium hydroxide	2.3000 E-1	2.3000 E-1	2.3000 E-1	1
Zinc chloride	2.5000 E-1	2.5000 E-1	2.5000 E-1	1

*Number of containers with specific hazardous constituent.

Reference: SWITS database

Waste Codes

The code shown below is for existing waste. Forecast waste could have additional codes.

Listed Components:

U151 Mercury

Characteristics:

D002 Corrosive

D005 Barium

D006 Cadmium

D009 Mercury

State Codes:

WT01 Toxic EHW

WT02 Toxic DW

WC02 Carcinogenic DW

Reference: SWITS database.

Hazardous Characteristics

Toxic, corrosive, and carcinogenic.

Hazardous Components

See above list. Mercury concentration is expected in high and low subcategories.

PACKAGING DESCRIPTION

Container Type

Primarily U.S. Department of Transportation 17H 208-L drums.

Internal Packaging

2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners.

Venting Mechanism

None.

Gross Weight

The minimum gross weight is 40.0 kg and maximum is 374.6 kg.

Closure Mechanism

Bolted lock ring for 208-L drums. NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

Table D-10. Specification for Feed Stream 5C1, Elemental Lead, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	5C1
<u>Common Name</u>	Elemental Lead
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums.

GENERATION

<u>Narrative Description</u>	Lead waste is generated from a variety of sources throughout the Hanford Site and other U.S. Department of Energy sites.
<u>Generator(s)</u>	The majority of the elemental lead waste in storage is from the Hanford Site and a one-time shipment from the Shippingport Reactor (not forecasted as a future generator). The Hanford Site is expected to be the major generator but other U.S. Department of Energy sites have forecasted a small amount of this waste.
<u>Existing Volume</u>	Approximately 114.4 m ³ or 237 DEs and 18 boxes are in the SWITS database.
<u>Forecast</u>	<p>The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is approximately 971 m³ or 1,148 DEs and 202 boxes.</p> <p>References: 1993 forecast data (see Appendixes A, B, and C); SWITS database.</p>

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	Drums or boxes that have lead coding with a description showing major physical characteristics of lead or metal are considered to contain elemental lead.
<u>Physical State</u>	Actual lead content of the existing drums is 113,950 kg (83% by weight) and about 9% by volume. The majority of the material in the drums and boxes is expected to be lead shielding (bricks, sheet, and bags of shot) and pipe. The remaining small percentage of material is any combination of adsorbent, polyethylene, polyurathane, nylon, paper, metal, asbestos, cardboard, rubber, or cloth.
<u>Density</u>	Average densities of existing drums is 1,478 kg/m ³ and boxes is about 925 kg/m ³ .

Moisture Content None.

Particle Size Not applicable.

Hardness Soft metal.

RADIOLOGICAL CHARACTERISTICS

Waste Class Classes I and III.

Radionuclide Content Existing waste total curie inventories of ^{99}Tc , ^{129}I , ^{79}Se , for existing waste are 2.1 E-6 , 7.9 E-8 , and 3.7 E-9 , respectively. The total enriched uranium content of existing waste is 1.2 g.

Dose Rate Existing waste drums range from 0.1 to 90 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description Primarily elemental lead.

Primary Components Lead metal.

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Asbestos	1.2247 E+2	1.2247 E+2	1.2247 E+2	1
Lead	4.5360 E-1	2.7215 E+3	1.0565 E+5	236
Lead brick	--	3.9499 E+2	6.8428 E+3	30
Lead glass	9.3200 E+0	9.3200 E+0	9.3200 E+0	1
Lead gloves	4.4500 E+0	4.4500 E+0	4.4500 E+0	1
Lead pig	5.9103 E+1	5.9103 E+1	5.9103 E+1	1
Lead shielding	2.9098 E+1	3.8201 E+2	9.3313 E+2	5
Leaded glass	1.0909 E+2	2.1972 E+2	3.2881 E+2	2
Sulfuric acid	1.0000 E-1	2.0000 E-1	3.0000 E-1	2

*Number of containers with specific hazardous constituent.

Waste Codes Characteristics:

D002 Corrosive

D008 Lead

State Codes:

WT01 Toxic EHW
WT02 Toxic DW

Reference: SWITS database.

Hazardous Characteristics Toxic.

Hazardous Components Lead.

PACKAGING DESCRIPTION

Container Type Primarily U.S. Department of Transportation 17H 208-L drums. Twenty-eight 322-, one 37.9-, one 30.3-, and one 7.6-L drums are shown in the SWITS database. A total of eighteen 1.22- by 1.22- by 2.13-m boxes also are in storage. Volume projection forecast data indicate that 2.5 m³ of lead waste could be packaged in boxes <3.62 m³. Forecast data indicate about 68% of the elemental lead will be from disassembled long-length equipment casks. If this disassembly is conducted in WRAP Module 2B, there would be some control over the type of container used for repackaging.

Internal Packaging 2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners.

Venting Mechanism None.

Gross Weight The minimum gross weight is 35.0 kg and maximum is 3,175 kg. Thirteen of the existing 322-L drums and 19 of the 208-L drums are heavier than 454.5 kg. The existing boxes have a minimum weight of about 2,131.9 kg and a maximum weight of about 3175.1 kg.

Closure Mechanism Bolted lock ring for 208-L drums.

NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

Table D-11. Specification for Feed Stream 5C2, Lead Chemicals/Solutions,
Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	5C2
<u>Common Name</u>	Lead Chemicals/Solutions
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums.

GENERATION

<u>Narrative Description</u>	Lead waste is generated from a variety of sources throughout the Hanford Site and other U.S. Department of Energy sites.
<u>Generator(s)</u>	The majority of the lead chemicals/solutions waste in storage is from the Hanford Site but other U.S. Department of Energy sites also have forecasted this waste type.
<u>Existing Volume</u>	Approximately 9.5 m ³ or 46 DEs are in the SWITS database.
<u>Forecast</u>	The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is approximately 17.4 m ³ or 84 DEs.

References: 1993 forecast data (see Appendixes A, B, and C); SWITS database.

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	Drums that have lead and other hazardous constituents in a chemical form, i.e., lead oxide, lead salts, and/or lead chemicals and solutions.
<u>Physical State</u>	Actual lead content of the drums is 5% by weight. The remaining high percentage of material is any combination of adsorbent (diatomaceous earth or similar material), polyethylene, glass, and other materials. Existing waste is about 50% lab packs and 50% absorbed or free liquids.
<u>Density</u>	Average density of existing drums is about 564 kg/m ³ .
<u>Moisture Content</u>	Dry waste except for a few containers of lead solutions.
<u>Particle Size</u>	Not applicable.

Hardness

Not applicable.

RADIOLOGICAL CHARACTERISTICS

Waste Class

Classes I and III.

Radionuclide Content

Nominal curie values per drum for drums of existing waste containing the radionuclide are:

⁹⁹Tc 3.5 E-8
¹²⁹I 3.1 E-9
⁷⁹Se 4.4 E-11
U 3.7 E-10
No ¹⁹⁷Np is reported.

Total curie inventories of ⁹⁹Tc, ¹²⁹I, and ⁷⁹Se for existing waste are 3.8 E-7, 1.6 E-8, and 1.3 E-10, respectively. The total enriched uranium content of existing waste is 0.4 g.

Dose Rate

Existing waste drums range from 0.03 to 2.5 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description

Various types of lead chemicals, salts, solutions, etc.

Primary Components

Primarily contained chemical reagents and standards. The following list of maximum amount of constituents in existing waste is provided for information.

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Acetic acid	3.6000 E-1	3.6000 E-1	3.6000 E-1	1
Arsenic	2.0000 E-4	1.1000 E-1	2.1080 E-1	4
Arsenic pentoxide	9.0000 E-1	9.0000 E-1	9.0000 E-1	1
Barium chromate	2.5600 E+0	2.5600 E+0	2.5600 E+0	1
Cadmium	0.0000 E+0	6.0000 E-2	6.1400 E-2	22
Cadmium chloride	5.8000 E-1	5.8000 E-1	5.8000 E-1	1
Cerium nitrate	1.1000 E-1	1.1000 E-1	1.1000 E-1	1
Chromic oxide	2.7000 E+0	2.7000 E+0	2.7000 E+0	1
Chromium	1.0000 E-3	3.1000 E+0	3.3393 E+0	27

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Chromium(III) potassium sulfate dodecahydrate	5.3000 E-1	5.3000 E-1	5.3000 E-1	1
Crystalline-quartz silica	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Hydrochloric acid	8.5740 E-1	1.2544 E+0	2.9818 E+0	3
Lead	3.0000 E-4	6.8040 E+1	8.1545 E+1	39
Lead acetate	5.8000 E-1	5.8000 E-1	5.8000 E-1	1
Lead chromate	8.4000 E-1	1.5000 E+0	2.3400 E+0	2
Lead dioxide	4.5000 E-1	4.5000 E-1	4.5000 E-1	1
Lead shielding	1.6352 E+2	1.6352 E+2	1.6352 E+2	1
Lead telluride	2.2000 E-1	2.2000 E-1	2.2000 E-1	1
Magnesium hydroxide	3.6000 E+0	3.6000 E+0	3.6000 E+0	1
Mercury	4.0000 E-3	4.0000 E-3	4.0000 E-3	1
Nitric acid	1.5800 E-1	1.5800 E-1	1.5800 E-1	1
Phthalic acid benzyl Butyl ester	1.0000 E-4	1.0000 E-3	1.2400 E-2	21
Phthalic bis(2-ethylhexyl) ester	3.7000 E-3	1.4000 E-2	1.7680 E-1	21
Potassium	2.0000 E-2	2.0000 E-2	2.0000 E-2	1
Potassium acetate	2.0000 E-2	2.0000 E-2	2.0000 E-2	1
Potassium bromate	4.5000 E-1	4.5000 E-1	4.5000 E-1	1
Potassium chlorate	4.5000 E-1	4.5000 E-1	4.5000 E-1	1
Potassium nitrite	4.5000 E-1	4.5000 E-1	4.5000 E-1	1
Potassium periodate	2.2000 E-1	2.2000 E-1	2.2000 E-1	1
Potassium permanganate	9.0000 E-1	9.0000 E-1	9.0000 E-1	1
Selenium	1.6000 E-3	6.0000 E-3	7.6000 E-3	2
Silver	3.0000 E-2	2.0000 E-1	2.3000 E-1	2
Silver zeolite	3.7300 E+0	3.7300 E+0	3.7300 E+0	1
Sodium	2.0000 E-2	2.3500 E-1	3.0007 E+0	22
Sodium chloride	8.4600 E-2	1.7500 E+1	1.7585 E+1	2

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Sodium hydroxide	1.0000 E+0	1.3600 E+0	2.3600 E+0	2
Sodium tripoly phosphate	1.6200 E+1	1.6200 E+1	1.6200 E+1	1
Thorium nitrate tetrahydrate	4.5000 E-1	4.5000 E-1	4.5000 E-1	1
Tungsten trioxide	1.3000 E-1	1.3000 E-1	1.3000 E-1	1
Vanadium oxide	6.0000 E-4	6.0000 E-4	6.0000 E-4	1

*Number of containers with specific hazardous constituent.

Waste Codes

The codes shown below are for existing waste.
Forecast waste could have additional codes.

Listed Components:

U144 Lead Acetate

Characteristics:

D001 Ignitable
D002 Corrosive
D004 Arsenic
D005 Barium
D006 Cadmium
D007 Chromium
D008 Lead
D009 Mercury
D010 Selenium
D011 Silver

State Codes:

WC01 Carcinogenic EHW
WC02 Carcinogenic DW
WT01 Toxic EHW
WT02 Toxic DW
WP01 Persistent EHW

Reference: SWITS database.

Hazardous Characteristics

Ignitable, carcinogenic, and toxic.

Hazardous Components

Lead.

PACKAGING DESCRIPTION

Container Type

Primarily U.S. Department of Transportation 17H 208-L drums.

Internal Packaging

2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners. There is no indication of the size of the inner containers; however, the maximum size is not expected to be much >3.8 L.

Venting Mechanism

None.

Gross Weight

The minimum gross weight is 40.0 kg and maximum is 453.0 kg.

Closure Mechanism

Bolted lock ring for 208-L drums.

NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

Table D-12. Specification for Feed Stream 5C3, Lead-Contaminated Heterogeneous Solids, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	5C3
<u>Common Name</u>	Lead-Contaminated Heterogeneous Solids
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums.

GENERATION

<u>Narrative Description</u>	Lead waste is generated from a variety of sources throughout the Hanford Site and other U.S. Department of Energy sites.
<u>Generator(s)</u>	The majority of the lead-contaminated heterogeneous solid waste in storage is from the Hanford Site but other U.S. Department of Energy sites also have forecasted this type of waste.
<u>Existing Volume</u>	Approximately 25.8 m ³ or 106 DEs and 1 box are in the SWITS database.
<u>Forecast</u>	<p>The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is approximately 869.4 m³ or 1,712 DEs and 142 boxes.</p> <p>References: 1993 forecast data (see Appendixes A, B, and C); SWITS database.</p>

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	Drums that have lead-contaminated waste/debris in any combination of cloth, absorbent (diatomaceous earth or similar material), metal, paper, polyethylene, wood, glass, rubber, conwed pads, stainless steel, filters, or wire.
<u>Physical State</u>	Actual lead chemical content of the drums is about 50% by weight. The remaining percentage consists of other materials and debris.
<u>Density</u>	The average density of existing drums is about 881 kg/m ³ and box is 387 kg/m ³ . The lead content of existing drum waste is a maximum of about 379.6 kg, a minimum of <1 kg.
<u>Moisture Content</u>	None.
<u>Particle Size</u>	Not applicable.

Hardness

Not applicable.

RADIOLOGICAL CHARACTERISTICS

Waste Class

Classes I and III.

Radionuclide Content

Nominal curie values per drum for drums of existing waste containing the radionuclide:

^{99}Tc 2.4 E-6
 ^{129}I 3.9 E-6
 ^{79}Se 1.3 E-10

Total curie inventories of ^{99}Tc , ^{129}I , and ^{79}Se for existing waste are 9.7 E-5, 1.2 E-4, and 3.8 E-10, respectively. The enriched uranium content of existing waste is 0.1 g.

Dose Rate

Existing waste drums range from 0.02 to 99.9 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description

Mostly debris-type materials.

Primary Components

Lead-contaminated waste. The following list of constituent contents in existing containers is provided for information.

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
111 Trichloroethane	1.0000 E-4	1.0000 E-4	1.3000 E-3	13
111-Trichloroethane	1.0000 E-4	2.0000 E-3	2.9000 E-3	10
Acetone	1.0000 E-4	2.0000 E-3	5.0000 E-3	31
Barium chromate	4.5000 E-1	1.0500 E+0	2.0300 E+0	3
Boron trifluoride	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Cadmium	5.0000 E-4	5.0000 E-4	5.0000 E-4	1
Calcium hydroxide	1.6000 E-1	2.1200 E-1	7.4200 E-1	4
Chlorides	1.1300 E-2	2.0700 E-2	6.9300 E-2	4
Chromium	0.0000 E+0	5.2600 E-2	1.2450 E-1	5
Cresylic acid	1.0000 E-4	2.0000 E-3	2.6000 E-3	7
Hydrochloric acid	2.6200 E-2	3.4000 E-2	1.1920 E-1	4

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Iron	7.9000 E-3	4.1080 E+0	6.3971 E+0	4
Lead	0.0000 E+0	3.7960 E+2	9.3957 E+3	101
Lead brick	2.9501 E+2	2.9501 E+2	1.1801 E+3	4
Lead chromate	6.4000 E-2	1.0201 E+1	1.0329 E+1	3
Lead shielding	2.0000 E-1	2.6000 E+0	2.8000 E+0	2
Mercury	0.0000 E+0	0.0000 E+0	0.0000 E+0	4
Methyl ethyl ketone	1.0000 E-4	1.0000 E-4	1.0000 E-4	1
Methyl ethyl ketone	1.0000 E-4	2.0000 E-3	4.8000 E-3	29
Methyl isobutyl ketone	1.0000 E-4	2.0000 E-3	5.0000 E-3	31
Methylene chloride	1.0000 E-4	2.0000 E-3	4.1000 E-3	22
Pentachlorophenol	3.0000 E-3	3.0000 E-3	3.0000 E-3	1
Silica	1.4000 E-1	1.4000 E-1	1.4000 E-1	1
Silver	6.0000 E-2	1.4000 E-1	2.7000 E-1	3
Sulfates	5.6600 E-2	1.0350 E-1	2.4410 E-1	3
Sulfuric acid	3.0000 E-4	4.0000 E-4	1.4000 E-3	4
Trichloroethylene	0.0000 E+0	0.0000 E+0	0.0000 E+0	4
Tungsten trioxide	7.0000 E-2	7.0000 E-2	7.0000 E-2	1

*Number of containers with specific hazardous constituent.

Waste Code

The codes shown below are for existing waste.
Forecast waste could have additional codes.

Listed Components:

F001 Halogenated solvent
F002 Halogenated solvent
F003 Nonhalogenated solvent
F004 Nonhalogenated solvent
F005 Nonhalogenated solvent

Characteristics:

D002 Corrosive
D003 Reactive
D005 Barium
D006 Cadmium
D007 Chromium

D008 Lead
D009 Mercury
D011 Silver
D037 Pentachlorophenol
D040 Trichloroethylene

State Codes:

WC01 Carcinogenic EHW
WC02 Carcinogenic DW
WT01 Toxic EHW
WT02 Toxic DW

Reference: SWITS database.

Hazardous Characteristics Corrosive, reactive, toxic, carcinogenic, and persistent.

Hazardous Components Lead and chromium.

PACKAGING DESCRIPTION

Container Type Primarily U.S. Department of Transportation 17H 208-L drums. One 37.8-L drum and one 1.22- by 1.22- by 2.44-m box are also present in the SWITS database.

Internal Packaging 2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners.

Venting Mechanism None.

Gross Weight The minimum gross weight is 18.1 kg and maximum is 1,315.4 kg.

Closure Mechanism Bolted lock ring for 208-L drums.

NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

Table D-13. Specification for Feed Stream 9A, Particulate/Sludge,
Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	9A
<u>Common Name</u>	Particulate/Sludge
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums.

GENERATION

<u>Narrative Description</u>	Particulate/sludge waste is generated from a variety of sources throughout the Hanford Site.
<u>Generator(s)</u>	Most of the existing particulate/sludge waste comes from the Hanford Site but other U.S. Department of Energy sites also have forecasted this type of waste.
<u>Existing Volume</u>	Approximately 45.5 m ³ or 219 DEs are in the SWITS database.
<u>Forecast</u>	The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is approximately 6,336.9 m ³ or 14,812 DEs and 899 boxes.

References: 1993 forecast data (see Appendixes A, B, and C); SWITS database.

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	This waste stream encompasses a wide range of materials including sludge, absorbed liquids (acids, alkalies, other chemicals, etc.), particulate (ash, soot, powder), absorbent (diatomaceous earth or similar material), soil, spent resin (excluding Liquid Effluent Treatment Facilities [LETF]), and some asbestos. These materials may be combined with small amounts of glass, polyethylene, paper, metal, etc. About 51 vol% of the particulate/sludge waste is projected to be received in boxes, with 52 vol% of the waste in boxes specifically designated as soils and about 86 vol% as soils/undefined particulate.
<u>Physical State</u>	Ranges from fine particles to paste-type material.
<u>Density</u>	Average density of existing drums is about 941 kg/m ³ .
<u>Moisture Content</u>	Primarily dry waste with water of hydration or retained moisture (unknown quantity).

Particle Size

Consistency of soil and caked sludge including lumps.

Hardness

Not available.

RADIOLOGICAL CHARACTERISTICS

Waste Class

Primarily Class I but a small portion may be Class III.

Radionuclide Content

Nominal curie values per drum for drums of existing waste containing the radionuclide:

⁹⁹ Tc	3.1 E-3
¹²⁹ I	1.9 E-8
⁷⁹ Se	1.3 E-11

No ¹⁹⁷Np has been reported. Total curie inventories of ⁹⁹Tc, ¹²⁹I, and ⁷⁹Se for existing waste are 6.4 E-2, 3.3 E-7, and 6.7 E-11, respectively. The enriched uranium content of existing waste is 22.814 g. These values do not take into account special-case wastes of high-enriched uranium that are forecast to be received from Portsmouth or other U.S. Department of Energy sites. Efforts are being made to obtain the estimated total curie inventory of ⁹⁹Tc for the Portsmouth waste. The ²³⁵U content of some Portsmouth drums is expected to range from <15 g/drum to several hundred grams/drum but would not exceed the limit of 350 g for shipping.

Dose Rate

Existing waste drums range from 0.2 to 15 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description

The majority of this waste is sludge, soils, resins, and other particulate waste contaminated with toxic metals. A large number of the drums are acid neutralization centrifuge sludge resulting from neutralization of fuel fabrication waste acids with hazardous constituents of sodium nitrate, sodium fluoride, chrome hydroxide, and sodium hydroxide. The sludge was absorbed in pozzolan or diatomaceous earth using twice the amount needed for the maximum amount of liquid. Absorbents may contain acids or alkalies.

Primary Components

Toxic metals, acids, nitrates, alkalies, pesticides, and other similar contaminants. The hazardous material content of the existing waste is about 37% by weight. The following list of constituent contents in existing containers is provided for information.

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count ^a
Aluminum nitrate	2.0000 E-1	4.8670 E+1	4.9660 E+1	4
Ammonium fluoride	5.4000 E-1	5.4000 E-1	5.4000 E-1	1
Ammonium persulfate	2.4000 E-1	2.4000 E-1	2.4000 E-1	1
Ammonium sulfate	3.5000 E+0	1.5600 E+1	1.9100 E+1	2
Arsenic	8.7000 E-2	8.7000 E-2	8.7000 E-2	1
Arsenic chloride	2.0000 E-2	2.0000 E-2	2.0000 E-2	1
Asbestos	2.5000 E-1	2.3600 E+1	2.3969 E+2	17
Barium	--	4.9990 E-1	9.6530 E-1	18
Barium hydroxide	4.5000 E-1	1.0500 E+0	1.5000 E+0	2
Barium nitrate	4.9320 E+0	4.9320 E+0	4.9320 E+0	1
Boric acid	3.0000 E+0	3.0000 E+0	3.0000 E+0	1
Cadmium	1.4000 E-3	1.1000 E-1	1.1140 E-1	2
Cadmium oxide	4.4000 E-1	4.4000 E-1	4.4000 E-1	1
Calcium nitrate	3.8200 E+0	3.8200 E+0	3.8200 E+0	1
Cerous nitrate	4.4500 E+0	4.4500 E+0	4.4500 E+0	1
Chromic oxide	5.0000 E-1	5.0000 E-1	5.0000 E-1	1
Chromic sulfate	1.0000 E-2	5.2000 E-1	5.3000 E-1	2
Chromium	8.0000 E-3	5.0600 E-1	1.2243 E+1	80
Chromium oxide	1.4900 E+0	1.4900 E+0	1.4900 E+0	1
Cobaltous sulfate	6.2280 E+0	6.2280 E+0	6.2280 E+0	1
Copper	2.6760 E+1	3.2200 E+1	1.8729 E+3	63
Corrosive	8.5910 E+1	8.5910 E+1	8.5910 E+1	1
Cupric nitrate	2.0000 E-2	2.0000 E-2	2.0000 E-2	1
Cupric sulfate	1.0000 E-1	6.2350 E+0	6.3350 E+0	2
Ferric nitrate	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Gadolinium nitrate	8.2700 E+0	8.2700 E+0	8.2700 E+0	1
Gallic acid	2.5000 E-1	2.5000 E-1	2.5000 E-1	1
Hydrofluoric acid	2.2000 E-2	2.2000 E-2	2.2000 E-2	1
Hydrogen iodate	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Hydrogen peroxide	1.0000 E-1	1.0000 E-1	1.0000 E-1	1

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count ^a
Iron oxide	5.1700 E+0	5.6200 E+0	8.3850 E+1	15
Iron(II) chloride	4.5830 E+1	4.5830 E+1	4.5830 E+1	1
Lead	1.3000 E-2	2.4000 E-2	3.0700 E-1	15
Lithium hydroxide	6.3500 E-1	6.3500 E-1	6.3500 E-1	1
Magnesium chloride	5.0000 E-2	5.0000 E-2	3.5000 E-1	7
Magnesium perchlorate	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Mercury	5.0000 E-4	1.0000 E-3	1.3200 E-2	15
Nickel hydroxide	2.0000 E-3	1.3500 E-1	1.3700 E-1	2
Nitric acid	1.0000 E-2	7.2800 E+0	2.6630 E+1	28
Oxalic acid	5.0000 E-1	7.0000 E-1	1.2000 E+0	2
Potassium fluoride	1.3500 E+0	1.3500 E+0	1.3500 E+0	1
Potassium hydroxide	7.4100 E+0	5.6250 E+1	7.3662 E+1	3
Potassium nitrate	4.7000 E-1	4.7000 E-1	4.7000 E-1	1
Potassium permanganate	8.0000 E-1	2.5100 E+1	2.5900 E+1	2
Potassium persulfate	4.5000 E-1	4.5000 E-1	4.5000 E-1	1
Selenium	2.0000 E-4	1.0002 E+0	1.0038 E+0	16
Silica	4.0000 E-2	4.0000 E-2	4.0000 E-2	1
Silver	1.4000 E-3	2.2400 E+1	5.8632 E+1	18
Silver nitrate	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Silver oxide	3.9000 E-1	3.9000 E-1	3.9000 E-1	1
Sodium aluminate	2.0000 E+0	2.0000 E+0	2.0000 E+0	1
Sodium carbonate	--	1.1760 E+1	2.0220 E+1	3
Sodium chloride	1.1000 E+1	1.9999 E+2	5.1230 E+3	32
Sodium chromate	5.8000 E+0	5.8000 E+0	5.8000 E+0	1
Sodium dichromate	2.1000 E+0	2.1000 E+0	2.1000 E+0	1
Sodium fluoride	9.0000 E-1	5.0800 E+1	3.0785 E+3	74
Sodium hydroxide	1.0002 E+0	3.7190 E+1	2.1992 E+3	66
Sodium metabisulfite	5.0000 E-1	5.0000 E-1	5.0000 E-1	1
Sodium nitrate	6.7000 E-1	4.8260 E+1	2.0850 E+3	76
Sodium nitrite	2.0800 E+1	2.0800 E+1	2.0800 E+1	1

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count ^a
Sodium oxide	5.1000 E-1	4.8260 E+1 ^b	7.2441 E+2	16
Sodium phosphate	--	--	--	1
Sodium silicate	--	--	--	1
Sulfamic acid	1.2000 E+0	1.2000 E+0	1.2000 E+0	1
Thorium nitrate	1.7600 E+0	1.7600 E+0	1.7600 E+0	1
Titanium dioxide	7.4390 E-1	7.4390 E-1	7.4390 E-1	1
Uranyl nitrate hexahydrate	1.3898 E+0	6.1099 E+0	9.3998 E+0	3
Yttrium nitrate	4.4500 E+0	4.4500 E+0	4.4500 E+0	1
Zirconium	5.9000 E-1	8.6000 E-1	4.6610 E+1	63

^aNumber of containers with specific hazardous constituent.

^bContainers exceeding 45 kg of sodium oxide may require special handling to avoid any possibility of storage in WRAP Module 2A.

Waste Codes

The codes shown below are for existing waste. Forecast waste could have additional codes.

Characteristics:

D001 Ignitable
D002 Corrosive
D004 Arsenic
D005 Barium
D006 Cadmium
D007 Chromium
D009 Mercury
D010 Selenium
D011 Silver

State Codes:

WC01 Carcinogenic EHW
WC02 Carcinogenic DW
WT01 Toxic EHW
WT02 Toxic DW

Reference: SWITS database.

Hazardous Characteristics

Toxic, corrosive, reactive, persistent, and carcinogenic.

Hazardous Components

Toxic metals and salts.

PACKAGING DESCRIPTION

Container Type

Primarily U.S. Department of Transportation 17H 208-L drums. Eighteen 322-, two 113.6-, one 37.8-, and four 30.3-L drums are shown in the SWITS database. Some of the forecast waste will be in 1.22- by 1.22- by 2.44-m boxes. Volume projection forecast data indicate that about 1,560 m³ of sludge/particulate waste could be packaged in boxes <3.62 m³.

Internal Packaging

2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners.

Venting Mechanism

None.

Gross Weight

The minimum gross weight is 12.3 kg and maximum is 345.2 kg.

Closure Mechanism

Bolted lock ring for 208-L drums.

NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

Table D-14. Specification for Feed Stream 9B, Heterogeneous Solids/Debris, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	9B
<u>Common Name</u>	Heterogeneous Solids/Debris
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums. One subset will be reverse osmosis filters from LETF C-018 and another subset will be high-efficiency particulate air (HEPA) filter packages in drums and boxes.

GENERATION

<u>Narrative Description</u>	Heterogeneous solids/debris waste is generated from a variety of sources throughout the Hanford Site.
<u>Generator(s)</u>	Most of the existing heterogeneous solids/debris waste comes from the Hanford Site but other U.S. Department of Energy sites also have forecasted this type of waste.
<u>Existing Volume</u>	Approximately 39.3 m ³ or 189 DEs are in the SWITS database.
<u>Forecast</u>	<p>This stream represents one of the greatest uncertainties with regard to forecast volumes because of the impacts of the "Debris Rule" (57 FR 37194) and regulatory/U.S. Department of Energy issues surrounding startup of specific facilities. The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is estimated to be 14,849 m³ or 44,371 DEs and 1,552 boxes.</p> <p>References: 1993 forecast data (see Appendixes A, B, and C); SWITS database.</p>

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	This waste stream encompasses any combination of cloth, metal, paper, polyethylene, wood, glass, absorbent, rubber, conwed pads, HEPA and reverse osmosis filters, concrete, biological waste, and other materials or debris. Approximately 38 vol% of the debris waste is projected to be received in boxes. The overall makeup of this feed stream, including boxes and drums, includes about 16 vol% as concrete and 22 vol% as metals.
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Physical State

All shapes but generally >60 mm. A major portion of the metal is stock, scrap, or equipment <13 mm in thickness but a considerable amount of metal will be much larger in cross-section.

Density

Average density of existing drums is about 450 kg/m³.

Moisture Content

None.

Particle Size

Not available.

Hardness

Not available.

RADIOLOGICAL CHARACTERISTICS

Waste Class

Primarily Class I but a small portion may be Class III.

Radionuclide Content

Nominal curie values per drum for drums of existing waste containing the radionuclide:

⁹⁹ Tc	6.6 E-6
¹²⁹ I	2.7 E-6

No ⁹⁷Se or ¹⁹⁷Np has been reported. Total curie inventories of ⁹⁹Tc and ¹²⁹I for existing waste are 4.3 E-4 and 1.2 E-4, respectively. The enriched uranium content of existing waste is 10,532 g. These values do not take into account special-case wastes of high-enriched uranium that are forecast to be received from Portsmouth or other U.S. Department of Energy sites. Efforts are being made to obtain the estimated total curie inventory of ⁹⁹Tc for the Portsmouth waste. The ²³⁵U content of some Portsmouth drums is expected to range from <15 g/drum to several hundred g/drum but would not exceed the limit of 350 g for shipping.

Dose Rate

Existing waste drums range from 0.01 to 95 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description

All types of hazardous constituents may be present in this waste including small amounts of surface contamination from organics. This feed stream has no identified contained liquids and it is assumed the hazardous constituents are primarily present through incidental contact.

Primary Components

Toxic metals, acids, nitrates, alkalies, pesticides, organics, and other similar contaminants. The hazardous material content of the existing waste is about 5% by weight. The following list of constituent contents in existing containers is provided for information.

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
111 Trichlorethane	1.0000 E-4	1.0000 E-4	2.0000 E-4	2
111 Trichloroethane	1.0000 E-4	1.0000 E-4	3.2000 E-3	32
111 Trichloroethane	1.0000 E-4	1.0000 E-4	2.4000 E-3	24
Acetone	1.0000 E-4	1.0000 E-4	6.7000 E-3	67
Acid	2.0000 E-1	2.0000 E-1	2.0000 E-1	1
Aluminum nitrate	2.2702 E+0	2.5200 E+0	4.7902 E+0	2
Aluminum	1.1600 E-2	1.1600 E-2	1.1600 E-2	1
Ammonium fluoride	2.9900 E+0	7.8900 E+0	1.8320 E+1	3
Ammonium fluozirconate	7.4800 E+0	1.9730 E+1	4.5810 E+1	3
Ammonium nitrate	2.9900 E+0	7.8900 E+0	1.8320 E+1	3
Asbestos	5.0000 E-4	1.0000 E-1	1.0050 E-1	2
Benzene	0.0000 E+0	0.0000 E+0	0.0000 E+0	1
Beryllium	5.0000 E-3	5.0000 E-3	5.0000 E-3	1
Boron trifluoride	1.2000 E-1	1.2000 E-1	1.2000 E-1	1
Cadmium	3.0000 E-2	3.0000 E-2	3.0000 E-2	1
Cadmium nitrate	5.5020 E-1	1.2501 E+0	1.8003 E+0	2
Calcium chloride	4.8000 E-1	4.8000 E-1	4.8000 E-1	1
Calcium fluoride	1.0200 E+1	1.1000 E+1	2.1200 E+1	2
Chlorides	5.0000 E-4	3.0000 E-2	3.0500 E-2	2
Chromium	5.0000 E-4	5.0000 E-4	2.5000 E-3	5
Chromium oxide	3.0000 E-2	3.0000 E-2	3.0000 E-2	1
Coal tar pitch	4.5000 E-1	4.5000 E-1	4.5000 E-1	1
Cobalt	2.0000 E-3	2.0000 E-3	2.0000 E-3	1
Copper	3.0000 E-4	1.8400 E+1	6.2560 E+2	35
Creosote	1.3000 E-3	1.3000 E-3	1.3000 E-3	1

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Cresylic acid	1.0000 E-4	1.0000 E-4	1.6000 E-3	16
Ferric nitrate	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Hexone	0.0000 E+0	0.0000 E+0	0.0000 E+0	35
Hydrochloric acid	4.9990 E-1	4.9990 E-1	4.9990 E-1	1
Hydrofluoric acid	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Iron	1.2000 E-1	1.5000 E-1	2.7000 E-1	2
Isobutanol	0.0000 E+0	0.0000 E+0	0.0000 E+0	35
Methyl isobutyl ketone	1.0000 E-4	1.0000 E-4	1.0000 E-4	1
Methyl chloride	1.0000 E-4	1.0000 E-4	1.0000 E-4	1
Methyl ethyl ketone	1.0000 E-4	1.0000 E-4	6.7000 E-3	67
Methyl isobutyl ketone	1.0000 E-4	1.0000 E-4	1.0000 E-4	1
Methyl isobutyl ketone	1.0000 E-4	1.0000 E-4	6.5000 E-3	65
Methylene chloride	1.0000 E-4	1.0000 E-4	5.7000 E-3	57
Nickel	4.0000 E-4	1.0000 E-1	1.5040 E-1	3
Nickel-cadmium batteries	7.7382 E+0	7.7382 E+0	7.7382 E+0	1
Nitric acid	4.9990 E-1	4.0002 E+0	8.1702 E+0	5
Oxalic acid	3.0000 E-1	3.0000 E-1	3.0000 E-1	1
Oxalic acid crystals	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Phosphoric acid	2.9996 E+0	2.9996 E+0	1.1998 E+1	4
Potassium	4.0000 E-3	4.0000 E-3	4.0000 E-3	1
Potassium hydroxide	8.9990 E-1	4.7350 E+1	1.1434 E+2	6
Pyridine	0.0000 E+0	0.0000 E+0	0.0000 E+0	35
Silicon	1.7000 E+0	1.7000 E+0	1.7000 E+0	1
Silver	2.1000 E-1	4.1998 E+0	4.4098 E+0	2
Soda ash	3.0000 E+0	3.0000 E+0	3.0000 E+0	1
Sodium	2.1000 E-1	2.1000 E-1	2.1000 E-1	1
Sodium bromate	6.3000 E-1	6.3000 E-1	6.3000 E-1	1
Sodium hydroxide	1.0000 E-1	1.1000 E+1	4.5758 E+1	11
Sodium hypochlorite	3.0000 E-1	3.0000 E-1	3.0000 E-1	1

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Sodium nitrite	2.6500 E-1	2.6500 E-1	2.6500 E-1	1
Stannous chloride	4.8000 E-1	4.8000 E-1	4.8000 E-1	1
Sulfates	1.0000 E-3	1.0000 E-1	1.0750 E-1	3
Sulfuric acid	2.0000 E-1	2.0000 E-1	2.0000 E-1	1
Surface prep	8.9990 E-1	8.9990 E-1	8.9990 E-1	1
Tar	1.0000 E-4	1.0000 E-4	1.0000 E-4	1
Toluene	0.0000 E+0	0.0000 E+0	0.0000 E+0	35
Uranyl nitrate hexahydrate	5.0000 E-2	1.8000 E+0	4.2399 E+0	6
Xylene	0.0000 E+0	0.0000 E+0	0.0000 E+0	35
Zinc chromate	1.5998 E+0	1.5998 E+0	1.5998 E+0	1

*Number of containers with specific hazardous constituent.

Waste Codes

The codes shown below are for existing waste.
Forecast waste could have additional codes.

Listed Components:

F001 Halogenated solvent
F002 Halogenated solvent
F003 Nonhalogenated solvent
F004 Nonhalogenated solvent
F005 Nonhalogenated solvent

Characteristics:

D001 Ignitable
D002 Corrosive
D003 Reactive
D006 Cadmium
D007 Chromium
D011 Silver
D018 Benzene

State Codes:

WC01 Carcinogenic EHW
WC02 Carcinogenic DW
WT01 Toxic EHW
WT02 Toxic DW

Reference: SWITS database.

Hazardous Characteristics Toxic, corrosive, reactive, ignitable, and carcinogenic. No individual drums have been identified to date with all three codes D001, D002, and D003.

Hazardous Components Toxic metals, salts, and small concentrations of organics.

PACKAGING DESCRIPTION

Container Type Primarily U.S. Department of Transportation 17H 208-L drums. Two 322-, four 113.6-, and one 18.9-L drums are shown in the SWITS database. Volume projection forecast data indicate that about 45 m³ of debris-type waste (HEPA filters, noncombustible, and metals) could be packaged in boxes <3.62 m³.

Internal Packaging 2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners.

Venting Mechanism None.

Gross Weight The minimum gross weight is 4.5 kg and maximum is 394.6 kg.

Closure Mechanism Bolted lock ring for 208-L drums.

NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

Table D-15. Specification for Feed Stream 9C, Contained Liquid, Including Physical, Chemical, and Radiological Characteristics.

FEED STREAM

<u>CDR Identification Number</u>	9C
<u>Common Name</u>	Contained Liquid
<u>Subset(s)</u>	Subset lot definition is expected to be based on similar waste codes for a specific group of drums.

GENERATION

<u>Narrative Description</u>	Liquid waste is generated from a variety of sources throughout the Hanford Site and other U.S. Department of Energy sites.
<u>Generator(s)</u>	The majority of the contained liquid waste in storage is from the Hanford Site but other U.S. Department of Energy sites also have forecasted this type of waste.
<u>Existing Volume</u>	Approximately 17.1 m^3 or 82 DEs are in the SWITS database.
<u>Forecast</u>	<p>The total amount of this waste, including the existing volume and forecasts from various generators and WRAP Module 1, is approximately 654.7 m^3 or 3,147 DEs.</p> <p>References: 1993 forecast data (see Appendixes A, B, and C); SWITS database.</p>

PHYSICAL CHARACTERISTICS

<u>Narrative Description</u>	All the existing contained liquid waste is either lab packs or containers that have been identified from the descriptions of the waste in the drums. These lab packs/containers contain a wide range of chemicals excluding high concentrations of mercury and lead that will require special processing. The liquid containers are expected to be either glass or polyethylene vessels and are expected to be surrounded by absorbent (diatomaceous earth or similar material) and/or conwed padding. About 40% of the forecast waste are lab packs and the remainder are other contained liquids.
<u>Physical State</u>	Hazardous constituents are only about 13% by weight of the existing drums. The remaining materials are absorbent and possibly some heterogeneous solid waste mixed in with the contained liquid.
<u>Density</u>	Average density of existing drums is about 560 kg/m^3 .

Moisture Content Liquid.

Particle Size Not available.

Hardness Not available.

RADIOLOGICAL CHARACTERISTIC

Waste Class Mostly Class I. Only a very small portion of this waste is expected to be Class III.

Radionuclide Content Nominal curie values per drum for drums of existing waste containing the radionuclide:

^{99}Tc 4.2 E-9
 ^{129}I 3.2 E-9
 ^{79}Se 1.6 E-10

Total curie inventories of ^{99}Tc , ^{129}I , and ^{79}Se for existing waste are 3.8 E-8, 2.6 E-8, and 4.8 E-10, respectively. The enriched uranium content of existing waste is 0.2 g.

Dose Rate Existing waste drums range from 0.01 to 42 mrem/h at drum surface.

Reference: SWITS database.

CHEMICAL CHARACTERISTICS

Narrative Description Chemicals consist of acids, alkalies, various dissolved salts (including toxic metals), nitrates, and water-reactive substances.

Primary Components All types of chemicals containing hazardous constituents. The following list of constituent contents in existing containers is provided for information.

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Acid	1.0002 E+0	1.0002 E+0	1.0002 E+0	1
Aluminum nitrate	4.9990 E-1	1.1000 E+1	2.2500 E+1	3
Ammonium sulfate	1.1800 E+0	1.1800 E+0	1.1800 E+0	1
Antimony pentachloride	6.0000 E-1	6.0000 E-1	6.0000 E-1	1
Arsenic	2.8000 E-3	2.8000 E-3	2.8000 E-3	1
Barium	2.0000 E-1	2.0000 E-1	2.0000 E-1	1

WHC-SD-W100-RD-001
Revision 1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Barium carbonate	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Barium chloride	1.9500 E+0	1.9500 E+0	1.9500 E+0	1
Beryllium oxide	8.0000 E-1	8.0000 E-1	8.0000 E-1	1
Calcium oxide	1.5000 E+0	1.5000 E+0	1.5000 E+0	1
Chromium	1.5000 E-3	4.0000 E-1	7.3450 E-1	10
Copper	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
Ferric hydroxide	2.0000 E-1	2.0000 E-1	2.0000 E-1	1
Hydrochloric acid	8.2640 E-1	5.4000 E+0	1.3398 E+1	6
Hydrofluoric acid	3.0000 E-3	5.2344 E+1	7.6896 E+1	3
Muriatic acid	1.1399 E+0	1.1399 E+0	1.1399 E+0	1
Nickel hydroxide	3.0000 E-1	3.0000 E-1	3.0000 E-1	1
Nitric acid	6.0000 E-2	2.4598 E+1	3.6255 E+1	17
Phosphoric acid	4.5900 E-2	4.9986 E+1	3.0693 E+2	18
Phosphoric hydrochloric acid solution	1.9001 E+1	1.9001 E+1	1.9001 E+1	1
Potassium chloride	1.5000 E+0	1.5000 E+0	1.5000 E+0	1
Potassium hydroxide	1.9999 E+1	1.9999 E+1	1.9999 E+1	1
Potassium pyrosulfate	4.5000 E-1	4.5000 E-1	4.5000 E-1	1
Selenium	0.0000 E+0	0.0000 E+0	0.0000 E+0	4
Silver	1.0000 E-1	2.0000 E-1	4.8800 E-1	3
Silver nitrate	1.2200 E-2	1.2200 E-2	1.2200 E-2	1
Sodium	2.5601 E+0	2.5601 E+0	2.5601 E+0	1
Sodium bicarbonate	1.1300 E+1	1.1300 E+1	1.1300 E+1	1
Sodium carbonate	2.7500 E-2	1.6000 E-1	1.8750 E-1	2
Sodium chloride	2.0000 E-2	9.2000 E-1	1.5401 E+0	3
Sodium dichromate	9.0000 E-1	9.0000 E-1	9.0000 E-1	1
Sodium hydroxide	1.5750 E-1	7.6500 E+1	6.3473 E+2	20
Sodium nitrate	7.4980 E-1	1.0350 E+1	1.1100 E+1	2
Sulfuric acid	6.3000 E-3	9.1900 E-2	1.5760 E-1	4
Trisodium phosphate	3.4100 E+1	3.4100 E+1	3.4100 E+1	1

Hazardous constituent	Minimum (kg)	Maximum (kg)	Total (kg)	Count*
Uranyl nitrate	1.4000 E-1	1.4000 E-1	1.4000 E-1	1
Water	8.9040 E-1	8.9040 E-1	8.9040 E-1	1
Zinc	2.5000 E-1	2.5000 E-1	2.5000 E-1	1

*Number of containers with specific hazardous constituent.

Waste Codes

The codes shown below are for existing waste.
Forecast waste could have additional codes.

Characteristics:

D001 Ignitable
D002 Corrosive
D004 Arsenic
D005 Barium
D007 Chromium
D010 Selenium
D011 Silver

State Codes:

WC01 Carcinogenic EHW
WC02 Carcinogenic DW
WL02 Labpack DW
WT01 Toxic EHW
WT02 Toxic DW

Reference: SWITS database.

Hazardous Characteristics Ignitable, corrosive, carcinogenic, and toxic.

Hazardous Components Chromium, barium, arsenic, selenium, silver, and other hazardous constituents.

PACKAGING DESCRIPTION

Container Type Primarily U.S. Department of Transportation 17H 208-L drums. Small containers in existing storage consist of four 113.5-, one 37.8-, four 30.2, and four 18.9-L drums and are also present in the SWITS database.

Internal Packaging 2.3-mm rigid polyethylene liner for most 208-L drums but some drums could have 0.25-mm flexible polyethylene liners. There is no indication of the size of the inner containers; however, the maximum size is not expected to be much >3.8 L.

Venting Mechanism None.

Gross Weight

The minimum gross weight is 6.8 kg and maximum is 440.9 kg.

Closure Mechanism

Bolted lock ring for 208-L drums.

NOTE: Several different types of rigid liners are available for use, each having a different closure mechanism.

D1.0 REFERENCES

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D2.0 GLOSSARY

ABBREVIATIONS AND ACRONYMS

CCWE	constituent concentrations in waste extract
CDR	conceptual design report
DE	drum equivalent
DW	dangerous waste
EHW	extremely hazardous waste
EP	extraction procedure
ETF	Effluent Treatment Facility
HEPA	high-efficiency particulate air
LETF	Liquid Effluent Treatment Facility
RCRA	Resource Conservation and Recovery Act
SWITS	solid waste information and tracking system
TCLP	toxic characteristic leach procedure
TEDF	Treated Effluent Disposal Facility
WRAP	Waste Receiving and Processing

APPENDIX E

RADIOLOGICAL DATA FOR FEED STREAMS 5 THROUGH 9

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APPENDIX E

RADIOLOGICAL DATA FOR FEED STREAMS 5 THROUGH 9

RADIONUCLIDES SUMMARY REPORT

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
1A	Curies	⁹⁹ Tc	7.7800 E-5	1.9100 E-4	5.2751 E-1	2,766
		Total beta/gamma	7.7800 E-5	1.9100 E-4	5.2751 E-1	2,766
	grams	Uranium-enriched	7.3100 E+0	1.8000 E+1	4.9713 E+4	2,766
1B	Curies	⁹⁹ Tc	2.2100 E-4	2.8000 E-4	1.2421 E+0	4,437
		Total beta/gamma	2.2100 E-4	2.8000 E-4	1.2421 E+0	4,437
	grams	Uranium-enriched	5.4590 E+0	5.4590 E+1	2.3937 E+5	4,437
1C	Curies	⁹⁹ Tc	1.3400 E-6	1.2000 E-3	1.7065 E+0	4,670
		Total beta/gamma	1.3400 E-6	1.2000 E-3	1.7065 E+0	4,670
	grams	Uranium-enriched	3.0000 E-4	3.7500 E+2	1.3742 E+6	4,670
1D	Curies	⁹⁹ Tc	1.5200 E-7	3.6500 E-5	2.0079 E-3	423
		Total beta/gamma	1.5200 E-7	3.6500 E-5	2.0079 E-3	423
	grams	Uranium-enriched	3.3800 E-5	7.1860 E+0	4.7947 E+2	423
5A1	Curies	¹¹⁰ Ag	1.3500 E-6	1.3500 E-6	1.3500 E-6	1
		¹⁴ C	1.7000 E-9	2.2000 E-9	3.9000 E-9	2
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	8.5500 E-6	4.6000 E-4	8.5855 E-4	3
		⁶⁰ Co	9.0000 E-12	3.2000 E-4	4.5576 E-4	9
		¹³⁴ Cs	3.2000 E-5	5.6000 E-4	1.0620 E-3	3
		¹³⁷ Cs-- ^{137m} Ba	3.1000 E-12	6.2900 E-3	1.0230 E-2	16
		¹⁵⁴ Eu	9.3500 E-6	9.3500 E-6	9.3500 E-6	1
		¹⁵⁵ Eu	4.9500 E-6	4.9500 E-6	4.9500 E-6	1
		³ H	2.0900 E-6	9.7000 E-6	1.9990 E-5	3
		¹²⁹ I	3.8000 E-10	2.6700 E-8	2.7530 E-8	3
		⁴⁰ K	5.2000 E-9	5.2000 E-9	5.2000 E-9	1
		⁸⁵ Kr	1.7000 E-4	2.1000 E-3	2.2700 E-3	2
		⁹⁴ Nb	4.4000 E-13	5.1000 E-13	9.5000 E-13	2

WHC-SD-W100-RD-001
• Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
5A1 (cont)		⁵⁹ Ni	2.5000 E-7	3.1000 E-7	5.6000 E-7	2
		⁶⁰ Ni	9.0000 E-12	9.0000 E-12	9.0000 E-12	1
		⁶³ Ni	1.5000 E-4	1.8000 E-4	3.3000 E-4	2
		¹⁴⁷ Pm	4.0400 E-6	1.2000 E-3	2.2040 E-3	3
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	8.6200 E-6	3.2000 E-4	4.0562 E-4	4
		⁷⁹ Se	7.7000 E-9	8.9000 E-9	1.6600 E-8	2
		⁹⁰ Sr-- ⁹⁰ Y	8.1000 E-11	2.1000 E-3	3.9635 E-3	12
		⁹⁹ Tc	2.0600 E-8	2.8000 E-7	5.4060 E-7	3
		Total beta/gamma	4.4280 E-10	1.3290 E-2	4.0557 E-2	25
	grams	²⁴¹ Am	5.8200 E-8	1.3100 E-6	6.6082 E-6	6
		²⁴² Cm	2.4000 E-9	3.0000 E-9	5.4000 E-9	2
		Pu	1.2000 E-9	1.0000 E-6	1.0012 E-6	2
		²³⁸ Pu	4.8400 E-11	7.1000 E-6	1.4110 E-5	8
		²³⁹ Pu	4.3100 E-7	2.0300 E-5	1.0163 E-4	6
		²⁴⁰ Pu	4.1100 E-8	2.5000 E-5	2.5206 E-5	6
		²⁴¹ Pu	3.8200 E-8	3.1000 E-5	3.1191 E-5	6
		²⁴² Pu	3.8200 E-8	3.8200 E-8	3.8200 E-8	1
		²³⁴ Th	2.1000 E-12	2.1000 E-12	2.1000 E-12	1
		Uranium-depleted	4.9479 E-4	4.9479 E-4	4.9479 E-4	1
		Uranium-enriched	1.0000 E-3	5.0000 E-2	5.1000 E-2	2
		Uranium-natural	2.3900 E+0	2.3900 E+0	2.3900 E+0	1
5A2	Curies	¹⁴ C	3.2800 E-18	5.8000 E-10	5.4415 E-9	17
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	4.8400 E-7	4.5000 E-3	6.2015 E-3	4
		⁶⁰ Co	9.0000 E-11	1.5000 E-4	4.5139 E-4	16
		¹³⁵ Cs	8.0800 E-15	1.6200 E-14	2.4280 E-14	2
		¹³⁷ Cs-- ^{137m} Ba	1.3500 E-9	9.0000 E-4	1.7275 E-3	22
		¹⁵² Eu	1.9000 E-6	2.8000 E-6	2.6300 E-5	11
		¹⁵⁴ Eu	1.9000 E-6	2.8000 E-6	2.6300 E-5	11
		⁵⁹ Fe	2.0000 E-5	2.0000 E-5	4.0000 E-5	2
		³ H	8.0000 E-12	4.2200 E-6	7.3768 E-6	17

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
5A2		¹²⁹ I	7.7400 E-16	1.7000 E-11	1.6221 E-10	15
		⁸⁵ Kr	2.0000 E-6	2.9000 E-6	2.7400 E-5	11
		⁵⁴ Mn	3.0000 E-5	3.0000 E-5	6.0000 E-5	2
		⁹⁴ Nb	9.2100 E-16	1.9000 E-14	1.8077 E-13	13
		⁵⁹ Ni	4.6000 E-8	6.7000 E-8	6.2900 E-7	11
		⁶⁰ Ni	9.0000 E-11	9.0000 E-11	9.0000 E-11	1
		⁶³ Ni	2.4000 E-6	3.5000 E-6	3.2800 E-5	11
		¹⁰⁷ Pd	1.6300 E-15	3.2600 E-15	4.8900 E-15	2
		¹⁴⁷ Pm	1.4900 E-6	2.1000 E-3	2.9045 E-3	4
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	2.1400 E-7	1.1000 E-3	1.5006 E-3	4
		⁷⁹ Se	6.0800 E-12	3.5000 E-10	2.9483 E-9	12
		¹⁵¹ Sm	4.4000 E-11	5.0000 E-4	9.0000 E-4	4
		⁹⁰ Sr-- ⁹⁰ Y	8.1000 E-10	8.0000 E-4	1.6234 E-3	19
		⁹⁹ Tc	4.0600 E-13	1.1000 E-8	1.0408 E-7	15
		Total beta/gamma	4.4280 E-9	1.7091 E-2	2.6955 E-2	26
		⁹³ Zr	5.6600 E-14	1.1300 E-13	1.6960 E-13	2
	grams	²⁴³ Am	5.2000 E-19	5.2000 E-19	5.2000 E-19	1
		²⁴² Cm	3.6000 E-19	2.3000 E-16	3.4937 E-16	12
		²³⁸ Pu	1.9000 E-8	4.0000 E-4	4.0025 E-4	12
		²³⁹ Pu	8.9700 E-9	1.7900 E-8	2.6870 E-8	2
		²⁴⁰ Pu	1.5700 E-10	3.3000 E-7	3.3047 E-7	3
		²⁴¹ Pu	2.7300 E-9	4.4000 E-7	3.8082 E-6	12
		²³⁴ Th	2.8800 E-17	5.7400 E-17	8.6200 E-17	2
		Uranium-depleted	2.0129 E-6	1.2630 E+0	1.2638 E+0	4
		Uranium-enriched	1.2420 E+1	1.2420 E+1	1.2420 E+1	1
5A3	Curies	¹⁴ C	1.4600 E-15	3.3000 E-11	4.5989 E-11	8
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	4.3000 E-7	4.2300 E-2	6.0200 E-2	7
		⁶⁰ Co	2.8000 E-8	3.9000 E-5	1.1027 E-4	6
		¹³⁷ Cs-- ^{137m} Ba	4.5000 E-9	8.5000 E-3	1.2015 E-2	19
		¹⁵² Eu	1.5000 E-7	1.5000 E-7	1.5000 E-7	1

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
5A3 (cont)		¹⁵⁴ Eu	2.9000 E-7	6.0000 E-6	1.2290 E-5	4
		⁵⁵ Fe	1.8000 E-7	1.8000 E-7	1.8000 E-7	1
		⁵⁹ Fe	2.0000 E-6	6.0000 E-6	1.2000 E-5	3
		³ H	1.8000 E-9	3.9900 E-5	5.2105 E-5	8
		¹²⁹ I	4.8000 E-14	3.5800 E-13	4.0600 E-13	2
		⁵⁴ Mn	3.0000 E-6	9.0000 E-6	1.8000 E-5	3
		⁹⁴ Nb	5.5000 E-17	8.1900 E-16	8.7400 E-16	2
		⁵⁹ Ni	4.9000 E-9	4.9000 E-9	4.9000 E-9	1
		⁶³ Ni	5.8000 E-7	5.8000 E-7	5.8000 E-7	1
		¹⁴⁷ Pm	1.3200 E-6	1.9900 E-2	2.8401 E-2	7
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	1.9000 E-7	1.0200 E-2	1.4532 E-2	8
		¹²⁵ Sb	3.8000 E-6	3.8000 E-6	3.8000 E-6	1
		⁷⁹ Se	9.5000 E-13	5.4000 E-12	6.3500 E-12	2
		¹⁵¹ Sm	4.0000 E-4	4.8000 E-3	7.4000 E-3	6
		⁹⁰ Sr-- ⁹⁰ Y	4.3000 E-8	7.3000 E-3	1.0410 E-2	16
		⁹⁹ Tc	3.1000 E-11	6.1200 E-8	6.1431 E-8	3
		^{125m} Te	8.8000 E-7	8.8000 E-7	8.8000 E-7	1
		Total beta/gamma	8.7570 E-9	1.6140 E-1	2.5409 E-1	35
	grams	²⁴¹ Am	2.3200 E-12	1.0000 E-6	1.0002 E-6	6
		²⁴² Cm	1.0200 E-16	1.1000 E-16	2.1200 E-16	2
		Pu	1.0000 E-6	1.3200 E-3	3.4310 E-3	4
		²³⁸ Pu	2.2400 E-13	9.3900 E-9	9.6676 E-9	6
		²³⁹ Pu	6.0300 E-10	1.4100 E-8	3.1569 E-8	5
		²⁴⁰ Pu	5.8300 E-11	9.0700 E-10	2.0650 E-9	5
		²⁴¹ Pu	7.2100 E-12	2.4300 E-9	4.0344 E-9	7
		Uranium-depleted	3.6600 E-4	1.0000 E-1	1.3037 E-1	3
5C1	Curies	⁷ Be	2.3380 E-3	2.3380 E-3	2.3380 E-3	1
		¹⁴ C	7.3900 E-13	2.6000 E-8	2.7239 E-8	36
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	2.6000 E-3	1.4840 E-1	9.6310 E-1	33
		⁵⁶ Co	9.2820 E-7	9.2820 E-7	9.2820 E-7	1

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
5C1 (cont)		⁵⁷ Co	3.4580 E-5	3.4580 E-5	3.4580 E-5	1
		⁵⁸ Co	4.8300 E-6	4.8300 E-6	4.8300 E-6	1
		⁶⁰ Co	1.0000 E-10	2.8000 E-2	1.0510 E-1	108
		¹³⁴ Cs	2.5000 E-7	2.4000 E-4	5.3115 E-4	13
		¹³⁷ Cs-- ^{137m} Ba	2.8000 E-9	5.1000 E-1	1.0840 E+0	193
		¹⁵² Eu	1.0000 E-10	3.7000 E-4	3.8338 E-4	4
		¹⁵⁴ Eu	2.7000 E-10	2.2000 E-4	8.4938 E-4	35
		¹⁵⁵ Eu	4.0000 E-10	4.5000 E-6	4.5004 E-6	2
		⁵⁵ Fe	2.6000 E-7	2.5000 E-4	2.5026 E-4	2
		¹⁵³ Gd	5.0000 E-4	5.0000 E-4	5.0000 E-4	1
		³ H	4.5000 E-9	1.0000 E-4	8.2291 E-4	39
		¹⁷⁵ Hf	6.0000 E-6	1.2600 E-4	2.0400 E-4	5
		²⁰³ Hg	4.0000 E-6	8.4000 E-5	1.3600 E-4	5
		¹²⁹ I	1.9000 E-13	7.8600 E-8	7.8783 E-8	4
		⁸⁵ Kr	8.0000 E-8	7.9000 E-5	7.9840 E-5	3
		⁵⁴ Mn	7.5880 E-6	3.0600 E-5	3.8188 E-5	2
		²² Na	4.2000 E-5	4.2000 E-5	4.2000 E-5	1
		⁹⁴ Nb	2.0000 E-16	9.3000 E-10	9.3020 E-10	3
		⁵⁹ Ni	1.9000 E-9	3.8000 E-6	3.8058 E-6	3
		⁶⁰ Ni	9.0000 E-10	6.6000 E-3	6.6237 E-3	9
		⁶³ Ni	3.5000 E-7	4.5000 E-4	4.5081 E-4	3
		¹⁴⁷ Pm	2.1000 E-7	6.9700 E-2	4.6431 E-1	39
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	7.8000 E-6	3.5800 E-2	2.6596 E-1	63
		⁷⁹ Se	3.7000 E-12	3.6000 E-9	3.6517 E-9	3
		¹⁵¹ Sm	4.0000 E-4	1.6900 E-2	1.1320 E-1	33
		⁹⁰ Sr-- ⁹⁰ Y	5.7100 E-20	3.0000 E-2	2.2938 E-1	125
		⁹⁹ Tc	1.2000 E-10	7.5200 E-7	2.0843 E-6	7
		Total beta/gamma	1.3500 E-8	1.0300 E+0	6.8306 E+0	269
		⁶⁵ Zn	7.7700 E-7	3.0000 E-6	3.7770 E-6	2

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
5C1 (cont)	grams	²⁴¹ Am	2.8000 E-15	3.0000 E-4	3.0411 E-4	11
		²⁴² Cm	8.3000 E-14	1.0000 E-10	1.0018 E-10	3
		Pu	1.0000 E-12	1.0000 E-6	5.0001 E-6	7
		²³⁸ Pu	1.6000 E-11	2.3000 E-6	2.3322 E-6	8
		²³⁹ Pu	1.8000 E-10	1.1290 E-1	1.1294 E-1	6
		²⁴⁰ Pu	2.0000 E-11	8.8000 E-3	8.8000 E-3	3
		²⁴¹ Pu	4.5000 E-11	1.0000 E-5	1.0058 E-5	5
		²⁴² Pu	3.3000 E-11	3.3000 E-11	6.6000 E-11	2
		²³⁴ Th	2.9000 E-10	2.9000 E-10	2.9000 E-10	1
		Uranium-depleted	1.0000 E-3	2.2000 E-1	4.1876 E-1	6
		Uranium-enriched	1.0000 E-2	5.0000 E-1	1.2110 E+0	9
5C2	Curies	¹⁴ C	4.3700 E-15	5.0000 E-10	5.0003 E-10	3
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	6.4500 E-7	7.8400 E-6	8.4850 E-6	2
		⁶⁰ Co	9.0000 E-10	5.9000 E-6	1.0354 E-5	8
		¹³⁷ Cs-- ^{137m} Ba	6.8900 E-11	3.7500 E-4	8.8949 E-4	36
		¹⁵² Eu	2.5000 E-5	2.5000 E-5	2.5000 E-5	1
		¹⁵⁴ Eu	1.6100 E-6	4.5000 E-5	4.6610 E-5	2
		¹⁵⁵ Eu	3.8500 E-7	1.1000 E-4	1.1039 E-4	2
		³ H	4.6400 E-9	1.2100 E-6	1.3273 E-6	5
		¹⁷⁵ Hf	8.0000 E-6	8.0000 E-6	8.0000 E-6	1
		²⁰³ Hg	5.3300 E-6	5.3300 E-6	5.3300 E-6	1
		¹²⁹ I	9.2000 E-13	1.5500 E-8	1.5568 E-8	5
		⁴⁰ K	1.5000 E-7	2.7900 E-7	4.2900 E-7	2
		²² Na	6.6700 E-6	6.6700 E-6	6.6700 E-6	1
		⁹⁴ Nb	2.4500 E-15	2.6000 E-14	4.3350 E-14	3
		⁵⁹ Ni	2.5000 E-10	2.5000 E-10	2.5000 E-10	1
		⁶⁰ Ni	9.0000 E-10	5.9000 E-6	7.8619 E-6	4
		⁶³ Ni	2.5000 E-8	2.5000 E-8	2.5000 E-8	1
		¹⁴⁷ Pm	9.0000 E-9	2.4100 E-5	3.0399 E-5	4
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	2.8400 E-7	3.4600 E-6	3.7440 E-6	2

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
5C2 (cont)		¹²⁵ Sb	4.4000 E-8	4.4000 E-8	4.4000 E-8	1
		⁷⁹ Se	1.6200 E-11	9.8400 E-11	1.3260 E-10	3
		⁹⁰ Sr-- ⁹⁰ Y	5.3000 E-9	2.1000 E-4	5.7683 E-4	30
		⁹⁹ Tc	4.5800 E-11	6.1200 E-8	3.8399 E-7	11
		^{125m} Te	4.4000 E-8	4.4000 E-8	4.4000 E-8	1
		Total beta/gamma	1.3410 E-10	9.7980 E-4	4.3406 E-3	46
	grams	²⁴¹ Am	1.3000 E-10	8.2880 E-6	1.8182 E-5	23
		²⁴² Cm	2.8000 E-22	1.8600 E-15	2.1650 E-15	3
		²³⁸ Pu	1.0700 E-13	9.5600 E-9	7.8953 E-8	23
		²³⁹ Pu	9.5700 E-10	2.1600 E-5	1.7193 E-4	22
		²⁴¹ Pu	7.2600 E-9	3.8800 E-7	4.6256 E-7	4
		²³² Th	1.0000 E+0	1.0000 E+0	1.0000 E+0	1
		²³⁴ Th	1.0300 E-6	1.0300 E-6	1.0300 E-6	1
		Uranium-depleted	1.0951 E-6	6.1000 E-1	1.6162 E+0	31
		Uranium-enriched	4.4000 E-1	4.4000 E-1	4.4000 E-1	1
5C3	Curies	¹⁴ C	3.2700 E-14	1.0000 E-7	4.0001 E-7	14
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	1.0000 E-6	9.3000 E-3	4.6667 E-2	12
		⁶⁰ Co	9.0000 E-10	1.3500 E-3	3.7497 E-3	27
		¹³⁴ Cs	1.0000 E-7	1.5900 E-2	1.5900 E-2	5
		¹³⁷ Cs-- ^{137m} Ba	2.8000 E-9	2.7400 E-2	1.8577 E-1	89
		¹⁵² Eu	1.2800 E-9	5.3300 E-9	9.7000 E-9	4
		¹⁵⁴ Eu	9.2000 E-10	2.0000 E-6	2.0407 E-6	6
		¹⁵⁵ Eu	5.3300 E-9	3.2000 E-5	4.3024 E-5	6
		³ H	4.1800 E-8	1.4900 E-3	9.2164 E-3	43
		¹⁷⁵ Hf	1.2000 E-5	3.6000 E-5	1.0800 E-4	4
		²⁰³ Hg	8.0000 E-6	2.4000 E-5	7.2000 E-5	4
		¹²⁹ I	8.0300 E-12	1.9000 E-5	1.1708 E-4	30
		⁵⁴ Mn	1.0000 E-6	1.0000 E-6	1.0000 E-6	1
		⁹⁴ Nb	1.8400 E-14	1.9400 E-14	5.7200 E-14	3
		⁶⁰ Ni	9.0000 E-10	9.0000 E-7	1.8009 E-6	3

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
5C3 (cont)		¹⁴⁷ Pm	4.6300 E-6	4.3000 E-3	4.0487 E-2	43
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	4.2600 E-6	2.2000 E-3	1.5137 E-2	25
		⁷⁹ Se	1.2100 E-10	1.2800 E-10	3.7700 E-10	3
		¹⁵¹ Sm	5.0000 E-4	1.1000 E-3	5.6000 E-3	7
		⁹⁰ Sr-- ⁹⁰ Y	5.3000 E-9	1.3500 E-2	9.5240 E-2	84
		⁹⁹ Tc	4.4800 E-9	1.4700 E-5	9.7354 E-5	40
		Total beta/gamma	9.2000 E-10	8.4730 E-2	7.6177 E-1	110
	grams	²⁴¹ Am	3.8400 E-9	1.9000 E-1	1.9027 E-1	46
		²⁴² Cm	2.2800 E-15	2.4200 E-15	7.1100 E-15	3
		Pu	1.0000 E-6	1.0000 E-6	2.0000 E-6	2
		²³⁸ Pu	5.5400 E-11	3.4500 E-8	3.0796 E-7	34
		²³⁹ Pu	2.2600 E-7	3.0700 E-4	2.3247 E-3	37
		²⁴⁰ Pu	4.0500 E-8	4.0500 E-8	4.0500 E-8	1
		²⁴¹ Pu	2.3900 E-11	8.4200 E-8	2.5903 E-7	9
		²³² Th	5.0000 E+0	5.0000 E+0	1.0000 E+1	2
		Uranium-depleted	2.7000 E-9	7.4642 E-1	3.3535 E+0	39
		Uranium-enriched	1.0000 E-1	1.0000 E-1	1.0000 E-1	1
		Uranium-natural	1.0000 E+1	1.0000 E+1	2.0000 E+1	2
9A	Curies	¹¹⁰ Ag	8.5260 E-8	8.5260 E-8	8.5260 E-8	1
		^{110m} Ag-- ¹¹⁰ Ag	7.3500 E-8	7.6200 E-8	2.2345 E-7	3
		¹³³ Ba	3.7600 E-3	3.7600 E-3	3.7600 E-3	1
		⁷ Be	3.9250 E-4	8.1500 E-4	2.8762 E-3	6
		¹⁴ C	2.6900 E-15	1.0000 E-4	1.0000 E-4	33
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	3.9600 E-7	4.1000 E-2	1.6790 E-1	31
		⁵⁶ Co	1.5970 E-7	4.6410 E-7	1.7137 E-6	6
		⁵⁷ Co	3.8370 E-9	2.4700 E-5	3.8599 E-5	5
		⁵⁸ Co	7.5430 E-7	1.9900 E-6	6.9146 E-6	6
		⁶⁰ Co	9.0000 E-10	2.0000 E-4	2.8787 E-3	50
		¹³⁷ Cs-- ^{137m} Ba	2.8000 E-9	8.2000 E-3	3.4634 E-2	64
		¹⁵² Eu	2.5000 E-5	2.5000 E-5	5.0000 E-5	2

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
9A (cont)		¹⁵⁴ Eu	4.5000 E-5	4.5000 E-5	9.0000 E-5	2
		¹⁵⁵ Eu	1.1000 E-4	1.1000 E-4	2.2000 E-4	2
		³ H	8.5900 E-10	4.8400 E-5	2.2858 E-4	43
		¹²⁹ I	6.5900 E-13	1.3700 E-7	3.2642 E-7	17
		⁴⁰ K	1.8000 E-5	1.8000 E-5	1.8000 E-5	1
		⁵⁴ Mn	9.8450 E-7	5.4600 E-6	1.9422 E-5	6
		²² Na	2.9900 E-8	1.6010 E-7	6.0950 E-7	5
		⁹⁴ Nb	1.5100 E-15	2.9300 E-15	1.1740 E-14	6
		⁶⁰ Ni	1.4650 E-6	7.3080 E-6	3.4895 E-5	6
		¹⁴⁷ Pm	1.6600 E-9	1.9200 E-2	8.0861 E-2	43
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	2.1000 E-9	9.9000 E-3	4.0902 E-2	33
		³⁵ S	3.9650 E-6	3.9650 E-6	3.9650 E-6	1
		⁷⁵ Se	1.4100 E-3	1.4100 E-3	1.4100 E-3	1
		⁷⁹ Se	1.1700 E-11	1.9300 E-11	6.7400 E-11	5
		¹⁵¹ Sm	5.0000 E-4	4.7000 E-3	2.3600 E-2	26
		⁹⁰ Sr-- ⁹⁰ Y	5.3000 E-9	7.1000 E-3	3.0767 E-2	49
		⁹⁹ Tc	8.4900 E-12	6.4300 E-2	6.4300 E-2	21
		Total beta/gamma	1.6950 E-8	1.5630 E-1	3.9950 E+0	212
		^{131m} Xe	2.6000 E-5	2.6000 E-5	2.6000 E-5	1
		⁶⁵ Zn	1.2440 E-7	3.5490 E-7	1.4145 E-6	6
	grams	²⁴¹ Am	2.4000 E-11	2.0100 E-5	2.5688 E-4	40
		²⁴² Cm	1.8700 E-16	3.6400 E-16	1.4580 E-15	6
		Pu	1.0000 E-6	1.0000 E-6	1.0000 E-6	1
		²³⁸ Pu	1.9900 E-14	4.2000 E-8	1.6408 E-7	24
		²³⁹ Pu	1.7700 E-10	1.3400 E-4	5.6170 E-4	24
		²⁴⁰ Pu	6.6300 E-7	8.1900 E-6	3.3976 E-5	13
		²⁴¹ Pu	4.4700 E-9	6.6500 E-7	3.5639 E-6	21
		²⁴² Pu	2.2800 E-9	2.8100 E-8	1.1652 E-7	13
		Uranium-depleted	1.7380 E-8	3.8195 E+4	6.4826 E+4	32
		Uranium-enriched	1.0700 E-6	6.3960 E+2	2.2814 E+4	86

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
9B	Curies	¹⁴ C	1.0700 E-14	9.2700 E-12	1.8687 E-11	11
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	7.5000 E-5	3.9400 E-2	8.3570 E-2	13
		⁶⁰ Co	9.0000 E-10	4.3000 E-2	1.6990 E-1	46
		¹³⁴ Cs	1.2500 E-5	1.2500 E-5	1.2500 E-5	1
		¹³⁵ Cs	1.0000 E-4	1.0000 E-4	1.0000 E-4	1
		¹³⁷ Cs-- ^{137m} Ba	2.8000 E-9	1.6000 E-2	9.4479 E-2	128
		⁵⁵ Fe	2.5200 E-5	2.5200 E-5	2.5200 E-5	1
		³ H	8.2900 E-9	4.3700 E-4	2.0572 E-3	74
		¹²⁹ I	5.1000 E-9	1.0000 E-4	1.2204 E-4	45
		⁵⁴ Mn	1.0100 E-5	1.0100 E-5	1.0100 E-5	1
		⁶⁰ Ni	9.0000 E-10	2.4100 E-5	5.0983 E-5	7
		¹⁰⁷ Pd	1.0000 E-4	1.0000 E-4	1.0000 E-4	1
		¹⁴⁷ Pm	4.0700 E-7	1.8500 E-2	4.4806 E-2	73
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	3.0000 E-5	2.1500 E-2	1.0967 E-1	47
		¹⁵¹ Sm	1.0000 E-4	4.5000 E-3	9.4000 E-3	11
		⁹⁰ Sr-- ⁹⁰ Y	1.1250 E-9	6.8000 E-3	4.5232 E-2	126
		¹⁸² Ta	1.0000 E-5	1.0000 E-5	1.0000 E-5	1
		⁹⁹ Tc	3.9400 E-9	1.4700 E-4	4.2868 E-4	65
		Total beta/gamma	8.8180 E-9	1.5040 E-1	9.4304 E-1	191
		⁹⁰ Zr	1.0000 E-4	1.0000 E-4	1.0000 E-4	1
	grams	²⁴¹ Am	1.2500 E-16	1.2200 E-3	1.2648 E-3	68
		Pu	1.0000 E-6	5.1300 E-2	9.1138 E-2	12
		²³⁸ Pu	3.4300 E-17	5.7500 E-8	2.4306 E-7	63
		²³⁹ Pu	1.1000 E-13	1.3000 E-4	8.3679 E-4	68
		²⁴⁰ Pu	6.6900 E-15	2.8100 E-7	2.8100 E-7	2
		²⁴¹ Pu	5.5000 E-16	2.3400 E-8	2.3400 E-8	2
		²⁴² Pu	2.2900 E-17	9.6400 E-10	9.6400 E-10	2
		Uranium-depleted	1.6000 E-14	2.4000 E+2	4.8146 E+2	70
		Uranium-enriched	5.0000 E-1	1.0530 E+4	1.0532 E+4	4
		Uranium-natural	2.7735 E+3	9.4300 E+4	1.8583 E+5	34

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
9C	Curies	²²⁸ Ac	4.0000 E-4	4.0000 E-4	1.2000 E-3	3
		²¹² Bi	5.0000 E-4	5.0000 E-4	1.5000 E-3	3
		¹⁴ C	7.4500 E-17	5.3000 E-10	7.7041 E-10	7
		¹⁴⁴ Ce-- ¹⁴⁴ Pr	1.2700 E-7	1.7000 E-3	1.7006 E-3	3
		⁶⁰ Co	1.0000 E-13	9.0000 E-3	6.0092 E-2	55
		¹³⁴ Cs	2.5500 E-6	2.5500 E-6	2.5500 E-6	1
		¹³⁵ Cs	1.8300 E-13	4.7900 E-13	6.6200 E-13	2
		¹³⁷ Cs-- ^{137m} Ba	1.5000 E-10	5.0000 E-3	6.1790 E-3	41
		¹⁵² Eu	4.5000 E-11	2.5000 E-5	7.8707 E-5	7
		¹⁵⁴ Eu	9.0000 E-11	4.5000 E-5	1.3871 E-4	8
		¹⁵⁵ Eu	2.1000 E-10	1.1000 E-4	5.1003 E-4	9
		⁵⁵ Fe	4.3300 E-1	4.3300 E-1	4.3300 E-1	1
		⁵⁹ Fe	2.0000 E-6	4.4800 E-4	7.6400 E-4	6
		³ H	4.4800 E-11	4.1400 E-4	4.1788 E-4	11
		¹²⁹ I	1.7600 E-14	2.5200 E-8	2.5894 E-8	8
		⁸⁵ Kr	1.2000 E-6	2.7000 E-6	3.9000 E-6	2
		⁵⁴ Mn	3.0000 E-6	9.0000 E-3	4.2144 E-2	12
		⁹⁴ Nb	4.8000 E-16	1.7000 E-14	2.7110 E-14	4
		⁵⁹ Ni	2.8000 E-8	6.1000 E-8	8.9000 E-8	2
		⁶⁰ Ni	1.0000 E-13	9.0000 E-10	1.1880 E-8	16
		⁶³ Ni	1.5000 E-6	2.3400 E-4	2.3870 E-4	3
		²¹² Pb	3.0000 E-4	3.0000 E-4	9.0000 E-4	3
		¹⁰⁷ Pd	3.7000 E-14	9.6600 E-14	1.3360 E-13	2
		¹⁴⁷ Pm	1.0100 E-7	8.0000 E-4	8.0733 E-4	5
		¹⁰⁶ Ru-- ¹⁰⁶ Rh	5.6100 E-8	4.0000 E-4	4.0025 E-4	3
		⁷⁹ Se	1.0800 E-11	3.2000 E-10	4.8080 E-10	3
		¹⁵¹ Sm	9.9900 E-10	4.0000 E-4	4.0000 E-4	3
		⁹⁰ Sr-- ⁹⁰ Y	4.4000 E-10	8.6000 E-3	9.9246 E-3	42
		⁹⁹ Tc	9.2200 E-12	1.9500 E-8	3.8006 E-8	9
		²⁰⁸ Tl	1.0000 E-4	1.0000 E-4	3.0000 E-4	3

WHC-SD-W100-RD-001
Revision 1

Stream	Unit	Radionuclide	Minimum value	Maximum value	Total value	Count*
9C (cont)	grams	Total beta/gamma	4.5000 E-11	4.3420 E-1	5.8437 E-1	91
		⁹³ Zr	1.2800 E-12	3.3500 E-12	4.6300 E-12	2
		²⁴¹ Am	2.9200 E-11	5.4800 E-8	6.1474 E-8	5
		²⁴² Cm	2.2000 E-19	2.0300 E-16	2.6380 E-16	4
		²⁴³ Cm	5.0300 E-10	5.0300 E-10	5.0300 E-10	1
		Pu	5.4026 E-7	3.9500 E-4	3.9654 E-4	3
		²³⁸ Pu	1.2100 E-12	2.5000 E-8	3.7297 E-8	5
		²³⁹ Pu	1.0800 E-8	4.0100 E-6	4.6459 E-6	5
		²⁴⁰ Pu	3.5500 E-9	2.4400 E-7	2.4755 E-7	2
		²⁴¹ Pu	2.0000 E-12	4.0000 E-7	1.7704 E-6	11
		²⁴² Pu	8.3700 E-10	2.5500 E-7	2.5584 E-7	2
		²²⁴ Ra	3.0000 E-4	3.0000 E-4	9.0000 E-4	3
		²³² Th	5.2350 E+3	5.2350 E+3	1.5705 E+4	3
		²³⁴ Th	6.5200 E-16	1.7000 E-15	2.3520 E-15	2
		²³² U	4.6700 E-12	4.6700 E-12	4.6700 E-12	1
		²³³ U	7.0000 E-3	7.0000 E-3	2.1000 E-2	3
		Uranium-depleted	1.2422 E-5	4.4541 E+1	4.8567 E+1	10
		Uranium-enriched	1.0000 E-1	1.0000 E-1	2.0000 E-1	2

*Number of containers with specific hazardous constituent.